Effect of Monetary Policy on the Economy of Developing African Economies: Evidence from Nigeria, Kenya and South Africa: 1986-2016

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NOVEMBER, 2018

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**BEING A DISSERTATION PRESENTED
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF
DOCTOR OF PHILOSOPHY (Ph.D) DEGREE IN BANKING AND FINANCE**

**DEPARTMENT OF BANKING AND FINANCE,
FACULTY OF MANAGEMENT SCIENCES,
NNAMDI AZIKIWE UNIVERSITY, AWKA**

NOVEMBER, 2018

DECLARATION

This is to declare that this research work titled "Effect of Monetary Policy on the Economy of Developing African Economies: Evidence from Nigeria, Kenya and South Africa: 1986-2016" was carried out by Anaemena, Chigozie Hart; Reg. No.2014417008P. To the best of my knowledge, this work is original and has not been previously submitted to this University or other institution.

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Anaemena, Chigozie Hart Date

Student

APPROVAL

We hereby certify that this dissertation titled "Effect of Monetary Policy on the Economy of Developing African Economies: Evidence from Nigeria, Kenya and South Africa (1986-2016) by Anaemena, Chigozie Hart with Registration No. 2014417008P, satisfied the standard in partial fulfillment of the requirements for the award of Doctor of Philosophy (Ph.D) in Banking and Finance.

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DEDICATION

I dedicate this work and the completion of my Ph.D programme to the Almighty God, through his blessed son, Jesus Christ for the strength, courage and abundant grace to successfully complete this programme and to my family for standing by me all through my academic endeavours in life.

ACKNOWLEDGEMENTS

Firstly, I am grateful to the Almighty God who preserved me through the course of this programme. I also wish to express my profound gratitude my lead supervisor, Professor of Finance, Prof. Steve N. Ibenta, who took the pains to go through this work with doggedness amidst his tight and busy schedules. This research work received timeless and upgraded fine-tuning and I owe it to my second supervisor and the former Head of Department, Dr. P. K. Adigwe.

The invaluable contributions of my reviewer's Dr Celestine Okaro and Dr. Pius Okoye the external reviewer cannot be erased from this work and am very grateful. I wish to thank Dr. P. K. Adigwe, my second supervisor and our former Head of Department's contributions to my learning, supervision and knowledge are highly appreciated and his passion and unlimited commitment to the success of my research work and the success story of Post-Graduate programme in our department is immeasurable. I am so grateful to the selfless service of Dr. Austin Odum, our new Head of Department.

I must not fail to thank our Departmental lecturers not limited to Prof. Clem Nwakoby, Dr. Ifeanyi Nwanna and Prof. Vincent Ezeabasili (our adjunct lecturer) for their invaluable contributions to this dissertation. Dr. Gideon Ezu, Dr. F. N. Echekoba, Elder S. Ekezie, Dr. (Mrs.) Ifeoma Amakor, Administrative staff – Mrs. Nebe and Mrs. Christy are appreciated. I also wish to appreciate our present Dean Professor (Mrs.) Chizoba Ekwueme and the former Dean, Rev. (Canon) Prof. Anayo, Nkamnebe and sub-dean, Dr. Ogbodo as well.

I also, wish to thank all my colleagues for their accommodation, understanding and support throughout the period of my study. They include Dr. Kenechukwu Mojekwu, Dr. Izekor Andrew, Dr. Alajekwu Bernard, Dr. Jeff-Anyeneh Sarah, Dr. Obi-Nwosu Victoria, Dr. Vitalis Obialom, Yua Paul, Dr. Ijeoma Okeke, Ibeyenwa Ekene, late Idyu Atume, Ofeimun Godwin, Dr. Chioma Okeke. My Course Rep (Chairman) Dr. Ogbonna Stanley, I never wish to have another, you simply the best.

I am grateful to my siblings Chijioke Anaemene (Rev.), Mrs. Caro Chukwu (Commander), Mrs. Ifeoma Okoye (Ochi-ora), Mrs. Hope Eze (Research Analyst), Comfort Albert and my Mum of no regrets, Beatrice Anaemene.

Finally, I am most grateful to my wife Ngozi Helen Oliseh for your support and encouragement through the course of this programme. You are every Man's dream (Hon.). To my daughter Delight Chikamso Oliseh thank you for being a delight to me through this programme, you are truly special.

November, 2018

Anaemena, Chigozie Hart

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURE

ABSTRACT

Monetary policy is a key factor that's used to direct economic development of developing African economy. This study examines the effect of monetary policy on the economy of developing African economies; evidence from Nigeria, Kenya and South Africa economies. The objective of this study is to investigate the effect of monetary policy in Cash Reserve Ratio (CRR), Interest Rate (INTR), Inflation Rate (INFR) and Money Supply (M2) on economic development variables in Gross Domestic Product (GDP), Market Capitalization (MC), Manufacturing Output (MU) and Gross National Income (GNI). The study used secondary data obtained from World Bank, IMF and the Central Bank of respective selected countries and subjected them to Ordinary Least Square (OLS), Granger Causality test and Generalized Least Square (GLS) Panel Data Analysis techniques, to test the interaction between independent variables namely CRR, INTR, INFR and M2 and dependent variables in in GDP, MC, MU and GNI.at the 10% level of significance. The findings amongst others show that monetary policy in CRR, INTR, INFR and M2 had no significant effect on GDP, MC, MU and GNI in Nigeria and Kenya but there is significant effect of monetary policy in South Africa; while in the selected African developing economies' pooled panel result indicate that Monetary policy variables used had positive but insignificant effect on GDP, MC, MU and GNI. However, the result further discovered that there was a significant relationship between monetary policy and economic development of developing African economies. Thus, the study concludes that Monetary policy does not affect stock economic development in developing African economies rather monetary policy have significant relationship with economic development of African developing economies. Hence, the study recommends among others that monetary regulatory authority of the selected developing African economies should reduce reserve ratio so as to reduce interest rates on loan and improve money supply to facilitate enhanced economic activities and economic growth at large.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Economic development of African economies is significantly tied to their monetary policy directions. The monetary policy directions of an economy control the flow of economic activities that reflect the overall developmental performance of the country. Monetary policy is one of the roles of the Central Bank, which act as a specialized agency of government to control financial movement within the economy. Financial control function of Central Banks consequently brings to bare the mechanism for anticipated role of credit direction and funds availability in the economy. However, this credit direction powers funds availability that reflects on the functions and activities of banks in the economy, which are controlled by the monetary policies of the apex bank.

According to Onyeiwu (2012), monetary policy is a technique of economic management that facilitates sustainable economic growth and development. It's the primary pursuit of nations and formal articulation of how money affects economic aggregates which dates back to the time of Adams Smith and later championed by the monetary economists.

Monetary policy is a key economic policy instrument that government uses to shape economic performance. In contrary to fiscal policy, monetary policy can resolve the issue of economic shocks very fast. Generally, monetary policy influences macroeconomic variables which include employment creation, price stability, gross domestic product growth and equilibrium in the balance of payment in developing country (Anowor & Okorie, 2016; Precious, 2014). The monetary policy role of Central Banks of any country is anchored on targeting achievement of full-employment equilibrium, rapid economic growth, and maintenance of balance of payments equilibrium (external balance), output growth and sustainable development. Thus, the monetary policy role on the economic development and the changing in aggregate economic activity depend on how monetary policy is conducted and the independency of the central bank to choose the appropriate monetary tools to formulate the monetary policy of macroeconomic objectives (Alavinasab, 2016).

Since the expositions of the role of monetary policy in influencing macroeconomic objectives like economic growth, price stability, stock market performance, equilibrium in balance of payments and host of other objectives; monetary authorities are saddled with the responsibility of using monetary policy to grow and develop economies.

The monetary authority and policy maker always target the intermediate variables which include the short-term interest rate, money supply, and exchange rate, which is considered as the most powerful instrument of monetary policy for economic development and direction (Artus & Barroux, 1990; Fasanya, Onakoya, & Agboluaje, 2013). The basic goals of monetary policy are the promotion of stable prices, sustainable output and employment. In macroeconomic theory, monetary policy is expected to affect the real economy through movements in interest rates which would alter the cost of capital and investment in the productive sector. Compared to other macroeconomic policies, the impacts of monetary policy appears to be greater on the economy in general and on financial markets in particular, especially in the short-term, through some variables such as money supply, credit, interest rates and exchange rate. The ultimate target of monetary policy is to influence money markets, economic activities and price levels in the economy (Hai & Trang, 2015).Kuttner and Mosser (2002) show that the efficiency of monetary policy depends much more on policy makers' ability to identify both point of time and efficiency of monetary policy implementation that affects macroeconomic performance and price stability through its various channels.

According to IMF (2012a), the trusted mechanism behind the classical monetary policy transmission mechanisms in advanced economies is that monetary authorities should manage money growth and interest rates to impact credit conditions in the economy (and the aggregate demand) to reach programmed targets of single digit inflation and pre-determined levels of net external reserves (IMF 2010).

Investigations into the effect of monetary policy on the economy has continued to generate active research interest because it is the channels through which monetary shocks transmitted changes with developments in both global and the domestic economy. In recent times, increasing attention has focused on the private sector effects of monetary policy given that the private sector respond differently to monetary policy shocks through credit availability for its business functions.

For instance, the monetary policy of the Nigerian Central Bank has facilitated increased money supply over time from N23.81 Billion in 1986 to N345.85 Billion in 1996 which signify over 1000% increase within the period. Between 1997 to 2007, the money supply increased from N413.28 Billion to N5, 127.40 Billion with almost the same corresponding percentage with 1986 to 1996. The increase continues to N21, 607.68 Billion in 2016 (World Bank, 2016). In South Africa, the money supply as at 1986 was 56.921 Billion and increase to 295.313 Billion at approximately 500% all in South African currency. In 1997, the South African money supply was 350.700 Billion and increased to 1,393.528 Billion and further increased to 2,600.811 Billion as at 2016 showing continuous increase in the money supply of South Africa within the study period (World Bank, 2016). The two countries experienced an astronomical increase in their money supply over the time period. While the economic development as reflected in the Gross National Income (GNI); in South Africa, the real GNI based on PPP was $6160 in 1990 and fell continuously to $6100 in 1993. But the GNI picked up from $6180 in 1994 to $7010 in 1997 before a slight fall in the income in 1998 to $7000. The GNI picked up again in 1999 continuously till 2007 in the tune of $11350 before sharp fall and rise in 2008 and 2009 in the tune of $11,210 and $11,530 respectively (World Bank, 2017). In Kenya, the real GNI was $2,291 and fell the next year in 1991 to $2,239 and fell further till 1993. The GNI in Kenya however, were basically floating between $2,054 in 1993 as minimum to $2,897 as the maximum in 2016. But in Nigeria, the real GNI based on PPP was $2,753 in 1990 and fell continuously like South Africa to $2,465 in 1993 before peaking up in 1994 to $2,496 and continuously to $2,657 in 1999. The GNI fell to $2,388 in 2000 before leaping up in 2001 to $2,618 and continuously to the end of the study period in 2016 to $5,546 (World Bank, 2017). This shows that the GNI of Nigeria and South Africa share liking characteristics but experienced growth rate of 4.27% and 1.33% since 1996 and 1997 respectively while GNI in Kenya however dragged along the period under review.

The dwindling economic development of African economies can be traced to skyrocketing inflation rates over time and high interest rates which have affected investment activities both in the short and long run. The ever-increasing money supply is not also adding to developmental strides in African economies which have led to several studies on monetary policies and economic development variables in economic growth, stock market performance, industrial growth, credit mobilization, standard of living, price stability and so on. However, economic developments of African countries are still questionable regardless of the monetary policy decision taking over time and economic direction anticipated. The low industrial growth, standard of living, poor credit facilitation, corruption infected credit rationing, unfavourable price stability, appreciated book value stock market performance without a corresponding direct economic impact on industrial growth and funds availability for investment and economic growth have however question the overall function of monetary policy of African economies to move their developmental agendas.

The monetary policy is therefore said to be narrowed. This is due to their narrowed function of mostly issuing bond, determining reserve requirement in order to serve the government economic policy, engaging in inflation control, interest rate determination and economic liquidity. Therefore, this study aims to analyze the effect of monetary policy on economic development of the selected developing African economies.

1.2 Statement of the Problem

In discussing the effect of monetary policy on economic development variables, Khan (2010) opine that monetary policy objectives are concerned with the management of numerous monetary targets which include; boosting growth, attaining full employment, stabilizing price, averting economic crisis, stabilizing real exchange rate and interest rates. Monetary policy is the use of instruments at the disposal of the Central Bank to influence the availability and cost of credit/money in order to achieve macroeconomic stability (Edoumiekumo, Karimo & Amaegberi, 2013).

In developing countries, underdeveloped financial systems and weak interest rate responsiveness inhibit the use of the interest rate and demand for money channels, while monetary policy is effective on the asset side of financial intermediary balance sheet (the credit channel view) where it tends to have greater impact. Inflation targeting and exchange rate policy have dominated CBN’s monetary policy focus based on assumption that these are essential tools of achieving macroeconomic stability (Ajayi, 1999). These monetary objectives can only be achieved through the financial market where the direct bearing of monetary policies are transmitted to credit provision both in Banks-intermediation and other formal financial markets. Thus, the functioning of the financial markets determines the level of rapid capital formation for economic development and economic growth at large. The function of monetary policies in reserve requirement determination, interest rate determination, credit channeling (money supply) and inflation control affects standard of living, industrial performance, stock market performance, credit to private sector investment and economic growth and their speed of impact are based on the swiftness the monetary policy role plays on financial intermediation which influence economic development.

The economic performance of development variables in industrial productivity, standard of living, stock market, investment and economic growth are recognized as the catalyst for attaining the twin goals of broad based sustainable economic development and poverty alleviation as full achievement of the earlier mentioned development variables allows for multiplier effect on entrepreneurship and employment creation opportunities that increase incomes for the poor and rich alike.

These have prompted different academic research to be carried out on monetary policy and economic development across the world. For instance, Emenike (2010) looked at monetary policy and private sector credit by revealing that credit to the private sector is an effective channel for monetary policy transmission. Wulandari (2012) examine the important role of Credit Channel and Interest Rate Channel in Monetary Transmission Mechanism and discover that interest rate channel plays important role in monetary transmission mechanism for maintaining inflation but has limited role in the economic growth while on the other hand, credit-bank lending channel can effectively affect economic growth. Khaysy and Gang (2017) study the impact of monetary policy on economic development and reveal that money supply, interest rate and inflation rate have negative effect on the real GDP per capita in the long run and only the real exchange rate has a positive sign. Udude (2014) also examine the impact of monetary policy on the growth of Nigeria economy and concluded that monetary policy did not impact significantly on economic growth of Nigeria. The findings from empirical studies shows that monetary policy mechanism are significant channels for economic growth, and the monetary policy have however have insignificant effect on economic growth. Thus, the following questions are asked; does monetary policy mechanism drive economic development in economic growth, stock market performance, industrial output and standard of living (gross national income)? Hence, this study intends to examine the effect of monetary policy on the economic development of developing African economies.

1.3 Objectives of the study

The main objective is to determine the effect of monetary policy on the economic development of developing African countries. The following objectives are reviewed for the study;

1. To determine the relationship between Monetary Policy and Gross Domestic Product in developing African countries.
2. To ascertain the relationship between Monetary Policy and Market Capitalization in developing African countries.
3. To determine the relationship between Monetary Policy and Manufacturing Output in developing African countries.
4. To determine the relationship between Monetary Policy and Gross National Income per Capital (GNI) in developing African countries.
5. To ascertain the direction of causality between Monetary Policy and economic development of developing African Countries.

1.4 Research Questions

Based on the established objectives above, the study post the following research questions;

1. What is the relationship between Monetary Policy and Gross Domestic Product in developing African countries?
2. What is the relationship between Monetary Policy and Market Capitalization in developing African countries?
3. What is the relationship between Monetary Policy and Manufacturing Output in developing African countries?
4. What is the relationship between Monetary Policy and Gross National Income per Capital (GNI) in developing African countries?
5. What is the direction of causality between monetary policy and economic developing of developing African countries?

1.5 Research Hypotheses

The study has the following hypotheses in null form in line with research questions;

Ho_1: There is no significant relationship between Monetary Policy and Gross Domestic Product in developing African countries.

Ho_2: There is no significant relationship between and market capitalization in developing African countries.

Ho_3: There is no significant relationship between Monetary Policy and Manufacturing Output in developing African countries.

Ho_4: There is no significant relationship between Monetary Policy and Gross National Income per Capital (GNI) in developing African countries.

Ho_5: There is no direction of causal effect of monetary policy on economic development of developing African economies.

1.6 Significance of the Study

The findings of this study will be of immense benefit to scholars, students, investors, policy makers and apex financial institutions of other countries within and outside the study frame.

Scholars: This study will improve the understanding of scholars on effect of fluctuations in monetary policies on economic development of African economies and future scholars can use this research as a basis for further research in the area of financial policies in monetary policies of the apex bank across Africa.

Students: The students will understand the directions of causal effect between monetary policy and economic development in African countries.

Policy Makers: The outcome of monetary policies effect and influence on the economic development of African countries will serve as an important reference for designing investment friendly monetary policies that will engender economic growth and development in developing African countries.

Investors: Investors will be in a position to utilize the research findings and recommendations from the study to forecast on possible monetary policy direction on economic situations.

Financial Institutions: The different countries apex financial institutions will be enlighten as to the performance of its monetary policies on economic development and in comparing them with other countries performance adopt more efficient policy to foster economic development.

The study is expected to contribute to the existing literature in the field of financial policies.

1.7 Scope of the Study

The study scope examined the effect of monetary policy instruments on economic variables covering the period of 1986 (the period of structural adjustment programme in Nigeria and implementation of structural adjustment programmes (SAPs) in Kenya during 1980/1981 fiscal years which later became an important part of economic management after the publication of Sessional Paper No. 1 of 1986 (Rono, 2002)) to 2016 in developing African countries basically Nigeria, Kenya and South Africa. The choice of Nigeria (West-Africa), South Africa (Southern Africa) and Kenya (Eastern Africa) are based on their position as one of the fastest developing African economies. The variables considered for the monetary policy instruments include Inflation Rate, Interest rate, Cash Reserve Ratio and money supply while the dependent variables in economic growth proxy by Gross Domestic Product (GDP), stock market performance proxy by Market Capitalization (MC), Industrial Output proxy by Manufacturing Output (MU) and standard of living proxy by Gross National Income per Capital (GNI). The study used secondary data sourced from Central Bank of Nigeria statistical bulletin, South African Reserve Bank Bulletin, Central Bank of Kenya statistical bulletin, International monetary fund data base, World Bank statistical data and Knoema. Ordinary least square (OLS), granger causality test, Panel data study will be conducted for the study. Augmented Dickey Fuller (ADF) will also be tested for stationarity of the time series data.

1.8 Limitations of the Study

In this study, the data adopted is restricted to the confines of three emerging African countries in Nigeria, Kenya and South Africa (Osadume, 2017). This is in bid to study the peculiarity of the impact of monetary policy on the economy of emerging African economies.

Time series annual data is on Gross Domestic Product, Gross National Income, Market Capitalization, Manufacturing Output, Credit to the Private Sector, Inflation rate, Interest rate, Cash reserve ratio and Money supply collected for a period of 31 years from 1986 – 2016. The researcher will collect annual data for only 31 years which will be sufficient in statistical terms.

The monetary policy instruments are many but the study will be limited to Interest rate, Cash reserve ratio and Money supply for the purpose of the study. As other monetary policy instruments like treasury bills, treasury certificate and certificate of deposit across the countries under consideration are inconsistent thus making it vulnerable for use in the study.

1.8 Definition of Terms

Monetary Policy**:** Monetary policy is a combination of measures designed to regulate the value, supply and cost of money in an economy, in consonance with the expected level of economic activity (Bernanke, 2005).

Monetary Policy Rate**:** Monetary policy rate also known as Minimum rediscount rate refers to the rate set as a benchmark to guide monetary institutions intrest rate for instruments traded in the money market.

Cash Reserve Ratio:The sum of legal tender money held by commercial bank (vault cash), and the current account of the commercial bank held at the central bank.

Interest Rate: This is the proportion of a loan that is charged as interest to the borrower, typically expressed as an annual percentage of the loan outstanding.

Gross Domestic Product: This represent the monetary value of all the finished goods and services produced within a country's borders in a specific time period.

Manufacturing Output:Themanufacturing output is the output of all factories in a country, is a sub-set of industrial output while the industrial output is the total output of all the facilities producing goods within a country.

Economic Growth: It is an increase in the capacity of an economy to produce goods and services, compared from one period of time to another.

Market Capitalization: This is the total market value of all of a company's outstanding shares. It is also incorrectly known to some as what the company is really worth, or in other words the value of the business. Keep reading to learn more about why it doesn't always reflect a company's actual value.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

The chapter looks at the conceptual review, theoretical framework and empirical review of literature relevant for the study.

2.1 Conceptual Framework

Various frameworks have guided perception and understanding of the interplay of monetary policies on economic development across the world.

2.1.1 Monetary Policy

According to Onyeiwu (2012), monetary policy is a technique of economic management that brings about sustainable economic growth and development. Monetary policy refers to the combination of measures designed to regulate the value, supply and cost of money in an economy, to attain and match with the level of economic activities (Okaro, 2014). The stance (direction) of monetary policy is dictated by the prevailing economic situation and policy objectives which have remained broadly the same over the years-price stability; sound financial system, balance of payments viability and economic growth and development. Traditionally monetary policy is seen as influencing economic direction via different routes; namely the interest rate channel, the demand for money and the credit channel. Monetary policy can also be described as the act of controlling the direction and movement of monetary policy and credit facilities in pursuance of stable price and economic growth in an economy (CBN, 2015). In contemporary economics, the central bank is the authority with the mandate of monetary policy manipulation via monetary policy tools to accelerate and achieve desired economic macroeconomic objectives. Chang and Grabel (2004), defined monetary policy as government actions that influence the money supply and market interest rates i.e government control both money supply and market interest rates via policy instruments in open market operations, discount rates and reserve requirements. Monetary policy is a driver of economic growth through its conscious manipulation of credit rate, money supply and inflation rate to achieve economic growth (Chipote & Makhetha-Kosi, 2014)

Hossain and Chowdhury (1998) posit that money supply is basically made up of domestic credit and net foreign assets and domestic credits is composed of central bank credit to government and commercial bank credit to the public.

Basically, the channel of monetary policy is concerned with the changes associated with the alteration of money supply and the effects on prices of goods and services, output of sectors and employment. Positive changes in aggregate demand in the country do reposition production level, employment and wages which in turn reflect on prices. The monitoring of the extent of policy transmission is imperative so as to take adequate measures in avoiding adverse effects which is inimical to the growth and development of the economy. Given the Keynesian channel of monetary transmission and that of neoclassical, in this context, it is necessary to examine the channels of transmission mechanism of key instruments such as interest rate, credit, exchange rate, asset prices and inflation expectation (Uma, Ogbonna & Obidike, 2015).

2.1.2 Transmission Mechanism of Monetary Policy

Interest Rate Channel

The Monetary Policy Rate (MPR) is the official interest rate in use in Nigeria by the apex bank in 2006. Prior to this period, the Minimum Rediscount Rate (MRR) was in use. The country witnessed instability on the official interest rate due to changes over the years. However, in the year 2000 there was a relative volatility of the official interest rate, but in 2004 and 2005 there was a relative stability in the interest rate. Given this situation, the commercial banks experienced instability in their lending rate between 1999 Q1 to 2007 Q4 and it was more volatile than the apex bank's interest rate. The volatility was highly conspicuous in 1999, 2001, 2003, 2004 and 2005. However, prime lending rate has witnessed instability since after consolidation of 2005, post-consolidation period of 2007 and this period (Ndekwe, 2013).

Firms and investors react in a way given the instability in lending rate. High interest rate raises the cost of investment given that interest rate is inversely related to investment. Bature (2014) notes that economic agents who are confronted with higher real cost of borrowing resulting from contractionary monetary policy usually cut down borrowing and then consumption which in turn reduces aggregate demand, output and employment. On the other hand, an expansionary monetary policy has the effect of encouraging investment, income generation, output and employment of resources. So, Nigeria has witnessed low investment over the years resulting from volatility of both apex and commercial banks interest rates.

The interest rate channel is supported by empirical studies. For instance, recent studies by Nwosa and Saibu (2012) asserted that interest rate channel of transmission is very strong in impacting on the productive sector of the Nigerian economy. Ishioro (2013) added that negative monetary shocks pose a constraint to the banking system's capability to dispose deposits, and consequently, demand for bonds rise while demand for money declines. So, non-fully adjustability of price leads to a fall in real money balances causing interest rates to rise and increasing the cost of capital. Fall in investment lowers both aggregate demand and output.

Credit Channels

The credit channels are associated with the bank lending and the bank balance sheets transmission mechanism. Credit channel is made up of factors that assist and support the effect of interest rate. It is linked with the commercial banks and an augmentation mechanism. However, lending rate is taken to be less important in this respect if the demand for bank deposits is highly elastic. A rise in Treasury bill rate has a way of moving deposits out of banking system, thereby affecting aggregate demand through accessibility of credit instead of through cost. This bank lending rate transmission shows the great role banks play in the financial system in that they offer bank deposits which add to the aggregate broad money supply and they hold various assets and give loans to different classes of borrowers. So, the contractionary monetary policy usually reduces bank reserves and bank deposits give impacts through its effect on the borrowers. The availability of banks loans can be regulated by raising reserves requirements with the aim of lowering total quantity of commercial bank assets. Besides, the Central Bank of Nigeria can engage in open market sales of treasury bills and government development stock. This action has the power of reducing commercial banks' reserves considering the fact that depositors will prefer and switch over to lucrative financial assets and lessen commercial banks deposits (Mishkin, 1995; Ishioro, 2013; Bature, 2014).

Studies by Li (2000) and Repullo and Suarez (2000) have shown that expansionary monetary policy raises bank lending and aggregate investment; reduce the spread between rates charged to borrowers and risk-free rate and result to a movement or shift in the offering of credit to more risky firms. In other words, monetary expansion can bring a liquidity effect that increases credit to households and raises aggregate economic activity.

Suffice it to note that the balance channel of monetary policy hinges on contractionary or expansionary policy impacts that is not only on market interest rates but also on financial positions of borrower directly or indirectly. Contractionary policy adversely affects borrowers in that raising interest rate will increase interest expenses, lowering net cash flows and damnify the borrowers' financial power. In the same vein, raising interest rate will bring a fall in asset prices thereby lessening borrowers' collateral. This situation also reduces the purchasing power of consumers and consequently reduces firms' total revenue due to low demand. Consequently, firms fixed or quasi-fixed cost are affected as they cannot adjust in the short run, and so this gap reduces the firms' net worth and credit worthiness. So, the balance sheet channel functions via the network of business firms (Bernanke and Blinder 1988, 1992).

Exchange Rate Channel

In actual fact, any change in the exchange rate impacts on spending pattern of the people, firms and ultimately on goods and services. In a flexible exchange rate regime which is determined by the market forces and an expansionary monetary policy will lower the domestic currencies and raise the prices of imported goods and services. The output, employment and resources utilization can be influenced by exchange rate transmission depending on the degree of openness of the economy and the exchange rate arrangement. Studies have shown that exchange rate channel operates through aggregate demand and aggregate supply which is more effective under flexible exchange rate regime and the channel involves interest rate effects. A rise in domestic real interest rate, then domestic deposits is more lucrative in comparison to deposits denominated in foreign currencies and deposits which give rise to a rise in exchange rate and consequently a fall in the net export and output. A fall in the domestic currency's purchasing power will bring about proportional currency depreciation in the foreign exchange market under purchasing power parity (Taylor, 1995; Mishkin, 1995; Obstfeld and Rogoff, 1995; Krugman and Obstfeld, 2000).

Asset Price Channel

In this channel of transmission, contractionary interest rate (raising interest rate) makes bonds relatively less profitable to equities forcing equities prices to fall. It can be inferred that reducing equity prices leads to a decline in q (the ratio of market value of firms to the replacement cost). Tobin q theory (1969) refers it (q) as the market value of firms divided by the replacement cost of capital. The equity price channel is sub-divided into two which are investment effect due to Tobin's quantity theory of money and wealth effect on consumption and Modigliana's life cycle income hypothesis. So, lowering investment expenditure brings about reaction on asset price channel of monetary transmission mechanism, specifically on wealth effect of consumption. Modigliana (1971) in his life-cycle hypothesis of consumption, points that wealth is the major determinant factor of consumption expenditure in any economy. But financial wealth is an important aspect of stock and so transmission channel is linked to interest rate relationship with asset prices, specifically common stock. A fall in stock prices leads to a decline in financial wealth and consequently lowers the lifetime resources of household, thereby reducing consumption. In other words, when asset price is falling it affects aggregate demand in two ways.

One is that long term interest rate and value of housing and financial assets such as stocks and bonds will fall, which in turn reduce financial wealth and adversely affect household consumption. Two is that lower prices of financial assets reduce the market value of firms compared to the replacement cost of capital which retard investment demand. So, the channel of monetary policy transmission is that regulations of interest rate inform of contractionary approach brings a fall in stock prices thereby impacting on the other sub-channel of transmission mechanism in the other assets prices channel (Mishkin 2001; Mukherjee and Bhattacharya, 2011).

Bank Lending Channel

Bernanke and Blinder (1988) extend the underlying ideas of the IS-LM model to apply to the bank lending channel. In this framework, banks play an important role in the financial system by issuing liabilities such as bank deposits and holding assets such as bank loans. Specifically, theories and models of the bank lending channels emphasize that deposits constitute the principle source of funds for lending in almost all banks and bank loans make up the principle source of funds for investment in many firms.

The work of Gertler and Gilchrist (1993) rests on two assumptions regarding the bank lending channel. The first assumption is that bank loans and other non-bank assets are imperfect substitutes because of imperfect information in credit markets. The second is that the central bank controls the supply of bank loans through a monetary policy. The tightening monetary policy will reduce bank loans supply and influences real economic activity.

Monetary policy affects the external finance premium through the supply of credit of commercial banks. If the supply of bank loans is disrupted, bank dependent firms cannot obtain credit.

However, they may incur costs associated with finding new lenders. Thus, reduction in the supply of loans is likely to increase external finance premium and reduce real economic activity.

Reserve requirements

The monetary authority exerts regulatory control over banks. Monetary policy can be implemented by changing the proportion of total assets that banks must hold in reserve with the central bank. Banks only maintain a small portion of their assets as cash available for immediate withdrawal; the rest is invested in illiquid assets like mortgages and loans. By changing the proportion of total assets to be held as liquid cash, the Federal Reserve changes the availability of loanable funds. This acts as a change in the money supply. Central banks typically do not change the reserve requirements often because it creates very volatile changes in the money supply due to the lending multiplier (Bazina, 2012).

Expectation Channels

This channel is not independent and it plays significant role in an effective transmission mechanism. There is expectation of changes in private wages and prices since these can acceleratealteration of nominal demand with respect to central bank policy and impact on the delay to inflation decline. Expectation channel centres on private sector’s anticipation about future related variables. The expectation channel sees all variables as having inter-temporal or short term mutual effects and so they are determined in a forward-looking approach since they are influenced by the economic agent’s conviction about future shocks to the economy and how the apex bank responds to them. The expectation channels are short period reciprocity perception of the static interest rate, asset prices, exchange rate and monetary credit mechanisms. A typical example is that suppose there is public awareness on the future policy of apex bank, not yet backed with existing policy. This pronouncement does impact on real activity by changing market expectations which will trigger changes in current money and assets markets and ultimately result to changes in output and inflation. Nevertheless, this operation is a function of few factors such as the extent of apex bank credibility. So, a higher level of credibility will result in more anticipation effects of monetary policy and vice versa. Besides, is the extent of predictability of apex bank actions which its improvement bothers on raising transparency and a sound policy dissemination to the public. Lastly, it's a known high level of commitment to changing its tools of influencing the economy constantly has a way of encouraging the influence of expectation channel (Loayza and Schmidt-Hebbel, 2002; Mohanty and Turner, 2006).

All the aforementioned demonstrates the transmission channels depending on the development of the country and the institutional frame work. Countries have unique transmission mechanism and not a uniform channel. A very open economy with developed money and financial market has more channel of transmission than an underdeveloped economy with weak institutional arrangement. Whatever channel of monetary policy transmission mechanism dominant in a country, the apex bank has the responsibility of adequate policy implementation and monitoring to ensure stability, improved aggregate economic activity and sustainable growth.

The Balance Sheet channel

The balance sheet channel is associated with the effects of a policy induced change in interest rates on cash flows and on the subsequent balance sheet positions of non-financial firms that depend mostly on bank loans (Bernanke and Gertler, 1989). Monetary tightening policy increases interest rates, making non-financial firms' interest expenses increase and reducing their cash flows, and weakening their balance sheet positions. The value of collateral is reduced due to the falling of asset prices associated with rising interest rates. These effects lead to a reduction of a firm's net worth and raising the external premium of external funds. Bernanke and Gertler

(1995) develops the balance sheet channel as a broader credit channel, emphasizing a firm's increasing credit cost in the presence of financial market imperfection and how asymmetric information problems occur.

The balance sheet channel is based on the theory that the external finance premium facing a firm should depend on the firm's financial position. The greater the firm's net worth, the lower the external finance premium should be. Since the firm's financial position affects the external finance premium and then the overall terms of credit, fluctuations in the quality of the firms' balance sheets should similarly affect its investment and spending decisions.

Lower net worth of the firm might cause lower lending, thus, small and medium firms are more likely to face a disproportionately larger external finance premium. Thus, the ability of small and medium firms to access short term credit is limited reaction to a depreciation of balance sheet positions by cutting down investment and inventories.

2.1.3 Monetary Policy in Nigeria

The primary goal of monetary policy in Nigeria has been the maintenance of domestic price and exchange rate stability since it is critical for the attainment of sustainable economic growth and external sector viability (Sanusi, 2002). According to Kogar (1995), Central Banks cannot realize efficient monetary policy without setting new procedures and instruments in the long-run, because profit seeking financial institutions change or create new instruments in order to evade regulations or respond to the economic conditions in the economy. The CBN is the apex, principal regulator and supervisor in the money market, with the Nigerian Deposit Insurance Corporation (NDIC) playing complementary role. Actually, the promulgation of the CBN Decree

24 and Banks and Other Financial Institutions (BOFI) Decree 25, both of 1991, gave the Bank more flexibility in regulating and supervising the banking sector and licensing finance companies which was not so before. The CBN, apart from designing and implementing policies with a view to help in the development and growth of the country always pursue her universal goals of maintaining monetary stability through strengthening the real sector. CBN (2011) notes that the monetary policy strategy, is anchored on the attainment of internal balance and external viability. This is the intention of the Monetary Policy Committee that employs appropriate instruments of monetary policy to effect changes in the liquidity of the deposit money in the banks to influence the supply of money and regulates the financial institutions interest rates so as to affect all spending in the economy. Mordi (2009) notes that monetary policy is a blend of measures and/or set of instruments designed by the Central Bank to regulate the value, supply and cost of money consistent with the absorptive capacity of the economy or the expected level of economic activity without necessarily generating undue pressure on domestic prices and the exchange rate. Low and stable inflation has been pursued by the Central Bank. This is because of the unfavourable costs it has in the economy. So, the intention of monetary authority is aimed at counteracting undesirable distortions in macroeconomic variables.

Nnanna, (2001) reveal in his study of evolution of monetary policy in Nigeria in the past four decades, that though, the monetary management in Nigeria has been relatively more successful during the period of financial sector reform which is characterized by the use of indirect rather than direct monetary policy tools yet, the effectiveness of monetary policy has been undermined by the effects of fiscal dominance, political interference and the legal environment in which the Central Bank operates.

Monetary policy stabilizes the economy better under a flexible exchange rate system than a fixed exchange rate system and it stimulates growth better under a flexible rate regime but is accompanied by severe depreciation, which could destabilize the economy meaning that monetary policy would better stabilize the economy if it is used to target inflation directly than be used to directly stimulate growth (Busari, Omoke & Adesoye, 2002).

The effect for sustainable growth began in Nigeria in the early 1980's with the introduction of Structural Adjustment Programme (SAP), in response to the emergence and persistence of unstable macroeconomic instability. The Structural Adjustment Programme monetary policy was aimed at moderation inflation, increasing domestic savings, allocating resources efficiently, improving capital inflow and local production and employment, enhancing external reserves and stabilizing the Naira exchange rate (Nwoko, Ihemeje & Anumadu, 2016).

In the 1980s and 1990s (Batini, 2004) stress that monetary policy was often constrained by fiscal indiscipline. Monetary policies financed large fiscal deficit which averaged 5.6 percent of annual GDP and though the situation moderated in the later part of the 1990s it was short lived as Batini, described the monetary policy subsequently as too loose which resulted to poor inflation and exchange rates record.

Overtime, different monetary policy tools have been employed for monetary control and economic direction. For instance, the adoption of Structural Adjustment Program (SAP) in Nigeria, offered a sea of policy change in monetary policy development in Nigeria. The deregulation exercise in the financial system led to the establishment of two foreign exchange markets in 1986. In 1987, interest rate controls completely removed liberalized bank licensing and the unified foreign exchange markets. In 1988, foreign exchange bureaus were established, bank portfolio restrictions relaxed and the Nigerian Deposit Insurance Corporation was established. In 1989, banks were permitted to pay interest on demand deposits, the auction markets for government securities was introduced, the capital adequacy standards were reviewed upward and the extension of credit based on foreign exchange deposits was banned. In 1990, the risk-weighted capital standard was introduced and banks required paid-up capital increased. Also in 1990, a uniform accounting standards was introduced for banks while a stabilization security to mop up excess liquidity was also introduced. In 1991, there was an embargo on bank licensing while the administration of interest rate was introduced.

Also the Central Bank was empowered to regulate and supervise all financial institutions in the economy. In 1992, the interest rate controls removed once again while the privatization of government-owned banks commenced. More so, capital market deregulation commenced, credit control was dismantled while the foreign exchange market was reorganized. In 1993, indirect monetary instruments were introduced while in 1994 the interest and exchange rate controls were Re-imposed. In 1996, all mandatory credit allocations on banks by the CBN guidelines were abolished while in 1997 the minimum paid up capital of merchant and commercial banks was further raised to a uniform level of N500 million. In addition, the operational situation for banks was further liberalized in 2001 with the introduction of universal banking system while in 2005 the minimum paid up capital was further raised to N25 billion naira for all commercial banks in accordance with the recapitalization exercise. In 2006, the Central Bank of Nigeria introduced a new monetary policy implementation structure (Monetary Policy Rate (MPR)) to replace the Minimum Rediscounted Rate (MRR). Specifically, this is done to dampen the volatility of interest rate in money market and stimulate a transaction rate that would improve the transmission of monetary policy actions and ultimately to achieve a stable value of the domestic currency.

2.1.4 Monetary Policy in South Africa

In South Africa, the primary objective of monetary policy in South Africa is to achieve and maintain price stability in the interest of sustainable and balanced economic development and growth. Price stability reduces uncertainty in the economy and, therefore, provides a favourable environment for growth and employment creation. Furthermore, low inflation contributes to the protection of the purchasing power of all South Africans, particularly the poor who have no means of defending themselves against continually rising prices. The central bank has the authorization to conduct the monetary policy and its frameworks have been continuously changing since the 1960s. Various frameworks have been adopted as weaknesses in one framework lead to the adoption of another framework. The Reserve Bank has full operational autonomy and its monetary policy is set by the Bank's Monetary Policy Committee (MPC), which conducts monetary policy within a flexible inflation-targeting framework. This allows for inflation to be out of the target range as a result of first-round effects of a supply shock and for the Bank to determine the appropriate time horizon for restoring inflation to within the target range. This flexibility does not relieve the Bank of its responsibility with respect to returning inflation to within the target range but allows for interest rate smoothing over the cycle, which may mitigate any output variability from the monetary policy response to the shock.

The evolution of the South African monetary policy has been remarkable. From the "direct controls" regime in 1970 to the "liquidity asset ratio-based system" between 1960 and 1981, to the most recent monetary policy adopted in 2000 – the "inflation targeting framework" – the South African monetary policy system has been able to adapt to economic and development challenges both domestically and abroad. The inflation targeting is a monetary policy framework in which the Central Bank announces an explicit inflation target and implements policy to achieve this target directly. In fact, the inflation targeting framework provides full operational autonomy to the South African Reserve Bank (SARB), which can elect the use of any available monetary policy instrument in its pursuit of targets. Although there were some periods of fallout (e.g. 11.5 per cent in 2008), the SARB managed to bring inflation within the three to six per cent band (Ncube & Ndowu, 2013). During the period of 1960 to 1981, the Reserve Bank focused on quantitatively controlling interest rate and credit using the liquid asset requirements (Aron & Muellbauer, 2006). Controlling the liquid asset requirements affects the commercial banks' ability to create money as they are required to hold a certain amount of liquid assets as reserves. This will constrain the money supply in an economy, thereby controlling inflation.

In the period 1981 to 1985, the De Kock Commission (1978) was appointed to evaluate the monetary policy framework, and they recommended the use of preannounced monetary target range for a broad definition of money (M3) in South Africa (Chipote & Makhetha-Kosi, 2014). M3 money comprises of M2 plus large-denomination time deposits at all commercial banks; term repurchase agreements at commercial banks and saving and loan associations and institution only money market mutual fund balances (Mishkin, 2008).

Following the recommendation by the De Kock Commission, the cost of cash reserves-based system with preannounced monetary targets system was adapted from 1986 to 1998. The intention was to have control over the cost of cash reserves and the reserve bank controlled the discount rate. According to Casteleign (2003), the short term interest rate became the main monetary policy instrument during this period because of its influence on the cost of overnight lending and market interest rate thereby reducing the demand for credit. The eclectic approach was used from 1998 to 1999. It involved monitoring wide range of indicators, such as changes in the bank extension, overall liquidity in the banking sector, the yield curve, changes in official foreign reserves, changes in the exchange rate of the Rand, and inflation movements and expectations. The growth in money supply and bank credit extension were used as intermediate guidelines for the determination of short-term interest rates.

In 2000, the SARB adopted an inflation targeting framework through using interest rates as the policy instrument with the view of achieving price stability. Van de Merwe (2004) states the following as the motivations for adopting this framework: the role of inflation targeting to discipline monetary policy and increase the central bank's accountability; uncertainties among the public about the monetary stance adopted by the authorities when informal inflation targeting is used; better coordination of monetary and other economic policies; and the ability of inflation targeting to affect inflationary expectations. The inflation targeting framework was adopted with an objective of maintaining CPIX inflation between 3 and 6 % by the year 2002, using discretionary changes in the repo rate as its main policy instrument (Uwilingiye, 2010).

The SARB employs various instruments of monetary policy to influence interest rates, most of which is the accommodation instrument, supplemented by various open market operations (Gidlow, 2002). Most instruments used by SARB focus on market-oriented policy measures which seek to guide or encourage financial institutions to take certain actions on a voluntary basis rather than compelling financial institutions. The reserve bank uses the repo rate as the accommodation instrument. Other major instruments used by the central bank include the open market operations, reserve requirement ratios and the discount window policy.

2.1.5 Monetary Policy in Kenya

In Kenya, monetary policy consists of decisions and actions taken by the Central Bank to ensure that the supply of money in the economy is consistent with growth and price objectives set by the government. The objective of monetary policy is to maintain price stability in the economy. Price stability refers to maintenance of a low and stable inflation. The Central Bank of Kenya's principal objective is formulation and implementation of monetary policy directed to achieving and maintaining stability in the general level of prices. The aim is to achieve stable prices, measured by a low and stable inflation, and to sustain the value of the Kenya shilling. The Central Bank of Kenya Act Sections 4 and 5 provides that the Cabinet Secretary for the National Treasury shall, by notice in writing to the Bank, provide the price stability target of the Government at least in every period of 12 months. The target is provided at the beginning of the financial year (Central Bank of Kenya, 2012).

Monetary policy is guided by a monetary programme, which is premised on the economic growth and inflation targets provided by the National Treasury. Monetary policy decisions are made by the Monetary Policy Committee (MPC). The MPC meets at least once every two months and reviews data and analysis from various sources including the Central Bank Departments enabling it to decide on any action to maintain or vary its stance.

The Monetary Policy Committee is the organ of the Central Bank of Kenya (CBK) responsible for formulating monetary policy. The Committee was formed vide Gazette Notice 3771 on April 30, 2008, replacing the hitherto Monetary Policy Advisory Committee (MPAC).

The Central Bank has several tools that it can use to counter changes in the market and influence price stability:

- Reserve Requirements
- Discount Window Operations
- Open Market Operations

Commercial banks in Kenya are required by law to keep a specified proportion of their total deposits at the Central Bank. This proportion of deposits is called the Cash Reserve Ratio (CRR), and when the Central Bank needs to significantly adjust the amount of money in the market, it can increase or decrease the ratio.

The CRR deposits are held in the CBK at no interest. The CRR is currently set at 5.25 percent of the total of a bank's domestic and foreign currency deposit liabilities. To facilitate commercial banks' liquidity management, commercial banks are currently required to maintain their CRR based on a daily average level from the 15th of the previous month to the 14th of the current month and not to fall below a CRR of 3 percent on any day.

The CBK, as lender of last resort, provides secured loans to commercial banks on an overnight basis at a penal rate that is over the CBR. This facility is referred to as the Discount Window or Standing Facility. The penal rate restricts banks to seek funding in the market only resorting to Central Bank funds as a last solution.

The CBK does not have automatic standing facilities with respect to overnight lending. Access to the Window is governed by rules and guidelines which are reviewed from time to time by the CBK. Banks making use of this facility more than twice in a week are scrutinized closely and supervisory action taken. Open Market Operations (OMO) refers to actions by the CBK involving purchases and sales of eligible Government securities to regulate the money supply and the credit conditions in the economy. OMO can also be used to stabilize short-term interest rates. When the Central Bank buys securities on the open market, it increases the reserves of commercial banks, making it possible for them to expand their loans and hence increase the money supply. Specifically the Central Bank conducts open market operations using:

1. Repurchase Agreements (Repos) which entail the sale of eligible Government securities by the CBK to commercial banks through an auction system to reduce the level of commercial banks deposits held at CBK. Repos thus reduce the commercial banks'

capacity to make loans and advances to customers. The Central Bank undertakes to repurchase the security after three or seven days depending on the mutual agreement. The Late Repo, sold in the afternoon, has a 4-day tenor and is issued at an interest rate 100 basis points below the Repo on that day. When a weekend or public holiday coincide with the maturity date of the Repo, the tenor is extended to the next working day.

2. Reverse Repos are purchases by CBK of eligible Government securities from commercial banks. They enhance the liquidity of the money market during periods of tighter than desired liquidity level thereby dampening upward pressure on interest rate. The current tenors for Reverse Repos are 7, 14, 21, and 28 days.
3. Term Auction Deposit (TAD) is used when the securities held by the CBK for Repo purposes are exhausted or when CBK considers it desirable to offer longer tenor options. The CBK seeks to acquire deposits through a transfer agreement from commercial banks at an auction price but with no exchange of security guarantee. Currently, the tenors for such deposits at CBK are 14, 21, or 28 day periods. At maturity, the proceeds revert to the respective commercial banks.
4. Horizontal Repos are modes of improving liquidity distribution between commercial banks under CBK supervision. They are transacted between commercial banks on the basis of signed agreements using government securities as collateral, and have negotiated tenors and yields. Horizontal Repos help banks overcome the problem of limits to lines of credit, thus promoting more efficient management of interbank liquidity.

Other Monetary Policy Tools

Central Bank Rate (CBR): The CBR is reviewed and announced by the Monetary Policy Committee (MPC) at least every two months. Movements in the CBR, both in direction and magnitude, signal the monetary policy stance. In order to enhance clarity and certainty in monetary policy implementation, the CBR is the base for all monetary policy operations.

Whenever the Central Bank is injecting liquidity through a Reverse Repo, the CBR is the lowest acceptable rate by law. Likewise, whenever the Bank wishes to withdraw liquidity through a Vertical Repo, the CBR is the highest rate that the CBK will pay on any bid received. However, to ensure flexibility and effectiveness of monetary policy operations in periods of volatility in the market, the CBK can raise the maximum acceptable interest rates on Term Auction Deposit to above the CBR. Movements in the CBR are transmitted to changes in short-term interest rates. A reduction of the CBR signals an easing of monetary policy and a desire for market interest rates to move downwards. Lower interest rates encourage economic activity and thus growth. When interest rates decline, the quantity of credit demanded should increase.

Foreign Exchange Market Operations: The CBK can also inject or withdraw liquidity from the banking system by engaging in foreign exchange transactions. A sale of foreign exchange to banks withdraws liquidity from the system while the purchase of foreign exchange injects liquidity into the system. Participation by the CBK in the foreign exchange market is usually motivated by the need to acquire foreign exchange to service official debt, and to build-up its foreign exchange reserves in line with the statutory requirement.

The CBK uses its best endeavours to maintain foreign reserves equivalent to four months' imports as recorded and averaged for the last three preceding years. The CBK does not participate in the foreign exchange market to defend a particular value of the Kenya shilling but may intervene in the exchange market to stabilize the market in the event of excess volatility.

2.1.6 Economic Development

Economic development is a broader concept that accommodates social, economic progress and economic growth at large. It is generally believe that monetary policy influences macroeconomic variables which include employment creation, price stability, gross domestic product growth and equilibrium in the balance of payment in developing country (Anowor & Okorie, 2016; Precious, 2014).

For the purpose of this study, the economic development will be broken down into economic growth (GDP), stock market performance (market capitalization), manufacturing performance, private sector investment (credit) and economic development (GNI).

2.1.7 Economic growth (GDP)

Economic growth is subject to a range of determining factors, wherein the role of interest rate movements is but one of these factors. While the short-run actions of the monetary authorities are important, it is crucial to consider how building a reputation for price and financial market stability over time impacts long-run economic growth (Bhorat & Hirsch, 2016). According to Sen (1983) economic growth is one aspect of the process of economic development. It is an increase in the capacity of an economy to produce goods and services, compared from one period of time to another. It can be measured in nominal or real terms, the latter of which is adjusted for inflation. Traditionally, aggregate economic growth is measured in terms of gross national product (GNP) or gross domestic product (GDP), although alternative metrics are sometimes used. It is how much more the economy produces than it did in the prior period. Specifically, economic growth is best measured in nominal terms after removal of the effects of inflation. Maintenance of stability in the domestic level of prices and exchange rates is an important condition of economic growth.

The economic growth of African economies have however increased overtime and these growth have been motivated by many factors that cut across domestic monetary policy and external sector influences. The monetary policy has motivated the direction of investment activities which determine the economic growth of the African nations over time. The growths have encountered different calculation and recalculation strategy over times which have given an improved position of the economic growth indicator over time in African countries.

However, one unavoidable issue for reports on economic growth in Africa is the accuracy of GDP estimates. Existing economic data are considered inaccurate and thus unreliable in many African countries, leading to what some have called an African statistical tragedy (Shanta, 2011). Calculating exact GDP is difficult and expensive in general and even more so in African countries, which often lack sufficient statistical capacities. GDP estimates are negatively affected by the lack of appropriate censuses or by government interference for political purposes (in order to boast about higher growth rates). For this reason, GDP data should be taken with caution.

The inaccuracy of GDP calculation became obvious in the context of the GDP recalculation recently undertaken by several countries through so-called GDP 'rebasing'. This exercise led to impressive results. Ghana, the first country to do so in 2010, saw its GDP almost double, thus becoming a middle-income country. Nigeria's case is similar, with a 2014 GDP recalculation which led to an almost twofold increase in its economy, making it the biggest African economy, ahead of South Africa. Nigeria's 'rebasing' took branches of the economy which had not existed in 1990, the previous base year (e.g. the telecoms sector and the movie industry, both drivers of Nigerian economic growth), into account. Kenya and Uganda also recalculated their GDP in 2014 and their GDP estimates increased by 25% from 9 and 13%,10 respectively.

