MK7227 Postgraduate Dissertation

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[The Impact of Macroeconomic variables on economic growth: A Panel Data Analysis of selected Developing Sub-Saharan African countries]

A dissertation submitted in partial fulfillment of the requirements of the Royal Docks Business School, University of East London for the degree of **[MSc. Finance and Risk]**

[September, 2015]

[12,275]

I declare that no material contained in the thesis has been used in any other submission for an academic award

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ACKNWOLEDGEMENT

I am grateful to God Almighty for his continuous sustenance, strength and guidance through the period of this research work.

I dedicate this work to my beloved family back home in my beloved country Nigeria and I hope this work contributes to my hope, passion and the realization of my vision for Nigeria and Africa's sustainable development.

I am very thankful for my supervisor, Dr. Stefan Lutz for his guidance and encouragement throughout the period of this study and finally, I am appreciative of all my friends who have made my study period at the University of East London.

ABSTRACT

The emphasis of the study examines the impact of macroeconomic variables i.e. inflation, interest rate, unemployment, export and foreign direct investment on gross domestic product of selected Sub-Saharan African countries over a 20 year period (1993-2013) with the objective of identifying how these variables interact with the GDP, For the purpose of this study annual data is collected from 1993-2013 for some selected Sub-Saharan African countries and analyzed using panel data. It is expected that by estimating the model of the sample countries, economic growth has a positive relationship with foreign direct investment (FDI) and export, while interest rate, unemployment rate and inflation in the same sample period has a negative relationship with economic growth. Adopting the random effect model from the results of the Hausman test at 5% confidence level, results found that inflation rate measured by consumer price index and unemployment have had a negative effect on economic growth in the SSA region between the period 1993-2013, foreign direct investment, interest rate and export rate have had a positive significant effect on economic growth.

Key words: Economic growth, macroeconomics, pooled OLS, fixed effects, random model.

CHAPTER 1: INTRODUCTION

1.1. INTRODUCTION:

There has been a shift of economic power from developed markets due to saturation to emerging markets, reports from PWC, (2015) estimates that the emerging markets' purchasing power will outgrow that of the G7. Sullivan, (2012) reported that investors increased willingness to invest in emerging markets. As this shift to emerging markets persists, a focus has been created on Sub-Sahara Africa region which is the second fastest growing region behind Asian Pacific region in terms of Real GDP (Euromonitor, 2013). The SSA region has a lot of interest due to abundance of natural resources, a rising cost of living and rising FDI from other developing nations especially China with its $653 billion sovereign- wealth fund looking to invest in emerging markets with special attention paid to South Africa, Kenya, Tanzania, Djibouti with has a port access to the second most populous African country; Ethiopia (Clark, 2015).

According to Euromonitor, (2013), The SSA region has a demographic advantage which is the key to long term growth, other than the growing middle class population, the region is expected to grow by 17% by 2030 making it the fastest growing and labor population as opposed to the global ageing population with urbanization rate expected to increase at 28% by 2030. The region has the youngest population in the world with at least 70% under the age of 30 as population is expected to reach 1billion by 2030 generally interpreting a larger consumer market. However, there are disadvantages to investing in the region following insecurity, corruption, income inequality but most especially if the government fails to create adequate jobs to meet with the growing population, there will be a social unrest since similar researchers (Muhammad and Muhammad, 2013) have found that unemployment rate has a negative correlation with the GDP. Therefore, in this study, it is important to

understand how these macroeconomic variables have interacted with each other historically to present day economic climate in SSA.

The GDP is a controversial economic measuring tool which has been widely researched using various macroeconomic variables for various countries and time series combination, yet literature on these variables are sparsely available and fragmented. Gross domestic product simply measures the level of economic output of within the borders of a country, where an increase in a country's GDP strongly correlates with an increase in the country's standard of living. GDP also acts as a sign of overall health of the economy closely monitored through various independent variables such as inflation (CPI, PPI and RPI), interest rate, unemployment, government spending, national income, exchange rate, foreign direct investment which need to be controlled by a country's government in order to achieve optimum stability. For example, the government needs to curtail higher unemployment level which will slow down GDP growth because a weaker labor force spells an unproductive economy. The key literature (Ullah and Rauf, 2013) analyzed the impacts of foreign direct investment, savings rate and exports for some selected Asian countries using panel data fixed and random effects and found that FDI and savings positively affects economic growth while exports have an inverse relationship with economic growth.

Despite the relatively weaker global economic conditions, Sub-Saharan Africa (SSA) has continued to witness strong economic growth especially in 2011 when regional output aggrandized by a faster pace of 5% compared to the (2004-2008) pre-crisis period when the region's output averaged 6.5%. in recent developments, World bank, (2015) reported that growth accelerated moderately in Sub-Saharan Africa in 2014 despite various risks such as the Ebola outbreak, large budget deficits due to increased spending in Ghana and Zambia, Boko Haram insurgency in northern Nigeria, conflicts in South Sudan and Central African Republic and decline in oil prices which adversely affected Sub-Saharan oil producing countries (Nigeria, Ghana and Angola). Falling oil

prices led to the weakening of the Nigerian Naira against the U.S dollar in early November which led to the central bank tightening the monetary policy and devaluing the naira and the same was said for other oil exporting countries currency i.e. Ghana and Angola. Ghana and South Africa Central Banks equally tightened their monetary policy because inflation rose above the upper limit of the target range for 2014, which is contrary to the single digit average inflation rate that Ghana has been targeting. World Bank (2015) reported that in mid-2011, the Bank of Ghana in a bid to regulate the inflation rate reduced the interest rate from 13.5% to 13% which was expected to trigger a cheaper borrowing rate for commercial banks suggesting that the monetary policy is a strong tool for regulating inflation. Studies by Agalega and Antwi (2013) on the impacts of similar macroeconomic variables on Ghana's output suggested that a high rate of inflation beyond 14% will adversely affect the GDP.

This research investigates the impacts of Macroeconomic variables on the gross domestic product of developing Sub-Saharan Africa using Panel data analysis to evaluate cross sectional and time series data. For the purpose of this research, the dependent variable GDP is denoted by the GDP growth rate and the independent variables are interest rate, inflation (CPI, % of GDP), FDI net inflows (% of GDP), exports (% of GDP) and unemployment rate (% of total labor force).

1.2. STATEMENT OF PROBLEM:

Gross domestic output level of a country is influenced by all microeconomic and macroeconomic variables which are all generally interlinked to measure a country's economic health; this research will analyze the variables that have been identified by previous literature to have had a significant impact on the GDP across 10 SSA countries. There exists a cumbersome and still growing yet fragmented body of literature which has tried to investigate the effect of inflation, interest rate, export, FDI and unemployment rate on GDP. An empirical study of Pakistan's economic output Jilani, Cheema and Asim, (2010) concluded that inflation has a significant

negative relationship with GDP, the extreme values of inflation either low or high adversely affected Pakistan's economic growth, however, this study did not conform to results from similar study Smyth (1992) cited in Jilani, Cheema and Asim, (2010) which found that inflation has insignificant relationship with GDP.

Several studies have also found a significant relationship between GDP and other macroeconomic variables, (Muhammad and Muhammad, 2013) found negative correlation between unemployment rate and the Malaysian GDP, similarly, recent studies (Mehmood, 2012), however adopting a comparative approach on the effects of different factors on GDP in Pakistan and Bangladesh found conflicting effects for the same macroeconomic variables on both countries. This study found that gross national expenditures, goods exports, gross savings and financial consumption expenditure have a positive impact on Pakistan's GDP however in the case of Bangladesh, this study found that gross national expenditures, external debts stock total, goods imports and exports have a positive effect on the Bangladesh GDP, however final consumption expenditure had a negative impact on Bangladesh GDP suggesting that as consumption increases, GDP decreases and vice versa.

The emphasis of this study is to attempt to empirically investigate the macroeconomic factors that have significant impacts on selected individual oil exporting, middle income and low income/ fragile Sub-Sahara African economies and their growth as classified by World Bank over a 20 year period (1993-2013) whilst analyzing the nature and extent of these impacts. Due to the uncertainty affecting the individual performance of macroeconomic variables (epidemic and insurgency) in some selected countries, this will justify the need to empirically study how these surges in macroeconomic variables affect the GDP in these countries.

1.3. RESEARCH OBJECTIVES:

The emphasis of this study will attempt to attain the following objectives:

1. To investigate the impact of Inflation, Interest rate, Unemployment rate and foreign direct investment on economic growth of selected SSA member countries.
2. To identify with reasons why some countries outperform others economically.

1.4. RESEARCH QUESTIONS:

This research will attempt to answer questions like:

1. Do the selected independent macroeconomic variables have significant impact on GDP?
2. If so, how do these macroeconomic variables in (1) affect GDP?
3. What are the reasons for the differences in economic performance of selected countries?

1.5. SCOPE OF STUDY:

This research paper focuses on the study of economic growth in Sub-Saharan African countries within the last 20 years (1993-2013), however this study is restricted to World Bank classification of Sub-Saharan African countries into four economic categories i.e. Oil exporting countries – Cameroon, Nigeria, Chad, Angola, middle income class –Botswana, Cape Verde, South Africa, fragile countries and non-fragile low income countries. This study will be focusing on the first two categories mentioned above because economic group in the latter categories can be heavily influenced by non-economic events such as outbreak of a civil conflict or recovery i.e. Togo, Liberia, Sao Tome and Principe, although for the non-fragile low income countries, economic developments can be explained by more conventional economic factors i.e. Benin, The Gambia, Kenya, Sierra Leone, Uganda will be included in this research however restricted to countries whose complete data can be found on renowned databases such as World Bank, country's statistic bureau and Data stream.

