COMFORT OPEYEMI BABANIYI

EFFECT OF EXCHANGE RATE UNDERVALUATION ON ECONOMIC GROWTH IN NIGERIA

MASTER'S THESIS

2022

NEAR EAST UNIVERSITY

INSTITUTE OF GRADUATE STUDIES

DEPARTMENT OF ECONOMICS AND ADMINISTRATIVE SCIENCES

EFFECT OF EXCHANGE RATE UNDERVALUATION ON ECONOMIC GROWTH IN NIGERIA

MASTER'S THESIS

COMFORT OPEYEMI BABANIYI

Nicosia

February, 2022

NEAR EAST UNIVERSITY

INSTITUTE OF GRADUATE STUDIES

DEPARTMENT OF ECONOMICS AND ADMINISTRATIVE SCIENCES

EFFECT OF EXCHANGE RATE UNDERVALUATION ON ECONOMIC GROWTH IN NIGERIA

MASTER'S THESIS

COMFORT OPEYEMI BABANIYI

Supervisor

Prof. Dr. Hüseyin Özdeşer

Co-Supervisor

Assist. Prof. Dr. Mehdi Seraj

Nicosia

February, 2022

Approval

We certify that we have read the thesis submitted by **COMFORT OPEYEMI BABANIYI** titled **"EFFECT OF EXCHANGE RATE UNDERVALUATION ON ECONOMIC GROWTH IN NIGERIA**" and that in our combined opinion it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Economics and Administrative Sciences.

Examining Committee	Name-Surname	Signature
Head of the Committee:	Prof. Dr. Hüseyin Özdeşer	…..…..……
Committee Member:	Assist. Prof. Dr. Mehdi Seraj	…..…..……
Committee Member:	Assist. Prof. Dr. Ahmad Samour	…..…..……
Committee Member:	Assist. Prof. Dr. Andisheh Saliminezhad	…..…..……

Approved by the Head of the Department

…../…../2022

……..
Prof. Dr. Hüseyin Özdeşer
Head of Department

Approved by the Institute of Graduate Studies

…../…../2022

Prof. Dr. Kemal Hüsnü Can Başer
Head of the Institute

Declaration

I, Comfort Opeyemi Babaniyi hereby declare that this thesis entitled ‘effect of exchange rate undervaluation on economic growth in Nigeria’ has been prepared myself under the guidance and supervision of ‘Prof. Huseyin Ozdeser and Assist. Prof. Dr. Mehdi Seraj’ in partial fulfillment of the Near East University, Graduate School of Social Sciences regulations and does not to the best of my knowledge breach and Law of Copyrights and has been tested for plagiarism and a copy of the result can be found in the Thesis.

- The full extent of my Thesis can be accessible from anywhere.
- My Thesis can only be accessible from Near East University.
- My Thesis cannot be accessible for two (2) years. If I do not apply for extension at the end of this period, the full extent of my Thesis will be accessible from anywhere.

Comfort Opeyemi Babaniyi

…../…../…..

Dedication

This research work is dedicated to God Almighty who has given me the opportunity and grace to go through this work. To him alone be all the glory.

Acknowledgements

My profound gratitude goes to God Almighty, the omnipotent, omniscient, and omnipresent for sparing and giving me strength, patience, good health, knowledge and opportunity, to successfully complete my Master's program.

I owe a lot of thanks to my mother, Mrs. Babaniyi and my son Prosper for the support and efforts you gave me emotionally and financially throughout my academic career. God will grant you long life and you shall eat the fruit of you labor in Jesus name (Amen).

Lastly, I will like to express my profound gratitude to my supervisor Prof. Huseyin Ozdeser and co-supervisor Asst. Prof. Mehdi Seraj for their patience, guidance, mentorship, supervision and knowledge during the course of my research.

Comfort Opeyemi Babaniyi

Abstract

Effect of Exchange Rate Undervaluation on Economic Growth in Nigeria

Babaniyi, Comfort Opeyemi

Supervisor: Prof. Dr. Hüseyin Özdeşer
Co-Supervisor: Assist. Prof. Dr. Mehdi Seraj

MA, Department Of Economics and Administrative Sciences

February, 2022, 87 pages

The study examined the effect of exchange rate undervaluation on the economic growth in Nigeria, data used ranged from 1980 to 2020. The paper was a quantitative research work, and data were collected from secondary sources such as the World Bank, and Central Bank of Nigeria. Data used in this paper for the regression and modeling were GDP, GDPPC, INF, GOVC, TOT, TOPEN, and UNDERVAL. The thesis is built on the fundamental equilibrium exchange model. The ARDL bound test showed that there was co-integration between variables; both long run and short run results showed that UNDERVAL has a positive and significant relationship with GDP growth a proxy for economic growth, the ARDL long-run and short run showed that INF had a negative and significant effect on economic growth in Nigeria. Other Residual diagnostics test was used to check for irregularities in the variables result showed the non-existence of heteroskedasticity and serial correlation. The CUSUMsq showed that the variables were stable. However, the study's empirical research revealed that the exchange rate is associated with production growth in a favorable manner. As a result, the government should push export promotion techniques to maintain a surplus balance of trade, as well as create a favorable environment, appropriate security, efficient fiscal and monetary policies, and infrastructure facilities to attract international investors to Nigeria.

Key words: Exchange rate, Undervaluation, Economic Growth.

Özet

Nijerya'da Döviz Kuru Düşük Değerlemesinin Ekonomik Büyümeye Etkisi

Babaniyi, Comfort Opeyemi

Danışman: Prof. Dr. Hüseyin Özdeşer
Yardımcı Danışman: Yrd. Doç. Dr. Mehdi Seraj

Yüksek Lisans, İktisadi ve İdari Bilimler Bölümü

Şubat, 2022, 87 Sayfa

Çalışma, döviz kuru düşük değerlemesinin Nijerya'daki ekonomik büyüme üzerindeki etkisini inceledi, kullanılan veriler 1980 ile 2020 arasında değişiyordu. Makale nicel bir araştırma çalışmasıydı ve veriler Dünya Bankası ve Nijerya Merkez Bankası gibi ikincil kaynaklardan toplandı. . Bu belgede regresyon ve modelleme için kullanılan veriler GDP, GDPPC, EXR, INF, GOVC, TOT, TOPEN ve UNDERVAL'dir. Temel denge değişim modeli üzerine inşa edilen tez, Nijerya'da EXR ile ekonomik büyüme arasında pozitif ve istatistiksel olarak anlamlı bir ilişki ortaya koymuştur. Bu çalışma için sıfır hipotez reddedildi; dolayısıyla UNDERVAL'in Nijerya'daki ekonomik büyüme üzerinde olumsuz bir etkisi oldu. Analizleri yürütmek için Otomatik Gerilemeli Dağıtılmış Gecikme modeli kullanıldı ve sonuçlar, UNDERVAL'in ekonomik büyüme için bir vekil olan GSYİH büyümesi ile negatif ve anlamlı bir ilişkisi olduğunu gösterdi. ARDL sınır testi, değişkenler arasında eşbütünleşme olduğunu gösterdi; ARDL uzun vadede, INF'nin Nijerya'da negatif ve önemli bir ekonomik büyümeye sahip olduğunu gösterdi. Diğer Artık tanı testi, değişkenlerdeki düzensizlikleri kontrol etmek için kullanıldı, sonuç değişen varyans ve seri korelasyonun olmadığını gösterdi. CUSUMsq değişkenlerin kararlı olduğunu gösterdi. Bununla birlikte, çalışmanın ampirik araştırması, döviz kurunun üretim artışı ile olumlu bir şekilde ilişkili olduğunu ortaya koydu. Sonuç olarak, hükümet, uluslararası yatırımcıları Nijerya'ya çekmek için elverişli bir ortam, uygun güvenlik, etkin maliye ve para politikaları ve altyapı tesisleri yaratmanın yanı sıra, fazla ticaret dengesini korumak için ihracatı teşvik tekniklerini zorlamalı.