The economic growth of African economies

Table 2.1 Economic growth (GDP) of African countries

Year	NIG GDP (PPP)$'Billion	Kenya GDP (PPP) $'Billion	SA GDP (PPP) $'Billion
1986	112.071	26.388	189.786
1987	102.575	28.634	198.718
1988	114.173	31.441	214.313
1989	126.283	34.151	227.979
1990	147.672	36.878	235.66
1991	155.954	38.616	241.024
1992	164.627	39.07	241.25
1993	176.693	39.962	250.036
1994	186.863	41.845	263.617
1995	195.026	44.549	277.499
1996	213.69	47.182	294.733
1997	228.864	48.095	307.714
1998	243.262	50.236	312.662
1999	253.902	52.233	324.933
2000	279.677	53.741	346.133
2001	306.174	57.153	363.706
2002	332.317	58.31	382.834
2003	379.239	61.226	401.983
2004	423.923	65.826	431.849
2005	475.53	71.792	469.265
2006	530.957	78.33	510.789
2007	594.477	85.924	552.49
2008	654.716	87.813	581.304
2009	718.866	91.406	576.709
2010	800.185	100.3	601.5
2011	856.619	108.637	633.638
2012	909.314	115.511	659.334
2013	972.646	123.965	683.962
2014	1049.091	132.406	704.514
2015	1108.021	144.1	735.4
2016	1089.103	152.7	739.1

Source*: World Bank data 2016; World Data Atlas 2017, Central Bank of Nigeria, 2016; Knoema 2017; Index Mundi 2017*

From table 2.1, the Nigerian and South African economic growth started on a high note and progressed over the years continuous. In 1986, the Nigerian economic growth started at $112.071 Billion and continues to progress to $213.69 Billion within ten years, while the South African economic growth was $189.786 and grew to $294.733 Billion almost the same proportion with

Nigeria over the same period of time. However, the Kenyan economic growth started poorly at the beginning of the period compared to the other countries economic growth at $26.388 Billion. By 1996, the economic growth of Kenya grew to $47.182 Billion at almost 100% growth from the beginning of the study period. By 2006, the Nigerian economic growth had doubled to $594.477 Billion compared to the figure of 1996 and slightly surpasses the economic growth of South Africa at $510.789. While the Kenya economic growth almost doubled the figure of 1996 by growing to $ 78.33 Billion. By 2016, the Kenyan economic growth grew to $152.7 Billion but not in the same proportion of Nigerian and South Africa whose growth picked too $1,089.103 Billion and $739.1 Billion respectively. The table show that the economic growth of Nigeria and South Africa were over time appreciating at a competing rate while the Kenyan economic growth appreciated at a slow pace which give a distinct distance between the Kenyan economic growth appreciation to the duo of Nigeria and South African economic growth appreciation within the period under review.

2.1.8 Stock Market Performance

Stock market is a market where buyers and sellers engage in trade of financial securities like bonds, stocks etc and undertaken by participants such as individuals and institutions (World Bank, 2014). The market channels surplus funds from savers to institutions (deficit areas) which then invest them into productive use. This market provides long term finance for real sector developments (Desai, Foley & Hines, 2006). The primary function of stock markets is to serve as a mechanism for transforming savings into financing for the real sector. According to El-Wassal (2013), he noted that from a theoretical perspective, stock markets can accelerate economic growth by mobilizing and boosting domestic savings and improving the quantity and quality of investment. Better savings mobilization may increase the rate of saving and if stock markets allocate savings to investment projects yielding higher returns, the increasing rate of return to savers will make savings more attractive. Consequently, more savings will be channeled into the corporate sector. Efficient stock markets make corporations compete on an equal basis for funds and help make investment more efficient.

The commonly used measures to assess stock market development are stock market size and stock market liquidity (El-Wassal, 2013). The knowledge of the dimensions of stock market development will enable appropriate policies, measures and actions to be formulated and activated to assist stock markets to "develop" and also to diagnosis existing weaknesses. Primarily, it is important to state that growth and development is not the same thing. For a stock market to grow means that it increases in size or liquidity. To develop implies increasing or improving a stock market's ability to satisfy an economy's needs as stipulated among the main functions of stock markets.

i) Stock Market Size: There are two main indicators of stock market size: market capitalization and the number of listed companies.

a) Market Capitalization Ratio – This measures the value of listed shares divided by Gross Domestic Product (GDP). The assumption behind this variable is that capital market size is positively correlated with the ability to mobilize Capital (savings, money supply etc) and diversify risk on an economy-wide basis. Thorbecke (1997), found a positive and significant effect of monetary policy expansion on stock market performance.

b) The Number of Listed Shares - The number of listed shares is used as a complementary measure of stock market size. The main importance of this measure is that it is a proxy for the breadth of the stock market and is not subject to stock market fluctuations (Bekaert, Harvey, Lundblad & Siegel, 2004b and Rajan & Zingales, 2003).

c) The All Share Index – This is a series of numbers which shows the changing average value of the share prices of all companies in a stock exchange, and which is used as a measure of how well a market is performing. An index is a calculated average of selected share prices, representing a particular market or sector. It is a basket of shares that provides a broad sample of an industry, sector or economy. The collective performance of these shares gives a good indication of trends in the overall market they represent. It enables investors to track changes in the value of a general stock market, indices also provides a useful benchmark to measure the success of investment vehicles such as mutual funds, savings, foreign direct investments etc

ii) Stock Market Liquidity

Sarr and Lybek (2002), observed that one of the most important aspects of stock market development is liquidity. Liquid markets offer a number of benefits:

i) They render financial assets more attractive to investors, who can transact in them more easily. In addition, liquid markets allow investors to switch out of equity if they want to change the composition of their portfolio;

ii) Liquid markets permit financial institutions to accept larger asset-liability mismatches;

iii) They allow companies to have permanent access to capital through equity issues; and

iv) Liquid markets allow a central bank to use indirect monetary instruments and generally contribute to a more stable monetary transmission mechanism.

Analysts generally use the term Liquidity to refer to the ability to easily buy and sell securities. There are five dimensions of market liquidity, which are: tightness, immediacy, depth, breadth and resiliency. Tightness refers to low transaction costs, such as the difference between buy and sell prices. Immediacy represents the speed with which orders can be executed and settled, and thus reflects among other things, the efficiency of the trading, clearing and settlement systems. Depth refers to the existence of abundant orders, either actual or easily uncovered of potential buyers and sellers, both above and below the price at which a security would be trading on the market. Breadth means that orders are both numerous and large in value with minimal impact on prices, and resiliency usually denotes the speed with which price fluctuations resulting from trades are dissipated (Sarr & Lybek, 2002). A sound measure of liquidity will account for the cost associated with trading including the time cost and the uncertainty of finding a counterpart and finalizing the transaction. The most commonly used liquidity indicators include;

a) Total Value of Shares Traded Ratio (TVSTR) – This measures the total value of shares traded on the stock exchange divided by the Gross Domestic Product (GDP). The total value of stock traded ratio measures the organised trading of firm's equity as a share of national output and therefore should positively correlate with liquidity on an economy-wide basis. The total value of shares traded ratio complements the market capitalization ratio; although a market may be large but with little trading (Levine & Zervos, 1998).

b) Market Turnover Ratio (MTR) – This is the total value of shares traded divided by market capitalization and variable measures how liquid a market is. This ratio also complements the market capitalization ratio (Levine & Zervos, 1998). A large but inactive market will have a large market capitalization ratio but a small turnover ratio. Turnover also complements the total value of stock traded ratio. While, the total value traded ratio captures trading relative to the size of the economy, turnover measures trading relative to the size of the stock market.

For the purpose of our study, the stock market performance is narrowed down to market capitalization which is the aggregate valuation of the company based on its current share price and the total number of outstanding stocks. It is calculated by multiplying the current market price of the company's share with the total outstanding shares of the company in the three emerging African countries under review. The monetary policy plays both expansionary and contractionary roles which affect market capitalization in the stock market. Table 2.2 show the performance of market capitalization of the three African emerging economies.

Table 2.2 Market Capitalization (MC) of African countries

Year	South Africa MC ($'m)	Nig MC ($'m)	Kenya MC ($'m)
1986	102,652	3,883	306
1987	138,788	2,065	352
1988	126,189	2,207	390
1989	145,438	1,746	424
1990	136,869	1,370	453
1991	184,705	1,880	453
1992	164,046	1,220	637
1993	217,098	2,143	1,060
1994	259,523	2,977	3,047
1995	277,389	7,777	2,018
1996	241,571	12,714	1,799
1997	230,039	12,559	1,813
1998	168,536	10,322	2,089
1999	259,739	2,940	1,409
2000	204,301	2,401	1,255
2001	147,472	2,396	1,045
2002	181,998	2,374	1,431
2003	260,748	9,493	4,183
2004	442,520	15,866	3,891
2005	549,310	22,244	6,384
2006	711,232	32,831	11,378
2007	828,185	84,895	13,345
2008	482,700	48,062	10,854
2009	799,024	32,223	10,967
2010	925,007	50,546	14,461
2011	789,037	39,028	10,203
2012	907,723	56,205	14,791
2013	942,812	80,610	22,256
2014	933,931	63,466	26,140
2015	735,945	49,974	18,204
2016	951,320	29,792	18,848

Source*: World Bank data 2016; World Data Atlas 2017, Central Bank of Nigeria, 2016; Knoema 2017; Index Mundi 2017*

The Nigerian and Kenyan stock market performance in market capitalization were far below the performance of the South African stock market performance within the period under review. However, the Nigerian market capitalization grew and falls overtime. It started by falling from $3,883Million in 1986 to $1,220Million in 1992 before rising to $2,143 and further to $12,714Million in 1996 and fell again continuously from 1997 to 2002. In 2003, the activities of recapitalization process instigated action in the capital market which prompted the market capitalization process to increase to $9,493Million and further till the global recession of 2008 when the market capitalization took a nose dive approach to $48,062Million in 2008 from $84,895Million in 2007. The fall continues until 2010 when it picked again to $50,546Million and fall again to $$39,028Million in 2011 before rising in 2012 and 2013 in the tune of $56,205Million and $80,610Million respectively. From 2014, the market capitalization fell from $63,466Million to $29,792Million the end of study period. In Kenya, the market capitalization started increasing from the beginning of the period to 1994 before a sharp fall was experienced in 1995 from $3,047Million to $2,018Million. The Kenyan market capitalization fell in 1996 but picked again 1997 and 1998 respectively in ascending order. But in 1999, the capitalization fell continuously to 2001. It picked up in 2002 and further in 2003 to $4,183Million but another fall hit the market in 2004 to 3,891Million but an increase ensued in 2005 to 2007 before falling again in 2008 due to global financial crisis. From 2011, the market capitalization increased continuously to 2014 before falling in 2015 with a slight increase in 2016. The South African market capitalization though started on a strong note in $102,652Million, and had its own fare share of rise and fall over time. However, it also ended strongly in 2016 to the tune of $951,320Million.

2.1.9 Manufacturing sector

Manufacturing activities have significant impact on the economy of a nation. It industrialization acts as a catalyst that accelerates the pace of structural transformation and diversification of economic, enable a country to fully utilize its factor endowment and to depend less on foreign supply of finished goods or raw materials for its economic growth, development and sustainability. It developed economies, for instance, they account for a substantial proportion of total economic activities. Industrialization which is a deliberate and sustained application and combination of an appropriate technology, infrastructure managerial expertise and other important resources has attracted considerable interest in development economies in recent times.

Manufacturing sector, as a component of industry, provide information on such sectoral activities as:

[i] Total production.

[ii] Costs and other outlays accompanying such production.

[iii] Inter-relationship between wages, salaries, interest rates, depreciation, business taxes and operating surpluses.

In Nigeria, the sub-sector is responsible for about 10% of total GDP annually. In terms of employment generation, manufacturing activities account for about 12 per cent of the labour force in the formal sector of the nation's economy. This is why manufacturing sectors are relevant indices of the economic performance of a nation. In Africa, it has always been realized that economic development requires growth with structural change.

Industrialization has been accepted as the major driving force of the modern economy. In most modern economies, industrial sector serves as the vehicle for the production of goods and services, the generation of employment and the enhancement of incomes.

Hence, Kayode (1989) described industry and in particular the manufacturing sub-sector, as the heart of the economy. African countries have employed several monetary policy strategies which were aimed at enhancing the productivity of the sector in order to bring about economic growth and development (Olorunfemi, Tomola, Felix & Ogunleye, 2013).

Nwosa, Agbeluyi and Saibu (2011) established that there have been various regimes of monetary policy in Nigeria and across African countries, sometimes monetary policy is tight and at other times it is loose; this mostly used to stabilize prices and enhance the real sector performance such as the manufacturing sector. This is premised from CBN (2008) which reveals that the contribution of manufacturing sector to the Nigerian economy is insignificant as compared to the oil and the agricultural sector.

2.1.10 Problems Affecting Africa's Manufacturing Sector

Bakare-Aremu and Osobase, (2015) state that the main problems that have characterized the manufacturing sector of Nigeria and other African countries are lack of competitiveness, import dependency, low capacity utilization and low output. According to them, the period of the implementation of import substitution industrialization strategy produced a manufacturing sector that is weak, non-competitive and highly import dependent. Even though some growth in value-added was recorded during this period (particularly in the oil boom period 1973-81), manufacturing sector performance has been propelled by investment in factor accumulation rather than efficiency in factor use. They argued that the period of adjustment reforms (and beyond) has also featured low capacity utilization resulting in low output in the manufacturing sector, non-competitiveness of exports even after the introduction of various export incentive scheme and trade liberalization policy.

Soderbom and Teal (UNIDO, 2002) in their study of the performance of Nigerian manufacturing firms report on the Nigerian manufacturing enterprise survey 2001, had as part of their findings that the most frequently cited number-one problem for the firms is physical infrastructure, followed by access to credit, insufficient demand, cost of imported raw materials, and lack of skilled labour. This aggregation masks considerable differences over the size range in problem perceptions; for instance among micro firms the most frequently cited main problem is credit access, while for medium and large/macro firms it is physical infrastructure.

According to Anyanwu (2004) in Bakare-Aremu and Osobase, (2015), the lingering problems rocking the manufacturing sector are as follow:

(a) Low level of technology;
(b) Low level of capacity utilization rate;
(c) Low investments;
(d) High cost of production;
(e) Inflation; and
(f) Poor performing infrastructure.

Apart from these militating factors listed above, there exist other fundamental and current socioeconomic and political problems affecting manufacturing. These factors are stated as follow:

(1) Multiple Taxation/Levies: This stands out as one of the thorniest problems of the sub-sector in recent time. The tax and levies structures in the country are not well defined and are also volatile as all levels of government come up with different ways of raising revenue to finance their budgets. The government must take a position that recognizes that some of its expenditures and fiscal activities have negative impacts on the economy. The recent government active drive on internally generated revenue where a manufacturer/business concern is made to pay over 61 different taxes/levies per annum from the three tiers of government has a negative impact (Bakare-Aremu & Osobase, 2015). Taxes are paid by the producers but of course, the incidence is mostly borne by the consumers especially for goods with relative inelastic demand. This accounts for the reason why prices of commodities are highly volatile in the Nigerian local markets.

(2) Scarcity/Incessant Increase in Petroleum Products' Prices (In Nigeria): As an alternative to the epileptic power supply, manufacturers rely on generators to stay in business. The prices of diesel (AGO) and petrol (PMS) alone which have now constituted the larger chunks of costs of inputs in the production process have led to high cost of doing business in the country. In 1999, the Obasanjo administration assumed office and argued for the removal of the oil subsidy claiming that the proceeds could be used for important economic purposes. Eight years later, the former president left petrol price at N75.00 from the N19.00 which he met in the year 1999. This is about 295 per cent hike in petrol price. In addition to this, reduction in subsidy payment by President Jonathan in January 2012 aggravated this effect by raising the PMS Price toN97 from N65 his predecessor left it (a 38.14 per cent and 410.5 per cent since inception of democracy in 1999). But what about its concomitant effect on other products since their prices are tied to oil price?

(3) Insecurity of Lives and Property: Business thrives in a conducive environment that is devoid of factors inimical to growth and development. The constant ethno-religious and political crises in the country have contributed in large measure to the relocation of some firms from certain parts of the country to another while others like the multinational companies are threatening to quit business in Nigeria.

However, table 2.3 reveals the performance of the emerging African economies manufacturing sector since 1986.

Table 2.3 Manufacturing Utilization (MU) of African countries

Year	Nig MU ($'M)	Kenya MU ($'M)	South Africa MU ($'M)
1986	5572	1672	29205
1987	2758	1765	29849
1988	3602	1873	31791
1989	2512	1981	32385
1990	2712	2085	31657
1991	2897	2167	30211
1992	2315	2193	29220
1993	2621	2230	29167
1994	2728	2275	29945
1995	2317	2360	31890
1996	2244	2450	32331
1997	2448	2450	33206
1998	2620	2406	33125
1999	3023	2350	33316
2000	5431	2374	36016
2001	4009	2412	37154
2002	4038	2415	38194
2003	5575	2558	37620
2004	8347	2672	39461
2005	11131	2797	41909
2006	14006	2972	44608
2007	15406	3102	46995
2008	19476	3138	48083
2009	13373	3105	42973
2010	23810	3245	45512
2011	29425	3480	46893
2012	35485	3460	47876
2013	45981	3654	48270
2014	54779	3771	48321
2015	46631	3902	48154
2016	42344	4021	49443

Source*: World Bank data 2016; World Data Atlas 2017, Central Bank of Nigeria, 2016; Knoema 2017; Index Mundi 2017*

Like the market capitalization, the manufacturing output/production performed better in South Africa than Nigeria and Kenya. The Nigerian manufacturing output started by falling in 1987 to $2758Million from $5,572Million in 1986 the beginning of the study period. However, between 1989 to 1998, the manufacturing output was not more than $2897Million and less than $2244Million. In 1999, the manufacturing output rose and fell subsequently in 2001 to 2002 before rising in 2003 from $5,575Million continuously to 2008 in $19,476Million. In 2009, it fell briefly and picked again to $23,810 and continuously till 2014 in the tune of $54,779Million before falling in 2015 to $46,631Million. The Kenyan manufacturing output started on a rising note from the beginning of the study period till 1999 before falling from $2,406Million in 1998 to $2,350Million in 1999. From 2000, the Kenyan manufacturing output picked continuously till the end of the study period in 2016. The South African manufacturing started on the high note but experience sharp fluctuations over time in output. Starting from $29,205Million 1986, it increased overtime to $32,385Million in 1989 and fell in 1990 continuously till 1993. In 1994, the South African manufacturing output picked again till 2008 to the tune of $48,083Million. It fell in 2009 but increased in 2010 till the end of the study period with slight fall in 2015.

2.1.11 Economic development (GNI)

Economic development usually refers to the adoption of new technologies, transition from agriculture-based to industry-based economy, and general improvement in living standards. It is the process by which a nation improves the economic, political, and social well-being of its people. For the purpose if our study, economic development is a growth in average income, usually defined as per capita (per person) income.

The concept, however, has been in existence in the West for centuries. Modernization, Westernization, and especially Industrialization are other terms people have used while discussing economic development. Economic development has a direct relationship with the environment and environmental issues. The scope of economic development includes the process and policies by which a nation improves the economic, political, and social well-being of its people (O'Sullivan & Sheffrin, 2003). The development of a country has been associated with different concepts but generally encompasses economic growth through higher productivity, political systems that represent as accurately as possible the preferences of its citizens (Simon, 1966).

The gross national income (GNI) is the total domestic and foreign output claimed by residents of a country, consisting of gross domestic product (GDP), plus factor incomes earned by foreign residents, minus income earned in the domestic economy by nonresidents (Todaro & Smith, 2011).

Torado and Smith (2011) sum up development and underdevelopment using 3 key questions;

What has been happening to poverty?

What has been happening to unemployment?

What has been happening with inequality?

They conclude that if the three of these have declined from higher levels, then beyond doubt, this has been a period of development. If one or more of these problems have been growing worse, especially if all the three have, then that would be a period of ‘underdevelopment.

The economic development of a country is defined as the development of the economic wealth of the country. Economic development is aimed at the overall wellbeing of the citizens of a country, as they are the ultimate beneficiaries of the development of the economy of their country. It looks at the standard of living in the economy. Economic development is a sustainable boost in the standards of living of the people of a country. It implies an increase in the per capita income of every citizen. It also leads to the creation of more opportunities in the sectors of education, healthcare, employment and the conservation of the environment (Willis, 2011).

A standard of living is the level of wealth, comfort, material goods and necessities available to a certain socioeconomic class or a certain geographic area. The standard of living includes factors such as income, gross domestic product, national economic growth, economic and political stability, political and religious freedom, environmental quality, climate, and safety. The standard of living is closely related to quality of life (Investopedia, 2017).

The gross national incomes of the different countries under review are displayed in table 2.5.

Table 2.4 Gross National Income (GNI) of African countries

Years	Nig GNI	Kenya GNI	South Africa GNI
1986	NA	NA	NA
1987	NA	NA	NA
1988	NA	NA	NA
1989	NA	NA	NA
1990	2753	2291	6160
1991	2677	2239	6220
1992	2584	2156	6100
1993	2465	2054	6180
1994	2496	2069	6380
1995	2539	2132	6570
1996	2635	2192	6830
1997	2656	2152	7010
1998	2626	2169	7000
1999	2657	2150	7170
2000	2388	2112	7520
2001	2618	2130	7770
2002	2624	2088	8140
2003	2804	2088	8420
2004	3632	2140	9000
2005	3623	2223	9660
2006	4215	2298	10380
2007	4215	2384	10920

2008	4340	2333	11350
2009	4474	2344	11210
2010	4862	2467	11530
2011	4970	2557	11930
2012	5065	2586	12220
2013	5205	2654	12540
2014	5472	2718	12780
2015	5546	2805	12900
2016	5876	2897	12860

Source*: World Bank data 2016; World Data Atlas 2017, Central Bank of Nigeria, 2016; Knoema 2017; Index Mundi 2017*

The GNI for Nigeria and Kenya pose same rates of figures over time until late 1990s when the GNI in Nigeria started to increase to up to 3000. In 2001, the GNI was at 2618 and by 2004 the GNI became 3632 and further increased in 2006 to 4215. By 2012, the GNI hade improve to 5065 and the growth in GNI continue to the end of study period in 2016 to the tune of 5876. The Kenyan GNI maintain a 2000 plus status quo which peaked in 2016 to 2897 and had its least figure at 2054 in 1993. However, the South African GNI increased over time to the end of the study period with slight fall in standard of living over time in 1992, 1998, 2009 and 2016 all briefly and picked up subsequently. It shows that the standard of living in South Africa performed better over time in South Africa and Nigeria compared to Kenya. Overall, the standard of living in African economies improved generally.

2.2 Theoretical Framework

Monetary theory has undergone a vast and complex evolution since the study of the economic phenomenon first came into limelight. It has drawn the attention of many researches with different views on the role and dimensions of money in attaining macro- economic objectives.

Consequently, there are quite a number of studies aimed at establishing relationship between monetary policy and other economic aggregates.

In this chapter we will look at the theory that this study is anchored on for this study.

2.2.1 IS-LM Theory of Money Supply

The IS-LM model is another sensitive theory of money supply that is significant to credit facilitation (monetary movement) for economic direction.The IS-LM Model capture the interplay of variables where economic growth and development is determined by five key variables, which are money supply, interest rate, gross domestic saving, inflation and gross domestic debt. Jeffrey (2014) agree with Friedman (1995) by arguing that monetary policy can determine the long-run path of inflation, but its effect on real economic activity is limited and temporary. The contribution of central bank to economic growth is very low. The transmission process can be expressed through the ISLM model. For example, if the central bank uses expansionary monetary policy by open market leads to right ward shift in LM curve, it is meaning that interest rate decreases and the gross domestic product goes up. However, these consequences is considered as the immediate short-run effect of monetary policy, then the price level would increase, thus the LM curve snapping back gain.

The economic programme of a country typically defines the main economic objectives in terms of whether (direct) endogenous or (indirect) exogenous monetary mechanism is adopted to control money and credit. To achieve the macro-economic targets, the authorities implement a set of fiscal, monetary and other economic and structural policies (Okaro, 2011).

Hence, this study adopt the IS-LM Model of Monetary policy that prove that a decrease in the interest rate increases the amount of investment spending resulting in increased aggregate demand and the level of output and vice versa. The theory also show that decrease in interest rate increase money supply and economic aggregates. This increase is considered the monetarist expansionary policy. Thus, the analysis of money-growth relationship is crucial for conducting appropriate monetary and development policies.

Lacker (2014) agree with (Friedman, 1995) who argued that monetary policy can determine the long-run path of inflation, but its effect on real economic activity is limited and temporary. The contribution of central bank to economic growth is very low. The transmission process can be expressed through the ISLM model. For example, if the central bank uses expansionary monetary policy by open market leads to right ward shift in LM curve, it is meaning that interest rate decreases and the gross domestic product goes up. However, these consequences is considered as the immediate short-run effect of monetary policy, then the price level would increase, thus the LM curve snapping back gain.

2.3 Empirical Review

Various empirical literatures show that monetary policy shocks have some modest effects on economic parameters.

2.3.1 Monetary policy and economic growth proxy by Gross Domestic Product (GDP)

Various studies have been carried out between monetary policy and economic growth/economic development proxy by gross domestic product because most research carried out view economic development from a growth perspective. This study dissected growth from development and review them separately, thus the reviews of previous studies on economic growth.

Using money supply as a measure of monetary policy, Nouri and Samimi (2011) examine the impact of monetary policy on economic growth in Iran adopting ordinary least squares (OLS) technique and data covering the period 1974-2008. A positive and significance relationship between money supply and economic was established in the study. Fasanya, Onakoya and Agboluaje (2013) also examining the impact of monetary policy on economic growth using time series data covering the period 1975-2010. The effects of stochastic shocks of each of the endogenous variables were explored using Error Correction Model (ECM). Findings of the study reveal a long run relationship among the variables. Also, the core finding of the study shows that inflation rate, exchange rate and external reserve are significant monetary policy instruments that drive growth in Nigeria.

Hameed, Khalid and Sabit (2012) review the decisions of monetary authorities and how influences the macro variables like GDP, money supply, interest rates, exchange rates and inflation. It asserts that the foremost objective of monetary policy is to enhance the level of welfare of the masses and it is instrumental to price stability, economic growth, checking BOP deficits and lowering unemployment. The method of least square OLS explained the relationship between the variables under study. Tight monetary policy in term of increase interest rate has significant negative impact on output. Money supply has strong positive impact on output that is positive inflation and output is negatively correlated, exchange rates also have negative impact on output

Micheal and Ebibai (2014) examine the impact of monetary policy on selected macroeconomic variables such as gross domestic product, inflation and balance of payment in Nigeria using OLS regression analysis. The result shows that the provision of investment friendly environment in Nigeria will increase the growth rate of GDP.

Olorunfemi and Dotun (2008) assess the impact of monetary policy on the economic performance in Nigeria using simple regression. The study found out that there was a negative relationship between interest rate and GDP on the one hand and inflation and GDP on the other. The study did not disaggregate the impact of monetary policy on the various sectors of the economy like the industrial sector.

Nasko (2016) examine the impact of monetary policy on economic growth in Nigeria. The study uses time-series data covering the range of 1990 to 2010 by using variables such as money supply, interest rate, financial deepening and gross domestic product. The study discovered that all the variables were found to have marginal impact on the economic growth of Nigeria.

Adigwe, Echekoba and Onyeagba (2015) also examine the impact of monetary policy on the Nigerian economy.The result of the analysis shows that monetary policy represented by money supply exerts a positive impact on GDP growth but negative impact on the rate of inflation.

Nwoko, Ihemeje and Anumadu (2016) study the extent to which the Central Bank of Nigeria Monetary Policies effectively promotes economic growth. The findings from the study indicate that average price and labour force have significant influence on Gross Domestic Product while money supply was not significant. Interest rate was negative and statistically significant.

Okoro (2013) examined the impact monetary policy on Nigeria economic growth by testing the influence of interest rate, inflation, exchange rate, money supply and credit on GDP. Augumente Dickey Fuller (ADF) test, Philips–Perron Unit Test, Co-integration test and Error Correction Model (ECM) techniques were employed. The results show the existence of long–run equilibrium relationship between monetary policy instruments and economic growth.

Udude (2014) examined the impact of monetary policy on the growth of Nigeria economy between the period of 1981 and 2012 with the objective of finding out the impact of various monetary policy instruments (money supply, interest rate, exchange rate and liquidity ratio) in enhancing economic growth of the country within the period considered using vector error correction mechanism (VECM) test. The result of the vector error correction mechanism (VECM) test indicates that only exchange rate exerted significant impact on economic growth in

Nigeria while other variables did not. Equally, only money supply though statistically insignificant possessed the expected sign while others contradicted expectation thus concluding that monetary policy did not impact significantly on economic growth of Nigeria within the period under review.

Sulaiman and Migiro (2014) evaluate the nexus (link) between the Nigerian economic growth and monetary policy from 1981 to 2012. It measures economic growth using gross domestic product and the indices of monetary policy that include: cash reserve ratio, monetary policy rate, exchange rate, money supply, and interest rate. The co-integration test result shows that the variables are cointegrated with one other and the test for causality indicates that monetary policy has a noticeable influence on the growth of the economy, while economic growth does not influence monetary policy equally significantly. This suggests that the monetary policy transmission mechanisms contribute positively to the productivity of the Nigerian economy – thus enhancing economic growth. However, Ehigiamusoe, Uyi and Kizito (2013) also studying on the Link between Money Market and Economic Growth in Nigeria: using the Vector Error Correction Model Approach found that money supply significantly and negatively impact on economic growth and conclude that the link between money market and the real sector is very weak.

Onyeiwu (2012), also examine the impact of monetary policy on the Nigerian economy using the ordinary least squares method (OLS) to analyse data between 1981 and 2008 reveal that monetary policy presented by money supply exerts a positive impact on GDP growth and Balance of Payment but negative impact on rate of inflation. However, Ajisafe and Folorunso (2002) examine the relative effectiveness of monetary and fiscal policy on economic activity in Nigeria using co-integration and error correction modelling techniques and annual series for the period 1970 to 1998. The study reveal that monetary rather than fiscal policy exerts a greater impact on economic activity in Nigeria and concluded that emphasis on fiscal action by the government has led to greater distortion in the Nigerian economy.

Other African studies like Njimanted, Akume and Mukete (2016) empirically explore the impact of key monetary policy variables on the economic growth in the CEMAC zone from the period of 1981 to 2015.Their study reveals that key monetary policy variables influence economic growth of the CEMAC zone in different ways with inflation rate as the impact factor. The study further revealed that lending and inflation rate generated substantial destabilizing impacts on the economic growth, suggesting that the monetary authorities should play a critical role in creating an enabling environment for growth.

Hakizamungu, Mbabazize and Ruhara (2016) using quarterly data from 2000Q1 to 2015Q4 to investigate the dynamic influence of interest rate channel, exchange rate channel and credit channel of monetary transmission mechanisms on economic growth in Rwanda and the results from the variance decomposition revealed that in long run the credit channel is more effective than other channels of monetary transmission mechanism by affecting RGDP with a shock of 52.15% in long- run at the 64th period followed by interest rate channel and exchange rate channel respectively. In the short- run interest rate channel affects the economic growth of Rwanda than other channels.

Kamaan (2014) examine the effect of monetary policy on economic growth in Kenya.Findings from this study indicated that one standard deviation monetary policy shock proxied by the CBR has a negative and insignificant effect on the output in the first two months which then becomes positive and insignificant in the next four months. However, a one standard deviation shock of the interbank rate to inflation is positive and significant for the first two and a half months. The effect continues to be positive but insignificant up to the sixth month.

Guantai and Rotich (2016) investigate the effects of monetary policy measures on the economic growth in Kenya. They used monetary policy variables in money supply, interest rates, exchange rates and cash reserve ratio on the economic growth proxied by Gross Domestic Product growth rate. The findings of the study revealed that money supply was positively and significantly related to economic growth, interest rates and exchange rates were however found to have a negative relationship with economic growth. The findings further revealed that cash reserve ratio had positive but insignificant relationship with economic growth.

Wulandari (2012) assess the importance role of two monetary transmission mechanism channels in managing inflation and contributing to economic growth, by employing Structural Vector Autoregression (SVAR) model. The study looking at both interest rate channel and credit bank lending channels discovered that that interest rate channel plays important role in monetary transmission mechanism for maintaining inflation but has limited role in the economic growth. In the other hand, credit-bank lending channel can effectively affect economic growth.

Mohsan-Khudri and Shoayeb-Noman (2015) evaluate the trends in policy variables and examine the impact of fiscal and monetary instruments on economic growth (RGDP) from the period of 1979-80 to 2012-13 and discovered thatinflation rate and interest rate on deposit have negative impact on RGDP.

Chipote and Makhetha-Kosi (2014) explores the role played by monetary policy in promoting economic growth in the South African economy over the period 2000-2010 using Augmented Dickey-Fuller and Phillips Perron unit root tests to test for stationarity and Johansen co-integration and the Error Correction Mechanism are employed to identify the long-run and short-run dynamics among the variables. The finding of this study shows that money supply, repo rate and exchange rate are insignificant monetary policy instruments that drive growth in South Africa whilst inflation is significant.

Precious (2014) investigate the impact of monetary policy in promoting economic growth in the South African economy over the period 2000-2010, by using Johansen co-integration and the Error Correction Mechanism to identify the long-run and short-run dynamics between variables. The finding shows that money supply, repo rate and exchange rate had the positive impact on economic growth in South African countries.

Drama (2017) examine the impacts of monetary policy on economic growth by studying the case of Cote d'Ivoire through the SVARmodelto generate impulse response function that raises the impact of economic policy shocks on growth in Cote d'Ivoire. The result of the study demonstrate that innovations in monetary aggregate impact in real activities and prices although very low. This implies that monetary policy shocks are not the main determinant of business cycle movements in Cote d'Ivoire.

Outside Africa, Bhattarai (2011) investigated the impact of exchange rate and money supply on growth, inflation and interest rate in the UK found that depreciation of Sterling and higher interest rate have negative impact on economic growth.

Osasohan (2014) also investigate empirically the impact of monetary policy on economic growth in the United Kingdom over a study period spanning from 1940-2012 using the Vector Error Correction Model (VECM). The study shows that a long run relationship exists among the monetary variables. Specifically, it finds that the inflationary rate and money supply are significant monetary policy instruments that drive growth in the United Kingdom.

In Iran, Seyed (2016) examines the impact of monetary policy on economic growth over the period 1971-2011. Seyed discover that in the long run, economic growth was significantly influenced by money supply, exchange rate and inflation rate, while in short run, the results of estimated Error-correction model indicate that money supply and exchange rate also significantly impact on economic growth in Iran.

Based on the reviewed empirical literature, the study showed that contradicting findings were shown in the same country study and across, thus this objective of the study is to identify the effect of monetary policy on economic growth so as to have a stand in the literature.

2.3.2 Monetary policy and stock market performance proxy by Market Capitalization

Stock market share sensitive reactions with the monetary policy as a simple change in monetary policy either for expansionary or contractionary purpose, the stock market react swiftly to every monetary actions and inactions. This has prompted researchers to venture the possible reaction of the stock market to monetary policies and vice versa. Various studies have been carried out in the literature. For instance, Kimani and Mutuku (2013) investigate the impact of inflation, Central Depository System (CDS) and other macroeconomic variables (including deposit rate, gross domestic product terms of trade and the net effective exchange rate) on the Nairobi stock market performance using quarterly data from the Central Bank of Kenya (CBK) and the Nairobi Stock Exchange (NSE) for the period December 1998 to June 2010. Their study shows that there is a negative relationship between inflation and stock market performance in Kenya.

Mutuku (2014) further examine the relationship between stock market returns and monetary policy stance in Kenya using time series data for the period 2003 to 2013. The study employed the ordinary least square method and discovered that money supply multiplier has a positive and significant influence on stock market returns. The results further revealed that treasury bills rate, cash reserve requirement and Repo rate as indicators of monetary policy do not significantly influence Kenyan stock market returns.

Ngigi (2008) analyzed the impact of fiscal and monetary policies on securities market performance in Kenya using the general to specific model specification and deduction. Values for the anticipated and unanticipated fiscal and monetary policies were obtained and used in the estimation of the securities market performance. Results showed that both anticipated monetary policy actions and unanticipated fiscal policies actions affect securities market performance negatively while unanticipated monetary policy has positive effect on securities market performance. Anticipated fiscal policy was found to have no effect on market performance.

Daferighe and Aje (2009) examine the link between stock prices and monetary policy using Nigerian data for the period 1997-2006 and found evidence of a negative, albeit weak relationship. Nemaorani (2012) estimated single equation models by regressing real and nominal stock returns on changes in short-term interest rate using Botswana data. Using monthly data for the period 2001-2011, he found a positive and statistically significant relationship between interest rate changes and stock returns. His explanation for this counter-intuitive result was that the dominant players in the domestic stock market, who are the commercial banks, are also the main beneficiaries of interest rate increases through their exclusive participation in the Bank of Botswana Certificates. However, Nemaorani does not explain how he dealt with the simultaneity and omitted variables problems described earlier.

Adaramola (2011) investigated the impact of macroeconomic indicators on stock prices in Nigeria. This work has unique interest on the individual firm's level. Secondary data on stock prices of selected firms and six macroeconomic variables between 1985:1 and 2009:4 were used for the analysis. The macroeconomic indicators used in the research work are: money supply, interest rate, exchange rate, inflation rate, oil price and gross domestic product. The panel model was used to examine the impact of macroeconomic variables on stock prices of the selected firms in Nigeria. The model was considered appropriate for its ability to combine both time series and cross-sectional data. The empirical findings of the study revealed that macro-economic variables have varying significant impact on stock prices of individual firms in Nigeria. Apart from inflation rate and money supply, all the other macroeconomic variables have significant impacts on stock prices in Nigeria. The study therefore concluded with empirical evidences that trends in macroeconomic variables can be used to predict movement of stock prices to a great extent in Nigeria.

Okpara (2010) analyze the effect of monetary policy on the Nigerian stock market returns A Vector Error Correction Model and the Forecast Error Decomposition Analysis were also used to determine the long and short run dynamic properties of the equations. The study discovered that, monetary policy is a significant determinant of long-run stock market returns in Nigeria. As, high Treasury bill rate reduces stock market returns and thus, shows an evidence of monetary policy efforts to slow down the economy. While current and one period lag interest rate exert a positive and significant influence on the stock market returns.

Eze (2011) investigates the effect of monetary policy on stock market performance in Nigeria using ordinary least square; co-integration and error correction model. It was discovered that stock market performance is strongly determined by broad money supply, exchange rates and consumer price index in the short and long-run.

Ogbulu and Uruakpa (2011) investigate the link between monetary policy and stock prices in the Nigerian capital market as well as the direction of causality between monetary policy variables and asset prices using quarterly data from second quarter of 1986 to fourth quarter of 2011. The empirical results show that there is one co-integrating long run dynamic relationship between stock prices and the set of broad money supply, interest rate, foreign exchange rates and inflation. The parsimonious ECM estimates indicate that broad money supply has a positive and significant impact on stock prices while interest rate depicts a weak relationship with stock prices. In addition, the study reported uni-directional causality from stock prices to broad money supply and also from foreign exchange rate to stock prices. The impulse response and variance decomposition analyses reveal that own shocks from stock prices are the dominant source of variations in the forecast error decomposition.

Abaenewe and Ndugbu (2012) investigate the effect of monetary policy development on equity prices in the Nigerian Stock Exchange Market using annual data from 1985 to 2010 using ordinary least square regression (OLS) to test monetary policy variables in interest rate, exchange rate and consumer price index (proxy for inflation) on the equity prices (proxied by all share price index). The result of the analysis showed a weak correlation between monetary policy and equity prices. This reflected in the explanatory variables which accounted only 15.6% in the changes of equity prices in Nigeria. All the explanatory variables are negatively and insignificantly related to equity prices, except the consumer price index that has insignificant positive relationship with equity prices. The study further revealed that monetary policy made no significant influence over the prices of ordinary equities in Nigeria.

Chude and Chude (2013) examine the effect of broad money supply on the stock market returns in Nigeria. Stationarity test, co-integration test and error correction model were used as a model. It was discovered that there is long run relationship between broad money supply and stock market returns in Nigeria and that broad money supply has been relatively high over the years and has significant positive impact on the stock market returns in Nigeria.

Shehu (2013)assess the reactions of Nigeria's stock market to monetary policy innovations during the period of global financial crisis on the basis of monthly data over the period January, 2007 to August, 2011. In this study, stock market return was regressed against major monetary policy instruments; money stock (M1, and M2) and monetary policy rate (MPR).Results from the empirical analysis revealed that the unanticipated component of policy innovations on M2 and MPR exerts destabilizing effect on NSE's returns, whereas the anticipated component does not.The study strongly recommends realistic and timely policy pronouncements by the MPC to achieve stability in the market. This support the result of earlier study in Juat-Hong (2009) which reveals that only the anticipated component of money supply shock affects the volatility of equity returns in Malaysian market but the unanticipated components do not.

Nwakoby and Alajekwu (2016) investigate the effect of monetary policies on stock market performance in Nigeria from 1986 to 2013. The study used All Share Index as the indicator of stock market performance (ASI) while the explanatory variables included Monetary Policy Rate (MPR), Treasury bill rate (TBR), Lending interest rate (INT), Liquidity ratio (LR) and deposit rate (DR). The co-integration result of their study indicates that there is long run relationship between monetary policy and stock market performance in Nigeria. This was further supported by the OLS regression result that showed that monetary policy significantly explains 53% of changes stock market performances in Nigeria.

In Asia, Yoshino, Taghizadeh-Hesary, Hassanzadeh and Prasetyo (2014), studied the response of stock markets to monetary policy (An Asian Stock Market perspective) a case of Tehran stock market. They estimated the response of Asian stock market prices to exogenous monetary policy shocks employing the VECM. The results indicated that stock prices increase persistently in response to exogenous monetary policy easing. Further they conclude that there is an andogenous response of the stock prices to monetary policy as evidenced by variance deposition results

Seong (2013) investigates the evidence of monetary policy effect on the Singapore stock exchange during January 1991 to September 2013. Using Engle-Granger Cointegration, Engle-Granger two-step Error Correction Model and Pairwise Granger Causality, the study reveal there are short run and long run linkages between monetary policy instruments and Singapore stock exchange.

Zare, Azali and Habibullah (2013) examine the asymmetric response of stock market volatility to monetary policy over bull and bear market periods in ASEAN5 countries (Malaysia, Indonesia, Singapore, the Philippines and Thailand) using the well-tested pooled mean group (PMG) technique. Estimating the models using monthly data from 1991:1 to 2011:12, the results show that a contractionary monetary policy (interest rate increases) has a stronger long-run effect on stock market volatility in bear markets than bulls which is consistent with the prediction of finance constraints models.

Qayyum and Anwar (2011) showed that markets returns in Pakistan are not only affected significantly by its lag, but, by monetary policy via variations in the repo rates. An increase (decrease) in the repo rates, indicating a monetary policy tightening (expansionary), according to them decreases (increases) the returns to the stock market. This implies that the monetary policy has a positive impact on the volatility of the stock market.

In Europe and America, Ioannidis and Kontonikas (2006) investigate the effect of the monetary policy on securities returns in thirteen OECD countries over the period 1972-2002. They regressed the securities market variable on the monetary policy variable and found that securities returns decrease when money supply decreases. Their findings indicate that monetary policy shifts have significant negative impact on both nominal and inflation-adjusted securities returns. This relationship was significantly different from zero at the 5 percent level in 10 out of 13 countries. However, the strengths of the links differed from one country to another possibly because of their inherent structural differences.

Bjornland and Lietemo (2009) employed a VAR methodology that used both short-run and long-run identification scheme to examine the relationship between monetary policy and asset prices and found that there is substantial simultaneous interaction between the interest rate setting and shocks to real stock returns in the US. This implies that just as monetary policy is important for the determination of stock prices, the stock market is an important source of information for the conduct of monetary policy.

Fern´andez-Amador, G¨achter Larch and Peter (2011) study the actual impact of monetary policy on stock liquidity and thereby addressing its role as a determinant of commonality in liquidity using panel estimations and vector autoregressive models. The result of the study suggest that an expansionary monetary policy of the European Central Bank leads to an increase of stock market liquidity in the German, French and Italian markets. These findings were robust for seven proxies of liquidity and two measures of monetary policy.

Oskar (2014) estimate the interaction between returns on the US stock market (Standard & Poor’s 500 and Dow Jones Industrial Average), US monetary policy and the Investor Sentiment using a structural vector autoregressive (VAR) methodology for the period of January 2000 to November 2014. The different measures of a monetary policy are the rate change (which has been separated into a expected change and a unexpected change) and the growth rate of money supply (M2) and discover that, on average, there is a significant relationship between an expected change in the fed fund target rate and stock market returns.

These review elaborated on diverse standing and review of monetary policy and stock market reactions. However, this objective of the study will look at the monetary policy instruments and stock market performance in market capitalization.

2.3.3 Monetary policy and Industrial Output (Manufacturing Output (MO))

Monetary policy as one of the economic policies is usually used in achieving various macroeconomic objectives like increase in output needs and providing favourable environment for effective promotion of output. Various empirical works have been carried out in line with monetary policies and manufacturing output across the world. By exploring into the areas of study, this research reviewed Chimobi and Uche (2010), who examine the relationship between Money supply, Inflation and Output in Nigeria. The study adopted co-integration and granger-causality test analysis. The co-integrating result of the study showed that the variables used in the model exhibited no long run relationship among each other. Nevertheless, money supply was seen to granger cause both output and inflation. The result of the study suggested that monetary stability can contribute towards price stability in the Nigerian economy since the variation in price level is mainly caused by money supply and concluded that inflation in Nigeria is to an extent a monetary phenomenon.

Chukwu (2009) analyze the effect of monetary policy innovations in Nigeria. The study used a Structural Vector Auto-Regression (SVAR) approach to trace the effects monetary policy stocks on output and prices in Nigeria. The study also analyzed three alternative policy instruments, that is, broad money (M2), minimum rediscount rate (MRR), and the real effective exchange rate (REER). The study found evidence that monetary policy innovations have both real and nominal effect on economic parameter depending on the policy variable selected.

Another study on Nigerian in Saibu and Nwosa (2011), examine the growth of Nigerian sectoral output caused by monetary policy from 1986 to 2008. The results indicated that the manufacturing sector is not receptive to monetary policy and the agricultural sector is sensitive to changes in exchange rate. In addition, it was discovered that improvement in the performance of the mining sector is largely determined by interest and exchange rates and that the exchange rate variability and total loan disbursed by bank are key factors in predicting the behavior of the construction/building sector. On the whole, the most influential monetary measure is the exchange rate.

Akujuobi and Chima (2012) also examine the impact of commercial Bank credit to the production sector on economic development in Nigeria for the period 1960-2008 using an ordinary least square technique. The commercial banks' credit to the following subsectors of the production sector - agriculture, forestry and fishery, manufacturing, mining and quarrying and real estate and construction were examined against the Gross Domestic Product. The finding of the study revealed that a long-run relationship exists between banks' credits to the production sector and economic growth. Also, the finding showed that, there was a high evidence of a bi-directional causal relationship between two of the explanatory variables and the Gross Domestic Product (GDP) with only the commercial banks' credit to the mining and quarrying sub-sector appearing to be a significant contributor at 1% significant level. Hence, the study concludes that, commercial Banks' lending to the production sector has not performed well in relation to contribution to economic growth.

Owalabi and Adegbite (2014) analyze the impact of monetary policy on industrial growth in Nigerian economy using multiple regression analysis. They analyzed the relationship between manufacturing output, treasury bills, deposit and lending, and rediscount rate and industrial growth, and found that the variables had significant effects on the industrial growth.

Modebe and Ezeaku (2016) investigate the linkage between inflation and manufacturing sector growth in Nigeria using annualized time series data from 1982 to 2014. The regression results reveal that inflation and interest rate have negative and non-significant effect on manufacturing sector growth while exchange rate appear to positively and significantly influence the growth of manufacturing sector value added. Granger causality results reveal a unidirectional causality running from exchange rate to output growth. Inflation and interest rate however are not causal for output growth and *viz versa*.

Sola, Obamuyi,Adekunjo and Ogunleye (2013) examine manufacturing performance for sustainable economic development in Nigeria using Panel data analysis for secondary data from 1980-2008. The result of the study showed that investment, capacity utilization and import were major determinants of manufacturing performance for the period.

Lawal (2016) analyze the effect of exchange rate fluctuations on manufacturing sector output in Nigeria from 1986 to 2014, a period of 28 years, Using ARDL it was discovered that exchange rate fluctuations have long run and short run relationship on manufacturing sector output. The result further showed that exchange rate has a positive relationship on manufacturing sector output but not significant. This was supported by Asher (2012), who showed that exchange rate fluctuations have a positive effect on manufacturing sector in Nigeria. However, exchange rate fluctuations have no significant effect on the quantity and quality of goods manufactured by Nigeria firms.

Omini, Ogbeba and Okoi (2017) investigate the impact of monetary policy shocks on industrial output in Nigeria using restricted VAR (VECM) model and Granger causality test for the period 1970 to 2015. Results show that contribution of manufacturing subsector to GDP responded positively to shocks in monetary policy, commercial bank credit to industrial sector and exchange rates, while contribution of solid minerals subsector to GDP responded positively to shocks in commercial bank credit to the industrial sector and exchange rate after the first year. On the other hand, the causality test result indicated a unidirectional causality running from monetary policy rate and exchange rate to the contribution of manufacturing sector to GDP on the one hand, and commercial bank credit to the industrial sector and exchange rate to the contribution of solid mineral sector to GDP on the other. Thus, stating that monetary policy shocks facilitate growth of industrial output in Nigeria.

Unaimikogbo and Enoma (2001) evaluate the impact of monetary and fiscal policies on manufacturing industry in Nigeria with a simulation equation model 1986 to 1997. Using Ordinary Least Square (OLS) estimation technique of data analysis, the study found that both policies contribute significantly to the growth of the manufacturing industry. They concluded that monetary variable is more effective and dependable than fiscal variable in affecting changes in economic activities.

Odior (2013) empirically investigates the impact of macroeconomic factors on manufacturing productivity in Nigeria over the period 1975 to 2011. The analysis starts with examining stochastic characteristics of each time series by testing their stationarity using Augmented Dickey Fuller (ADF) test and estimate error correction mechanism model. The findings were reinforced by the presence of a long-term equilibrium relationship, as evidenced by the cointegrating equation of the VECM. The study showed that credit to the manufacturing sector in the form of loans and advances and foreign direct investment have the capacity to sharply increase the level of manufacturing productivity in Nigeria, while broad money supply has less impact and concluded that expansionary policies are vital for the growth of the manufacturing sector in Nigeria which in turn would lead to economic growth.

Nneka (2013) examined the performance of monetary policy on manufacturing sector in Nigeria for time frame 1986 to 2009. She noted that the main focus of monetary policy in relation to the manufacturing sector has always been the stimulation of output, employment and the promotion of domestic and external stability, while that of fiscal policy has been the generation of revenue for the government and the protection of domestic infant industries against unfair competition from import and dumping. Vector Error Correction (VEC) and Ordinary Least Square (OLS) estimation were used to study the models for significance, magnitude, direction and relationship. The study revealed that money supply positively affects manufacturing output index while company lending rate, company income tax rate, Inflation rate, Exchange rate has a negative impact to the performance of the manufacturing sector over the years. They recommended that expansionary policies are vital for the growth of the manufacturing sector in Nigeria which in turn would lead to economic growth.

Imoughele andIsmaila (2014) examine the impact of monetary policy on Nigeria's manufacturing sector performance for the period 1986-2012. The study showed that individual variables: external reserve, exchange rate and inflation rate were statistically significant to manufacturing sector output while broad money supply and interest rate were not statistically significant to manufacturing sector output in the previous and current year. However, interest rate, exchange rate and external reserve impacted negatively on the sector output but broad money supply and inflation rate affect the sector positively.

Bakare-Aremu and Osobase (2015) investigate the impact of monetary and fiscal policies on the performance of the manufacturing sector as a real sector in Nigeria, using an error correction mechanisms model, and discover that those policies has expected impact on output of the manufacturing sector in Nigeria both in the short-run and long-run. The study further established that stabilization policy in the duo of Monetary and fiscal policies have great impact on manufacturing sector performance and that if certain adjustments are made it would better the lots of the people by developing the sector, through Government fiscal policy and its monetary policy measures.

Uzoma, Bowale and Ogundipe (2017) investigated the effect of monetary policy on the manufacturing sector output in Nigeria using a quarterly data from 1981 to 2015 employing the structural vector autoregressive (SVAR) framework. The impulse response functions of the study showed that all monetary variables as well as other variables with the exception of government expenditure conformed to economic theory. The major finding of the study is that the lending interest rate accounted for the biggest variance in the manufacturing contribution to gross domestic product as shown by the forecast error variance decomposition. However, similar study was carried out in South Africa in Adebayo and Harold (2016) using an eight variable Structural Vector Autoregression (SVAR) model examined the response of industrial sector performance in South Africa to monetary policy shocks using a monthly data from 1994:1 to 2012:12. The study found out that money supply shock has a significant positive impact on the industrial output growth from about the eight months.

