IMPACT OF EXCHANGE RATE DEPRECIATION AND AGRICULTURAL OUTPUT ON AGRICULTURAL EXPORTS IN NIGERIA 1981-2020

BY

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SSC1707733

DEPARTMENT OF ECONOMICS
FACULTY OF SOCIAL SCIENCES
UNIVERSITY OF BENIN

JANUARY, 2023

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A PROJECT SUBMITTED TO THE DEPARTMENT OF ECONOMICS FACULTY OF SOCIAL SCIENCES, UNIVERSITY OF BENIN, BENIN CITY IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF BACHELOR OF SCIENCE (B.Sc. ECON) HONOURS.

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CERTIFICATION

This is to certify that this project titled "IMPACT OF EXCHANGE RATE DEPRECIATION AND AGRICULTURAL OUTPUT ON AGRICULTURAL EXPORTS IN NIGERIA" was carried out by Praise Omanibe Ujirooghene AHWE with matriculation number SSC1707733 from the Department of Economics. It is found worthy of acceptance in partial fulfillment of the award of Bachelor of Science (B.Sc) Degree of Economics

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Dr. S.O Igbinedion
Head of Department

Date: _____

DEDICATION

I dedicate this research work to God Almighty and to my parents Engr. Emmanuel and Mrs. Ruth Ahwe

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I would like to express my gratitude and appreciation to all who has made it possible in one way or the other to the completion of this project

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ABSTRACT

The study examined the impact of exchange rate depreciation and agricultural output on the agricultural exports of Nigeria (1981-2020). Error Correction mechanism was adopted to examine the relationship among the variables in the study that is the relationship between the dependent and independent variables. The variables were also found to have an overall significant effect on Nigerian agricultural export from the F-statistic obtained in the model. The study found that the level of agricultural output has a positive and significant impact on economic growth in both short run and long run. Also, the study found that exchange rate has a negative and significant impact on economic growth in both short run and long run. Also, the study found that level of import has a negative and significant impact on agricultural export in the short run and long run. Also, the study found that real interest rate has a negative and non significant impact on agricultural export in both short run and long run. Finally, the study found that investment has a positive and significant impact on agricultural export in both long and short run. Therefore, the study recommends that government should provide basic amenities like electricity in order to enhance storage of agricultural produce which in turn boosts output. Also the government should adjust trade exchange rate policies to favor farmers as this would encourage farmers to increase their output and in turn increase exportation.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND TO THE STUDY

In Nigeria prior to and after independence and even up until 1970, agriculture was the dominant economic activity (Akinbode & Ojo, 2018). Statistics have shown that the share of agriculture in total output was about 63.5 percent in 1960, making it the dominant economic activity during that decade (CBN, 2009). However, this dominant role played by agriculture has since diminished following the discovery and subsequent exploitation of oil in commercial quantities, especially beginning from 1970 (Akinniran & Olatunji, 2018). The diminished role of agriculture in Nigeria has been blamed on several factors including exchange rate policy (Babatunde & Shuaibu, 2012). This is so because exchange rate is an important economic variable as its appreciation or depreciation affects the performance of other macroeconomic variables in any economy (Zubair, Burney, Sarwat & Mubin, 2014). The deep attention paid to variations in exchange rate also stems from the fact that its movement has far-reaching implications on the real sector and hence aggregate output in an economy (Enekwe, Ordu & Nwoha, 2013). Before the adoption of the structural adjustment programme (SAP) in 1986, the Nigerian naira was overvalued under the then fixed exchange rate system (Caporale, Gil-Alana, & Mudida, 2012).

The overvaluation of the naira relative to the major global currencies during the fixed exchange rate regime resulted to balance of payments disequilibrium, capital flight and a drain in the country's external reserves (Enekwe, Ordu & Nwoha, 2013). The fixed exchange rate system also affected the performance of agricultural exports in Nigeria. Evidence from statistics showed that the share of agricultural exports in total exports declined from 29.94% in 1970 to 4.68% in 1975 and further to 2.40% in 1980 (CBN, 2011). However, following the implementation of structural adjustment programme (SAP) in 1986, exchange rate was liberalized in line with the cardinal objectives of SAP. The liberalization of the exchange rate led to the devaluation of the Nigerian naira against other world currencies.

The goal of liberalization of the exchange rate was meant to enhance the external sector of the Nigerian economy through expansion of exports, particularly agriculture export (Enekwe, Ordu & Nwoha, 2013). However, statistics have shown that in spite of the liberalization of the exchange rate that the share of agriculture in total exports has remained at a dismal level. Statistical information indicated that the share of agriculture in total exports was 5.23% in 1987, 2.21% in 1990, 1.63% in 1995, 0.48% in 2000, 0.61% in 2005, 1.18% in 2010, 1.85% in 2014, and 3.35% in 2018 (CBN, 2018). Theoretically, it is argued that depreciation of the exchange rate does promote exports as it makes exports cheaper relative to import.. The flow of foreign income arising from increase in

exports increases domestic investment which in turn leads to increase in overall productivity (Ettah, Akpan & Etim, 2011). On the other hand, appreciation of the exchange rate increases imports and decreases exports, which ultimately leads to a fall in the overall economic performance. As observed by Joseph and Akhanolu (2011), exchange rate stability has a positive impact, while exchange rate instability has a destabilizing and negative impact on the overall economic performance (Ettah, Akpan & Etim, 2011) but considering the abysmal performance of the agricultural exports even in the face of various exchange rate reforms/regimes, it would be pertinent to ask a general question as: what is the effect of exchange rate on agricultural exports in Nigeria? Understanding the perceived effect of exchange rate policy on agricultural exports is indispensable in formulating appropriate exchange rate policy that will boost domestic production for export in Nigeria (Gatawa & Mahmud, 2017).

On the empirical ground, studies have investigated the effect of exchange rate on agricultural exports in Nigeria but findings from these studies have showed mixed results. For instance, studies such as Adubi and Okunmadewa (1999), Akinniran and Olatunji (2018) and Akinbode and Ojo (2018), among others, showed from their results that exchange rate has a significant negative effect on agricultural exports in Nigeria. On the other hand, studies such as Ettah, Akpan and Etim (2011), Gatawa and Mahmud (2017), among others showed that exchange rate has a significant positive impact on agricultural exports in Nigeria.

These mixed results have created serious debate on the effect of exchange rate on agricultural exports in Nigeria. Whether or not exchange rate policy has enhanced or inhibited agricultural sector performance in Nigeria has remained an empirical puzzle. This is because, despite the crucial role played by exchange rate, there have been intense arguments as to the nature of its on agricultural sector performance in Nigeria (Joseph & Akhanolu, 2011).

1.2 STATEMENT OF THE PROBLEM

Since the introduction of the Structural Adjustment Programme (SAP) in 1986, the Nigerian economy has become more open to market forces and their attendant problems. All those whiles, the Nigerian economy had to deal with problems of unstable exchange rate, high interest rate, high inflation rate and unstable agricultural sector output, high and increasing rate of unemployment, trade imbalances which had adversely affected agricultural sector output in Nigeria (Abdul & Marwan, 2013). Economists differ on which policies that could enhance long-run agricultural sector output. Antwi, Mills and Zhao (2013) argue that exchange rate policies are necessary for long-term agricultural sector output in Nigeria. However, Anderson and Jodon (1968) postulated that monetary policy has greater and faster impact on agricultural sector output, thus suggesting that greater reliance be placed on monetary measures than fiscal measures in the conduct of stabilization policy. Gatawa, Akinola, and Muftau (2017) asserted that exchange rate variable is more effective and dependable than fiscal variable in

affecting changes in agricultural sector output. Other scholars argue that the growth of human capital, that is, investment in education and training contributes significantly to long-run agricultural sector output (Barro, 1990). Previous attempts to understand the effects of exchange rate on agricultural sector output in Nigeria have resulted in conflicting opinions. The existing studies disagreed both in the line of significance and direction of relationship. Several the findings highlight significant influence from exchange rate variables especially the moderating effect of nominal exchange rate (Gatawa, Akinola, Muftau, 2017; Olawale, 2015; Muftaudeen, Hussainatu, 2014; Ojede, Amin, Daigyo, 2013). Despite agreeing that agricultural sector output responds to exchange rate, these studies are at variance as to the direction of the effects. For instance Holden, Sparman, 2013; Paul, Akindele, 2016, argued that all the exchange rate variables they employed have a negative effect on agricultural sector output in both the long and short run suggesting that growing exchange rate, money supply, interest rate, and credit extension will rather hamper agricultural sector output in Nigeria as against the belief from studies like Onwanchukwu, (2015), Ozei, Sezgin, Topkaya, (2013), that exchange rate variables enhance agricultural sector output of the economy. A number of studies outrightly argued that exchange rate variables have no effect on agricultural sector output (Onuorah, Osuji 2014; Olawunmi, Adedayo 2016). Aroriode and Ogunbadejo, (2014), noted that interest rate, exchange rate and inflation rate are not statistically significant tools for

enhancing agricultural sector output. These shortcomings have somehow contributed to the knowledge gap in the literature which this study closes by using data from (1987-2019), a period of 32 years and increasing the number of exchange rate variables.

Also, the agricultural sector has suffered from years of poor management, inconsistent and poorly implemented government policies, government neglect and lack of basic infrastructure (Yunana & Amba, 2016). Presently, it accounts for 30.77% of GDP, 35% of employment in the economy. Nigeria is no longer a major exporter of cocoa, groundnut, rubber and palm products (Umeora, 2010). Crop production remains the major driver of the sector, accounting for 92.93% of overall nominal growth of the sector in the third quarter (National bureau of statistics, Nigeria 2020). Due to this backdrop, agriculture has not kept up with the rapid population growth and Nigeria once a large net exporter of food now imports most of its food requirements (Umeora, 2010). Dependence on oil is not the only cause of the under-development of the Nigerian agricultural sector, but also: Falusi and Olayiole (1980) observed that Nigerian agriculture is characterized by illiterate farmers who live in rural areas producing over 90% of the total food consumed and other agricultural products and with regards to their educational status give little or no room for improvement through scientific research. Olayemi (1985) noted that more than 90% of the consumed food in Nigeria is provided by the small-scale farmers.

The exchange rate is particularly essential in any country since it is a factor of a country's relative state of economic condition (Ozei,; Sezgin & Topkaya, 2013). It is a critical component of economic development. Imports from such a country are less expensive, whereas exports to overseas markets are more expensive. Subsequently, a favorable exchange rate is one of the goals of every administration (Onwanchukwu, 2015). An increment in the exchange rate of the trade partners of a nation is useful for an exporting economy, as it has a favorable effect on exports to the trading partners of that economy (Englama 2010)

When the exchange rate of a country is volatile, it potentially leads to market instability, trader profit volatility, unfavorable trade balance, inflation uncertainty, increased risk and effects on output and transaction costs (Onwanchukwu, 2015). High exchange rate fluctuation, in concept, contributes to uncertainty, which is presented as a risk. For example, in high-volatility circumstances, risk-averse traders may limit trading as a result of unanticipated expenses associated with currency rate fluctuations (Ojede, Amin & Daigyo, 2013). Higher exchange rate fluctuations, which, through growing risk and uncertainties, reduce the confidence of investors in the economy, which could be due to exchange rate depreciation (Onuorah & Osuji, 2014). Developed nations' exports include capital and finished commodities, whereas developing countries' major exports are mining industry goods, particularly natural resources such as oil.

Nigeria, like many other developing countries, is heavily reliant on imports (Onuorah & Osuji, 2014).

Nigeria and the rest of the globe rely heavily on crude oil for energy. Nigeria's economic and political prospects are heavily influenced by oil, which is a key component of the country's economy (Ismaila, 2016). Crude oil has brought Nigeria considerable money, but its impact on the country's economic progress is still debatable in terms of returns and productivity (Muftaudeen & Hussainatu, 2014). From the 1970s oil boom to the present, Nigeria has overlooked its huge agricultural and light industry bases in favor of an excessive dependence on crude oil (Umeora, 2010). However, in Nigeria, the flow of oil exports is regulated and governed by a variety of factors, including the inflation, real gross domestic product, exchange rate and, most importantly, government policy at any given time (Muftaudeen & Hussainatu, 2014). Amidst this stated problem, this study seeks to addressed the following study questions:

1.3 RESEARCH QUESTIONS

From the statement of problem above, the following research questions are drawn;

1. Does exchange rate affect agricultural exports in Nigeria?
2. Does agricultural output affect agricultural exports in Nigeria?