Anahtar Kelimeler: Döviz kuru, Değer düşüklüğü, Ekonomik Büyüme.

Table of Contents

CHAPTER IV

CHAPTER V

List of Tables

Page

List of Figures

Page

List of Abbreviations

ARDL:	Autoregressive Distribution Lag
FEER:	Fundamental Equilibrium Exchange Rate
GOVC:	Government Consumption
INF:	Inflation Rate GDP Deflator
EXR:	Exchange Rate
GDPPC:	GDP per Capita
INVT:	Investment
TOT:	Terms of Trade
TOPEN:	Trade Openness
GDP:	Gross Domestic Product Growth Percentage

CHAPTER I

Introduction

Background to the Study

The exchange rate has been highlighted as a significant economic variable that influences a country's economic growth owing to its direct effects on the domestic price level, resource allocation, investment, and profitability of traded products and services, among other things. Undervaluation of an exchange rate occurs when the value of a country's currency in foreign exchange is less than it should be based on economic conditions (Cam, 2019). Undervaluation of the exchange rate is used to increase exports, promote as well as attract foreign investment, and stimulate economic growth (Farok, 2019; Rodrik.2008).

In 1960, the Nigerian currency was equivalent to the pound sterling, and the naira exchange rate remained generally constant between 1973 and 1979. Following the US decision to stop her efforts to convert the US dollar into gold, international currencies such as the US dollar, Deutsche mark, French franc, Japanese yen, Dutch guilder, Swiss franc, and the Canadian dollar, among others, were made parallel (CBN, 2009). The value of the naira was purposefully increased to source inputs for economic growth from abroad. However, due to the distortion in the Nigerian economy caused by fixed exchange rates from 1960 to 1980, the Nigerian government implemented the Structural Adjustment Policy in 1986. As a result, the Structural Adjustment Programme tries to identify a realistic exchange rate for the naira and reorganize the economy's production base.

According to statistics from the Central Bank of Nigeria (CBN), its average exchange rate from 1981 to 1986 fluctuated from #0.6100 to #2.0206. The factors of quantity demanded as well as quantity supplied have set the exchange rate via the second-tier foreign exchange market since 1986. Since that day, the naira's exchange rate has just been declining in the foreign exchange market. The naira’s instability and repeated devaluation in the foreign exchange market have negatively affected Nigeria's economic growth. From 1986 to 1988, a Dual Exchange Rate System, the Dutch Auction System, and a Unified Exchange Rate System, among other things, were

implemented. This was done to get a reasonable exchange rate for the Nigerian currency and other key goals. The expansionary fiscal policy that resulted in increased demand pressure as a consequence of the merger from 1987 to 1988 worsen exchange rate depreciation (CBN, 2009), and the official exchange rate from 1987 to 1998 dropped within an average range of #4.0179 to #92.6934. (CBN, 2016).

Between 1999 and 2008, the Nigerian official exchange rate ranged between #92.33 and #118.517 (World Bank, 2012) under the Wholesale Dutch Auction System, which allowed banks to buy on their account and sell to their customers (CBN, 2009), and the Central Bank of Nigeria was designated as the primary supplier of dollars. From 2009 to 2015, the Nigerian official exchange rate averaged #148.88 to #192.44 (World Bank, 2017) under the Retail Dutch Auction System (RDAS), Wholesale Auction System, and Foreign Exchange Forward Market to minimize the demand for the dollar. With the onset of global economic crises and COVID-19, which resulted in a drop in crude oil prices on the international market, lowering the supply of the dollar, and increasing demand for foreign exchange, the official exchange rate ranged between #253.49 to #306.084 from 2016 to 2020. (World Bank, 2020). Thus, the Central Bank of Nigeria implemented tight monetary policies to remedy the country's insecure financial condition, intending to reduce inflation, increase national reserves, and strengthen the naira under the new flexible exchange rate system (CBN, 2020).

Statement of the Problem

The impact of exchange rate undervaluation on economic growth seems to have been a point of controversy among scholars, but no acceptable conclusion has been reached on the topic. According to Cam (2019), exchange rate undervaluation has been recognized as a catalyst for a country's economic growth since it helps raise exports, attracts foreign investment, and boosts economic growth. According to Béreau, Villavicencio, and Mignon (2012), undervaluation considerably boosts economic growth. Undervaluation increases exports and growth, but the magnitude of the undervaluation determines the rate of growth. Undervaluation, according to Elbadawi, Kaltani, and Soto (2011), is a critical component for long-term economic growth. According to Meja-Reyes, Osborn, and Sensier (2010), undervaluation serves as a regime in economic growth and has a positive influence. Therefore, any direction in which the exchange rate changes is a crucial element in economic growth.

According to Gala (2007), currency undervaluation is a vital component in development. According to Keynesian theory, undervaluation promotes exports, increases employment and investment, and encourages all sectors of industry to create more for export by boosting the level of technology in developing nations. According to Papanikos (2015), an undervalued Euro causes economic growth to increase, whereas Vaz and Baer (2014) claim that currency undervaluation does have a positive influence on economic growth. Rodrik (2008) concluded that overvaluation harms growth and undervaluation smoothes it.

On the other hand, Nouira and Sekkat (2012) believe that undervaluation does not promote economic growth, but rather leads to increased efficiency and growth. They went on to say that undervaluation has a favorable influence on exports but a negative effect on other economic aspects, thus the overall effect may be negative. Some scholars, such as Eichengeen (2008), have failed to uncover a critical connection of transmission among both exchange rate undervaluation as well as economic growth. There's also a lack of agreement among researchers that the study is intended to investigate the effect of exchange rate undervaluation on Nigeria's economic growth.

Research Questions

- Does the undervaluation affect the growth of Nigeria's economy?
- Is there any substantial link between undervaluation and growth in the Nigerian economy?
- Does the undervaluation have a causal link with growth in Nigeria?

Objectives of the Study

The objectives of the study are to;

- Verify the impact of undervaluation on the growth in Nigeria's economy.
- Take a look at the link between undervaluation and growth in the Nigerian economy.
- To decide the causal link undervaluation have with growth in the Nigerian economy**.**

Hypothesis of the Study

The following null hypotheses have been developed to provide significant results, conclusions, and recommendations:

$H_0$1: undervaluation has no significant impact on the growth of the Nigerian economy.

$H_0$2: Undervaluation does not have a causal link with growth in the Nigerian economy.

Significance of the Study

The importance of the exchange rate cannot be overstated since it has a direct impact on domestic pricing levels, the viability flows of goods, resource distribution, and financial choices in Nigeria. This study is expected to be useful to the government, Nigeria's central bank, and the general public in the following ways.

The research will help the government provide directions for allocating foreign exchange to certain or crucial sectors of the economy. Investors will be enticed to invest in this sector as a result of this. The goal is to capitalize on the potential prospects in such sectors to enhance economic productivity.

The research findings would also be useful to financial institutions like the Central Bank of Nigeria in their pursuit of a consistent exchange rate policy. The Apex Bank's consistent exchange rate policy will help in the preservation of the domestic currency's external worth.