Ivrendi and Yildirim (2013) investigation of macroeconomic parameters and monetary policy shocks in a cross-section of 6 rapidly emerging nations: Turkey, South Africa, Brazil, China, India, and Russia. Adopting a Structural VAR model, it found that tight monetary policy in most countries increases the value of legal tender, interest rates and reduces inflationary pressure and output. There is no fact of exchange rate, price, trade and output relationship. The study affirmed exchange rate as the most important transmission mechanism in the six countries.

Omolade and Ngalawa (2016) investigate the relationship between monetary policy and growth of the manufacturing sector in Algeria. Using a structural vector autoregressive model and quarterly frequency data for the period 1980Q1 to 2010Q4, the study finds no evidence that money supply responds to fluctuations in manufacturing sector growth or Gross Domestic Product (GDP) growth. Interest rates, however, are seen to explain nearly a third of the variations in manufacturing output growth, suggesting that the manufacturing sector is sensitive to interest rates. Their study also reveals that money supply variations are largely explained by changes in interest rates. The monetary authorities adjust total money supply in response to any movements in the rate of interest, probably to keep the rate of interest within a certain target given other developments in the fundamentals. The interest rates, in turn, play an important role in determining variations in manufacturing sector growth.

Other studies outside Africa are shown in Rafiq and Mallick (2008) who examine the effects of monetary policy on output in the three largest euro area economies (Germany, France and Italy) using the new VAR identification procedure. Quarterly observations from 1981-2005 were used. Results suggest that monetary policy innovations are at their most potent only in Germany. Apart from Germany, it remains ambiguous as to whether a rise in interest rates concludes with a fall in output, thereby showing a lack of homogeneity in the responses.

The study of Berument and Dincer (2008) measured the effects of monetary policy for Turkey through structural VAR (SVAR) technique covering the period 1986-2000. Empirical results show that a tight monetary policy has a temporary effect on output, causing output to decline for three months in a statistically significant fashion. The findings confirm the work of previous studies (Sousa and Zaghini, 2008; Sims, 1992; Eichenbaum and Evans, 1995). Employing the same estimation technique, Bhuiyan *(*2008) examined the effects of monetary policy shock in

Canada by using the overnight target rate as the monetary policy instrument. Using monthly data from 1994-2007, findings of the study indicate that the transmission of the monetary policy shock to real output operates through both the interest rate and the exchange rate.

Savannarideth (2015) also examine the money-output Granger causality in Lao PDR and found that money supply does not Granger-cause output.

The product effects of monetary policy on the banking credit capacity to the industrial sector are also discussed in Bada (2017), who examine the effect of banks' credit on agricultural and manufacturing outputs on the Nigerian economy. The study subject manufacturing and agricultural outputs to functions of commercial banks' credits to private sector, interest rate, prime lending rate, money supply, exchange rate, prime lending rate and agriculture credit guarantee scheme fund. Using Co-integration test; Vector error correction test; and Causality test and they discovered that banks' credits have the significant impact on the agricultural and manufacturing sector in Nigeria.

Toby and Peterside (2014) analyzed the role of banks in financing the agriculture and manufacturing sectors in Nigeria from 1981-2010. Agricultural contribution to GDP, manufacturing contribution to GDP, commercial banks' lending to agriculture, merchant banks' lending to agriculture, commercial banks' lending to manufacturing and merchant banks' lending to manufacturing were variables considered in the study, two levels of analysis were adopted in the study using descriptive analysis direct on the panel data 1 and 2 through multiple regression analysis. They found out that role of banks in facilitating the contribution of the agriculture and manufacturing sectors to economic growth is still limited. It was therefore, recommends that monetary policy instruments should emphasis mandatory sector allocation of credit with appropriate incentives to boost the flow of funds from the banks to the real sector.

Chinweoke, Egwu, and Nwabeke, (2015), investigated the impact of commercial banks loans and advances to the agricultural and manufacturing sectors on the economic growth in Nigeria for the periods, 1994 – 2013 using an ordinary least square technique, The result of the study shows that banks' loans and advances to agricultural and manufacturing sectors have a statistically significant impact on economic growth.

Sanusi (2002) opines that the ability of the CBN to pursue an effective monetary policy in a globalised and rapidly integrated financial market environment depends on several factors. These include: instituting appropriate legal framework, institutional structure and conducive political environment, which allows the Bank to operate with reference to exercising its instrument and operational autonomy in decision- making; the degree of coordination between monetary and fiscal policies to ensure consistency and complementarity; the overall macroeconomic environment, including the stage of development, depth and stability of the financial markets as well as the efficiency of the payments and settlement systems; the level and adequacy of information and communication facilities; and the availability of consistent, adequate, reliable, high quality and timely information to the Bank. He stressed that seeking a proper role for monetary policy in promoting strong and sustainable growth in a stable macroeconomic environment in Nigeria is an on-going challenge for the Central Bank (Imoughele&Ismaila, 2014).

Based on the results of various previous studies conducted on the subject matter, this objective tends to bridge the gap by employing monetary policy tools on Manufacturing output of African emerging economies in Nigeria, Kenya and South Africa.

2.3.4 Monetary policy and Standard of Living proxy by Gross National Income per Capital (GNI)

Looking at monetary policy and economic development, different studies carried out view development from growth perspective which made it somewhat difficult to ascertain developmental impact of monetary policies in the literature. Developmental indicators are basically in human development index, standard of living, employment level, birth rate and death rate, child delivery rate, number of doctors to patient rates, e.t.c. But, most studies on economic development did not capture this variables and possible related variables in their study which makes it almost depleted in the literature. However, the following reviewed work throws some light in the direction of our study which necessitated their inclusion in our literature.

Akanegbu and Gidigbi (2014) investigate whether economic development existed in Nigeria in the past 27 years, covering the periods of 1986 – 2012. The state that going by the variable that is statistically significant between the difference of unemployment rate and poverty incidence, the study finds that there is no economic development but widening of the Gross Domestic Products.

Okorafor (2010) examine the impact of monetary policy instruments on the economic development in Nigeria during the period 1980-2006.With the aid of the t-ratio, the study revealed that only two out of the six selected explanatory variables exert a significant impact on the level of economic development in Nigeria between the study periods (pre-and-post-deregulation).

Gul, Mughal and Rahim (2012) review how the decisions of monetary authorities were influential on stabilizing price, economic growth, curtailing deficits in balance of payments and reducing unemployment level. The regression analysis showed that contractionary monetary policies with balanced adjustment of explanatory variables exerted favorable influence on the explained variable.

Akujobi (2012) investigate the impact of monetary policy instrument on economic development of Nigeria using multiple regression technique and found that treasury bill, minimum rediscount rate and liquidity rate have significant impact on economic development of Nigeria at both 1% and 5% levels of significance, treasury bill at 5.6%, minimum rediscount rate at 7.4% and liquidity rate at 7.7%, while interest rate was not significant at all.

Okwo, Eze and Nwoha (2012) examine the effect of monetary policy outcomes on macroeconomic stability in Nigeria. The study analyzed gross domestic product, credit to the private sector, net credit to the government and inflation using OLS technique. None of the variables were significant, which suggested that monetary policy as a policy option may have been inactive in influencing price stability in Nigeria.

Based on the fact that depleted literature exist on monetary policy and development indicator variables, this objective of the study intend to ascertain the effect of monetary policy on economic development proxy by gross national income in African emerging economies.

2.4 Summary of Empirical Review

No	Author/Year	Topic/Period covered	Methodology	Theoretical Framework	Conclusion/recommendation (Findings)
1	Khaysy, S. & Gang, S. (2017)	The Impact of Monetary Policy on Economic Development: Evidence from Lao PDR	Johansen Cointegration and Error Correction Model	IS-LM model	The finding shows that money supply, interest rate and inflation rate negatively effect on the real GDP per capita in the long run and only the real exchange rate has a positive sign.
2	Akanegbu, B. N. & Gidigbi, M. O. (2014)	An Assessment of the Economic Development Existence in Nigeria	Time-series OLS regression analysis		The study discovered that there is no economic development existed in the country between the periods of 1986 to 2012 fiscal years.
3	Guantai, G. K, & Rotich, G. (2016)	Effects of monetary policy measures on the economic growth in Kenya	Correlation and Regression Analysis	Theory of Employment, Interest, and Money	The findings further revealed that cash reserve ratio had positive but insignificant relationship with economic growth.
4	Okorafor, E. O. (2012)	Monetary policy and economic development: lessons from the deregulation policy in Nigeria	Mean and Standard deviation		The study reveal that most of the variables in line with policy formulation and implementation inconsistencies appear to hinder the full impact of monetary policy on the Nigerian economy
5	Akujuobi, L. E. (2010)	Monetary Policy and Nigeria's Economic Development	Ordinary Least Squares regression model		The study found out that apart from cash reserve ratio, others did not impact much on the economic development of the nation and this may be as a result of the underdevelopment of the paths of these instruments such as the money and capital markets.
6	Fiador, V. O. L. (2016)	Monetary Policy and Economic Performance – Evidence from selected African countries	Autoregressive Distributed Lags (ARDL) Model		The study fails to find a growth impact for stock market development as well as confirm private capital as a function of interest rates.
7	Mansur, H. I. & Ruzita, M. A. (2005)	Exchange rate, monetary policy & manufacturing output in Malaysia	Generalized impulse response function	J-Curve effect	The study discovered that exchange rate shocks seem to have larger effects on the manufacturing output than on the aggregate output.
8	Bakare-Aremu, T. A. Osobase, A. O. (2015)	Effect of Fiscal and Monetary Policies on Industrial Sector Performance- Evidence from Nigeria	Error correction mechanisms model for OLS		The study established that stabilization policy has a great impact on manufacturing sector performance and that if certain adjustment are made it would better the lots of the people by developing the sector, through Government fiscal policy and its monetary policy

					measures.
9	Imoughele, L. E. &Ismaila, M. (2014)	Empirical Investigation of the impact of Monetary Policy on Manufacturing sector Performance in Nigeria (1986 – 2012)	Granger Causality test, co-integration and VAR model	Keynesian theory and monetarist theory	The study discovered that the manufacturing sector contribute insignificantly to the Nigerian economy
10	Onodugo, I. C., Okoro, O. E. U., Amujiri, B. A. & Onodugo, V. A. (2014)	The Impact of monetary policy regimes on performance of commercial banks in Nigeria	Regression model and Pearson Product moment correlation techniques	Loan pricing theory	The study discovered that monetary policy regimes during the SAP period did not have significant impact on the total Assets value, deposit mobilization, loans and advances and credit to the private sector.
11	Ehinomen, E. & Akorah, C. C. (2014)	The Impact of Monetary Policy on Agricultural Development In Nigeria (1970-2010)	Ordinary Least Square method (OLS)	Keynesian theory of Money	The result showed that although CBN's monetary policies play crucial role in influencing the level of agricultural productivity in the country, it has not recorded significant progress in terms of providing enabling environment for better performance in the agricultural sector.
12	Toby, A. J. & Peterside, D. (2014)	Monetary Policy, Bank Management and Real Sector Finance in Nigeria: Who is to Blame?	*multiple regression models*		*The inferential results show that bank management decisions were significantly insensitive to the credit needs of the agricultural and manufacturing sectors.*
12	CBN (2014)	Effects of Monetary Policy on the Real Economy of Nigeria: A Disaggregated Analysis	Structural vector autoregressive (SVAR) framework		The results of the forecast error variance decomposition show that the most important monetary policy variables that explain the variation in sectoral output are interbank call rate and money supply.
13	Adeleke, O. &Ngalawa, H. (2016)	Monetary policy transmission and growth of the manufacturing sector in Algeria	structural vector autoregressive model	the endogenous growth model	The study reveals that money supply variations are largely explained by changes in interest rates.
14	Okoye, L. U., Nwakoby, C. I. N. & Modebe, N. J. (2015)	Interest Rate Reform and Real Sector Performance: Evidence from Nigeria	vector error correction model (VECM).		The study shows that exchange rate volatility has an insignificant positive impact on industrial output performance.
15	Uzoma, O. A., Bowale, E. E. & Ogundipe, A. A.	Monetary Policy Shocks and Manufacturing Sector Output in Nigeria: A Structural Var-	Structural vector autoregressive (SVAR) framework	Monetary transmission mechanism	The study discovered that the lending interest rate accounted for the biggest variance in the manufacturing contribution to gross domestic product as shown by the

	(2017)	approach		theory	forecast error variance decomposition.
16	Omini, E. E., Ogbeba, P. E. & Okoi, O. B. (2017)	Monetary Policy Shocks and Industrial Output in Nigeria	VAR (VECM) model and Granger causality test		The result of the study show that the contribution of manufacturing subsector to GDP responded positively to shocks in monetary policy, commercial bank credit to industrial sector and exchange rates, while contribution of solid minerals subsector to GDP responded positively to shocks in commercial bank credit to the industrial sector and exchange rate after the first year. The study further reveal that the causality test result indicated a unidirectional causality running from monetary policy rate and exchange rate to the contribution of manufacturing sector to GDP on the one hand, and commercial bank credit to the industrial sector and exchange rate to the contribution of solid mineral sector to GDP on the other.
17	Zare, R., Azali, M. &Habibullah, M. S. (2013)	Monetary Policy and Stock Market Volatility in the ASEAN5: Asymmetries over Bull and Bear Markets	Tested pooled mean group (PMG) technique	Markov-switching models and the rule based non-parametric approach	The results show that a contractionary monetary policy (interest rate increases) has a stronger long-run effect on stock market volatility in bear markets than bulls consistent with the prediction of finance constraints models.
18	Ioannidis, C.& Kontonikas, A. (2006)	Monetary Policy and the Stock Market: Some International evidence	OLS regression model	Theory of transmission mechanism	The result of the study indicates that monetary policy shifts significantly affect stock returns, thereby supporting the notion of monetary policy transmission via the stock market.
19	Seong, L. M. (2013)	Transmission of Monetary Policy to the Stock Exchange: Further Evidence from Singapore	Engle-Granger Cointegration, Engle-Granger two step Error Correction Model and Pairwise Granger Causality	Tobin's q theory	The result reveal there are short run and long run linkages between monetary policy instruments and Singapore stock exchange. The result further shows Granger causal relation from monetary policy instruments to the stock exchange.
20	Abaenewe, Z. C. & Ndugbu, M. O.	Analysis of the Effect of Monetary Policy development	Ordinary least square regression	Monetary policy transmission	The study has revealed that monetary policy has not made significant influence over the prices of ordinary

	(2012)	on Equity Prices in Nigeria.	(OLS)	mechanism	equities in Nigeria.
21	Singh, A. (2014)	A Study of Monetary Policy Impact on Stock Market Returns	Arch model		This analysis proves that IIP is influenced by changes in CRR and interest rates is found to be non-significant when it comes to NIFTY volatility.
22	Aliyu, U. R. S. (2014)	Reactions of Stock Market to Monetary Policy Shocks During the Global Financial Crisis: The Nigerian Case	GARCH	New classical macroeconomics and rational expectation hypothesis (REH).	The result of the analysis revealed that the un-anticipated component of policy innovations on M2 and MPR exerts distabilizing effect on NSE's returns, whereas the anticipated component does not.
23	Nwakoby, C. & Alajekwu, U. B. (2016)	Effect of Monetary Policy on Nigerian Stock Market Performance	Johansen co-integration, OLS and granger causality tests	McKinnon-Shaw (1973) theories on finance and development	The study indicate that monetary policy has the potential (53%) to influence the stock market, but the causality analyses showed that monetary policy cannot influence stock market performance but rather stock market performance has influenced the direction of monetary policy in Nigeria through lending and deposit rates.
24	Norfeldt, O. (2014)	The effects of Monetary Policy on Stock Market Returns	Vector autoregressive (VAR) methodology.		There is a significant relationship between an expected change in the fed fund target rate and stock market returns
25	Anowor, O. F. & Okorie, G. C. (2016)	A Reassessment of the impact of Monetary Policy on Economic Growth: Study of Nigeria	Error Correction Model approach.		The result showed that a unit increase in Cash Reserve Ratio (CRR) led to approximately seven units increase in economic growth in Nigeria.
26	T.K. Jayaraman & Dahalan, J. (2010)	Monetary Policy Transmission Mechanism in Samoa	VAR Model and Johansen Co-integration		The study findings are that money and exchange rate channels are important channels in transmitting monetary impulses to Samoa's real sector, followed by credit and interest rate channels.
27	Roşoiu, A. & Roşoiu, I. (2013)	Monetary Policy Transmission Mechanism in Emerging Countries	Bayesian VAR approach	Classical and Keynesian theories	Main result of the empirical study is that both interest rate and exchange rate channels are effective for the monetary policy transmission mechanism in Hungary and Czech Republic.
28	Mutwiri, N. M. (2017)	Monetary policy tools and inflation in Kenya	Multiple regression techniques (OLS).	Keynesian theory, quantity	The findings of the study show that the policy makers need critical evaluation and monitor of money supply

				theory of money and Monetarism theory	in Kenya so as to ensure a stable retail prices level.
29	Ridhwan, M. M., Groot, H. L. F., & Nijkamp, P. & Rietveld, P. (2010)	The Impact of Monetary Policy on Economic Activity -Evidence from a Meta-Analysis	Vector Autoregressive (VAR) models	Tobin's *q*-theory	The findings reveal that capital intensity, financial deepening, the inflation rate, and economic size are important in explaining the variation in outcomes across regions and over time.
30	Nwoko, N. M., Ihemeje, J. C. &Anumadu, E. (2016)	The Impact of Monetary Policy on the Economic Growth of Nigeria	Ordinary Least Squares (OLS)	Keynesian theory and Monetarist theory	The findings from this study indicate that average price and labour force have significant influence on Gross Domestic Product while money supply was not significant.
31	Obafemi, F. N. & Ifere, E. O. (2015)	Monetary Policy Transmission Mechanism in Nigeria: A FAVAR	Impulse response function	FAVAR methodology	The results showed that interest rates and credit channels are the dominant and strongest channel of transmission of monetary shocks in Nigeria, followed by Exchange rate and money channel.
32	Hakizamungu, C., Mbabazi Mbabazize, M. & Mulindabigwi, R. (2016)	Monetary Transmission Mechanism in Rwanda	Co-integration techniques, Variance decomposition	Keynesian IS-LM view	The results from the variance decomposition revealed that in long run the credit channel is more effective than other channels of monetary transmission mechanism by affecting RGDP with a shock of 52.15% in long- run at the 64th period followed by interest rate channel and exchange rate channel respectively.
33	Alavinasab, S. M. (2015)	Monetary Policy and Economic Growth: A case study of Iran	Error-correction model	IS-LM theory	The findings of the study show that in the long run, economic growth has found to be significantly influenced by money supply, exchange rate and inflation rate.
34	Agbonlahor, O. (2014)	The Impact of monetary policy on the economy of the United Kingdom: A Vector Error Correction Model (VECM)	Vector Error Correction Model (VECM)	Keynesian theory	The study discovered that the inflationary rate and money supply are significant monetary policy instruments that drive growth in the United Kingdom.
35	Chipote, P. & Makhetha-Kosi, P. (2014)	Impact of Monetary Policy on Economic Growth: A Case Study of South Africa	Johansen co-integration and the Error Correction Mechanism	IS-LM theory	The finding of this study shows that money supply, repo rate and exchange rate are insignificant monetary policy instruments that drive growth in South Africa whilst inflation is significant.

Source: Researchers Compilation

2.5 Gap in the Literature

From the empirical review and summary of empirical findings objective by objective reviews, the study discovered the followings;

1. Most studies consider basic variables that are significant in present monetary policy directions in Treasury bill rate in Brima and Brima (2017), Akujobi (2012), Nwakoby and Alajekwu (2016) and Okpara (2010)
2. The study also discovered that most researches were swapping economic growth variables for economic development in (Khaysy & Gang, 2017; Akanegbu & Gidigbi, 2014 and Akujobi, 2012).
3. From the empirical review little or no study in Africa considers a panel data analysis on economic variables to the best of the researcher's knowledge.

These form the basis for the study, by looking at how monetary policies have impacted economy of emerging African economies in Nigeria, Kenya and South Africa.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Research Design

According to Ibenta (2008), research design contains the description of methods and procedures employed in data collection, design and validation of test instruments, testing of hypothesis and statistical analysis of raw data. This research work shall employ the *ex-post facto* research design which is the type of research involving events that have already taken place and for which data already exists, and the research is merely involved in data gathering. This type of design is common and ideal method used in conducting research in business and social sciences.

3.2 Sources and Nature of Data

The data used for the study are secondary data and were sourced from the CBN statistical bulletin of various years, World Bank Data base, IMF, Knoema and the South African Central Bank. The study shall cover the period of 31 years from 1986 to 2016.

3.3 Model Specification and Validity

In analyzing the determinant of economic development via monetary policies in developing African economies between 1986 and 2016, the study using OLS techniques adopt and modify the model used by Khaysy and Gang (2017). This research is modeled after Khaysy and Gang (2017) model stated as:

GDP = f(M2, REX, INTR, INFR)

$GDP = \beta_0 + \beta_1 M2 + \beta_2 REX + \beta_3 INTR + \beta_4 INFR + U_t$ .... (1)

Where: GDP- Gross Domestic Product,M2- Money Supply, REX- Real Exchange Rate, INTR- Interest Rate, INFR- Inflation Rate.

Since, this study looks at monetary policy and economic development of developing African economies. Therefore, the model for the study in line with previous studies is modified and expressed thus;

GDP = f(IntR, CRR, TBR, M2) 3.1

MC = f(IntR,CRR, TBR, M2) 3.2

MO = f(IntR, CRR, TBR, M2) 3.3

GNI = f(IntR, CRR, TBR, M2) 3.4

Where:

GDP- Gross Domestic Product

MC- Market Capitalization

MO- Manufacturing Output

GNI- Gross National Income

IntR- Interest Rate

CRR- Cash Reserve Ratio

TBR- Treasury Bill Rate and

M2- Money Supply

These models were transformed to log-linear econometric format to obtain the coefficient of the elasticity of the variables, while reducing the effect of any outliner variable. In the log-linear regression, the coefficients are easy to interpret as the problems of different units have been solved and the interpretation becomes easy in elasticity terms. Findings with log linear modeling specification are sensitive to functional form (Kalim, 2009) while Layson (1984) argued that log linear is superior to linear form and gives more favourable results.

Thus, the mathematical format of the model is as follows;

$\log GDP_t = \alpha_0 + \alpha_1 \log IntR_t + \alpha_2 \log CRR_t + \alpha_3 \log M2_t + U_t$ …….3.5

$\log MC_t = \alpha_0 + \alpha_1 \log IntR_t + \alpha_2 \log CRR_t + \alpha_3 \log M2_t + U_t$ 3.6

$\log MO_t = \alpha_0 + \alpha_1 \log IntR_t + \alpha_2 \log CRR_t + \alpha_3 \log M2_t + U_t$ 3.7

$\log GNI_t = \alpha_0 \ \alpha_0 + \alpha_1 \log IntR_t + \alpha_2 \log CRR_t + \alpha_3 \log M2_t + U_t$ 3.8

Apriori Expectations of $ß_1<0$, $ß_2<0$, $ß_3>0$ and $ß_4<0$ indicate the relationship expressed that shows that IntR and CRR increase are expected to exert a negative effect on the dependent variables. See apriori table below for summarized expectations

Table 3.1: Apriori expectation table

Symbol	Variables	Substitution	Sign	Implications
IntR	Interest Rate	Monetary Policy tool	Negative (-)	Reduces money supply in the economy
CRR	Cash Reserve Ratio	Monetary Policy tool	Negative (-)	Reduce credit facilities of financial institutions and money supply in the long run
TBR	Treasury Bill Rate	Monetary Policy tool	Positive (+)	Increases economic activities and development
M2	Money Supply	Monetary Policy tool	Positive (+)	Increases economic activities and development

Source: Researcher Assumption from IS-LM Model/Theory of Monetary policy

3.4 Empirical Model Estimation Techniques

Stationarity Test (Unit Root Test): This ensures reliability of the data and avoids spurious result. The unit root is used to determine presence of stationarity in a given time series data, thus the employment of the Augmented Dickey-Fuller (ADF) for this purpose.

It is stated thus:

$$Y_t = \alpha_0 + \beta_t + \psi Y_{t-1} + \sum_{i=1}^{p} \delta_i \Delta Y_{t-1} + \varepsilon_i \ \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2.1)$$

Where:

α = Intercept

β = coefficient on a time trend

t = the time or trend variable

Δ = First difference operator

Y_t = Variable of choice

α_i; and δ_i = (for I = 1 and 2) constant

ε_i = stationary stochastic (process)

p = Number of lagged-terms via Akaike information criterion (AIC) Hypothesis testing:

H_0: $\psi = 0$, i.e. There is a unit root (time series is non-stationary).

H_1: $\psi \neq 0$, i.e. There is no unit root, (time series is stationary).

***Decision rule**:* reject Null hypothesis (H_0), if the computed ADF test is higher than the critical values. This implies stationarity of the time data series, as there is non-existence of a unit root; and therefore data is confirmed as suitable for use in estimation of econometric relationships. However, where the alternative holds leading to failure to reject the null hypothesis.

Granger Causality: The test for linear causality between the variables under consideration shall be carried out using Granger Causality Technique. It is used to determine whether one time series forecast another.

Statistical Criteria

Statistical Criteria is concerned with statistical reliability and significance of the estimated parameters of the models and testing of the hypotheses.

3.4.1 Test for Serial Correlation

In a time series or panel data model, this is correlation between the errors in different time periods. A series is said to be serially correlated where the data are correlated across time and the errors arise from adjacent time periods. It could either be positive or negative serial correlation:

$$\mathrm{Corr}(u, u_s) \neq 0$$

A suspicion of serial correlation may be corrected using;

The Durbin-Watson (DW) Statistics: A test for first order autocorrelation, i.e. a test for whether a (residual) series is related to its immediately preceding values. One way to motivate the test and to interpret the test statistic would be in the context of a regression of the time t error on its previous value (Durbin and Watson, 1951).

$$U_t = pu_{t-1} + v_t$$

Where: u_t= Error term at time t; p = Probability values; v_t= Variable at time t.

The Breusch-Godfrey Statistics: This is a joint test for autocorrelation that will allow examination of the relationship between the mean of the error term and it's lagged values at the same time. The Breusch-Godfrey test is a more general test for autocorrelation up to the rth order (Godfrey 1978, Pagan and Godfrey 1979).

3.4.2 Test for Heteroscedasticity

This is when the assumption of homoscedasticity is violated by the variables in the model. It is a situation where the variance of the error term is not constant. The presence of this error will make the regression estimators not to be best linear unbiased estimators (BLUE) any longer. Ways to correct this will include use of Arch tests (1980); Generalized Least Square (GLS); Use of log-linear models (Brooks, 2014).

3.4.3 Test for Multicollinearity

This is said to exist when the same explanatory variable is inadvertently used twice in a regression and in such a case the model parameters cannot be estimated. This can be corrected by: ignoring it; dropping one of the collinear variables or by transforming the highly correlated variables (Brooks, 2014).

3.4.4 Test for Ramsey Reset Specification

Ramsey's (1969) Reset test is a general test for misspecification of functional form. It is also known as non-linearity test. It reveals a situation where the share of the regression model estimated is linear but it should have been non-linear. It is essentially a model stability tests and helps to give strong level of reliability to the results of the model.

3.4.5 Cointegration Tests

When time series variables are non-stationary, it is interesting to see if there is a certain common trend between those non-stationary series. If two non-stationary series $\mathbf{X_t \sim I(1), Y_t \sim I(1)}$ has a linear relationship such that $\mathbf{Z_t = m + a.\ X_t + \beta.\ Y_t}$ **and** $\mathbf{Z_t \sim I(0)}$, **(**$\mathbf{Z_t}$ is stationary), then we call the two series $\mathbf{X_t}$ and $\mathbf{Y_t}$ are cointegrated.

Two broad approaches to test for the cointegration are Engel and Grange (1987) and Johansen (1988). Broadly speaking cointegration test is equivalent to examine if the residuals of regression between two non-stationary series are stationary. For Engel-Granger test, regress $\mathbf{Y_t}$on $\mathbf{X_t}$ (or vice versa), and use the residual to see if it is stationary (unit root test described above). If it is stationary, two series $\mathbf{X_t}$ and $\mathbf{Y_t}$cointegrated.

The Engle-Granger two-step method will be adopted to examine whether a cointegrating relation exist between monetary policy instruments in Inflation rate, Interest rate, Cash Reserve Ratio and Money Supply on economy indicators of selected emerging African countries, as well as the short-run effect of Inflation rate, Interest rate, Cash Reserve Ratio and Money Supply on economy indicators (market capitalization, credit to the private sector, gross domestic product, gross national income and manufacturing output) and the speed of error correction, if any, among the variables. The Engle-Granger method involves following steps:

The first step involves determining whether a set of data contain unit roots in the individual time series. Unit root test are used to determine whether time series exhibit mean-reverting behavior by showing their order of integration. If a pair of time series, such as *MCt* and *GDPIt*, are I(1) variables, then cointegration techniques can be used to model their long-run relationship. The Augmented Dickey-Fuller (fuller, 1976; and Dickey and Fuller, 1979) and Phillips-Perron (Phillips, 1978; and Phillips and Perron, 1988) are used to examine the order of integration of *MCt* and *GDPt.* The ADF test is estimated thus:

$$\Delta Yt = \alpha o + \beta t + \alpha 1Yt\text{-}1 + \Sigma b1\Delta Yt\text{-}1 + \varepsilon t$$

I = 2

The null hypothesis is that Yt contains unit root, which implies that $\alpha 1 = 1$, against the alternative that the series does not contain unit root, which implies that $\alpha 1 < 1$. Dickey and Fuller (1981) provide cumulative distribution function of the ADF statistic. If the computed absolute value of the coefficient of $\alpha 1$ is less than ADF critical tau values, reject the null hypothesis that $\alpha 1 = 1$, in which case Yt does not contain unit root. Otherwise accept the null hypothesis, in which case Yt contains unit root. Phillips-Perron non-parametric test is used to confirm the result of the ADF test. The Phillip-Perron tests have two merits over ADF. Firstly, it is robust to general forms of heteroscedasticity in error term (εt). Secondly, it gives the user the latitude to specify a lag length for the test regression. The Phillips-Perron is estimated as follows:

$$Yt = \alpha o + \beta t = \alpha 1Yt\text{-}1 + \varepsilon t$$

The null hypothesis of the PP tests is that there is a unit root in Yt series, against the alternative hypothesis of no unit root in Yt. The decision rule of PP tests is the same with ADF.

Once the order of integration of the series (MC and GDP) are confirmed I(1), the long run relationship is established by running the cointegrating regression. The residual-based unit root test is used to examine whether the residuals are stationary. If they are stationary, then the series are cointegrated. If the residuals are not stationary, there is no cointegrated.

Rejecting the null hypothesis of a unit root, therefore, is evidence in favour of cointegration (Engle and Granger, 1987; Lee, 1993). The residual-based test is estimated as follows:

$\Delta\mu t = \alpha 1 \mu t\text{-}1 + \varepsilon t$

Where, $\Delta\mu t$ are the estimated first differenced residual, $\mu t\text{-}1$ are the estimated lagged residuals,$\alpha 1$ is the parameter of interest representing slope of the line, εt are errors obtained from the regression. If the selected stock market capitalization (MCt) and foreign direct investments (GDPt) are cointegrated, εt should fail a unit root test.

3.4.6 Regression Analyses

The Classical Linear Regression Model (CLRM) which represents the foundational model for most higher and vigorous econometric analyses form the most fundamental technique of data analyses for this work. The Ordinary Least Square (OLS) method will be used as it captures the required robustness and flexibility required for a panel data research work. Regression analyses is basically concerned with the study of the dependence of one variable (dependent variable) on one or more other explanatory or independent variables (regressors) with the view to finding out or estimating/predicting the mean or average value of the former in terms of known or repeated values of the latter(Gujarti and Porter, 2009).

In specific terms, regression analyses explains the variation in an outcome (dependent variable) Y, as it depends on a predictor (independent explanatory) variable X. it is a correlation based test. Correlation is one of the most common and useful statistics. It describes the degree of relationship between two variables.

Its predictive power is dependent on the estimation of the relationship between X and Y variables. The accuracy of such predictive capability depends on the amount of scatter: the less the scatter, the more the predictive accuracy.

R^2 test: This is also known as the coefficient of multiple determination tests. It is used to determine the goodness of fit of estimated coefficients of the variables in the specified models. To adopt the rejection criteria, for the stated null hypotheses, the R^2 value for the estimated regression equation for each pair of our dependent and independent variable must be 50% and above to be significant. Hence, the critical value will be determined at 5% level of significant.

F-Statistic: This was applied to ascertain the overall significance of the model. The acceptance criteria for our null hypotheses of no significant relationship between the dependent and independent variables shall be based on the statement that "if the calculated is less than the critical F-value, we accept; otherwise we do not accept the null hypotheses". The F value provides a test of the null hypotheses that the true slope coefficient is simultaneously zero. If the F value computed exceeds the critical value from the F table at the percent level of significance, we reject the Ho (null hypothesis). Therefore, the critical value will be based on 2 degrees of freedom at 5% level of significance.

T-Statistic: Which is also referred as student t-test was used to test for significance, to ascertain the statistical reliability of the coefficient in the specified models. We tested whether the estimated coefficient are significantly different from zero. T-statistics are applied to measure or judge the statistical reliability of the estimated individual regression coefficients. It is imperative to deploy the t-statistics where the sample size is below (30). The decision rule of the t-statistics (Bryant, 1960) is as follows:

i) Where the estimated (calculated) t is greater than the critical t value of the null hypothesis (H_O) is rejected and the alternate H_1 is accepted, i.e $t_c > t_1$, and

ii) Where the estimated (calculated) t is less than the critical value of table t, accept the null hypothesis Ho, and reject the alternate hypothesis, H_1 ie $t_c < t_1$, reject H_1 and accept Ho.

Durbin Watson statistics: It is a tests for autocorrelation in the residuals from a statistical regression analysis. It is always between 0 and 4. Values approaching 0 indicate positive autocorrelation values toward 4 indicate negative autocorrelation. Autocorrelation can be significant in analyzing historical pricing information if one does not know how to look out for it. Hence, in order to avoid autocorrelation issues, the easiest solution in finance is to simply convert a series of percentage-price changes from day to day.

Test for Significance (T-Statistic or Z-Statistic)

The p-value of the t-statistic or z-statititistics will be used to test the significance of the overall regression using Generalized Least Square and the significance of the parameter estimates respectively. The chosen level of significance for this research work was10% (except otherwise stated). The p-value from the computed E-views table is compared with the p-value of the z-statistics from the Z-normal distribution table otherwise. If the p-value from the computed E-views is greater than the p-value from the z-distribution table, the relationship is said to be significant, otherwise it is not significant. (Brooks, 2014)

This is a procedure by which sample results are used to verify the truth or falsity of a null hypothesis in the tests as conducted and reported, Lehman, (1959).

The key idea behind the significance of the parameter estimates is that of test statistic (estimator) and the sampling distribution of such under the null hypothesis. The hypothesis is stated thus according to Gujarati and Porter (2009):

H_0: βi=0

H_A: $\beta i \neq 0$

The decision to accept or reject $H_0$is made on the basis of the value of the test statistic obtained. If Z* falls in the acceptance region, the null will be accepted but will be rejected if it falls outside the acceptance region. If the null hypothesis is accepted, it indicates that the parameters are not statistically significant. On the other hand, it is statistically significant if the value of the test statistic lies outside the acceptance region hence H_A will be accepted, Osuala, (2010).

Decision rule: Using Panel data Error correction model, accept Null hypothesis (H_o) if p-value of table Z-statistic (Z_{pv} Table) is greater than the computed Z-statistics p-value (Z_{PV} Computed) and conclude that there is no significant relationship between the tested variables of interest, otherwise reject.

T-statistics or Z-statistic is a test of significance of the overall regression and it points out whether a significant relationship exists amongst all the variables fitted into the regression model. It specifically measures the goodness of fit of the model, Hill and Williams (2001).

Correlation Coefficient

This is generally used to measure the strength of linear relationship between two or more variables and as such will be adopted to measure the degree of the relationship variables under consideration. To establish the degree of association or degree of co-variability between two variables, the correlation coefficient (r^1) would be calculated. The correlation coefficient (r^1) was chosen because it does not require an assumption of our sample being drawn from normal distribution as is required under the usual correlation coefficient.

Co-Efficient of Determination

This is also known as Adjusted R-Square statistics. This statistical tool is employed for better interpretation of result. It explains the degree of variation in stock market capitalization as explained by its relationship with foreign direct investments. This will principally be used at the point that this work will test Stock market capitalization against all the variants of foreign direct investments and gross domestic products combined in a multiple regression. Multiple coefficient of determination (R^2) is used to measure such variations in y-variable which is explained by the independent variables- x_1, x_2 and $x_{3.}$

3.4.7 Pairwise Granger Causality Test

This is used to prove the direction of influence. The test assumes that the information relevant to the prediction of the variable are contained solely in the time series data on these variables. Generall, since the future cannot predict the past, if variables x1, x2 and x3 should precede y. Therefore, in a regression of y on the variables (including its own past values) if we include past or lagged values x and it significantly improves the predication of y, then we can say that x (Granger) causes y and vice-versa. This test is popularized by Granger (1969) who assumed that the current values of a variable (Y) is conditioned on the past values of another (X) or the other way round. This test shows whether a bidirectional or unidirectional causality exists between the variables of interest. In this work, this test shall be adopted to confirm whether Stock Market growth granger causes foreign direct investments or foreign direct investments granger causes stock market growth. It may also show whether they both granger causes themselves. Specifically, it will show whether there is a causal relationship between the two and if there is, is it unidirectional or bidirectional.

CHAPTER FOUR
PRESENTATION AND ANALYSIS OF DATA

Here, the presentation of datasets collected and collated from the World Bank statistical database, International Monetary Fund (IMF), National Bureau of Statistics and the statistical bulletins of Central banks of Nigeria, Kenya and South Africa for the periods under study (1986-2016) are presented in tabular forms for the purpose of clarity.

The results of various econometric and statistical methods of estimations adopted in line with the objectives and aforementioned methodology of this work are also contained in this chapter. The formulated equations and hypotheses are tested and presented with conclusions drawn against the backdrop of the formulated models and apriori expectations. Diagnostic test, standard and validity tests are also conducted and shown with the main aim of vouching for the reliability of the used datasets and estimated models.

4.4 Data Presentation

4.1.4 Data Presentation for Nigeria Selected Variables

Table 4.1 Nigeria's Selected Monetary policy instruments and economic development data 1986–2016

Years	Nig GNI	MU	MC	GDP	IntR	M2	CRR	TBR
1986	NA	5572	3,883	112,071	9.96	14,753.25	1.7	8.50
1987	NA	2758	2,065	102,575	13.96	7,223.85	1.4	11.75
1988	NA	3602	2,207	114,173	16.62	8,534.62	2.1	11.75
1989	NA	2512	1,746	126,283	20.44	5,860.93	2.9	17.50
1990	2753	2712	1,370	147,672	25.3	7,194.20	2.9	17.50
1991	2677	2897	1,880	155,954	20.04	7,986.60	2.9	15.00
1992	2584	2315	1,220	164,627	24.76	7,461.59	4.4	21.00
1993	2465	2621	2,143	176,693	31.65	8,980.96	6	26.90
1994	2496	2728	2,977	186,863	20.48	12,133.86	5.7	12.50
1995	2539	2317	7,777	195,026	20.23	14,555.41	5.8	12.50
1996	2635	2244	12,714	213,690	19.84	16,910.21	7.5	12.25
1997	2656	2448	12,559	228,864	17.8	19,622.44	7.8	12.00
1998	2626	2620	10,322	243,262	18.8	24,001.72	8.3	12.95
1999	2657	3023	2,940	253,902	20.29	7,581.09	11.7	17.00
2000	2388	5431	2,401	279,677	21.27	10,187.61	9.8	12.00
2001	2618	4009	2,396	306,174	23.44	11,774.86	22.9	12.95
2002	2624	4038	2,374	332,317	24.77	12,900.50	22.8	18.88
2003	2804	5575	9,493	379,923	20.71	13,668.82	20.7	15.02
2004	3632	8347	15,866	423,923	19.18	16,035.89	17.3	14.21
2005	3623	11131	22,244	475,530	17.95	19,900.16	20.2	7.00
2006	4215	14006	32,831	530,957	16.9	27,682.17	14.1	8.80
2007	4215	15406	84,895	594,477	16.94	46,707.18	21.2	6.91
2008	4340	19476	48,062	654,716	15.48	78,608.52	12.3	7.03

2009	4474	13373	32,223	718,866	18.36	73,328.85	5.6	3.72
2010	4862	23810	50,546	800,185	17.59	77,579.40	7.3	6.25
2011	4970	29425	39,028	856,619	16.02	85,607.83	17	12.00
2012	5065	35485	56,205	909,314	16.79	100,883.15	16.3	12.00
2013	5205	45981	80,610	972,646	16.72	110,766.59	31.1	12.00
2014	5472	54779	63,466	1,049,091	16.55	114,734.29	34.2	13.00
2015	5546	46631	49,974	1,108,021	16.85	97,419.39	32.1	11.00
2016	5876	42344	29,792	1,089,103	16.87	82,480.54	25.9	14.00

Source*: World Bank data 2017; National Bureau of Statistic, 2017; Index Mundi 2017.*

Comments:

Table 4.1 shows trend in the various variables used to measure monetary policy in money supply (M2), interest rates (INTR), cash reserve ratio (CRR), and treasury bill rate (TBR) and economic development variables in gross domestic product (GDP), market capitalization (MC), manufacturing output (MU) and gross national income (GNI) for Nigeria from 1986 to 2016 (a 31 year period).

The table 4.1 shows that the GNI started in 1990 at $2753Million and fell continuously till 1993 to the tune of $2465Million before rising continuously till 1999 and subsequently had a sharp fall in 2000 at $2388Million and rose continuously from 2001 at $2618Million till the end period of the study in 2016 at $5876Million. This showed that the gross national income of Nigerian grew from 2001 to 2016 aggressively in the period. The Nigerian manufacturing output started at $5572Million and fluctuated over time from the beginning to the end period of the study but have sensitive upward surge in 2000 and 2003 at $5,431Million and $5,575Million respectively and from 2004 till the end of study period manufacturing output continue to increase. The MC started from a high level of $3883Million in 1986 and by 1992 fell to $1220Million. This shows a massive fall in market capitalization in Nigeria.From 1993 to 2007, the MC had increased and fall repeatedly as a result of key monetary policies that trigger actions in the stock market both in 1998 where it peaked and fell in 1999 due to democratic transition and 2003 due to recapitalization process. By 2008, the market capitalization (MC) had moved down to $48,062Million, showing decline in capitalization in the Nigerian stock market. Similarly, the stock market performance parameter showed upward (growth) and downward (decline) movement between 2009 to the end of the study period. The Nigerian economic growth represented by GDP showed to be more stable in the upward surge than the over development variables with little falls at few intervals in 1987 and 2016. Apart from these two periods the Nigerian gross domestic product has soared continuously in line and reaction to economic activities.

The monetary policy in money supply showed volatile movement as conspicuous ups and downs were shown within the period which reflected how the total money supplied within the study period have fallen and risen sharply in 1987 falls to $7,223.85Million from $14,753.25Million in 1986, rise to $12,133.86Million in 1994 from $8,980.96Million in 1993, falling in 1999 to $7,581.09Million from $24,001.72Million in 1998 and increasing again in 2000 to 10,187.61 continuously to the end of the study period. This showed that money supply have reacted steadily to CRR, MPR etc of the monetary regulatory agency to facilitate money supply in Nigeria.

4.1.5 Data Presentation for Kenya Selected Variables

Table 4.2: Kenya's selected Monetary Policy instruments and Economic Development data 1986 –2016

Years	Kenya GNI	MU	MC	GDP	IntR	M2	CRR	TBR
1986	NA	1672	306	26,388	14	2,203.33	0	0
1987	NA	1765	352	28,634	14	2,404.04	0	0
1988	NA	1873	390	31,441	15	2,421.22	0	0
1989	NA	1981	424	34,151	17.25	2,349.17	0	0
1990	2291	2085	453	36,878	18.75	2,549.91	0	0
1991	2239	2167	453	38,616	19	2,526.21	0	0
1992	2156	2193	637	39,070	21.07	2,999.36	0	17.15
1993	2054	2230	1,060	39,962	29.99	2,131.96	0	18.21
1994	2069	2275	3,047	41,845	36.24	2,715.05	0	23.13
1995	2132	2360	2,018	44,549	28.8	3,822.68	0	16.21

1996	2192	2450	1,799	47,182	33.79	4,312.54	0	21.14
1997	2152	2450	1,813	48,095	30.25	5,042.16	0	23.81
1998	2169	2406	2,089	50,236	29.49	5,043.88	0	26.12
1999	2150	2350	1,409	52,233	22.38	4,614.73	0	9.72
2000	2112	2374	1,255	53,741	22.34	4,466.37	0	20.14
2001	2130	2412	1,045	57,153	19.67	4,574.22	12	15.24
2002	2088	2415	1,431	58,310	18.45	5,020.17	10.2	13.22
2003	2088	2558	4,183	61,226	16.57	5,818.93	9.8	11.42
2004	2140	2672	3,891	65,826	12.53	6,327.72	10.6	2.35
2005	2223	2797	6,384	71,792	12.58	7,285.87	9.9	4.52
2006	2298	2972	11,378	78,330	13.64	8,936.14	10.1	4.81
2007	2384	3102	13,345	85,924	13.34	11,528.68	12.2	4.36
2008	2333	3138	10,854	87,813	14.02	12,955.50	9.6	4.7
2009	2344	3105	10,967	91,406	14.8	13,489.20	9.7	3.9
2010	2467	3245	14,461	100,300	14.37	16,130.48	10.4	1.39
2011	2557	3480	10,203	108,637	15.05	17,141.98	9.2	2.88
2012	2586	3460	14,791	115,511	19.72	20,606.97	12.2	20.12
2013	2654	3654	22,256	123,965	17.31	23,313.92	9.2	9.32
2014	2718	3771	26,140	132,406	16.51	26,580.10	10.4	8.24
2015	2805	3902	18,204	144,100	16.09	27,155.81	9.1	8.13
2016	2897	4021	18,848	152,700	16.56	27,236.52	8.1	10.5

Source*: World Bank data 2017; National Bureau of Statistic, 2017; Index Mundi 2017.*

Comments:

Table 4.2 shows trend in the various variables used to measure monetary policy in money supply (M2), interest rates (INTR), and cash reserve ratio (CRR) and economic development variables in gross domestic product (GDP), market capitalization (MC), manufacturing output (MU) and gross national income (GNI) for Kenya from 1986 to 2016 (a 31year period).

The table 4.2 shows that the GNI started in 1990 at $2291Million and maintain a steady flow not more than $2897Million in 2016. The lowest GNI for Kenya was in 1994 at $2054Million. This showed that the gross national income of Kenya maintained a range from 1990 to 2016. The Kenyan manufacturing output started at $1672Million and grew continuously till 2016 at $4021Million the end period of study. With only two falls in growth in 2009 at $3105 from $3138Million in 2008 and in 2012 at $3460Million from $3480Million in 2011. Thus, the growth process of manufacturing output in Kenya is steady and low in nature. Just like GNI and MU, MC also maintain a steady low growth path from the beginning of the study period with some falls and rises from middle of the study year to the end of study year. In 1996, it fell to $1,799Million from $2018Million in 1995 and in 1999 it fell to $1409Million from $2089Million in 1998. The falls also occurred in 2004 ($3891Million), 2008 ($10,854Million), 2011 ($10,203Million) and 2015 ($18,204Million). The MC overtime in Kenya however improved within the period considered in the study.

The Kenyan economic growth represent by GDP showed to be more stable in the upward surge than the over development variables with no falls at any year in the period. Its growth is also similar to the Nigerian scenario where there was continuous upward surge in GDP.

The monetary policy in money supply showed also an upward surge like GDP with little slight falls in 1989, 1993 and 2000. This showed that money supply have continuously been maintained at a level due to regulated monetary policy that have controlled money supply in Kenya economy.

4.1.6 Data Presentation for South Africa Selected Variables

Table 4.3: South Africa's selected Monetary Policy instruments and Economic Development data 1986 –2016

Years	SA GNI	MU	MC	GDP	IntR	M2	CRR	TBR
1986	NA	29205	102,652	189,786	14.33	33,113.89	0	8.41
1987	NA	29849	138,788	198,718	12.5	45,515.63	0	9.03
1988	NA	31791	126,189	214,313	15.33	50,271.30	0	15.28
1989	NA	32385	145,438	227,979	19.83	53,618.21	0	18
1990	6160	31657	136,869	235,660	21	59,974.21	0	17.39
1991	6220	30211	184,705	241,024	20.31	65,219.64	0	16.15
1992	6100	29220	164,046	241,250	18.91	64,772.41	0	12.04
1993	6180	29167	217,098	250,036	16.16	60,512.82	0	10.19
1994	6380	29945	259,523	263,617	15.58	65,630.00	0	12.47
1995	6570	31890	277,389	277,499	17.9	76,151.39	0	13.94
1996	6830	32331	241,571	294,733	19.52	72,858.14	0	15.93
1997	7010	33206	230,039	307,714	20	80,238.48	0	14.65

1998	7000	33125	168,536	312,662	21.79	76,270.84	0	17.2
1999	7170	33316	259,739	324,933	18	76,269.58	0	10.7
2000	7520	36016	204,301	346,133	14.5	72,291.60	0	10.2
2001	7770	37154	147,472	363,706	13.77	69,711.82	3.8	9.2
2002	8140	38194	181,998	382,834	15.75	67,538.22	9.7	12.27
2003	8420	37620	260,748	401,983	14.96	105,766.74	3.7	7.31
2004	9000	39461	442,520	431,849	11.29	139,931.48	3.7	7.27
2005	9660	41909	549,310	469,295	10.63	171,532.69	3.3	6.82
2006	10380	44608	711,232	510,789	11.17	197,965.69	3	8.39
2007	10920	46995	828,185	552,490	13.17	238,331.39	3.4	10.48
2008	11350	48083	482,700	581,304	15.13	230,626.54	3.3	10.77
2009	11210	42973	799,024	576,709	11.71	229,166.00	3.5	7.07
2010	11530	45512	925,007	601,500	9.83	285,339.68	3.9	5.59
2011	11930	46893	789,037	633,638	9	309,140.68	4	5.46
2012	12220	47876	907,723	659,334	8.75	289,443.75	3.5	4.99
2013	12540	48270	942,812	683,962	8.5	259,161.39	3.5	5.14
2014	12780	48321	933,931	704,514	9.13	247,418.53	3.5	6.04
2015	12900	48154	735,945	735,400	9.42	230,641.59	3.1	6.74
2016	12860	49443	951,320	739,100	10.46	214,704.55	3.5	7.61

Source*: World Bank data 2017; National Bureau of Statistic, 2017; Index Mundi 2017.*

Comments:

Table 4.3 shows trend in the various variables used to measure monetary policy in money supply (M2), interest rates (INTR) and cash reserve ratio (CRR) and economic development variables in gross domestic product (GDP), market capitalization (MC), manufacturing output (MU) and gross national income (GNI) for South Africa from 1986 to 2016 (a 31year period).

The table 4.2 shows that the GNI starting from 1990 at $6160Million and maintain a steady growth with slight falls till the end of study period in 2016 at $12860Million. The lowest GNI for South Africa was in 1992 at $6100Million. This showed that the gross national income of South Africa maintained a range from 1986 to 2016 with slight falls in 1992 ($6100Million), 1998 ($7000Million), 2009 ($11210Million) and 2016 ($12860Million). However, the national income grew at a steady rate than other countries in Nigeria and Kenya. The South African manufacturing output started at $29205Million and grew continuously till 2016 at $49443Million the end period of study but had a long fall from 1990 to 1993 to the amount of $30211Million, $29220Million and $29167Million. Thus, the growth process of manufacturing output in South Africa is steady in nature. The MC also maintains a steady growth path from the beginning of the study period with some major falls and rises in the study year. In 1986, MC started at $102,652Million, rose until a fall was experienced in 1988 and 1990 to $126,189Million from $138,788Million in 1987 and $136,869Million from $145,438Million in 1989 respectively. In 1996, it fell to $241,571Million from $277,389Million in 1995 and fell continuously to 1998 before rising in 1999 to $259,739Million and falling again in 2000 to $204,301Million and further in 2001. By 2002, the MC rose continuously to $828,185Million in 2007 before falling again to $482,700Million in 2008. The MC rose to its peak to the end of the study period with some falls in 2011 and 2015. The MC overtime in South Africa however improved within the period considered in the study.

The South African economic growth represent by GDP showed to be more stable in the upward surge than the over development variables with only one minor slight fall in 2009 in the period. Its growth is also similar to the Nigerian and Kenyan scenario where there was continuous upward surge in GDP.