1.4 OBJECTIVES OF THE STUDY

The broad objective of this study is to determine the influence of agricultural development on economic growth in Nigeria.

1. Analyse the impact of exchange rate on agricultural exports in Nigeria.
2. Investigate the impact of agricultural output on agricultural exports in Nigeria.

1.5 RESEARCH HYPOTHESES

For the purpose of this study, the following hypotheses are tested;

$H0_1$ - Exchange rate does not have any significant impact on agricultural exports in Nigeria.

$H0_2$ - Agricultural output does not have any significant impact on agricultural exports in Nigeria.

1.6 SIGNIFICANCE OF THE STUDY

The significance of this work lies on the fact that with improved agriculture, the Nigerian economy stands to gain in its efforts towards development. This study attempts to answer the question; what is the relevance of agriculture in economic growth, the cause of agricultural decline and how the present state of our agricultural productivity will be improved. This will form the basis upon which suggestions will be made as to how the full potentials of agriculture can be harnessed.

1.7 SCOPE AND LIMITATIONS OF THE STUDY

This study focuses on Nigeria and on the impact of exchange rate depreciation and agricultural output on the agricultural exports of Nigeria. This study covered the relationship between exchange rate depreciation and agricultural output and agricultural exports in Nigeria for a period of 40 years (1981 – 2020).

The originality and reliability of any study or research work is based on the quantity and quality of available data. Though it is the duty and intention of any researcher to bring out and show everything the study is to have, but there are constraints which include, time, finance, and difficulty in getting data.

1.8 STRUCTURE OF THE STUDY

This research work is organized in five chapters; Chapter one is the introduction, which consist of the background to the study, statement of the problem, research questions, objectives of the study, research hypotheses, significance of the study, scope and limitations of the study . Chapter two being the review of the related literature presents the theoretical literature, empirical literature and other areas concerning the subject matter. Chapter three is the theoretical framework and model specification which presents the theoretical framework, model specification and data sources adopted in the study. Chapter four concentrate on the data presentation and analysis. Chapter five gives a summary of findings, recommendations and conclusion made of the study.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 CONCEPT OF EXCHANGE RATE AND EXCHANGE RATE DEPRECIATION

Exchange rate is the domestic price of a currency. The exchange rate is the cost of another currency of the country's currency (Yunana & Amba, 2016). An exchange rate is the currency value in one country relative to another country's currency or a free trade area. Two currencies are exchanged for each other at this price (Tadesse & Badiane, 2018). According to Onosewalu and Taofeek (2008), the demand for Naira comes from people who invest from abroad in the Nigerian economy and thus need the currency of Nigeria, or from companies purchasing local products to enable them to receive Naira to pay for the goods.

Also, exchange rate depreciation, according to Ogunkoya & Shobayo (2014), is a decrease in a currency's value when compared to other currencies. Economic fundamentals, interest rate differences, political unrest, or investor risk aversion are a few causes of exchange rate depreciation.**There are various types of exchange rates. They are as follows:**

(1) Flexible Exchange Rate System also known as Fluctuating Exchange Rate or Floating Exchange Rate.

(2) Fixed Exchange Rate System/Pegged Exchange Rate

(3) Spot Exchange Rate

(4) Forward Exchange Rate

(5) Purchasing Power Parity Exchange Rate

(6) Real Effective Exchange Rate or Sterling Index or Sterling Trade-Weighted Index.

Flexible Exchange Rate System

The Flexible Exchange Rate System, also known as floating Exchange Rate or fluctuating Exchange Rate, is the exchange rates controlled by the world currency supply and demand. In other words, these currencies are marked and can change rapidly because of supply and demand and are not controlled or monitored by central banks.

Floating exchange rate

A floating exchange rate is a system that relies on offer and demand compared to other currencies for the national monetary prices. The government, however, determines the rate at a fixed exchange rate, either fully or mostly. In response to market forces, flexible exchange rates fluctuate constantly. Two flexible exchange rates: pure floating regime and floating managed regime. Pure floating regimes, on one side, occur where there are simply in flexible exchange rate systems, no official purchases or currency sales. Managed (also called dirty) floating regimes, on the other hand, are the flexible currency regimes in which there is some, at least structured interference. These are the rates at which

authorities intervene to restrict short-term currency volatility without the intention of preserving a certain degree of the exchange rate.

Fixed exchange rate

A fixed exchange rate is a central bank system that links a country's official exchange rate with another country's currency or gold price. A flat currency system aims to maintain a limited set of the value of the currency. A flat currency system seeks to keep the currency's value in a small range. Fixed currency exchange system in which one currency's value is linked with another. Debtor invoicing software makes invoicing easy for customers worldwide in a different currency.

To preserve the rate and prevent the fluctuations, the Government shall take any measures necessary. Fixed exchange rates provide more certainty to exporters and importers and help the government reduce inflation. In a fixed exchange rate system, revaluations refer to infrequent decreases in the exchange rate, whereas devaluations refer to increases in the exchange rate.

Officially decreasing the value of a country's currency, making exports less costly for foreigners and discouraging imports by making import goods more expensive for domestic consumers, a devaluation in a fixed exchange rate would Make balance of current account to increase. Revaluation would have the opposite effect.

In the early 1970s, many developed countries introduced the floating exchange rate mechanism. The control of the behavior of a currency can also include a fixed exchange rate system such as the restriction of inflation rates. The pegged currency, however, is checked by its reference value in this respect. As a result, the value(s) of any currencies that have been pegged also will increase and decrease when the referral value increases or falls to other commodities and currencies that may trade the attached currency. That is to say, a tied currency relies on its benchmark to determine at each time how it describes its present value.

Spot Exchange rate

Spot Exchange rate is the current market price level at which one currency is exchanged for delivery at the earliest value feasible. The typical payment date (T+2) is usually 2 business days following the date of the transaction in spot currency transactions. The current market price is called the spot exchange rate for one currency. The FORCE market in most cases sets the spot rate, although some nations deliberately define or affect exchange rates via procedures like as currency restrictions. Currency traders utilize spot rates to find future, forward and options trading opportunities and on the spot market.

The spot exchange rate is the rate in effect at any given time in the market. It is considered the exchange rate for the immediate delivery of currency. The

spot rate would fluctuate all the time in response to market supply and demand changes. (Onosewalu and Taofeek,2008).

Forward exchange

Forward exchange is the rate by which the bank offers to exchange currency for currency for currency in the future. Multinational companies, banks and other financial institutions enter into forwarding contracts in order to make use of the forward rate for hedging reasons. When rate differs between two nations and is balanced, parity means that the forward rate comprises a premium or discount that reflects the difference rate. Future exchange rates may have important consequences for future spot rates. Financial economists have advanced the notion that the forward rate properly forecasts the future spot rate.

2.1.1 Evolution of Exchange Rate and Exchange Rate Depreciation in Nigeria: How Far?

Various factors affected the development of the Nigerian exchange market. Many factors influenced the evolution of the Nigerian market to its current state, include changing international trade patterns, fundamental economic transformations, and variations in supply and demand patterns (Akbar, 2016). In 1958, the Central Bank of Nigeria (CBN) was established and the Exchange Control Act 1962 was enacted, the foreign exchange entered by private sectors

and kept overseas (external to Nigeria) in balance by commercial banks serving as local exporter representatives. Most foreign exchange receipts during this era were exports from agriculture (Babatunde & Shuaibu, 2012). When the Central Bank of Nigeria was formed in 1958, the Nigerian currency was pegged to a British Pound Sterling, which led to delays in establishing an active foreign exchange market (Akbar 2016). Nevertheless, it became vital to create a local foreign market with the founding of the Central Bank of Nigeria and the consequent concentration of exchange authority inside the bank (Joseph & Akhanolu, 2011).

Nigeria's foreign exchange market exploded in the 1970s as crude oil exports increased, and commercial banks struggled to keep up with the influx of foreign currency (Joseph & Akhanolu, 2011). Despite this, a crisis occurred in 1982, which was averted due to the implementation of a strong exchange rate policy. Despite this, the foreign exchange control system was unable to produce a proper foreign exchange mechanism, and the Second-tier Foreign Exchange Market was established in 1986 (SFEM). Market forces under the SFEM decide the exchange rate and the foreign currency distribution in Naira (Akinniran & Olatunji, 2018) . On the other hand, the foreign exchange market remained volatile, which required additional changes in 1994 to reflect changes (Mousavi and Leelavathi, 2013). One change was the Naira's official link, the centralization of currencies in the Central Bank, restrictions on the Foreign Exchange Market

Bureau of Change as National Central Bank agents, the recognition of the parallel market illegality and the abolition of open accounts and bills as payment methods (Enekwe, Ordu & Nwoha, 2013). In 1995, with the formation of an autonomous exchange market (AFEM), the Foreign Exchange Market was liberalized and enabled the CBN to sell Foreign Currency to end users at a marked exchange rate through licensed dealers (Akinniran & Olatunji, 2018). The position of registered foreign- exchange buyers and sellers was likewise reshuffled by Bureaux de Change (Mousavi and Leelavathi, 2013).

With the introduction of an Inter-bank Foreign Exchange Market in 1999, the foreign exchange market was further liberalized to increase productivity. The Wholesale Dutch Auction System (WDAS) was recently adopted as an enhanced mechanism for deciding the exchange rate in the foreign exchange market on February 20, 2006 (Akinniran & Olatunji, 2018). The CBN will maintain active market engagement under the agreement, with transactions focused on a two-way quotation (Saeid and Leelavathi, 2013). WDAS aimed to build on the gains of retail DAS, liberalize the foreign exchange market further to increase depth, and achieve rate convergence between the official and other segments of the market (Ettah, Akpan & Etim, 2011). As a result, Nigeria's foreign exchange market has undergone significant changes in the last few decades. As a result, understanding foreign exchange markets and their efficiency in the Nigerian context becomes essential. (Akbar 2016).

Naira, Nigeria's currency, which continued its depreciation lately, is said to have lost 94.87 in five years (Ashike, 2022). As at the Ist September 2022, Naira weakened marginally by 0.04 percent as the dollar was quoted at N436.50/$ compared to N436.33 per dollar quoted on Ist September 2022 at the Investors and Exporters (I&E) forex window, data from the FMDQ said. Most foreign exchange dealers who participated at the FX auction on Wednesday maintained bids between N425.00 (low) and N437.00 (high) per dollar. The daily foreign exchange market turnover increased by 51.13 percent to $99.78 million on Monday from $66.02 million recorded on Friday (Ashike, 2022). The causes of naira depreciation in Nigeria so far includes market structure, restrictive policies, low oil sales and revenue, rationing of forex supply, and capital flight. In Nigeria, naira closed at N707 per dollar on as at the end of September 2022 at the parallel market, after crossing N715/$ (Ewubare, 2022). Top manufacturers in Nigeria are complaining about limited forex supply. As at September 2021, forex bought ratio stood at 25 percent through the Central Bank of Nigeria and 75 percent through other sources but currently, he said the forex bought ratio is 5 percent through the CBN and 95 percent through other sources. Exchange rate adjustment to N470/$ will free up N600bn per month to the Federation Account Allocation Committee (FAAC) (Ashike, 2022).. Oil production rose marginally by 0.51 percent to 1.183mbpd in July. Gross external reserves lost 0.41 percent to close the year 2022 at $39.02bn. Africa's largest economy's foreign reserves is now

6.72 percent below the 2021 peak of $41.83bn, adding that import and payment cover fell by 0.56 percent. Nigeria has a multiple exchange rate system (Ewubare, 2022). The World Bank had said allowing further gradual adjustment in the Investors and Exporters Foreign Exchange (IEFX) rate, where the CBN manages the price, would help eliminate misalignment and alleviate persistent FX pressures. Naira depreciation has been attributed to dollar shortage as Nigeria continues to struggle with diversifying and improving foreign exchange inflows (Ashike, 2022).