The research will help the general public understand the effect of exchange rates on the Nigerian economy, as well as position them to advise the government and some of these financial institutions, such as the Central Bank of Nigeria, on how to devise, modify, and implement better foreign exchange policies for the economy.

Finally, researchers will most likely profit from this work as reference materials for further research.

Scope of the Study

The thesis would concentrate upon the effect of exchange rate undervaluation on Nigerian economic growth. The study will span forty years (1980-2020) and will

rely on secondary data from the World Bank and the Statistical Bulletin of the Central Bank of Nigeria.

Contribution of the Study

However, another cornerstone study came in 2008 by Rodrik. Rodrik (2008) departed from the consensus as it concluded that a disequilibrium – an undervaluation of the real exchange rate- was contributing to growth. This has intensified the interest in research studying the role of real exchange rates on economic growth. This paper is in line with these recent works of literature. More specifically it aims to investigate if an undervaluation of the real exchange rate – a disequilibrium – has a positive impact on growth.

To do so, this study uses Rodrik's (2008) paper, "The real exchange rate and economic growth," as a benchmark to carry out a times series data to analyze the impact of exchange rate undervaluation on economic growth. The thesis collected data from Nigeria from 1980–2020. We used the fundamental equilibrium exchange rate (FEER)-based approach to estimate the misalignment measure – Undervaluation -. Then we use this measurement as an explanatory variable in a standard growth study.

We intend to contribute to the literature in two folds: First, we use a dynamic econometric estimation technique – ARDL – hence getting a better estimation result. To the best of our knowledge, this paper is one of the first to use the dynamic estimation approach in this field. Second, we included currency undervaluation as explanatory variables. There are few studies on this study that did this before.

Outline of the Study

The research will be spilt into five sections, the first of which will be an introductory section. The second chapter will be a survey of the literature, which consists of conceptual concerns, theoretical framework, and empirical literature. The third chapter will focus on methodology, including research design, data types and sources, model specification, and techniques of analysis will be discussed. The fourth chapter will cover data presentation and analysis, which will include presentation of data, analysis of data, and results interpretation, as well as discussion of findings. The fifth chapter will contain a summary of the results, conclusion, recommendations, and

limits of the study, as well as suggestions for further research and contributions to knowledge.

CHAPTER II

Literature Review

A review of relevant literature is the focus of this chapter. It is divided into three sections: conceptual, theoretical, and empirical review.

Analysis of Conceptual Questions

Concept of Exchange Rate

Different authors and academics have defined the principles of the exchange rate in various ways due to their diverse opinions on the term. The exchange rate, according to Jhingan (2003), is the rate at which a country's currency is exchanged for the currencies of other countries. He continued, " That it's the worth of a currency of a country to the value of another country's currency." Considering the exchange rate between the Nigerian naira and the US dollar, for example. It is the number of nairas needed to purchase one dollar. In the foreign exchange market, the exchange rate is the amount for which a nation's currency trades against the other. A conventional measure of the amount of local money per unit currency of another country is an exchange rate.

According to Ahuja (2013), '' The value of a country's currency in relation to another country's currency is called an exchange rate. Thus, the exchange rate is the price of domestic currency in relation to foreign currencies, which is required if a country desires to engage in foreign exchange operations. cost of one currency to another is also known as the exchange rate (Udenwa & Uwaleke, 2015). The amount at which one currency will be exchanged for another is then referred to as an exchange rate.

Thus, the working definition of exchange rate can be seen as the value of a Naira/Kobo to other countries' currencies at the foreign exchange market.

Concept of Exchange Rate Undervaluation

Undervaluation of an exchange rate occurs when the value of a country's currency in foreign exchange is less than it should be based on economic conditions (An. et. al., 2019). Undervaluation of the currency is used to increase a country's

exports, encourage and attract foreign investment, and stimulate economic growth. The deliberate downward adjustment of a country's currency is known as exchange rate undervaluation. It is an official exchange of a nation's currency for another nation's currency to achieve macroeconomic goals (An. et. al., 2019).

Undervaluation of an exchange rate occurs when the exchange rate of a currency is lower than it should be. Currency undervaluation is a levy on imports as well as a subsidy for exporters. Currency undervaluation lowers domestic production costs in terms of international currencies, whereas import tariffs raise costs. When a country's currency has a low value in foreign exchange, it's been suggested that it's undervalued. Undervaluation of an exchange rate makes a country's goods (export) more affordable in the global market while increasing the cost of imports (Byju's, 2021).

Concept of Economic Growth

Several scholars have defined the term economic growth in various ways based on their interpretation of what the term means. Economic growth, according to Todaro and Smith (2006), is a process in which a country's production capacity increases through time, resulting in higher levels of national output. A rise in output is known as economic growth. It is linked to a growth in the country's per capita income, as well as an increase in the labor force, consumption, capital, and trade volume (Jhingan, 2007). It follows that economic growth refers to any continuous activity that increases production capacity over time to improve people's well-being. Furthermore, growth is associated with a consistent rise in the nation's per-capita income as well as output that can be measured.

According to Lipsey and Chrystal (2007), economic growth is the driving force behind long-term increases in the standard of living. They went on to say that every economy must ride four major determinants or wheels of growth to achieve a certain level of economic growth. Wealth creation, human capital, environmental assets as well as technological change are the four characteristics. Economic growth entails an increase in income or per capita income, productivity, goods, capital, institutional changes, and so on. More precisely, in terms of the definition of economic growth, if economic growth is to be defined, a rise in per capita income or production must be "maintained." When we say "sustainable rise in income per capita," we're referring to

a long-term rising trend in income per capita. A temporary gain in income per capita including that encountered across the overall economy, cannot be explained as economic growth. (Ahuja, 2013).

Economic growth is a consistent and quantifiable rise in a country's economic real national income, per capita income, or output over a long period, followed by an expansion in its volume of trade, consumption, capital, and labor force.

Review of Theoretical Literature

Many theories have been proposed to explain and link the exchange rate, undervaluation, and economic growth.

The Theory of Exchange Rates

Marshall-Lerner Condition. This hypothesis was suggested by Alfred Marshall and Abba Lerner. They claim that devaluation improves a nation's public finances when the overall price differences of purchases for exported and imported goods are greater than one.

Assumptions of the Marshall-Lerner Condition. According to Thirlwall (1980), the elastic technique to the study of balance-of-payments modification based on the Marshall-Lerner condition is characterized by the following assumptions:

- The research is partial equilibrium in the sense that it solely considers the impact of exchange rate fluctuations on export and import markets, while all other variables are maintained constant. As a consequence, the export and import demand curves retain their positions. Price changes are influenced by changes in the exchange rate, causing demand curves for exports and imports to shift. Income changes as well, impacting demand curves for exports and imports.
- The values of exports in the country's currency do not emerge as demand emerges, the value of imported goods competing with exports does not fall as demand decreases, the value of imports in foreign currency does not fall as demand for imports falls, and the value of local goods competing with imports does not rise as demand for import substitutes rises. The four supply elasticities to evaluate are export

supply elasticity, supply elasticity of foreign products that compete with exports, supply elasticity of foreign goods that compete with imports, and supply elasticity of domestic goods that compete with imports.

Devaluation helps enhance a country's balance of payments if the total of price elasticities of demand for export and import in relative terms is more than unity, i.e., ex + em > 1.

Where

e_x = export demand elasticity

E_m = import demand elasticity.