1.6. RESEARCH HYPOTHESIS:

A multiple regression will be conducted in addition to the common effect model; however the multiple regression will be conducted individually based on the research model:

$$GDP_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2 IF_{it} + \beta_3 INT_{it} + \beta_4 UMP_{it} + \beta_5 EXP_{it}$$

The following null hypothesis has been proposed for this study:

i. FDI has a significant negative relationship with economic growth.
ii. Unemployment rate has a significant negative relationship with economic growth.
iii. Interest rate has a significant negative relationship with economic growth.
iv. Inflation rate has a significant negative relationship with economic growth.
v. Export has a significant negative relationship with economic growth.

1.7. SIGNIFICANCE OF STUDY:

This study examines the economic growth of Sub-Saharan African countries and how it interacts with various macroeconomic variables; its findings shall be relevant to various governmental bodies within and outside the region and also to investors who will have a better understanding of how macroeconomic variables in the sample countries interact with their decision making tactics. The results will also be significant to various institutions and entities in analyzing the trend surrounding the development of the Sub-Sahara Africa region within the last 20 years.

1.8. STUDY STRUCTURE:

The chapter one –Introduction gives a general introductory view into the topic and how it has evolved into what it is today. This chapter reviews the research objective and questions, significance of study.

Chapter two – this chapter critically evaluates existing literature and previous findings, discussing existing theories and formulating a theoretical framework for this study.

Chapter three discusses the research methodology applied in this study which is panel data and OLS, explaining the common model, fixed and random model. It also discusses the independent and dependent variables, data sources and sampling method and the test result properties used in analysis.
Chapter four will analyze the results of the data carried out using collected data to arrive at conclusions that will test the research objectives and answer the research questions.
Chapter five concludes the study and summarizes the findings of the research.
Chapter six presents several recommendations made to concerned selected countries based on the results and findings from the research study.

CHAPTER 2: LITERATURE REVIEW

2.1. INTRODUCTION:

There exists an extensive body of empirical and theoretical literature up till date that has been researched and attempt to establish various relationships between economic growth and macroeconomic variables and these theoretical findings are mostly in e-books and textbooks and the empirical findings found in academic journals, articles and publications.

This chapter will critically analyze the previous literatures which contain information and ideas surrounding the nature of the main idea of this research topic on economic growth. The review of literature will start with previous literature on the SSA looking at different SSA countries and their own unique macroeconomic conditions comparing results for general similarities, next will be the review on previous literatures on the dependent macroeconomic variable of the study; GDP and finally, this chapter will be rounded off with the review of previous literature on other developing countries.

2.2. PRIOR STUDIES ON MACROECONOMICS VARIABLES IN SUB-SAHARA AFRICA (SSA):

Sub-Saharan Africa has received reasonable amount of attention in previous literature focusing on how various macroeconomic variables interact

with each other and fuel growth in the region. The region accounts for 57% of low-income developing countries (LIDCs) population, (IMF, 2014). Fischer, (1991) identified that the 1980s were referred to as "the lost decade" for most developing countries in the Latin American and African continent because it was a decade of negative output. He also identified that developing countries in the 1980s implemented economic policy that focused on structural adjustment in order to restore domestic and external stability. According to (OSAA, 2009), Sub-Saharan Africa economy is highly dependent on agriculture making up for 12.7% of GDP, however the service and manufacturing sector in Africa contributes a smaller impact than the Agricultural sector.

Reports by World Bank, (2015) found that Investments in public infrastructure, increased agricultural production and service sector are key drivers of economic growth, it was also reported that economic growth accelerated moderately in the SSA region in 2015 by 4.5% compared to 4.3% in 2013. The region has suffered setbacks in a few of its member countries as well as significant economic growth in others. World Bank, (2015) reported slow growth in South Africa marked by the mining sector strikes, low investor confidence and electricity shortage, Angola suffered a decline in oil production amidst the declining global oil price crisis causing the oil exporting Angola a substantial blow to its income. Guinea, Sierra Leone and Liberia suffered a blow to its health sector and population with the outbreak of the Ebola virus which severely disrupted economic activities. On the other hand, Nigeria; the largest economy in the region grew at a robust pace supported by its booming non-oil sector, grow was also witnessed in Ivory Coast, Tanzania and Mozambique.

This research here is closer in spirit to (Agalega and Antwi, 2013) investigated the changes in GDP caused by changes in interest rate and inflation in Ghana from 1980-2010 established that a positive relationship existed between inflation and GDP while interest rate has negative relationship, however an empirical study on growth effects of macroeconomic stability factors in Nigeria (Kolawole, 2013) using time series data from 1980-

2011 using econometric techniques; Augmented Dickey Fuller (ADF) test, Granger causality test revealed that real interest rate significantly affects growth positively, but real exchange rate and external debt affects growth negatively. Results from multiple linear regressions indicates a fairly strong positive correlation between GDP, interest rate and inflation, however, it was argued that interest rate and inflation were only responsible for GDP movement by only 44% within the 31 year period, (Agalega and Antwi, 2013).

A similar research on Ghana's real GDP (Antwi, Mills and Zhao, 2013) however adopting Johansen approach to co-integration, it was concluded that after data from 1980-2010 were first analyzed using ADF test; results found that co-integration relationship between inflation adjusted GDP and its macroeconomic factors. Similar research by (Havi et al., 2013) on macroeconomic determinants on economic growth in Ghana approach applying the same Johansen method of co-integration from 1970-2011, with data set difference of a decade prior to (Antwi, Mills and Zhao, 2013) data set, results concluded that tangible capital and foreign aid had a positive correlation on real GDP per capita growth, however, in the long run; labor force, FDI, CPI, public expenditure and military rule are significant determinants of the growth of real gross. Reports from Okudzeto et al (2015) on Ghana's economic outlook confirms that despite Ghana's slight positive economic performance in 2014, the economy, the economy still suffered sharp currency depreciation, energy crisis, alongside rising inflation and interest rates confirming a negative relationship between inflation, interest rate and growth.

Arewa and Nwakahma, (2013) attempted to investigate the relationship between GDP, consumer price index (CPI) and unemployment and Public expenditure in the long run (1989-2011); Evidence from Nigeria using similar research methodology as (Antwi, Mills and Zhao, 2013); Johansen multivariate co-integration, results indicated that long run relationship existed between public expenditure and the specified variables. Arewa and Nwakahma, (2013) concluded that long run public expenditure; capital expenditure improves long

term economic elation as well as recurrent expenditure is necessary for economic growth.

Study by Kira, (2013) analyzed the factors determining GDP in developing country; Tanzania. Keynes model was adopted in analyzing Tanzanian GDP data set from 1970-2009, results shows a dormant growth in GDP with no significant changes. Kira, (2013) argued that the GDP of developing countries are "confused and unbalanced" citing that in the case of Tanzania, GDP is influenced by consumption and exports alongside problems such as increase in oil prices, power shortages and political instability and it was recommended that the investment sector should be encouraged for its impact on the GDP. In light of the African post-crisis GDP, results from UNCTAD, (2010); Brixiova and Ndikumana, (2011) suggested that it was necessary to adopt an appropriate fiscal policy targeting lower inflation as well as improve infrastructure anchored in the medium term expenditure suggesting that inflation had a negative impact on GDP while public expenditure have a positive impact on GDP. UNCTAD, (2010) suggested that African countries should build a robust regional markets, encourage local business and entrepreneurs in order to build resilience to shocks.

Mbulawa, (2015), while testing the same effect of macroeconomic variables on economic growth in Botswana using annual data from 1975-2012; his findings suggested that FDI and inflation had a positive impact on GDP explaining that the key determinants of economic growth was its historical performance and FDI citing that FDI can be increased by giving tax concessions to investors and removal of protectionist policies.

Moshi and Kilindo, (1999) studied the role of private sector investment in general economic growth in Tanzania using macroeconomic factors such as government expenditure on investment, GDP growth, capital inflows and exchange rate to build a model representing private investment. Results concluded that infrastructural public investment encourages a positive and significant effect on private investment suggesting that such policies adopted by the Tanzanian government since 1986 has encouraged private investment.

Results from another research Khamfula, (2004) assessed the macroeconomic policies implemented by the South African government during the post-apartheid era in order to battle poverty found that real income growth positively affects gross domestic savings, total mining products and changes in the money stock, on the negative side, the real income is negatively correlated to imports, total government expenditure, tax. Due to the measure of FDI in South Africa from the USA, real income was affected by USA interest rate and changes in USA CPI. Khamfula, (2004) concluded that the South African economic growth depends on the domestic nominal interest rate, corporate income tax, money stock, imports and domestic savings. Findings from Harmse, (2006) suggested a strong correlation between capital inflow and increased exports and the depreciation of the South African Rand between 1995 and 1997 even though there were strong signs of economic growth. It was also pointed out that a rise in labor productivity since 1994 indicates that the manufacturing firms in South Africa were ready to compete in global markets in the post-apartheid period supported generally by South Africa's industrializing fore-front.

2.3. PREVIOUS LITERATURE ON GROSS DOMESTIC PRODUCT:

All countries whether underdeveloped, developing or industrialized have to monitor of its general economic well-being which arises from various economic policies and decision making instituted by the government over the years. The GDP is known as the primary indicator of economic activity as described by the United Nations System of National Accounts 1993 and the European System of Accounts 1995 (Lee, 2012). GDP is a critical tool used to estimate the total value of all goods and services produced within an economy each year by economists and governments whom rely heavily on the output figures to implement policies and determine the extent to which public expenditure should be made.

A historical re-assessment of GDP estimation methods by Lancieri, (2015) found four approaches to dollar GDP estimation, the first two

quantitative methods published in a study carried out by the Economic Commission for Europe (ECE) in 1980 which is based on a small number of 30 physical indicators and basically suffered a lot of criticism as most indicators were referred to as "out-dated". The third approach; "Production approach" was first utilized by Angus Maddison in 1970 which had more realistic estimates given a higher number of indicators for five sectors of the economy and finally the fourth approach; Purchasing Power Parities (PPP), however Lancieri, (1990) cited in Lancieri, (2015) pointed out major loop holes in the PPP methodology such as it does not take into account capital and interest flows. Results from Lancieri, (2015) were strongly supported by results from (European PPP Expertise Centre, 2010). A research by Kasper, (2014) examined the link between Marxian determinants of surplus value and gross output confirms the traditional Marxian economics; Karl Marx's labor theory of value which has an underlying assumption that the value of a commodity can be measured by the average number of labor hours fuelled into production.