2.1.2 Exchange Rate Policy in Nigeria

Currency policy comprises the decision of the mechanism for the exchange rate and the establishment of the specific rate of exchange transactions (Ettah, Akpan & Etim, 2011). A country's exchange-rate policy affects the relative pricing structure in internal currency terms between globally (tradable) traded products and domestic (home) goods. In addition, exchange rate policies would impact the total level of domestic pricing (Babatunde & Shuaibu, 2012). This would lead to a broad impact in terms of pricing incentives on the whole economy on the precise exchange rate structure and exchange rate level chosen (Ettah, Akpan & Etim, 2011). One of Nigeria's monetary goals is exchange rate stability, which has been motivated by the country's desire to maintain a stable exchange rate over the period (Tadesse & Badiane, 2018). The public is measured by the nominal exchange rate on the economy's health where a depreciation rate is

associated with a deteriorating economy (Saeid and Leelavathi, 2013). Currency policy remains one of the most important benchmarks for economic growth, and hence governance remains a concern for developing nations. The viability of the foreign sector depends on the local currency exchange rate vs other international currencies (Akujinma, Chijindu and Theodora, 2017).

i. Pre- Sap Exchange Rate Policy

Nigeria's exchange rate policy was essentially inactive before the start of the structural adjustment program (sap), which began in 1959 with the introduction of the Nigerian pounds. The Nigerian pound's value was set at the same level as the British pound sterling, which had a declared value of $2.80 US dollars to pounds. On gaining independence in 1960, Nigeria became a member of the International Monetary Fund (IMF), and the Nigeria pound was declared to be equivalent to 2.49 grams of fine gold in 1962, while the value of the Nigeri a pound in relation to the US dollar was retained. In 1967, the British pound sterling was devalued, causing the Nigerian pound to appreciate, which was then exchanged for 1.17 British pound sterling. This appreciation was caused by Nigeria's inability to devalue her currency against the sterling. The nature of exchange rates during this time was a fixed exchange rate regime, as evidenced by policymakers' failure to direct exchange rates in response to the emergence of a balance of payment crisis, especially between 1967 and 1970.

The US dollar's central position as a reserve currency in foreign economic transactions caused the current fixed exchange rate regime to collapse (the Bretton Woods system) in 1971. The United States then determined to halt convertibility to gold from the USD, ushering in a new era of floating exchange rates. United States may have discarded the Bretton Woods System (fixed/pegged exchange rate system) in the late 1960s, but they were facing a balance of payment deficit. In December of 1971 the Nigerian authorities were not willing to weaken the Nigerian pound in the face of the drop in the dollar and the exchange rate rose from $2,80 to $3,04. Nigeria's decision not to devalue her currency was based on several factors, including the need to prevent an increase in the local price of the ongoing development program, the need to curb civil war-induced inflation, and, of course, the belief in the new rate's long-term viability due to the nation's increased external reserves as a result of crude oil earnings.

In the face of the decline of the dollar in December 1971, the Nigerian authorities failed to discount pounds and the exchange rate rose from $2.80 to $3.04. Nigerian dollar was a major factor. Nigeria's decision not to devalue her currency was based on several factors, including the need to avoid an increase in the local price of the ongoing development program, the need to tackle civil war-induced inflation, and, of course, the belief in the new rate's long-term viability as a result of the nation's increased external reserves as a result of crude oil earnings.

ii. Exchange Rate Under Sap

The principal policy aim of this Structural Adjustment Program (SAP) was to move the exchange rate to an outward export promotion strategy from an import substitution strategy to an inward-looking one using the final policy tool. Before the 1986 SAP, one dollar amounted to 77 kobo. This resulted in a move from a fixed exchange rate to a controlled FLC with no predefined currency path. The dollar was worth 1,756 naira later in the year when SAP began. Corporate managers mainly felt it was too much a dollar to chase. The N4.016 dollars, N5.35, N9.93, N22 in 1993, N21.876 in 1998 and N132.56 in 2008 have been replaced since 1987. This scenario shows the expanding disparity between foreign-exchange demand and supply, emphasizing the growing economic hardship that a nation and people suffer in implementing forced devaluation schemes like the SAP in Nigeria. The policy objective of the exchange rate was drawn from the general objective of the macroeconomic management of medium-term external and domestic equilibrium.

Internal balance refers to the amount of economic action that is consistent with inflation management whereas external balance refers to the balance of payments or to the deficit covered by projected capital inflow in the long-term current-account. The Structural Adjustment Program (SAP) is fundamentally inflationary, since it raises the domestic currency need in exchange for a unit volume of local products and imports.

SAP, too, has inflationary consequences since it is based on the failure to make capital the main source of economic development. It simply converts banks into a sophisticated and monetized economy in an artisan economy (Ogbimi, 2001). It has a tough inflationary effect to deal with the compulsory devaluation of the currency by the foreign exchange (FEM) of a certain country. Although SAP seemed to be formally abandoned in 2006, what was happening in SAP's term is intimately linked to the existing core macroeconomic policies on external sector reforms and inflation management.

2.1.3 Concept of Agriculture

The term "Agriculture" has been subjected to different definitions by various experts. Olawale (2015) defined agriculture as the art and science of the cultivation of crops and rearing of animals for man's use. He also emphasized that agriculture is also the production of fibres for industries, processing of farm produce, packaging and marketing of farm products. This definition is quite embracing as it covers all activities that ensure man's survival.

However, the aspect of research and training that is so vital in production was conspicuously missing in the definition. In order to fill this gap, Ojede, Amin and Daigyo (2013) defines agriculture as production of field crops, forestry, fishing and livestock, research and training of extension workers. Production is only complete when it gets to the final consumers. It involves forestry, fishing, processing, and marketing of these agricultural products. Adubi (2000) defined

agriculture as the cultivation of soil for crop production and of looking after animals to produce better meat and other food products and also a process by which farm products are sold.

For a purely subsistence economy, agricultural development will occur but not like in a fully developed economy (Ogunkoya & Shobayo, 2014). If there is enough food for the people and a marketable surplus is produced, it will increase the income of the peasants. The increased income generated would so provide means for them to purchase other necessities of life, which they cannot produce themselves (Obansa, Okoroafor, Aluko & Millicent Eze, 2013). By this means, the standard of living of the peasants will improve and unemployment, underdevelopment will be reduced. They stated that a fully developed economy, especially in agricultural sector, means increase in the production of export crops with an improvement in the quantity and grades of such export crops. For a country that has started to industrialize, agricultural output will be said to have acquired growth if agriculture can supply enough raw materials to the agro-allied industries (Ogunkoya & Shobayo, 2014).

Byerlee, Diao and Jackson (2009) are of the view that agriculture is an "engine of growth" in the early stages of development because of its high share of economic activities and its strong growth linkages with the rest of the economy. They also believe that agriculture can serve as a safety net in times of macro-economic crisis. "Agriculture can manage shocks and vulnerability at both

the macro level and household level. Beyond direct contribution to growth, a number of features specific to the sector enhance its contribution to growth: the large size of its growth linkages to other sectors and the positive externalities from assuring food security and reducing food prices.

According to Mousavi and Leelavathi (2013), agricultural export was the engine of growth prior to 1973, providing much of the revenue that the government used in developing a basic infra-structural system and also financed the import substitution industrialization programme.

2.1.4 Causes of Decline in Agricultural Production in Nigeria

At Nigeria's Independence in 1960, agriculture was the mainstay of the Nigerian economy. According to Gatawa & Mahmud (2017), peasant agricultural production to export provided the stimulus to Nigeria's overall economic growth. Agriculture provided employment to over 75% of the population and accounted for over 70% of total food consumption (Caporale, Gil-Alana, & Mudida, 2012). It also provided raw materials for industry, export earnings to finance imports and foreign exchange (Akinbode & Ojo, 2018).

Nigeria has an agrarian economy before the advent of oil in the late 1970's. At the peak of the oil boom, Saeid and Leelavathi (2013) observed: Nigeria can no longer produce enough food for its fast-growing population neither could the agricultural system cope with the increasing demands of the agricultural raw materials to keep the country's oil mills, textile and other agro based industries

operating at full capacity let alone have surpluses for export. According to Ogundari and Ojo (2007), Nigerian agriculture is characterized by: a multitude of small scale farmers ranging from 0.05 to 3.0 hectares per farm land scattered over wide expanse of land area, rudimentary farm systems, low capitalization and low yield per hectare. The role of agriculture remains significant in the Nigerian economy despite the strategic importance of the crude oil sector (Akinbode & Ojo, 2018).

The decline in the contribution of agriculture to the GDP of developing countries especially Nigeria overtime is due to the slower growth of the sector relative to other sectors of the economy and most especially, commercial exploration of petroleum (CBN, 2008). The daunting obstacles to agricultural development causing decline of food production is upland farming systems, especially in Nigeria for example, has often been attributed to poor rural infrastructure, poor market access and transport cost weak institutions to support agriculture (Joseph & Akhanolu, 2011). Joseph & Akhanolu (2011) further emphasized that modern farming technology are either not accessible or simply not economical to adopt. In terms of soil improvement, limitation seems to be the Farmer's inability to replenish nutrients lost in the continuous cultivation which has replaced the traditional bush fallow system (Caporale, Gil-Alana, & Mudida, 2012).

2.1.5 Problems Associated with Agricultural Development

Agriculture in Nigeria is a branch of the economy in Nigeria, providing employment for about 35% of the population as of 2020. As reported by the FAO; Agriculture remains the foundation of the Nigeria economy, despite the presence of oil in the country. It is the main source of livelihood for most Nigerians. The Agricultural sector is made up of four sub sectors; Crop Production, Livestock, Forestry and Fishing. In the third quarter of 2019, the sector grew by 14.88% year-on-year in nominal terms with a decline of 3.44% points from the third quarter of 2018. The largest driver of the sector remains crop production as it accounts for 91.6% of the sector in the third quarter of 2019 with a quarterly growth which stood at 44.12%. The agriculture sector contributed 29.25% to overall real GDP during the third quarter of 2019. The exportation sector's monthly earns improved in four years. In January 2016, agricultural exports ranked in N4.1 billion which then rose to 25 billion by January 2017. From April 2019 to march 2020, total agricultural exports hit N289 billion for Nigeria. Agriculture exports for the first six months of 2020 were N204.45 billion, which concerns that productivity is increasing in the sector to enable export growth.

From planting to harvesting and consumption/commercialization, different constraints have made farming difficult for farmers in Nigeria. In 2018, the minister of agriculture and rural development, chief Ogbe mentioned that about 30%-40% of the foods produced in Nigeria are ultimately wasted. This means that the problems stem beyond the farming process as issues such as wastage can still

hinder successful Agriculture. Agriculture in Nigeria has the potential to generate more if we can tackle the problems head on instead of looking for short fixes. The problems are: lack of modernization/mechanization; lack of information; poor infrastructure; poor research and record keeping; finance.

The place of agriculture in Nigeria's economy has remained critical over the decades since her political independence. As documented by Anyanwu (1997) agricultural sector played a dominant role in the generating of large proportion of the nation's Gross National Product (GNP) in the 1960s. She asserted that agriculture accounted for over 42 percent of commodity export earnings and about 74 percent of total government revenue within the period under review. Corroborating with the above is Obadan (2000), when he observed that the production of the agricultural products from independence to the early 1970s accounted for 96.4 percent of total export earning while non-oil export products accounted for 97.3 percent of total exportation.

However, this situation changed drastically at the beginning of the 1970s. Agricultural output started to decline rapidly at a time which not only coincided with the end of Nigeria Civil War, but also with the period of Oil Boom of 1970s and severe drought of 1977 (UK Pong, 1991). The overall agricultural situation deteriorated, creating wide gap between the supply and demand for food. Revenue from agricultural export declined and government was faced with mounting food import bills. Industries at the same time increasingly resorted to

importation of agricultural raw materials, thus putting a lot of stress on Nigerian foreign exchange (Malgwi, 1986). Nigeria, once a major exporter of certain food commodities such as cassava, groundnut, palm oil and palm kernel, etc, now is a major importer of food commodities. From the year 2001 to 2007, Nigeria imported a total of 160,209.10 in 2001, 138.993.52 in 2002, in 2003 146,1225.3, 147.380.40 in 2004, 193,259.09 in 2005, 235,440.18 in 2006 and 290,650.89 in 2007 worth of food and live animals (CBN Annual Report and Statement of Accounts, 2007).