Devaluation, on the other hand, will worsen the Balance of Payments if the total of the price elasticities of demand for export and import is less than one, ex + em <1. Devaluation has no influence on the Balance of Payments position if the absolute total of these elasticities equals one, ex + em = 1.

The Marshall-Lerner condition works in the following way to eliminate a devaluing country's balance of payment deficit.

Devaluation lowers domestic export prices in relation to the foreign currency. Exports increase when prices are low. How far they have gone rise is determined by the elasticity of export demand. The type of the good purchased, as well as market characteristics, have an impact.

The demand elasticity for a country's exports will diminish if it is just exporting raw commodities. Competing with other countries by exporting machinery, tools, and industrial products, demand for its goods would have high elasticity, and devaluation would be effective in reducing a shortage.

Devaluation increases the domestic price of imports, thus, reducing the number of goods imported. The amount by which import volume will fall is determined by import demand elasticity. In turn, the type of products imported by the devaluation nation determines the demand elasticity of imports.

Its demand elasticity for imports will fall if it imports manufactured products, natural resources, and industrial inputs. Devaluation will only help to fix a balance-of-payments deficit if the import elasticity of product demand is significant. Devaluation improves the balance of payments when the total demand elasticity for imports and export is greater than one.

The Monetary Approach to Exchange Rates. Polak proposed the monetary approach in 1950. (Polak,1957). The Exchange rate is decided by harmonizing the overall demand and supply per each country's currency, according to the monetary method. The demand for money is determined by the amount of actual income, the overall level of prices, as well as rate of interest. Money demand is directly proportional to actual income and market price and inversely proportional to the interest rate. The monetary authorities of many nations set the supply of money on their own. (Mehare & Edriss, 2013).

***Assumptions of the Monetary Approach to Exchange Rate*.** The foreign currency market is considered to be in equilibrium or at the interest parity price level from the outset, and the rate of interest is expected to be the same.

The monetary authority of the home country is thought to boost the money supply. According to the PPP hypothesis, it will also result in a devaluation of the national currency.

For example, if Nigeria's Central Bank raises money supply by 5%, prices would rise by 5% and the Naira will depreciate by 5% against the dollar over time. The interest rate is anticipated to reduce, given the increased demand for money. The rise in money supply and the resulting drop in interest rates would have an immediate effect on Nigeria's financial markets and currency rates. The drop in Nigeria's interest rate may result in increased Nigerian financial investments in the United States.

The monetary approach to determining the exchange rate can be deduced as follows:

Country 1 is Nigeria, while country 2 is the United States of America. When the demand for money (Md) equals the supply of money (Sm), the economy is said to be in balance., each of them reaches monetary equilibrium (Ms).

$M_{d1} = M_{S1}$ (2.1)

$M_{d2} = M_{S2}$ (2.2)

The two countries are denoted by subscripts 1 and 2.

$M_{S1} = K_1P_1Y_1$ (2.3)

$M_{d2} = K_2P_2Y_2$ (2.4)

Where;

In two nations, the desired nominal money balances to nominal national income rates are K1 and K2.

P_1 and P_2 = the two countries' price levels,

Y_1 and Y_2 = the two countries' real national incomes or outputs.

When we divide equation (2.3) by (2.4), in two nations, we have the monetary equilibrium conditions.

$$\frac{MS1}{MS2} = \frac{K1P1Y1}{K2P2Y2}$$

$$\frac{P1}{P2} = \frac{MS1}{MS2} \text{ X } \frac{K1Y1}{K2Y2}$$

According to PPP theory, P1/P2 is the exchange rate (R).

Thus;

$$R = \frac{MS1}{MS2} \text{ X } \frac{K2Y2}{K1Y1} \quad (2.5)$$

R will stay constant as long as MS1 and MS2 remain constant in the US and K1 and Y1 remain consistent in Nigeria. MS1 and R changes are proportionate, whereas MS2 changes are inversely proportional.

Some key aspects of the monetary approach and equation should be noted (iii). This strategy is founded on the PPP theory, first and foremost. Second, the preceding reasoning presupposes that the two nations' interest rates are originally equal. The interest rate in Nigeria is lower when the money supply is increased, which is reflected in a change in real income. Third, with no flow or change in reserves, the exchange

rate adjusts to clear each country's money markets. Finally, the exchange rate is influenced by each country's anticipated inflation rate.

Shortcomings of Monetary Theory to Exchange Rate. It has placed an overabundance on importance of money is emphasized, whereas trade as a factor of the foreign exchange rate receives minimal attention.

Monetary exchange rate models have performed poorly in terms of forecasting ability. This approach has been rejected by market efficiency tests.

The Portfolio Balance Approach to Exchange Rate Determination. If the home country's money supply is increased, the interest rate lowers instantly, according to the portfolio balance technique. As a consequence, the asset portfolio switches from domestic to domestic and international bonds. When domestic bonds are replaced by foreign bonds, the native currency depreciates instantly. Exports rise while imports fall as a result of the devaluation. It results in a trade surplus, which leads the domestic currency to gain, partially offsetting the initial devaluation (Mbutor & Al-Hassan, 2013). The following equations show how to apply the portfolio balance approach:

$$W = M + D + RF \quad (2.6)$$

Where

W = wealth,

M = nominal money balances demanded by domestic residents

D = demand for domestic bonds.

R= rate of exchange

RF = foreign bonds.

Thus, the equation can also be written as:

$$RF= W-M-D \quad (2.7)$$

$$M = a(r,k)\ w \quad (2.8)$$

$$D = b\ (r,k)\ w \quad (2.9)$$

$$RF = c\ (r,k)\ w \quad (2.10)$$

M is linked to W by coefficient a, D is linked to W by coefficient b, and RF is linked to W by coefficient c. The coefficients a, b, and c all are variables of the

domestic interest rate (r) and the foreign interest rate (r), respectively (k). It is assumed that the total of the a, b, and c coefficients is one. M has inverse relationships with both r and k, while D has direct relationships with both r and k. The link between RF and r is inverse, however, the relationship between RF and r' is direct. D rises as r rises, whereas M and RF fall. Increases in k boost RF while lowering M and D. As a consequence of saving, W increases over time. W causes M, D, and RF to rise.

Shortcomings of Portfolio Balance Method. The portfolio balance method is not without flaws.

It disregards real income as a factor influencing the exchange rate.
It does not address trade flows.
It gives expectations no role.
Empirical studies on the subject have yielded conflicting results.

Exchange Rate Purchasing Power Parity Theory (PPP). Gustav Cassel devised the purchasing power parity hypothesis in 1920 to calculate the exchange rate between nations with non-convertible paper currencies. The exchange rate between two nations is established at a point when both currencies' buying power is equal and is defined by their respective price levels. This is the fluctuating rather than fixed purchasing power parity.

"The quotients of the Purchasing Powers of the different currencies," Cassel defines purchasing power parity (Jhingan, 2003). According to the theory, the relative value of various currencies is determined by the connection between each currency's actual buying power in its home nation. It implies that in any nation, we should be able to get the same bundles of products for the same price. It also explains the exchange rate's equilibrium value in terms of inflation differences between two countries.

The purchasing power parity theory is divided into two types: absolute and relative. According to the absolute version, "the rate of exchange between currencies should be comparable to the ratio of the two nations' price indices." This version isn't utilized since it overlooks transportation costs as well as other trade barriers including non-traded items, capital flows, and real buying power. Economists use the relative version as a consequence of this. The purchasing power parity hypothesis may be presented in the following way using an example: Assume a basket of goods and services costs #20 in Nigeria and $5 in the US, with both nations using non-convertible

paper money. The rate of exchange between the two countries will be $5=#20 and $1=#4. (Antweiler, 2019)

The cost of shipping products from one nation to another, including customs and taxes, will, in reality, change the parity.