Various researchers Jones (2014), Economist, (2014) have reflected on the topic concerning the history and complex approach to measuring GDP in various countries dating back to 1934. The article highlighted three "theoretically equivalent" GDP estimation approaches i.e.

- Expenditure approach (GDP-E)=household final consumption expenditure+ final expenditure of non-profit institutions serving households + general government final consumption expenditure+ gross capital formation+ exports- imports).
- Income approach (GDP-I)= compensation of employees+ gross operating surplus+ mixed income + taxes on production – subsidies on production.
- And finally (GDP-P) = output- intermediate consumption + taxes on products – subsidies on products. (Lee, 2012; Jones, 2014).

Country statistics from Estonia confirms a correlation between Estonian macroeconomic variables and GDP. According to reports (Estonia, 2009), the GDP decreased in the 4th quarter of 2008 by 9.4% which during the same period recorded an increase in value added industrial sector which was caused

by a relatively small domestic demand as well as exports. Unemployment rate substantially increased in the 4th quarter to 7.6% which shows a negative correlation between unemployment and GDP. In the same quarter, the Estonian consumers witnessed an increase of 10.4% to its CPI, which indicates a negative correlation between inflation and GDP.

2.4. PRIOR STUDIES ON MACROECONOMICS VARIABLES IN OTHER DEVELOPING COUNTRIES:

In light of developing countries, various developing countries outside the SSA region or African continent have received great attention from previous studies. Looking outside the Sub-Sahara African region, Muhammad and Muhammad, (2013) found similar results to (Agalega and Antwi, 2013; Kolawole, 2013) for macroeconomic variables governing GDP movement in Malaysia citing that for a 30 year period 1980-2010 based on signs of coefficient, unemployment rate in Malaysia has a negative correlation with Malaysian GDP while interest rate and government spending have a positive correlation with GDP. Based on this analysis, it was further recommended that the Malaysian Government should tighten its monetary policy in order to bring down inflation as the interest rate has a negative correlation with the GDP. In order to "drive their point home" (Muhammad and Muhammad, 2013) compared results from studies on Malaysian macroeconomic variables to Pakistan which revealed country-specific factors responsible for the differences in comparison and recommended that Pakistan's high real exchange rate should be maintained as results found that exchange rate has a positive impact on GDP while interest rate ceiling should be removed in order to stimulate the economy.

A historic assessment of economic growth in some developing South Asian countries such as Bangladesh since 1971, (Lalon and Jahan, 2015) shows a stunted growth in GDP at around 6% for the past decade. An assessment of Bangladesh's key macroeconomic factors revealed a large dependency on Agriculture as a source of national income with the population and labor force

being plagued by illiteracy and lack of skills which is responsible for a one-third of the nation's population living below the national poverty line. Supporting this poverty is the absence of proper infrastructure, high inflation and the debt burden on the government increasing rapidly resulting in a budget deficit. It was recommended that the Bangladesh government should continue to improve the quality of education and promote gender equality which suggests a negative impact on unemployment rate, inflation as well improved production and consumption in the long run.

There exists another relevant category of papers which focus on measures of investment both domestic and foreign on regional growth. Panel data research (Ullah and Rauf, 2013; Martinez et al., 2012) analyzed the impacts of foreign direct investment, savings rate and exports for some selected Asian countries and Eastern Europe respectively using panel data fixed and random effects. (Ullah and Rauf, 2013) found that FDI and savings positively affects economic growth while exports have an inverse relationship with economic growth. Results from (Martinez et al., 2012) supports findings from (Lalon and Jahan, 2015) that domestic investment is a key factor for the growth of 13 selected Eastern European countries as well as adequate macroeconomic stability in this region as indicated by low levels of inflations and government debt. Similarly, D'Costa, Garcilazo, and Martins, (2013) found that inflation and regional growth have a negative relationship and government debt has a positive relationship with the dependent variable GDP.

Another interesting literature on macroeconomic variables in Asian countries, (Sharma, Singh and Singh, 2011) attempted to study the impact of macroeconomic variables on GDP growth and also study the pattern of the Consumer Price Index, Wholesale Price Index, GDP, GNI and interest rate in India and Sri Lanka. Results from the Granger Causality test suggests that exchange rate does not Granger cause inflation and vice versa in the cases of India and Sri Lanka. It was concluded that results from Granger model and VAR model suggests that CPI, WPI and Exchange rate does not have any influence on each other however variance decomposition model indicates a visible

impact of macroeconomic variables on the each other in the cases of the two countries.

Another cumbersome yet interesting set of papers analyzed the impact of various macroeconomic variables on GDP growth in Pakistan, (Kibria et al, 2014; Sabir and Tahir, 2012; Jilani, Cheema and Asim, 2010). Kibria et al, (2014) found negative yet significant correlation between inflation and interest rate and dependent variable GDP growth, however results from regression analysis affirms that inflation, interest rate, exchange rate and FDI all have significant impact on the GDP growth.

Recommendations suggested by Kibria et al, (2014) seemed to contradict each other given that if the government of Pakistan were to tighten its monetary policy which involved increasing interest rates in order to curb inflation, it will contradict the other recommendation for the government to abolish the high rate of interest rate in order to attract FDI and ultimately improve the GDP growth, however, it could be argued that the high interest rate is favorable to high rate of return seeking foreign financial investors. Similarly, (Jilani, Cheema and Asim, 2010) found that related results in terms of inflation and interest rate having a negative relationship with GDP affirming results from (Kibra et al, 2014; D'Costa, Garcilazo, and Martins, 2013); however, it was recommended that it was favorable for developing countries like Pakistan to maintain a high value of real exchange rate due to its significant but positive effect on GDP.

Studies by Sabir and Tahir, (2012) adopted a different approach by using poverty instead as the dependent variable and study the impacts of macroeconomic variables in Pakistan. Results conclude that livestock, minor crops, major crops and GDP growth rate per capita have negative impact on poverty while inflation and population growth rate have a positive impact on poverty, suggesting that over a wide spread of years, poverty reduction in Pakistan is strongly tied to changes in the macroeconomic variables. Similar studies on Pakistan (Arshad and Sukkur, 2014) suggest that unemployment, inflation and economic growth prominently contribute to each other compared

to other macroeconomic variables. It was found that inflation rate contributes to unemployment variance as much as compared to economic growth, unemployment contributes to economic growth as compared to inflation and unemployment contributes to inflation as compared to economic growth, however unemployment contributes more in both inflation and economic growth rate.

An interesting piece of literature (Acemoglu .D., et al 2002) attempted to shift attention from Macroeconomic variables as the primary cause of economic volatility to causal effect of institutions on economic outcomes. A study of former European colonist economies revealed that the presence of weak institutions caused volatility through various microeconomic and macroeconomic channels generally suggesting that inflation, interest rate amongst other economic variables are only secondary causal channels. Results from (Acemoglu .D., et al 2002) do not in any way contradict results from other literatures (Antwi, Mills and Zhao, 2013; Kira, 2013; Arewa and Nwakahma, (2013); Havi et al., (2013) with results generally suggesting a correlation with economic growth.

Previous study by (Ristanovic, 2010) on the CEEC-5 countries affirms results from (Khamfula, 2012) that countries that depend on foreign capital and demand are more prone to be affected negatively by world economic and financial crisis. A dependence on foreign capital makes it difficult to isolate the economy or curb the spread due to exposure has already been established.

A similar research on Romania, (Dracea and Cristea, 2010) attempted to analyze the individual impacts of Public expenditure, Final consumption, foreign direct investments, Net exports, stock variations, Trade balance, external demand and capital evolutions on the GDP, results concluded that in Romania, the most important variable that contributes to the GDP is the final consumption as one percent increase of the final consumption determines a GDP growth of 0.714%, followed by the FDI and then public expenditure and external demand. It was found that capital variation generate no significant

impact on the GDP growth and finally trade balance and net exports generate a negative effect on the GDP growth contradicting findings by (Harmse, 2006).

In conclusion, given the extensive review of similar literatures, it is obvious that key macroeconomic variables have been selected in this research on the second fastest growing region in the world. Its findings shall be relevant to various governmental bodies within and outside the region and also to investors who will have a better understanding of how macroeconomic variables in the sample countries interact with their decision making tactics.

CHAPTER 3: RESEARCH METHODOLOGY

3.1. INTRODUCTION:

This study focuses on the impact of macroeconomic variables on economic growth of selected Sub-Sahara African countries; this chapter following the review of previous literature will provide a step by step guide to a detailed research design and methodologies that was employed in testing various hypothesis, data collection method, while also giving a general overview of the macroeconomic variables under analysis.

3.2. RESEARCH OBJECTIVES:

The emphasis of this study will attempt to realize the following objectives:

1. To investigate the impact of Inflation, Interest rate, Unemployment rate, exports and foreign direct investment on economic growth of selected SSA member countries.
2. To identify with reasons why which country is in a better position economically.

3.3. RESEARCH QUESTIONS:

This research will focus on the impact of macroeconomic variables on economic growth of selected Sub-Sahara African countries. Findings will be answering the following questions:

1. Do the selected independent macroeconomic variables have significant impact on GDP of the selected SSA countries?
2. If so, how do these macroeconomic variables in (1) affect GDP?
3. What are the reasons for the differences in economic performance of selected countries?

3.4. RESEARCH PARADIGM:

This research naturally appeals to a positivistic research paradigm due to the presence of cross sectional and time series data required to achieve and present the objective of the impact of macroeconomic variables on economic growth of SSA countries.

3.5. RESEARCH DESIGN:

This research's objective encompasses the identification of the effects of specific macroeconomic variables of selected SSA countries on the economic growth and also goes further to conduct a comparative analysis between these selected entities on the reasons surrounding the difference in economic performance; relevant secondary data will be obtained and critically analyzed over a 20 year period from 1993-2013. The absence of quarterly data which would have helped narrow down our data to specifically pin point a period of certain trends has cause a limitation to this research.