The main agricultural environmental associated problem relates to population pressure on natural resources and this includes:

i. Soil erosion and loss of fertility as small holders seek to intensify production by adding labour to existing agricultural land without corresponding increase in capital (chemical, organic inputs, land conservation and infrastructure).

ii. Loss of biodiversity and the damage of natural ecosystems as small holders seek to enhance agriculture production by clearing forests and expanding into fragile ecosystems.

According to Ojuneye (2010), some major problems confronting Nigeria agriculture are poor infrastructural facilities such as poor feeder roads and road network, storage facilities, rural electrification, poor manpower development, socio cultural factor like the land tenure system, poor Government/Regulatory policies.

2.2 THEORETICAL LITERATURES

2.2.1 Exchange Rate Theory

This section reviews theories that tries to explain the various theories of exchange rate and its determinants.

There are different economic theories of the exchange rate. They include

a) Purchasing Power Parity.

b) Balance of Payment Theory

c) Optimum Currency Area Theory

d) The Portfolio Approach

f) The Traditional Flow Model

The purchasing power parity (PPP) principle uses a basket of products to compare the currencies of different countries. A tool for calculating the absolute purchasing power of various currencies by comparing the prices of goods in various countries. The theory is based on the belief that there are no trade or transportation barriers. Since it does not deal with the assets market, we consider the PPP to be just a partial equilibrium theory. The preconditions for absolute PPP do not hold because transportation prices, tariffs, and technical and preferential disparities still exist and locations. In most observational research, absolute PPP is not acknowledged. In other words, the rate at which the purchasing power of both countries is equal. This theory states that the exchange rate should fluctuate such that the price of a given good, or service stays constant regardless of where it

is purchased. As a result, the PPP theory is also known as the "law of one price." Expressed using the following equation:

$E = P / P^*$

Where;

E stands for the nominal exchange rate.

P = Rates in the domestic currency

P* = Foreign exchange rates in local currency

Another is Balancing of Payments theory. This exchange-rate theory argues that, according to the theory of the exchange rate, free-market demand forces and the foreign-exchange supply decide on the price of foreign currency for domestic money. In principle, the powers of demand and supply are calculated by different factors in the balance of payments of a country. The deficit in payment balance leads the exchange rate to decrease or devalue, while an exchange surplus reinforces the reserves that allow the price of the domestic currency to increase in foreign currency

Another important theory is the Optimum Currency Area (OCA) which was the initial and main theoretical background for exchange rate regimes (2018). Stabilizing the business cycle and trade according to this idea. Based on the ideas of shock symmetry, openness and mobility on the labor market. It says that by reducing the currency risk and therefore reduced hedge costs, a fixed exchange-rate regime may promote trade and industrial development. The

investment will also be increased by reducing the interest-rate currency premium. However, trade and production growth have slowed down by terminating or avoiding the essential relative price adjustment process. Money theory and asset market (or fund balance) methods are the basis of recent exchange rate strategies. They claim that the exchange rate is solely a money flow phenomenon. Theories of orthodox exchange rates mean, that trade flows, ultimately determining the movement of exchange rates, determine the exchange rate. On the other hand, most politicians have shifted their attention to more theories of exchange rates. However, traditional notions continue to be important at the end of the day.

Another theory is the Portfolio Approach. When calculating the exchange rate, the portfolio balance equation considers trade. Bonds and other domestic and foreign financial assets are considered imperfect substitutes. The exchange rate is established by balancing the supply and demand for financial assets, of which money is only one type. To begin with, this strategy assumes that a rise in the home country's money supply triggers an immediate decrease in the interest rate. As a result, the asset portfolio shifts away from domestic bonds and toward home currency and international bonds. When foreign bonds are replaced with domestic bonds, the home currency depreciates immediately. This depreciation leads to an increase in exports and a decrease in imports over time. Consequently, the portfolio equilibrium principle also describes exchange overshooting.

The trade balance model can be specified as

OB = PO QO + (XA-MB)

Another is the Traditional Flow Model, which considers the exchange rate to be the product of the relationship between foreign exchange demand and supply. In this concept, the exchange rate is in equilibrium when supply and demand` for foreign exchange are equal. The exchange rate changes to meet the demand for foreign exchange based on demand for domestic goods and properties by domestic residents. Under the flow model, relative income plays a role in determining the exchange rate, if international demand for domestic products is primarily determined by domestic income. Since the demand for assets is based on the difference between domestic and foreign interest rates, it can be assumed that the demand for assets is based on the difference between domestic and foreign interest rates.

Trade Related Theories:

Mercantilism Theory

This theory was popular in the 16th and 18th Century. During that time the wealth of the nation only consisted of gold or other kinds of precious metals so the theorists suggested that the countries should start accumulating gold and other kinds of metals more and more. The European Nations started doing so. Mercantilists, during this period stated that all these precious stones denoted the wealth of a nation, they believed that a country will strengthen only if the nation

imports less and exports more. They said that this is the favorable balance of trade and that this will help a nation to progress more.

Mercantilism thrived during the 1500's because there was a rise in new nation-states and the rulers of these states wanted to strengthen their nations. The only way to do so was by increasing exports and trade, because of which these rulers were able to collect more capital for their nations. These rulers encouraged exports by putting limitations on imports. This approach is called protectionism and it is still used today. Though, Mercantilism is one the most old-fashioned theory, it still remains a part of contemporary thinking. Countries like China, Taiwan, Japan, etcetera still favor

Absolute Cost Advantage Theory

This theory was developed by Adam Smith, he was the father of Modern Economics. This theory came out as a strong reaction against the protectionist mercantilist views on international trade. Adam Smith supported the necessity of free trade as the only assurance for expansion of trade. He said that a country should only produce those products in which they have an absolute advantage. According to Smith, free trade promoted international division of labour. By specialization and division of labour producers with different absolute advantages can always gain over producing in remoteness. He emphasised producing what a country specializes in so that it can produce more at a lower cost than other countries. This theory says that a country should export a product in which it has a

cost advantage. Adam's theory specified that a country's prosperity should not be premeditated by how much gold and other precious metals it has, but rather by the living standards of its citizens.

Comparative Cost Advantage Theory

The comparative cost theory was first given by David Ricardo. It was later polished by J. S. Mill, Marshall, Taussig and others. Ricardo said absolute advantage is not necessary. He also said a country will produce where there is comparative advantage.

The theory suggests that each country should concentrate in the production of those products in which it has the utmost advantage or the least disadvantage. Hence, a state will export those supplies in which it has the most benefit and import those supplies in which it has the least drawback. Comparative advantage arises when a country is not able to yield a commodity more competently than another country; however, it has the resources to manufacture that commodity more proficiently than it does other commodities.

Hecksher Ohlin Theory (H-0 Theory)

Smith and Ricardo's theories didn't help the countries figure out which products would give better returns to the country. In 1900s, two economists, Eli Hecksher, and Bertil Ohlin, fixated on how a country could profit by making goods that utilized factors that were in abundance in the country.

They explained that it is differences in factor endowments of different countries and different factor-proportions needed for producing different commodities that account for difference in comparative costs. This new theory is therefore-called Heckscher-Ohlin theory of international trade. Since there is wide agreement among modern economists about the explanation of international trade offered by Heckscher and Ohlin this theory is also called modern theory of international trade. Further, since this theory is based on general equilibrium analysis of price determination, this is also known as General Equilibrium Theory of International Trade. It is worthwhile to note that, contrary to the viewpoint of classical economists, Ohlin asserts that there does not exist any basic difference between the domestic (inter-regional) trade and inter-national trade. Indeed, according to him, international trade is only a special case of inter-regional trade. Thus, Ohlin asserts that it is not the cost of transport which distinguishes international trade from domestic trade, for transport cost is present in the domestic inter-regional trade. Trade because currencies of different countries are related to each other through foreign exchange rates which determine the value or purchasing power of different currencies.

Vent for Surplus Theory

Professor Williams has sponsored the doctrine of vent-for-surplus from the crude idea found in the classical theory of international trade presented by Adam Smith in the Wealth of Nations. Smith stated that foreign trade “carries out

that surplus part of the produce of their (trading countries) land and labour for which there is no demand among them and brings back in return for it something else for which there is a demand. It gives a value to their superfluities, by exchanging them for something else, which may satisfy a part of their wants, and increase their enjoyments. By means of it, the narrowness of the home market does not hinder the division of labour in any branch of art or manufacture from being carried to the highest perfection."

This means international trade overcomes the narrowness of the home market and by increasing the size of the market provides an outlet (vent) for the surplus generated in the domestic market. On this thread of argument, the "Vent-for-surplus" theory of international trade is developed by modern economists like Williams, Myint, etc., to explain the nineteenth-century process of expansion of foreign trade to the underdeveloped countries of the South-East Asia, Latin America, and Africa.

Under the vent-for-surplus approach, trade does not cause any reallocation of resources (here, labour) as in the case of the classical theory. The vent-for-surplus approach assumes that more raw materials will be produced from the available surplus of land and labour. That is to say, trade here induces a 'vent' or an outlet for the unused resources (labour and land). In this theory the gain from trade is measured in terms of the improvement of terms of trade, which is

ZT. The theory also implies that as trade goes further the country's specialization in raw materials tend to be full. As such, labour will be moved away from handicrafts to the production of raw materials. Here, there is reallocation. Then, the country will tend to operate at point R. Assuming some development, the country's PP-Curve will shift as P, R_r

The theory arrives at a conclusion that the typical less developed country under the colonial rule, however, ultimately experiences an adverse impact of foreign trade with the mother country when it exports raw materials and imports mechanized goods. Its handicrafts sector tends to vanish under the keen competition from imported mechanized goods. Moreover, since the country is primary producing its capacity is limited by the availability of cultivable land.

2.3 EMPIRICAL LITERATURES.

2.3.1 Previous studies on Exchange rate on Agricultural Export

Numerous studies have been conducted to investigate the impact of exchange rate on agricultural exports using various methods. Oyejide (2016) examined effects of trade and exchange rate policies on Nigeria's agricultural export over the period 1960-2015 using Ordinary Least Squares (OLS) and concludes that appreciation of real exchange rate adversely influences to non-oil export especially during the oil boom.

Employing the extended vector auto regressive (EVAR) as well as the ARIMA model, Adubi and Okunmadewa (2019) analyzed the effect of price and exchange rate volatility on Nigeria's agricultural trade flows, utilizing quarterly data covering the period 1986-2018. The results of the study showed that exchange rate volatility has a negative effect on agricultural exports in Nigeria.

Employing the ordinary least square (OLS) regression method, Ettah, Akpan and Etim (2011) analyzed the effects of price and exchange rate fluctuations on agricultural exports in Nigeria with emphasis on export of cocoa. The results revealed that exchange rate volatility has a significant positive impact on export of cocoa in Nigeria.

Babatunde and Shuaibu (2012) empirically examined the effect of real exchange rate on agricultural export in Nigeria using annual time series data covering the period 1980 to 2007. The study employed the Auto-Regressive Distributed Lag (ARDL) technique estimation technique. Results of the short run and long run estimates found that real exchange rate depreciation has a short run and long run positive relationship with agricultural exports while real exchange rate volatility has a negative relationship with agricultural exports in International Journal of Economics, Commerce and Management, United Kingdom Licensed under Creative Common Nigeria.

Employing the Auto-Regressive Distributed Lag (ARDL) technique, Gatawa and Mahmud (2017) investigated the effect of exchange rate on

agricultural exports in Nigeria, using annual time series data from 1981 to 2014. Result of their study showed that exchange rate has positive impact on agricultural exports volume in Nigeria.

Akinniran and Olatunji (2018) examined the effects of exchange rate on agricultural exports as well as the total agricultural export in Nigeria, using data from 1985 to 2010 and employing the Ordinary Least Squares (OLS) estimation technique. Result of the study showed that exchange rate has a significant negative effect on agricultural exports in Nigeria.