Purchasing Power Parity Theory Criticism. Calculating the purchasing power of a currency is difficult and accomplished with the use of index numbers which is not reliable.

The purchasing power parity hypothesis is designed for a static environment, but in actuality, the world is dynamic. Money and pricing circumstances, tariffs, and other factors are continually changing, making it hard to arrive at a stable rate of exchange conclusion.

Many balance of payments items, such as insurance and banking transactions, as well as capital transfers, are unaffected by changes in general price levels.
The Purchasing Power Parity (PPP) idea compares two nations' overall price levels without distinguishing between domestic and foreign commodities (Ahuja, 2013).

The Exchange Rate Mint Parity Theory (MPT). The mint parity hypothesis of currency rates was proposed by Wheatly in 1802. "The Mint Parity theory can be applied to countries that utilize the same metallic standard (gold or silver)," according to Aahana (2019). The weight of gold of a specified purity contained in a currency unit determined its value under the gold standard. The country's central bank was always willing to buy and sell gold at the agreed-upon price for an indefinite period. The mint price was the expense of transforming the country's traditional monetary unit to gold. The mint par of exchange, also known as mint parity, was a rate of exchange determined by comparing the metallic contents of two currencies on a weight-to-weight basis. As a consequence, the fundamental rate of exchange between the two currencies was determined by their mint par values.

The Mint Parity Theory Assumption. The gold standard establishes certain exchange rate boundaries that cannot be exceeded.

It's possible that the real and equilibrium exchange rates aren't the same.

Objections to the Mint Parity Theory. It is unrealistic.

The theory was based on the assumption of free international gold movements. Modern governments prohibit the free purchase and sale of gold on an international scale. Thus, it is not relevant.

At the moment, the majority of countries use non-convertible paper currencies. The exchange rate in such a system can't be determined by the mint parity theory.

Theory of Exchange Rates Undervaluation

Model of the Balassa–Samuelson Effect. The Balassa-Samuelson effect, according to Rodrik (2008), states that when nations achieve great productivity growth in tradable sectors, non-tradable prices increase and currencies appreciate, shifting them from a lower-income to a higher-income position. As a consequence, the currencies of higher-income nations are likely to appreciate more. The relative productivity growth rates in the traded and non-traded sectors, according to the theory's tenant, drive exchange rate movement. In a small open economy where the price of tradable is set at global prices since labor is transportable across sectors, higher productivity in the tradable sector leads to higher salaries in both the tradable and non-tradable sectors. Better wages in the non-tradable sector, from the other side, lead to higher non-tradable relative prices without a commensurate increase in production. As a result, the local currency gains value.

Model of Fundamental Equilibrium Exchange Rates (FEER). The model was credited to Williamson in 1994 and developed in response to the shortcomings in Rodrik's real exchange rate (RER) model (Berg and Miao, 2010). The model was created to find the actual exchange rate's equilibrium level by attaining internal and external balances (Rapetti, 2020). The models used major economic factors such as terms of trade, degree of trade openness, productivity, investment, government consumption, and the stock of net foreign assets to achieve this (Hinkle and Montiel 1999).

Behavioural Equilibrium Exchange Rate (BEER). Clark and MacDonald (1999) propounded the BEER technique. They considered this approach as a fairly broad approach to modeling equilibrium exchange rates. The constraint that the current account equals zero in equilibrium is, however, a crucial aspect of most BEER implementations. Furthermore, the BEER is comparable to variants of the internal-external balance technique such as the FEER. The BEER approach allows for the use

of a theoretical (real) exchange rate model to get a measure of the equilibrium exchange rate and, by extension, exchange rate misalignment.

The BEER method has some advantages over other internal-external balancing approaches, particularly the FEER. The BEER has the potential to capture all systematic and fundamental movements of exchange rates and can be subjected to rigorous statistical testing in terms of various metrics such as mean reversion speed. The BEER is also a very tractable method for determining an equilibrium exchange rate, based on a single equation and either time series or panel data (Faruqee,1989)

The Internal-External Balance (IEB) Approach. The equilibrium exchange rate, according to this viewpoint, is the rate that fulfills both internal and external balance. It's comparable to BEER and has long been the most popular method for determining an equilibrium exchange rate and identifying deviations from Purchasing Power Purity. In a normative sense, the approach placed a greater focus on the structure in determining the exchange rate.

The IEB approach is expressed in the equation below

$S(W) - I(X) = CA(q,y) = -KA(Z)$

Where;

S = National Savings

I = Investment Spending

W,X,Y,Z= Vectors of Variables

q= Real exchange rate consistent with internal balance.

Exchange-Rate System

A country's monetary authority (typically the Central Bank) uses an exchange rate regime to establish the value of its currency about other currencies. It's also known as the exchange rate system, which determines how much a native currency is worth in comparison to other currencies. Exchange rate regimes are traditionally divided into fixed and flexible regimes based on how flexible the central bank is when it comes to changing or varying exchange rates. However, based on actual national practices and the degree of monetary policy independence, the IMF has recently divided the regimes into three broad categories: hard exchange rate pegs, soft exchange rate pegs, and floating exchange rate regimes. As a result, for clarity, we use the IMF's most current categorization**.**

Hard Exchange Rate Peg (Fixed Exchange Rate Regime). Because its interest rates and exchange rate policies are connected to the nation of the anchor currency, this is an exchange rate regime that denies member countries' central banks the ability to conduct autonomous domestic monetary policy. According to the International Monetary Fund (IMF,2008), hard pegs are often associated with good fiscal and structural policies as well as low inflation. For all foreign currency transactions, a country's exchange rate is set under a hard peg regime. The value of a country's currency may be set against a single currency, another measure of value such as gold or Special Drawing Rights (SDRs), or a basket of currencies under this arrangement. The weights show the nations' proportion of international commerce, such as overall trade weight, export weight, import weight, or where external debt is dominating. In certain circumstances, governments abandon their currencies entirely and replace them with foreign currencies as legal currency.

The major reason for a fixed exchange rate system is that it protects monetary authorities' credibility. As a result, it is stated that if establishing monetary policy credibility becomes difficult locally, it may potentially be imported by fixing a currency's value to a hard-money nation (Velasco, 2000). As a consequence, the majority of nations using this approach have their currencies pegged to countries with low inflation. In addition, the system can cut interest rates, limit exchange currency concerns, and assure a stable financial sector. The hard exchange rate peg includes;

Currency or Monetary Union. This is a currency exchange rate system in which a group of nations agrees to use the same legal tender currency. By agreeing to this, the nations that make up the union immediately give up their independence in favor of a unified monetary policy. All member nations use an internally fixed exchange rate, but the single currency is permitted to float freely outside. As a result, joining a currency or monetary union entails giving up total control of domestic monetary policy to the monetary authorities.

Formal Dollarization. When a nation adopts a major foreign currency or the currency of a dominating economy as its domestic currency or legal tender, this is known as a currency substitution. As monetary policy is assigned to the anchor nation, the monetary authorities entirely relinquish control of domestic monetary policy. This agreement included nine nations as of 2004. Ecuador, for example, has made the dollar its official currency (Obadan, 2012). This is the most difficult variation of the pegged regime.