3.6. POPULATION AND SAMPLE SIZE:

The sample population consists of 48 Sub-Saharan African countries as listed on World Bank. Using renowned databases such as World Bank, country's statistic bureau, country's Central Bank and Data stream, Secondary time-series data will be collected for each selected sample country (entity); the sample size consists of five SSA countries however, the sample is restricted to:

1. World Bank classification of Sub-Saharan African countries into four economic categories i.e. Oil exporting countries – Cameroon, Nigeria, Chad, Angola, middle income class –Botswana, Cape Verde, South

Africa, fragile countries and non-fragile low income countries. This study will be focusing on the first two categories mentioned above because economic group in the latter categories can be heavily influenced by non-economic events such as outbreak of a civil conflict or recovery i.e. Togo, Liberia, Sao Tome and Principe.

2. Even though the non-fragile low income countries, economic developments can be explained by more conventional economic factors i.e. Benin, The Gambia, Kenya, Sierra Leone, Uganda will be included in this research however restricted to countries whose complete data can be found on renowned databases such as World Bank, country's statistic bureau and Data stream.

3.7. DATA COLLECTION:

Secondary time series data for the sample size was collected using renowned databases such as World Bank, country's statistic bureau, country's Central Bank and Data stream. Countries with incomplete data over the study period (1993-2013) were eliminated from the sample. Finally, the resulting data which contained both cross sectional and corresponding time series data was a balanced and long panel data of 10 SSA Countries' specified macroeconomic variables whose complete data was found on World bank database and Datastream, they include;

Nigeria, Burkina Faso, Kenya, Botswana, Madagascar, Malawi, Mauritius, South Africa, Swaziland, Zambia.

3.8. VARIABLES DESCRIPTION:

For this research study five macroeconomic variables has been selected to analyze the impacts of macroeconomic variable on economic growth in selected SSA countries. These variables are then divided into dependent (GDP) and independent variables (others). A brief description to rationalize each dependent variable is given below;

3.8.1. DEPENDENT VARIABLE:

3.8.1.1. ECONOMIC GROWTH:

Most existing literatures on economic growth have used the Gross Domestic Product as the chief Indicator of economic growth in any country; this measure has been applied in Ullah and Rauf, (2013), Jilani, Cheema and Asim (2010), Harmse, (2006), Dracea and Cristea, (2010), Khamfula, (2012), Acemoglu .D., et al (2002), Antwi, Mills and Zhao, (2013); Kira, (2013); Arewa and Nwakahma, (2013), Havi et al., (2013). In this study, the dependent variable GDP will be represented by GDP growth rate as an indicator of economic growth. This is consistent with similar studies; Harmse, (2006), Dracea and Cristea, (2010), Khamfula, (2012), Acemoglu .D., et al (2002), Antwi, Mills and Zhao, (2013) and Kira, (2013).

3.8.2. INDEPENDENT VARIABLE:

For the purpose of this study, four key macroeconomic variables have been selected in order to empirically analyze their effects on the dependent variable; the GDP growth rate. They include:

3.8.2.1. FOREIGN DIRECT INVESTMENT (FDI):

The FDI provides a vital source of funding and economic development for the African continent, (OECD, 2010). The SSA region has a lot of interest due to abundance of natural resources, a rising cost of living and rising FDI from other developing nations especially China with its $653 billion sovereign-wealth fund looking to invest in emerging markets,(Clark, 2015). These new developments funded by FDI further aid the production process, however the rate of flow of FDI is highly influenced by other factors such as government policies, the monetary policy in target country and investor's interest in target country.

3.8.2.2. INFLATION RATE:

The rate of inflation popularly measured by the Consumer Price Index (CPI) or PPI or RPI reduces the value of money in circulation in the economy, thereby causing a backdrop in economic activities where consumers result to spending their savings in order to make up for the increase in price and thus a decline in purchasing power.

3.8.2.3. INTEREST RATE:

The prime rate as set by each individual country's Central Bank is one of the major determinants of economic performance as it sets the pace for the financial and investment market. Governments may tighten or loosen its monetary policies in lieu of certain economic conditions which will have a "feed- through" effect through commercial banks to get to the consumers. If interest rate increases, consumers will opt to increase savings which place a downward pressure on consumption. It has been noted that interest rates have a positive correlation with inflation rate and for the purposes of this study, the interest rate chosen is the official bank lending rate collected from each country's Central bank.

3.8.2.4. UNEMPLOYMENT RATE:

Labor being one of the factors of production can highly affect gross output of a country. During an economic recession, unemployment rate is expected to rise due to the fall in demand of goods and services produced by firms which require less labor in order to stay competitive or under severe conditions, firms may go bankrupt and leave many workers redundant. Study by (Lalon and Jahan, 2015) recommended that the Bangladesh government should continue to improve the quality of education and promote gender equality which suggests a negative impact on unemployment rate, inflation as well improved production and consumption in the long run. This suggests that skilled labor improves the quality of production and reduces unemployment.

3.8.2.5. EXPORTS:

The role of export in economic growth often influences other macroeconomic variables; exports are often measured as a part of aggregate demand, a positive relationship between the two where an increase in exports will lead to an increase in aggregate demand further stimulating economic growth. Exports also have an influence on Employment especially in the manufacturing sector and play a large role in determining the state of the current account (balance of payment).

3.9. METHODOLOGY:

In order to estimate the data for this study, Panel data analysis (longitudinal data) is employed because of the presence of both cross sectional and time series data. Panel data analysis has been utilized in previous studies; Ullah and Rauf, (2013) to analyze the impacts of FDI, savings, tax and labor force on the economic performance of Asian countries with significant results obtained. Panel data makes it possible to get a handle on the time ordering of variables and to monitor the individual trends over time in additional complex and difficult data can be estimated using panel data, (Berrington, Smith and Sturgis, 2006). Data analysis and all tests will be conducted through Eviews 9 econometric software.

In order to analyze the effects of FDI, unemployment rate, inflation and interest rate on economic growth, the following model has been used

$$GDP_{it} = \square 0_{it} + \square 1FDI_{it} + \square 2IF_{it} + \square 3INT_{it} + \square 4UMP_{it} + \square 5EXP_{it} \quad \ldots\ldots\ldots\ldots 1$$

Where:

GDP= GDP (growth rate %)

FDI = foreign direct investment net inflow (% of GDP)

INF = inflation (consumer price index) as a % of GDP

INT= official bank lending rate

UMP= unemployment rate (% of total labor)

EXP = export of goods and services (% of GDP)

i= individual country

t= time series

This gives way to three types of panel data technique, i.e. Common effect model and individual specific effects which include the fixed effect model and random effect model.

3.9.1. PANEL DATA REGRESSION (OLS) RESEARCH HYPOTHESIS

A panel data OLS regression will be conducted i.e. common effect model; however the multiple regression will be conducted individually based on the research model:

$$GDP_{it} = \square 0_{it} + \square 1FDI_{it} + \square 2IF_{it} + \square 3INT_{it} + \square 4UMP_{it} + \square 5EXP_{it}$$

The following null hypothesis has been proposed for this study:

i. FDI has a significant negative effect with economic growth.
ii. Unemployment rate has a significant negative effect with economic growth.
iii. Interest rate has a significant negative effect with economic growth.
iv. Inflation rate has a significant negative effect with economic growth.
v. Exports have a significant negative effect with economic growth.

3.9.2. POOLED/ COMMON EFFECT MODEL:

The common effect or pooled model specifies constant coefficients across sectional and time series data which is more or less a simple OLS regression. A Breusch Pagan's Lagrange Multiplier test could be used to test for random effects in a linear model is based on pooled OLS residuals,

$$Y_{it} = \square + X_{it}\square + u_{it}$$

Where:

Y_{it}= dependent variable (regressand) of country i at the time t.

□= intercept term

X_{it} =independent variable (regressor) of country I at the time t.

□= coefficient for that independent variable.

U_{it}= the unobservable cross –section effects (between entity error term).

3.9.3. INDIVIDUAL SPECIFIC EFFECT:

This type of panel data model assumes that there exists an unobserved heterogeneity across individuals noted by □i, this brings into question whether the individual-specific effect □i correlates with the regressors (independent variables). Where there is a correlation between the individual specific effect □i and the regressors, that is a fixed model; where there is no correlation, it's a random effect model.

3.9.3.1. FIXED EFFECT MODEL (FE):

The FE model or least square dummy variable model makes the assumption that the intercept is not constant but it is entity (country) specific. It was designed to ascertain the causes of the changes in an entity. One of the advantages of the FE model is that it makes it possible to control all time-invariant differences between the countries, so that the estimated coefficients of the FE model will be free from bias due to the lack of time-invariant characteristics between the sample countries e.g. culture or education. For the purposes of this study, only individual-invariant regressors will be used e.g. economic trends.

The illustrated FE model:

$$Y_{it} = \square_i + X_{it}\square + u_{it}$$

Where: $\square_i$ =the unknown intercept for each country.

Other variables are constant as in CE model.

3.9.3.2. RANDOM EFFECT MODEL (RE):

RE model assumes that the intercept is not constant but it is country specific. It assumes that the differences across countries are stochastic and uncorrelated with the regressors in the model. Unlike the FE model, the random effect model can include time-invariant characteristics such as culture.

An illustration of RE model:

$$Y_{it} = \square + X_{it}\square + u_{it} + \epsilon_{it}$$

Where: ϵ_{it} = error term that changes within the cross-section but remains constant over time (within-entity error term)

Other variables are constant as in CE model.

3.9.4. CONSISTENCY AND EFFICIENCY: PANEL DATA ESTIMATORS

Based on the law of large numbers, consistency could have been improved by the availability of quarterly data for each entity which will increase the number of observation for more precise and accurate estimates, however annual data were only accessible for most variables and countries. Consistency was however enhanced through a balanced panel data set with complete cross sectional and time series data from 1993-2013 (20 years).