The monetary policy in money supply showed also an upward surge like GDP with repeated falls in 1992, 1996, 1998, 2008 and 2013 and further. This showed that money supply have continuously been reactive to monetary policy changes in reserve ratios of banks, interest rates and inflationary implications of regulated monetary authorities and economic conditions in South Africa economy.

4.2: Data Analysis

4.2.1: Descriptive Statistics and Test for Normality

The study will do descriptive statistics using the Jarque-Bera Normality test, which requires that for a series to be normally distributed; the histogram should be bell-shaped and the Jarque-Bera statistics would not be significant. This implies that the p-value given at the bottom of the normality test table should be greater than the chosen level of significance to accept the Null hypothesis, that the series is normally distributed (Brooks, 2014).

Table 4.4A: Descriptive Statistics for Nigeria Data

	CRR	GDP	INTR	M2	MC	MU	NIG_GNI	TBR
Mean	14.58519	498077.5	19.68815	40988.66	25122.52	15006.37	3630.259	12.82802
Median	12.30000	379923.0	18.80000	19622.44	12714.00	5575.000	2804.000	12.50000
Maximum	34.20000	1108021.	31.65000	114734.3	84895.00	54779.00	5876.000	26.90000
Minimum	2.900000	147672.0	15.48000	7194.204	1220.000	2244.000	2388.000	3.715000
Std. Dev.	9.345081	326734.8	3.661251	38007.19	25652.74	16455.34	1186.821	4.828243
Skewness	0.590806	0.626168	1.510512	0.752775	0.911293	1.171415	0.508397	0.709118
Kurtosis	2.243932	1.940312	5.341453	1.902452	2.694306	2.992102	1.682346	4.292719
Jarque-Bera	2.213828	3.027693	16.43511	3.905205	3.842179	6.175027	3.116340	4.142829
Probability	0.330578	0.220062	0.000270	0.141904	0.146447	0.045615	0.210521	0.126007
Sum	393.8000	13448092	531.5800	1106694.	678308.0	405172.0	98017.00	346.3567
Sum Sq. Dev.	2270.594	2.78E+12	348.5238	3.76E+10	1.71E+10	7.04E+09	36622129	606.1102
Observations	27	27	27	27	27	27	27	27

Source: Computation by author using E-view 9.5

From table 4.4A, the aggregative averages like mean, median and mode for all the observations maintain high averages. The spread and variations in the series are also indicated using the standard deviation which is minimal. Significantly, kurtosis which shows the degree of peakedness is also shown together with the skewness which is a reflection of the degree of or departure from symmetry of the given series. With all the variables showing an average kurtosis less than 3, there is evidence that they are all leptokurtic with less than half of the variables showing Jarque-Bera statistics of p-values in below the 5% level of significance, indicates a not absolute normal distribution.

Table 4.4B: Descriptive Statistics for Kenya Data

	CRR	GDP	INTR	KENYA_GNI	M2	MC	MU	TBR
Mean	6.025926	75103.93	20.12259	2312.148	10160.26	7570.889	2816.444	11.13815
Median	9.200000	61226.00	18.45000	2223.000	5818.935	3891.000	2558.000	9.720000
Maximum	12.20000	152700.0	36.24000	2897.000	27236.52	26140.00	4021.000	26.12000
Minimum	0.000000	36878.00	12.53000	2054.000	2131.962	453.0000	2085.000	0.000000
Std. Dev.	5.166430	34953.81	6.839537	241.6957	8356.373	7599.520	589.2175	7.988138
Skewness	-0.287207	0.803339	0.962114	1.023885	0.981430	0.894992	0.639210	0.297027
Kurtosis	1.206255	2.442589	2.756305	2.889722	2.554860	2.649528	2.091238	1.818509
Jarque-Bera	3.990906	3.253633	4.232298	4.731215	4.557340	3.742732	2.767734	1.967424
Probability	0.135952	0.196554	0.120495	0.093892	0.102420	0.153913	0.250608	0.373921
Sum	162.7000	2027806.	543.3100	62428.00	274327.1	204414.0	76044.00	300.7300
Sum Sq. Dev.	693.9919	3.18E+10	1216.261	1518837.	1.82E+09	1.50E+09	9026609.	1659.069
Observations	27	27	27	27	27	27	27	27

Source: Computation by author using E-view 9.5

The table 4.4B aggregative averages like mean, median and mode for all the observations maintain high averages. The spread and variations in the series are also indicated using the standard deviation which is minimal. The kurtosis which shows the degree of peakedness is also shown together with the skewness which is a reflection of the degree of or departure from symmetry of the given series. With all the variables showing an average kurtosis less than 3, there is evidence that they are all leptokurtic with less than half of the variables showing Jarque-Bera statistics of p-values at the 5% level of significance, indicates a not absolute normal distribution.

Table 4.4B: Descriptive Statistics for South Africa Data

	CRR	GDP	INTR	M2	MC	MU	SA_GNI	TBR
Mean	2.311111	449024.7	14.30889	150244.8	478991.9	39316.67	9138.889	10.07444
Median	3.300000	401983.0	14.50000	105766.7	277389.0	38194.00	8420.000	10.19000
Maximum	9.700000	739100.0	21.79000	309140.7	951320.0	49443.00	12900.00	17.39000
Minimum	0.000000	235660.0	8.500000	59974.21	136869.0	29167.00	6100.000	4.990000
Std. Dev.	2.287984	172626.0	4.258510	88727.09	311257.1	7244.522	2510.891	3.876258
Skewness	0.973688	0.322994	0.212651	0.393210	0.396775	0.023717	0.231822	0.468715
Kurtosis	4.861146	1.647679	1.730693	1.513697	1.448099	1.434206	1.458087	2.048734
Jarque-Bera	8.163157	2.526832	2.016024	3.180997	3.417886	2.760706	2.916520	2.006644
Probability	0.016881	0.282687	0.364944	0.203824	0.181057	0.251490	0.232641	0.366659
Sum	62.40000	12123668	386.3400	4056610.	12932780	1061550.	246750.0	272.0100
Sum Sq. Dev.	136.1067	7.75E+11	471.5077	2.05E+11	2.52E+12	1.36E+09	1.64E+08	390.6599

Observations	27	27	27	27	27	27	27	27

Source: Computation by author using E-view 9.5

The aggregative averages like mean, median and mode for all the observations maintain high averages in table 4.4C. The spread and variations in the series are also indicated using the standard deviation which is minimal. Significantly, kurtosis which shows the degree of peakedness is also shown together with the skewness which is a reflection of the degree of or departure from symmetry of the given series. With all the variables showing an average kurtosis less than 3, there is evidence that they are all leptokurtic with less than half of the variables showing Jarque-Bera statistics of p-values in below the 5% level of significance, indicates a not absolute normal distribution.

Table 4.4D: Panel Descriptive Statistics

	CRR	GDP	GNI	INTR	M2	MC	MU	TBR
Mean	6.741975	340735.4	5027.099	18.03988	67131.24	170561.8	19046.49	11.34687
Median	3.500000	253902.0	2897.000	17.31000	26580.10	22244.00	5575.000	11.42000
Maximum	34.20000	1108021.	12900.00	36.24000	309140.7	951320.0	54779.00	26.90000
Minimum	0.000000	36878.00	2054.000	8.500000	2131.962	453.0000	2085.000	0.000000
Std. Dev.	8.463124	284437.4	3373.131	5.703739	81903.71	282719.1	18391.74	5.873631
Skewness	1.431438	0.967701	1.060156	0.892859	1.508258	1.792479	0.481745	0.421507
Kurtosis	4.508022	3.081071	2.870408	4.108819	4.197092	4.818426	1.544693	2.903792
Jarque-Bera	35.33688	12.66419	15.22974	14.91165	35.54684	54.53525	10.28104	2.429764
Probability	0.000000	0.001778	0.000493	0.000578	0.000000	0.000000	0.005855	0.296745
Sum	546.1000	27599566	407195.0	1461.230	5437631.	13815502	1542766.	919.0967
Sum Sq. Dev.	5729.957	6.47E+12	9.10E+08	2602.611	5.37E+11	6.39E+12	2.71E+10	2759.963
Observations	81	81	81	81	81	81	81	81

Source: Computation by author using E-view 9.5

From the table 4.4D, the mean and median as well as the standard deviation for the panel data for the study area show even spread and variations for the series. The panel mean, median, maximum and standard deviation for the entire variables show positive, healthy trend and minimum variation. Significantly, kurtosis which shows the degree of peakedness is also shown along with the skewness which is a reflection of the degree or departure from symmetry of the given series. With all the variables having kurtosis above 3, there is strong evidence to believe they are all leptokurtic. The Jarque-Bera and the probability of the pooled panel data show strong sign of normality distribution considering the spread among the variables and a significant p-value of 0.00 for all the variables which is less than the chosen significant level of 5%. The implication of this is that the observed out-linear in the individual country descriptive statistics (Nigeria, Kenya and South-Africa) have been corrected through the panel pool effect and the result from such a process can be adequately relied upon.

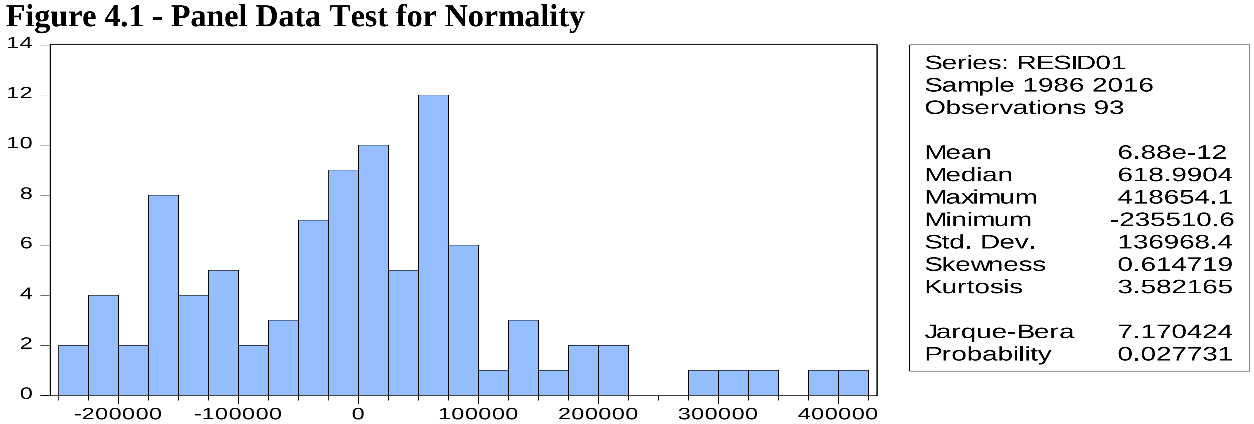
Table 4.5: Panel Covariance Matrix

	CRR	GDP	GNI	INTR	M2	MC	MU	TBR
CRR	70.74	1234331.12	-3355.07	-8.60	-22093.26	-493799.71	18490.94	-7.59
GDP	1234331.12	79905823878.36	578835783.05	-731905.73	15111555971.79	36258137380.42	4006316112.90	-372002.85
GNI	-3355.07	578835783.05	11237544.34	-11964.90	259453879.38	882342894.83	55981823.30	-5804.12
INTR	-8.60	-731905.73	-11964.90	32.13	-296601.96	-969186.75	-59180.04	26.18
M2	-22093.26	15111555971.79	259453879.38	-296601.96	6625400593.62	21606254870.79	1286217364.04	-160492.71
MC	-493799.71	36258137380.42	882342894.83	-969186.75	21606254870.79	78943271381.89	3922161333.99	-515922.00
MU	18490.94	4006316112.90	55981823.30	-59180.04	1286217364.04	3922161334.00	334080012.79	-24178.71
TBR	-7.59	-372002.85	-5804.12	26.18	-160492.71	-515922.00	-24178.71	34.07

Source: Computation by author using E-view 9.5

The table 4.5, covariance matrix table result indicates significant covariance between CRR, INTR, M2, TBR and all the independent variables in GDP, MC, MU and GNI at a range of almost over 100%. Hence, no suspicion of possible multicollinearity in the study and the study maintain the model structures of the hypothesis.

Figure 4.1 - Panel Data Test for Normality



Source: Computation by author using E-view 9.

The histogram in figure 4.1, shows a bell-shape and the Jarque-Bera with the p-value of the panel series is significant at the 5% level of significance showing strong Normality in the distribution.

4.2.2: **Diagnostic Tests**

This study embarked on diagnostic tests to ensure that our data and model used in this research work conforms to the basic assumptions of the classical linear regression which will ensure that the output of this process is not error prone and is reliable.

4.2.2.1: **Test for Stationarity**

Stationarity test requires that the variables in the series model must be stationery at a given level and p-value must be significant at that level. Stationerity is attained where the test statistics is most negative and greater than the critical value of the chosen level of significance.

Table 4.6A: Unit Root Tests for Nigeria Data

Var	ADF Test @ level	C. Values @5%	P-value	ADF Test @ 1st Diff	C. Values @5%	P-value	Order of Integration
CRR	-1.407850	-2.963972	0.5652	-5.612891	-2.622989	0.0001	**I(1)**
TBR	-2.841428	-2.963972	0.0645	-6.447851	-6.447851	0.0000	**I(1)**
INTR	-3.248814	-2.963972	0.0268	**-**	**-**	**-**	**I(0)**
M2	-0.270024	-2.963972	0.9182	-3.430100	-2.622989	0.0180	**I(1)**
GDP	-3.388966	-2.963972	0.0208	**-**	**-**	**-**	**I(0)**
MC	-1.756768	-2.963972	0.3937	-5.707650	-2.622989	0.0001	**I(1)**
MU	0.416239	-2.963972	0.9804	-4.211881	-2.622989	0.0027	**I(1)**
GNI	1.268178	-2.963972	0.9977	-4.994999	-2.632604	0.0005	**I(1)**

Source: Author's E-view 9.5 Computation

The summarized unit root test from table 4.6A reports display the tests for stationarity properties of the series following the Augmented Dickey Fuller (ADF) statistics. All the variables were found to be stationery at order one (1) except INTR and GDP which was stantionary at level. At both level and First difference as reported, the ADF Statistics for all the respective variables were all negative as the critical values at 5% significance level. The reported P values were all less than 0.05 chosen level of significance for which cause, the Null Hypothesis of the presence of unit root in all the variables is convincingly rejected.

Table 4.6B: Unit Root Tests for Kenya Data

Var	ADF Test @ level	C. Values @5%	P-value	ADF Test @ 1^{st} Diff	C. Values @5%	P-value	Order of Integration
CRR	-1.439939	-2.621007	0.5495	-6.755747	-2.622989	0.0000	**I(1)**
TBR	-2.547163	-2.960411	0.1147	-7.411161	-2.963972	0.0000	**I(1)**
INTR	-1.485225	-2.621007	0.5272	-5.287245	-2.622989	0.0002	**I(1)**
M2	-0.307760	-3.218382	0.9866	-3.690321	-3.221728	0.0393	**I(1)**
GDP	2.893723	-3.218382	1.0000	-3.455143	-3.221728	0.0436	**I(1)**
MC	-0.523818	-2.621007	0.8729	-5.257729	-2.622989	0.0002	**I(1)**
MU	1.340130	-2.621007	0.9983	-3.946125	-2.622989	0.0052	**I(1)**
GNI	2.110276	-2.629906	0.9998	-3.815985	-3.238054	0.0326	**I(1)**

Source: Author's E-view 9.5 Computation

The result in table 4.6B reports the tests for stationarity properties of the series following the Augmented Dickey Fuller (ADF) statistics. All the variables were found to be stationery at order one (1). At both level and the First difference as reported, the ADF statistics for all the respective variables were all negative as the critical values at 5% significance level. The reported P-values were all less than 0.05 chosen level of significance for which cause, the Null Hypothesis of the presence of unit root in all the variables is convincingly rejected.

Table 4.6C: Unit Root Tests for South Africa

Var	ADF Test @ level	C. Values @5%	P-value	ADF Test @ 1^{st} Diff	C. Values @5%	P-value	Order of Integration
CRR	-2.200372	-2.621007	0.2103	-6.085566	-2.622989	0.0000	**I(1)**
TBR	-1.733157	-2.960411	0.4053	-5.110200	-2.963972	0.0002	**I(1)**
INTR	-1.193527	-2.621007	0.6639	-3.747229	-2.622989	0.0085	**I(1)**
M2	-0.832119	-2.621007	0.7953	-3.020324	-2.622989	0.0447	**I(1)**
GDP	2.389002	-2.621007	0.9999	-2.830783	-2.622989	0.0664	**I(1)**
MC	-0.700308	-2.621007	0.8318	-6.940301	-2.622989	0.0000	**I(1)**
MU	-0.199430	-2.621007	0.9282	-4.886459	-2.622989	0.0005	**I(1)**
GNI	0.726829	-2.629906	0.9904	-5.729758	-2.635542	0.0001	**I(2)**

Source: Author's E-view 9.5 Computation

The table 4.6C reports the tests for stationarity properties of the series following the Augmented Dickey Fuller (ADF) statistics. All the variables were found to be stationery at order one (1) except for GNI which was stantionary at order 2. At both the First and Second difference as reported, the ADF statistics for all the respective variables were all negative as the critical values at 5% significance level. The reported P values were all less than 0.05 chosen level of significance for which cause, the Null Hypothesis of the presence of unit root in all the variables is convincingly rejected.

For the purposes of co-integration analysis and tests, it is also interesting to state that almost all the variables are expected to be integrated of the same order for all countries.

Table 4.6D: Panel Unit Root Result

Var	LL&C Test @ level	C. Values @5%	P-value	LL&C Test @ 1st Diff	C. Values @5%	P-value	Order of Integration
CRR	-2.512	-0.67579	0.2496	-7.847	-5.22695	0.0000	**I(1)**
TBR	-3.660	-0.75159	0.2261	-7.815	-5.38112	0.0000	**I(1)**
INTR	-4.784	-1.68490	0.0460	**-**	**-**	**-**	**I(0)**
M2	-1.484	1.18454	0.8819	-5.944	-3.64314	0.0001	**I(1)**
GDP	1.489	2.97997	0.9986	-8.199	-3.27157	0.0005	**I(2)**
MC	-4.676	-0.81161	0.2085	-10.710	-5.18267	0.0000	**I(1)**
MU	-2.224	0.49191	0.6886	-8.098	-4.99394	0.0000	**I(1)**
GNI	0.166	1.12120	0.8689	-6.798	-2.32273	0.0101	**I(1)**

Source: Author's E-view 9.5 Computation

The Table 4.6D shows the stationarity tests for the panel data series following the Levin, Lin and Chu (LLC) statistics. All the panel variables were found to be stationery at first difference level (1) except for INTR that was stationary at level and GDP that was stationary at second difference. At all the levels as reported, the variable p-value were all less than the 5% chosen significance level and thus we reject the Null hypothesis of the presence of Unit root and accept the alternative that there is no unit root and stationarity is attained by all the variables at the first difference levels.

4.2.2.2: Test for Multicollinearity

Table 4.7A: Correlation Matrix for Nigeria

	CRR	GDP	INTR	M2	MC	MU	NIG_GNI	TBR
CRR	1	0.7120289802863741	-0.3886755241493221	0.5839944523200419	0.5774033220693321	0.7414456300860761	0.6272259844916754	-0.1439029401636683
GDP	0.7120289802863741	1	-0.6566807546906825	0.9500250976754829	0.8148464098149559	0.957118083342086	0.9802433058869186	-0.442111428238927
INTR	-0.3886755241493221	-0.6566807546906825	1	-0.649215032845945	-0.6719326338887778	-0.5858445546136488	-0.6809273085428994	0.8024995740806059
M2	0.5839944523200419	0.9500250976754829	-0.649215032845945	1	0.849126173102158	0.9396263307157102	0.9340991371376765	-0.4370460203254415
MC	0.5774033220693321	0.8148464098149559	-0.6719326338	0.849126173102158	1	0.7909810974143098	0.832862030071742	-0.54724770777

			887778					86072
MU	0.7414456300860761	0.957118083342086	-0.5858445546136488	0.9396263307157102	0.7909810974143098	1	0.9329404294311412	-0.2881031027119552
NIG_GNI	0.6272259844916754	0.9802433058869186	-0.6809273085428994	0.9340991371376765	0.832862030071742	0.9329404294311412	1	-0.4699795386571401
TBR	-0.1439029401636683	-0.442111428238927	0.8024995740806059	-0.4370460203254415	-0.5472477077786072	-0.2881031027119552	-0.4699795386571401	1

Source: Author's E-view 9.5 Computation

From the correlation matrix table 4.7A, the result indicates significant correlation between CRR, INTR,TBR and M2 with all the four independent variables in GDP, MC, MU and GNI in the table respectively for Nigeria. Hence, there is no suspicion of possible multi-collinearity and the approach would drop no variable in the study as it will be considered unnecessary (Brooks, 2014).

Table 4.7B: Correlation Matrix for Kenya

	CRR	GDP	INTR	KENYA_GNI	M2	MC	MU	TBR
CRR	1	0.6722212122787715	-0.7742192505114752	0.4823153604512649	0.5976877768365582	0.6355131950148678	0.6749108566740649	-0.4764727556368008
GDP	0.6722212122787715	1	-0.5443999621525362	0.9427099101889629	0.988722525818134	0.9383324097400716	0.992678447742863	-0.3188808354750228
INTR	-0.7742192505114752	-0.5443999621525362	1	-0.4579325781903815	-0.4745988459170268	-0.5015191058849169	-0.5337009940062029	0.8181138923414239
KENYA_GNI	0.4823153604512649	0.9427099101889629	-0.4579325781903815	1	0.9619292407891708	0.8979156945644979	0.9322799046120568	-0.3417009473508494
M2	0.5976877768365582	0.988722525818134	-0.4745988459170268	0.9619292407891708	1	0.951452366697204	0.9809887618117262	-0.2743493019033928
MC	0.6355131950148678	0.9383324097400716	-0.5015191058849169	0.8979156945644979	0.951452366697204	1	0.9483292815067606	-0.3329604201969301
MU	0.6749108566740649	0.992678447742863	-0.5337009940062029	0.9322799046120568	0.9809887618117262	0.9483292815067606	1	-0.3231905122649108
TBR	-0.4764727556368008	-0.3188808354750228	0.8181138923414239	-0.3417009473508494	-0.2743493019033928	-0.3329604201969301	-0.3231905122649108	1

Source: Author's E-view 9.5 Computation

The correlation matrix table 4.7B result indicates significant correlation between CRR, INFR, INTR, TBR and M2 with all the four independent variables in GDP, MC, MU and GNI in the table respectively for Kenya. Hence, there is no suspicion of possible multi-collinearity and the approach would drop no variable in the study as it will be considered unnecessary (Brooks, 2014).

Table 4.7C: Correlation Matrix for South Africa

	CRR	GDP	INTR	M2	MC	MU	SA_GNI	TBR
CRR	1	0.5815720342271641	-0.6074668155701869	0.4905474768681357	0.4488497329616195	0.6439682284801049	0.5930656228007799	-0.5610032606633252
GDP	0.5815720342271641	1	-0.870183655434252	0.9272005995183405	0.9305207681155002	0.974281021527618	0.997011619194736	-0.7904698170653842
INTR	-0.6074668155701869	-0.870183655434252	1	-0.837844282854251	-0.8553365278708351	-0.8546844685623159	-0.8758814860978299	0.9493781083628966
M2	0.4905474768681357	0.9272005995183405	-0.837844282854251	1	0.9491103966891612	0.9259068147199699	0.9461507610113518	-0.76700789960468
MC	0.4488497329616195	0.9305207681155002	-0.8553365278708351	0.9491103966891612	1	0.9008016514081928	0.9396333711805408	-0.7653279749087636
MU	0.6439682284801049	0.974281021527618	-0.8546844685623159	0.9259068147199699	0.9008016514081928	1	0.9829965510702982	-0.7632831701451999
SA_GNI	0.5930656228007799	0.997011619194736	-0.8758814860978299	0.9461507610113518	0.9396333711805408	0.9829965510702982	1	-0.7948365145525555
TBR	-0.5610032606633252	-0.7904698170653842	0.9493781083628966	-0.76700789960468	-0.7653279749087636	-0.7632831701451999	-0.7948365145525555	1

Source: Author's E-view 9.5 Computation

From the correlation matrix table 4.7C, the result indicates significant correlation between CRR, INTR, TBR and M2 with all the four independent variables in GDP, MC, MU and GNI in the table respectively for South Africa. Hence, there is no suspicion of possible multi-collinearity and the approach would drop no variable in the study as it will be considered unnecessary (Brooks, 2014).

Table 4.7D: Panel Correlation Matrix

	CRR	GDP	GNI	INTR	M2	MC	MU	TBR
CRR	1	0.5191696292656271	-0.1189961632507586	-0.1803427684657522	-0.03227160338340426	-0.2089585234562584	-0.12028195109669697	-0.1545839595050507
GDP	0.5191696292656271	1	0.6108441864961375	-0.4567765324503858	0.6567708911134909	0.4565188489491806	0.7754088439516471	-0.225448784502769
GNI	-0.1189961632507586	0.6108441864961375	1	-0.6296671722251451	0.950863963383136	0.9367940507409225	0.9136630952088078	-0.2966141468268068
INTR	-0.1803427684657522	-0.4567765324503858	-0.6296671722251451	1	-0.642844298336017	-0.6085380855722205	-0.5711995225442879	0.791303600475269

M2	-0.03227160338340426	0.6567708911134909	0.950863963383136	-0.642844298336017	1	0.9447477448819972	0.864535936252745	-0.3377847761204484
MC	-0.2089585234562584	0.4565188489491806	0.9367940507409225	-0.6085380855722205	0.9447477448819972	1	0.7637349186925512	-0.314570025499364
MU	0.1202819519669697	0.7754088439516471	0.9136630952088078	-0.5711995225442879	0.864535936252745	0.7637349186925512	1	-0.226620210810922
TBR	-0.1545839595050507	-0.225448784502769	-0.2966141468268068	0.791303600475269	-0.3377847761204484	-0.314570025499364	-0.226620210810922	1

Source: Author's E-view 9.5 Computation

Table 4.7D shows a positive panel correlation of a maximum of 94.47% and minimum of 12.02% across border for all the monetary variables in CRR, INTR, TBR and M2 on the independent variables in GDP, MC, MU and GNI. Hence, there is no suspicion of possible multi-collinearity and the approach would drop no variable in the study as it will be considered unnecessary (Brooks, 2014).

4.2.2.3 Tests for Cointegration

Cointegration is an essential part of financial modelling analysis used in Finance to model long-run equilibrium relationship (Brooks, 2014) and this is supported by Woolbridge (2006). Soumare and Tchana (2015) used co-integration method to establish and test for long-run equilibrium relationship and thus form the basis for our adoption of cointegration method to test for the existence of long-run equilibrium relationship before we can proceed with our regression analysis.

i.) Individual Country Cointegration Tests

Table 4.8A: Cointegration Test Result for Nigeria @5% level

Date: 12/18/18 Time: 12:18 Sample (adjusted): 1992 2016 Included observations: 25 after adjustments Trend assumption: Linear deterministic trend Series: CRR GDP INTR M2 MC MU NIG_GNI TBR Lags interval (in first differences): 1 to 1
Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.999734	523.7835	159.5297	0.0000
At most 1 *	0.995662	317.9994	125.6154	0.0000
At most 2 *	0.941812	181.9889	95.75366	0.0000
At most 3 *	0.823820	110.8868	69.81889	0.0000
At most 4 *	0.704416	67.48055	47.85613	0.0003
At most 5 *	0.592909	37.01048	29.79707	0.0062
At most 6	0.376849	14.54251	15.49471	0.0692
At most 7	0.103032	2.718368	3.841466	0.0992

Trace test indicates 6 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.999734	205.7842	52.36261	0.0001
At most 1 *	0.995662	136.0105	46.23142	0.0000
At most 2 *	0.941812	71.10206	40.07757	0.0000
At most 3 *	0.823820	43.40629	33.87687	0.0027
At most 4 *	0.704416	30.47007	27.58434	0.0207
At most 5 *	0.592909	22.46797	21.13162	0.0323
At most 6	0.376849	11.82414	14.26460	0.1174
At most 7	0.103032	2.718368	3.841466	0.0992

Max-eigenvalue test indicates 6 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: Author’s E-view 9.5 Computation

The co-integration result for Nigeria in table 4.8A of the trace and maximum eigen-value tests shows the existence of Seven (7) co-integrating vectors (p-value of 0.0000, 0.0000, 0.0000, 0.0000, 0.0003 and 0.0062 for trace test and 0.0001, 0.0000, 0.0000, 0.0027, 0.0207 and 0.0323 for maximum eigen-value) between CRR, INTR, M2, TBR, GDP, MU, MC and GNI at the 5% level of significance. This thus confirms the existence of long-run equilibrium (cointegrating) effect of CRR, INTR, TBR and M2 on GDP, MC, MU and GNI.

Table 4.8B: Cointegration Test Result for Kenya @ 5% level

Date: 12/18/18   Time: 12:23
Sample (adjusted): 7 31
Included observations: 25 after adjustments
Trend assumption: Linear deterministic trend
Series: CRR GDP INTR KENYA_GNI M2 MC MU TBR
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.998257	428.7061	159.5297	0.0000
At most 1 *	0.959404	269.8993	125.6154	0.0000
At most 2 *	0.903322	189.7974	95.75366	0.0000
At most 3 *	0.873689	131.3882	69.81889	0.0000
At most 4 *	0.798943	79.66303	47.85613	0.0000
At most 5 *	0.632919	39.55891	29.79707	0.0028
At most 6	0.333409	14.50460	15.49471	0.0701
At most 7 *	0.160212	4.365131	3.841466	0.0367

Trace test indicates 6 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.998257	158.8068	52.36261	0.0000
At most 1 *	0.959404	80.10195	46.23142	0.0000
At most 2 *	0.903322	58.40915	40.07757	0.0002
At most 3 *	0.873689	51.72521	33.87687	0.0002
At most 4 *	0.798943	40.10412	27.58434	0.0008
At most 5 *	0.632919	25.05431	21.13162	0.0133
At most 6	0.333409	10.13947	14.26460	0.2029
At most 7 *	0.160212	4.365131	3.841466	0.0367

Max-eigenvalue test indicates 6 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: Author's E-view 9.5 Computation

The co-integration result for Nigeria in table 4.8B of the trace and maximum eigen-value tests shows the existence of Eight (8) co-integrating vectors (p-value of 0.0000, 0.0000, 0.0000, 0.0000, 0.0000 and 0.0028 for trace test and 0.0000, 0.0000, 0.0002, 0.0002, 0.0008, 0.0133 and 0.0036 for maximum eigen-value) between CRR, INTR, M2, TBR, GDP, MU, MC and GNI at the 5% level of significance. This thus confirms the existence of long-run equilibrium (cointegrating) effect of CRR, INTR, TBR and M2 on GDP, MC, MU and GNI.

Table 4.8C: Cointegration Test Result for South Africa @ 5% level

Date: 12/18/18 Time: 12:26
Sample (adjusted): 7 31

Included observations: 25 after adjustments
Trend assumption: Linear deterministic trend
Series: CRR GDP INTR M2 MC MU SA_GNI TBR
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.999798	471.1044	159.5297	0.0000
At most 1 *	0.965668	258.4728	125.6154	0.0000
At most 2 *	0.925289	174.1807	95.75366	0.0000
At most 3 *	0.805006	109.3276	69.81889	0.0000
At most 4 *	0.653202	68.45791	47.85613	0.0002
At most 5 *	0.559582	41.98257	29.79707	0.0012
At most 6 *	0.481087	21.48178	15.49471	0.0055
At most 7 *	0.183927	5.081285	3.841466	0.0242

Trace test indicates 8 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.999798	212.6316	52.36261	0.0001
At most 1 *	0.965668	84.29209	46.23142	0.0000
At most 2 *	0.925289	64.85312	40.07757	0.0000
At most 3 *	0.805006	40.86969	33.87687	0.0062
At most 4	0.653202	26.47534	27.58434	0.0688
At most 5	0.559582	20.50079	21.13162	0.0611
At most 6 *	0.481087	16.40050	14.26460	0.0226
At most 7 *	0.183927	5.081285	3.841466	0.0242

Max-eigenvalue test indicates 4 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: Author's E-view 9.5 Computation

The co-integration result for Nigeria in table 4.8C of the trace and maximum eigen-value tests shows the existence of Eight (8) co-integrating vectors (p-value of 0.0000, 0.0000, 0.0000, 0.0000, 0.0002, 0.0012, 0.0055 and 0.0242 for trace test and 0.0001, 0.0000, 0.0000, 0.0062, 0.0226 and 0.0242 for maximum eigen-value) between CRR, INTR, TBR, M2, GDP, MU, MC and GNI at the 5% level of significance. This thus confirms the existence of long-run equilibrium (cointegrating) effect of CRR, INTR, TBR and M2 on GDP, MC, MU and GNI.

ii) Panel Data Pooled Cointegration Results

Table 4.8D: RESULT – Johansen Fisher Panel Cointegration Tests

Johansen Fisher Panel Cointegration Test
Series: CRR GDP GNI INTR M2 MC MU TBR
Date: 12/18/18 Time: 12:32
Sample: 1986 2016
Included observations: 93
Trend assumption: Linear deterministic trend
Lags interval (in first differences): 1 1

Unrestricted Cointegration Rank Test (Trace and Maximum Eigenvalue)

Hypothesized No. of CE(s)	Fisher Stat.* (from trace test)	Prob.	Fisher Stat.* (from max-eigen test)	Prob.
None	464.7	0.0000	89.33	0.0000
At most 1	176.7	0.0000	137.5	0.0000
At most 2	139.3	0.0000	66.25	0.0000
At most 3	88.45	0.0000	40.26	0.0000
At most 4	56.07	0.0000	27.93	0.0001
At most 5	33.56	0.0000	20.03	0.0027
At most 6	20.23	0.0025	14.15	0.0280
At most 7	18.84	0.0044	18.84	0.0044

* Probabilities are computed using asymptotic Chi-square distribution.

Source: Author's E-view 9.5 Computation

The Panel Cointegration Trace and Maximum Eigenvalue Tests reveal the existence of Eight (8) co-integrating vectors (with p-values of 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, 0.0025 and 0.0044 respectively and also Fisher statistic of 0.0000, 0.0000, 0.0000, 0.0000, 0.0001, 0.0027, 0.0280 and 0.0044 respectively) between CRR, INTR, TBR, M2, GDP, MU, MC and GNI. This confirms the co-integration result of the residual co-integration tests of the existence of co-integration between CRR, INTR, TBR and M2 on GDP, MC, MU and GNI.

Decision rule: We reject null hypothesis of the no co-integration relationship to accept the alternative that there is co-integration. We thus, conclude that the monetary policy instruments in

CRR, INTR, TBR and M2 have long run equilibrium effect on GDP, MC, MU and GNI.CPI, EX, M2, TBC.

4.3 Test of Hypothesis

This part tests the hypotheses stated in chapter one as modeled in chapter three. In testing for these hypotheses, we proceeded to test the data for each country in the study area, to ascertain what the individual country result is;

Test of Hypothesis – Individual Country Output

Restatement of Hypothesis One

H_{o1}: There is no significant relationship between monetary policy and Gross Domestic Product in developing African countries.

H_1: There is a significant relationship between monetary policy and Gross Domestic Product in developing African countries.

Table 4.9A: Regression Result for Nigeria – Model 1

Dependent Variable: LOG(GDP)
Method: Least Squares
Date: 12/18/18 Time: 12:38
Sample: 1986 2016
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(CRR)	0.339069	0.051308	6.608448	0.0000
LOG(INTR)	0.402902	0.204492	1.970252	0.0595
LOG(TBR)	-0.196769	0.107786	-1.825556	0.0794
LOG(M2)	0.504224	0.055100	9.151077	0.0000
C	6.239482	0.929814	6.710460	0.0000

R-squared	0.957307	Mean dependent var	12.73719
Adjusted R-squared	0.950739	S.D. dependent var	0.768920
S.E. of regression	0.170660	Akaike info criterion	-0.551599
Sum squared resid	0.757245	Schwarz criterion	-0.320310
Log likelihood	13.54978	Hannan-Quinn criter.	-0.476204
F-statistic	145.7512	Durbin-Watson stat	1.225778
Prob(F-statistic)	0.000000		

Source: Computation by author using E-view 9.5

The result in table 4.9A shows R^2 and Adjusted R^2 of 95.73 and 95.07% respectively. This shows that the chosen regression model best fits the data. Hence, the goodness of fit regression model is 95.73% and implies that chosen explanatory variables explain variations in the dependent variables to the tune of 95.73%. Also, with a high Adjusted R^2 (95.07%) implies that the model can take on more variables conveniently without the R^2 falling beyond 95.73%. The overall impact of the variables are shown in the F-test and the F-statistics of 145.7512 is considered acceptable being positive and it shows that there is significant positive relationship between the dependent and explanatory variables showing that all the monetary policy variables have significant relationship with GDP in the study. The overall probability (F-statistics) of 0.00000 is rightly signed and very significant and displays a Durbin-Watson of 1.225778, showing the presence of autocorrelation on the chosen data.

The individual relationship in T-test showed that two (2) of the four (4) monetary policy instrument in CRR and M2 have positive and significant relationship with GDP in table 4.9A in Nigeria. Therefore, we reject null hypothesis to accept the alternative that states that there is a significant relationship between monetary policy and Gross Domestic Product in Nigeria.

Due to the presence of autocorrelation, the study conducts a serial autocorrelation test to confirm decision position.

Table 4.9A (i): BG serial correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	3.195985	Prob. F(2,24)	0.0588
Obs*R-squared	6.519850	Prob. Chi-Square(2)	0.0384

Source: Computation by author using E-view 9.5

From table 4.9A, the p-value is less than the chosen level of significance of 5%, confirming the presence of autocorrelation in the model. This is further enhanced with a Durbin-Watson statistic of 1.916469. Hence, we do not suspect any violation of the assumptions of classical linear regression. The applicable treatment was to log the variables as no treatment facilitated the significant result.

Table 4.9B: Regression Result for Kenya – Model

Dependent Variable: LOG(GDP)
Method: Least Squares
Date: 12/18/18 Time: 12:45
Sample (adjusted): 1 31
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	0.018817	0.005645	3.333371	0.0026
LOG(INTR)	0.282341	0.131738	2.143202	0.0416
TBR	-0.003735	0.003987	-0.936904	0.3574
LOG(M2)	0.523647	0.027141	19.29376	0.0000
C	5.549326	0.426146	13.02213	0.0000

R-squared	0.978476	Mean dependent var	11.02316
Adjusted R-squared	0.975164	S.D. dependent var	0.500579
S.E. of regression	0.078888	Akaike info criterion	-2.094889
Sum squared resid	0.161806	Schwarz criterion	-1.863601
Log likelihood	37.47079	Hannan-Quinn criter.	-2.019495
F-statistic	295.4861	Durbin-Watson stat	0.867786
Prob(F-statistic)	0.000000		

Source: Computation by author using E-view 9.5

The result in table 4.9B shows R^2 and Adjusted R^2 of 97.85% and 97.52% respectively. This shows that the chosen regression model best fits the data. Hence, the goodness of fit regression model is 97.85% and implies that chosen explanatory variables explain variations in the dependent variables to the tune of 97.85%. Also, with a high Adjusted R^2 (97.52%) implies that the model can take on more variables conveniently without the R^2 falling beyond 97.85%. the overall impact of the variables is shown in the F-statistics of 295.4861 is considered acceptable being positive and it shows that there is significant positive relationship between the dependent and explanatory variables showing that all the monetary policy variables have significant relationship with GDP in the study. The overall probability (F-statistics) of 0.00000 is rightly signed and very significant and displays a Durbin-Watson of 0.867786, showing the presence of autocorrelation on the chosen data.

The individual relationship in T-test showed that three (3) of the four (4) monetary policy instruments in CRR, INTR and M2 have positive and significant relationship with GDP in table 4.9B in Kenya. Therefore, we reject null hypothesis to accept the alternative that states that there is a significant relationship between monetary policy and Gross Domestic Product in Kenya.

Due to the presence of autocorrelation, the study conducts a serial autocorrelation test to confirm decision position.

Table 4.9B (i): BG serial correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	2.192432	Prob. F(2,24)	0.1335
Obs*R-squared	4.788847	Prob. Chi-Square(2)	0.0412

Source: Computation by author using E-view 9.5

From table 4.9B, the p-value is greater than the chosen level of significance of 5%, confirming the absence of autocorrelation in the model. This is further enhanced with a Durbin-Watson statistic of 1.814833. Hence, we do not suspect any violation of the assumptions of classical linear regression. The applicable treatment was to log the variables as no treatment facilitated the significant result.

Table 4.9B (ii): Heteroskedasticity Test

Heteroskedasticity Test: ARCH			
F-statistic	0.143624	Prob. F(1,28)	0.7076
Obs*R-squared	0.153097	Prob. Chi-Square(1)	0.6956

Source: Computation by author using E-view 9.5

The null hypothesis states that there is No heteroskedasticity if p-value is not significant and is greater than the chosen level of significance of 5%. Hence, in this case we accept the Null hypothesis that there is no evidence of heteroskedasticity since p-value is greater than 5% significance level.

Table 4.9C: Regression Result for South Africa – Model

Dependent Variable: LOG(GDP)
Method: Least Squares
Date: 12/18/18 Time: 12:53
Sample (adjusted): 1 31
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	0.035025	0.011105	3.153977	0.0040
LOG(INTR)	-0.053868	0.211301	-0.254936	0.8008
LOG(TBR)	-0.015417	0.146697	-0.105096	0.9171
LOG(M2)	0.527248	0.047903	11.00654	0.0000
C	6.837620	0.785912	8.700239	0.0000

R-squared	0.946353	Mean dependent var	12.85119
Adjusted R-squared	0.938100	S.D. dependent var	0.437816
S.E. of regression	0.108927	Akaike info criterion	-1.449579
Sum squared resid	0.308495	Schwarz criterion	-1.218291
Log likelihood	27.46848	Hannan-Quinn criter.	-1.374185
F-statistic	114.6627	Durbin-Watson stat	0.395583
Prob(F-statistic)	0.000000		

Source: Computation by author using E-view 9.5

The result in table 4.9C shows R^2 and Adjusted R^2 of 94.64% and 93.81% respectively. This shows that the chosen regression model best fits the data. Hence, the goodness of fit regression model is 94.54% and implies that chosen explanatory variables explain variations in the dependent variables to the tune of 94.54%. Also, with a high Adjusted R^2 (93.81%) implies that the model can take on more variables conveniently without the R^2 falling beyond 94.55%. The overall impact of the variables is shown in the F-statistics of 114.6627 is considered acceptable being positive and it shows that there is significant positive relationship between the dependent and explanatory variables indicating that all the monetary policy variables have significant relationship with GDP in the study. The overall probability (F-statistics) of 0.00000 is rightly signed and very significant and displays a Durbin-Watson of 0.395583, showing the presence of autocorrelation on the chosen data.

The individual relationship in T-test showed that 2 (two) of the 4 (four) monetary policy instrument in CRR and M2 have positive and significant relationship with GDP in table 4.9C in

South Africa. Therefore, we reject null hypothesis to accept the alternative that states that there is a significant relationship between monetary policy and Gross Domestic Product in South Africa. Due to the presence of autocorrelation, the study conducts a serial autocorrelation test to confirm decision position.

Table 4.9C (i): BG serial correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	24.76227	Prob. F(2,24)	0.0000
Obs*R-squared	20.88093	Prob. Chi-Square(2)	0.0000

Source: Computation by author using E-view 9.5

From table 4.9C, the p-value is less than the chosen level of significance of 5%, confirming the presence of autocorrelation in the model. This is further enhanced with a Durbin-Watson statistic of 1.917486. Hence, we do not suspect any violation of the assumptions of classical linear regression. The applicable treatment was to log the variables as no treatment facilitated the significant result.

Restatement of Hypothesis Two

H_{o2}: There is no significant relationship between money supply and market capitalization in developing African countries.

H_2: There is a significant relationship between money supply and market capitalization in developing African countries.

Table 4.10A: Regression Result for Nigeria – Model 2

Dependent Variable: LOG(MC)
Method: Least Squares
Date: 12/18/18 Time: 13:16
Sample: 1986 2016
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(CRR)	0.394944	0.138686	2.847756	0.0085
LOG(INTR)	-0.643361	0.552741	-1.163946	0.2550
LOG(TBR)	-0.689249	0.291344	-2.365758	0.0257

LOG(M2)	0.897986	0.148935	6.029393	0.0000
C	2.899183	2.513280	1.153545	0.2592

R-squared	0.909598	Mean dependent var	9.179911
Adjusted R-squared	0.895690	S.D. dependent var	1.428276
S.E. of regression	0.461292	Akaike info criterion	1.437120
Sum squared resid	5.532552	Schwarz criterion	1.668408
Log likelihood	-17.27535	Hannan-Quinn criter.	1.512514
F-statistic	65.40077	Durbin-Watson stat	1.092490
Prob(F-statistic)	0.000000		

Source: Computation by author using E-view 9.5

The result in table 4.10A shows R^2 and Adjusted R^2 of 90.05% and 89.57% respectively. This shows that the chosen regression model best fits the data. Hence, the goodness of fit regression model is 90.95% and implies that chosen explanatory variables explain variations in the dependent variables to the tune of 90.95%. Also, with a high Adjusted R^2 (89.57%) implies at the model can take on more variables conveniently without the R^2 falling beyond 90.95%. the overall impact of the variables is shown in the F-statistics of 65.40077 is considered acceptable being positive and it shows that there is significant positive relationship between the dependent and explanatory variables showing that all the monetary policy variables have significant relationship with MC in the study. The overall probability (F-statistics) of 0.00000 is rightly signed and very significant and displays a Durbin-Watson of 1.092490, showing the presence of autocorrelation on the chosen data.

The individual relationship in T-test showed that three (3) of the four (4) monetary policy instrument in CRR, TBR and M2 have positive and significant relationship with MC in table 4.10A in Nigeria. Therefore, we reject null hypothesis to accept the alternative that states that there is a significant relationship between monetary policy and Market Capitalization in Nigeria.

Due to the presence of autocorrelation, the study conducts a serial autocorrelation test to confirm decision position.

Table 4.10A (i): BG serial correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	5.489528	Prob. F(2,24)	0.0109
Obs*R-squared	9.730130	Prob. Chi-Square(2)	0.0077

Source: Computation by author using E-view 9.5

From table 4.10A (i), the p-value is less than the chosen level of significance of 5%, confirming the presence of autocorrelation in the model. This is further enhanced with a Durbin-Watson statistic of 1.963390. Hence, we do not suspect any violation of the assumptions of classical linear regression. The applicable treatment was to log the variables as no treatment facilitated the significant result.

Table 4.10B: Regression Result for Kenya – Model 2

Dependent Variable: LOG(MC)
Method: Least Squares
Date: 12/18/18 Time: 13:21
Sample (adjusted): 1 31
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	0.073575	0.032571	2.258918	0.0325
LOG(INTR)	1.159518	0.760103	1.525475	0.1392
TBR	-0.011183	0.023003	-0.486152	0.6309
LOG(M2)	1.389649	0.156597	8.874035	0.0000
C	-7.862662	2.458781	-3.197788	0.0036

R-squared	0.913289	Mean dependent var	7.973601
Adjusted R-squared	0.899948	S.D. dependent var	1.438997
S.E. of regression	0.455168	Akaike info criterion	1.410391
Sum squared resid	5.386630	Schwarz criterion	1.641679
Log likelihood	-16.86105	Hannan-Quinn criter.	1.485785
F-statistic	68.46128	Durbin-Watson stat	0.825699
Prob(F-statistic)	0.000000		

Source: Computation by author using E-view 9.5

The result in table 4.10B shows R^2 and Adjusted R^2 of 91.32% and 89.99% respectively. This shows that the chosen regression model best fits the data. Hence, the goodness of fit regression model is 91.32% and implies that chosen explanatory variables explain variations in the dependent variables to the tune of 91.32%. Also, with a high Adjusted R^2 (89.99%) implies that the model can take on more variables conveniently without the R^2 falling beyond 91.32%. The overall impact of the variables is shown in the F-statistics of 68.46128 is considered acceptable being positive and it shows that there is significant positive relationship between the dependent and explanatory variables showing that all the monetary policy variables have significant relationship with MC in the study. The overall probability (F-statistics) of 0.00000 is rightly signed and very significant and displays a Durbin-Watson of 0.825699 showing the presence of autocorrelation on the chosen data.

The individual relationship in T-test showed that two(2) of the four(4) monetary policy instruments in CRRand M2 have positive and significant relationship with MC in table 4.10B in Kenya. Therefore, we reject null hypothesis to accept the alternative that states that there is a significant relationship between monetary policy and Market Capitalization in Kenya.

Due to the presence of autocorrelation, the study conducts a serial autocorrelation test to confirm decision position.

Table 4.10B (i): BG serial correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	8.483021	Prob. F(2,24)	0.0016
Obs*R-squared	12.83862	Prob. Chi-Square(2)	0.0016

Source: Computation by author using E-view 9.5

From table 4.10B, the p-value is less than the chosen level of significance of 5%, confirming the presence of autocorrelation in the model. However, the Durbin-Watson statistic of 1.813373 do not support the result. Hence, we do not suspect any violation of the assumptions of classical linear regression. The applicable treatment was to log the variables as no treatment facilitated the significant result.

Table 4.10B (ii): Heteroskedasticity Test

Heteroskedasticity Test: ARCH

F-statistic	0.549000	Prob. F(1,28)	0.4649
Obs*R-squared	0.576903	Prob. Chi-Square(1)	0.4475

Source: Computation by author using E-view 9.5

The null hypothesis states that there is No heteroskedasticity if p-value is not significant and is greater than the chosen level of significance of 5%. Hence, in this case we accept the Null hypothesis that there is no evidence of heteroskedasticity since p-value is greater than 5% significance level in table 4.10B (ii).

Table 4.10C: Regression Result for South Africa – Model 2

Dependent Variable: LOG(MC)
Method: Least Squares
Date: 12/18/18 Time: 13:26
Sample (adjusted): 1 31
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	-0.027451	0.018099	-1.516742	0.1414
LOG(INTR)	-0.518256	0.344375	-1.504918	0.1444
LOG(TBR)	0.126731	0.239084	0.530069	0.6006
LOG(M2)	1.015621	0.078072	13.00882	0.0000
C	2.053306	1.280864	1.603063	0.1210

R-squared	0.952080	Mean dependent var	12.71054
Adjusted R-squared	0.944708	S.D. dependent var	0.754981
S.E. of regression	0.177528	Akaike info criterion	-0.472688
Sum squared resid	0.819420	Schwarz criterion	-0.241400
Log likelihood	12.32666	Hannan-Quinn criter.	-0.397294
F-statistic	129.1438	Durbin-Watson stat	1.904037
Prob(F-statistic)	0.000000		

Source: Computation by author using E-view 9.5

Looking at the result in table 4.10C, the result shows R^2 and Adjusted R^2 of 95.20% and 94.46% respectively. This shows that the chosen regression model best fits the data. Hence, the goodness of fit regression model is 95.20% and implies that chosen explanatory variables explain variations in the dependent variables to the tune of 95.20%. Also, with a high Adjusted R^2 (94.46%) implies that the model can take on more variables conveniently without the R^2 falling beyond 95.20%. The overall impact of the variables are shown in the F-test and the F-statistics of 129.1438 is considered acceptable being positive and it shows that there is significant positive relationship between the dependent and explanatory variables indicating that all the monetary policy variables have significant relationship with MC in the study. The overall probability (F-statistics) of 0.00000 is rightly signed and very significant and displays a Durbin-Watson of 1.904037, showing no presence of autocorrelation on the chosen data.

The individual relationship in T-test showed that one (1) of the four (4) monetary policy instrument in M2 have positive and significant relationship with MC in table 4.10C in South Africa. Therefore, we reject null hypothesis to accept the alternative that states that there is a significant relationship between monetary policy and Market Capitalization in South Africa.

Restatement of Hypothesis Three

H_{o3}: There is no significant relationship between monetary policy and Manufacturing Output in developing African countries.

H_{o3}: There is no significant relationship between monetary policy and Manufacturing Output in developing African countries.