Currency Board. When a group of nations is required by law to exchange their domestic currencies for a designated foreign currency at a set exchange rate, a Currency Board is formed. The monetary authority is legally required to uphold this pledge by guaranteeing that local currency in circulation and bank reserves are fully supported by foreign assets under this system. Although the conventional central bank roles of monetary management and lender of last resort are no longer available, depending on how rigorous the currency board arrangements' banking restrictions are, some flexibility may still be available (IMF, 2003). In a nutshell, a currency board consists of three (3) elements: a set exchange rate between a country's currency and an anchor currency; automatic convertibility; and a long-term commitment to the system, which is often expressed expressly in the central bank's statute. However, as Sozovska (2004) points out, a currency board system can only be trusted if the central bank maintains official exchange reserves large enough to cover the whole monetary base currency plus the cash reserves of banks with the central bank.

Soft Exchange Rate Peg. This is a hybrid exchange rate system that combines fixed (hard peg) and floating (floating) exchange rates. The central bank's domestic monetary policy is constrained by the soft peg. Currency values are kept steady by comparing them to an anchor currency or a basket of currencies under this arrangement. This is accomplished by allowing the exchange rate to fluctuate around a nominal anchor within a narrow band of less than 1% or a wide band of up to 30%, or by adjusting the exchange rate up or down periodically in response to quantitative economic indicators such as inflation differentials between anchor countries.

The monetary authority maintains stability by ensuring that foreign exchange interventions are carried out to ensure that the fixed parity is maintained. To maintain stable parity, interest rates, and foreign exchange might be changed, among other things. The monetary authority, on the other hand, is not committed to focusing all of its monetary (and, on occasion, fiscal) policies on maintaining parity. Soft pegs, on the other hand, are less likely to persist due to their vulnerability to financial crises, which may result in substantial devaluations or even the abandoning of the peg (IMF, 2001 and 2008). The following are some examples of soft peg programs:

Conventional Fixed Peg**.** The exchange rate is permitted to move in a restricted range of less than one percent around the fixed-rate, which is tied to a currency or

basket of currencies of the key financial or trade partners. Alternatively, for a brief period of at least three months, the exchange rate's maximum and minimum values may be permitted to fluctuate within a limited range of 2%. The fixed-rate is maintained by direct and indirect monetary policy actions, albeit it is not irreversible.

***Horizontal Band*.** The exchange rate is linked to a single currency or baskets of currencies at a predetermined rate and permitted to move within a range around the fixed (central) rate, which is conceptually comparable to a conventional fixed peg. However, since the range around the fixed rate is significantly broader than 1%, the approach is gentler. The European Exchange Rate Mechanism (ERM), also known as the ERM II, is a good example of this sort of structure. In the ERM II, a currency may float against the euro between a margin of at least 1% and 15% of the central rate. Under this system, the band width determines the degree of monetary policy reliance.

***Crawling Peg*.** This is an exchange rate system in which the exchange rate is modified in tiny percentages at a pre-determined fixed rate or in response to changes in specified quantitative economic indicators, most notably inflation differentials regularly. Disparities in previous inflation, discrepancies in goal and forecast inflation of key trade partners, and differences in domestic and major trading partner inflation rates are all examples of inflation differentials. Forward-looking (set at a pre-determined fixed rate and/or below predicted inflation differentials) or backward-looking (set at a pre-determined fixed rate and/or below projected inflation differentials) adjustments to the exchange rate may be made (set to create inflation-adjusted changes in the exchange rate). The crawling peg combines the flexibility required to handle differing inflation patterns across nations with reasonable certainty about future currency rates that matter to importers and exporters (Obadan, 2012).

***Crawling Bands*.** The currency is pegged within a broad band of at least 1% around a central rate in a crawling band, although the band or central rate is modified regularly at a predetermined set rate or to reflect changes in specified quantitative economic indicators. Around a creeping center rate, the bands are either symmetric (with identical upper and lower bounds) or asymmetrically widening (different upper and lower limits). The promise to keep the currency rate within a band, like the crawling peg, limits the flexibility of monetary policy. As a result, the band width affects the level of policy independence. Crawling band adjustments may be made in both directions.

Tightly Managed Float. A tightly managed float is a system in which foreign currency market interventions take the form of extremely close monitoring to maintain the exchange rate generally constant but without any specific trend. The central bank's action may be direct or indirect, depending on factors such as the balance of payments, foreign reserves, parallel market movements, and so on. To put it another way, this system permits the exchange rate to be established by the market, but the Central Bank actively monitors and intervenes in the market to regulate the rate and avoid significant volatility.

Flexible (Floating) Exchange Rate Regime. This is an exchange rate regime in which the international value of a currency is set at any given moment in time by the interplay of market forces of foreign exchange demand and supply. This approach enables the market to control the exchange rate by allowing for a continual exchange rate adjustment in response to changes in foreign currency demand and supply. As a result, it avoids the difficulty of determining the exchange rate, as in the case of a fixed exchange rate system. As a result, nations with flexible exchange rate regimes have the benefit of preserving monetary policy independence. A flexible exchange rate structure also equilibrates the demand for and supply of foreign currency by adjusting the exchange rate rather than the reserve level, as opposed to a fixed exchange rate system that results in changes in the number of foreign exchange reserves and the monetary base. Flexible exchange rate regimes are categorized based on their degree of flexibility, which is mostly determined by the amount of foreign currency intervention.

Free Floating. A free-floating exchange rate system (also known as clean floating) is one in which the exchange rate is decided at any given moment by the interplay of market forces of foreign currency demand and supply. In other words, in a free-floating system, the exchange rate is solely set by the market, and the government does not interfere in the process of deciding or maintaining a specific exchange rate. However, this is not the case in reality, since monetary authorities use official foreign exchange interventions from time to time to try to limit the pace of change and avoid excessive volatility in the currency rate that is not supported by economic fundamentals. However, central banks in a few nations (such as New Zealand, Sweden, Iceland, the United States, and those in the euro area) nearly never

interfere to regulate currency rates (Stone et. al., 2008). In a free-floating system, monetary policy is therefore in theory independent of exchange rate policy.

Managed Floating. Managed floatation, sometimes known as filthy floatation, is comparable to free floatation but offers less freedom. A managed floating system is one in which the government controls exchange rate movements by active, direct, or indirect action to stabilize the long-term trend of the exchange rate without setting a fixed exchange rate route or having a specified exchange rate objective. Typically, governments are concerned that excessive appreciation or depreciation of the exchange rate may jeopardize trade competitiveness, therefore they interfere either directly or indirectly. Correction of the balance of payments difficulties, regulation of domestic inflation levels, the buildup of foreign reserves, correction of parallel market inefficiencies, and other reasons for intervention are only a few of the reasons for intervention. As a result, the managed float method of currency rate management mirrors reality, and it has been more popular in recent years.

Differences of Fixed and Floating Exchange Rate Regimes About Influencing The Economic Growth. According to Mitchell (2020) the exchange rate regime is an important instrument for enhancing economic performance, because it affects a country's macroeconomic stability and competitiveness, As a result, choosing an exchange rate regime is difficult, especially for transition economies and it is dependent on the country's macroeconomic policies and general economic status. There is no optimal exchange rate regime for transition economies, according to Dornbusch and Rudiger (1994), because different regimes contribute differently in different countries. The nature of the shocks is crucial to the traditional debate between fixed and flexible regimes (Dornbusch, Rudiger, 1994). Standard models suggest that floating rates are preferable when the disruptions are predominantly monetary and international because exchange rate movements can effectively protect the home economy.