A Panel unit root test will be conducted as an alternative to Panel unit root test to ensure that the data collected is stationery before usage.

A Hausman test which tests if the u_{it} correlates with the independent variables (regressors) will be ran to decide between the fixed or random effects where the:

H_0: The suitable model is the random effects model.

H_1: The suitable model is the fixed effects model.

If probability of the Chi square test is greater than the *P* value =*0.05* or *5%*, the H_0 will be rejected and the fixed effects model estimator will be used to achieve consistent results, however if the *P* value is less than *5%,* the null hypothesis will be accepted and random effects estimator will be used in order to achieve consistent results.

R2 which estimates between 0 and 1 explains the better the goodness of fit.

3.10. LIMITATION OF STUDY

This research's methodology is limited by certain factors however this will not erode the significance and foundation of this study.

The key limitation is the absence of incomplete data for some SSA countries which has limited the amount of countries from the population size eligible for sample selection, 10 SSA countries out of 48 populations were eligible for sampling.

Furthermore, the absence of quarterly data for some regressors which would have helped narrow down our data to enhance and improve consistency and efficiency has cause a limitation to this research.

CHAPTER 4: DATA ANALYSIS

4. INTRODUCTION:

This chapter analyses the key results and objectives of this study. The collected data were analyzed using Eviews 9, stated hypothesis were tested, basically this chapter provides answers to the research questions and reviewing answers to relevant empirical studies. The chapter begins with a Panel unit root test where each variable are tested data stationary before being used.

4.1. PANEL UNIT ROOT TEST:

All variables were subjected to Panel unit root test to ensure that they have no unit root (hence, data is stationary) before usage. Each panel was test at level with the following hypothesis were formulated;

H_0 = (panel data) has unit root (variable is not stationary).

H_1 = (panel data) has no unit root (variable is stationary).

Results for each of the four models (Levin, Lin & Chut, Pesaran and Shin W-Stat, ADF –Fisher Chi square, PP –Fisher Chi square) which were met in order to satisfy the unit root test were interpreted using the following guideline;

- If the Prob is more than 5%, then we cannot reject the H_0 and accept H_0, (variable has unit root).
- But if the Prob less than 5%, we can reject the H_0 rather we accept H_1.

- Alternatively, if the *P* value < *5%* = reject H_0 and accept H_1 but if *P* value > *5%,* accept the H_0.
- In a case where each model presents conflicting results, we choose the hypothesis that majority of the results support.

4.1.1. INTREPRETATION:

Appendix 1 presents panel unit root test results for dependent variable GDP at level for all four models, results from all for models present p-values of 0%, which is less than 5%, we reject the H_0. All models result shows that GDP is stationary. Results from FDI, UNEMP and CPI presents similar results as GDP where the p-values are less than 5%, although for UNEMP majority of the models suggests that the variable is stationary, so we conclude that UNEMP is stationary.

All non-stationary data (EXP01, INTR) were converted to stationary data by converting it from level (original data) to of first difference (variable); D(EXP01), D(INTR) after conversion, the D(EXP01) has p value less than 5%, we accept h_1, similar results were found for D(INTR). All data used are all stationary.

4.2. DESCRIPTIVE STATISTICS:

Appendix 7 presents a summary of descriptive statistical results for the regressant and regressors, the descriptive statistics begins with the measure of central tendency; mean and median. The mean is the most reliable measure of central tendency for making inferences about a population from a sample, however the mean is subject to outliers, the median is a better measure of central tendency in cases of extreme outliers; appendix 7.1 (see appendix) presents individual country descriptive data, this appendix shows that Burkina Faso has a high GDP growth within the study period, its GDP averaged 6% annual growth rate and the maximum value of the growth is 11% during 1996 while the minimum growth rate was 1.3% in 1994. Zambia has the second largest GDP at 5.4% average annual growth rate, its maximum GDP value is 10.3% achieved in 2010 which shows a speedy recovery for the Zambian economy from 2008 global crisis while the minimum value of GDP -8.6% was

obtained in 1994. Botswana, Malawi and Mauritius came in third, fourth and fifth respectively.

In the export category, Swaziland exports more merchandize and services than other sample countries included in the study, its exports averaged 69.9% of the GDP, followed closely by Mauritius with 58% of its exports making up its GDP. Botswana, Malawi and Zambia follow suit respectively.

Nigeria attracted foreign investors than other samples with average FDI within the study period at 9.5%, followed closely by Zambia in the second position. Unemployment rate averaged 32.7% in Nigeria, suggesting that 32.7% of Nigeria's total labor force is gainfully unemployed. South Africa and Swaziland land came in second and third respectively with a tangible percentage of the countries' total labor force unemployed.

From appendix 7.2 (see appendix), The GDP from the sample representing the SSA region averaged 4.08% and a median 3.9% meaning that total output in the 10 selected countries increased at an average of 4.08% which is a good performance for the 10 sample countries with GDP ranging from -12.7% to 16.7% representing a larger population.

FDI for the 10 sample countries averaged 3.27% with a mid-point of 1.65%, suggesting a data is extremely skewed to the right with skewness of 4.8 similarly CPI too with skewness at 3, however GDP, EXP and INTR are negatively skewed.

All variables are leptokurtic as all kurtosis are positive and greater than two which increases the higher probability for extreme value and lower variance.

CPI as a percentage of GDP averaged 11.52% and a mid-point of 8.45% revealing that the CPI influenced GDP by approximately 12%. Converting EXP into stationary using D(EXP) increased the range spread from a minimum of -16.3% to maximum of 13.5%, D(EXP) averaged 0.3385% and a median of 0.05%.

4.3. REGRESSION ANALYSIS:

The OLS regression model and panel data regression techniques are utilized to probe into the relationship between the selected macroeconomic variables (EXP, INTR, FDI, CPI, UNEMP) and economic growth represented by GDP. The null hypothesis for the econometric model used in the regression analysis asserts that all macroeconomic variables have a negative effect on the growth.

$$GDP_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2 IF_{it} + \beta_3 INT_{it} + \beta_4 UMP_{it} + \beta_5 EXP_{it} + u_{it}$$

Pooled OLS model results are displayed in appendix 8.

The pooled OLS model presents the following results; R^2 statistics is 0.065 suggesting that the model explains 6.5% of the variables in this result and F-statistic 2.7 and Durbin-Watson stat 1.725.

The fixed effect model presents displayed in appendix 9 shows the following results; R2 statistics is 0.185 suggesting that the model explains 18.5%. F-statistic shows a 3 and a Durbin Watson stat of 1.97.

From the random effect model displayed in appendix 10, R2 statistics suggests that the model explains 7.6% of the variables; F-stat is 3.22 and Durbin Watson test of 1.87.

All three panel data models presents different estimates, however, the Hausman test was conducted on the random effects estimate in order to choose the appropriate model. Results from Hausman shows a p value of 29.32% which is more than 5%, there we accept the H_0 suggesting the random effect model is the most appropriate model (see appendix 11).

Summary of the OLS, Fixed and Random effects model;

Regressant: GDP Regressors:	OLS estimates	Fixed Effect estimates	Random effect estimates
CPI	(-0.016591)** 0.4085*	(-0.02798)** 0.2277*	(-0.02156)** 0.313*
FDI	(0.016558)**	(-0.0090)**	(0.0091)**

	0.7173*	0.86*	0.846*
DINTR	(0.095045)** 0.0275*	(0.144182)** 0.001*	(0.1248)** 0.0035*
DEXP01	(0.10205)** 0.0493*	(0.0966)** 0.054	(0.099372)** 0.0467*
UNEMP	(-0.03937)** 0.1102*	(-0.0982)** 0.250*	(-0.043794)** 0.2281*
C	(4.81)** 0.000*	(5.91)** 0.00*	(4.9735)** 0.00*
F-stat	2.7	2.998	3.22
R^2	0.0652	0.1849	0.0768
Durbin Watson	1.72582	1.978	1.87

**=coefficient
*=probability

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Adopting the random effect model from the results of the hausman test at 5% confidence level, the following conclusions can be made;

i. The inflation rate measured by consumer price index has an insignificant negative effect on economic growth. Accept H_0- Inflation has a negative effect on economic growth.
ii. Foreign direct investment has a positive insignificant effect on economic growth. Accept H_1- FDI has a positive effect on economic growth.
iii. Interest rate has a positive significant effect on economic growth. Accept H_1- interest rate has a positive effect on economic growth.
iv. Export rate has a positive significant effect on economic growth. Accept H_1- export has a positive effect on economic growth.
v. Unemployment rate has a negative insignificant effect on economic growth. Accept H_0- unemployment has a negative effect on economic growth.

4.4. PRIOR RESULTS AND EXPECTED OUTCOME:

This section contains discussions comparing previous regression models and their prior expectations; the aim is to compare the findings of this research to the findings of other studies. The model utilized is as follows:

$$GDP_{it} = \beta_{0it} + \beta_1 FDI_{it} + \beta_2 IF_{it} + \beta_3 INT_{it} + \beta_4 UMP_{it} + \beta_5 EXP_{it} + \beta_{uit}$$

Figure 8 (see appendix) shows the pooled OLS regression results on the effect of five macroeconomic variables on GDP. Result of the OLS suggests similar results as the random effect model presenting a positive significant relationship between interest rate and export with GDP annual growth during 1993-2013. CPI and UNEMP have negative insignificant relationship with GDP annual growth during 1993-2013 while FDI has an insignificant relationship with GDP during the study period. These five variables explain 6.5% part of the GDP and the remaining in GDP may be as a result of some other variables that were not included in the sample. The value of F-stat is less than 5 which means that this model is insignificant.

Results of the fixed model regression presents similar results compared to both common and random effect model with R-squared of 18%.