Table 4.11A: Regression Result for Nigeria -Model 3

Dependent Variable: LOG(MU)
Method: Least Squares
Date: 12/18/18 Time: 13:29
Sample: 1986 2016
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(CRR)	0.252312	0.128635	1.961450	0.0606
LOG(INTR)	-0.954370	0.512683	-1.861521	0.0740
LOG(TBR)	0.212984	0.270230	0.788159	0.4377
LOG(M2)	0.825119	0.138141	5.973017	0.0000
C	2.337004	2.331138	1.002516	0.3253

R-squared	0.870504	Mean dependent var	8.895486
Adjusted R-squared	0.850581	S.D. dependent var	1.106881
S.E. of regression	0.427861	Akaike info criterion	1.286655
Sum squared resid	4.759700	Schwarz criterion	1.517943
Log likelihood	-14.94315	Hannan-Quinn criter.	1.362049
F-statistic	43.69458	Durbin-Watson stat	0.570817
Prob(F-statistic)	0.000000		

Source: Computation by author using E-view 9.5

The result in table 4.11A shows R^2 and Adjusted R^2 of 87.05% and 85.06% respectively. This shows that the chosen regression model best fits the data. Hence, the goodness of fit regression model is 87.05% and implies that chosen explanatory variables explain variations in the dependent variables to the tune of 87.05%. Also, with a high Adjusted R^2 (85.06%) implies that the model can take on more variables conveniently without the R^2 falling beyond 87.05%. the overall impact of the variables is shown in the F-statistics of 43.69458 is considered acceptable being positive and it shows that there is significant positive relationship between the dependent and explanatory variables showing that all the monetary policy variables have significant relationship with MU in the study. The overall probability (F-statistics) of 0.00000 is rightly signed and very significant and displays a Durbin-Watson of 0.570817, showing the presence of autocorrelation on the chosen data.

The individual relationship in T-test showed that one (1) of the four (4) monetary policy instrument in M2 have positive and significant relationship with MU in table 4.11A in Nigeria. Therefore, we reject null hypothesis to accept the alternative that states that there is a significant relationship between monetary policy and Manufacturing Output in Nigeria.

Due to the presence of autocorrelation, the study conducts a serial autocorrelation test to confirm decision position.

Table 4.11A (i): BG serial correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	18.47731	Prob. F(2,24)	0.0000
Obs*R-squared	18.79420	Prob. Chi-Square(2)	0.0001

Source: Computation by author using E-view 9.5

From table 4.11A (i), the p-value is less than the chosen level of significance of 5%, confirming the presence of autocorrelation in the model. However, the Durbin-Watson statistic of 1.95531 do not support the result. Hence, we do not suspect any violation of the assumptions of classical linear regression. The applicable treatment was to log the variables as no treatment facilitated the significant result.

Table 4.11B: Regression Result for Kenya - Model 3

Dependent Variable: LOG(MU)

Method: Least Squares
Date: 12/18/18 Time: 13:33
Sample (adjusted): 1 31
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	0.008242	0.003359	2.453924	0.0211
LOG(INTR)	0.245319	0.078382	3.129793	0.0043
TBR	-0.003929	0.002372	-1.656195	0.1097
LOG(M2)	0.261006	0.016148	16.16306	0.0000
C	4.861587	0.253549	19.17413	0.0000

R-squared	0.965836	Mean dependent var	7.869391
Adjusted R-squared	0.960580	S.D. dependent var	0.236406
S.E. of regression	0.046937	Akaike info criterion	-3.133335
Sum squared resid	0.057280	Schwarz criterion	-2.902047
Log likelihood	53.56669	Hannan-Quinn criter.	-3.057941
F-statistic	183.7611	Durbin-Watson stat	0.751382
Prob(F-statistic)	0.000000		

Source: Computation by author using E-view 9.5

Based on the result in table 4.11B, the R^2 and Adjusted R^2 are 96.58% and 96.06% respectively. This shows that the chosen regression model best fits the data. Hence, the goodness of fit regression model is 96.58% and implies that chosen explanatory variables explain variations in the dependent variables to the tune of 96.58%. Also, with a high Adjusted R^2 (96.06%) implies that the model can take on more variables conveniently without the R^2 falling beyond 96.58%. The overall impact of the variables is shown in the F-statistics of 183.7611 is considered acceptable being positive and it shows that there is significant positive relationship between the dependent and explanatory variables showing that all the monetary policy variables have significant relationship with MU in the study. The overall probability (F-statistics) of 0.00000 is rightly signed and very significant and displays a Durbin-Watson of 0.751382 showing the presence of autocorrelation on the chosen data.

The individual relationship in T-test showed that three (3) of the four (4) monetary policy instruments in CRR, INTR and M2 have positive and significant relationship with MU in table

4.11B in Kenya. Therefore, we reject null hypothesis to accept the alternative that states that there is a significant relationship between monetary policy and Manufacturing Output in Kenya. Due to the presence of autocorrelation, the study conducts a serial autocorrelation test to confirm decision position.

Table 4.11B (i):BG serial correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.056333	Prob. F(2,24)	0.3633
Obs*R-squared	2.508080	Prob. Chi-Square(2)	0.2853

Source: Computation by author using E-view 9.5

From table 4.11B (i), the p-value is greater than the chosen level of significance of 5%, confirming that the presence of autocorrelation in the model is insignificant. This is further enhanced with a Durbin-Watson statistic of 1.716175. Hence, we do not suspect any violation of the assumptions of classical linear regression. The applicable treatment was to log the variables as no treatment facilitated the significant result.

Table 4.11B (ii): Heteroskedasticity Test

Heteroskedasticity Test: ARCH			
F-statistic	1.290479	Prob. F(1,28)	0.2656
Obs*R-squared	1.321739	Prob. Chi-Square(1)	0.2503

Source: Computation by author using E-view 9.5

The null hypothesis states that there is No heteroskedasticity if p-value is not significant and is greater than the chosen level of significance of 5%. Hence, in this case we accept the Null hypothesis that there is no evidence of heteroskedasticity since p-value is greater than 5% significance level in table 4.11B (ii).

Table 4.11C: Regression Result for South Africa - Model 3

Dependent Variable: LOG(MU)
Method: Least Squares
Date: 12/18/18 Time: 13:37
Sample (adjusted): 1 31
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

CRR	0.018835	0.005006	3.762295	0.0009
LOG(INTR)	-0.234542	0.095258	-2.462181	0.0208
LOG(TBR)	0.134726	0.066133	2.037190	0.0519
LOG(M2)	0.208646	0.021596	9.661539	0.0000
C	8.384855	0.354301	23.66590	0.0000

R-squared	0.942988	Mean dependent var	10.53327
Adjusted R-squared	0.934217	S.D. dependent var	0.191461
S.E. of regression	0.049106	Akaike info criterion	-3.042974
Sum squared resid	0.062697	Schwarz criterion	-2.811686
Log likelihood	52.16610	Hannan-Quinn criter.	-2.967580
F-statistic	107.5113	Durbin-Watson stat	0.999128
Prob(F-statistic)	0.000000		

Source: Computation by author using E-view 9.5

Looking at the result in table 4.11C, the result shows R^2 and Adjusted R^2 of 94.30% and 93.42% respectively. This shows that the chosen regression model best fits the data. Hence, the goodness of fit regression model is 94.30% and implies that chosen explanatory variables explain variations in the dependent variables to the tune of 94.30%. Also, with a high Adjusted R^2 (93.42%) implies that the model can take on more variables conveniently without the R^2 falling beyond 94.30%. The overall impact of the variables is shown in the F-test and the F-statistics of 107.5113 is considered acceptable being positive and it shows that there is significant positive relationship between the dependent and explanatory variables indicating that all the monetary policy variables have significant relationship with MU in the study. The overall probability (F-statistics) of 0.00000 is rightly signed and very significant and displays a Durbin-Watson of 0.999128, showing the presence of autocorrelation on the chosen data.

The individual relationship in T-test showed that all the four (4) monetary policy instrument in CRR, INTR, TBR and M2 have positive and significant relationship with MU in table 4.11C in South Africa. Therefore, we reject null hypothesis to accept the alternative that states that there is a significant relationship between monetary policy and Manufacturing Output in South Africa.

Table 4.11C (i): BG serial correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	9.409441	Prob. F(2,24)	0.0010

Obs*R-squared	13.62449	Prob. Chi-Square(2)	0.0011

Source: Computation by author using E-view 9.5

From table 4.11C (i), the p-value is less than the chosen level of significance of 5%, confirming that the presence of autocorrelation in the model. This is further enhanced with a Durbin-Watson statistic of 2.131470. Hence, we do not suspect any violation of the assumptions of classical linear regression. The applicable treatment was to log the variables as no treatment facilitated the significant result.

Restatement of Hypothesis Four

H_{o4}: There is no significant relationship between monetary policy and Gross National Income per Capital (GNI) in developing African countries.

H_{o4}: There is a significant relationship between monetary policy and Gross National Income per Capital (GNI) in developing African countries.

Table 4.12A: Regression Result for Nigeria -Model 4

Dependent Variable: LOG(NIG_GNI)
Method: Least Squares
Date: 12/18/18 Time: 13:41
Sample (adjusted): 1990 2016
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(CRR)	0.032111	0.042752	0.751109	0.4605
LOG(INTR)	-0.098201	0.260889	-0.376409	0.7102
LOG(TBR)	0.027553	0.082940	0.332205	0.7429
LOG(M2)	0.277459	0.043636	6.358462	0.0000
C	5.472376	1.046008	5.231675	0.0000

R-squared	0.871655	Mean dependent var	8.147509
Adjusted R-squared	0.848319	S.D. dependent var	0.317343
S.E. of regression	0.123593	Akaike info criterion	-1.178066
Sum squared resid	0.336056	Schwarz criterion	-0.938096
Log likelihood	20.90389	Hannan-Quinn criter.	-1.106710
F-statistic	37.35315	Durbin-Watson stat	0.852273
Prob(F-statistic)	0.000000		

Source: Computation by author using E-view 9.5

The result in table 4.12A shows R^2 and Adjusted R^2 of 87.17% and 84.83% respectively. This shows that the chosen regression model best fits the data. Hence, the goodness of fit regression model is 87.17% and implies that chosen explanatory variables explain variations in the dependent variables to the tune of 87.17%. Also, with a high Adjusted R^2 (84.83%) implies that the model can take on more variables conveniently without the R^2 falling beyond 87.17%. the overall impact of the variables is shown in the F-test and the F-statistics of 37.35315 is considered acceptable being positive and it shows that there is significant positive relationship between the dependent and explanatory variables showing that all the monetary policy variables have significant relationship with GNI in the study. The overall probability (F-statistics) of 0.00000 is rightly signed and very significant and displays a Durbin-Watson of 0.852273, showing the presence of autocorrelation on the chosen data.

The individual relationship in T-test showed that one (1) of the four (4) monetary policy instrument in M2 have positive and significant relationship with GNI in table 4.12A in Nigeria. Therefore, we accept null hypothesis to reject the alternative that states that there is a significant relationship between monetary policy and Gross National Income in Nigeria.

Due to the presence of autocorrelation, the study conducts a serial autocorrelation test to confirm decision position.

Table 4.12A (i): BG serial correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	3.649969	Prob. F(2,20)	0.0445
Obs*R-squared	7.219736	Prob. Chi-Square(2)	0.0271

Source: Computation by author using E-view 9.5

From table 4.12A (i), the p-value is less than the chosen level of significance of 5%, confirming that the presence of autocorrelation in the model. This is further enhanced with a Durbin-Watson statistic of 1.777288. Hence, we do not suspect any violation of the assumptions of classical linear regression. The applicable treatment was to log the variables as no treatment facilitated the significant result.

Table 4.12A (ii): Heteroskedasticity Test

Heteroskedasticity Test: ARCH

F-statistic	1.150363	Prob. F(1,24)	0.2941
Obs*R-squared	1.189225	Prob. Chi-Square(1)	0.2755

Source: Computation by author using E-view 9.5

The null hypothesis states that there is No heteroskedasticity if p-value is not significant and is greater than the chosen level of significance of 5%. Hence, in this case we accept the Null hypothesis that there is no evidence of heteroskedasticity since p-value is greater than 5% significance level in table 4.12A (ii).

Table 4.12B: Regression Result for Kenya -Model 4

Dependent Variable: LOG(KENYA_GNI)
Method: Least Squares
Date: 12/18/18 Time: 13:45
Sample (adjusted): 5 31
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	-0.005555	0.003119	-1.781322	0.0887
LOG(INTR)	0.092296	0.073122	1.262217	0.2201
TBR	-0.004578	0.001990	-2.300995	0.0312
LOG(M2)	0.141028	0.013358	10.55765	0.0000
C	6.296800	0.246621	25.53234	0.0000

R-squared	0.878546	Mean dependent var	7.740970
Adjusted R-squared	0.856463	S.D. dependent var	0.100072
S.E. of regression	0.037913	Akaike info criterion	-3.541451
Sum squared resid	0.031623	Schwarz criterion	-3.301481
Log likelihood	52.80958	Hannan-Quinn criter.	-3.470095
F-statistic	39.78464	Durbin-Watson stat	0.801240
Prob(F-statistic)	0.000000		

Source: Computation by author using E-view 9.5

Based on the result in table 4.12B, the R^2 and Adjusted R^2 are 87.85% and 85.65% respectively. This shows that the chosen regression model best fits the data. Hence, the goodness of fit regression model is 87.85% and implies that chosen explanatory variables explain variations in the dependent variables to the tune of 87.85%. Also, with a high Adjusted R^2 (85.65%) implies that the model can take on more variables conveniently without the R^2 falling beyond 87.85%. The overall impact of the variables as shown in the F-statistics of 39.78464 is considered acceptable being positive and it shows that there is significant positive relationship between the dependent and explanatory variables showing that all the monetary policy variables have significant relationship with GNI in the study. The overall probability (F-statistics) of 0.00000 is rightly signed and very significant and displays a Durbin-Watson of 0.801240 showing the presence of autocorrelation on the chosen data.

The individual relationship in T-test showed that three (3) of the four (4) monetary policy instrument in CRR, TBR and M2 have positive and significant relationship with GNI in table 4.12B in Kenya. Therefore, we reject null hypothesis to accept the alternative that states that there is a significant relationship between monetary policy and Gross National Income in Kenya.

Due to the presence of autocorrelation, the study conducts a serial autocorrelation test to confirm decision position.

Table 4.12B (i): BG serial correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	3.149263	Prob. F(2,20)	0.0647
Obs*R-squared	6.466529	Prob. Chi-Square(2)	0.0394

Source: Computation by author using E-view 9.5

From table 4.12B (i), the p-value is less than the chosen level of significance of 5%, confirming that the presence of autocorrelation in the model. This is further enhanced with a Durbin-Watson statistic of 1.499787. Hence, we do not suspect any violation of the assumptions of classical linear regression. The applicable treatment was to log the variables as no treatment facilitated the significant result.

Table 4.12C: Regression Result for South Africa -Model 4

Dependent Variable: LOG(SA_GNI)
Method: Least Squares
Date: 12/18/18 Time: 13:49
Sample (adjusted): 5 31
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

CRR	0.019166	0.006466	2.964048	0.0072
LOG(INTR)	-0.282396	0.154810	-1.824150	0.0817
LOG(TBR)	0.115296	0.101737	1.133270	0.2693
LOG(M2)	0.332129	0.039323	8.446149	0.0000
C	5.621215	0.671299	8.373637	0.0000

R-squared	0.958315	Mean dependent var	9.083600
Adjusted R-squared	0.950736	S.D. dependent var	0.276572
S.E. of regression	0.061387	Akaike info criterion	-2.577676
Sum squared resid	0.082903	Schwarz criterion	-2.337706
Log likelihood	39.79863	Hannan-Quinn criter.	-2.506320
F-statistic	126.4418	Durbin-Watson stat	0.578459
Prob(F-statistic)	0.000000		

Source: Computation by author using E-view 9.5

Looking at the result in table 4.12C, the result shows R^2 and Adjusted R^2 of 95.83% and 95.07% respectively. This shows that the chosen regression model best fits the data. Hence, the goodness of fit regression model is 95.83% and implies that chosen explanatory variables explain variations in the dependent variables to the tune of 95.83%. Also, with a high Adjusted R^2 (95.07%) implies that the model can take on more variables conveniently without the R^2 falling beyond 95.83%. The overall impact of the variables is shown in the F-statistics of 126.4418 is considered acceptable being positive and it shows that there is significant positive relationship between the dependent and explanatory variables indicating that all the monetary policy variables have significant relationship with GNI in the study. The overall probability (F-statistics) of 0.00000 is rightly signed and very significant and displays a Durbin-Watson of 0.578459, showing the presence of autocorrelation on the chosen data.

The individual relationship in T-test showed that two (2) of the four (4) monetary policy instrument in CRR and M2 have positive and significant relationship with GNI in table 4.12C in South Africa. Therefore, we reject null hypothesis to accept the alternative that states that there is a significant relationship between monetary policy and Gross National Income in South Africa.

Due to the presence of autocorrelation, the study conducts a serial autocorrelation test to confirm decision position.

Table 4.12C (i): BG serial correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	21.08541	Prob. F(2,20)	0.0000
Obs*R-squared	18.31425	Prob. Chi-Square(2)	0.0001

Source: Computation by author using E-view 9.5

From table 4.12C (i), the p-value is less than the chosen level of significance of 10%, confirming that the presence of autocorrelation in the model. This is further enhanced with a Durbin-Watson statistic of 2.025842. Hence, we do not suspect any violation of the assumptions of classical linear regression. The applicable treatment was to log the variables as no treatment facilitated the significant result.

Restatement of Hypothesis Five

H_{o5}: There is no direction of causal effect of monetary policy on economic development of developing African economies.

H_5: There is direction of causal effect of monetary policy on economic development of developing African economies.

NIGERIA

Table 4.13A (i): Pairwise Granger Causality Test for Model 5 – Nigeria

Pairwise Granger Causality Tests
Date: 12/18/18 Time: 15:55
Sample: 1986 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CRR does not Granger Cause GDP	29	0.25204	0.7792
GDP does not Granger Cause CRR		1.57089	0.2285
INTR does not Granger Cause GDP	29	0.62285	0.5449
GDP does not Granger Cause INTR		3.49117	0.0467
TBR does not Granger Cause GDP	29	0.94809	0.4015
GDP does not Granger Cause TBR		1.64403	0.2142
M2 does not Granger Cause GDP	29	1.79616	0.1875
GDP does not Granger Cause M2		2.46220	0.1065

Source: Computation by author using E-view 9.5

From the Granger Causality Test result in Table 4.13A (i), for Nigeria, the test was carried out with a lag 2period, monetary policy instrument is unbundled into four variants and their causal relationship with GDP tested. The choice of a lag of 2 is aimed at not sacrificing greater degrees of freedom which may be prejudicial to the outcome of the test. From the results, there was a uni-directional causality relationship from GDP to INTR (with p-values of 0.0467) without a feedback returning from INTR to GDP (since all their p-values 0.5449 is more than the 5% chosen level of significance). Hence, there are no causal relationships from CRR, INTR, TBR and M2 to GDP in Nigeria.

Table 4.13A (ii): Pairwise Granger Causality Test for Model 5 – Nigeria

Pairwise Granger Causality Tests
Date: 12/18/18 Time: 15:59
Sample: 1986 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CRR does not Granger Cause MC	29	1.11059	0.3457
MC does not Granger Cause CRR		0.73248	0.4912
INTR does not Granger Cause MC	29	0.28126	0.7573
MC does not Granger Cause INTR		3.43959	0.0486
TBR does not Granger Cause MC	29	0.68995	0.5113
MC does not Granger Cause TBR		1.26620	0.3001
M2 does not Granger Cause MC	29	1.33756	0.2814
MC does not Granger Cause M2		9.56885	0.0009

Source: Computation by author using E-view 9.5

From the Granger Causality Test result in Table 4.13A (ii), for Nigeria, the test was carried out with a lag 2period, monetary policy instrument is unbundled into four variants and their causal relationship with MC tested. The choice of a lag of 2 is aimed at not sacrificing greater degrees of freedom which may be prejudicial to the outcome of the test. From the results, there was a uni-directional causality relationship from MC to INTR and M2 (with p-values of 0.0486 and 0.0009) without a feedback returning from INTR and M2 to MC (since all their p-values 0.7573 and 0.2814 are more than the 10% chosen level of significance). Hence, there are no causal relationships from CRR, INTR and M2 to MC in Nigeria.

Table 4.13A (iii): Pairwise Granger Causality Test for Model 5 – Nigeria

Pairwise Granger Causality Tests
Date: 12/18/18 Time: 16:01
Sample: 1986 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CRR does not Granger Cause MU	29	0.89053	0.4236
MU does not Granger Cause CRR		3.77200	0.0376
INTR does not Granger Cause MU	29	0.27315	0.7633
MU does not Granger Cause INTR		1.58875	0.2249
TBR does not Granger Cause MU	29	0.85171	0.4392
MU does not Granger Cause TBR		0.31033	0.7361
M2 does not Granger Cause MU	29	5.09789	0.0143
MU does not Granger Cause M2		0.26654	0.7683

Source: Computation by author using E-view 9.5

From the Granger Causality Test result in Table 4.13A (iii), for Nigeria, the test was carried out with a lag 2period, monetary policy instrument is unbundled into four variants and their causal relationship with MU tested. The choice of a lag of 2 is aimed at not sacrificing greater degrees of freedom which may be prejudicial to the outcome of the test. From the results, there was a uni-directional causality relationship from MU to CRR and from M2 to MU (with p-values of 0.0376 and 0.0143) without a feedback returning from CRR to MU and MU to M2 (since all their p-values 0.4236 and 0.7683 are more than the 5% chosen level of significance). Hence, there are no causal relationships from CRR, TBR and INTR to MU in Nigeria.

Table 4.13A (iv): Pairwise Granger Causality Test for Model 5 – Nigeria

Pairwise Granger Causality Tests
Date: 12/18/18 Time: 16:04
Sample: 1986 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.

CRR does not Granger Cause NIG_GNI	25	2.71400	0.0906
NIG_GNI does not Granger Cause CRR		1.03134	0.3747
INTR does not Granger Cause NIG_GNI	25	0.37804	0.6900
NIG_GNI does not Granger Cause INTR		2.61658	0.0979
TBR does not Granger Cause NIG_GNI	25	2.31042	0.1251
NIG_GNI does not Granger Cause TBR		1.36175	0.2790
M2 does not Granger Cause NIG_GNI	25	0.21473	0.8086
NIG_GNI does not Granger Cause M2		5.41508	0.0132

Source: Computation by author using E-view 9.5

From the Granger Causality Test result in Table 4.13A (iv), for Nigeria, the test was carried out with a lag 2period, monetary policy instrument is unbundled into four variants and their causal relationship with GNI tested. The choice of a lag of 2 is aimed at not sacrificing greater degrees of freedom which may be prejudicial to the outcome of the test. From the results, there was a uni-directional causality relationship from GNI to M2 (with p-value of 0.0132) without a feedback returning from M2 to GNI (since all the p-value 0.8086 is more than the 5% chosen level of significance). Hence, there are no causal relationships from CRR, INTR, TBR and M2 to MU in Nigeria.

Decision: Based on the general output for Nigeria, we accept the null hypothesis for CRR, INTR and M2 that there exists no causal relationship to Nigerian economic development variables.

KENYA

Table 4.13B (i): Pairwise Granger Causality Test for Model 5 – Kenya

Pairwise Granger Causality Tests
Date: 12/18/18 Time: 16:08
Sample: 1 32
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CRR does not Granger Cause GDP	29	0.81869	0.4529
GDP does not Granger Cause CRR		0.28873	0.7518
INTR does not Granger Cause GDP	29	0.91398	0.4144
GDP does not Granger Cause INTR		0.53734	0.5912
TBR does not Granger Cause GDP	29	0.80301	0.4597
GDP does not Granger Cause TBR		0.10827	0.8978

M2 does not Granger Cause GDP	29	0.22228	0.8023
GDP does not Granger Cause M2		3.59728	0.0430

Source: Computation by author using E-view 9.5

From the Granger Causality Test result in Table 4.13B (i), for Kenya, the test was carried out with a lag 2period, monetary policy instrument is unbundled into four variants and their causal relationship with GDP tested. The choice of a lag of 2 is aimed at not sacrificing greater degrees of freedom which may be prejudicial to the outcome of the test. From the results, there was a uni-directional causality relationship from GDP to M2 (with p-value of 0.0430) without a corresponding feedback returning from M2 to GDP (since its p-value of 0.8023 is more than the 5% chosen level of significance). Hence, there are no causal relationships from CRR, INTR, TBR and M2 to GDP in Kenya.

Table 4.13B (ii): Pairwise Granger Causality Test for Model 5 – Kenya

Pairwise Granger Causality Tests
Date: 12/18/18 Time: 16:10
Sample: 1 32
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CRR does not Granger Cause MC	29	3.24411	0.0566
MC does not Granger Cause CRR		0.10636	0.8995
INTR does not Granger Cause MC	29	0.84500	0.4419
MC does not Granger Cause INTR		1.24821	0.3050
TBR does not Granger Cause MC	29	0.34552	0.7113
MC does not Granger Cause TBR		2.24267	0.1280
M2 does not Granger Cause MC	29	4.37511	0.0240
MC does not Granger Cause M2		1.07673	0.3566

Source: Computation by author using E-view 9.5

From the Granger Causality Test result in Table 4.13B (ii), for Kenya, the test was carried out with a lag 2period, monetary policy instrument is unbundled into four variants and their causal relationship with MC tested. The choice of a lag of 2 is aimed at not sacrificing greater degrees of freedom which may be prejudicial to the outcome of the test. From the results, there was a uni-directional causality relationship from M2 to MC (with p-values of 0.0566 and 0.0240) without a corresponding feedback returning from MC to M2 (since there p-value 0.3566 is more than the 5% chosen level of significance). Hence, there are no causal relationships from INTR, CRR and TBR to MC in Kenya.

Table 4.13B (iii): Pairwise Granger Causality Test for Model 5 – Kenya

Pairwise Granger Causality Tests
Date: 12/18/18 Time: 16:12
Sample: 1 32
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CRR does not Granger Cause MU	29	2.19823	0.1329
MU does not Granger Cause CRR		0.09625	0.9086
INTR does not Granger Cause MU	29	2.17635	0.1353
MU does not Granger Cause INTR		0.77664	0.4712
TBR does not Granger Cause MU	29	1.58685	0.2253
MU does not Granger Cause TBR		0.33605	0.7179
M2 does not Granger Cause MU	29	2.45420	0.1072
MU does not Granger Cause M2		4.33084	0.0248

Source: Computation by author using E-view 9.5

From the Granger Causality Test result in Table 4.13B (iii), for Kenya, the test was carried out with a lag 2period, monetary policy instrument is unbundled into four variants and their causal relationship with MU tested. The choice of a lag of 2 is aimed at not sacrificing greater degrees of freedom which may be prejudicial to the outcome of the test. From the results, there was a bi-directional causality relationship from MU to M2 (with p-value of 0.0248) with a corresponding feedback returning from M2 to MC (since its p-value of 0.1072 is approximately equal to 5% chosen level of significance). Hence, there are no causal relationships from CRR, TBR and INTR to MU in Kenya.

Table 4.13B (iv): Pairwise Granger Causality Test for Model 5 – Kenya

Pairwise Granger Causality Tests
Date: 12/18/18 Time: 16:15
Sample: 1 32
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CRR does not Granger Cause KENYA_GNI	25	2.01231	0.1599
KENYA_GNI does not Granger Cause CRR		0.14218	0.8683
INTR does not Granger Cause KENYA_GNI	25	0.16387	0.8500
KENYA_GNI does not Granger Cause INTR		1.02088	0.3783
TBR does not Granger Cause KENYA_GNI	25	0.05717	0.9446
KENYA_GNI does not Granger Cause TBR		0.76196	0.4798
M2 does not Granger Cause KENYA_GNI	25	9.79204	0.0011
KENYA_GNI does not Granger Cause M2		0.73017	0.4942

Source: Computation by author using E-view 9.5

From the Granger Causality Test result in Table 4.13B (iv) for Kenya, the test was carried out with a lag 2period, monetary policy instrument is unbundled into four variants and their causal relationship with GNI tested. The choice of a lag of 2 is aimed at not sacrificing greater degrees of freedom which may be prejudicial to the outcome of the test. From the results, there was a uni-directional causality relationship from M2 to GNI (with p-value of 0.0011) without a corresponding feedback returning from GNI to M2 (since its p-value – 0.4942 is more than the 5% chosen level of significance). Hence, there are no causal relationships from CRR, TBR and INTR to GNI in Kenya.

Decision: Based on the general output for Kenya, we accept the null hypothesis that CRR, TBR, INTR and M2 have no causal relationship to Kenya economic development variables.

SOUTH AFRICA

Table 4.13C (i): Pairwise Granger Causality Test for Model 5 – South Africa

Pairwise Granger Causality Tests
Date: 12/18/18 Time: 16:17
Sample: 1 32
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CRR does not Granger Cause GDP	29	1.82909	0.1822
GDP does not Granger Cause CRR		1.42052	0.2612
INTR does not Granger Cause GDP	29	5.28131	0.0126
GDP does not Granger Cause INTR		11.7605	0.0003
TBR does not Granger Cause GDP	29	6.15249	0.0070
GDP does not Granger Cause TBR		6.14594	0.0070

M2 does not Granger Cause GDP	29	4.96745	0.0157
GDP does not Granger Cause M2		2.92584	0.0729

Source: Computation by author using E-view 9.5

From the Granger Causality Test result in Table 4.13C (i), for South Africa, the test was carried out with a lag 2period, monetary policy instrument is unbundled into four variants and their causal relationship with GDP tested. The choice of a lag of 2 is aimed at not sacrificing greater degrees of freedom which may be prejudicial to the outcome of the test. From the results, there was a bi-directional causality relationship from between INTR, TBR and M2 on GDP (with p-values of 0.0126, 0.0070 and 0.0157) with a corresponding feedback returning from GDP to INTR, TBR and M2 (since its p-values are 0.0003, 0.0070 and 0.0729 are less than the 5% chosen level of significance). Hence, there are causal relationships from INTR, TBR and M2 to GDP in South Africa.

Table 4.13C (ii): Pairwise Granger Causality Test for Model 5 – South Africa

Pairwise Granger Causality Tests
Date: 12/18/18 Time: 16:20
Sample: 1 32
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CRR does not Granger Cause MC	29	4.04417	0.0306
MC does not Granger Cause CRR		0.53534	0.5923
INTR does not Granger Cause MC	29	1.17007	0.3274
MC does not Granger Cause INTR		4.63587	0.0198
TBR does not Granger Cause MC	29	1.81009	0.1853
MC does not Granger Cause TBR		2.19192	0.1336
M2 does not Granger Cause MC	29	5.79469	0.0088
MC does not Granger Cause M2		4.60993	0.0202

Source: Computation by author using E-view 9.5

From the Granger Causality Test result in Table 4.13C (ii), for South Africa, the test was carried out with a lag 2period, monetary policy instrument is unbundled into four variants and their causal relationship with MC tested. The choice of a lag of 2 is aimed at not sacrificing greater degrees of freedom which may be prejudicial to the outcome of the test. From the results, there was a bi-directional causality relationship from between M2 on MC (with p-value of 0.0088) with a corresponding feedback returning from MC to M2 (with its p-value – 0.0202 is less than the 5% chosen level of significance). However, CRR have a uni-directional causal relationship with MC with a corresponding feedback from MC to CRR, MC also had a uni-directional relationship with INTR. Hence, there are causal relationships from CRR and M2 to MC in South Africa.

Table 4.13C (iii): Pairwise Granger Causality Test for Model 5 – South Africa

Pairwise Granger Causality Tests
Date: 12/18/18 Time: 07:22
Sample: 1 32
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CRR does not Granger Cause MU	29	0.74083	0.4873
MU does not Granger Cause CRR		1.79511	0.1877
INTR does not Granger Cause MU	29	9.84100	0.0008
MU does not Granger Cause INTR		13.7901	0.0001
TBR does not Granger Cause MU	29	7.93899	0.0023
MU does not Granger Cause TBR		6.07581	0.0073
M2 does not Granger Cause MU	29	2.17114	0.1359
MU does not Granger Cause M2		7.09881	0.0038

Source: Computation by author using E-view 9.5

From the Granger Causality Test result in Table 4.13C (iii), for South Africa, the test was carried out with a lag 2period, monetary policy instrument is unbundled into four variants and their causal relationship with MU tested. The choice of a lag of 2 is aimed at not sacrificing greater degrees of freedom which may be prejudicial to the outcome of the test. From the results, there was a bi-directional causality relationship from between INTR and TBR on MU (with p-values of 0.0008 and 0.0023) with a corresponding feedback returning from MU to INTR and TBR (with p-values 0.0001 and 0.0073 which are less than the 5% chosen level of significance). There was also a uni-directional relationship from MU to M2 (with p-value of 0.0038). Hence, there are causal relationships from INTR to MU in South Africa.

Table 4.13C (iv): Pairwise Granger Causality Test for Model 5 – South Africa

Pairwise Granger Causality Tests
Date: 12/18/18 Time: 07:25
Sample: 1 32
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CRR does not Granger Cause SA_GNI	25	2.23961	0.1325
SA_GNI does not Granger Cause CRR		0.89619	0.4239
INTR does not Granger Cause SA_GNI	25	4.65380	0.0219
SA_GNI does not Granger Cause INTR		5.44504	0.0129
TBR does not Granger Cause SA_GNI	25	6.91228	0.0052
SA_GNI does not Granger Cause TBR		2.16761	0.1406
M2 does not Granger Cause SA_GNI	25	3.13087	0.0656
SA_GNI does not Granger Cause M2		1.77167	0.1957

Source: Computation by author using E-view 9.5

From the Granger Causality Test result in Table 4.13C (iv) for South Africa; the test was carried out with a lag 2period, monetary policy instrument is unbundled into four variants and their causal relationship with GNI tested. The choice of a lag of 2 is aimed at not sacrificing greater degrees of freedom which may be prejudicial to the outcome of the test. From the results, there was a bi-directional causality relationship from between INTR and GNI (with p-value of 0.0219) with a corresponding feedback returning from GNI to INTR (since its p-value – 0.0129 is less than the 5% chosen level of significance). A uni-directional relationship also exists from TBR and M2 to GNI with P-values of 0.0052 and 0.0656 respectively without a corresponding feedback from GNI to TBR and M2. Hence, there are causal relationships from INTR, TBR and M2 to GNI in South Africa.

Decision: Based on the general output for South Africa, we reject the null hypothesis and accept the alternative that CRR, INTR, TBR and M2 have causal relationship to South African economic development variables.

Test of Hypothesis – Pooled Effect Output

Since, the study is a regional study, the analysis and findings of this study will be based on panel data analysis. Thus, the data for the selected study areas are pooled together to enable the researchers determine the optimum overall result for the Sub-Saharan African region, adopting the following procedures;

Table 4.14A –POOLED EFFECT PANEL EGLS (E-views Generalized Least Square)

Dependent Variable: LOG(GDP)
Method: Panel EGLS (Period weights)
Date: 12/18/18 Time: 07:31
Sample: 1986 2016
Periods included: 31
Cross-sections included: 3
Total panel (balanced) observations: 93
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	0.033010	0.004301	7.675419	0.0000
LOG(INTR)	0.334314	0.210494	1.588235	0.1158
TBR	0.012362	0.009074	1.362399	0.1765
LOG(M2)	0.644490	0.032068	20.09775	0.0000
C	4.395183	0.761115	5.774665	0.0000

Weighted Statistics

R-squared	0.909941	Mean dependent var	13.56673
Adjusted R-squared	0.905847	S.D. dependent var	3.870551
S.E. of regression	0.373630	Sum squared resid	12.28476
F-statistic	222.2833	Durbin-Watson stat	0.176997
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.868863	Mean dependent var	12.20385
Sum squared resid	12.59292	Durbin-Watson stat	0.271543

Source: Computation by author using E-view 9.5

The pooled effect model results in table 4.14A, was carried out using Generalized Least square period weightings and the R^2 and Adjusted R^2 both showed 90.99% and 90.58% respectively. This shows that the chosen regression model best fits the data. Hence, the goodness of fit panel regression model is 90.99% and implies that chosen explanatory variables explain variations in the dependent variable to the tune of 90.99%. The square of the correlation between the value of the dependent variable and the corresponding fitted values from the model. A correlation coefficient must be between -1 and +1 by definition. Hence, a high correlation of 90.99% implies that the model fits the data well and thus provides a very good fit to the data. Also, with a high Adjusted R^2 (90.58%) implies that the model can take on more variables conveniently without the R^2 falling beyond 90.99%, which is very commendable. F-statistics of 222.2833 is considered very good being positive and significantly large enough and it shows that there is significant positive relationship between the dependent and explanatory variables. The overall probability (F-statistics) of 0.0000000 is rightly signed and very significant. The Durbin-Watson of 0.176997 is considered to show presence of auto-correlation.

Table 4.14B – FIXED EFFECT PANEL E-views Generalized Least Square (EGLS)

Dependent Variable: LOG(GDP)
Method: Panel Least Squares
Date: 12/18/18 Time: 07:34
Sample: 1986 2016
Periods included: 31
Cross-sections included: 3
Total panel (balanced) observations: 93

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	0.013746	0.002719	5.055911	0.0000
LOG(INTR)	0.555565	0.099283	5.595774	0.0000
TBR	-0.014610	0.003397	-4.300704	0.0001
LOG(M2)	0.231675	0.049113	4.717157	0.0000
C	8.366149	0.565280	14.80001	0.0000

Effects Specification

Cross-section fixed (dummy variables)
Period fixed (dummy variables)

R-squared	0.994222	Mean dependent var	12.20385
Adjusted R-squared	0.990508	S.D. dependent var	1.021659
S.E. of regression	0.099536	Akaike info criterion	-1.488151
Sum squared resid	0.554811	Schwarz criterion	-0.480558
Log likelihood	106.1990	Hannan-Quinn criter.	-1.081314
F-statistic	267.6850	Durbin-Watson stat	0.792316
Prob(F-statistic)	0.000000		

Source: Computation by author using E-view 9.5

Fixed Effect panel analysis was also carried out to compare the output of this panel data analysis obtained from the pooled data with the fixed effect. In table 4.14B, The R^2 and Adjusted R^2 both showed 99.42% and 99.05% respectively. This shows that the chosen regression model best fits the data. Hence, the goodness of fit panel regression model is 99.42% and implies that chosen explanatory variables explain variations in the dependent variables to the tune of 99.42%. The square of the correlation between the value of the dependent variable and the corresponding fitted values from the model. Also, with a high Adjusted R^2 (99.05%) implies that the model can take on more variables conveniently without the R^2 falling beyond 99.42%, which is very commendable. F-statistics of 267.6850 is considered very good being positive and significantly large enough and it shows that there is significant positive relationship between the dependent and explanatory variables. The overall probability (F-statistics) of 0.0000000 is rightly signed and very significant and shows that CRR, INTR and M2 have significant effect on GDP. However, the Durbin-Watson of 0.792316 is poor and shows the presence of auto-correlation in the study.

Table 4.14C: RANDOM EFFECT PANEL (E-views Generalized Least Square (EGLS))

Dependent Variable: LOG(GDP)
Method: Panel EGLS (Two-way random effects)
Date: 12/18/18 Time: 07:38
Sample: 1986 2016
Periods included: 31
Cross-sections included: 3
Total panel (balanced) observations: 93
Wallace and Hussain estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.

CRR	0.020479	0.002832	7.232583	0.0000
LOG(INTR)	0.346660	0.109767	3.158135	0.0022
TBR	-0.008467	0.004573	-1.851738	0.0674
LOG(M2)	0.564493	0.027633	20.42819	0.0000
C	5.479058	0.595487	9.200971	0.0000

Effects Specification		S.D.	Rho
Cross-section random		0.623400	0.9470
Period random		0.000000	0.0000
Idiosyncratic random		0.147415	0.0530

Weighted Statistics			
R-squared	0.930637	Mean dependent var	0.517846
Adjusted R-squared	0.927484	S.D. dependent var	0.581621
S.E. of regression	0.156623	Sum squared resid	2.158719
F-statistic	295.1721	Durbin-Watson stat	0.750611
Prob(F-statistic)	0.000000		

Unweighted Statistics			
R-squared	0.839735	Mean dependent var	12.20385
Sum squared resid	15.38998	Durbin-Watson stat	0.105287

Source: Computation by author using E-view 9.5

The Random effect panel model was also carried out with above results in table 4.14C to compare the outcome of the process with earlier results and be able to ascertain which procedure gives the best output in terms of R^2, Adjusted R^2, F-statistics, Probability and Durbin-Watson. The result shows that the Random effect model produced the least R^2 (93.06%), Adjusted R^2 (92.75%), F-statistics (295.1721), and Durbin-Watson (0.750611), this was the least result of the three panels data analytical procedures namely - pooled effect, fixed effect and the random effect models. Of the three test procedures, the Random effect model of the panel data analysis produced the better result in terms of -R^2 (93.06%), Adjusted R^2 (92.75%), F-statistics (295.1721), and Durbin-Watson (0.750611) and the overall probability was significant at 0.0000. However, we shall further subject the result of above test procedures to Redundant Fixed Effects Test and the Correlation Random Effect- Hausman Test for both the fixed effect model and

Random effect model respectively as a confirmatory test to determine which of the panel data testing technique to be adopted for our analysis.

Table 4.14D: Redundant Fixed Effects Test

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section and period fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	500.911929	(2,56)	0.0000
Cross-section Chi-square	273.291420	2	0.0000
Period F	5.316006	(30,56)	0.0000
Period Chi-square	125.319108	30	0.0000
Cross-Section/Period F	37.561445	(32,56)	0.0000
Cross-Section/Period Chi-square	289.406692	32	0.0000

Source: Computation by author using E-view 9.5

The p-value associated with the test statistics in table 4.14D is significant at 0.0000 when compared to chosen significance level of 5%. However, we further undertake the Hausman Test to determine its own result and adopt the best outcome for our panel data analysis.

Table 4.14E: Correlated Random Effect Hausman Test

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

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	4	1.0000
Period random	0.000000	4	1.0000
Cross-section and period random	0.000000	4	1.0000

Source: Computation by author using E-view 9.5

The p-value for the Hausman Tests is table 4.14E is greater than 5% chosen level of significance and shows that the fixed effect model estimates will give a better result for the purpose of our panel data analysis (Wooldridge, 2006).

Restatement of Hypothesis One

H_{o1}: There is no significant relationship between monetary policy and Gross Domestic Product in developing African countries.

H_1: There is a significant relationship between monetary policy and Gross Domestic Product in developing African countries.

Table 4.15: Result-Gross Domestic Product (EGLS test) for Model 1

Dependent Variable: LOG(GDP)
Method: Panel Least Squares
Date: 12/18/18 Time: 07:34
Sample: 1986 2016
Periods included: 31
Cross-sections included: 3
Total panel (balanced) observations: 93

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	0.013746	0.002719	5.055911	0.0000
LOG(INTR)	0.555565	0.099283	5.595774	0.0000
TBR	-0.014610	0.003397	-4.300704	0.0001
LOG(M2)	0.231675	0.049113	4.717157	0.0000
C	8.366149	0.565280	14.80001	0.0000

Effects Specification

Source: Computation by author using E-view 9.5

From table 4.15, CRR, INTR, TBR and M2, have a t-statistic value of 5.055911. 5.595774, -4,300704 and 4.717157 with p-values of 0.0000, 0.0000, 0.0001 and 0.0000 were found to have a positively statistically significant effect on GDP at 5% significance level since its p-values are less than 5% except TBR that pose negative and significant effect on GDP. This result is very instructive as past levels of CRR, INTR, TBR and M2 shows significant effect on economic growth GDP) within the selected developing African economies at the 5% level of significance and indicates that a 1% increase in past levels of CRR, INTR and M2 will respectively result to a 0.013746%, 0.555565% and 0.231675% increase in GDP except TBR that shows that a 1% increase in past levels of TBR will result to a 0.014610% decrease in GDP. Therefore, we reject the null hypothesis and accept the alternative.

Decision Rule: We therefore reject the null hypothesis and accept the alternative that there is a significant relationship between monetary policy and Gross Domestic Product in developing African countries.

Restatement of Hypothesis Two

H_{o2}: There is no significant relationship between monetary policy and market capitalization in developing African countries.

H_2: There is a significant relationship between monetary policy and market capitalization in developing African countries.

Table 4.16: Result-Market Capitalization – Panel (EGLS test) for Model 2

Dependent Variable: LOG(MC)
Method: Panel Least Squares
Date: 12/18/18 Time: 07:57
Sample: 1986 2016
Periods included: 31
Cross-sections included: 3
Total panel (balanced) observations: 93

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	0.008826	0.008279	1.066165	0.2893
LOG(INTR)	0.122200	0.320296	0.381522	0.7038
TBR	0.002971	0.013344	0.222625	0.8244
LOG(M2)	1.335978	0.080875	16.51896	0.0000
C	-4.006176	1.333229	-3.004868	0.0035
Effects Specification				

Source: Computation by author using E-view 9.5

From table 4.16, M2, have a t-statistic value of 16.51896 with p-value of 0.0000 was found to have a positively statistically significant effect on MC at 5% significance level since its p-value is less than 5%. This result is very instructive as past levels of M2 shows positive and significant effect on economic development variable (MC) within the selected developing African economies at the 5% level of significance and indicates that a 1% increase in past level of M2 will respectively result to a 1.335978% increase in MC. However, the CRR, TBR and INTR with probability values more than 0.05% showed a positively insignificant effect (relationship with) on MC. The P-values are more than the 5% significance level. Thus, the null hypothesis accepted.

Decision Rule: We therefore accept the null hypothesis that there is no significant relationship between monetary policy and Market Capitalization in developing African countries.

Restatement of Hypothesis Three

H_{o3}: There is no significant relationship between Monetary policy and Manufacturing Output in developing African countries.

H_3: There is no significant relationship between Monetary policy and Manufacturing Output in developing African countries.

Table 4.17: Result-Manufacturing Output - Panel (EGLS test) for Model 3

Dependent Variable: LOG(MU)
Method: Panel Least Squares
Date: 12/18/18 Time: 08:00
Sample: 1986 2016
Periods included: 31
Cross-sections included: 3
Total panel (balanced) observations: 93

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	0.038820	0.006084	6.381077	0.0000
LOG(INTR)	0.521853	0.235376	2.217102	0.0293
TBR	-0.016930	0.009806	-1.726408	0.0879
LOG(M2)	0.437446	0.059433	7.360316	0.0000
C	3.151109	0.979751	3.216236	0.0018

Effects Specification

Source: Computation by author using E-view 9.5

From table 4.17, CRR, INTR and M2 have a t-statistic value of 6.381077, 2217102 and 7.360316 with p-values of 0.0000, 0.0293 and 0.0000 respectively was found to have a positively statistically significant effect on MU at 5% significance level since its p-values are less than 5%. This result is very instructive as past levels of CRR, INTR and M2 shows positive and significant effect on economic development variable (MU) within the selected developing African economies at the 5% level of significance and indicates that a 1% increase in past level of CRR, INTR and M2 will respectively result to a 0.038820%, 0.521853% and 0.437446% increase in MU. However, only TBR with t-statistics of -1.726408 with p-values of 0.0879 showed that a positively insignificant effect (relationship with) on MU. The P-values are more than the 5% significance level. Thus, the null hypothesis is rejected and the alternative accepted.

Decision Rule: We therefore reject the null hypothesis and accept the alternative that there is a significant relationship between monetary policy and Manufacturing output in developing African countries.

Restatement of Hypothesis Four

H_{o4}: There is no significant relationship between monetary policy Inflation rate, Interest rate, Cash Reserve Ratio, Money Supply and Gross National Income per Capital (GNI) in developing African countries.

H_4: There is a significant relationship between Inflation rate, Interest rate, Cash Reserve Ratio, Money Supply and Gross National Income per Capital (GNI) in developing African countries.

TABLE 4.18: Result- Gross National Income–Panel (EGLS test) for Model 4

Dependent Variable: LOG(GNI)
Method: Panel Least Squares
Date: 12/18/18 Time: 08:05
Sample (adjusted): 1990 2016
Periods included: 27
Cross-sections included: 3
Total panel (balanced) observations: 81

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	0.003240	0.002369	1.367578	0.1756
LOG(INTR)	-0.156522	0.107742	-1.452747	0.1505
TBR	0.002556	0.004226	0.604829	0.5471
LOG(M2)	0.217341	0.026733	8.130051	0.0000
C	6.486476	0.470585	13.78386	0.0000

Effects Specification

Source: Computation by author using E-view 9.5

From table 4.18, all the monetary instruments (variables) in CRR, TBR and INTR have a t-statistic values of 1.367578, -1.452747 and 0.604829 with p-values of 0.1756, 0.1505and 0.5471 respectively was found to have both positive and negative statistically insignificant effect on GNI at 5% significance level since its p-value are more than 5%. However, the t-statistics of M2 of 8.130051 with p-value of 0.0000 show positively significant effect of M2 on GNI. This result is very instructive as past levels of CRR, INTR and M2 shows positive and insignificant effect on economic development variable (GNI) within the selected developing African economies at the 5% level of significance. Thus, the null hypothesis is accepted and the alternative rejected.

Decision Rule: We therefore accept the null hypothesis that there is no significant relationship between Inflation rate, Interest rate, Cash Reserve Ratio, Money Supply and Gross National Income in developing African countries.

Restatement of Hypothesis Five

H_{o5}: There is no direction of causal effect of monetary policy on economic development of developing African economies.

H_{o5}: There is direction of causal effect of monetary policy on economic development of developing African economies.

Table 4.19(i): Result for Causality Effect on GDP– Model 5

Pairwise Granger Causality Tests
Date: 12/18/18 Time: 08:11
Sample: 1986 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CRR does not Granger Cause GDP	87	0.13253	0.8761
GDP does not Granger Cause CRR		1.81883	0.1687
INTR does not Granger Cause GDP	87	0.41703	0.6604
GDP does not Granger Cause INTR		2.15052	0.1229
TBR does not Granger Cause GDP	87	0.08948	0.9145
GDP does not Granger Cause TBR		0.42665	0.6541

M2 does not Granger Cause GDP	87	3.36199	0.0395
GDP does not Granger Cause M2		1.07757	0.3452

Source: Computation by author using E-view 9.5

The result from table 4.19(i) showing granger causality of monetary policy against economic growth variable in GDP carried out at the 5% level of significance using a lag of 2 period reveals that M2 for panel pooled data granger cause GDP with F-statistics of 3.36199 and p-value of 0.0395 at 5% level of significance, however without a corresponding feedback from GDP to M2. But, the remaining monetary policy instruments in CRR, TBR and INTR had an insignificant effect on GDP with the p-values of its F-statistics results being more than the 5% significance level. Thus, CRR, TBR and INTR does not granger cause GDP in the selected African developing economies.

Table 4.19(ii): Result for Causality Effect on MC– Model 5

Pairwise Granger Causality Tests
Date: 12/18/18 Time: 08:14
Sample: 1986 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CRR does not Granger Cause MC	87	0.22570	0.7985
MC does not Granger Cause CRR		0.33097	0.7192
INTR does not Granger Cause MC	87	0.42536	0.6550
MC does not Granger Cause INTR		2.17808	0.1198
TBR does not Granger Cause MC	87	0.17234	0.8420
MC does not Granger Cause TBR		0.63222	0.5340
M2 does not Granger Cause MC	87	1.83985	0.1653
MC does not Granger Cause M2		11.7120	3.E-05

Source: Computation by author using E-view 9.5

The result from table 4.19(ii) showing granger causality of monetary policy against economic development variable in MC carried out at the 5% level of significance using a lag of 2 period reveals that all the monetary policy instruments in CRR, TBR, INTR and M2 with F-statistics of 0.22570, 0.63222, 2.17808 and 11.7120 with p-values of 0.7985, 0.8420, 0.6550 and 0.1653 respectively for panel data does not granger cause MC at 5% level of significance. Thus, CRR, TBR, INTR and M2 does not granger cause MC in the selected African developing economies.

Table 4.19(iii): Result for Causality Effect on MU– Model 5

Pairwise Granger Causality Tests
Date: 12/18/18 Time: 08:17
Sample: 1986 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CRR does not Granger Cause MU	87	0.45564	0.6356
MU does not Granger Cause CRR		6.52242	0.0024
INTR does not Granger Cause MU	87	0.21986	0.8031
MU does not Granger Cause INTR		2.21258	0.1159
TBR does not Granger Cause MU	87	0.43814	0.6467
MU does not Granger Cause TBR		0.28989	0.7491
M2 does not Granger Cause MU	87	0.43335	0.6498
MU does not Granger Cause M2		2.45410	0.0922

Source: Computation by author using E-view 9.5

The result from table 4.19(iii) showing granger causality of monetary policy against economic development variable in MU carried out at the 5% level of significance using a lag of 2 period reveals that all the monetary policy instruments in CRR, TBR, INTR and M2 with F-statistics of 0.45564, 0.43814, 0.21986 and 0.43335 with p-values of 0.6356, 0.6467, 0.8031 and 0.6498 respectively for panel data does not granger cause MU at 5% level of significance. However, MU was able to granger cause changes in CRR with F-statistics of 6.52242 with p-values of 0.0024. Hence, CRR, TBR, INTR and M2 does not granger cause MU in the selected African developing economies.