When shocks are mostly caused by erratic domestic monetary and financial policies, fixed exchange rates are desirable because they help to discipline wayward policymakers. Flexible exchange rate proponents argued that these regimes are more effective than fixed exchange rates at correcting the balance of payments imbalances. Furthermore, they emphasized that variable rates help the accomplishment of internal balance and other economic objectives by allowing a country to reach external balance

quickly and automatically. Flexible exchange rates, on the other hand, according to proponents of fixed exchange rates, reduce the volume of international commerce and investment, are more likely to lead to destabilizing speculation, and are inflationary by introducing a level of uncertainty not present under fixed rates. Furthermore, the ability to absorb shocks, which is one of the most enticing qualities of floating exchange rates, has recently been questioned.

According to Cooper (1999), it is suggested that nations with flexible exchange rates, with the exception of those with well-developed and sophisticated markets, as a result of greater capital mobility, the volatility in the actual value of domestic assets will rise. Excessive real-value changes in domestic assets may jeopardize stability. The presence of substantial trade-offs between credibility and flexibility is emphasized in the current literature, which also considers the extreme arrangements of flexible and rigid regimes.

A floating regime allows a country to have its monetary policy, allowing the economy to adjust to domestic and international shocks like changes in trade and interest rates. This flexibility, however, comes at the expense of some credibility, which is connected to higher inflation. Fixed exchange rates, on the other hand, restrict flexibility while enhancing reliability.

Nigeria's Administration of Foreign Exchange

Fixed, flexible, and hybrid or variant exchange rate regimes have all been used at different times in Nigeria's economic history, depending on the prevailing economic conditions and the Federal government's overall development objectives. The shifting pattern of international commerce, institutional changes, and structural shifts in production have all altered Nigeria's foreign exchange practices.

No-definition-exchange-rate-regime period (Before CBN). Agriculture was the primary source of foreign currency until the CBN was established in 1958 and the Exchange Control Act was enacted in 1962. Private firms earned foreign money during the period, and commercial banks operated as agents for local exporters, keeping their foreign exchange balances in foreign banks. Because the Nigerian pound was pegged at par with the British pound sterling at this time, foreign currency management was rudimentary and underdeveloped. However, with the establishment of the CBN in 1959 and the arrival of additional export items other than agriculture (particularly

crude oil), Nigeria's trade partners grew, necessitating the development of effective foreign currency management measures.

Fixed-Exchange-Rate System (1959–1986). The term "fixed exchange rate regime" refers to a period when the country's currency rate was set and regulated by the monetary authorities, leaving little space for market factors such as demand and supply. Between 1959 (when the CBN began operations) and June 1986, this period was known as the "CBN era" (when the Structural Adjustment Programme, SAP, was introduced). Between 1959 and 1967, the government used ad hoc or administrative means to determine the exchange rate of the Nigerian pound, which was set at par with the British pound sterling until November 1967, when the British pound sterling was devalued by 10%. The Nigerian government chose to establish its exchange rate system, apart from the pound sterling, from this point on.

As a result, the monetary authorities designated the United States dollar as one of the reserve currencies for setting the Nigerian pound's exchange rate. Following that, the currency of the nation was pegged to a basket of seven currencies (US dollar, the Deutsche mark, the Swiss franc, the French franc, the Dutch guilder, the Japanese yen, and the Canadian dollar). Based on their country's proportionate trade share with Nigeria, each of the seven currencies was allocated distinct weights. To limit the occurrence of arbitrage in the naira exchange rate quote, the "one currency intervention system" was implemented in 1985. The value of the Nigerian currency was decided by quoting it against a single currency, the US dollar, at any given moment, and this rate was then used to calculate the exchange rate of Nigeria's trade partners' currencies.

Exchange Rate System with Flexibility (1986 June to date). In 1986, the SAP framework's strategy of currency rate liberalization gave way to Nigeria's variable exchange rate regime. The foreign exchange administration was liberalized under this system, and the exchange rate was left to the forces of demand and supply to decide. The dual exchange rate system, consisting of a first and second-tier foreign exchange rate market, was established in September 1986. (SFEM). The first layer utilized a set currency rate for government transactions or official business, while the second tier used a market-determined exchange rate for private sector transactions. The dual exchange rate system was designed to minimize destabilizing fluctuations in the exchange rate. The first and second-tier foreign exchange markets amalgamated into a single foreign exchange market (FEM) in July 1987 due to the difficulty of maintaining the systems. In 1988, this was renamed the independent foreign exchange market

(AFEM) to allow non-oil inflows into Deposit Money Banks while also reducing demand pressure. "The policy was meant to correct fundamental imbalances in the economy by adopting a flexible exchange rate system," according to the CBN (2009:76).

The AFEM was found to be rife with speculative activity, and in January 1989, it was renamed the inter-bank foreign exchange market (IFEM). The CBN used movements in the exchange rates of major foreign currencies as a reference to determine the proper level of the naira exchange rate throughout this period. The IFEM was changed in December 1990, when the Retail Dutch Auction System (DAS) was reintroduced after it had been discontinued in 1987. The CBN, however, was forced to adjust the exchange rate method due to ongoing exchange rate volatility and an increasing difference between the official and parallel market prices (which was beyond the internationally allowed level of 5.0%). As a result, with the launching of the Naira on March 5, 1992, the foreign currency market was completely deregulated. Although volatility decreased at this time, demand remained high.

The exchange rate was briefly set in 1994, but the policy goals were not achieved since the naira fell substantially on the parallel market. The "directed deregulation" of the foreign currency market in 1995 resulted in a policy shift from a fixed exchange rate system to a flexible one. The new policy's main goal was to stop the currency from depreciating too much while also ensuring that foreign reserves were allocated and used efficiently. The Exchange (Monitoring and Miscellaneous Provisions) Act 1995 gave bureau de change (BDCs) the ability to purchase and sell foreign currency under the new policy, which was implemented in 1989. The Autonomous Foreign Exchange Market was re-established as a result of the Act.

(AFEM), a flexible system in which privately sourced foreign currency was exchanged at market rate while government or official transactions were handled at a predetermined rate. The key elements of AFEM were market expansion and the elimination of the interbank foreign exchange market, but the CBN continued to intervene in the market frequently to keep the exchange rate stable. The AFEM was supposed to close the gap between the official and parallel market rates, ultimately bringing all the different exchange rates together in a single larger foreign exchange market.

With the reintroduction of the inter-bank foreign exchange market (IFEM) in 1999, the foreign exchange market was further liberalized, to eliminate rent-seeking

and restore market stability. The CBN reinstated the Retail Dutch Auction System (RDAS) in 2002 as a result of the expanding gap between official and parallel market currency rates, which was partly attributable to the country's growing need for foreign money. Although the system restored market confidence by moderating rates, narrowing the premium, and lowering rent-seeking behavior, it was replaced in February 2006 by the wholesale Dutch Auction System (wDAS) to reinforce the gains of RDAS and further open up the foreign currency market. The CBN also cited increased foreign reserve positions, banking sector soundness as a consequence of the consolidation effort, and budgetary discipline as further grounds for the shift.

The wDAS helped to stabilize the exchange rate by reducing market demand pressures. Oil firms and international investors subscribing to Federal government debt instruments, as well as the initial public offerings (IPOs) of several indigenous enterprises, resulted in a massive influx of foreign currency into the market in the first half of 2008. However, due to the global financial crisis, there was a major outflow of foreign money from the nation in October 2008, increasing the pressure on the foreign exchange market. The exchange rate dropped sharply as a result, prompting the CBN to reintroduce the RDAS in January 2009 to relieve demand pressure. Despite this, demand remained strong, and the exchange rate dropped across the board.