Figure 10 (see appendix) shows the random effect regression results on the effect of five economic variables on the GDP. The R square shows that 7.7% of the GDP is explained by the regressors. The absence of the problem of autocorrelation is confirmed by the value of the Durbin Watson statistic 1.8723. Results from the random effect model (see fig 10 in appendix) indicates that there is positive and significant relationship between Interest rate and export with GDP annual growth during 1993-2013. CPI and UNEMP have negative insignificant relationship with GDP annual growth during 1993-2013 while FDI has an insignificant relationship with GDP during the study period. These five variables explain 7.7% part of the GDP and the remaining in GDP may be as a result of some other variables that were not included in the sample. The value of F-stat is less than 5 which means that this model is

insignificant. Random effect model has the highest F-stat at 3.22 amongst all three models however still insignificant below 5%.

The results show that at a 5% confidence level, the following outcome for each regressor can be explained as follows;

4.4.1. INFLATION RATE:

Results from this study suggest that inflation had a negative effect on economic growth within the study period; this result conforms to other research findings (Jilani, Cheema and Asim, 2010; Okudzeto et al, 2015; Ndikumana, 2011). Although results expected a negative relationship between GDP and inflation which conforms to common economic theory that an extremely high or low levels of inflation has an adverse effect on economic growth evident in similar research, however results from this study suggests an insignificant relationship between the CPI and economic growth for the selected sample countries. Judging from the R^2 stat, CPI variable used to represent inflation rate amongst other variables explains only 7.7% of the GDP. Inflation in African economy amongst other economies is driven by other variables; According to African Development Bank, (2015), different African economies have different variables (sometimes combined) driving inflation in their economy e.g. monetary expansion accounting for over 40% and 30% of inflation in Ethiopia and Uganda respectively, oil prices are responsible for driving inflation in Kenya and Tanzania constituting for 20% and 26% of inflation. World food prices only constitute 11% to Kenya's inflation, 13% to Uganda's inflation; oil prices constitute most to Kenya's inflation, (ADFB, 2015). Reports by Trasino, (2011) stated that the steady increase in CPI has been one of the region's major policy challenges suggesting that SSA inflation has been only partly driven by rising food prices. From the sample, Zambia has the highest consumer price index averaged 28.2%, comparing the CPI figure to its official interest rate at 37% for the study period suggesting a positive effect between inflation and interest rate; in Zambia, maximum CPI at 183.3% corresponds with 113.3% interest rate also in 1993.

In Nigeria, CPI was at an all-time high in 1995 at 72.8% with GDP at 35.8% due to the increase in oil prices in 1994 for reasons ranging from the strike of the Nigerian oil industry workers, which led to a decline in oil production by 4.7% less than the previous year. This suggests that unemployment and political uncertainties has an adverse effect on output; in this case, a politically inclined uncertainty in one of the major industries in the oil exporting Nation in 1994 brought inflation in consumer prices from 57% in 1994 to an all-time high of 72.8% (United Nation Economic Commission for Africa, 2015). An increase in oil prices as a global energy source will create a corresponding effect on other price indices e.g. Producer price index and inevitably the CPI (UNECA, 2015). Similarly, the case of civil war in oil producing Angola brought a sharp increase in prices of metal ores and minerals in 1994, (UNECA, 2015).

In more recent years, a cross examination of data reveals that generally, inflation has a negative effect on the GDP, e.g. Zambia, CPI averaged 28.2% while output averaged 5.4% from 1993-2013, following the privatization of the mining industry, Zambia's GDP per capita rose by 2.8% between 2000-2010, which was accompanied by a sharp rise in inflation rates, however, the monetary policy was tightened in line with a supporting fiscal policy with the aim of balancing the domestic budget, thus rapidly declining the level of inflation to 8.5% in 2010 from 13.4% in 2009. In Swaziland, GDP averaged 2.6% while CPI in the same period averaged 8.1%. Results shows similar pattern in South Africa, GDP averaged 3% and CPI averaged 6.5% and so on. Even though, the data we have on the inflation only reflects part of inflationary effects on GDP, hence the insignificant results, however, results are strong enough to conclude a negative effect on economic growth.

4.4.2. FOREIGN DIRECT INVESTMENT:

Results from this study are supported by findings from the key literature (Ullah and Rauf, 2013), FDI has a positive yet insignificant relationship with GDP. The rate at which foreign investment flows into a country adds to its gross domestic output. Following the post-apartheid period in South Africa in

1994, FDI witnessed a steady increase from 0.3% in 1994 to 6% in 2001. Nigeria received the highest FDI averaged at 9.5% within the study period accompanied by the privatization reforms to most its monopolistic and oligopolistic industries. Economic growth in Africa in the 90's was partly retarded by lack of aggressive entrepreneurship, underdeveloped financial markets and to a certain percentage; reluctance to dispose national enterprises solely to foreign investors for fear of losing significant equity in privatized assets. The Nigerian telecommunications industry went from the inefficient national service provider NITEL in the 90s to a present day highly competitive industry with the advent of South African Telecommunication service provider; MTN, to the Nigerian owned second largest service provider; Globacom and the Asian owned Airtel, Etisalat networks, etc. Oil giants such as Chevron, Shell and Halliburton were attracted to the oil producing nation with the discovery of its oil rich Niger Delta area; the year 2005 saw the entrance of Giant South African retailer; Shoprite in Nigeria's underdeveloped FMCG market serving the nation's large consumer market.

As this shift to emerging markets persists, a focus has been created on Sub-Sahara Africa region which is the second fastest growing region behind Asian Pacific region in terms of Real GDP (Euromonitor, 2013). The SSA region has a lot of interest due to abundance of natural resources, a rising cost of living and rising FDI from other developing nations especially China with its $653 billion sovereign- wealth fund looking to invest in emerging markets with special attention paid to South Africa, Kenya, Tanzania, Djibouti with has a port access to the second most populous African country; Ethiopia (Clark, 2015).

Recent reports show that unsaturated markets in Africa are promising destinations for foreign investors seeking internationalization accompanied by a large consumer market and the abundance of labor in the continent. According to (Fingar, 2015), FDI growth prospects were balanced between two halves of the continent; North Africa and SSA region with the SSA region FDI rising from $42bn to $61bn compared to North Africa from $10bn to $26bn.

Reports also indicate that three major industries witnessed top three Investment inflow in 2014 i.e. oil and gas accounting for $33bn investments, Real estate looking at $12bn and communications at $6bn. Other than Egypt receiving the most investments of $18bn in the African continent in 2014, Angola, Nigeria and Mozambique came in second, third and fourth place with total investments of $16bn, $11bn and $9bn respectively, (Fingar, 2015). South Africa's real estate industry remains at the top of the chart even though 2014 saw a 15% decline in capital investments, however, this doesn't deter its competitiveness in the SSA region.

4.4.3. EXPORTS:

This study found a positive significant export related influence on economic growth. After the 2008 crisis, economic activity has been driven by higher commodity prices and rising export demand; however exports are still subject to higher food and energy prices. Strong commodity prices encouraged growth in oil exporting countries; Nigeria and Angola, other commodity exporting countries such gold in Ghana and South Africa and Diamond in Botswana supported strong growth within the allotted period.

Historically, exports has shown a close tie with economic growth evidence can be drawn from the 1992 drought that severely affected Southern African countries, for many cash crop exporting countries there were massive decline in exports and revenues thus slowing the pace of economic growth. In 1994, Malawi's agricultural sector was severely affected by drought early that year, slowing economic growth to a negative figure. Uganda recovered from the drought of 1992 due to sharply rise in export volumes accounted for by the high prices for the country's major cash crop i.e. coffee. The revenue from the export of diamonds; a mineral richly deposited in Botswana has registered high rate of economic growth averaging 49% within a 20 year period.

Clearly, an increase in export volume will earn more revenue for the country, thus further reducing African countries' reliance of foreign aid. A specialization in producing a particular commodity provides comparative

advantage for African countries, e.g. a judicious management of export revenues by government to fuel public expenditure and infrastructural development alongside a skilled workforce will stimulate economic development like in the case of South Africa; the most advanced country in the SSA region. Furthermore, the importance of the agricultural sector as a fore-tool to stimulating economic growth has been undermined by some African nations since the discovery of rich natural resources. Agriculture should be used as an important tool for every nation to fully satisfy domestic demand, break even and export excess to further stimulate economic growth.

4.4.4. UNEMPLOYMENT RATE:

Results from this study support previous findings (Muhammad and Muhammad, 2013) that unemployment has a negative influence on economic growth. A nation not producing a full capacity will stand to lose efficiency in production and international competitiveness. Unemployment needs to be controlled by a country's government in order to achieve optimum stability. For example, the government needs to curtail higher unemployment level which has slow down GDP growth because a weaker labor force spells an unproductive economy. With a population of over 160million people, Nigeria averaged the highest unemployment rate in our sample at 32.7%.

The SSA region has the youngest population in the world with at least 70% under the age of 30 as population is expected to reach 1billion by 2030 generally interpreting a larger consumer market. One of the greatest problems perceived remains that if the government fails to create adequate jobs to meet with the growing population, there will be a social unrest. Recent violent outbreaks have arisen in South Africa following the recent Xenophobia attacks as a result of the high unemployment rate in the country hit an 11 year high mid-2015 to 26.4% (McGroarty, 2015).

Amare, (2014) reported that the challenge of unemployment in Africa although often linked with population, is largely as a result of country-specific economic and political structures; lack of investment in infrastructure and lack

of government subsidization for industries with higher job creating potential i.e. agriculture. Another contributing factor to the high unemployment challenge in Africa is the levels of education as low skill levels continually persist to be a problem, however despite the considerable increase in the level of education amongst the young population compared to the aging population; there exists a mismatch between skills gained and employment opportunities.
For a nation to produce at optimum stability, it must tackle the problem of unemployment from the root i.e. education and match the skills gained with employment opportunities especially in sectors that have a high chance of creating employment.