Table 4.19(iv): Result for Causality Effect on GNI– Model 5

Pairwise Granger Causality Tests
Date: 12/18/18 Time: 08:20
Sample: 1986 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CRR does not Granger Cause GNI	75	2.75446	0.0705
GNI does not Granger Cause CRR		0.43691	0.6478

INTR does not Granger Cause GNI	75	0.72324	0.4888
GNI does not Granger Cause INTR		1.84480	0.1657
TBR does not Granger Cause GNI	75	1.92250	0.1539
GNI does not Granger Cause TBR		1.77152	0.1776
M2 does not Granger Cause GNI	75	5.76239	0.0048
GNI does not Granger Cause M2		5.57583	0.0057

Source: Computation by author using E-view 9.5

The result from table 4.19(iv) showing granger causality of monetary policy against economic growth variable in GNI carried out at the 5% level of significance using a lag of 2 period reveals that M2 and GNI have a bi-directional effect on one another with F-statistics of 5.76239 (P-value of 0.0048) from M2 to GNI, while from GNI to M2 has F-statistics of 5.57583 (P-value of 0.0057) at 5% level of significance for panel pooled data. However, there was no causal effect either ways between CRR, TBR, INTR and GNI at 5% level of significance. Thus, CRR, TBR and INTR does not granger cause changes in GNI in the selected African developing economies.

Decision Rule: Based on the overall result of the study on granger causality in table 4.19(i-iv), we accept the null hypothesis to reject alternative hypothesis that there is no direction of causal effect of monetary policy on economic development of developing African economies.

4.4 Discussion of Findings

This study examined the effect of monetary policy on the economic development of developing African countries from 1986 to 2016 with the intention of determining how monetary policy has affected economic development in selected developing African economies using empirical evidence from Nigeria, Kenya and South Africa. In line with a detail theoretical review and empirical analyses, findings were made addressing the research questions posted as well as set and tested hypotheses. The study employed five models and used diagnostics tests namely – Unit root test, multicollinearity, correlation and cointegration tests; regression tests, panel data analysis and causality testing techniques to test and analyze the data represented in table 4.1, 4.2 and 4.3; and the subsequent tests results in tables 4.4A to table 4.19 (iv). The findings are hereby discussed below in line with the objectives of this study.

Objective One

To determine the relationship between Monetary Policy (Treasury bill rate (TBR), Interest rate (IntR), Cash Reserve Ratio (CRR), Money Supply (M2)) and Gross Domestic Product in developing African countries

The result of the panel data regression analysis revealed that monetary policy has a positive and significant effect on gross domestic product in selected developing African economies. The study showed that CRR, INTR, TBR and M2, have a t-statistic value of 5.055911. 5.595774, -4,300704 and 4.717157 with p-values of 0.0000, 0.0000, 0.0001 and 0.0000 were found to have a positively statistically significant effect on GDP at 5% significance level since its p-values are less than 5% except TBR that pose negative and significant effect on GDP.

The result of this study is supported by the findings of single country studies in Nouri and Samimi (2011), Fasanya, Onakoya and Agboluaje (2013), Hameed, Khalid and Sabit (2012), Nasko (2016) and Adigwe, Echekoba and Onyeagba (2015) who found a positive and significant effect of monetary policy on economic growth. This result supports our theory, the IS-LM Model of Monetary policy and our apriori expectations of a significant effect.

The implication of this result is that the monetary policies in the selecting emerging African economies have overtime been effective on economy growth as the manipulation and direction of monetary policy instruments have improve economic activities as shown on the improved economic growth in the study in the selected developing African economies.

It is also important to note that in the individual country analysis in Nigeria, Kenya and South Africa. The Nigerian study showed that the three variables in CRR, INTR and M2 positively and significantly affected (show relationship with) GDP. In Kenya, all the monetary policy in CRR, INFR, INTR and M2 significantly affected (show relationship with) GDP while in South Africa, both CRR and M2 shows both positive and significant relationship with GDP. This result conforms to individual countries study findings mentioned earlier. Thus, monetary policy in CRR, INFR, INTR and M2 shows significantly relationship with GDP for the selected emerging African economies.

Objective Two

To ascertain the relationship between Monetary Policy and Market Capitalization in developing African countries

The result of the panel data analysis shows that only M2 have a t-statistic value of 16.51896 with p-value of 0.0000 which was found to have a positively statistically significant effect on MC at 5% significance level. This result is very instructive as past levels of M2 shows positive and significant effect on economic development variable (MC) within the selected developing African economies at the 5% level of significance and indicates that a 1% increase in past level of M2 will respectively result to a 1.335978% increase in MC. However, the CRR, TBR and INTR with probability values more than 0.05% showed a positively insignificant effect (relationship with) on MC. The P-values are more than the 5% significance level. Thus, the null hypothesis accepted.

The result of this study is corroborated by the study of Adaramola (2011), Okpara (2010), Eze (2011), Chude and Chude (2013) and Nwakoby and Alajekwu (2016), whose study found a positive and significant effect of monetary policy instrument on stock market variables like market capitalization, all share index etc. This findings support IS-LM Model of Monetary policy theory and our apriori expectations of a significant relationship in the selected developing African economies.

Similarly, looking at the individual country study, the result that CRR, INTR and M2 significantly and positively show relationship with MC in Nigeria, while in Kenya all the four variables in CRR, INFR, INTR and M2 positively and significantly show relationship with MC and in South Africa both INTR and M2 significantly show relationship with M2 which supported our earlier findings. Reasonable direct interpretations of this result is that monetary policy positively and significantly improve and show relationship with MC in the individual countries and all the selected developing African economies collectively.

Objective Three

To determine the relationship between Monetary Policy and Manufacturing Output in developing African countries

The result of the panel data studies shows that CRR, INTR and M2 have a t-statistic value of 6.381077, 2217102 and 7.360316 with p-values of 0.0000, 0.0293 and 0.0000 respectively was found to have a positively statistically significant effect on MU at 5% significance level since its p-values are less than 5%. This result is very instructive as past levels of CRR, INTR and M2 shows positive and significant effect on economic development variable (MU) within the selected developing African economies at the 5% level of significance and indicates that a 1% increase in past level of CRR, INTR and M2 will respectively result to a 0.038820%, 0.521853% and 0.437446% increase in MU.

The result of this study is supported by the study of Chimobi and Uche (2010), Akujuobi and Chima (2012), Owalabi and Adegbite (2014) and Lawal (2016), whose studies found positive and significant relationship with manufacturing output (MU). This findings support IS-LM Model of Monetary policy theory and our apriori expectations of a significant relationship in the selected developing African economies.

Surprisingly, a cascaded test of this objective on individual study area revealed a positive and significant relationship between CRR, M2 and MU in Nigeria; in Kenya, all the four variables show significant relationship with MU while for South Africa, CRR and M2 show significant relationship with MU thereby supporting the panel data output and previous findings.

Adopting the panel data results above for our purpose of study, monetary policies show significant relationship (effect) with manufacturing output (MU) in the selected developing African economies. A conceiveable direct interpretation of this result is that monetary policies improve manufacturing activities and output in the selected developing African economies thus stimulating their performance.

Objective Four

To determine the relationship between Monetary Policy and Gross National Income per Capital (GNI) in developing African countries

The result of the panel data regression studies shows that CRR, TBR and INTR have a t-statistic values of 1.367578, -1.452747 and 0.604829 with p-values of 0.1756, 0.1505 and 0.5471 respectively was found to have both positive and negative statistically insignificant effect on GNI at 5% significance level since its p-value are more than 5%. However, the t-statistics of M2 of 8.130051 with p-value of 0.0000 show positively significant effect of M2 on GNI. This result is very instructive as past levels of CRR, INTR and M2 shows positive and insignificant effect on economic development variable (GNI) within the selected developing African economies at the 5% level of significance.

The result of this study contradicted the findings of Akanegbu and Gidigbi (2014), Gul, Mughal and Rahim (2012) and Akujobi (2012), whom found a statistically significant relationship (effect) of monetary policy with economic development. These findings seem to follow the IS-LM Model of Monetary policy theory and our apriori expectations of a significant relationship in the selected developing African economies were contradicted.

A probable direct interpretation of this result is that the effort of monetary authorities in its policy does not facilitate economic development in the selected developing African economies.

It is also imperative to mention that in the individual country analysis, while in Nigeria, only one variable in M2 significantly show relationship with GNI while the rest have insignificant relationships; in Kenya and South Africa, both CRR and M2 show significant relationship with GNI.

Objective Five

To ascertain the direction of causality between monetary policy and economic development of developing African Countries

The result of the granger causality of Monetary policy considered in CRR, INTR, TBR and M2 for the different economic development variables in GDP, MC, MU and GNI carried out at the 5% level of significance using a lag of 2 period generally reveals that all the monetary policy variables were unable to granger most of the economic development variables (see table 4.19 (i-iv)) in the selected developing African economies.

This result is consistent with the findings of Okwo, Eze and Nwoha (2012), Savannarideth (2015), who found non-causal effect of monetary policy on output but contradicted by Omolade and Ngalawa (2016), who discovered that monetary policies granger cause effect on economic development variable. This result however is not consistent with the IS-LM Model of Monetary policy theory and our apriori expectations of a significant relationship in the selected developing African economies were contradicted.

The result of the individual country further confirm earlier panel study position/scenario as seen in Nigeria and Kenya for instance, none of the monetary policy was able to granger cause an effective change on economic development variables (GDP, MC, MU and GNI), while only South Africa showed an effective granger causal effect of monetary policy on economic development variables which contradict general findings.

The panel data analysis result on pairwise granger causality does not support the IS-LM Model of Monetary policy theory and our apriori expectations of a significant relationship in the selected developing African economies were contradicted. The implication of this panel result is that the selected developing African economies is yet to productively use its monetary policy to develop the performance of economic development as much of the policies are not efficiently effective. Another implication of this result is that the monetary policies reduce monetary flows within the economy which affect economic activities and economic development at large.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

The findings from the specific objectives of this study are as follows:

1. That monetary policy in cash reserve ratio (CRR), treasury bill rate (TBR), interest rate (INTR) and money supply (M2) has positive and statistically significant relationship with economic growth in gross domestic product (GDP) in the selected developing African economies.
2. That monetary policy in cash reserve ratio (CRR), treasury bill rate (TBR), interest rate (INTR) and money supply (M2) has positive and statistically significant relationship with stock market performance index proxied by market capitalization (MC) in the selected developing African economies.
3. That monetary policy in cash reserve ratio (CRR), treasury bill rate (TBR), interest rate (INTR) and money supply (M2) has positive and statistically significant relationship with manufacturing output (MU) in the selected developing African economies.

4. That monetary policy in cash reserve ratio (CRR), treasury bill rate (TBR), interest rate (INTR) and money supply (M2) has positive and statistically insignificant relationship with gross national income (GNI) in the selected developing African economies.
5. That monetary policy in cash reserve ratio (CRR), treasury bill rate (TBR), interest rate (INTR) and money supply (M2) does not granger cause a significant effective change on economic growth variables in GDP, MC, MU and GNI in the selected developing African economies.

5.2 Conclusion

This research work studied the effect of monetary policy on economic development of developing African economies and the study is anchored on IS-LM Model of Monetary policy theory. The theory holds that a decrease in the interest rate increases the amount of investment spending resulting in increased aggregate demand and the level of output and vice versa. The theory also show that decrease in interest rate increase money supply and economic aggregates. Various studies showed contradicting findings both in favour and against monetary policy facilitating economic development variables in both individual country study and regional studies. Monetary policies determine the reserve ratios of banks and their interest rates on loans, influence inflation rate and generally the total money supply in the economy which in turn play significant roles on the direction of economic activities and development generally. The study viewed economic development from economic growth, stock market performance, industrial output and national income so as to view their possible reactions to monetary policies in the selected developing African economies.

In order to buttress the effect of monetary policies on economic development of selected developing African economies and improve the current literature, the study employed a robust analytical tool for panel data and time series study. Thus, the study's broad objective is to examine the effect of monetary policy on economic development of developing African economies focusing basically on three economies namely – Nigeria, Kenya and South Africa.

From the analysis in chapter four, the results from our study proved that monetary policy have a significant relationship with economic development variables in gross domestic product (GDP), market capitalization (MC) and manufacturing output (MU). While, there was no significant relationship between monetary policy and gross national income (GNI) and the monetary policy was grossly unable to granger cause a significant effective change on economic development variables (GDP, MC, MU and GNI) in the selected developing African economies. In conclusion, based on the outcome of our Study, we affirm that monetary policy has no significant effect on economic development of the selected developing African economies.

5.3 Recommendations

In line with the objectives of this study, the following recommendations are made:

1. The monetary regulatory authority of the selected developing African economies should reduce banks reserve ratio so as to reduce interest rates on loan that will improve money supply to facilitate enhanced economic activities and economic growth at large.
2. The monetary regulatory authority should manage interest rates, inflationary rate and cash reserve ratio such that stock market performance will not be affected negatively by

ensuring that changes in monetary policy instruments are not swiftly changed at intervals without control so as not to trigger panic stock market activities.

3. The regulatory authorities are advised to reduce interest rates and increase money supply such that both loans and funds will be easily accessed by manufacturing/industrial outlets to enhance manufacturing output in the selected developing African economies.
4. The monetary agency should also ensure interest rate of deposit money banks loans are reduced drastically to encourage loan activities which will boost money supply that enhances investment activities and national income at large. The reserve ratios of banks should be reduced to accommodate reduced interest rates and availability of funds in the banks to service demands for loans and investment activities within the selected developing African economies.
5. The monetary policy of the selected developing African economies should strengthen money supply to improve economic development by ensuring financial deepening within the economies and providing viable economic environment for financial enhancement to boost investment activities within the economies.

5.4 Contributions to Knowledge

The study empirically proves that monetary policy has no significant effect on economic development of the selected developing African economies but have significant relationship with economic development in the selected developing Africa economies which validates the objective of this study.

1. This work contributes to current literature on subject by establishing that monetary policy may not granger cause economic development and at the same time have a significant relationship with economic development.

2. This work further validates the findings of some researchers such as Hameed, Khalid and Sabit (2012), Nwakoby and Alajekwu (2016) and Chude and Chude (2013) that monetary policy has a significant relationship with economic development and findings of Abakah (2009) and Raymond (2009), that monetary policy has no significant effects on economic development.
3. Most reviewed literature employed an individual variable like only gross domestic product, market capitalization and value of stock traded or number of listed shares. This work however employed highly unused variable in manufacturing output and gross national income.

5.5 Recommendations for Further Studies

In line with the recommendations of the study, there are areas that need further inquiry so as to improve the empirical literature further. Thus, the following areas should be looked into to improve the literature;

1. The monetary instruments in money supply (M2), treasury bill rate (TBR),interest rate (IntR) and cash reserve ratio (CRR) should be decomposed further into(Currency in circulation, Demand Deposits and Quasi money for money supply, Cash Reserve and Liquidity Ratios for Cash Reserve Ratio) to enumerate the effect of Monetary policy on economic growth of developing African economies.
2. A comparative study of developing African economies should also be considered by narrowing further research to two countries in Nigeria and Kenya or South Africa.

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Appendix

Nigeria-CRR at Level

Null Hypothesis: CRR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-1.40785	0.565
Test critical values:	1% lev	-3.67017	
	5% lev	-2.96397	
	10% lev	-2.62100	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CRR)
Method: Least Squares
Date: 04/05/18 Time: 23:23

Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR(-1)	-0.139682	0.099216	-1.407850	0.1702
C	2.557346	1.554155	1.645489	0.1111

R-squared	0.066108	Mean dependent var	0.806667
Adjusted R-squared	0.032754	S.D. dependent var	5.191833
S.E. of regression	5.106097	Akaike info criterion	6.163088
Sum squared resid	730.0224	Schwarz criterion	6.256501
Log likelihood	-90.44632	Hannan-Quinn criter.	6.192972
F-statistic	1.982041	Durbin-Watson stat	1.999501
Prob(F-statistic)	0.170182		

Nigeria-CRR at 1st Difference

Null Hypothesis: D(CRR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-5.61289	0.000
Test critical values:	1% lev	-3.67932	
	5% lev	-2.96776	
	10% lev	-2.62298	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CRR,2)
Method: Least Squares
Date: 04/05/18 Time: 23:33
Sample (adjusted): 1988 2016
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CRR(-1))	-1.109866	0.197735	-5.612891	0.0000
C	0.959998	1.014109	0.946641	0.3522

R-squared	0.538497	Mean dependent var	-0.203448
Adjusted R-squared	0.521405	S.D. dependent var	7.727386
S.E. of regression	5.345850	Akaike info criterion	6.256990
Sum squared resid	771.6091	Schwarz criterion	6.351287
Log likelihood	-88.72636	Hannan-Quinn criter.	6.286523
F-statistic	31.50454	Durbin-Watson stat	1.921347
Prob(F-statistic)	0.000006		

Nigeria-GDP at Level

Null Hypothesis: GDP has a unit root
Exogenous: Constant
Lag Length: 4 (Automatic - based on SIC, maxlag=4)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-3.38896	0.020
Test critical values:	1% lev	-3.71145	
	5% lev	-2.98103	
	10% lev	-2.62990	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP)
Method: Least Squares
Date: 04/07/18 Time: 06:44
Sample (adjusted): 1991 2016
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	-0.108234	0.031937	-3.388966	0.0029
D(GDP(-1))	1.015642	0.321368	3.160369	0.0049
D(GDP(-2))	-0.262920	0.391479	-0.671609	0.5095
D(GDP(-3))	0.544451	0.396337	1.373705	0.1847
D(GDP(-4))	0.929409	0.365343	2.543937	0.0193
C	12043.59	5803.943	2.075071	0.0511

R-squared	0.741466	Mean dependent var	36208.88
Adjusted R-squared	0.676833	S.D. dependent var	26303.29
S.E. of regression	14952.84	Akaike info criterion	22.26236
Sum squared resid	4.47E+09	Schwarz criterion	22.55269
Log likelihood	-283.4107	Hannan-Quinn criter.	22.34597
F-statistic	11.47186	Durbin-Watson stat	1.970853
Prob(F-statistic)	0.000025		

Nigeria-INFR at Level

Null Hypothesis: INFR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-2.61904	0.100
Test critical values:	1% lev	-3.67017	
	5% lev	-2.96397	
	10% lev	-2.62100	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INFR)
Method: Least Squares
Date: 04/07/18 Time: 06:47
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFR(-1)	-0.383985	0.146612	-2.619047	0.0141
C	8.179417	4.071536	2.008927	0.0543

R-squared	0.196773	Mean dependent var	0.333333
Adjusted R-squared	0.168087	S.D. dependent var	16.55793
S.E. of regression	15.10237	Akaike info criterion	8.331921
Sum squared resid	6386.283	Schwarz criterion	8.425334
Log likelihood	-122.9788	Hannan-Quinn criter.	8.361804
F-statistic	6.859407	Durbin-Watson stat	1.584943
Prob(F-statistic)	0.014075		

Nigeria-INFR at 1st Difference

Null Hypothesis: D(INFR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-4.78087	0.000
Test critical values:	1% lev	-3.67932	
	5% lev	-2.96776	
	10% lev	-2.62298	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INFR,2)
Method: Least Squares
Date: 04/07/18 Time: 06:51
Sample (adjusted): 1988 2016
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFR(-1))	-0.917733	0.191959	-4.780872	0.0001
C	0.142363	3.170131	0.044908	0.9645

R-squared	0.458448	Mean dependent var	0.037931
Adjusted R-squared	0.438391	S.D. dependent var	22.77974
S.E. of regression	17.07127	Akaike info criterion	8.579143
Sum squared resid	7868.566	Schwarz criterion	8.673440
Log likelihood	-122.3976	Hannan-Quinn criter.	8.608676
F-statistic	22.85674	Durbin-Watson stat	1.750766

Prob(F-statistic)	0.000055

Nigeria-INTR at Level

Null Hypothesis: INTR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-3.24881	0.026
Test critical values:	1% lev	-3.67017	
	5% lev	-2.96397	
	10% lev	-2.62100	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INTR)
Method: Least Squares
Date: 04/07/18 Time: 06:53
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INTR(-1)	-0.439861	0.135391	-3.248814	0.0030
C	8.671121	2.652869	3.268582	0.0029

R-squared	0.273761	Mean dependent var	0.230333
Adjusted R-squared	0.247824	S.D. dependent var	3.386382
S.E. of regression	2.936945	Akaike info criterion	5.056957
Sum squared resid	241.5180	Schwarz criterion	5.150370
Log likelihood	-73.85436	Hannan-Quinn criter.	5.086841
F-statistic	10.55479	Durbin-Watson stat	1.976272
Prob(F-statistic)	0.003009		

Nigeria-M2 at Level

Null Hypothesis: M2 has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-0.27002	0.918
Test critical values:	1% lev	-3.67017	
	5% lev	-2.96397	
	10% lev	-2.62100	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(M2)
Method: Least Squares
Date: 04/07/18 Time: 06:56
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
M2(-1)	-0.013378	0.049543	-0.270024	0.7891
C	2730.515	2501.682	1.091472	0.2844

R-squared	0.002597	Mean dependent var	2257.576
Adjusted R-squared	-0.033024	S.D. dependent var	9626.141
S.E. of regression	9783.798	Akaike info criterion	21.27918
Sum squared resid	2.68E+09	Schwarz criterion	21.37260
Log likelihood	-317.1878	Hannan-Quinn criter.	21.30907
F-statistic	0.072913	Durbin-Watson stat	1.213379
Prob(F-statistic)	0.789122		

Nigeria-M2 at 1st Difference

Null Hypothesis: D(M2) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prol
Augmented Dickey-Fuller test statistic		-3.43010	0.018
Test critical values:	1% lev	-3.67932	
	5% lev	-2.96776	
	10% lev	-2.62298	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(M2,2)
Method: Least Squares
Date: 04/07/18 Time: 06:58
Sample (adjusted): 1988 2016
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(M2(-1))	-0.647710	0.188831	-3.430100	0.0020
C	1590.837	1793.793	0.886856	0.3830

R-squared	0.303506	Mean dependent var	-255.4983
Adjusted R-squared	0.277710	S.D. dependent var	10842.40
S.E. of regression	9214.701	Akaike info criterion	21.16146
Sum squared resid	2.29E+09	Schwarz criterion	21.25576
Log likelihood	-304.8412	Hannan-Quinn criter.	21.19099
F-statistic	11.76559	Durbin-Watson stat	1.889913
Prob(F-statistic)	0.001954		

Nigeria-MC at Level

Null Hypothesis: MC has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-1.75676	0.393
Test critical values:	1% lev	-3.67017	
	5% lev	-2.96397	
	10% lev	-2.62100	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MC)
Method: Least Squares
Date: 04/07/18 Time: 07:00
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MC(-1)	-0.190621	0.108507	-1.756768	0.0899
C	5047.243	3614.549	1.396369	0.1736

R-squared	0.099280	Mean dependent var	863.6333
Adjusted R-squared	0.067111	S.D. dependent var	15419.82
S.E. of regression	14893.41	Akaike info criterion	22.11957
Sum squared resid	6.21E+09	Schwarz criterion	22.21298
Log likelihood	-329.7935	Hannan-Quinn criter.	22.14945
F-statistic	3.086235	Durbin-Watson stat	2.002540
Prob(F-statistic)	0.089890		

Nigeria-MC at 1st Difference

Null Hypothesis: D(MC) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-5.70765	0.000
Test critical values:	1% lev	-3.67932	
	5% lev	-2.96776	
	10% lev	-2.62298	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MC,2)

Method: Least Squares
Date: 04/07/18 Time: 07:06
Sample (adjusted): 1988 2016
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(MC(-1))	-1.127571	0.197554	-5.707650	0.0000
C	1158.858	2960.002	0.391506	0.6985

R-squared	0.546807	Mean dependent var	-633.2414
Adjusted R-squared	0.530022	S.D. dependent var	23120.39
S.E. of regression	15850.17	Akaike info criterion	22.24622
Sum squared resid	6.78E+09	Schwarz criterion	22.34052
Log likelihood	-320.5702	Hannan-Quinn criter.	22.27575
F-statistic	32.57727	Durbin-Watson stat	1.986757
Prob(F-statistic)	0.000005		

Nigeria-MU at Level

Null Hypothesis: MU has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		0.41623	0.98
Test critical values:	1% lev	-3.67017	
	5% lev	-2.96397	
	10% lev	-2.62100	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MU)
Method: Least Squares
Date: 04/07/18 Time: 07:08
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MU(-1)	0.021622	0.051946	0.416239	0.6804
C	953.8225	1011.959	0.942551	0.3540

R-squared	0.006150	Mean dependent var	1225.733
Adjusted R-squared	-0.029345	S.D. dependent var	4172.363
S.E. of regression	4233.139	Akaike info criterion	19.60362
Sum squared resid	5.02E+08	Schwarz criterion	19.69703
Log likelihood	-292.0542	Hannan-Quinn criter.	19.63350
F-statistic	0.173255	Durbin-Watson stat	1.587762
Prob(F-statistic)	0.680409		

Null Hypothesis: D(MU) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-4.21188	0.002
Test critical values:	1% lev	-3.67932	
	5% lev	-2.96776	
	10% lev	-2.62298	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MU,2)
Method: Least Squares
Date: 04/07/18 Time: 07:10
Sample (adjusted): 1988 2016
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(MU(-1))	-0.808111	0.191865	-4.211881	0.0003
C	1093.353	821.4208	1.331051	0.1943

R-squared	0.396512	Mean dependent var	-50.79310
Adjusted R-squared	0.374161	S.D. dependent var	5276.952
S.E. of regression	4174.596	Akaike info criterion	19.57790
Sum squared resid	4.71E+08	Schwarz criterion	19.67219
Log likelihood	-281.8795	Hannan-Quinn criter.	19.60743
F-statistic	17.73994	Durbin-Watson stat	1.968160
Prob(F-statistic)	0.000252		

Nigeria-GNI at Level

Null Hypothesis: NIG_GNI has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		1.26817	0.99
Test critical values:	1% lev	-3.71145	
	5% lev	-2.98103	
	10% lev	-2.62990	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(NIG_GNI)
Method: Least Squares
Date: 04/07/18 Time: 07:13
Sample (adjusted): 1991 2016
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NIG_GNI(-1)	0.050446	0.039778	1.268178	0.2169
C	-58.65768	147.5875	-0.397443	0.6946

R-squared	0.062803	Mean dependent var	120.1154
Adjusted R-squared	0.023753	S.D. dependent var	225.5392
S.E. of regression	222.8445	Akaike info criterion	13.72463
Sum squared resid	1191832.	Schwarz criterion	13.82141
Log likelihood	-176.4202	Hannan-Quinn criter.	13.75250
F-statistic	1.608276	Durbin-Watson stat	2.263764
Prob(F-statistic)	0.216899		

Nigeria-GNI at 1st Difference

Null Hypothesis: D(NIG_GNI) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-4.99499	0.000
Test critical values:	1% lev	-3.72407	
	5% lev	-2.98622	
	10% lev	-2.63260	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(NIG_GNI,2)
Method: Least Squares
Date: 04/07/18 Time: 07:16
Sample (adjusted): 1992 2016
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(NIG_GNI(-1))	-1.043034	0.208816	-4.994999	0.0000
C	132.7677	51.79163	2.563497	0.0174

R-squared	0.520334	Mean dependent var	16.24000
Adjusted R-squared	0.499479	S.D. dependent var	326.7958
S.E. of regression	231.2000	Akaike info criterion	13.80106
Sum squared resid	1229429.	Schwarz criterion	13.89857
Log likelihood	-170.5133	Hannan-Quinn criter.	13.82811

F-statistic	24.95002	Durbin-Watson stat	1.966388
Prob(F-statistic)	0.000047		

Kenya-CRR at Level

Null Hypothesis: CRR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-1.43993	0.549
Test critical values:	1% lev	-3.67017	
	5% lev	-2.96397	
	10% lev	-2.62100	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CRR)
Method: Least Squares
Date: 04/07/18 Time: 07:22
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR(-1)	-0.124175	0.086236	-1.439939	0.1610
C	0.909916	0.631511	1.440855	0.1607

R-squared	0.068945	Mean dependent var	0.270000
Adjusted R-squared	0.035693	S.D. dependent var	2.502571
S.E. of regression	2.457503	Akaike info criterion	4.700509
Sum squared resid	169.1009	Schwarz criterion	4.793922
Log likelihood	-68.50763	Hannan-Quinn criter.	4.730392
F-statistic	2.073425	Durbin-Watson stat	2.376472
Prob(F-statistic)	0.160973		

Kenya-CRR at 1st Difference

Null Hypothesis: D(CRR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-6.75574	0.000
Test critical values:	1% lev	-3.67932	
	5% lev	-2.96776	

10% lev	-2.62298	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CRR,2)
Method: Least Squares
Date: 04/08/18 Time: 07:35
Sample (adjusted): 1988 2016
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CRR(-1))	-1.261020	0.186659	-6.755747	0.0000
C	0.361217	0.468651	0.770758	0.4475

R-squared	0.628305	Mean dependent var	-0.034483
Adjusted R-squared	0.614538	S.D. dependent var	4.033102
S.E. of regression	2.503975	Akaike info criterion	4.740108
Sum squared resid	169.2870	Schwarz criterion	4.834404
Log likelihood	-66.73156	Hannan-Quinn criter.	4.769640
F-statistic	45.64011	Durbin-Watson stat	2.024434
Prob(F-statistic)	0.000000		

Kenya-GDP at Level

Null Hypothesis: GDP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		2.89372	1.000
Test critical values:	1% lev	-4.29672	
	5% lev	-3.56837	
	10% lev	-3.21838	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP)
Method: Least Squares
Date: 04/08/18 Time: 07:40
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	0.088405	0.030551	2.893723	0.0074
C	-1104.147	712.3181	-1.550076	0.1328
@TREND("1986"	-36.54819	114.6501	-0.318780	0.7523

R-squared	0.725050	Mean dependent var	4210.400
Adjusted R-squared	0.704683	S.D. dependent var	3072.638
S.E. of regression	1669.766	Akaike info criterion	17.77339
Sum squared resid	75279200	Schwarz criterion	17.91351
Log likelihood	-263.6009	Hannan-Quinn criter.	17.81822
F-statistic	35.59979	Durbin-Watson stat	1.670675
Prob(F-statistic)	0.000000		

Kenya-GDP at 1st Difference

Null Hypothesis: D(GDP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-3.45514	0.063
Test critical values:	1% lev	-4.30982	
	5% lev	-3.57424	
	10% lev	-3.22172	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP,2)
Method: Least Squares
Date: 04/08/18 Time: 07:42
Sample (adjusted): 1988 2016
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	-0.603737	0.174736	-3.455143	0.0019
C	-289.4143	697.8926	-0.414697	0.6818
@TREND("1986"	184.9442	61.79169	2.993027	0.0060

R-squared	0.318565	Mean dependent var	219.1034
Adjusted R-squared	0.266147	S.D. dependent var	2024.316
S.E. of regression	1734.135	Akaike info criterion	17.85210
Sum squared resid	78187807	Schwarz criterion	17.99355
Log likelihood	-255.8555	Hannan-Quinn criter.	17.89640
F-statistic	6.077397	Durbin-Watson stat	1.942168
Prob(F-statistic)	0.006831		

Kenya-INFR at Level

Null Hypothesis: INFR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

	t-Statist	Prob

Augmented Dickey-Fuller test statistic	-3.0475(	0.04
Test critical values: 1% lev	-3.6701	
5% lev	-2.9639	
10% lev	-2.6210(	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INFR)
Method: Least Squares
Date: 04/08/18 Time: 07:59
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFR(-1)	-0.486328	0.159582	-3.047505	0.0050
C	6.079320	2.454526	2.476779	0.0196

R-squared	0.249074	Mean dependent var	0.126667
Adjusted R-squared	0.222255	S.D. dependent var	9.231577
S.E. of regression	8.141315	Akaike info criterion	7.096121
Sum squared resid	1855.868	Schwarz criterion	7.189534
Log likelihood	-104.4418	Hannan-Quinn criter.	7.126005
F-statistic	9.287284	Durbin-Watson stat	1.801197
Prob(F-statistic)	0.004993		

Kenya-INTR at Level

Null Hypothesis: INTR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

	t-Statist	Prob
Augmented Dickey-Fuller test statistic	-1.4852	0.52
Test critical values: 1% lev	-3.6701	
5% lev	-2.9639	
10% lev	-2.6210(	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INTR)
Method: Least Squares
Date: 04/08/18 Time: 08:04
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

INTR(-1)	-0.136994	0.092238	-1.485225	0.1487
C	2.765847	1.904466	1.452295	0.1575

R-squared	0.073029	Mean dependent var	0.085333
Adjusted R-squared	0.039922	S.D. dependent var	3.399030
S.E. of regression	3.330490	Akaike info criterion	5.308457
Sum squared resid	310.5806	Schwarz criterion	5.401870
Log likelihood	-77.62685	Hannan-Quinn criter.	5.338340
F-statistic	2.205893	Durbin-Watson stat	1.914654
Prob(F-statistic)	0.148657		

Kenya-INTR at 1st Difference

Null Hypothesis: D(INTR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-5.2872	0.000
Test critical values:	1% lev	-3.6793	
	5% lev	-2.9677	
	10% le	-2.6229	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INTR,2)
Method: Least Squares
Date: 04/08/18 Time: 08:05
Sample (adjusted): 1988 2016
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INTR(-1))	-1.017594	0.192462	-5.287245	0.0000
C	0.089544	0.654182	0.136879	0.8921

R-squared	0.508689	Mean dependent var	0.016207
Adjusted R-squared	0.490492	S.D. dependent var	4.934288
S.E. of regression	3.522087	Akaike info criterion	5.422456
Sum squared resid	334.9375	Schwarz criterion	5.516753
Log likelihood	-76.62562	Hannan-Quinn criter.	5.451989
F-statistic	27.95496	Durbin-Watson stat	1.991249
Prob(F-statistic)	0.000014		

Kenya-GNI at Level

Null Hypothesis: KENYA_GNI has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

	t-Statist	Prob

Augmented Dickey-Fuller test statistic		2.11027	0.999
Test critical values:	1% lev	-3.71145	
	5% lev	-2.98103	
	10% lev	-2.62990	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(KENYA_GNI)
Method: Least Squares
Date: 04/08/18 Time: 09:17
Sample (adjusted): 1991 2016
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
KENYA_GNI(-1)	0.112207	0.053172	2.110276	0.0454
C	-233.6082	122.2637	-1.910691	0.0681

R-squared	0.156512	Mean dependent var	23.30769
Adjusted R-squared	0.121366	S.D. dependent var	61.19070
S.E. of regression	57.35739	Akaike info criterion	11.01028
Sum squared resid	78956.88	Schwarz criterion	11.10706
Log likelihood	-141.1337	Hannan-Quinn criter.	11.03815
F-statistic	4.453263	Durbin-Watson stat	1.228049
Prob(F-statistic)	0.045446		

Kenya-GNI at 1st Difference

Null Hypothesis: D(KENYA_GNI) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-3.81598	0.032
Test critical values:	1% lev	-4.37430	
	5% lev	-3.60320	
	10% lev	-3.23805	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(KENYA_GNI,2)
Method: Least Squares
Date: 04/08/18 Time: 09:19
Sample (adjusted): 1992 2016
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

D(KENYA_GNI(-1	-0.795558	0.208480	-3.815985	0.0009
C	-50.68309	30.11435	-1.683021	0.1065
@TREND("1986"	4.044431	1.722089	2.348561	0.0282

R-squared	0.398318	Mean dependent var	5.760000
Adjusted R-squared	0.343620	S.D. dependent var	59.79429
S.E. of regression	48.44372	Akaike info criterion	10.71085
Sum squared resid	51629.47	Schwarz criterion	10.85711
Log likelihood	-130.8856	Hannan-Quinn criter.	10.75142
F-statistic	7.282081	Durbin-Watson stat	1.822445
Prob(F-statistic)	0.003741		

Kenya-M2 at Level

Null Hypothesis: M2 has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-0.30776	0.986
Test critical values:	1% lev	-4.29672	
	5% lev	-3.56837	
	10% lev	-3.21838	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(M2)
Method: Least Squares
Date: 04/08/18 Time: 09:20
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
M2(-1)	-0.014146	0.045965	-0.307760	0.7606
C	-402.6663	367.0844	-1.096931	0.2824
@TREND("1986"	87.61552	39.86355	2.197885	0.0367

R-squared	0.382575	Mean dependent var	834.4398
Adjusted R-squared	0.336840	S.D. dependent var	1096.222
S.E. of regression	892.7046	Akaike info criterion	16.52103
Sum squared resid	21516880	Schwarz criterion	16.66115
Log likelihood	-244.8154	Hannan-Quinn criter.	16.56585
F-statistic	8.365012	Durbin-Watson stat	1.448788
Prob(F-statistic)	0.001489		

Kenya-M2 at 1st Difference

Null Hypothesis: D(M2) has a unit root

Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-3.69032	0.039
Test critical values:	1% lev	-4.30982	
	5% lev	-3.57424	
	10% lev	-3.22172	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(M2,2)
Method: Least Squares
Date: 04/08/18 Time: 09:24
Sample (adjusted): 1988 2016
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(M2(-1))	-0.780791	0.211578	-3.690321	0.0010
C	-300.1270	376.9002	-0.796304	0.4331
@TREND("1986"	60.48782	27.48698	2.200599	0.0368

R-squared	0.348196	Mean dependent var	-4.138252
Adjusted R-squared	0.298058	S.D. dependent var	1059.397
S.E. of regression	887.5837	Akaike info criterion	16.51258
Sum squared resid	20482925	Schwarz criterion	16.65402
Log likelihood	-236.4324	Hannan-Quinn criter.	16.55688
F-statistic	6.944654	Durbin-Watson stat	1.895640
Prob(F-statistic)	0.003833		

Kenya-MC at Level
Null Hypothesis: MC has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-0.52381	0.872
Test critical values:	1% lev	-3.67017	
	5% lev	-2.96397	
	10% lev	-2.62100	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MC)
Method: Least Squares
Date: 04/08/18 Time: 09:26

Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MC(-1)	-0.038137	0.072806	-0.523818	0.6045
C	855.8371	689.9936	1.240355	0.2251

R-squared	0.009704	Mean dependent var	618.0667
Adjusted R-squared	-0.025663	S.D. dependent var	2810.475
S.E. of regression	2846.310	Akaike info criterion	18.80977
Sum squared resid	2.27E+08	Schwarz criterion	18.90319
Log likelihood	-280.1466	Hannan-Quinn criter.	18.83966
F-statistic	0.274385	Durbin-Watson stat	1.964250
Prob(F-statistic)	0.604527		

Kenya-MC at 1st Difference

Null Hypothesis: D(MC) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-5.25772	0.000
Test critical values:	1% lev	-3.67932	
	5% lev	-2.96776	
	10% lev	-2.62298	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MC,2)
Method: Least Squares
Date: 04/08/18 Time: 09:28
Sample (adjusted): 1988 2016
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(MC(-1))	-1.011042	0.192296	-5.257729	0.0000
C	644.6081	553.3209	1.164981	0.2542

R-squared	0.505890	Mean dependent var	20.62069
Adjusted R-squared	0.487590	S.D. dependent var	4065.746
S.E. of regression	2910.377	Akaike info criterion	18.85642
Sum squared resid	2.29E+08	Schwarz criterion	18.95072
Log likelihood	-271.4182	Hannan-Quinn criter.	18.88596
F-statistic	27.64372	Durbin-Watson stat	2.009596
Prob(F-statistic)	0.000015		

Kenya-MU at Level

Null Hypothesis: MU has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		1.34013	0.998
Test critical values:	1% lev	-3.67017	
	5% lev	-2.96397	
	10% lev	-2.62100	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MU)
Method: Least Squares
Date: 04/08/18 Time: 09:32
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MU(-1)	0.028986	0.021629	1.340130	0.1910
C	1.666873	58.62216	0.028434	0.9775

R-squared	0.060275	Mean dependent var	78.30000
Adjusted R-squared	0.026713	S.D. dependent var	71.66452
S.E. of regression	70.70084	Akaike info criterion	11.41913
Sum squared resid	139961.1	Schwarz criterion	11.51255
Log likelihood	-169.2870	Hannan-Quinn criter.	11.44902
F-statistic	1.795948	Durbin-Watson stat	1.606436
Prob(F-statistic)	0.190978		

Kenya-MU at 1^{st} Difference

Null Hypothesis: D(MU) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-3.94612	0.005
Test critical values:	1% lev	-3.67932	
	5% lev	-2.96776	
	10% lev	-2.62298	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MU,2)
Method: Least Squares

Date: 04/08/18 Time: 09:33
Sample (adjusted): 1988 2016
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(MU(-1))	-0.736584	0.186660	-3.946125	0.0005
C	57.53730	19.56798	2.940380	0.0066

R-squared	0.365779	Mean dependent var	0.896552
Adjusted R-squared	0.342289	S.D. dependent var	88.31290
S.E. of regression	71.62120	Akaike info criterion	11.44713
Sum squared resid	138499.1	Schwarz criterion	11.54143
Log likelihood	-163.9834	Hannan-Quinn criter.	11.47666
F-statistic	15.57190	Durbin-Watson stat	2.016568
Prob(F-statistic)	0.000510		

South Africa-CRR at Level

Null Hypothesis: CRR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-2.20037	0.210
Test critical values:	1% lev	-3.67017	
	5% lev	-2.96397	
	10% lev	-2.62100	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CRR)
Method: Least Squares
Date: 04/08/18 Time: 09:36
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR(-1)	-0.288472	0.131101	-2.200372	0.0362
C	0.683033	0.391896	1.742894	0.0923

R-squared	0.147424	Mean dependent var	0.116667
Adjusted R-squared	0.116975	S.D. dependent var	1.722485
S.E. of regression	1.618609	Akaike info criterion	3.865352
Sum squared resid	73.35708	Schwarz criterion	3.958765
Log likelihood	-55.98028	Hannan-Quinn criter.	3.895236
F-statistic	4.841638	Durbin-Watson stat	2.028720
Prob(F-statistic)	0.036196		

South Africa-CRR at 1st Difference

Null Hypothesis: D(CRR) has a unit root			
Exogenous: Constant			
Lag Length: 0 (Automatic - based on SIC, maxlag=0)			
		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-6.08556	0.000
Test critical values:	1% lev	-3.67932	
	5% lev	-2.96776	
	10% lev	-2.62298	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CRR,2)
Method: Least Squares
Date: 04/08/18 Time: 09:40
Sample (adjusted): 1988 2016
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CRR(-1))	-1.157100	0.190139	-6.085566	0.0000
C	0.137483	0.327983	0.419178	0.6784

R-squared	0.578350	Mean dependent var	0.013793
Adjusted R-squared	0.562733	S.D. dependent var	2.665886
S.E. of regression	1.762848	Akaike info criterion	4.038210
Sum squared resid	83.90608	Schwarz criterion	4.132507
Log likelihood	-56.55405	Hannan-Quinn criter.	4.067743
F-statistic	37.03411	Durbin-Watson stat	2.086585
Prob(F-statistic)	0.000002		

South Africa-GDP at Level

Null Hypothesis: GDP has a unit root			
Exogenous: Constant			
Lag Length: 0 (Automatic - based on SIC, maxlag=0)			
		t-Statist	Prob
Augmented Dickey-Fuller test statistic		2.38900	0.999
Test critical values:	1% lev	-3.67017	
	5% lev	-2.96397	
	10% lev	-2.62100	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP)
Method: Least Squares

Date: 04/08/18 Time: 09:42
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	0.027994	0.011718	2.389002	0.0239
C	6911.721	5172.677	1.336198	0.1922

R-squared	0.169320	Mean dependent var	18310.47
Adjusted R-squared	0.139653	S.D. dependent var	11796.64
S.E. of regression	10941.96	Akaike info criterion	21.50294
Sum squared resid	3.35E+09	Schwarz criterion	21.59635
Log likelihood	-320.5441	Hannan-Quinn criter.	21.53282
F-statistic	5.707331	Durbin-Watson stat	1.153305
Prob(F-statistic)	0.023873		

South Africa-GDP at 1st Difference

Null Hypothesis: D(GDP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-2.83078	0.066
Test critical values:	1% lev	-3.67932	
	5% lev	-2.96776	
	10% lev	-2.62298	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP,2)
Method: Least Squares
Date: 04/08/18 Time: 09:43
Sample (adjusted): 1988 2016
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	-0.474158	0.167501	-2.830783	0.0087
C	8740.533	3690.810	2.368188	0.0253

R-squared	0.228865	Mean dependent var	-180.4138
Adjusted R-squared	0.200305	S.D. dependent var	11568.91
S.E. of regression	10345.58	Akaike info criterion	21.39298
Sum squared resid	2.89E+09	Schwarz criterion	21.48727
Log likelihood	-308.1982	Hannan-Quinn criter.	21.42251
F-statistic	8.013335	Durbin-Watson stat	1.777758
Prob(F-statistic)	0.008662		

South Africa-INFR at Level

Null Hypothesis: INFR has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=0)				
			t-Statist	Prob
Augmented Dickey-Fuller test statistic			-2.0154	0.27
Test critical values:	1% lev		-3.6701	
	5% lev		-2.9639	
	10% lev		-2.6210	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INFR)
Method: Least Squares
Date: 04/08/18 Time: 09:45
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFR(-1)	-0.202296	0.100373	-2.015440	0.0535
C	1.405799	0.926913	1.516646	0.1406

R-squared	0.126692	Mean dependent var	-0.280000
Adjusted R-squared	0.095502	S.D. dependent var	2.300285
S.E. of regression	2.187688	Akaike info criterion	4.467908
Sum squared resid	134.0074	Schwarz criterion	4.561321
Log likelihood	-65.01862	Hannan-Quinn criter.	4.497791
F-statistic	4.062000	Durbin-Watson stat	1.926807
Prob(F-statistic)	0.053548		

South Africa-INFR at 1st Difference

Null Hypothesis: D(INFR) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=0)				
			t-Statist	Prob
Augmented Dickey-Fuller test statistic			-5.4701	0.00
Test critical values:	1% lev		-3.6793	
	5% lev		-2.9677	
	10% lev		-2.6229	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(INFR,2)
Method: Least Squares
Date: 04/08/18 Time: 09:47
Sample (adjusted): 1988 2016
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFR(-1))	-1.053938	0.192671	-5.470141	0.0000
C	-0.360165	0.442421	-0.814077	0.4227

R-squared	0.525670	Mean dependent var	0.006897
Adjusted R-squared	0.508103	S.D. dependent var	3.357713
S.E. of regression	2.354945	Akaike info criterion	4.617384
Sum squared resid	149.7357	Schwarz criterion	4.711680
Log likelihood	-64.95207	Hannan-Quinn criter.	4.646917
F-statistic	29.92244	Durbin-Watson stat	1.874138
Prob(F-statistic)	0.000009		

South Africa-INTR at Level

Null Hypothesis: INTR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-1.19352	0.663
Test critical values:	1% lev	-3.67017	
	5% lev	-2.96397	
	10% lev	-2.62100	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INTR)
Method: Least Squares
Date: 04/08/18 Time: 09:49
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INTR(-1)	-0.111504	0.093424	-1.193527	0.2427
C	1.498475	1.414792	1.059149	0.2986

R-squared	0.048412	Mean dependent var	-0.129000
Adjusted R-squared	0.014427	S.D. dependent var	2.081033
S.E. of regression	2.065967	Akaike info criterion	4.353414
Sum squared resid	119.5102	Schwarz criterion	4.446828
Log likelihood	-63.30122	Hannan-Quinn criter.	4.383298
F-statistic	1.424507	Durbin-Watson stat	1.252817

Prob(F-statistic)	0.242678			

South Africa-INTR at 1st Difference

Null Hypothesis: D(INTR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-3.74722	0.008
Test critical values:	1% lev	-3.67932	
	5% lev	-2.96776	
	10% lev	-2.62298	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INTR,2)
Method: Least Squares
Date: 04/08/18 Time: 09:50
Sample (adjusted): 1988 2016
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INTR(-1))	-0.677846	0.180893	-3.747229	0.0009
C	-0.015801	0.375570	-0.042072	0.9668

R-squared	0.342133	Mean dependent var	0.098966
Adjusted R-squared	0.317768	S.D. dependent var	2.440475
S.E. of regression	2.015768	Akaike info criterion	4.306349
Sum squared resid	109.7096	Schwarz criterion	4.400646
Log likelihood	-60.44207	Hannan-Quinn criter.	4.335882
F-statistic	14.04173	Durbin-Watson stat	1.473849
Prob(F-statistic)	0.000860		

South Africa-M2 at Level

Null Hypothesis: M2 has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-0.83211	0.795
Test critical values:	1% lev	-3.67017	
	5% lev	-2.96397	
	10% lev	-2.62100	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(M2)
Method: Least Squares
Date: 04/08/18 Time: 09:52
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
M2(-1)	-0.033691	0.040489	-0.832119	0.4124
C	10572.63	6514.525	1.622932	0.1158

R-squared	0.024133	Mean dependent var	6053.022
Adjusted R-squared	-0.010720	S.D. dependent var	19596.83
S.E. of regression	19701.59	Akaike info criterion	22.67913
Sum squared resid	1.09E+10	Schwarz criterion	22.77254
Log likelihood	-338.1869	Hannan-Quinn criter.	22.70901
F-statistic	0.692421	Durbin-Watson stat	1.039296
Prob(F-statistic)	0.412383		

South Africa-M2 at 1st Difference

Null Hypothesis: D(M2) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-3.02032	0.044
Test critical values:	1% lev	-3.67932	
	5% lev	-2.96776	
	10% lev	-2.62298	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(M2,2)
Method: Least Squares
Date: 04/08/18 Time: 09:56
Sample (adjusted): 1988 2016
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(M2(-1))	-0.525787	0.174083	-3.020324	0.0055
C	2604.091	3538.553	0.735920	0.4681

R-squared	0.252540	Mean dependent var	-977.1990
Adjusted R-squared	0.224857	S.D. dependent var	20392.50
S.E. of regression	17954.01	Akaike info criterion	22.49549
Sum squared resid	8.70E+09	Schwarz criterion	22.58978
Log likelihood	-324.1846	Hannan-Quinn criter.	22.52502

F-statistic	9.122358	Durbin-Watson stat	1.794985
Prob(F-statistic)	0.005466		

South Africa-MC at Level

Null Hypothesis: MC has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-0.7003(	0.83
Test critical values:	1% lev	-3.6701	
	5% lev	-2.9639	
	10% le	-2.6210(	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MC)
Method: Least Squares
Date: 04/08/18 Time: 09:57
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MC(-1)	-0.053957	0.077048	-0.700308	0.4895
C	50761.33	39476.57	1.285859	0.2090

R-squared	0.017214	Mean dependent var	28288.93
Adjusted R-squared	-0.017886	S.D. dependent var	124826.2
S.E. of regression	125937.6	Akaike info criterion	26.38930
Sum squared resid	4.44E+11	Schwarz criterion	26.48271
Log likelihood	-393.8395	Hannan-Quinn criter.	26.41918
F-statistic	0.490431	Durbin-Watson stat	2.431873
Prob(F-statistic)	0.489514		

South Africa-MC at 1st Difference

Null Hypothesis: D(MC) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-6.9403(	0.00(
Test critical values:	1% lev	-3.6793	
	5% lev	-2.9677(	
	10% le	-2.6229	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MC,2)
Method: Least Squares
Date: 04/08/18 Time: 09:59
Sample (adjusted): 1988 2016
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(MC(-1))	-1.323703	0.190727	-6.940301	0.0000
C	35087.27	23210.71	1.511685	0.1422

R-squared	0.640804	Mean dependent var	6180.655
Adjusted R-squared	0.627500	S.D. dependent var	201473.1
S.E. of regression	122964.6	Akaike info criterion	26.34365
Sum squared resid	4.08E+11	Schwarz criterion	26.43795
Log likelihood	-379.9830	Hannan-Quinn criter.	26.37319
F-statistic	48.16778	Durbin-Watson stat	2.131679
Prob(F-statistic)	0.000000		

South Africa-MU at Level

Null Hypothesis: MU has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-0.19943	0.928
Test critical values:	1% lev	-3.67017	
	5% lev	-2.96397	
	10% lev	-2.62100	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MU)
Method: Least Squares
Date: 04/08/18 Time: 10:00
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MU(-1)	-0.008195	0.041090	-0.199430	0.8434
C	984.7177	1581.813	0.622525	0.5386