Akinbode and Ojo (2018) evaluated the effect of exchange rate volatility on agricultural exports in Nigeria from 1980 to 2015 and employing the Auto-Regressive Distributed Lag (ARDL) technique. Results showed that exchange rate volatility has negative and insignificant effect on agricultural exports in Nigeria. Researchers outside Nigeria have also investigated the effect of exchange rate on agricultural exports.

Using structural vector autoregressive (VAR) estimation technique, Shane, Roe and Somwaru (2008) investigate the relationship between exchange rate, foreign income and the United States agricultural exports, utilizing annual time series data from 1980 to 2021. The VAR estimates showed that there is a significant negative effect of exchange rate on aggregate U.S. agricultural exports.

Abule and Abdi (2012) investigated the impact of exchange rate variability on export of Ethiopia's agricultural products, utilizing annual time

series data covering the period 1992-2010 and employing the Autoregressive Distributive Lag (ARDL) modeling technique. Results indicated the existence of a negative relationship between oilseeds and exchange rate variability. Using the granger causality analysis,

Meusavi and Leelavathi (2013) examine the causal nexus between exchange rates and agricultural exports in India, employing annual time series data from 1980 to 2010. The granger causality test showed no causality relationship between the exchange rate and agricultural exports. This means that exchange rate does not predict significantly agricultural exports in India.

Wasiu, and Ndukwe, (2018) investigated the possible asymmetric effect of real exchange rate dynamics on agricultural output performance in Nigeria over the period of 1981 to 2016. The study employed a combination of stationary and nonstationary variables as was found out through the ADF unit root test. Based on the Bounds test for cointegration, a long-run relationship was absent between real exchange rate and agricultural output, irrespective of specifications. The result of model estimation showed that the significant drivers of agricultural output are real exchange rate (log-levels), real appreciation and depreciation (after some lags), industrial capacity utilization rate, and government expenditure on agriculture (after some lags). ACGSF loan exerted a positive and insignificant influence on agricultural output.

Gatawa, and Mahmud (2019) analyzed short and long-run impacts of exchange rate fluctuations on agricultural exports volume in Nigeria. ARDL was used as the method of analysis; the independent variables include official exchange rate, agricultural loans and relative prices of agricultural exports while the dependent variable is agricultural export volume. GARCH was used to estimate the volatility of exchange rates, and other diagnostic tests. The short-run results revealed that official exchange rate and agricultural loans have significant positive impact on agricultural export volumes which has the effect of expanding the dependent variable while, relative prices of agricultural exports has significant negative impact on agricultural exports volume which also has the effect of contracting the dependent variable. The long-run results revealed similar findings apart from the official exchange rate which has statistically significant negative impact on agricultural exports volume. i.e., contrary to normal expectations.

Dominic (2017) examined the impact of exchange rate on coca export in Nigeria. The Augmented Dickey Fuller Unit root, Johansen co-integration, ordinary least square, and diagnostic tests as well as error correction mechanism were adopted to analyze the secondary time series data, between 1980 and 2013, generated from Food and Agricultural Organization (FAO), World Bank and the Central Bank of Nigeria (CBN). The ADF unit root test results showed that none of the variables was stationary at level I (0), whereas all the variables – cocoa export, agricultural export, exchange rate trade openness and world cocoa price

became stationary after first difference or order one I (1). The Johansen co-integration test of the long run relationship revealed that both trace statistics and maximum eigen value had two cointegrating equations at 5% whereas the trace statistics alone had 1 co-integrating equation at 1%, implying the existence of long run relationship between coca export, agricultural export, exchange rate, trade openness and world price of cocoa. The positive sign of the error correction mechanism of 0.07 suggested that deviation from the long run equilibrium is adjusted over the following period by 7%. The t-test showed direct relationship between cocoa export and Exchange rate cum agricultural export. The diagnostic test revealed non-existence of heteroskedasticity and serial correlation in the error term. The paper concluded that agricultural export, exchange rate, trade openness and world price of cocoa taken together affected cocoa export in Nigeria

Charles and Fortune (2019) examined the effect of exchange rate variation on Nigeria economy. The objective was to investigate how Naira exchange rate variations against key currencies affect the country's real gross domestic product. The ordinary least square method was used as data analysis techniques. The study used cointegration, unit root, and granger causality test and error correction estimate to study the dynamic effects of commodity currencies on financial market. The study found that naira exchange rate variation with the currencies can explain 65 percent variation on Nigerian real gross domestic products while the

remaining 35 percent estimation can be traced to external variables not included in the model.

2.3.2 Literature on Agricultural Output on Agricultural Export

Hashemi-Tabar and Akbari (2009) examined the link between agricultural exports and exchange rate volatility in Iranian economy using annual time series data covering the period 1956 to 2015. The authors employed the vector error correction (VEC) modeling technique and found that exchange rate volatility had an adverse effect on agricultural exports in Iran.

Saeid and Leelavathi (2013) investigated the causal relationships between agricultural exports and real exchange rate in India, using time series data between 1980 and 2010 and employing the Granger causality analysis. The results revealed that there is no significant relationship between quantity of agricultural export and real exchange rate during the period under evaluation implying that both variables do not cause each other in either direction.

CHAPTER THREE

THEORETICAL FRAMEWORK AND MODEL SPECIFICATION

3.1 THEORETICAL FRAMEWORK

The theoretical framework for the study is based is the Keynesian IS-LM framework. The investment-saving (IS) curve describes the combination of both income (Y) and the interest rate (r);

$Y = C(Y - T) + I(r) + G$ ……... (1)

Equation (1) states that the quantity of goods produced, Y, must equate the quantity of goods demanded, C + I + G. Now, assuming a linear consumption function and investment function, we have;

$Y = C + I + G$……... (2)

Seeing our study relates to agricultural exports, let's bring in the external sector then we have:

$Y = C + I + G + X - M$ ……... (3)

To achieve the goal of the study, let's make exports the subject of the equation seeing that agricultural exports is the predicted variable in the study:

$X = C + I + G - Y - M$ ……... (4)

Conclusively, equation 4 shows that the level exports can be determined by the level of consumption, investment, government expenditure, the level of output and the level of imports

3.2 MODEL SPECIFICATION

The methodology adopted in this study is the linear regression employing the technique of Co-integration and Error Correction Model (ECM). The error correction model (ECM), is a type of time series regression model, that is based on the behavioral supposition that there exists an equilibrium relationship between two or more time series that governs both short- and long-term behavior.

This research shall employ econometric method. According to Modalla (1992), this method gives the best techniques for the verification and refutation of theories. It also provides qualitative estimation of the relationship among variables without much subjective judgment. The specification of econometric model is always based on economic theory or any available information relating to the phenomenon being studied (Koutsoyiannis 1997). Modifying the equation specified in the theoretical framework, the specification of the models adopted for this investigation is implicitly stated as follows:

Model to be estimated for objective two

AGE = F (AGY, EXR, IMP, RIR,INV)

$AGE = \alpha o + \alpha_1 AGY + \alpha_2 EXR + \alpha_3 IMP + \alpha_4 RIR + \alpha_5 INV + e$

$\alpha_0 > 0, \quad \alpha_1 > 0, \quad \alpha_2 < 0, \quad \alpha_3 < 0 \quad \text{and} \quad \alpha_4 < 0$

Where:

AGE = Level of Agricultural Exports

AGY = Agricultural Output

EXR = Exchange Rate

IMP = Level of Imports

RIR = Real Interest Rate.

INV = Investment

e = A Stochastic error term.

e is a variable representing other factors that may determine agricultural exports which are not captured in the model:

α_0 = Constant term.

α_1, α_2, α_3, α_4, α_5 = Parameters of the slope.

Finally, an estimation technique that was also employed for this study is the error correction mechanism. The ECM model for this study can be expressed as;

$$AGE_t = \beta_0+\beta_1\Delta AGY_{t-i}+\beta_2\Delta EXR_{t-i}+\beta_3\Delta IMP_{t-i}+\beta_4\Delta RIR_{t-i}+\beta_5\Delta INV_{t-i} +\varepsilon ECM_{t-I}+Ut \quad .....(6)$$

The coefficient of error correction term is expected to be negative ($\varepsilon<0$) and significant as this is necessary condition to ensuring the existence of long run relationship and adjusted disequilibrium in the model (Narayan, 2005). But the coefficient of the ECM can be positive and statistically significant depicting the nature of the long run relationship. Thus it doesn't have to be a negative value for all models. Similarly, the ECM_{t-1} depicts one period lagged error correction term.

The value of its coefficient measures the speed of adjustment to equilibrium from the short run disequilibrium in the model.

3.3 DATA SOURCES

This study is majorly based on secondary data on selected models and for the other control variables mentioned in the model from Central bank of Nigeria (CBN) Statistical Bulletin, and World Development indicators covering the period from 1981-2020.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION OF TEST RESULTS

This chapter contains the analysis and representation of data. It shows the empirical analysis of the study which examines the impact of exchange rate depreciation and agricultural output on the agricultural exports of Nigeria.

4.1 PRE-ESTIMATION OF TEST RESULTS

4.1.1 Descriptive Statistics

The table 4.1 below shows the summary statistics for the variable of this study:

Table 4.1.: Summary Statistics for the Variables

Measures	AGE	AGY	EXR	IMP	RIR	INV
Mean	0.868816	22.88138	108.3197	3.26E+10	0.453578	2.51E+09
Median	0.361642	22.23471	111.2313	1.71E+10	4.310292	1.61E+09
Maximum	7.268343	36.96508	410.7006	1.01E+11	18.18000	8.84E+09
Minimum	0.005946	12.24041	0.617708	3.53E+09	-65.85715	1.89E+08
Std. Dev.	1.483849	4.589772	110.6144	3.03E+10	14.25917	2.57E+09
Skewness	3.196667	0.440302	1.003014	0.789989	-2.717477	1.168319
Kurtosis	13.11132	4.732787	3.279781	2.157846	12.91104	3.154680
Jarque-Bera	5.244317	5.514084	6.225171	27.89351	15.80091	12.058574
Probability	0.072646	0.063479	0.084486	0.059631	0.0889371	0.746336
Observations	41	41	41	40	41	41

Source: Author's Computation using Eviews 9

The Table 4.1 indicates that AGE has a mean of 0.87, AGY has a mean value of 22.88, EXR has a mean of 108.32, IMP has a mean 3.26, RIR has a mean of 0.45 and INV has a mean of 2.51 respectively. Also, AGE has a standard deviation of 1.48, AGY has a standard deviation of 4.59, EXR has the standard deviation of 110.61, IMP has a standard deviation of 3.03, RIR has the standard deviation of 14.26, INV has a standard deviation of 2.57. AGE is positively

skewed, AGY is positively skewed, EXR is positively skewed, IMP is positively skewed also RIR is negatively skewed and INV is positively skewed. The table above also shows that mean values fall between the minimum and maximum values. Furthermore, for the kurtosis, the value often compared to is 3. From the table 4.1, we see that the kurtosis values for the variables AGE, AGY, EXR, RIR, INV are all leptokurtic (k>3) while the variable IMP is platykurtic (k<3). Normality test uses the null hypothesis of non-normality against the alternative hypothesis of normality. If the probability value of the Jacque-Berra statistics is greater than 0.05, the null hypothesis of non-normality is rejected. From the table above, all the probability values of the Jacque-Berra statistics were greater than the 0.05 significant level, hence, they are all normally distributed.

4.1.2. Test for Stationarity

This section investigates the stationarity property of the time series variables' stationarity. Stationarity refers to the fact that the statistical characteristics of a time series (or, more precisely, the process that generates it) do not change with time. Stationarity is important because many useful analytical techniques, statistical tests, and models rely on it. The table below shows the stationarity or non-stationarity of the variables in these investigations, as well as the order of integration:

Table 4.2.:Unit Root Test: Augmented Dickey Fuller Approach

Variables	ADF Statistics (level)	Critical Values at 5%	ADF Statistics (1st Difference)	Critical Values at 5%	Order of Integration
AGE	-3.867950	-2.938987	-6.131904	-2.941145	I(1)
AGY	-2.562353	-2.941145	-6.965308	-2.941145	I(1)
EXR	-2.941145	-2.936942	-3.791044	-2.938987	I(1)
IMP	-0.624863	-2.938987	-5.773289	-2.941145	I(1)
RIR	-7.477454	-2.936942	-10.07486	-2.938987	I(1)
INV	-1.972513	-2.936942	-10.02406	-2.941145	I(1)

Source: Author's Computation using Eviews 9

From the table 4.2 above, it can be seen that the variables of this study were all stationary at I(1) at 5 percent significant level.