4.4.5. MONETARY POLICY:

The interest rate was found to have a positive significant correlation with economic growth for the sample countries within the study period, however this results is not in line with findings from (Agalega and Antwi, 2013) on GDP caused by changes in interest rate and inflation in Ghana from 1980-2010 established that a positive relationship existed between inflation and GDP while interest rate has negative relationship, however an empirical study on growth effects of macroeconomic stability factors in Nigeria (Kolawole, 2013) using time series data from 1980-2011 using econometric techniques; Augmented Dickey Fuller (ADF) test, Granger causality test revealed that real interest rate significantly affects growth positively. This is because the monetary policy is known as a prominent tool in regulating inflationary pressures. A tighter monetary policy reduces the money supply in the economy thus slowing down economy activities (consumption and investment) and brings inflation back to designated target; however, it is possible that in the case of the samples used in this study within this study period, the monetary policy reforms may have been subject to other influences.

5. CONCLUSION

5.1. STUDY OBJECTIVE:

The emphasis of the study examines the impact of macroeconomic variables i.e. inflation, interest rate, unemployment, export and foreign direct investment on gross domestic product of selected Sub-Saharan African countries over a 20 year period (1993-2013) with the objective of identifying why and which country is in a better position. For the purpose of this study annual data is collected from 1993-2013 for some selected Sub-Saharan African countries and analyzed using panel data.

5.2. KEY FINDINGS:

First judging from the descriptive statistics, each country's GDP statistics are influenced by other country-specific variables, the selected macroeconomic variable tested in this study explains 7.7% of the variations in economic growth within the 20 years study period.

It was also observed that the GDP of the 10 panel SSA sample countries has grown at an average of 4.08% within the 20 year study period, suggesting a slow growth pace but generally improved economic outlook in the last two decades.

Although various economic reforms with strong and supporting monetary and fiscal policies were implemented as part of market and trade liberalization programs in the 80s and 90s, however the 90s saw a more viable growth for SSA region than the 80s, many observers cited the democratization of most SSA states between 1991-1994 thus partially eliminating some political obstacles that were active in the 80s.

The regression model adopted investigates the impact of inflation, Interest rate, rate of unemployment, foreign direct investment and export on economic growth, the following conclusions were reached:

- Inflation rate and unemployment rate have had a negative effect on economic growth in the SSA region from 1993-2013, foreign direct investment, interest rate and export rate have had a positive significant effect on economic growth, however FDI has an insignificant effect on growth.

The implication of the obtained results generally translates into the fact that the government of SSA states has to implement sustainable economic policies to slow down inflation rate, set up policies such as favorable fiscal policies and tackle political uncertainties in order attract foreign investors. For a nation to produce at optimum capacity, it must tackle the problem of unemployment from the root i.e. education the large youthful population and match the skills gained with employment opportunities especially in sectors that have a high chance of creating employment i.e. agriculture, information technology, etc. The government needs to curtail higher unemployment level which has slow down GDP growth because a weaker labor force spells an unproductive economy.

An increase in export volume is paramount driver at the fore-front of economic growth. An increase in export will earn more revenue for the country, thus further reducing African countries' reliance of foreign aid. A specialization in producing a particular commodity provides comparative advantage for African countries, e.g. a judicious management of export revenues by government to fuel public expenditure and infrastructural development alongside a skilled workforce will stimulate economic development like in the case of South Africa; the most advanced country in the SSA region.

A lower rate of inflation interprets that cheaper goods are obtainable in a country, which will increase export demands and thus foreign buyers will have to exchange the foreign currency for the local currency demand thus causing an appreciating the local currency.

6. RECOMMENDATION

The study of 10 African countries recognizes that various macroeconomic variables affect economic growth in different ways. This chapter draws upon findings from the study to make recommendations to government of SSA states.

6.1. RECOMMENDATION TO THE AFRICAN STATES GOVERNMENT:

Based on the analysis of this study, it has concluded that in case of the sample countries, GDP growth is enhanced by attracting FDI and an increasing volume of export demand as well as tightening the monetary policy while other variables such as unemployment and inflation have negative impacts on the economy of selected countries.

It is recommended that governments formulate and encourage investment-friendly policies in sectors that have more potential to provide employment i.e. Agriculture. Foreign direct investment can create new jobs; enhance the technological output promoting employment and growth.

Increased FDI has been found to result to an increase in government's domestic revenue through taxation on the working population's earnings and the business profits of foreign owned multi-nationals and also other taxes on businesses i.e. capital allowances, property taxes and capital gains, (OECD, 2008), similarly, an increase in export volume backed by low inflation-export prices will cause an appreciation in local currency against foreign currencies. FDI has the potential of introducing new technological skills to enhance a country's human resource capital. Governments that are keen to attract FDI should have accessible markets with promising profit opportunities; a transparent legal and regulatory policy, a skilled and responsive labor market where education should be encouraged and cultivated today in anticipation for its long term effect on labor force as well as a well-developed public infrastructure.

Recommendation on whether to tighten or loosen the monetary policy depends on country specific effects taking into accounts other variables such as different inflation figures, final consumption; however, the monetary is a strong tool for regulating inflation and money supply in the economy. Recently, amidst the declining oil prices adversely affecting oil producing countries, oil exporters such as Nigeria chose to shield itself against declining revenue by increasing tax on importation of luxurious goods and tighten its monetary policy to decrease money supply in the economy and get inflation

back on target or at least close to it. Inflation has been found to have a negative effect on growth. Therefore to tighten or loosen the monetary policy will depend on the current level of inflation and situation in each country.

The importance of the agricultural sector has been downplayed in some African countries since the discovery of large oil reserves in certain parts of Africa. Food is a universal merchandize constantly in demand be it in the form of raw materials for industries or final consumption for households, It is therefore highly recommended that agriculture which not only contributes immensely to export volumes with adequate specialization and technology but also leads to a self-sufficient nation, that can produce and feed itself domestically and have enough to export as well as the ability to substantially reduce unemployment rate, thus "killing three birds with one stone". Not only African leaders but Africa as a whole should have an overhaul to recognize the little that has been built since the economic and political reforms began in the last three decades or so and start over again but this time, putting agricultural specialization and large scale production at the fore-front of the campaign for a more developing continent.

The high unemployment rate in this region is related to the high rate of population growth; dividing the GDP figure by a higher population results to a lower GDP per capita. The high unemployment rate emanates from the inability of the government to situate sustainable institutions in order to meet the level of unemployment. In lieu of this, it Is recommended that both the government and private sectors take active parts to encourage entrepreneurial skills and loosen the monetary policy enough to result to a balanced reduction in cost of financing/ access to the credit market and keep inflation on target.

6.2. RECOMMENDATION TO FUTURE RESEARCHERS:

The selected sample size for this research has been subjected to various limitations. The sample size excludes prominent African economies such as Ghana, oil producing Angola, Cote d'ivoire, Cameroun, Tanzania, etc due to lack of complete data, further research should be done, involving more cross

sectional data and more regressors such as exchange rate, final consumption, oil prices and general inflation measures. The need for the above recommendation is evident in the R^2 stat, suggesting that only 7.7% of GDP for the 10 countries is explained by the chosen regressors which is relatively low; it strongly suggests that there are other factors that affect GDP measure that have not been included in this research work.

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Appendices:

1. Panel unit root test on GDP

Panel unit root : Summary
Series: GDP
Date: 08/08/15 Time: 11:28
Sample: 1993 2013
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-8.00853	0.0000	10	190
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-6.89453	0.0000	10	190
ADF - Fisher Chi-square	84.4888	0.0000	10	190
PP - Fisher Chi-square	121.421	0.0000	10	200

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

2. Panel unit root on FDI:

Panel unit root test: Summary
Series: FDI
Date: 08/08/15 Time: 11:45
Sample: 1993 2013
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-2.36994	0.0089	10	190

Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-2.98526	0.0014	10	190
ADF - Fisher Chi-square	44.0683	0.0015	10	190
PP - Fisher Chi-square	117.362	0.0000	10	200

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

3. Panel unit root on CPI:

Panel unit root test: Summary
Series: CPI
Date: 08/08/15 Time: 11:44
Sample: 1993 2013
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-4.17943	0.0000	10	190
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-6.30118	0.0000	10	190
ADF - Fisher Chi-square	77.7756	0.0000	10	190
PP - Fisher Chi-square	147.493	0.0000	10	200

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

4. Panel unit root on INTR:

Panel unit root test: Summary
Series: INTR
Date: 08/08/15 Time: 11:47
Sample: 1993 2013
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				

Levin, Lin & Chu t*	-0.27324	0.3923	10	190
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	0.12971	0.5516	10	190
ADF - Fisher Chi-square	19.7386	0.4744	10	190
PP - Fisher Chi-square	48.3110	0.0004	10	200

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

4.1. First difference of INTR

Panel unit root test: Summary
Series: D(INTR)
Date: 08/08/15 Time: 12:02
Sample: 1993 2013
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-8.84197	0.0000	10	180
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-7.58623	0.0000	10	180
ADF - Fisher Chi-square	93.5459	0.0000	10	180
PP - Fisher Chi-square	254.955	0.0000	10	190

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

5. Panel unit root on EXP:

Panel unit root test: Summary
Series: EXP01
Date: 08/08/15 Time: 11:49
Sample: 1993 2013
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-0.88718	0.1875	10	190
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-0.64517	0.2594	10	190
ADF - Fisher Chi-square	27.6881	0.1170	10	190
PP - Fisher Chi-square	28.8197	0.0914	10	200

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

5.1. First Difference of EXP01

Panel unit root test: Summary
Series: D(EXP01)
Date: 08/08/15 Time: 12:05
Sample: 1993 2013
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-6.57232	0.0000	10	180
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-6.27772	0.0000	10	180
ADF - Fisher Chi-square	78.2280	0.0000	10	180
PP - Fisher Chi-square	160.940	0.0000	10	190

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

6. Panel unit root on UNEMP:

Panel unit root test: Summary
Series: UNEMP
Date: 08/08/15 Time: 11:51
Sample: 1993 2013
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel

Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-0.92998	0.1762	10	190
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-1.96613	0.0246	10	190
ADF - Fisher Chi-square	35.5506	0.0174	10	190
PP - Fisher Chi-square	38.2549	0.0082	10	200