R-squared	0.001418	Mean dependent var	674.6000
Adjusted R-squared	-0.034245	S.D. dependent var	1561.467
S.E. of regression	1587.978	Akaike info criterion	17.64265

Sum squared resid	70606872	Schwarz criterion	17.73606
Log likelihood	-262.6398	Hannan-Quinn criter.	17.67253
F-statistic	0.039773	Durbin-Watson stat	1.865570
Prob(F-statistic)	0.843367		

South Africa-MU at 1st Difference

Null Hypothesis: D(MU) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-4.88645	0.000
Test critical values:	1% lev	-3.67932	
	5% lev	-2.96776	
	10% lev	-2.62298	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MU,2)
Method: Least Squares
Date: 04/08/18 Time: 10:03
Sample (adjusted): 1988 2016
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(MU(-1))	-0.941389	0.192652	-4.886459	0.0000
C	637.3576	325.3296	1.959113	0.0605

R-squared	0.469313	Mean dependent var	22.24138
Adjusted R-squared	0.449658	S.D. dependent var	2177.647
S.E. of regression	1615.488	Akaike info criterion	17.67913
Sum squared resid	70464637	Schwarz criterion	17.77343
Log likelihood	-254.3474	Hannan-Quinn criter.	17.70867
F-statistic	23.87748	Durbin-Watson stat	1.954669
Prob(F-statistic)	0.000041		

South Africa-GNI at Level

Null Hypothesis: SA_GNI has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		0.72682	0.99
Test critical values:	1% lev	-3.71145	
	5% lev	-2.98103	
	10% lev	-2.62990	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(SA_GNI)
Method: Least Squares
Date: 04/08/18 Time: 10:05
Sample (adjusted): 1991 2016
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SA_GNI(-1)	0.013214	0.018180	0.726829	0.4744
C	138.8265	169.2522	0.820234	0.4202

R-squared	0.021538	Mean dependent var	257.6923
Adjusted R-squared	-0.019232	S.D. dependent var	220.2055
S.E. of regression	222.3129	Akaike info criterion	13.71985
Sum squared resid	1186152.	Schwarz criterion	13.81663
Log likelihood	-176.3581	Hannan-Quinn criter.	13.74772
F-statistic	0.528281	Durbin-Watson stat	0.836206
Prob(F-statistic)	0.474361		

South Africa-GNI at 1st Difference

Null Hypothesis: D(SA_GNI) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=1)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-2.36709	0.160
Test critical values:	1% lev	-3.72407	
	5% lev	-2.98622	
	10% lev	-2.63260	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(SA_GNI,2)
Method: Least Squares
Date: 04/08/18 Time: 10:23
Sample (adjusted): 1992 2016
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(SA_GNI(-1))	-0.413572	0.174717	-2.367096	0.0267
C	107.4989	59.88688	1.795033	0.0858

R-squared	0.195893	Mean dependent var	-4.000000
Adjusted R-squared	0.160931	S.D. dependent var	201.8663
S.E. of regression	184.9109	Akaike info criterion	13.35424

Sum squared resid	786417.0	Schwarz criterion	13.45175
Log likelihood	-164.9280	Hannan-Quinn criter.	13.38129
F-statistic	5.603144	Durbin-Watson stat	1.894743
Prob(F-statistic)	0.026722		

South Africa-GNI at 2nd Difference

Null Hypothesis: D(SA_GNI,2) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=1)

		t-Statist	Prob
Augmented Dickey-Fuller test statistic		-5.72975	0.000
Test critical values:	1% lev	-3.73785	
	5% lev	-2.99187	
	10% lev	-2.63554	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(SA_GNI,3)
Method: Least Squares
Date: 04/08/18 Time: 10:09
Sample (adjusted): 1993 2016
Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(SA_GNI(-1),2)	-1.193880	0.208365	-5.729758	0.0000
C	3.818034	41.51640	0.091964	0.9276

R-squared	0.598761	Mean dependent var	0.833333
Adjusted R-squared	0.580523	S.D. dependent var	314.0052
S.E. of regression	203.3720	Akaike info criterion	13.54761
Sum squared resid	909923.7	Schwarz criterion	13.64578
Log likelihood	-160.5713	Hannan-Quinn criter.	13.57365
F-statistic	32.83013	Durbin-Watson stat	1.911200
Prob(F-statistic)	0.000009		

Panel-CRR at Level

Null Hypothesis: Unit root (common unit root process)
Series: CRR
Date: 04/08/18 Time: 10:15
Sample: 1986 2016
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 87
Cross-sections included: 3

Method	Stat	Pro
Levin, Lin & Chu t*	-0.6	0.2

** Probabilities are computed assuming asympotic normality

Intermediate results on CRR

Cross Section	2nd Sta Coeffic	Variar of Re	HAC Dep	La	M La	Ba wid	Ol
Nigeria	-0.138	35.8	16.1			7	2
Kenya	-0.107	5.53	4.48			1	2
South Afric	-0.293	2.51	0.49			1:	2
	Coeffic	t-Sta	SE R	m	si		Ol
Pooled	-0.152	-2.5	1.0(	-0.!	0.8		8

Panel-CRR at 1st Difference

Null Hypothesis: Unit root (common unit root process)
Series: D(CRR)
Date: 04/08/18 Time: 10:27
Sample: 1986 2016
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 84
Cross-sections included: 3

Method	Stat	Pro
Levin, Lin & Chu t*	-5.2	0.0

** Probabilities are computed assuming asympotic normality

Intermediate results on D(CRR)

Cross Section	2nd Sta Coeffic	Variar of Re	HAC Dep	La	M La	Ba wid	Ol
Nigeria	-1.089	39.3	4.54			2!	2
Kenya	-1.365	6.00	1.86			5	2
South Afric	-1.477	2.76	0.31			1!	2
	Coeffic	t-Sta	SE R	m	si		Ol
Pooled	-1.312	-7.8	1.0(	-0.!	0.9		8

Panel-GDP at Level

Null Hypothesis: Unit root (common unit root process)
Series: GDP
Date: 04/08/18 Time: 10:29
Sample: 1986 2016
Exogenous variables: Individual effects
User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 87
Cross-sections included: 3

Method	Stat	Pro
Levin, Lin & Chu t*	2.9	0.9

** Probabilities are computed assuming asympotic normality

Intermediate results on GDP

Cross Section	2nd Sta Coeffic	Varia of R	HAC Dep	La	M La	Ba wi	O
Nigeria	-0.037	3.E+	2.E+			4	2
Kenya	0.067	2.E+	3.E+			4	2
South Afri	0.009	1.E+	3.E+			3	2
	Coeffic	t-St	SE R	m	si		O
Pooled	0.015	1.4	1.0	-0.	0.		8

Panel-GDP at 1st Difference

Null Hypothesis: Unit root (common unit root process)
Series: D(GDP)
Date: 04/08/18 Time: 10:31
Sample: 1986 2016
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 84
Cross-sections included: 3

Method	Stat	Pro
Levin, Lin & Chu t*	-0.5	0.3

** Probabilities are computed assuming asympotic normality

Intermediate results on D(GDP)

Cross Section	2nd Sta Coeffic	Varia of R	HAC Dep	La	M La	Ba wi	O
Nigeria	-0.222	3.E+	3.E+			3	2
Kenya	-0.151	4.E+	3996			2	2
South Afri	-0.494	1.E+	3.E+			2	2
	Coeffic	t-St	SE R	m	si		O
Pooled	-0.253	-2.8	1.0	-0.	0.		8

Panel-GDP at 2nd Difference

Null Hypothesis: Unit root (common unit root process)
Series: D(GDP,2)
Date: 04/08/18 Time: 10:31
Sample: 1986 2016

Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 81
Cross-sections included: 3

Method	Stat	Pro
Levin, Lin & Chu t*	-3.2	0.0

** Probabilities are computed assuming asympotic normality

Intermediate results on D(GDP,2)

Cross Section	2nd Sta Coeffic	Varia of R	HAC Dep	La	M La	Ba wi	O
Nigeria	-1.318	3.E+	2.E+			5	2
Kenya	-1.747	3.E+	7663			2(	2
South Afri	-1.539	1.E+	2.E+			2	2
	Coeffic	t-St	SE R	m	si		O
Pooled	-1.611	-8.1	1.0	-0.	0.		8

Panel-GNI at Level

Null Hypothesis: Unit root (common unit root process)
Series: GNI
Date: 04/08/18 Time: 10:53
Sample: 1986 2016
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 75
Cross-sections included: 3

Method	Stat	Pro
Levin, Lin & Chu t*	1.1	0.8

** Probabilities are computed assuming asympotic normality

Intermediate results on GNI

Cross Section	2nd Sta Coeffic	Varia of R	HAC Dep	La	M La	Ba wi	O
Nigeria	0.058	456	662			3	2
Kenya	0.047	251	612			2	2
South Afri	-0.009	310	881			2	2
	Coeffic	t-St	SE R	m	si		O
Pooled	0.002	0.1	1.0	-0.	0.		7

Panel-GNI at 1^{st} Difference

Null Hypothesis: Unit root (common unit root process)
Series: D(GNI)

Date: 04/08/18 Time: 10:55
Sample: 1986 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 0
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 75
Cross-sections included: 3

Method	Stat	Pro
Levin, Lin & Chu t*	-2.3:	0.0

** Probabilities are computed assuming asympotic normality

Intermediate results on D(GNI)

Cross Section	2nd Sta Coeffic	Varia of R	HAC Dep	La	M La	Ba wi	Ol
Nigeria	-1.237	391:	1025			0	2
Kenya	-0.795	206	173.			24	2
South Afri	-0.405	314	995			5	2
	Coeffic	t-Sta	SE R	m	si		Ol
Pooled	-0.791	-6.7	1.06	-0.	1.(		7

Panel-INFR at Level

Null Hypothesis: Unit root (common unit root process)
Series: INFR
Date: 04/08/18 Time: 10:57
Sample: 1986 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 0
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 90
Cross-sections included: 3

Method	Stat	Pro
Levin, Lin & Chu t*	-2.9	0.0

** Probabilities are computed assuming asympotic normality

Intermediate results on INFR

Cross Section	2nd Sta Coeffic	Varia of R	HAC Dep	La	M La	Ba wi	Ol
Nigeria	-0.528	186.	59.6			1	3
Kenya	-0.550	57.0	31.4			7	3
South Afri	-0.368	4.16	0.30			2	3
	Coeffic	t-Sta	SE R	m	si		Ol
Pooled	-0.479	-5.5	1.0(	-0.(	0.		9

Panel-INTR at Level

Null Hypothesis: Unit root (common unit root process)
Series: INTR
Date: 04/08/18 Time: 10:59
Sample: 1986 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 0
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 90
Cross-sections included: 3

Method	Stat	Pro
Levin, Lin & Chu t*	-1.6	0.0

** Probabilities are computed assuming asympotic normality

Intermediate results on INTR

Cross Section	2nd Sta Coeffic	Varia of R	HAC Dep	La	M La	Ba wi	O
Nigeria	-0.505	6.82	7.18			4	3
Kenya	-0.181	9.63	11.2			2	3
South Afri	-0.337	3.26	0.73			2	3
	Coeffic	t-Sta	SE R	m	si		O
Pooled	-0.306	-4.7	1.0	-0.	0.		9

Panel-M2 at Level

Null Hypothesis: Unit root (common unit root process)
Series: M2
Date: 04/08/18 Time: 11:00
Sample: 1986 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 0
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 90
Cross-sections included: 3

Method	Stat	Pro
Levin, Lin & Chu t*	1.1	0.8

** Probabilities are computed assuming asympotic normality

Intermediate results on M2

Cross Section	2nd Sta Coeffic	Varia of R	HAC Dep	La	M La	Ba wi	O
Nigeria	-0.156	8.E+	1.E+			1	3
Kenya	-0.014	7172	9081			2	3
South Afri	-0.096	4.E+	7.E+			3	3
	Coeffic	t-Sta	SE R	m	si		O
Pooled	-0.053	-1.4	1.0	-0.	0.		9

Panel-M2 at 1st Difference

Null Hypothesis: Unit root (common unit root process)
Series: D(M2)
Date: 04/08/18 Time: 11:00
Sample: 1986 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 0
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 87
Cross-sections included: 3

Method	Stat	Pro
Levin, Lin & Chu t*	-3.6	0.0

** Probabilities are computed assuming asympotic normality

Intermediate results on D(M2)

Cross Section	2nd St Coeffic	Varia of R	HAC Dep	La	M La	Ba wi	O
Nigeria	-0.647	8.E+	8.E+			2(	2
Kenya	-0.780	7063	1766			1	2
South Afri	-0.526	3.E+	4.E+			2	2
	Coeffic	t-St	SE R	m	si		O
Pooled	-0.636	-5.9	1.0(	-0.(	0.(		8

Panel-MC at Level

Null Hypothesis: Unit root (common unit root process)
Series: MC
Date: 04/08/18 Time: 11:04
Sample: 1986 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 0
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 90
Cross-sections included: 3

Method	Stat	Pro
Levin, Lin & Chu t*	-0.8	0.2

** Probabilities are computed assuming asympotic normality

Intermediate results on MC

Cross Section	2nd St Coeffic	Varia of R	HAC Dep	La	M La	Ba wi	O
Nigeria	-0.501	2.E+	2.E+			2	3
Kenya	-0.309	6.E+	5573			2(	3
South Afri	-0.395	1.E+	1.E+			0	3

	Coeffic	t-St	SE R	m	si		Ol
Pooled	-0.384	-4.6	1.0	-0.	0.		9

Panel-MC at 1st Difference

Null Hypothesis: Unit root (common unit root process)
Series: D(MC)
Date: 04/08/18 Time: 11:06
Sample: 1986 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 0
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 87
Cross-sections included: 3

Method	Stat	Pro
Levin, Lin & Chu t*	-5.1	0.0

** Probabilities are computed assuming asympotic normality

Intermediate results on D(MC)

Cross Section	2nd St Coeffic	Varia of R	HAC Dep	La	M La	Ba wi	Ol
Nigeria	-1.125	2.E+	1.E+			4	2
Kenya	-1.027	8.E+	1.E+			1	2
South Afri	-1.324	1.E+	4.E+			0	2

	Coeffic	t-St	SE R	m	si		Ol
Pooled	-1.161	-10.7	1.0	-0.	0.		8

Panel-MU at Level

Null Hypothesis: Unit root (common unit root process)
Series: MU
Date: 04/08/18 Time: 11:08
Sample: 1986 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 0
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 90
Cross-sections included: 3

Method	Stat	Pro
Levin, Lin & Chu t*	0.4	0.6

** Probabilities are computed assuming asympotic normality

Intermediate results on MU

Cross	2nd St	Varia	HAC	M	Ba

Section	Coeffic	of R	Dep	La	La	wi	Ol
Nigeria	-0.132	1.E+	9.E+			5	3
Kenya	-0.024	459:	593			2	3
South Afri	-0.256	2.E+	1.E+			1:	3
	Coeffic	t-Sta	SE R	m	si		Ol
Pooled	-0.113	-2.2:	1.0:	-0.(	0.:		9

Panel-MU at 1st Difference

Null Hypothesis: Unit root (common unit root process)
Series: D(MU)
Date: 04/08/18 Time: 11:10
Sample: 1986 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 0
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 87
Cross-sections included: 3

Method	Stat	Pro
Levin, Lin & Chu t*	-4.9	0.0

** Probabilities are computed assuming asympotic normality

Intermediate results on D(MU)

Cross Section	2nd Sta Coeffic	Varia of R	HAC Dep	La	M La	Ba wi	Ol
Nigeria	-0.902	2.E+	1.E+			4	2
Kenya	-0.797	448(	838.			1(	2
South Afri	-0.947	2.E+	2679			1:	2
	Coeffic	t-Sta	SE R	m	si		Ol
Pooled	-0.879	-8.0:	1.0(	-0.(	0.:		8

Nigeria-Johansen Cointegration test

Date: 04/08/18 Time: 11:31
Sample (adjusted): 1992 2016
Included observations: 25 after adjustments
Trend assumption: Linear deterministic trend
Series: CRR GDP INFR INTR M2 MC MU NIG_GNI
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesi No. of CE	Eigenval	Trace Statisti	0.05 Critical Va	Prob.
None *	0.9937(	409.62:	159.52:	0.00(

At most 1	0.97425	282.672	125.615	0.000
At most 2	0.94688	191.181	95.7530	0.000
At most 3	0.82889	117.801	69.8188	0.000
At most 4	0.69525	73.6638	47.8561	0.000
At most 5	0.66870	43.9564	29.7970	0.000
At most 6	0.47824	16.3330	15.4947	0.037
At most	0.00275	0.06905	3.84140	0.792

Trace test indicates 7 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesi No. of CE	Eigenval	Max-Eig Statisti	0.05 Critical Va	Prob.
None *	0.99370	126.950	52.3620	0.000
At most 1	0.97425	91.4907	46.2314	0.000
At most 2	0.94688	73.3807	40.0775	0.000
At most 3	0.82889	44.1372	33.8768	0.002
At most 4	0.69525	29.7073	27.5843	0.026
At most 5	0.66870	27.6234	21.1310	0.005
At most 6	0.47824	16.2640	14.2640	0.023
At most	0.00275	0.06905	3.84140	0.792

Max-eigenvalue test indicates 7 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

CRR	GDP	INFR	INTR	M2	MC	MU	NIG_GNI
0.16309	-2.02E-0	-0.00239	0.01691	2.85E	-1.37E-	8.51E-0	0.001337
-0.37897	2.59E-0	-0.03147	0.04662	-0.0001	-1.16E-	0.00043	-0.006815
0.03535	1.85E-0	0.05501	-0.58164	2.71E	-6.11E-	5.79E-0	-0.002910
-0.10436	2.79E-0	0.05450	0.15204	-0.0001	0.0001	-0.00010	-0.002220
0.26714	-1.94E-0	0.01011	0.13852	0.0001	-0.0001	-0.00017	0.004188
0.12856	-1.81E-0	0.01679	-0.22173	-1.18E	-0.0001	3.04E-0	0.006732
0.02483	1.21E-0	-0.02960	-0.08513	1.26E	-3.39E-	-0.00013	0.000361
-0.01229	-3.46E-0	0.00618	-0.04047	0.0001	-9.53E-	0.00018	0.002854

Unrestricted Adjustment Coefficients (alpha):

D(CRR)	-2.75718	2.46990	0.78211	-1.3187	0.7221	-0.16183	0.261460	0.0712
D(GDP)	-107.398	-6576.08	447.013	-41.997	3549.4	-493.659	6548.314	421.23
D(INFR	1.11669	3.13110	-9.33505	-4.2232	-1.0988	-0.53415	2.024799	-0.0068
D(INTR	-0.30973	0.21128	0.66230	-1.6851	-1.3104	0.53328	0.660239	0.0002
D(M2)	-2391.78	-591.318	-1760.23	3379.8	-1145.8	1970.45	2456.803	104.76
D(MC)	-4382.84	1680.61	638.311	1441.3	5441.0	7491.68	3012.624	314.81
D(MU)	-2458.19	-1048.51	-132.687	-210.72	1330.4	-19.6163	1256.046	17.932
D(NIG_GI	54.9221	10.0052	68.7802	35.521	94.811	1.31810	41.03352	-2.7752

1 Cointegrating Equation(s):		Log likelih	-1343.34				

Normalized cointegrating coefficients (standard error in parentheses)

CRR	GDP	INFR	INTR	M2	MC	MU	NIG_GNI
1.00000	-0.0001:	-0.0146	0.10368	0.000:	-8.43E-	0.0005:	0.008195
	(5.3E-0	(0.0110	(0.0825	(2.2E-	(2.8E-(	(5.1E-0	(0.00084

Adjustment coefficients (standard error in parentheses)

D(CRR)	-0.4496
	(0.1448
D(GDP)	-17.516
	(620.44
D(INFR	0.1821:
	(0.4881
D(INTR	-0.0505:
	(0.1171
D(M2)	-390.08
	(272.07
D(MC)	-714.81
	(576.42
D(MU)	-400.91
	(112.99
D(NIG_GI	8.9575:
	(6.7751

2 Cointegrating Equation(s):		Log likelih	-1297.5				

Normalized cointegrating coefficients (standard error in parentheses)

CRR	GDP	INFR	INTR	M2	MC	MU	NIG_GNI
1.00000	0.00000	0.20385	-0.4033:	0.0006	7.89E-	-0.0031	0.030082
		(0.0246	(0.1914	(3.9E-	(5.5E-(	(8.0E-0	(0.00163
0.00000	1.00000	1766.9:	-4099.6:	4.154:	0.7057	-30.060:	176.972
		(254.83	(1981.6	(0.402	(0.5678	(0.8233	(16.8292

Adjustment coefficients (standard error in parentheses)

D(CRR)	-1.3857:	0.0001:
	(0.2549	(2.0E-0
D(GDP)	2474.6	-0.1682:
	(1404.5	(0.1117
D(INFR	-1.0044	5.86E-(
	(1.1889	(9.5E-0
D(INTR	-0.1305	1.17E-(
	(0.2955	(2.4E-0
D(M2)	-165.99:	0.0329:
	(685.37	(0.0545
D(MC)	-1351.7:	0.1319
	(1447.1	(0.1151
D(MU)	-3.5549	0.0224:
	(263.12	(0.0209
D(NIG_GI	5.1657	-0.0008
	(17.105	(0.0013

3 Cointegrating Equation(s):	Log likelih	-1260.9(					

Normalized cointegrating coefficients (standard error in parentheses)

CRR	GDP	INFR	INTR	M2	MC	MU	NIG_GNI
1.00000	0.00000	0.00000	2.15870	0.0007	0.0003	-0.0042	0.049769
			(0.2679	(6.0E-	(8.6E-(	(0.0001	(0.00255
0.00000	1.00000	0.00000	18107.2	4.3482	3.2911	-39.0470	347.6091
			(2553.1	(0.570	(0.8180	(1.1770	(24.3122
0.00000	0.00000	1.00000	-12.568	-0.0001	-0.0014	0.0050	-0.096573
			(0.8273	(0.000	(0.0002	(0.0003	(0.00788

Adjustment coefficients (standard error in parentheses)

D(CRR	-1.3580	0.0001	-0.0281
	(0.2418	(1.9E-0	(0.0370
D(GDP	2490.4	-0.1674	231.82
	(1408.8	(0.1119	(215.80
D(INFR	-1.3345	4.13E-(	-0.6148
	(0.6541	(5.2E-0	(0.1001
D(INTR	-0.1071	1.29E-(	0.0305
	(0.2880	(2.3E-0	(0.0441
D(M2)	-228.22	0.0296	-72.512
	(661.64	(0.0525	(101.34
D(MC)	-1329.1	0.1331	-7.2920
	(1450.8	(0.1152	(222.23
D(MU)	-8.2462	0.0221	31.580
	(263.70	(0.0209	(40.393
D(NIG_G	7.5975	-0.0007	3.3378
	(15.513	(0.0012	(2.3763

4 Cointegrating Equation(s):	Log likelih	-1238.8					

Normalized cointegrating coefficients (standard error in parentheses)

CRR	GDP	INFR	INTR	M2	MC	MU	NIG_GNI
1.00000	0.00000	0.00000	0.00000	0.0014	-0.0001	-0.0052	0.055447
				(9.3E-	(0.0001	(0.0001	(0.00378
0.00000	1.00000	0.00000	0.00000	10.412	-0.8432	-47.834	395.2374
				(0.848	(1.139	(1.6553	(34.5685
0.00000	0.00000	1.00000	0.00000	-0.0043	0.0014	0.0111	-0.129632
				(0.000	(0.0005	(0.0007	(0.01613
0.00000	0.00000	0.00000	1.00000	-0.0003	0.0002	0.0004	-0.002630
				(3.1E-	(4.1E-(	(6.0E-0	(0.00125

Adjustment coefficients (standard error in parentheses)

D(CRR	-1.2204	8.42E-(	-0.1000	-0.5868
	(0.2026	(2.0E-0	(0.0397	(0.286
D(GDP	2494.8	-0.1685	229.53	-574.8
	(1452.9	(0.1468	(284.67	(2052.
D(INFR	-0.8937	-7.66E-(	-0.8452	4.9524
	(0.4880	(4.9E-0	(0.0956	(0.689
D(INTR	0.0686	-3.41E-(	-0.0614	-0.6368
	(0.2317	(2.3E-0	(0.0454	(0.327
D(M2)	-580.95	0.1240	111.92	1469.7

	(571.56	(0.0577	(111.98	(807.3				
D(MC)	-1479.5!	0.1733!	71.360	-147.8				
	(1487.7	(0.1503	(291.50	(2101.				
D(MU)	13.745	0.0162	20.081	-45.32				
	(270.95	(0.0273	(53.089	(382.7				
D(NIG_GI	3.8903	0.0002	5.2762	-33.20				
	(15.512	(0.0015	(3.0393	(21.91				

5 Cointegrating Equation(s):		Log likelih	-1223.9					

Normalized cointegrating coefficients (standard error in parentheses)

CRR	GDP	INFR	INTR	M2	MC	MU	NIG_GNI
1.00000	0.00000	0.00000	0.00000	0.0000	0.0036	-0.0078	0.080420
					(0.0005	(0.0008	(0.01590
0.00000	1.00000	0.00000	0.00000	0.0000	26.657	-66.599	576.610
					(4.375	(6.2003	(116.994
0.00000	0.00000	1.00000	0.00000	0.0000	-0.0100	0.0189	-0.204865
					(0.0018	(0.0025	(0.04839
0.00000	0.00000	0.00000	1.00000	0.0000	-0.0006	0.0010	-0.008464
					(0.000	(0.0002	(0.00369
0.00000	0.00000	0.00000	0.00000	1.0000	-2.6411	1.8021	-17.4184
					(0.4000	(0.5669	(10.6977

Adjustment coefficients (standard error in parentheses)

D(CRR	-1.0275	7.02E-(	-0.0927	-0.4868	-0.0001
	(0.2197	(2.1E-0	(0.0367	(0.270	(0.000
D(GDP	3443.0	-0.2373	265.44	-83.14	1.6100
	(1650.4	(0.1549	(276.14	(2027.	(0.888
D(INFR	-1.1873	-5.54E-(	-0.8563	4.800	-0.0002
	(0.5576	(5.2E-0	(0.0933	(0.685	(0.000
D(INTR	-0.2813	-8.74E-(	-0.0746	-0.818	4.86E-
	(0.2137	(2.0E-0	(0.0357	(0.262	(0.000
D(M2)	-887.07	0.1462	100.32	1310.!	-0.7061
	(657.51	(0.0617	(110.01	(807.9	(0.353
D(MC)	-26.047	0.0680	126.40	605.8	0.3260
	(1605.8	(0.1507	(268.69	(1973.	(0.864
D(MU)	369.15	-0.0094	33.541	138.9	0.3378
	(268.72	(0.0252	(44.961	(330.1	(0.144
D(NIG_GI	29.218	-0.0015	6.2354	-20.07	0.0124
	(13.518	(0.0012	(2.2618	(16.61	(0.007

6 Cointegrating Equation(s):		Log likelih	-1210.1					

Normalized cointegrating coefficients (standard error in parentheses)

CRR	GDP	INFR	INTR	M2	MC	MU	NIG_GNI
1.00000	0.00000	0.00000	0.00000	0.0000	0.0000	-0.0139	0.309248
						(0.0013	(0.02506
0.00000	1.00000	0.00000	0.00000	0.0000	0.0000	-111.12	2238.431
						(10.210	(183.840
0.00000	0.00000	1.00000	0.00000	0.0000	0.0000	0.0356	-0.828307
						(0.0039	(0.07103
0.00000	0.00000	0.00000	1.00000	0.0000	0.0000	0.0021	-0.049373

						(0.0002	(0.00488
0.0000	0.0000	0.0000	0.0000	1.000	0.0000	6.2131	-182.062
						(0.9656	(17.3871
0.0000	0.0000	0.0000	0.0000	0.000	1.0000	1.6701	-62.3391
						(0.3251	(5.85385

Adjustment coefficients (standard error in parentheses)

D(CRR	-1.0483	7.32E-	-0.0954	-0.450	-0.0001	-0.0003
	(0.2257	(2.2E-0	(0.0373	(0.285	(0.000	(0.0001
D(GDP	3379.6	-0.2283	257.15	26.31	1.6158	-0.4746
	(1702.0	(0.1658	(281.36	(2152.	(0.888	(0.7934
D(INFR	-1.2560	-4.57E-	-0.8653	4.918	-0.0002	0.0003
	(0.5710	(5.6E-0	(0.0943	(0.722	(0.000	(0.0002
D(INTR	-0.2128	-1.84E-	-0.0657	-0.936	-1.41E-	-6.58E-
	(0.2087	(2.0E-0	(0.0345	(0.263	(0.000	(9.7E-0
D(M2)	-633.73	0.1106	133.41	874.0	-0.7293	0.3825
	(624.92	(0.0608	(103.30	(790.3	(0.326	(0.2913
D(MC)	937.15	-0.0675	252.19	-1055.	0.2380	-1.8015
	(1317.4	(0.1283	(217.77	(1666.	(0.687	(0.6141
D(MU)	366.63	-0.0091	33.212	143.3	0.3381	-0.2141
	(277.32	(0.0270	(45.843	(350.7	(0.144	(0.1292
D(NIG_G	29.388	-0.0015	6.2575	-20.36	0.0124	-0.0166
	(13.950	(0.0013	(2.3060	(17.64	(0.007	(0.0065

7 Cointegrating Equation(s): Log likelih -1202.0

Normalized cointegrating coefficients (standard error in parentheses)

CRR	GDP	INFR	INTR	M2	MC	MU	NIG_GNI
1.0000	0.0000	0.0000	0.0000	0.000	0.0000	0.0000	-0.033925
							(0.00565
0.0000	1.0000	0.0000	0.0000	0.000	0.0000	0.0000	-486.438
							(48.3954
0.0000	0.0000	1.0000	0.0000	0.000	0.0000	0.0000	0.046423
							(0.01323
0.0000	0.0000	0.0000	1.0000	0.000	0.0000	0.0000	0.004203
							(0.00088
0.0000	0.0000	0.0000	0.0000	1.000	0.0000	0.0000	-29.7067
							(3.44509
0.0000	0.0000	0.0000	0.0000	0.000	1.0000	0.0000	-21.3849
							(1.98456
0.0000	0.0000	0.0000	0.0000	0.000	0.0000	1.0000	-24.5214
							(1.14865

Adjustment coefficients (standard error in parentheses)

D(CRR	-1.0418	7.35E-	-0.1032	-0.473	-0.0001	-0.0003	0.000850
	(0.2232	(2.2E-0	(0.0389	(0.284	(0.000	(0.0001	(0.00022
D(GDP	3542.2	-0.2204	63.286	-531.2	1.6980	-0.6963	-4.287957
	(1459.2	(0.1420	(254.83	(1858.	(0.761	(0.6860	(1.41375
D(INFR	-1.2057	-4.32E-	-0.9252	4.746	-0.0002	0.0002	0.001243
	(0.5027	(4.9E-0	(0.0878	(0.640	(0.000	(0.0002	(0.00049
D(INTR	-0.1964	-1.76E-	-0.0852	-0.992	6.88E-	-8.82E-	0.000427
	(0.1891	(1.8E-0	(0.0330	(0.240	(9.9E-	(8.9E-0	(0.00018
D(M2)	-572.72	0.1136	60.679	664.8	-0.6984	0.2993	-0.965679

	(531.43	(0.0517	(92.811	(676.9	(0.2774	(0.2498	(0.51489
D(MC)	1011.9	-0.0638	163.00	-1311.8	0.2758	-1.90354	-0.841640
	(1255.2	(0.1221	(219.21	(1598.	(0.6553	(0.5901	(1.21616
D(MU)	397.827	-0.0076	-3.97357	36.383	0.3538	-0.25668	-1.038164
	(220.43	(0.0214	(38.497	(280.7	(0.1150	(0.1036	(0.21357
D(NIG_GI	30.4070	-0.00153	5.04274	-23.861	0.0129	-0.01803	-0.011991
	(12.831	(0.0012	(2.2409	(16.34	(0.0067	(0.0060	(0.01243

Kenya-Johansen co-integration

Date: 04/08/18 Time: 11:43
Sample (adjusted): 1992 2016
Included observations: 25 after adjustments
Trend assumption: Linear deterministic trend
Series: CRR GDP INFR INTR KENYA_GNI M2 MC MU
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesi No. of CE	Eigenva	Trace Statistic	0.05 Critical Va	Prob.**
None *	0.9933	423.165	159.529	0.0000
At most 1	0.9682	297.689	125.615	0.0000
At most 2	0.9498	211.475	95.7536	0.0000
At most 3	0.9007	136.679	69.8188	0.0000
At most 4	0.7180	78.9191	47.8561	0.0000
At most 5	0.6362	47.2703	29.7970	0.0002
At most 6	0.4577	21.9910	15.4947	0.0046
At most 7	0.2347	6.68827	3.84146	0.0097

Trace test indicates 8 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesi No. of CE	Eigenva	Max-Eige Statistic	0.05 Critical Va	Prob.**
None *	0.9933	125.475	52.3626	0.0000
At most 1	0.9682	86.2138	46.2314	0.0000
At most 2	0.9498	74.7961	40.0775	0.0000
At most 3	0.9007	57.7600	33.8768	0.0000
At most 4	0.7180	31.6488	27.5843	0.0142
At most 5	0.6362	25.2792	21.1316	0.0123
At most 6	0.4577	15.3027	14.2646	0.0341
At most 7	0.2347	6.68827	3.84146	0.0097

Max-eigenvalue test indicates 8 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

CRR	GDP	INFR	INTR	KENYA_(	M2	MC	MU	
-0.48851	-0.0001	-0.23921	-0.3102(	-0.0258(	0.0007(	1.59E	0.007	
0.09928	-0.0009	-0.17154	-0.1090:	-0.0254(	0.0018	-0.000	0.034	
0.13245	-0.0001	0.01669	-0.0217	-0.0063	0.0008!	0.000	-0.008	
0.64775	-0.0002	0.00130	0.0609:	0.0127!	0.0007!	-0.000	-0.004	
0.01232	-0.0002	0.00520	-0.2193(	-0.0027(	0.0013	-3.36E	0.002	
-0.03666	-8.71E-	-0.09495	0.0142	0.0193:	-0.0007(	0.000	0.007	
0.24268	0.0002	-0.12059	0.2882!	0.0107:	-0.0013!	0.000	-0.006	
0.00384	-6.51E-	-0.01673	0.0944(	-0.0049	0.0007(	-0.000	-0.000	

Unrestricted Adjustment Coefficients (alpha):

D(CRR	1.2953	-0.62789	-0.9381	-1.4829(	0.0546!	0.091	0.128	0.137(
D(GDP	263.29	137.091	-523.74:	-286.12(	989.69	-830.0	-135.0	-50.63
D(INFR	4.4705	0.33836	2.3104!	3.9151:	-0.7927:	3.684	-1.743	-0.510
D(INTR	0.0002	0.48579	0.3474:	-0.0988	-0.0133!	0.551	-1.631	-0.668(
D(KENYA_	0.6869	11.1214	-11.857(	-11.252	9.4937(	-29.98	-0.953	-0.532!
D(M2)	-216.52	37.4162	-708.96	19.356	66.486:	36.13	0.565	-126.7(
D(MC)	-494.85	207.428	-2338.9:	831.19	-443.12	-16.23	-722.4	160.7
D(MU)	22.058	-6.54909	0.7428	18.871(	-0.8424!	-29.22	-12.12	-6.065

1 Cointegrating Equation(s): Log likelih(-1009.9!

Normalized cointegrating coefficients (standard error in parentheses)

CRR	GDP	INFR	INTR	KENYA_(	M2	MC	MU
1.00000	0.0004	0.48967	0.6351	0.0528	-0.0015(	-3.25E	-0.014
	(4.6E-(	(0.0138:	(0.0179	(0.0016	(0.0001	(3.9E	(0.00

Adjustment coefficients (standard error in parentheses)

D(CRR	-0.6328
	(0.249
D(GDP	-128.62
	(214.7(
D(INFR	-2.1839
	(0.917(
D(INTR	-9.81E-
	(0.369
D(KENYA_	-0.3355
	(5.581!
D(M2)	105.77
	(98.34!
D(MC)	241.74
	(358.9
D(MU)	-10.775
	(6.002:

2 Cointegrating Equation(s): Log likelih(-966.84!

Normalized cointegrating coefficients (standard error in parentheses)

CRR	GDP	INFR	INTR	KENYA_(	M2	MC	ML
1.00000	0.0000	0.39770	0.5632:	0.03998	-0.0007:	-0.000	0.000
		(0.0121	(0.0131	(0.0011	(7.3E-0	(3.9E	(0.00(
0.00000	1.0000	225.572	176.318	31.467:	-2.0498	0.188	-37.19
		(12.821	(13.803	(1.2109	(0.0770	(0.04(	(0.887

Adjustment coefficients (standard error in parentheses)

D(CRR	-0.6951	0.00032
	(0.241(	(0.0004(
D(GDP	-115.01	-0.18069
	(218.3	(0.4190
D(INFR	-2.1503	-0.00120
	(0.934	(0.0017
D(INTR	0.0481	-0.00045
	(0.371	(0.0007
D(KENYA_	0.7685	-0.01054
	(5.512	(0.0105
D(M2)	109.49	0.00812
	(100.2	(0.1923
D(MC)	262.34	-0.09549
	(365.2	(0.7008
D(MU)	-11.426	0.00173
	(6.066(	(0.0116

3 Cointegrating Equation(s): Log likelih -929.44

Normalized cointegrating coefficients (standard error in parentheses)

CRR	GDP	INFR	INTR	KENYA_(	M2	MC	ML
1.00000	0.0000	0.00000	3.4185	0.2917(	-0.0261	-0.021	0.730
			(0.7651	(0.0710	(0.0039	(0.00:	(0.05(
0.00000	1.0000	0.00000	1795.8	174.23	-16.471	-12.09	376.6
			(430.53	(39.997	(2.1991	(1.16	(28.2
0.00000	0.0000	1.00000	-7.1795	-0.6329	0.0639	0.054	-1.834
			(1.9188	(0.1782	(0.0098	(0.00	(0.12

Adjustment coefficients (standard error in parentheses)

D(CRR	-0.8194	0.00051	-0.2178
	(0.216(	(0.0004	(0.1238
D(GDP	-184.38	-0.07723	-95.242
	(214.9	(0.4069	(122.85
D(INFR	-1.8443	-0.00166	-1.0888
	(0.916	(0.0017	(0.5241
D(INTR	0.0941	-0.00052	-0.0775
	(0.381	(0.0007	(0.2183
D(KENYA_	-0.8020	-0.00819	-2.2700
	(5.481	(0.0103	(3.1330
D(M2)	15.588	0.14816	33.544
	(42.93	(0.0813(	(24.542
D(MC)	-47.459	0.36653	43.755
	(214.0	(0.4053	(122.35
D(MU)	-11.327	0.00158	-4.1408
	(6.276	(0.0118	(3.5876

4 Cointegrating Equation(s):	Log likelih	-900.56

Normalized cointegrating coefficients (standard error in parentheses)

CRR	GDP	INFR	INTR	KENYA_	M2	MC	MU
1.0000	0.0000	0.0000	0.0000	0.0257	0.0011	0.000	-0.037
				(0.0045	(0.0002	(0.00	(0.00
0.0000	1.0000	0.0000	0.0000	34.535	-2.1293	-0.604	-26.69
				(3.6003	(0.1736	(0.10	(2.08
0.0000	0.0000	1.0000	0.0000	-0.0744	0.0065	0.008	-0.222
				(0.0283	(0.0013	(0.00	(0.01
0.0000	0.0000	0.0000	1.0000	0.0777	-0.0079	-0.006	0.224
				(0.0211	(0.0010	(0.00	(0.01

Adjustment coefficients (standard error in parentheses)

D(CRR	-1.7799	0.00088	-0.2197	-0.4033
	(0.142	(0.0001	(0.0508	(0.0578
D(GDP	-369.72	-0.00618	-95.614	-102.67
	(339.5	(0.4132	(120.90	(137.44
D(INFR	0.6917	-0.00263	-1.0837	-1.2356
	(1.210	(0.0014	(0.4311	(0.4901
D(INTR	0.0301	-0.00049	-0.0777	-0.0666
	(0.612	(0.0007	(0.2181	(0.2480
D(KENYA_	-8.0910	-0.00540	-2.2846	-1.8532
	(8.463	(0.0103	(3.0137	(3.4259
D(M2)	28.126	0.14336	33.570	79.715
	(68.80	(0.0837	(24.498	(27.849
D(MC)	490.94	0.16012	44.836	232.48
	(294.1	(0.3579	(104.72	(119.04
D(MU)	0.8963	-0.00310	-4.1162	-4.9961
	(9.232	(0.0112	(3.2874	(3.7371

5 Cointegrating Equation(s):	Log likelih	-884.74

Normalized cointegrating coefficients (standard error in parentheses)

CRR	GDP	INFR	INTR	KENYA_	M2	MC	MU
1.0000	0.0000	0.0000	0.0000	0.0000	0.0022	0.001	-0.086
					(0.0003	(0.00	(0.00
0.0000	1.0000	0.0000	0.0000	0.0000	-0.6198	1.748	-92.28
					(0.3070	(0.24	(4.47
0.0000	0.0000	1.0000	0.0000	0.0000	0.0033	0.003	-0.080
					(0.0006	(0.00	(0.00
0.0000	0.0000	0.0000	1.0000	0.0000	-0.0045	-0.001	0.076
					(0.0005	(0.00	(0.00
0.0000	0.0000	0.0000	0.0000	1.0000	-0.0437	-0.068	1.899
					(0.0102	(0.00	(0.14

Adjustment coefficients (standard error in parentheses)

D(CRR	-1.7793	0.00086	-0.2194	-0.4153	-0.0305
	(0.142	(0.0001	(0.0507	(0.0688	(0.0067
D(GDP	-357.52	-0.28903	-90.466	-319.77	-13.284
	(265.6	(0.3359	(94.578	(128.47	(12.523
D(INFR	0.6819	-0.00240	-1.0879	-1.0617	-0.0865

	(1.199	(0.0015	(0.4269	(0.5800	(0.0565
D(INTR	0.0299	-0.0004	-0.0777	-0.0636	-0.0158
	(0.612	(0.0007	(0.2182	(0.2964	(0.0288
D(KENYA_	-7.9740	-0.00811	-2.2352	-3.9358	-0.3949
	(8.217	(0.0103	(2.9262	(3.9750	(0.3874
D(M2)	28.945	0.12436	33.915	65.130	9.1995
	(67.32	(0.0851	(23.973	(32.565	(3.1743
D(MC)	485.48	0.28677	42.531	329.69	34.124
	(278.4	(0.3522	(99.155	(134.69	(13.129
D(MU)	0.8860	-0.0028	-4.1206	-4.8113	-0.1640
	(9.231	(0.0116	(3.2873	(4.4656	(0.4352

6 Cointegrating Equation(s): Log likelih -872.10

Normalized cointegrating coefficients (standard error in parentheses)

CRR	GDP	INFR	INTR	KENYA_	M2	MC	MU
1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.006	0.115
						(0.00	(0.01
0.0000	1.0000	0.0000	0.0000	0.0000	0.0000	3.968	-147.4
						(0.43	(6.68
0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	-0.008	0.216
						(0.00	(0.02
0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.015	-0.331
						(0.00	(0.02
0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.088	-1.990
						(0.01	(0.19
0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	3.580	-88.98
						(0.39	(6.16

Adjustment coefficients (standard error in parentheses)

D(CRR	-1.7826	0.00085	-0.2281	-0.4140	-0.0287	-0.002
	(0.141	(0.0001	(0.0527	(0.0682	(0.0074	(0.00
D(GDP	-327.09	-0.21671	-11.649	-331.57	-29.325	1.694
	(197.7	(0.2508	(73.919	(95.640	(10.395	(0.66
D(INFR	0.5468	-0.0027	-1.4377	-1.0093	-0.0153	0.005
	(0.904	(0.0011	(0.3381	(0.4375	(0.0475	(0.00
D(INTR	0.0097	-0.00054	-0.1301	-0.0558	-0.0051	0.000
	(0.601	(0.0007	(0.2249	(0.2910	(0.0316	(0.00
D(KENYA_	-6.8747	-0.0055	0.6117	-4.3621	-0.9743	0.035
	(5.146	(0.0065	(1.9232	(2.4883	(0.2704	(0.01
D(M2)	27.620	0.12121	30.484	65.644	9.8978	-0.624
	(66.94	(0.0848	(25.019	(32.371	(3.5184	(0.22
D(MC)	486.08	0.28818	44.072	329.46	33.811	-1.925
	(278.7	(0.3534	(104.16	(134.76	(14.648	(0.93
D(MU)	1.9574	-0.00031	-1.3458	-5.2267	-0.7288	0.039
	(6.802	(0.0086	(2.5423	(3.2893	(0.3575	(0.02

7 Cointegrating Equation(s): Log likelih -864.45

Normalized cointegrating coefficients (standard error in parentheses)

CRR	GDP	INFR	INTR	KENYA_	M2	MC	MU
1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	-0.292

							(0.044
0.00000	1.0000	0.00000	0.0000(	0.0000(	0.0000(	0.000	110.9
							(27.64
0.00000	0.0000	1.00000	0.0000(	0.0000(	0.0000(	0.000	-0.338
							(0.056
0.00000	0.0000	0.00000	1.0000(	0.0000(	0.0000(	0.000	0.666
							(0.105
0.00000	0.0000	0.00000	0.0000(	1.0000(	0.0000(	0.000	3.764
							(0.630
0.00000	0.0000	0.00000	0.0000(	0.0000(	1.0000(	0.000	144.1
							(25.30
0.00000	0.0000	0.00000	0.0000(	0.0000(	0.0000(	1.000	-65.11
							(7.673

Adjustment coefficients (standard error in parentheses)

D(CRR)	-1.7514	0.00089	-0.2436	-0.3769	-0.0273	-0.002	7.60E
	(0.144	(0.0001	(0.0555	(0.0824	(0.0074	(0.00(	(0.00(
D(GDP)	-359.87	-0.25276	4.6421	-370.51	-30.773	1.878	-0.402
	(203.87	(0.2559	(78.471	(116.53	(10.590	(0.727	(0.192
D(INFR	0.1236	-0.00319	-1.2274	-1.5120	-0.0340	0.007	-0.000
	(0.858	(0.0010	(0.3305	(0.4909	(0.0446	(0.003	(0.00(
D(INTR	-0.3862	-0.00097	0.0666(	-0.5262	-0.0226	0.002	-0.000
	(0.510	(0.0006	(0.1966	(0.2920	(0.0265	(0.001	(0.00(
D(KENYA_	-7.1061	-0.00576	0.7267	-4.6370(	-0.9845	0.037	-0.009
	(5.357	(0.0067	(2.0621	(3.0625	(0.2783	(0.019	(0.005
D(M2)	27.757	0.12136	30.416(	65.807	9.9039	-0.624	-0.305
	(69.754	(0.0875	(26.848	(39.872	(3.6234	(0.248	(0.065
D(MC)	310.75	0.09538	131.20(	121.20	26.065	-0.943	-1.603
	(241.6	(0.3033(	(92.994	(138.10	(12.550	(0.862	(0.227
D(MU)	-0.9842	-0.00354	0.1159	-8.7207	-0.8587(	0.056	-0.012
	(6.552	(0.0082	(2.5219	(3.7453	(0.3403	(0.023	(0.00(

South Africa-Johansen Cointegration

Date: 04/08/18 Time: 12:25
Sample (adjusted): 1992 2016
Included observations: 25 after adjustments
Trend assumption: Linear deterministic trend
Series: CRR GDP INFR INTR M2 MC MU SA_GNI
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothes No. of CE	Eigenva	Trace Statist	0.05 Critical Va	Prob.*
None *	0.9954	440.52	159.529	0.000
At most	0.9761	305.95	125.615	0.000
At most	0.9380	212.55	95.7530	0.000
At most	0.8820	143.01	69.8188	0.000
At most	0.8495	89.578	47.8561	0.000
At most	0.5550	42.220	29.7970	0.001
At most	0.4238	21.974	15.4947	0.004

At most	0.2793	8.1906	3.8414	0.004

Trace test indicates 8 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothes No. of CE	Eigenva	Max-Eig Statist	0.05 Critical Va	Prob.
None	0.9954	134.57	52.362	0.000
At most	0.9761	93.399	46.231	0.000
At most	0.9380	69.539	40.077	0.000
At most	0.8820	53.434	33.876	0.000
At most	0.8495	47.358	27.584	0.000
At most	0.5550	20.245	21.131	0.066
At most	0.4238	13.784	14.264	0.059
At most	0.2793	8.1906	3.8414	0.004

Max-eigenvalue test indicates 5 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

CRR	GDP	INFR	INTR	M2	MC	MU	SA_GI
0.2375	1.74E-	-0.6012	-0.3008	-1.25E-	1.73E-	0.000	-0.0046
-0.9475	0.0002	0.7475	0.2643	6.67E-	-1.65E-	-9.29E	-0.0165
-0.3420	0.0001	0.2521	-0.0221	3.88E-	1.19E-	0.002	-0.0205
-0.8760	6.60E-	0.1405	-0.4396	5.62E-	-3.34E-	-8.36E	0.0015
-1.2455	0.0001	0.5395	-0.7270	1.80E-	-4.49E-	0.000	-0.0128
-0.1600	-0.0002	-0.3970	0.2898	-6.31E-	-6.29E-	-0.001	0.0253
-0.9556	0.0001	0.3353	-0.0258	1.93E-	-2.04E-	-0.000	-0.0075
-0.5863	0.0001	0.8354	-0.3652	8.54E-	-1.15E-	0.000	-0.0102

Unrestricted Adjustment Coefficients (alpha):

D(CRR	0.3231	-0.2876	0.8008	0.6313	0.9528	0.304	-0.0217	-0.0387
D(GDF	1453.5	-3306.3	-397.10	-322.50	269.91	-1246.	1354.1	-1611.3
D(INFF	0.7281	0.5829	0.5771	0.2349	0.5750	0.264	-0.1526	-0.1095
D(INTF	0.7324	0.1736	-0.2058	0.0314	0.8039	0.120	0.0519	0.3938
D(M2)	-1410.9	-5231.5	-2222.0	744.72	-3442.6	5401.	239.90	1633.2
D(MC)	-11845.	-17548.	-51577.	64041.	-29981.	1452	-1696.8	699.50
D(MU)	791.81	-56.005	-8.6264	149.18	-171.11	150.5	129.47	-38.491
D(SA_G	41.496	-58.811	13.011	39.937	-28.924	-21.78	-4.6547	-16.952

1 Cointegrating Equation(s): Log likelil -1197.8

Normalized cointegrating coefficients (standard error in parentheses)

CRR	GDP	INFR	INTR	M2	MC	MU	SA_GI
1.0000	7.32E-	-2.5307	-1.2663	-5.26E-	7.26E-	0.000	-0.0195

	(2.9E-(	(0.071ﾐ	(0.0663	(6.5E-(	(2.5E-(	(0.00(	(0.002(

Adjustment coefficients (standard error in parentheses)

D(CRF	0.0767
	(0.096;
D(GDF	345.33
	(324.6(
D(INFF	0.1730
	(0.072(
D(INTF	0.1740
	(0.073;
D(M2)	-335.21
	(643.7(
D(MC)	-2814.2
	(5899.:
D(MU)	188.11
	(23.88;
D(SA_G	9.8585
	(5.641!

2 Cointegrating Equation(s): Log likelil -1151.1!

Normalized cointegrating coefficients (standard error in parentheses)

CRR	GDP	INFR	INTR	M2	MC	MU	SA_GI
1.0000(	0.0000	-2.1615	-1.0570ﾐ	-5.64E-	6.09E-	0.000	-0.0116
		(0.044ﾞ	(0.0528	(4.3E-(	(1.8E-(	(0.00(	(0.000!
0.0000(	1.0000	-5042.8	-2858.5(	0.0515	0.1597	2.479	-107.25
		(187.3ﾞ	(221.58	(0.018:	(0.007ｲ	(0.51;	(2.089!