4.1.3 Test for Co-integration

Co-integration tests detect situations in which two or more non-stationary time series are integrated in such a way that they cannot diverge from equilibrium over time. The tests are designed to determine how sensitive two variables are to the same average price over a given time. The test results are given below as:

TABLE 4.3: Johansen Co-integration test

TABLE 4.3.1: Trace Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.551522	95.33420	95.75366	0.0534
At most 1 *	0.487140	64.86212	69.81889	0.0066
At most 2 *	0.413137	39.48755	47.85613	0.0014
At most 3	0.237868	19.23490	29.79707	0.4761
At most 4	0.120718	8.912750	15.49471	0.3735
At most 5	0.100483	4.024085	3.841466	0.8448

Source: Author's Computation

In the table 4.3.1, the trace test indicates that there is a co-integrating relationship among the variables at 0.05 significant level and so there is a long run relationship among the variables captured by this study.

TABLE 4.3.2: Maximum Eigenvalue Test

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.551522	30.47207	40.07757	0.0034
At most 1 *	0.487140	25.37457	33.87687	0.0001
At most 2 *	0.413137	20.25265	27.58434	0.0039
At most 3 *	0.237868	10.32215	21.13162	0.0039
At most 4	0.120718	4.888665	14.26460	0.7558
At most 5	0.100483	4.024085	3.841466	0.7448

Source: Author's Computation

In the table 4.3.2, maximum eigenvalue test indicates there is co-integrating relationship among the variables at 0.05 significant level and so there is long run relationship among the variables captured by this study.

4.1.4 Model Estimates

LONG RUN

Table 4.4.1: Normalized Cointegrating Equation

Dependent Variable: AGE

Independent Variables	AGY	EXR	LNIMP	RIR	LNINV
Coefficients	-0.152178	0.000893	1.014813	0.068100	-1.259612
T-statistic	(2.07563)	(3.00544)	(4.70472)	(0.02812)	(0.48271)

Source: Author's Computation using Eviews 9

Also, the table 4.4.1 above indicates that the agricultural output positively affects the level of agricultural export in the long run. This implies that one unit

increase in the agricultural output will result in 0.15 unit increase in the level of agricultural exports. The results above show that the agricultural output is a significant factor affecting the level of agricultural export.

Also, the table above indicates that the exchange rate negatively affects the level of agricultural export in the long run. This implies that one unit increase in exchange rate will result in 0.001 unit decrease in the level of agricultural export. The results above show that the exchange rate is a significant factor affecting the level of agricultural export.

Also, the table above indicates that the level of import negatively affects the level of agricultural export in the long run. This implies that one unit increase in the level of import will result in 1.01 unit decrease in the level of agricultural exports. The results above show that the level of import is an significant factor affecting the level of agricultural export.

Also, the table above indicates that the real interest rate negatively affects the level of agricultural export in the long run. This implies that one unit increase in real interest rate will result in 0.07 unit decrease in the level of agricultural export. The results above show that the real interest rate is an non significant factor affecting the level of agricultural export.

Also, the table above indicates that investment positively affects the level of agricultural export in the long run. This implies that one unit increase in the investment will result in 1.26 unit increase in the level of agricultural exports. The

results above show that investment is a non significant factor affecting the level of agricultural export.

SHORT RUN

Given that the stationarity condition is met at I(1), Error Correction mechanism is used in this study to examine the relationship between the dependent and independent variables. The table 4.4.2 shows the ECM regression results regressing AGE which is used to capture economic growth in Nigeria on the independent variables AGY, EXR, IMP, RIR and INV.

Table 4.4.2: Parsimonious Error Correction Estimates

Dependent Variable: AGE				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.903561	0.267647	3.375941	0.0019
D(AGY(-1))	0.271824	0.080427	3.379761	0.0385
D(EXR(-1))	-0.030726	0.013668	-2.248025	0.0539
D(IMP(-1))	-0.123275	0.059700	-2.064908	0.0274
D(RIR(-1))	-0.007200	0.016377	-0.439634	0.6632
D(INV(-1))	0.886750	0.902434	0.982620	0.6240
ECM(-1)	-0.587864	0.208096	-2.824961	0.0081
R-squared	0.905261	F-statistic		2.343406
Adjusted R-squared	0.874997	Prob(F-statistic)		0.054659
Sum squared resid	60.68803	Durbin-Watson stat		1.857919

Source: Author's Computation using Eviews 9

4.2 DISCUSSION OF RESULTS

The parsimonious error correction model is shown in table 4.4.2 (ECM). It shows that each year, approximately 59% of short run deviation from long run (equilibrium) value of agricultural exports is corrected annually to maintain equilibrium in the system. It's worth noting that the ECM's coefficient has a

negative sign, as predicted, and is significant at the 5% level. Hence it will slightly play the role of error correction in the system

Also, the table above indicates that the agricultural output positively affects the level of agricultural export in the short run. A unit increase in the agricultural output will result in 0.27 unit increase in the level of agricultural exports. The results above show that the agricultural output is a significant factor affecting the level of agricultural export.

Also, the table above indicates that the exchange rate negatively affects the level of agricultural export in the short run. This implies that one unit increase in exchange rate will result in 0.03 unit decrease in the level of agricultural export. The results above show that the exchange rate is a significant factor affecting the level of agricultural export.

Also, the table above indicates that the level of import negatively affects the level of agricultural export in the short. This implies that one unit increase in the level of import will result in 0.12 unit decrease in the level of agricultural exports. The results above show that the level of import is a significant factor affecting the level of agricultural export.

Also, the table above indicates that the real interest rate negatively affects the level of agricultural export in the short run. This implies that one unit increase in real interest rate will result in 0.07 unit decrease in the level of agricultural

export. The results above show that the real interest rate is an non significant factor affecting the level of agricultural export.

Also, the table above indicates that investment positively affects the level of agricultural export in the long run. This implies that one unit increase in the investment will result in 0.89 unit increase in the level of agricultural exports. The results above show that investment is a non significant factor affecting the level of agricultural export.

Finally, the R-squared value is found to be 90% and the Durbin Watson value 1.86 which is approximately equals 2 indicating that autocorrelation is absent in the estimated model, this makes the estimated model reliable and fit for policy perspective.

4.3 POLICY IMPLICATIONS

Agricultural output was shown to be an important factor to positively affects agricultural exports in Nigeria. Increasing agricultural production would result to increase in goods available for exports to other countries. The federal government of Nigeria has prioritized agricultural development under its Economic Recovery and Growth Plan, which seeks to create new jobs in labour-intensive sectors including agriculture, boost agriculture's GDP contribution to more than 8% by 2020, up from current levels of between 3% and 4% annually, and make the country a net exporter of key crops including rice, cashew, groundnuts, vegetable oil and cassava (see overview). The government is

moving to build on steady recent growth in both crop production and agricultural exports through a number of policies, including the development of staple crop processing zones (SCPZs) and reforms to the quality control process. Cassava and sugarcane have particularly high potential for export growth, as evidenced by major private investments, one of which will see a new biofuel plant established in Kogi State, potentially linking to one of 14 planned SCPZs. Although food manufacturing and agricultural exports have both shown strong recent growth, the UN Food and Agricultural Organization of the United Nations (FAO) reports that production hurdles have negatively impacted agricultural and macroeconomic growth, with value added per capita in the sector rising by less than 1% annually in recent decades. According to the FAO, it has been estimated that due to declining productivity Nigeria loses $10bn annually in export opportunities for major crops including cocoa, cotton, palm oil and groundnut, while increases in food crop production have been outpaced by population growth, leading to a surge in food imports. The FAO identified rice and cassava as crops with high potential for increased production and processing, noting that, with 50m tonnes harvested annually across 3.7m ha, Nigeria is the world's largest cassava producer, accounting for 20% of global supply, 34% of African supply and 46% of West African supply.

Exchange rate was also shown to be an important factor that negatively affects agricultural exports in Nigeria. An unstable exchange rate system most

often erodes external competitiveness of the agricultural export sector because it undermines the incentive structure. That the exchange rate volatility coefficients were significant with negative right signs suggest that risk-averse agricultural exporters would strongly reduce their activities, switch their sources of supply and demand, or change policies so as to minimize their exposure to the adverse effects of exchange rate variability in the Nigerian investment climate. This, in turn, could alter the distribution of output across other sectors of the economy. Moreover, trade policy actions aimed at stabilizing trade flows actions likely generated uncertain results.

Imports was also shown to be important factor that negatively affects agricultural exports in the country. The total international trade in agricultural goods in the country stood at N3.24tn in 2021, with the import value exceeding export value by N2.23tn, findings have revealed. Despite interventions by the Federal Government to diversify the economy and increase food production in the country, security concerns have driven a lot of farmers out of their livelihood. Figures obtained from the National Bureau of Statistics revealed that while Nigerian farmers exported goods worth N127.2bn in the first quarter of 2021, the country imported N630.2bn goods. In the second quarter, agricultural goods worth N165.27bn were exported while import value was N652.08bn. The NBS figures on foreign trade statistics revealed that Nigeria's exported agricultural foods goods were worth N79.4bn and N132.71bn in the third and fourth quarters,

while the import values were N789.1bn and N667.16bn respectively. According to the NBS, most of the agricultural products were exported to Europe and Asia. The exports of agricultural products were mainly fermented cocoa beans, sesamum seeds, and superior quality raw cocoa beans. The NBS disclosed that major agricultural goods imported included durum wheat (not in seeds) from the United Arab Emirates and Lithuania. This was followed by crude palm oil from China and Malaysia, and palm olein, also from Malaysia. This clearly indicates importation is a threat to agricultural exports in Nigeria.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION

5.0 SUMMARY OF FINDINGS

The study seeks to examine the impact of exchange rate depreciation and agricultural output on the agricultural exports of Nigeria. The study tests for unit root using Augmented Dickey-Fuller (ADF) to check if the variables are stationary or non-stationary. Also, to check that long run relationship exists among all the variables using Johansen co-integration test. The outcome shows the exists of long-run relationship among the variables employed in the study. Error Correction mechanism was adopted to examine the relationship among the variables in the study that is the relationship between the dependent and independent variables. The Durbin-Watson test was carried out to check for autocorrelation. The variables were also found to have an overall significant effect on Nigerian agricultural export from the F-statistic obtained in the model. The study found that the level of agricultural output has a positive and significant impact on economic growth in both short run and long run. Also, the study found that exchange rate has a negative and significant impact on economic growth in both short run and long run. Also, the study found that level of import has a negative and significant impact on agricultural export in the short run and long run. Also, the study found that real interest rate has a negative and non significant impact on agricultural export in both short run and long run. Finally, the study

found that investment has a positive and significant impact on agricultural export in both long and short run.

5.1 CONCLUSIONS

In conclusion, the empirical result show that trade exchange rate policy which was used to capture degree of at which agricultural output depreciation affects agricultural export in Nigeria and this relationship was found to be significant from the study. This finding doesn't seem to conform to what holds in Nigeria.

Nigeria’s potential for export is yet to be realized. A key constraint has been the recent conduct of macroeconomics, particularly agricultural export. This has led to rising inflation and decline in real incomes. National economic management became a Herculean task as the economy has to contend with volatility of agricultural output. The widespread lack of fiscal discipline was further exacerbated by poor co-ordination of trade exchange rate policies among the three tiers of government. Based on a regular budget, government proposed spending most of its money on running the administration rather than in the badly needed agricultural projects to create more goods and boost exports.