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

7. Descriptive Statistics

7.1. Individual samples

	mean	median	st dev	minimum	maximum
Burkina Faso					
GDP	6.0	6.5	2.3	1.3	11.0
FDI	0.8	0.5	0.8	0.1	3.1
CPI	3.9	2.3	5.8	-1.1	25.2
INTR	5.1	4.8	0.9	4.0	6.0
EXP	13.3	10.8	5.7	8.7	26.1
UNEMP	2.8	2.8	0.4	2.3	3.3
Kenya					
GDP	3.7	3.8	2.4	0.2	8.4
FDI	0.6	0.3	0.7	0.0	2.5
CPI	12.0	9.8	10.3	1.6	46.0
INTR	20.7	18.5	7.6	12.5	36.2
EXP	24.5	22.7	5.6	17.9	38.9
UNEMP	9.6	9.6	0.3	9.2	10.1
Botswana					
GDP	4.8	5.8	4.0	-7.7	9.7
FDI	2.9	1.5	4.3	-6.9	13.5
CPI	8.8	8.5	2.2	5.9	14.3
INTR	14.4	14.8	2.0	10.2	16.5
EXP	49.3	49.6	5.9	34.8	60.9
UNEMP	20.6	21.2	2.0	17.6	23.8
Madagascar					
GDP	2.7	3.7	4.6	-12.7	9.8
FDI	4.0	1.7	4.6	0.2	15.1
CPI	13.1	9.9	11.4	-1.2	49.1
INTR	35.8	30.0	11.9	24.3	60.0

EXP	25.2	25.0	4.8	15.3	32.6
UNEMP	3.5	3.6	0.7	2.6	5.0
Malawi					
GDP	4.4	4.3	5.4	-10.2	16.7
FDI	2.1	1.8	1.6	0.2	5.1
CPI	22.3	15.4	17.9	7.4	83.3
INTR	37.5	33.1	11.0	23.8	56.2
EXP	27.6	28.0	6.5	16.1	47.6
UNEMP	7.6	7.6	0.2	7.2	7.9
Mauritius					
GDP	4.3	4.1	1.7	1.2	9.0
FDI	2.0	1.2	1.9	-0.6	5.8
CPI	6.1	6.5	2.2	2.5	10.5
INTR	17.2	20.8	5.3	8.5	21.9
EXP	58.4	58.2	4.9	49.0	68.5
UNEMP	8.3	8.5	0.8	6.8	9.6
South Africa					
GDP	3.0	3.1	1.7	-1.5	5.6
FDI	1.5	1.0	1.4	0.0	6.0
CPI	6.5	5.9	2.4	1.4	11.5
INTR	14.1	14.5	3.9	8.5	21.8
EXP	27.3	27.2	3.7	21.5	35.6
UNEMP	23.9	24.7	2.5	16.9	27.2
Swaziland					
GDP	2.6	2.6	0.9	1.2	4.8
FDI	3.0	2.9	3.0	-3.3	9.7
CPI	8.1	7.3	3.1	3.4	13.8
INTR	13.6	14.0	3.5	8.5	19.5
EXP	69.9	63.7	13.7	57.3	100.9
UNEMP	22.7	22.7	0.3	21.7	23.0
Zambia					
GDP	5.4	6.7	4.0	-8.6	10.3
FDI	5.5	4.8	2.2	1.1	9.6
CPI	28.2	21.4	37.6	6.4	183.3
INTR	37.0	31.8	23.2	9.5	113.3
EXP	31.2	30.6	5.6	23.9	43.3
UNEMP	15.0	15.3	2.1	12.0	19.7
Nigeria					
GDP	3.8	3.6	2.3	1.1	10.8
FDI	9.5	5.3	12.5	-0.3	45.4
CPI	18.2	11.5	19.5	2.7	72.8

INTR	18.0	17.9	4.7	7.7	31.7
EXP	8.3	7.6	2.7	7.4	18.9
UNEMP	32.7	31.7	7.7	18.0	51.7

7.2. Panel data samples

Date: 08/08/15
Time: 12:08
Sample: 1993 2013

	GDP	CPI	FDI	UNEMP	DINTR	DEXP01
Mean	4.080000	11.52150	3.271000	14.62950	-0.544000	0.338500
Median	3.900000	8.450000	1.650000	11.00000	-0.100000	0.050000
Maximum	16.70000	83.30000	45.40000	51.70000	16.30000	13.50000
Minimum	-12.70000	-1.200000	-3.300000	2.300000	-42.70000	-16.30000
Std. Dev.	3.365267	11.69314	5.283240	9.817382	5.487433	4.553586
Skewness	-1.105030	3.062652	4.857462	0.765776	-2.478008	-0.274386
Kurtosis	8.786434	14.93809	33.82821	3.284745	22.63949	4.964374
Jarque-Bera	319.7266	1500.311	8706.321	20.22275	3418.931	34.66598
Probability	0.000000	0.000000	0.000000	0.000041	0.000000	0.000000
Sum	816.0000	2304.300	654.2000	2925.900	-108.8000	67.70000
Sum Sq. Dev.	2253.680	27209.18	5554.612	19179.82	5992.273	4126.294
Observations	200	200	200	200	200	200

8. Pooled OLS Regression model:

Dependent Variable: GDP
Method: Panel Least Squares
Date: 08/08/15 Time: 12:12
Sample (adjusted): 1994 2013
Periods included: 20
Cross-sections included: 10
Total panel (balanced) observations: 200

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.810113	0.482032	9.978832	0.0000
CPI	-0.016591	0.020029	-0.828373	0.4085

FDI	0.016558	0.045660	0.362638	0.7173
UNEMP	-0.039370	0.024535	-1.604612	0.1102
DINTR	0.095045	0.042795	2.220968	0.0275
DEXP01	0.102050	0.051593	1.977997	0.0493

R-squared	0.065204	Mean dependent var	4.080000
Adjusted R-squared	0.041111	S.D. dependent var	3.365267
S.E. of regression	3.295366	Akaike info criterion	5.252453
Sum squared resid	2106.731	Schwarz criterion	5.351402
Log likelihood	-519.2453	Hannan-Quinn criter.	5.292496
F-statistic	2.706378	Durbin-Watson stat	1.725820
Prob(F-statistic)	0.021740		

9. Fixed effect model:

Dependent Variable: GDP
Method: Panel Least Squares
Date: 08/08/15 Time: 12:13
Sample (adjusted): 1994 2013
Periods included: 20
Cross-sections included: 10
Total panel (balanced) observations: 200

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.914263	1.374430	4.303065	0.0000
CPI	-0.027984	0.023120	-1.210397	0.2277
FDI	-0.009017	0.051907	-0.173708	0.8623
UNEMP	-0.098201	0.085149	-1.153278	0.2503
DINTR	0.144182	0.043068	3.347774	0.0010
DEXP01	0.096630	0.049827	1.939317	0.0540

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.184938	Mean dependent var	4.080000
Adjusted R-squared	0.123258	S.D. dependent var	3.365267
S.E. of regression	3.151051	Akaike info criterion	5.205388
Sum squared resid	1836.888	Schwarz criterion	5.452762
Log likelihood	-505.5388	Hannan-Quinn criter.	5.305496
F-statistic	2.998337	Durbin-Watson stat	1.978475
Prob(F-statistic)	0.000361		

10. Random effect model:

Dependent Variable: GDP
Method: Panel EGLS (Cross-section random effects)
Date: 08/08/15 Time: 12:17
Sample (adjusted): 1994 2013
Periods included: 20
Cross-sections included: 10

Total panel (balanced) observations: 200
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.973536	0.708998	7.014876	0.0000
CPI	-0.021563	0.021330	-1.010898	0.3133
FDI	0.009134	0.046973	0.194463	0.8460
UNEMP	-0.043794	0.036223	-1.209018	0.2281
DINTR	0.124873	0.042237	2.956508	0.0035
DEXP01	0.099372	0.049633	2.002142	0.0467

Effects Specification

	S.D.	Rho
Cross-section random	0.964305	0.0856
Idiosyncratic random	3.151051	0.9144

Weighted Statistics

R-squared	0.076825	Mean dependent var	2.407072
Adjusted R-squared	0.053031	S.D. dependent var	3.247545
S.E. of regression	3.160261	Sum squared resid	1937.526
F-statistic	3.228848	Durbin-Watson stat	1.872366
Prob(F-statistic)	0.007996		

Unweighted Statistics

R-squared	0.062072	Mean dependent var	4.080000
Sum squared resid	2113.790	Durbin-Watson stat	1.716233

11. Hausman test:

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	6.135664	5	0.2932

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
CPI	-0.027984	-0.021563	0.000080	0.4715
FDI	-0.009017	0.009134	0.000488	0.4112
UNEMP	-0.098201	-0.043794	0.005938	0.4802
DINTR	0.144182	0.124873	0.000071	0.0218
DEXP01	0.096630	0.099372	0.000019	0.5323

Cross-section random effects test equation:

Dependent Variable: GDP
Method: Panel Least Squares
Date: 08/08/15 Time: 12:23
Sample (adjusted): 1994 2013
Periods included: 20
Cross-sections included: 10
Total panel (balanced) observations: 200

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.914263	1.374430	4.303065	0.0000
CPI	-0.027984	0.023120	-1.210397	0.2277
FDI	-0.009017	0.051907	-0.173708	0.8623
UNEMP	-0.098201	0.085149	-1.153278	0.2503
DINTR	0.144182	0.043068	3.347774	0.0010
DEXP01	0.096630	0.049827	1.939317	0.0540

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.184938	Mean dependent var	4.080000
Adjusted R-squared	0.123258	S.D. dependent var	3.365267
S.E. of regression	3.151051	Akaike info criterion	5.205388
Sum squared resid	1836.888	Schwarz criterion	5.452762
Log likelihood	-505.5388	Hannan-Quinn criter.	5.305496
F-statistic	2.998337	Durbin-Watson stat	1.978475
Prob(F-statistic)	0.000361		

Accept null hypothesis: random effect is appropriate