Adjustment coefficients (standard error in parentheses)

D(CRF	0.3493	-6.86E-
	(0.389:	(0.000:
D(GDF	3478.0	-0.8274
	(1042.:	(0.275ﾞ
D(INFF	-0.3793	0.0001
	(0.257;	(6.8E-(
D(INTF	0.0095	5.75E-
	(0.298;	(7.9E-(
D(M2)	4621.7	-1.3738
	(2294.(	(0.607;
D(MC)	13812.	-4.7319
	(23848	(6.310!
D(MU)	241.18	-0.0006
	(97.17!	(0.025ﾞ
D(SA_G	65.583	-0.0144
	(17.83!	(0.004ﾞ

3 Cointegrating Equation(s): Log likelil -1116.3ﾐ

Normalized cointegrating coefficients (standard error in parentheses)

CRR	GDP	INFR	INTR	M2	MC	MU	SA_GI
1.0000(	0.0000	0.0000	-0.2883ｲ	-0.0001	6.62E-	0.009	-0.026C

				(0.2730	(2.3E-	(8.7E-	(0.00	(0.002
	0.0000	1.0000	0.0000	-1065.0	-0.2020	0.1719	21.67	-140.86
				(592.37	(0.049	(0.018	(1.37	(5.312
	0.0000	0.0000	1.0000	0.3556	-5.03E-	2.41E-	0.003	-0.0066
				(0.1298	(1.1E-	(4.2E-	(0.00	(0.001

Adjustment coefficients (standard error in parentheses)

D(CRR	0.0753	8.96E-	-0.2073
	(0.352	(0.000	(0.3377
D(GDP	3613.9	-0.9059	-3445.6
	(1099.	(0.345	(1053.2
D(INFR	-0.5767	0.0002	0.1434
	(0.224	(7.1E-	(0.2155
D(INTR	0.0799	1.68E-	-0.3625
	(0.311	(9.8E-	(0.2982
D(M2)	5381.8	-1.8128	-3622.6
	(2357.	(0.741	(2259.4
D(MC)	31455.	-14.921	-19000.
	(21177	(6.657	(20296.
D(MU)	244.13	-0.0023	-520.12
	(102.9	(0.032	(98.652
D(SA_G	61.133	-0.0118	-65.632
	(18.57	(0.005	(17.801

4 Cointegrating Equation(s): Log likelil -1089.6

Normalized cointegrating coefficients (standard error in parentheses)

CRR	GDP	INFR	INTR	M2	MC	MU	SA_GI
1.0000	0.0000	0.0000	0.0000	-0.0001	5.71E-	0.006	-0.0184
				(1.6E-	(5.9E-	(0.00	(0.001
0.0000	1.0000	0.0000	0.0000	-0.0860	0.1384	11.35	-112.65
				(0.026	(0.009	(0.65	(2.375
0.0000	0.0000	1.0000	0.0000	-8.90E-	1.36E-	0.007	-0.0160
				(2.0E-	(7.4E-	(0.00	(0.001
0.0000	0.0000	0.0000	1.0000	0.0001	-3.14E-	-0.009	0.0264
				(2.6E-	(9.9E-	(0.00	(0.002

Adjustment coefficients (standard error in parentheses)

D(CRR	-0.4777	9.38E-	-0.1186	-0.4685
	(0.405	(9.7E-	(0.2995	(0.177
D(GDP	3896.4	-0.9080	-3490.9	-1160.7
	(1435.	(0.344	(1060.5	(630.0
D(INFR	-0.7825	0.0002	0.1764	-0.1810
	(0.282	(6.8E-	(0.2090	(0.124
D(INTR	0.0523	1.71E-	-0.3581	-0.1837
	(0.407	(9.8E-	(0.3010	(0.178
D(M2)	4729.3	-1.8078	-3518.0	-1236.7
	(3077.	(0.738	(2273.8	(1350.
D(MC)	-24650.	-14.498	-10001.	-28092.
	(16343	(3.922	(12074.	(7173.
D(MU)	113.43	-0.0013	-499.15	-318.42
	(124.3	(0.029	(91.861	(54.57
D(SA_G	26.144	-0.0116	-60.020	-45.878

	(19.91	(0.004	(14.715	(8.741			

5 Cointegrating Equation(s):	Log likelil	-1065.9

Normalized cointegrating coefficients (standard error in parentheses)

CRR	GDP	INFR	INTR	M2	MC	MU	SA_GI
1.0000	0.0000	0.0000	0.0000	0.0000	-0.0001	0.070	-0.1697
					(7.7E-	(0.00	(0.026
0.0000	1.0000	0.0000	0.0000	0.0000	-0.0218	53.00	-210.04
					(0.050	(4.80	(17.77
0.0000	0.0000	1.0000	0.0000	0.0000	-0.0001	0.050	-0.1167
					(5.3E-	(0.00	(0.018
0.0000	0.0000	0.0000	1.0000	0.0000	0.0001	-0.062	0.1496
					(6.6E-	(0.00	(0.023
0.0000	0.0000	0.0000	0.0000	1.0000	-1.8630	483.9	-1131.5
					(0.556	(52.6	(194.7

Adjustment coefficients (standard error in parentheses)

D(CRR	-1.6646	0.0002	0.3954	-1.1613	3.25E-
	(0.312	(6.1E-	(0.1932	(0.159	(1.5E-
D(GDF	3560.2	-0.8668	-3345.2	-1357.0	-0.2536
	(1944.	(0.379	(1201.9	(992.5	(0.095
D(INFF	-1.4988	0.0003	0.4867	-0.5991	5.56E-
	(0.269	(5.3E-	(0.1668	(0.137	(1.3E-
D(INTF	-0.9489	0.0001	0.0756	-0.7682	1.78E-
	(0.400	(7.8E-	(0.2472	(0.204	(2.0E-
D(M2)	9017.3	-2.3333	-5375.5	1266.3	-0.3601
	(3845.	(0.750	(2376.4	(1962.	(0.188
D(MC)	12692.	-19.074	-26178.	-6293.2	1.8365
	(17009	(3.320	(10511.	(8680.	(0.831
D(MU)	326.56	-0.0275	-591.48	-194.01	-0.0083
	(147.9	(0.028	(91.428	(75.49	(0.007
D(SA_G	62.171	-0.0160	-75.627	-24.848	-0.0026
	(23.28	(0.004	(14.392	(11.88	(0.001

6 Cointegrating Equation(s):	Log likelil	-1055.8

Normalized cointegrating coefficients (standard error in parentheses)

CRR	GDP	INFR	INTR	M2	MC	MU	SA_GI
1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.004	-0.0129
						(0.00	(0.001
0.0000	1.0000	0.0000	0.0000	0.0000	0.0000	45.47	-192.19
						(3.26	(9.151
0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	-0.002	0.0075
						(0.00	(0.001
0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	-0.003	0.0096
						(0.00	(0.000
0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	-158.1	389.66
						(11.4	(32.07
0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	-344.6	816.52
						(28.8	(80.84

Adjustment coefficients (standard error in parentheses)

D(CRF	-1.7134	0.0001	0.2744(	-1.0730	1.33E-	-7.40E
	(0.278:	(6.8E-(	(0.1814	(0.148(	(1.7E-(	(6.5E
D(GDF	3759.8	-0.5220	-2850.2:	-1718.4	-0.1749	0.092
	(1859.:	(0.456:	(1212.4	(989.2:	(0.110(	(0.04:
D(INFF	-1.5411	0.0002	0.3818:	-0.5225	3.89E-	-2.28E
	(0.239i	(5.9E-(	(0.1563	(0.127!	(1.4E-(	(5.6E
D(INTF	-0.9682	0.0001	0.0277(	-0.7333	1.02E-	1.89E
	(0.397!	(9.8E-(	(0.2592	(0.211!	(2.4E-(	(9.4E
D(M2)	8152.8	-3.8269	-7520.0i	2832.1	-0.7009	-0.007
	(2873.:	(0.704!	(1873.4	(1528.(	(0.170!	(0.067
D(MC)	10368.	-23.090	-31944.(	-2082.8	0.9203	-2.626
	(15603	(3.828:	(10174.	(8301.!	(0.928:	(0.367
D(MU)	302.46	-0.0691	-651.27:	-150.36	-0.0178	0.009
	(129.9!	(0.031i	(84.741	(69.14:	(0.007	(0.00:
D(SA_G	65.658	-0.0100	-66.979:	-31.162	-0.0012	0.000
	(20.93i	(0.005:	(13.653	(11.14(	(0.001:	(0.00(

7 Cointegrating Equation(s): Log likelil -1048.9

Normalized cointegrating coefficients (standard error in parentheses)

CRR	GDP	INFR	INTR	M2	MC	MU	SA_GI
1.0000(	0.0000	0.0000	0.0000(	0.0000	0.0000	0.000	0.0004
							(0.000:
0.0000(	1.0000	0.0000	0.0000(	0.0000	0.0000	0.000	-63.526
							(1.543:
0.0000(	0.0000	1.0000	0.0000(	0.0000	0.0000	0.000	0.0014
							(0.000:
0.0000(	0.0000	0.0000	1.0000(	0.0000	0.0000	0.000	0.0003
							(0.000:
0.0000(	0.0000	0.0000	0.0000(	1.0000	0.0000	0.000	-57.673
							(5.156:
0.0000(	0.0000	0.0000	0.0000(	0.0000	1.0000	0.000	-158.62
							(11.77:
0.0000(	0.0000	0.0000	0.0000(	0.0000	0.0000	1.000	-2.8293
							(0.051:

Adjustment coefficients (standard error in parentheses)

D(CRF	-1.6926	0.0001	0.2671	-1.0724	1.28E-	-6.95E	0.0023
	(0.312!	(7.3E-(	(0.1881	(0.147!	(1.7E-(	(7.2E	(0.000:
D(GDF	2465.7	-0.2846	-2396.0	-1753.5	-0.1488	0.064	0.9903
	(1962.(	(0.458(	(1180.0	(927.8!	(0.105:	(0.04!	(2.604:
D(INFF	-1.3952	0.0002	0.3306:	-0.5186	3.60E-	8.36E	0.0016
	(0.257:	(6.0E-(	(0.1546	(0.121(	(1.4E-(	(5.9E	(0.000:
D(INTF	-1.0179	0.0001	0.0451!	-0.7346	1.12E-	8.26E	0.0002
	(0.446(	(0.000:	(0.2685	(0.211:	(2.4E-(	(1.0E	(0.000!
D(M2)	7923.5	-3.7848	-7439.6:	2825.9	-0.6962	-0.012	-15.157
	(3231.i	(0.755:	(1943.1	(1527.!	(0.173:	(0.07:	(4.288:
D(MC)	11989.	-23.387	-32513.	-2039.0	0.8875	-2.591	-164.95
	(17542	(4.099:	(10546.	(8293.:	(0.941(	(0.40:	(23.27(
D(MU)	178.73	-0.0464	-607.85(	-153.70	-0.0153	0.006	-0.2734
	(128.7:	(0.030(	(77.385	(60.85(	(0.006!	(0.00:	(0.170
D(SA_G	70.106	-0.0108	-68.540:	-31.042	-0.0013	0.000	0.0422

	(23.43	(0.005	(14.092	(11.08	(0.001	(0.00	(0.031

Panel-Johansen co-integration

Johansen Fisher Panel Cointegration Test
Series: CRR GDP INFR GNI INTR M2 MC MU
Date: 04/08/18 Time: 12:31
Sample: 1986 2016
Included observations: 93
Trend assumption: Linear deterministic trend
Lags interval (in first differences): 1 1

Unrestricted Cointegration Rank Test (Trace and Maximum Eigenvalue)

Hypothesiz No. of CE(	Fisher Stat.* (from trace tes	Prol	Fisher Stat.* (from max-eigen t	Prol
None	440.7	0.00	120.9	0.00
At most 1	183.5	0.00	119.5	0.00
At most 2	160.7	0.00	77.00	0.00
At most 3	109.5	0.00	53.19	0.00
At most 4	70.13	0.00	33.48	0.00
At most 5	43.59	0.00	23.29	0.00
At most 6	27.82	0.00	19.54	0.00
At most 7	20.66	0.00	20.66	0.00

* Probabilities are computed using asymptotic Chi-square distribution.

Individual cross section results

Cross Sect	Trace Test Statistics	Prob	Max-Eign Test Statistics	Prob
Hypothesis of no cointegration				
Nigeria	438.2262	0.00	154.6531	0.00
Kenya	423.1651	0.00	125.4759	0.00
South Afri	440.5262	0.00	134.5740	0.00
Hypothesis of at most 1 cointegration relationship				
Nigeria	283.5731	0.00	100.5330	0.00
Kenya	297.6892	0.00	86.2138	0.00
South Afri	305.9522	0.00	93.3999	0.00
Hypothesis of at most 2 cointegration relationship				
Nigeria	183.0401	0.00	70.8206	0.00
Kenya	211.4754	0.00	74.7962	0.00
South Afri	212.5523	0.00	69.5395	0.00
Hypothesis of at most 3 cointegration relationship				
Nigeria	112.2195	0.00	44.5921	0.00
Kenya	136.6793	0.00	57.7601	0.00

South Afri(	143.0128	0.00	53.4343	0.00
Hypothesis of at most 4 cointegration relationship				
Nigeria	67.6274	0.00	26.0905	0.07
Kenya	78.9192	0.00	31.6489	0.01
South Afri(	89.5785	0.00	47.3581	0.00
Hypothesis of at most 5 cointegration relationship				
Nigeria	41.5369	0.00	25.6521	0.01
Kenya	47.2703	0.00	25.2792	0.01
South Afri(	42.2204	0.00	20.2456	0.06
Hypothesis of at most 6 cointegration relationship				
Nigeria	15.8848	0.04	15.8207	0.02
Kenya	21.9911	0.00	15.3028	0.03
South Afri(	21.9748	0.00	13.7841	0.05
Hypothesis of at most 7 cointegration relationship				
Nigeria	0.0640	0.80	0.0640	0.80
Kenya	6.6883	0.00	6.6883	0.00
South Afri(	8.1906	0.00	8.1906	0.00

**MacKinnon-Haug-Michelis (1999) p-values

Nigeria-Serial Correlation Test (GDP)

Nigeria GDP BG-TEST

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	3.195985	Prob. F(2,24)	0.0588
Obs*R-squared	6.519850	Prob. Chi-Square(2)	0.0384

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 04/08/18 Time: 14:18
Sample: 1986 2016
Included observations: 31
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(CRR)	0.005969	0.050619	0.117912	0.9071
LOG(INFR)	-0.000725	0.048230	-0.015031	0.9881
LOG(INTR)	-0.049934	0.205469	-0.243023	0.8101
LOG(M2)	-0.007671	0.049048	-0.156403	0.8770
C	0.213295	0.872517	0.244459	0.8090
RESID(-1)	0.512305	0.203861	2.513006	0.0191
RESID(-2)	-0.252692	0.206626	-1.222943	0.2332

R-squared	0.210318	Mean dependent var	1.18E-15
Adjusted R-squared	0.012897	S.D. dependent var	0.164211
S.E. of regression	0.163149	Akaike info criterion	-0.592628
Sum squared resid	0.638821	Schwarz criterion	-0.268824
Log likelihood	16.18573	Hannan-Quinn criter.	-0.487076
F-statistic	1.065328	Durbin-Watson stat	1.916469

Prob(F-statistic)	0.410121

Nigeria GDP Heteroskedasticity test

Heteroskedasticity Test: ARCH

F-statistic	4.592524	Prob. F(1,28)	0.0409
Obs*R-squared	4.227219	Prob. Chi-Square(1)	0.0398

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 04/08/18 Time: 14:20
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.016102	0.006861	2.346815	0.0262
RESID^2(-1)	0.375278	0.175116	2.143018	0.0409

R-squared	0.140907	Mean dependent var	0.025789
Adjusted R-squared	0.110225	S.D. dependent var	0.029970
S.E. of regression	0.028270	Akaike info criterion	-4.229688
Sum squared resid	0.022377	Schwarz criterion	-4.136274
Log likelihood	65.44531	Hannan-Quinn criter.	-4.199804
F-statistic	4.592524	Durbin-Watson stat	1.762562
Prob(F-statistic)	0.040945		

Kenya GDP BG Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.192432	Prob. F(2,24)	0.1335
Obs*R-squared	4.788847	Prob. Chi-Square(2)	0.0912

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 04/08/18 Time: 14:28
Sample: 1986 2016
Included observations: 31
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	-0.003764	0.005919	-0.635909	0.5309
LOG(INFR)	-0.006221	0.017724	-0.350996	0.7287
LOG(INTR)	-0.028101	0.058537	-0.480060	0.6355
LOG(M2)	0.015818	0.029935	0.528413	0.6021
C	-0.021116	0.247287	-0.085393	0.9327

RESID(-1)	0.474924	0.226857	2.093492	0.0470
RESID(-2)	-0.052672	0.260315	-0.202340	0.8414

R-squared	0.154479	Mean dependent var	-8.88E-16
Adjusted R-squared	-0.056901	S.D. dependent var	0.068033
S.E. of regression	0.069942	Akaike info criterion	-2.286623
Sum squared resid	0.117405	Schwarz criterion	-1.962819
Log likelihood	42.44266	Hannan-Quinn criter.	-2.181071
F-statistic	0.730811	Durbin-Watson stat	1.814833
Prob(F-statistic)	0.629486		

Kenya GDP Heteroskedasticity test

Heteroskedasticity Test: ARCH

F-statistic	0.143624	Prob. F(1,28)	0.7076
Obs*R-squared	0.153097	Prob. Chi-Square(1)	0.6956

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 04/08/18 Time: 14:32
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.004682	0.001273	3.679044	0.0010
RESID^2(-1)	-0.081833	0.215931	-0.378977	0.7076

R-squared	0.005103	Mean dependent var	0.004352
Adjusted R-squared	-0.030429	S.D. dependent var	0.005011
S.E. of regression	0.005087	Akaike info criterion	-7.659997
Sum squared resid	0.000725	Schwarz criterion	-7.566584
Log likelihood	116.9000	Hannan-Quinn criter.	-7.630114
F-statistic	0.143624	Durbin-Watson stat	1.771354
Prob(F-statistic)	0.707563		

South Africa GDP BG-Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	24.76227	Prob. F(2,24)	0.0000
Obs*R-squared	20.88093	Prob. Chi-Square(2)	0.0000

Test Equation:
Dependent Variable: RESID

Method: Least Squares
Date: 04/08/18 Time: 14:37
Sample: 1986 2016
Included observations: 31
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	-0.014532	0.007627	-1.905385	0.0688
LOG(INFR)	0.040217	0.029972	1.341824	0.1922
LOG(INTR)	0.001309	0.064881	0.020180	0.9841
LOG(M2)	0.068081	0.034086	1.997347	0.0572
C	-0.835957	0.512827	-1.630098	0.1161
RESID(-1)	0.986205	0.183025	5.388354	0.0000
RESID(-2)	0.045678	0.245949	0.185721	0.8542

R-squared	0.673578	Mean dependent var	1.06E-15
Adjusted R-squared	0.591973	S.D. dependent var	0.099060
S.E. of regression	0.063277	Akaike info criterion	-2.486922
Sum squared resid	0.096094	Schwarz criterion	-2.163119
Log likelihood	45.54730	Hannan-Quinn criter.	-2.381371
F-statistic	8.254089	Durbin-Watson stat	1.917486
Prob(F-statistic)	0.000065		

South Africa GDP-Heteroskedasticity test

Heteroskedasticity Test: ARCH

F-statistic	14.85493	Prob. F(1,28)	0.0006
Obs*R-squared	10.39899	Prob. Chi-Square(1)	0.0013

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 04/08/18 Time: 14:40
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.003344	0.002627	1.272784	0.2136
RESID^2(-1)	0.827168	0.214614	3.854209	0.0006

R-squared	0.346633	Mean dependent var	0.009794
Adjusted R-squared	0.323298	S.D. dependent var	0.013483
S.E. of regression	0.011091	Akaike info criterion	-6.100971
Sum squared resid	0.003444	Schwarz criterion	-6.007558
Log likelihood	93.51456	Hannan-Quinn criter.	-6.071087
F-statistic	14.85493	Durbin-Watson stat	1.411303
Prob(F-statistic)	0.000620		

Nigeria MC-BG test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	5.489528	Prob. F(2,24)	0.0109
Obs*R-squared	9.730130	Prob. Chi-Square(2)	0.0077

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 04/08/18 Time: 15:17
Sample: 1986 2016
Included observations: 31
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(CRR)	0.037554	0.146146	0.256965	0.7994
LOG(INFR)	0.067615	0.138394	0.488567	0.6296
LOG(INTR)	0.129825	0.572285	0.226854	0.8225
LOG(M2)	-0.048312	0.139255	-0.346935	0.7317
C	-0.176678	2.418658	-0.073048	0.9424
RESID(-1)	0.602959	0.209900	2.872600	0.0084
RESID(-2)	0.024699	0.233625	0.105721	0.9167

R-squared	0.313875	Mean dependent var	1.41E-15
Adjusted R-squared	0.142344	S.D. dependent var	0.472544
S.E. of regression	0.437622	Akaike info criterion	1.380756
Sum squared resid	4.596306	Schwarz criterion	1.704559
Log likelihood	-14.40171	Hannan-Quinn criter.	1.486308
F-statistic	1.829843	Durbin-Watson stat	1.963390
Prob(F-statistic)	0.135531		

Nigeria MC-Heteroskedasticity test

Heteroskedasticity Test: ARCH

F-statistic	3.564259	Prob. F(1,28)	0.0694
Obs*R-squared	3.387622	Prob. Chi-Square(1)	0.0657

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 04/08/18 Time: 15:20
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.140790	0.059784	2.354995	0.0258
RESID^2(-1)	0.341052	0.180649	1.887924	0.0694

R-squared	0.112921	Mean dependent var	0.211293
Adjusted R-squared	0.081239	S.D. dependent var	0.266771
S.E. of regression	0.255705	Akaike info criterion	0.174755

Sum squared resid	1.830780	Schwarz criterion	0.268168
Log likelihood	-0.621324	Hannan-Quinn criter.	0.204639
F-statistic	3.564259	Durbin-Watson stat	1.816854
Prob(F-statistic)	0.069440		

Kenya MC-BG Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	8.483021	Prob. F(2,24)	0.0016
Obs*R-squared	12.83862	Prob. Chi-Square(2)	0.0016

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 04/08/18 Time: 15:45
Sample: 1986 2016
Included observations: 31
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	0.004307	0.022139	0.194545	0.8474
LOG(INFR)	-0.010932	0.085119	-0.128428	0.8989
LOG(INTR)	0.096029	0.258037	0.372152	0.7130
LOG(M2)	-0.008874	0.119995	-0.073954	0.9417
C	-0.199070	1.186090	-0.167837	0.8681
RESID(-1)	0.762380	0.185253	4.115351	0.0004
RESID(-2)	-0.432367	0.189504	-2.281570	0.0317

R-squared	0.414149	Mean dependent var	-1.12E-15
Adjusted R-squared	0.267686	S.D. dependent var	0.399031
S.E. of regression	0.341472	Akaike info criterion	0.884579
Sum squared resid	2.798480	Schwarz criterion	1.208383
Log likelihood	-6.710979	Hannan-Quinn criter.	0.990131
F-statistic	2.827674	Durbin-Watson stat	1.813373
Prob(F-statistic)	0.031629		

Kenya MC-Heteroskedasticity Test

Heteroskedasticity Test: ARCH

F-statistic	0.549000	Prob. F(1,28)	0.4649
Obs*R-squared	0.576903	Prob. Chi-Square(1)	0.4475

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 04/08/18 Time: 15:46
Sample (adjusted): 1987 2016

Included observations: 30 after adjustments				

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.137041	0.051133	2.680082	0.0122
RESID^2(-1)	0.138295	0.186646	0.740946	0.4649

R-squared	0.019230	Mean dependent var	0.158868
Adjusted R-squared	-0.015797	S.D. dependent var	0.227128
S.E. of regression	0.228915	Akaike info criterion	-0.046592
Sum squared resid	1.467258	Schwarz criterion	0.046821
Log likelihood	2.698879	Hannan-Quinn criter.	-0.016708
F-statistic	0.549000	Durbin-Watson stat	1.941046
Prob(F-statistic)	0.464895		

Nigeria MU-BG Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	18.47731	Prob. F(2,24)	0.0000
Obs*R-squared	18.79420	Prob. Chi-Square(2)	0.0001

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 04/08/18 Time: 15:57
Sample: 1986 2016
Included observations: 31
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(CRR)	-0.033157	0.088835	-0.373237	0.7122
LOG(INFR)	-0.069995	0.087099	-0.803624	0.4295
LOG(INTR)	0.088909	0.354852	0.250552	0.8043
LOG(M2)	0.002508	0.086938	0.028853	0.9772
C	-0.017719	1.534914	-0.011544	0.9909
RESID(-1)	1.010291	0.190918	5.291764	0.0000
RESID(-2)	-0.341839	0.204188	-1.674141	0.1071

R-squared	0.606264	Mean dependent var	1.16E-15
Adjusted R-squared	0.507831	S.D. dependent var	0.401560
S.E. of regression	0.281714	Akaike info criterion	0.499829
Sum squared resid	1.904703	Schwarz criterion	0.823632
Log likelihood	-0.747344	Hannan-Quinn criter.	0.605381
F-statistic	6.159103	Durbin-Watson stat	1.955314
Prob(F-statistic)	0.000513		

Nigeria MU-Heteroskedasticity Test

Heteroskedasticity Test: ARCH

F-statistic	18.51579	Prob. F(1,28)	0.0002
Obs*R-squared	11.94161	Prob. Chi-Square(1)	0.0005

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 04/08/18 Time: 16:02
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.063431	0.046567	1.362152	0.1840
RESID^2(-1)	0.627511	0.145831	4.302997	0.0002

R-squared	0.398054	Mean dependent var	0.161244
Adjusted R-squared	0.376556	S.D. dependent var	0.281924
S.E. of regression	0.222603	Akaike info criterion	-0.102516
Sum squared resid	1.387455	Schwarz criterion	-0.009103
Log likelihood	3.537742	Hannan-Quinn criter.	-0.072632
F-statistic	18.51579	Durbin-Watson stat	1.736638
Prob(F-statistic)	0.000186		

Kenya MU-BG Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.056333	Prob. F(2,24)	0.3633
Obs*R-squared	2.508080	Prob. Chi-Square(2)	0.2853

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 04/08/18 Time: 16:17
Sample: 1986 2016
Included observations: 31
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	-0.001180	0.002708	-0.435639	0.6670
LOG(INFR)	-0.005742	0.010522	-0.545667	0.5903
LOG(INTR)	-0.014866	0.031997	-0.464593	0.6464
LOG(M2)	0.003512	0.013879	0.253059	0.8024
C	0.032405	0.135966	0.238334	0.8136
RESID(-1)	0.327039	0.231735	1.411265	0.1710
RESID(-2)	0.050865	0.222968	0.228125	0.8215

R-squared	0.080906	Mean dependent var	2.03E-15
Adjusted R-squared	-0.148868	S.D. dependent var	0.036485
S.E. of regression	0.039106	Akaike info criterion	-3.449382
Sum squared resid	0.036703	Schwarz criterion	-3.125579

Log likelihood	60.46542	Hannan-Quinn criter.	-3.343830
F-statistic	0.352111	Durbin-Watson stat	1.716175
Prob(F-statistic)	0.901620		

Kenya MU-Heteroskedasticity Test

Heteroskedasticity Test: ARCH

F-statistic	1.290479	Prob. F(1,28)	0.2656
Obs*R-squared	1.321739	Prob. Chi-Square(1)	0.2503

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 04/08/18 Time: 16:23
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001512	0.000388	3.899985	0.0005
RESID^2(-1)	-0.213721	0.188136	-1.135993	0.2656

R-squared	0.044058	Mean dependent var	0.001251
Adjusted R-squared	0.009917	S.D. dependent var	0.001720
S.E. of regression	0.001711	Akaike info criterion	-9.839123
Sum squared resid	8.20E-05	Schwarz criterion	-9.745709
Log likelihood	149.5868	Hannan-Quinn criter.	-9.809239
F-statistic	1.290479	Durbin-Watson stat	1.975971
Prob(F-statistic)	0.265590		

South Africa MU-BG Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	9.409441	Prob. F(2,24)	0.0010
Obs*R-squared	13.62449	Prob. Chi-Square(2)	0.0011

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 04/08/18 Time: 16:28
Sample: 1986 2016
Included observations: 31
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	-0.005993	0.004964	-1.207299	0.2391
LOG(INFR)	-0.010341	0.018297	-0.565152	0.5772
LOG(INTR)	-0.021782	0.042866	-0.508149	0.6160

LOG(M2)	0.003888	0.018845	0.206300	0.8383
C	0.046404	0.300879	0.154226	0.8787
RESID(-1)	0.828109	0.199523	4.150435	0.0004
RESID(-2)	-0.168879	0.220026	-0.767544	0.4502

R-squared	0.439500	Mean dependent var	-2.75E-15
Adjusted R-squared	0.299375	S.D. dependent var	0.048999
S.E. of regression	0.041014	Akaike info criterion	-3.354147
Sum squared resid	0.040371	Schwarz criterion	-3.030344
Log likelihood	58.98928	Hannan-Quinn criter.	-3.248595
F-statistic	3.136480	Durbin-Watson stat	2.131470
Prob(F-statistic)	0.020517		

South Africa MU-Heteroskedasticity Test

Heteroskedasticity Test: ARCH

F-statistic	4.406522	Prob. F(1,28)	0.0449
Obs*R-squared	4.079292	Prob. Chi-Square(1)	0.0434

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 04/08/18 Time: 16:33
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001507	0.000601	2.506955	0.0183
RESID^2(-1)	0.397917	0.189559	2.099172	0.0449

R-squared	0.135976	Mean dependent var	0.002363
Adjusted R-squared	0.105118	S.D. dependent var	0.002561
S.E. of regression	0.002422	Akaike info criterion	-9.143807
Sum squared resid	0.000164	Schwarz criterion	-9.050393
Log likelihood	139.1571	Hannan-Quinn criter.	-9.113923
F-statistic	4.406522	Durbin-Watson stat	1.636220
Prob(F-statistic)	0.044942		

Nigeria GNI-BG Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	3.649969	Prob. F(2,20)	0.0445
Obs*R-squared	7.219736	Prob. Chi-Square(2)	0.0271

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 04/08/18 Time: 16:40

Sample: 1990 2016
Included observations: 27
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(CRR)	0.010812	0.037156	0.290980	0.7741
LOG(INFR)	-0.018976	0.039188	-0.484236	0.6335
LOG(INTR)	-0.004108	0.220852	-0.018601	0.9853
LOG(M2)	-0.014362	0.039488	-0.363700	0.7199
C	0.186296	0.949940	0.196113	0.8465
RESID(-1)	0.523339	0.233698	2.239388	0.0367
RESID(-2)	0.085303	0.263619	0.323584	0.7496

R-squared	0.267398	Mean dependent var	-8.88E-16
Adjusted R-squared	0.047617	S.D. dependent var	0.112363
S.E. of regression	0.109655	Akaike info criterion	-1.364538
Sum squared resid	0.240485	Schwarz criterion	-1.028580
Log likelihood	25.42126	Hannan-Quinn criter.	-1.264640
F-statistic	1.216656	Durbin-Watson stat	1.777288
Prob(F-statistic)	0.338744		

Nigeria GNI-Heteroskedasticity Test

Heteroskedasticity Test: ARCH

F-statistic	1.150363	Prob. F(1,24)	0.2941
Obs*R-squared	1.189225	Prob. Chi-Square(1)	0.2755

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 04/08/18 Time: 16:43
Sample (adjusted): 1991 2016
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.009277	0.003813	2.433317	0.0228
RESID^2(-1)	0.223213	0.208114	1.072550	0.2941

R-squared	0.045739	Mean dependent var	0.011788
Adjusted R-squared	0.005979	S.D. dependent var	0.015391
S.E. of regression	0.015345	Akaike info criterion	-5.442225
Sum squared resid	0.005651	Schwarz criterion	-5.345448
Log likelihood	72.74892	Hannan-Quinn criter.	-5.414357
F-statistic	1.150363	Durbin-Watson stat	1.912380
Prob(F-statistic)	0.294140		

Kenya GNI-BG Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	3.149263	Prob. F(2,20)	0.0647
Obs*R-squared	6.466529	Prob. Chi-Square(2)	0.0394

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 04/08/18 Time: 16:51
Sample: 1990 2016
Included observations: 27
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	0.001384	0.002912	0.475070	0.6399
LOG(INFR)	-0.003690	0.011761	-0.313769	0.7569
LOG(INTR)	0.004909	0.040960	0.119838	0.9058
LOG(M2)	-0.004021	0.013745	-0.292514	0.7729
C	0.022481	0.192822	0.116590	0.9083
RESID(-1)	0.552575	0.231641	2.385475	0.0271
RESID(-2)	-0.032404	0.265449	-0.122071	0.9041

R-squared	0.239501	Mean dependent var	9.66E-17
Adjusted R-squared	0.011351	S.D. dependent var	0.038165
S.E. of regression	0.037947	Akaike info criterion	-3.486816
Sum squared resid	0.028800	Schwarz criterion	-3.150858
Log likelihood	54.07201	Hannan-Quinn criter.	-3.386918
F-statistic	1.049754	Durbin-Watson stat	1.499787
Prob(F-statistic)	0.423855		

Kenya Heteroskedasticity Test

Heteroskedasticity Test: ARCH

F-statistic	6.033823	Prob. F(1,24)	0.0217
Obs*R-squared	5.223424	Prob. Chi-Square(1)	0.0223

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 04/08/18 Time: 16:53
Sample (adjusted): 1991 2016
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000717	0.000301	2.380045	0.0256
RESID^2(-1)	0.333176	0.135637	2.456384	0.0217

R-squared	0.200901	Mean dependent var	0.001153

Adjusted R-squared	0.167605	S.D. dependent var	0.001361
S.E. of regression	0.001242	Akaike info criterion	-10.47070
Sum squared resid	3.70E-05	Schwarz criterion	-10.37392
Log likelihood	138.1191	Hannan-Quinn criter.	-10.44283
F-statistic	6.033823	Durbin-Watson stat	1.720302
Prob(F-statistic)	0.021651		

South Africa GNI-BG Test:

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	21.08541	Prob. F(2,20)	0.0000
Obs*R-squared	18.31425	Prob. Chi-Square(2)	0.0001

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 04/08/18 Time: 16:58
Sample: 1990 2016
Included observations: 27
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	-0.004522	0.004607	-0.981538	0.3381
LOG(INFR)	0.013118	0.019902	0.659131	0.5173
LOG(INTR)	-0.019409	0.058728	-0.330497	0.7445
LOG(M2)	0.012723	0.025269	0.503513	0.6201
C	-0.110014	0.414138	-0.265647	0.7932
RESID(-1)	1.128897	0.202596	5.572150	0.0000
RESID(-2)	-0.306918	0.265679	-1.155222	0.2616

R-squared	0.678306	Mean dependent var	-7.56E-16
Adjusted R-squared	0.581797	S.D. dependent var	0.057839
S.E. of regression	0.037404	Akaike info criterion	-3.515672
Sum squared resid	0.027981	Schwarz criterion	-3.179714
Log likelihood	54.46157	Hannan-Quinn criter.	-3.415774
F-statistic	7.028469	Durbin-Watson stat	2.025842
Prob(F-statistic)	0.000393		

South Africa GNI-Heteroskedasticity Test

Heteroskedasticity Test: ARCH

F-statistic	14.56862	Prob. F(1,24)	0.0008
Obs*R-squared	9.821045	Prob. Chi-Square(1)	0.0017

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares

Date: 04/08/18 Time: 17:01
Sample (adjusted): 1991 2016
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000999	0.000904	1.104890	0.2802
RESID^2(-1)	0.887644	0.232557	3.816886	0.0008

R-squared	0.377732	Mean dependent var	0.003339
Adjusted R-squared	0.351805	S.D. dependent var	0.004205
S.E. of regression	0.003385	Akaike info criterion	-8.465021
Sum squared resid	0.000275	Schwarz criterion	-8.368244
Log likelihood	112.0453	Hannan-Quinn criter.	-8.437153
F-statistic	14.56862	Durbin-Watson stat	1.382780
Prob(F-statistic)	0.000836		

Panel results

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section and period fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	312.670105	(2,56)	0.0000
Cross-section Chi-square	232.380036	2	0.0000
Period F	3.737796	(30,56)	0.0000
Period Chi-square	102.245020	30	0.0000
Cross-Section/Period F	25.064642	(32,56)	0.0000
Cross-Section/Period Chi-square	253.827904	32	0.0000

Cross-section fixed effects test equation:
Dependent Variable: LOG(GDP)
Method: Panel Least Squares
Date: 04/10/18 Time: 00:14
Sample: 1986 2016
Periods included: 31
Cross-sections included: 3
Total panel (balanced) observations: 93

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	0.039990	0.009182	4.355520	0.0001
LOG(INFR)	0.247570	0.077758	3.183846	0.0023
LOG(INTR)	0.356263	0.282082	1.262978	0.2117
LOG(M2)	0.714948	0.042329	16.89007	0.0000
C	3.149819	1.073881	2.933117	0.0048

Effects Specification

Period fixed (dummy variables)

R-squared	0.906976	Mean dependent var	12.20385
Adjusted R-squared	0.852444	S.D. dependent var	1.021659
S.E. of regression	0.392450	Akaike info criterion	1.247717
Sum squared resid	8.932987	Schwarz criterion	2.200845
Log likelihood	-23.01882	Hannan-Quinn criter.	1.632563
F-statistic	16.63214	Durbin-Watson stat	0.444595
Prob(F-statistic)	0.000000		

Period fixed effects test equation:
Dependent Variable: LOG(GDP)
Method: Panel Least Squares
Date: 04/10/18 Time: 00:14
Sample: 1986 2016
Periods included: 31
Cross-sections included: 3
Total panel (balanced) observations: 93

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	0.020487	0.002907	7.048526	0.0000
LOG(INFR)	-0.020801	0.026954	-0.771742	0.4424
LOG(INTR)	0.198796	0.072382	2.746478	0.0073
LOG(M2)	0.553221	0.028420	19.46563	0.0000
C	5.966374	0.410695	14.52751	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.977044	Mean dependent var	12.20385
Adjusted R-squared	0.975443	S.D. dependent var	1.021659
S.E. of regression	0.160101	Akaike info criterion	-0.753735
Sum squared resid	2.204387	Schwarz criterion	-0.563109
Log likelihood	42.04869	Hannan-Quinn criter.	-0.676766
F-statistic	610.0615	Durbin-Watson stat	0.719380
Prob(F-statistic)	0.000000		

Cross-section and period fixed effects test equation:
Dependent Variable: LOG(GDP)
Method: Panel Least Squares
Date: 04/10/18 Time: 00:14
Sample: 1986 2016
Periods included: 31
Cross-sections included: 3
Total panel (balanced) observations: 93

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	0.031644	0.004626	6.841061	0.0000
LOG(INFR)	0.171967	0.055644	3.090476	0.0027
LOG(INTR)	0.450941	0.158229	2.849918	0.0054
LOG(M2)	0.676535	0.032488	20.82393	0.0000

C	3.494544	0.673365	5.189674	0.0000

R-squared	0.882847	Mean dependent var	12.20385
Adjusted R-squared	0.877522	S.D. dependent var	1.021659
S.E. of regression	0.357549	Akaike info criterion	0.833177
Sum squared resid	11.25005	Schwarz criterion	0.969339
Log likelihood	-33.74275	Hannan-Quinn criter.	0.888155
F-statistic	165.7881	Durbin-Watson stat	0.383985
Prob(F-statistic)	0.000000		

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

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	4	1.0000
Period random	59.286061	4	0.0000
Cross-section and period random	0.000000	4	1.0000

* Cross-section test variance is invalid. Hausman statistic set to zero.
** WARNING: estimated period random effects variance is zero.

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
CRR	0.019997	0.020493	0.000000	0.4161
LOG(INFR)	-0.016355	-0.020334	0.000006	0.1038
LOG(INTR)	0.181187	0.199467	0.000307	0.2968
LOG(M2)	0.544690	0.553771	0.000134	0.4322

Cross-section random effects test equation:
Dependent Variable: LOG(GDP)
Method: Panel EGLS (Period random effects)
Date: 04/10/18 Time: 00:20
Sample: 1986 2016
Periods included: 31
Cross-sections included: 3
Total panel (balanced) observations: 93
Wallace and Hussain estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.095180	0.433064	14.07455	0.0000
CRR	0.019997	0.002946	6.788303	0.0000
LOG(INFR)	-0.016355	0.026883	-0.608370	0.5445
LOG(INTR)	0.181187	0.074003	2.448387	0.0164
LOG(M2)	0.544690	0.030431	17.89935	0.0000

Effects Specification			S.D.	Rho
Cross-section fixed (dummy variables)				
Period random			0.056778	0.1252
Idiosyncratic random			0.150066	0.8748

Weighted Statistics			
R-squared	0.977874	Mean dependent var	12.20385
Adjusted R-squared	0.976330	S.D. dependent var	0.974128
S.E. of regression	0.149869	Sum squared resid	1.931624
F-statistic	633.4717	Durbin-Watson stat	0.683594
Prob(F-statistic)	0.000000		

Unweighted Statistics			
R-squared	0.976949	Mean dependent var	12.20385
Sum squared resid	2.213594	Durbin-Watson stat	0.687635

Period random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
CRR	0.015811	0.020493	0.000005	0.0310
LOG(INFR)	-0.011477	-0.020334	0.000144	0.4598
LOG(INTR)	0.262000	0.199467	0.004242	0.3370
LOG(M2)	0.241437	0.553771	0.003632	0.0000

Period random effects test equation:
Dependent Variable: LOG(GDP)
Method: Panel EGLS (Cross-section random effects)
Date: 04/10/18 Time: 00:21
Sample: 1986 2016
Periods included: 31
Cross-sections included: 3
Total panel (balanced) observations: 93
Wallace and Hussain estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.951444	0.745987	11.99946	0.0000
CRR	0.015811	0.003608	4.382445	0.0000
LOG(INFR)	-0.011477	0.029330	-0.391305	0.6970
LOG(INTR)	0.262000	0.097014	2.700643	0.0091
LOG(M2)	0.241437	0.066516	3.629762	0.0006

Effects Specification			S.D.	Rho
Cross-section random			0.652537	0.9594
Period fixed (dummy variables)				
Idiosyncratic random			0.134258	0.0406

Weighted Statistics			
R-squared	0.974812	Mean dependent var	12.20385
Adjusted R-squared	0.960047	S.D. dependent var	0.581356
S.E. of regression	0.116203	Sum squared resid	0.783182
F-statistic	66.02056	Durbin-Watson stat	0.408077
Prob(F-statistic)	0.000000		

Unweighted Statistic:			
R-squared	0.628780	Mean dependent var	12.20385
Sum squared resid	35.64773	Durbin-Watson stat	0.008965

Cross-section and period random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
CRR	0.016017	0.020493	0.000001	0.0000
LOG(INFR)	-0.013563	-0.020334	-0.000090	NA
LOG(INTR)	0.263733	0.199467	0.001678	0.1167
LOG(M2)	0.222875	0.553771	0.002569	0.0000

Cross-section and period random effects test equation:
Dependent Variable: LOG(GDP)
Method: Panel Least Squares
Date: 04/10/18 Time: 00:21
Sample: 1986 2016
Periods included: 31
Cross-sections included: 3
Total panel (balanced) observations: 93

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.138141	0.647166	14.12023	0.0000
CRR	0.016017	0.003083	5.195464	0.0000
LOG(INFR)	-0.013563	0.025039	-0.541673	0.5902
LOG(INTR)	0.263733	0.082750	3.187101	0.0024
LOG(M2)	0.222875	0.057973	3.844443	0.0003

Effects Specification

Cross-section fixed (dummy variables)
Period fixed (dummy variables)

R-squared	0.992354	Mean dependent var	12.20385
Adjusted R-squared	0.987439	S.D. dependent var	1.021659
S.E. of regression	0.114503	Akaike info criterion	-1.207983
Sum squared resid	0.734211	Schwarz criterion	-0.200389
Log likelihood	93.17120	Hannan-Quinn criter.	-0.801145
F-statistic	201.8978	Durbin-Watson stat	0.428203
Prob(F-statistic)	0.000000		

Hypothesis 2 result

Dependent Variable: LOG(MC)
Method: Panel Least Squares
Date: 04/10/18 Time: 08:11
Sample: 1986 2016
Periods included: 31
Cross-sections included: 3
Total panel (balanced) observations: 93

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	0.012146	0.010721	1.132957	0.2621
LOG(INFR)	0.112772	0.087073	1.295138	0.2006
LOG(INTR)	0.209867	0.287766	0.729300	0.4689
LOG(M2)	1.044217	0.201603	5.179561	0.0000
C	-1.546009	2.250536	-0.686952	0.4949

Effects Specification

Cross-section fixed (dummy variables)
Period fixed (dummy variables)

R-squared	0.982797	Mean dependent var	9.954685
Adjusted R-squared	0.971738	S.D. dependent var	2.368571
S.E. of regression	0.398186	Akaike info criterion	1.284657
Sum squared resid	8.878926	Schwarz criterion	2.292250
Log likelihood	-22.73656	Hannan-Quinn criter.	1.691495
F-statistic	88.86882	Durbin-Watson stat	0.597533
Prob(F-statistic)	0.000000		

Hypothesis 3

Dependent Variable: LOG(MU)
Method: Panel Least Squares
Date: 04/10/18 Time: 08:33
Sample: 1986 2016
Periods included: 31
Cross-sections included: 3
Total panel (balanced) observations: 93

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	0.053425	0.009096	5.873259	0.0000
LOG(INFR)	-0.098929	0.073879	-1.339065	0.1860
LOG(INTR)	0.501776	0.244162	2.055097	0.0445
LOG(M2)	0.622150	0.171055	3.637128	0.0006
C	1.293960	1.909523	0.677636	0.5008

Effects Specification

Cross-section fixed (dummy variables)

Period fixed (dummy variables)			
R-squared	0.957797	Mean dependent var	9.099383
Adjusted R-squared	0.930666	S.D. dependent var	1.283072
S.E. of regression	0.337851	Akaike info criterion	0.956027
Sum squared resid	6.392022	Schwarz criterion	1.963620
Log likelihood	-7.455261	Hannan-Quinn criter.	1.362864
F-statistic	35.30291	Durbin-Watson stat	0.596169
Prob(F-statistic)	0.000000		

Hypothesis 4

Dependent Variable: LOG(GNI)
Method: Panel Least Squares
Date: 04/10/18 Time: 09:05
Sample (adjusted): 1990 2016
Periods included: 27
Cross-sections included: 3
Total panel (balanced) observations: 81

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	0.001718	0.003687	0.466143	0.6432
LOG(INFR)	-0.029630	0.031874	-0.929595	0.3572
LOG(INTR)	0.072553	0.104045	0.697320	0.4890
LOG(M2)	0.011206	0.072297	0.155003	0.8775
C	8.058075	0.807199	9.982762	0.0000

Effects Specification

Cross-section fixed (dummy variables)
Period fixed (dummy variables)

R-squared	0.972187	Mean dependent var	8.324026
Adjusted R-squared	0.953646	S.D. dependent var	0.617103
S.E. of regression	0.132862	Akaike info criterion	-0.907438
Sum squared resid	0.847317	Schwarz criterion	0.068078
Log likelihood	69.75125	Hannan-Quinn criter.	-0.516048
F-statistic	52.43257	Durbin-Watson stat	0.124451
Prob(F-statistic)	0.000000		

TBR unit roots Nigeria

Null Hypothesis: TBR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.841428	0.0645
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TBR)
Method: Least Squares
Date: 12/16/18 Time: 10:45
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TBR(-1)	-0.433858	0.152690	-2.841428	0.0083
C	5.705723	2.068902	2.757850	0.0101

R-squared	0.223812	Mean dependent var	0.183333
Adjusted R-squared	0.196090	S.D. dependent var	4.332797
S.E. of regression	3.884829	Akaike info criterion	5.616375
Sum squared resid	422.5731	Schwarz criterion	5.709789
Log likelihood	-82.24563	Hannan-Quinn criter.	5.646259
F-statistic	8.073712	Durbin-Watson stat	1.975423
Prob(F-statistic)	0.008283		

Unit root Nigeria 2

Null Hypothesis: D(TBR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.447851	0.0000
Test critical values:	1% level	-3.679322	
	5% level	C	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TBR,2)
Method: Least Squares
Date: 12/16/18 Time: 10:43
Sample (adjusted): 1988 2016
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TBR(-1))	-1.211118	0.187833	-6.447851	0.0000
C	0.095786	0.807846	0.118570	0.9065

R-squared	0.606269	Mean dependent var	-0.008621
Adjusted R-squared	0.591687	S.D. dependent var	6.806809
S.E. of regression	4.349510	Akaike info criterion	5.844476
Sum squared resid	510.7925	Schwarz criterion	5.938772
Log likelihood	-82.74490	Hannan-Quinn criter.	5.874008
F-statistic	41.57479	Durbin-Watson stat	2.098527
Prob(F-statistic)	0.000001		

Unit root Kenya 1

Null Hypothesis: TBR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.547163	0.1147
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TBR)
Method: Least Squares
Date: 12/18/18 Time: 11:38
Sample (adjusted): 2 32
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TBR(-1)	-0.340826	0.133806	-2.547163	0.0164
C	3.606989	1.700809	2.120750	0.0426

R-squared	0.182823	Mean dependent var	0.300645
Adjusted R-squared	0.154645	S.D. dependent var	6.655211
S.E. of regression	6.119014	Akaike info criterion	6.523020
Sum squared resid	1085.828	Schwarz criterion	6.615535
Log likelihood	-99.10681	Hannan-Quinn criter.	6.553178
F-statistic	6.488041	Durbin-Watson stat	2.278882
Prob(F-statistic)	0.016426		

Unit root Kenya 2

Null Hypothesis: D(TBR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.411161	0.0000
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TBR,2)
Method: Least Squares
Date: 12/18/18 Time: 11:44
Sample (adjusted): 3 32
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TBR(-1))	-1.325512	0.178853	-7.411161	0.0000
C	0.424596	1.190939	0.356522	0.7241

R-squared	0.662347	Mean dependent var	-0.039333
Adjusted R-squared	0.650288	S.D. dependent var	11.01524
S.E. of regression	6.514023	Akaike info criterion	6.650132
Sum squared resid	1188.110	Schwarz criterion	6.743545
Log likelihood	-97.75198	Hannan-Quinn criter.	6.680016
F-statistic	54.92531	Durbin-Watson stat	2.037601
Prob(F-statistic)	0.000000		

Unit root South Africa 1

Null Hypothesis: TBR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.733157	0.4053
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TBR)
Method: Least Squares
Date: 12/18/18 Time: 11:49
Sample (adjusted): 2 32
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TBR(-1)	-0.193282	0.111520	-1.733157	0.0937
C	1.977027	1.241311	1.592692	0.1221

R-squared	0.093859	Mean dependent var	-0.035161
Adjusted R-squared	0.062612	S.D. dependent var	2.526005
S.E. of regression	2.445647	Akaike info criterion	4.688837
Sum squared resid	173.4545	Schwarz criterion	4.781353
Log likelihood	-70.67698	Hannan-Quinn criter.	4.718995
F-statistic	3.003832	Durbin-Watson stat	1.755411
Prob(F-statistic)	0.093691		

Unit root South Africa 2

Null Hypothesis: D(TBR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.110200	0.0002

Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TBR,2)
Method: Least Squares
Date: 12/18/18 Time: 11:58
Sample (adjusted): 3 32
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TBR(-1))	-0.964166	0.188675	-5.110200	0.0000
C	-0.056044	0.476536	-0.117608	0.9072

R-squared	0.482575	Mean dependent var	-0.030333
Adjusted R-squared	0.464096	S.D. dependent var	3.565241
S.E. of regression	2.609952	Akaike info criterion	4.820881
Sum squared resid	190.7317	Schwarz criterion	4.914294
Log likelihood	-70.31321	Hannan-Quinn criter.	4.850764
F-statistic	26.11415	Durbin-Watson stat	1.839548
Prob(F-statistic)	0.000021		

Unit root Panel 1

Null Hypothesis: Unit root (common unit root process)
Series: TBR
Date: 12/18/18 Time: 12:01
Sample: 1986 2016
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 87
Cross-sections included: 3

Method	Statistic	Prob.**
Levin, Lin & Chu t*	- 0.75159	0.2261

** Probabilities are computed assuming asympotic normality

Intermediate results on TBR

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-Width	Obs
Nigeria	-0.42291	14.515	10.130	1	1	3.0	29
Kenya	-0.30198	35.571	21.367	1	1	9.0	29
South Africa	-0.23111	5.8093	3.1550	1	1	13.0	29
	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-0.29625	-3.660	1.005	-0.548	0.895		87

Unit root Panel 2

Null Hypothesis: Unit root (common unit root process)

Series: D(TBR)
Date: 12/18/18 Time: 12:03
Sample: 1986 2016
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 84
Cross-sections included: 3

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-5.38112	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on D(TBR)

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
Nigeria	-1.51229	17.116	3.4487	1	1	12.0	28
Kenya	-1.40185	42.254	5.8126	1	1	13.0	28
South Africa	-0.95448	5.3424	1.0321	1	1	12.0	28
	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-1.23568	-7.815	1.016	-0.549	0.901		84