5.2 RECOMMENDATIONS

On this basis of the emanating findings, this study proffered the following recommendations:

1. Relating to the study agricultural output was found to have a significant and positive effect on economic growth. Therefore, the study recommends that government should provide basic amenities like electricity in order to enhance storage of agricultural produce which in turn boosts output.
2. Relating to the study exchange rate was found to have a negative and significant effect on economic growth. Therefore, the study recommends that the government should adjust trade exchange rate policies to favor farmers as this would encourage farmers to increase their output and in turn increase exportation.
3. Relating to the study the level of import was found to have a level of import has a negative and significant effect on economic growth . Therefore, the study recommends that government should create enabling domestic market where farmers can carry out buying and selling of farm produce as this would reduce the level of import and in turn boost the economy.
4. Relating to the study real interest rate was found to have a negative and non-significant effect on economic growth. Therefore, the study recommends that government should create a developed system of available

loans at reasonable interest rates for all farmers to maximize production and enhance more exportation of goods.

5. Investment was found to have a positive and significant effect on economic growth. the study recommends that the government should increase budgetary allocation to the agricultural sector as well as enhance the attractiveness of the sector to private investors as this would enhance agricultural production and in turn boost the economy .

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APPENDIX

UNIT ROOT TEST
AT LEVEL
AGE

Null Hypothesis: AGE has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.867950	0.0051
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(AGE)
Method: Least Squares
Date: 12/10/22 Time: 15:55
Sample (adjusted): 1983 2021
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AGE(-1)	-0.423468	0.109481	-3.867950	0.0004
D(AGE(-1))	0.492719	0.144914	3.400076	0.0017
C	0.375615	0.180922	2.076121	0.0451

R-squared	0.349624	Mean dependent var	-0.006536
Adjusted R-squared	0.313492	S.D. dependent var	1.142003
S.E. of regression	0.946215	Akaike info criterion	2.801110
Sum squared resid	32.23164	Schwarz criterion	2.929076
Log likelihood	-51.62165	Hannan-Quinn criter.	2.847023
F-statistic	9.676291	Durbin-Watson stat	1.693031
Prob(F-statistic)	0.000433		

AGY

Null Hypothesis: AGY has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.562353	0.1096

Test critical values:	1% level	-3.615588
	5% level	-2.941145
	10% level	-2.609066

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(AGY)
Method: Least Squares
Date: 12/10/22 Time: 16:01
Sample (adjusted): 1984 2021
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AGY(-1)	-0.260872	0.101810	-2.562353	0.0150
D(AGY(-1))	0.249607	0.138324	1.804511	0.0800
D(AGY(-2))	-0.410953	0.141494	-2.904383	0.0064
C	6.358086	2.394563	2.655218	0.0120

R-squared	0.389639	Mean dependent var	0.220166
Adjusted R-squared	0.335784	S.D. dependent var	2.912149
S.E. of regression	2.373386	Akaike info criterion	4.665813
Sum squared resid	191.5206	Schwarz criterion	4.838190
Log likelihood	-84.65044	Hannan-Quinn criter.	4.727143
F-statistic	7.234927	Durbin-Watson stat	1.906730
Prob(F-statistic)	0.000700		

EXR

Null Hypothesis: EXR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.941145	1.0000
Test critical values:	1% level	-3.605593	
	5% level	-2.936942	
	10% level	-2.606857	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXR)
Method: Least Squares
Date: 12/10/22 Time: 16:04
Sample (adjusted): 1982 2021

Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXR(-1)	0.084163	0.028741	2.928311	0.0057
C	1.771840	4.069177	0.435430	0.6657

R-squared	0.184112	Mean dependent var	10.25207
Adjusted R-squared	0.162641	S.D. dependent var	19.75741
S.E. of regression	18.07948	Akaike info criterion	8.676139
Sum squared resid	12420.96	Schwarz criterion	8.760583
Log likelihood	-171.5228	Hannan-Quinn criter.	8.706671
F-statistic	8.575004	Durbin-Watson stat	1.589067
Prob(F-statistic)	0.005732		

IMP

Null Hypothesis: LNIMP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.624863	0.8534
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNIMP)
Method: Least Squares
Date: 12/10/22 Time: 16:06
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNIMP(-1)	-0.033049	0.052890	-0.624863	0.5359
C	0.810122	1.252590	0.646758	0.5218

R-squared	0.010443	Mean dependent var	0.028223
Adjusted R-squared	-0.016302	S.D. dependent var	0.350154
S.E. of regression	0.352996	Akaike info criterion	0.805202
Sum squared resid	4.610435	Schwarz criterion	0.890512
Log likelihood	-13.70143	Hannan-Quinn criter.	0.835810
F-statistic	0.390453	Durbin-Watson stat	1.844185
Prob(F-statistic)	0.535896		

RIR

Null Hypothesis: RIR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.477454	0.0000
Test critical values:	1% level	-3.605593	
	5% level	-2.936942	
	10% level	-2.606857	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RIR)
Method: Least Squares
Date: 12/10/22 Time: 16:10
Sample (adjusted): 1982 2021
Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RIR(-1)	-0.752044	0.100575	-7.477454	0.0000
C	2.003678	1.434726	1.396558	0.1707

R-squared	0.595367	Mean dependent var	1.677122
Adjusted R-squared	0.584719	S.D. dependent var	14.07429
S.E. of regression	9.069797	Akaike info criterion	7.296484
Sum squared resid	3125.926	Schwarz criterion	7.380928
Log likelihood	-143.9297	Hannan-Quinn criter.	7.327016
F-statistic	55.91232	Durbin-Watson stat	1.669006
Prob(F-statistic)	0.000000		

INV

Null Hypothesis: LNINV has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.972513	0.2972
Test critical values:	1% level	-3.610453	
	5% level	-2.936942	
	10% level	-2.607932	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNINV)
Method: Least Squares
Date: 12/10/22 Time: 16:14
Sample (adjusted): 1982 2020
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNINV(-1)	-0.183055	0.092803	-1.972513	0.0561
C	3.894506	1.957946	1.989077	0.0541

R-squared	0.095151	Mean dependent var	0.037980
Adjusted R-squared	0.070696	S.D. dependent var	0.679615
S.E. of regression	0.655152	Akaike info criterion	2.042021
Sum squared resid	15.88129	Schwarz criterion	2.127332
Log likelihood	-37.81941	Hannan-Quinn criter.	2.072630
F-statistic	3.890808	Durbin-Watson stat	2.687839
Prob(F-statistic)	0.056059		

AT FIRST DIFFERENCE

AGE

Null Hypothesis: D(AGE) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.131904	0.0000
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(AGE,2)
Method: Least Squares
Date: 12/10/22 Time: 16:17
Sample (adjusted): 1984 2021
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(AGE(-1))	-1.071441	0.174732	-6.131904	0.0000
D(AGE(-1),2)	0.497626	0.145653	3.416513	0.0016
C	0.009000	0.159852	0.056303	0.9554

R-squared	0.518570	Mean dependent var	0.014532
Adjusted R-squared	0.491059	S.D. dependent var	1.381213
S.E. of regression	0.985359	Akaike info criterion	2.884035
Sum squared resid	33.98261	Schwarz criterion	3.013318
Log likelihood	-51.79666	Hannan-Quinn criter.	2.930032
F-statistic	18.85001	Durbin-Watson stat	1.925890
Prob(F-statistic)	0.000003		

AGY

Null Hypothesis: D(AGY) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.965308	0.0000
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(AGY,2)
Method: Least Squares
Date: 12/10/22 Time: 16:21
Sample (adjusted): 1984 2021
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(AGY(-1))	-1.344637	0.193048	-6.965308	0.0000
D(AGY(-1),2)	0.515463	0.145863	3.533877	0.0012
C	0.303448	0.417702	0.726471	0.4724

R-squared	0.591524	Mean dependent var	-0.059850
Adjusted R-squared	0.568182	S.D. dependent var	3.888330
S.E. of regression	2.555133	Akaike info criterion	4.789742
Sum squared resid	228.5047	Schwarz criterion	4.919025
Log likelihood	-88.00510	Hannan-Quinn criter.	4.835740
F-statistic	25.34212	Durbin-Watson stat	1.924549
Prob(F-statistic)	0.000000		

EXR

Null Hypothesis: D(EXR) has a unit root

Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.791044	0.0062
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXR,2)
Method: Least Squares
Date: 12/10/22 Time: 16:25
Sample (adjusted): 1983 2021
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXR(-1))	-0.615988	0.162485	-3.791044	0.0005
C	6.986584	3.365894	2.075699	0.0449

R-squared	0.279764	Mean dependent var	1.329079
Adjusted R-squared	0.260298	S.D. dependent var	21.90668
S.E. of regression	18.84105	Akaike info criterion	8.759873
Sum squared resid	13134.45	Schwarz criterion	8.845184
Log likelihood	-168.8175	Hannan-Quinn criter.	8.790482
F-statistic	14.37202	Durbin-Watson stat	1.859642
Prob(F-statistic)	0.000537		

IMP

Null Hypothesis: D(LNIMP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.773289	0.0000
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LNIMP,2)
Method: Least Squares
Date: 12/10/22 Time: 16:26
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNIMP(-1))	-0.966258	0.167367	-5.773289	0.0000
C	0.034808	0.058095	0.599164	0.5528

R-squared	0.480751	Mean dependent var	-0.001678
Adjusted R-squared	0.466327	S.D. dependent var	0.487312
S.E. of regression	0.355996	Akaike info criterion	0.823399
Sum squared resid	4.562384	Schwarz criterion	0.909588
Log likelihood	-13.64459	Hannan-Quinn criter.	0.854065
F-statistic	33.33086	Durbin-Watson stat	1.996537
Prob(F-statistic)	0.000001		

RIR

Null Hypothesis: D(RIR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.07486	0.0000
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RIR,2)
Method: Least Squares
Date: 12/10/22 Time: 16:28
Sample (adjusted): 1983 2021
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RIR(-1))	-1.172504	0.116379	-10.07486	0.0000
C	0.464130	1.648030	0.281627	0.7798

R-squared	0.732858	Mean dependent var	-1.677296
Adjusted R-squared	0.725637	S.D. dependent var	19.48465
S.E. of regression	10.20599	Akaike info criterion	7.533746

Sum squared resid	3853.999	Schwarz criterion	7.619057
Log likelihood	-144.9081	Hannan-Quinn criter.	7.564355
F-statistic	101.5029	Durbin-Watson stat	2.179559
Prob(F-statistic)	0.000000		

INV

Null Hypothesis: D(LNINV) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.02406	0.0000
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNINV,2)
Method: Least Squares
Date: 12/10/22 Time: 16:30
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNINV(-1))	-1.470344	0.146682	-10.02406	0.0000
C	0.062959	0.099843	0.630582	0.5323

R-squared	0.736228	Mean dependent var	0.006970
Adjusted R-squared	0.728901	S.D. dependent var	1.180230
S.E. of regression	0.614512	Akaike info criterion	1.915218
Sum squared resid	13.59449	Schwarz criterion	2.001407
Log likelihood	-34.38915	Hannan-Quinn criter.	1.945884
F-statistic	100.4817	Durbin-Watson stat	1.986314
Prob(F-statistic)	0.000000		

LONG RUN CO-INTERGRATION

Date: 12/10/22 Time: 15:49
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments
Trend assumption: Linear deterministic trend
Series: AGE AGY EXR LNIMP RIR LNINV
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 *	0.551522	95.33420	95.75366	0.0534
At most 1 *	0.487140	64.86212	69.81889	0.0066
At most 2 *	0.413137	39.48755	47.85613	0.0014
At most 3	0.237868	19.23490	29.79707	0.4761
At most 4	0.120718	8.912750	15.49471	0.3735
At most 5	0.100483	4.024085	3.841466	0.8448

Trace test indicates 3 cointegrating equations 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 *	0.551522	30.47207	40.07757	0.0034
At most 1 *	0.487140	25.37457	33.87687	0.0001
At most 2 *	0.413137	20.25265	27.58434	0.0039
At most 3 *	0.237868	10.32215	21.13162	0.0039
At most 4	0.120718	4.888665	14.26460	0.7558
At most 5	0.100483	4.024085	3.841466	0.7448

Max-eigenvalue test indicates 4 cointegrating equations 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):

AGE	AGY	EXR	LNIMP	RIR	LNINV
-0.802950	-0.122191	0.000717	-0.814844	0.054681	1.011406
-0.287375	0.098459	-0.016974	2.424201	-0.079685	-1.092458
-0.046953	-0.300014	0.013744	-2.019109	-0.062041	1.449307
0.158365	-0.109099	0.002007	0.770870	0.060140	-0.985355
-0.065600	-0.061440	-0.013406	0.504947	0.021931	0.991740
0.180937	-0.096445	-0.007541	-0.589665	0.039215	0.114762

Unrestricted Adjustment Coefficients (alpha):

D(AGE)	0.651535	0.296032	0.021399	-0.138652	0.051925	-0.039866
D(AGY)	0.622318	-0.126630	1.327337	0.660645	-0.246113	0.138406
D(EXR)	3.883926	-2.160693	-3.988188	5.355422	-0.270368	-3.424040
D(LNIMP)	0.066271	-0.158732	-0.046281	-0.067555	-0.057358	-0.005523
D(RIR)	-1.943843	0.754388	2.641207	-1.487535	-1.466936	-1.712619
D(LNINV)	0.085319	0.033219	-0.179713	0.042910	-0.157451	0.035036

1 Cointegrating Equation(s): Log likelihood -470.4388

Normalized cointegrating coefficients (standard error in parentheses)

AGE	AGY	EXR	LNIMP	RIR	LNINV
1.000000	-0.152178	0.000893	1.014813	0.068100	-1.259612
	(2.07563)	(3.00544)	(4.70472)	(0.02812)	(0.48271)

Adjustment coefficients (standard error in parentheses)

D(AGE)	-0.523150
	(0.11775)
D(AGY)	-0.499690
	(0.39171)
D(EXR)	-3.118599
	(2.53155)
D(LNIMP)	-0.053212
	(0.04800)
D(RIR)	1.560810
	(1.29010)
D(LNINV)	-0.068507
	(0.08184)

2 Cointegrating Equation(s): Log likelihood -457.7515

Normalized cointegrating coefficients (standard error in parentheses)

AGE	AGY	EXR	LNIMP	RIR	LNINV
1.000000	0.000000	0.017548	-1.891768	0.038126	0.296981
		(0.00568)	(0.60556)	(0.03333)	(0.43104)
0.000000	1.000000	-0.121180	19.09989	-0.698043	-10.22877
		(0.03193)	(3.40433)	(0.18739)	(2.42322)

Adjustment coefficients (standard error in parentheses)

D(AGE)	-0.608223	-0.050465
	(0.11626)	(0.02139)
D(AGY)	-0.463300	-0.088510
	(0.41557)	(0.07647)
D(EXR)	-2.497670	-0.687322
	(2.66767)	(0.49086)
D(LNIMP)	-0.007596	-0.023726
	(0.04459)	(0.00821)

D(RIR)	1.344017	0.311797	
	(1.36519)	(0.25120)	
D(LNINV)	-0.078053	-0.007154	
	(0.08677)	(0.01597)	

3 Cointegrating Equation(s): Log likelihood -447.6251

Normalized cointegrating coefficients (standard error in parentheses)

AGE	AGY	EXR	LNIMP	RIR	LNINV
1.000000	0.000000	0.000000	1.025697	-0.179073	-0.996136
			(0.57546)	(0.04371)	(0.55980)
0.000000	1.000000	0.000000	-1.046799	0.801840	-1.299095
			(2.67498)	(0.20320)	(2.60218)
0.000000	0.000000	1.000000	-166.2539	12.37729	73.68916
			(37.8101)	(2.87211)	(36.7810)

Adjustment coefficients (standard error in parentheses)

D(AGE)	-0.609227	-0.056885	-0.004264
	(0.11639)	(0.04614)	(0.00298)
D(AGY)	-0.525622	-0.486729	0.020839
	(0.36109)	(0.14314)	(0.00924)
D(EXR)	-2.310412	0.509191	-0.015354
	(2.59832)	(1.02998)	(0.06648)
D(LNIMP)	-0.005423	-0.009841	0.002106
	(0.04407)	(0.01747)	(0.00113)
D(RIR)	1.220005	-0.480602	0.022102
	(1.30375)	(0.51681)	(0.03336)
D(LNINV)	-0.069615	0.046762	-0.002973
	(0.08226)	(0.03261)	(0.00210)

4 Cointegrating Equation(s): Log likelihood -442.4641

Normalized cointegrating coefficients (standard error in parentheses)

AGE	AGY	EXR	LNIMP	RIR	LNINV
1.000000	0.000000	0.000000	0.000000	-0.366324	0.388026
				(0.08741)	(0.67736)
0.000000	1.000000	0.000000	0.000000	0.992943	-2.711733
				(0.23449)	(1.81715)
0.000000	0.000000	1.000000	0.000000	42.72853	-150.6676
				(11.2563)	(87.2292)
0.000000	0.000000	0.000000	1.000000	0.182560	-1.349483
				(0.05923)	(0.45903)

Adjustment coefficients (standard error in parentheses)

D(AGE)	-0.631185	-0.041758	-0.004542	0.036652
	(0.11631)	(0.04763)	(0.00294)	(0.44834)
D(AGY)	-0.421000	-0.558805	0.022164	-2.984836
	(0.35198)	(0.14413)	(0.00889)	(1.35673)
D(EXR)	-1.462302	-0.075078	-0.004606	3.778170
	(2.50239)	(1.02472)	(0.06322)	(9.64570)

D(LNIMP)	-0.016122	-0.002471	0.001970	-0.397430
	(0.04353)	(0.01782)	(0.00110)	(0.16778)
D(RIR)	0.984431	-0.318314	0.019117	-3.066864
	(1.30481)	(0.53431)	(0.03296)	(5.02953)
D(LNINV)	-0.062820	0.042081	-0.002887	0.406948
	(0.08339)	(0.03415)	(0.00211)	(0.32142)

5 Cointegrating Equation(s): Log likelihood -440.0197

Normalized cointegrating coefficients (standard error in parentheses)

AGE	AGY	EXR	LNIMP	RIR	LNINV
1.000000	0.000000	0.000000	0.000000	0.000000	0.056830
					(0.38466)
0.000000	1.000000	0.000000	0.000000	0.000000	-1.814007
					(1.29694)
0.000000	0.000000	1.000000	0.000000	0.000000	-112.0365
					(39.7285)
0.000000	0.000000	0.000000	1.000000	0.000000	-1.184430
					(0.23507)
0.000000	0.000000	0.000000	0.000000	1.000000	-0.904106
					(1.95136)

Adjustment coefficients (standard error in parentheses)

D(AGE)	-0.634591	-0.044949	-0.005238	0.062872	0.003510
	(0.11635)	(0.04821)	(0.00343)	(0.45227)	(0.01756)
D(AGY)	-0.404855	-0.543684	0.025464	-3.109110	-0.003896
	(0.35080)	(0.14536)	(0.01036)	(1.36360)	(0.05294)
D(EXR)	-1.444566	-0.058467	-0.000982	3.641648	0.948129
	(2.50914)	(1.03974)	(0.07407)	(9.75333)	(0.37869)
D(LNIMP)	-0.012359	0.001053	0.002739	-0.426393	0.013823
	(0.04269)	(0.01769)	(0.00126)	(0.16593)	(0.00644)
D(RIR)	1.080662	-0.228185	0.038782	-3.807589	-0.451900
	(1.28756)	(0.53354)	(0.03801)	(5.00489)	(0.19433)
D(LNINV)	-0.052491	0.051755	-0.000776	0.327443	0.012295
	(0.07979)	(0.03306)	(0.00236)	(0.31014)	(0.01204)

SHORT RUN

Dependent Variable: AGE
Method: Least Squares
Date: 12/11/22 Time: 19:52
Sample (adjusted): 1983 2021
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.903561	0.267647	3.375941	0.0019
D(AGY(-1))	0.271824	0.080427	3.379761	0.0385
D(EXR(-1))	-0.030726	0.013668	-2.248025	0.0539

D(IMP(-1))	-0.123275	0.059700	-2.064908	0.0274
D(RIR(-1))	-0.007200	0.016377	-0.439634	0.6632
D(INV(-1))	0.886750	0.902434	0.982620	0.6240
ECM(-1)	-0.587864	0.208096	-2.824961	0.0081

R-squared	0.905261	Mean dependent var	0.897052
Adjusted R-squared	0.874997	S.D. dependent var	1.516173
S.E. of regression	1.377135	Akaike info criterion	3.639036
Sum squared resid	60.68803	Schwarz criterion	3.937624
Log likelihood	-63.96121	Hannan-Quinn criter.	3.746167
F-statistic	2.343406	Durbin-Watson stat	1.857919
Prob(F-statistic)	0.054659		

DATA

YEAR	AGE	AGY	EXR	IMP	RIR	INV
1981	0.11669	12.24041	0.617708	24009719475	-65.8571	542327289.1
1982	0.519733	13.50269	0.673461	18320281663	-4.58618	430611256.5
1983	0.076946	14.99073	0.72441	13819524933	-8.02239	364434580.2
1984	0.045199	18.30836	0.766527	10654543434	4.342493	189164784.9
1985	0.044902	18.22764	0.893774	9102971491	2.343231	485581320.9
1986	0.409406	18.02043	1.754523	4243888500	4.310292	193214907.5
1987	0.519733	20.55211	4.016037	4953390194	-4.76964	610552091.5
1988	0.63006	23.37165	4.536967	5158953486	-2.96268	378667097.7
1989	0.740387	21.2756	7.364735	5067935235	-6.61241	1884249739
1990	0.850714	21.55626	8.038285	6908759515	17.46624	587882970.6
1991	0.96104	20.88528	9.909492	10261492773	0.990847	712373362.5
1992	1.071367	20.32116	17.29843	8990513022	-14.9872	896641282.5
1993	1.181694	23.49113	22.0654	9387575638	-7.05247	1345368587
1994	1.292021	25.17385	21.996	9518139662	-15.9202	1959219858
1995	1.402347	25.48651	21.89526	3995726172	-31.4526	335842165
1996	1.622144	26.19916	21.88443	3529749545	-5.26078	499276809.5
1997	0.079966	27.41665	21.88605	4335437770	12.12661	469577019.8
1998	0.099477	27.90837	21.886	3811716862	11.48467	299566658.3
1999	0.134313	26.02849	92.3381	12063839304	6.047248	1004915631
2000	0.005946	21.35724	101.6973	12017504097	-1.14089	1140167556
2001	0.006176	24.47535	111.2313	15736052593	12.1387	1190618644
2002	0.281333	36.96508	120.5782	15797454749	3.023542	1874070753
2003	0.009263	33.82706	129.2224	21866489427	9.935713	2005353563
2004	0.281333	27.23045	132.888	20982274513	-2.60485	1874060887
2005	0.009263	26.08928	131.2743	32626574561	-1.59368	4982533930
2006	0.361642	24.73499	128.6517	35911382104	-5.62797	4854353979
2007	0.76228	24.66258	125.8081	46644431092	9.187171	6036021405
2008	0.928697	25.27975	118.5667	64200972067	6.684909	8194071895
2009	1.137224	26.74885	148.88	49482726081	18.18	8555990007
2010	1.631811	23.8937	150.2975	70853002118	1.067736	6026253091
2011	6.129512	22.23471	153.8625	90793633765	5.68558	8841062051
2012	7.268343	21.85996	157.5	80874233958	6.224809	7069908428
2013	3.205081	20.75862	157.3117	76653930614	11.20162	5562857987
2014	0.434799	19.99025	158.5526	86447570348	11.35621	4693828632
2015	0.309646	20.63189	192.4403	71947444729	13.59615	3064168904
2016	0.16018	20.98311	253.492	46998259619	6.686234	3453258408

2017	0.232204	20.84657	305.7901	50934118759	5.790567	2412974916
2018	0.133974	21.20377	306.0837	71637362154	6.055977	775247400
2019	0.114395	21.9063	306.921	1.0082E+11	4.522188	862480116.2
2020	0.155382	24.14331	358.8108	72178439248	5.37128	2305099812
2021	0.264813	23.35706	410.7006	43536678296	1.227719	2385277666

SOURCE: I. World Development Indicators (2021)
II. Central Bulletin Of Nigeria (2021)