As a result, in July 2009, the wDAS was relaunched. However, due to its inability to alleviate demand pressures, it was replaced in October 2013 by the RDAS, which was subsequently withdrawn on February 17, 2015, as a result of market reforms. As a result, the CBN shut down the market's official window and sent all foreign currency demand to the interbank market. The widened premium between the 35 interbank/BDCs and RDAS rates, the resulting speculative demand and unwholesome practices by economic agents, as well as the falling price of crude oil on the international market, all hurt the external reserves, necessitated this new exchange rate policy.

The Nigerian Foreign Exchange Market's Structure. The Nigerian foreign exchange market has developed over time in response to shifting macroeconomic fundamentals and a desire to relieve foreign currency demand pressures and stabilize the Naira exchange rate. In Nigeria, this development has resulted in the following sub-markets:

Foreign Exchange Market (Official Market). The CBN uses this opportunity to intervene in the market. It is used by the CBN to sell (supply) foreign currency to licensed dealers. By being the custodian of the country's external reserves, the CBN is the biggest single provider of foreign currency in this market. Spot transactions are conducted by auction twice a week (every Monday and Wednesday) during this window, and the value is received in T + 2 days (that is, the transaction day plus two days). 48 hours before the auction, authorized banks credit their CBN accounts with the Naira equivalent of the foreign currency they expect to acquire. By 11 a.m. on bidding day, their bids are sent to the CBN dealing room. The name of the client, the RC number, the Form 'M' number, the address, the purpose, the amount (USD), the rate Naira/US$ (or other currencies of interest), the form of payment, and the Bank name and code must all be included in these 36 37 bids. Any bid rate that falls below the action's cut-off is deemed unsuccessful. Under the WDAS, authorized banks may source foreign currency in their own or customers' accounts; whereas, under the RDAS, authorized banks may only source foreign exchange in their customers' accounts.

The Interbank Foreign Exchange Market. It is a market where banks trade with one another to exchange money. In January 1989, Nigeria launched the inter-bank foreign exchange market (IFEM) to relieve demand constraints in the official foreign exchange market. In 1995, it was repealed and reintroduced in October 1999. The interbank foreign currency market enables banks to trade with one another, while the CBN intervenes regularly to maintain a stable Naira exchange rate. Through the market process of demand and supply, authorized banks and major institutions interact and exchange foreign currency in the interbank market. The system is supposed to be financed entirely by the private sector (autonomous sources), with the CBN acting at its discretion to maintain a targeted exchange rate. Banks, private oil corporations, the Nigerian National Petroleum Corporation (NNPC), and corporate treasuries are among the main players in this market, in addition to the CBN.

Two-way quotations are used in the interbank market, which is supported by the deal tracker. At the interbank, the CBN intervenes. The CBN intervenes at the interbank rate that is currently in effect.

Bureaux-de-Change Market. BDCs were introduced in Nigeria in 1989 to expand the foreign exchange market and improve small end-users access to foreign

exchange for a variety of purposes, including Business Travel Allowance (BTA), Personal Travel Allowance (PTA), mortgage monthly payments, school fees, medical bills, and credit card payments, among others. In the spot market, BDCs serve as dealers, buying and selling foreign currency with a modest margin (premium) as a return. They also purchase and sell international bank notes as well as Travellers' Cheques (TCs) from the general public, banks, and the Central Bank of Nigeria (CBN). Due to the greater storage and transportation costs of coins compared to banknotes, BDCs seldom acquire or sell them.

Currency runs, in which there are more buyers than sellers of a currency or vice versa owing to currency speculation, are one of the dangers of BDCs. Currency speculation occurs when traders believe a specific currency is overpriced or undervalued, causing a surge in demand or supply for that currency. If the BDCs' actions aren't controlled, they might become money laundering conduits for terrorists.

Economic Growth Theories

The Classical growth theory, Neoclassical growth theory, and the Harrod-Domar growth theory will be adopted in this thesis.

The Classical Growth Theory. Kenton (2021) said that classical growth theory was founded during the Industrial Revolution by economists such as Adam Smith, David Ricardo, and Karl Marx. They tried to explain the dynamics that drive economic growth as well as the processes that support it. Economic growth, according to classical growth theory, is defined as the accumulation of capital and the reinvestment of profits generated through specialization, labor division, and the pursuit of comparative advantage. According to the Classical Growth Theory, as a country's population rises and resources become limited, economic growth will slow. This is an inference of economists who believe that a temporary increase in real GDP per person will inevitably lead to a population explosion, restricting a country's resources and, as a result, lowering real GDP. As a result, the country's economy will start to slow. Classical growth theory argued that unrestricted trade between nations, individual free enterprise, and respect for private property accumulation were all desirable ideas.

The Neoclassical Growth Theory. The pace of economic growth is governed by the expansion of capital stock, labor supply, and technical development through

time, according to the neoclassical growth model. The neoclassical growth theory recognized capital, labor, and technology as determinants of output as two factors of production functions (Dwivedi, 2001). According to neoclassical growth theory, the output is a measure of factor input growth, namely capital, labor, and technical advancement.

According to the hypothesis, an increase in labor makes the most significant contribution to production growth. Furthermore, in relatively stable equilibrium, production growth equals population or labor force growth and is exogenous of saving rate, i.e., it is independent of saving rate. While saving does not affect the steady-state pace of production growth, it does raise the steady-state level of per capita income through growing capital per capita. According to the neoclassical growth hypothesis, If two countries save at the same rate grow at the same pace, and have the same degree of technology, their per capita income levels would ultimately equalize (Ahuja, 2013).

This theory is relevant to this study because the production process necessitates the use of capital, labor, and technology. As a result, the availability of capital, labor, and technology will efficiently and effectively boost an economy's goods and services production. However, as the value of the currency rises, so does the cost of capital equipment. As a result, to acquire these capital types of equipment, firms must shift a reasonable amount of money from acquiring labor to the purchase of these capital goods, resulting in worker retrenchment. This means that as foreign exchange rises, so will the cost of capital equipment such as machines also increase and output will fall. When output suffers, economic growth suffers as well.

The Harrod-Domar Growth Model. Harrod and Domar's growth model has based on the Keynesian full employment and income theory's short-term analysis. It presents a more thorough long-term output hypothesis (Dwivedi, 2001). Investment, according to Harrod and Domar, has a significant impact on the economic growth process. They do, however, emphasize the dual nature of the investment. First, investment boosts aggregate demand and income, and second, it boosts the economy's productive capability by increasing the stock of capital (Jhingan, 2007). Thus, in an advanced capitalist economy where capital accumulation is critical, Harrod and Domar's growth models indicated at what rate investment should rise to achieve a constant growth rate.

Harrod and Domar's pioneering work on the maintenance of steady growth in advanced industrialized countries was instrumental in getting the ball rolling. They started with an income level that was equal to full employment. According to them, investment-generated demand must be adequate to balance the excess production induced by the investment to sustain full employment. The absolute amount of net investment, as well as the rate of increase in real national income, must both continue to rise to sustain steady growth with full employment. Because demand and income do not rise in tandem with annual investment, capital stock additions sit unused, and employment cannot be offered to the expanding labor population, resulting in the unemployment of these two primary resources, which is detrimental to long-term economic progress.

Finally, the Harrod and Domar model aims to find the equilibrium growth rate, which is the pace at which investment and income must expand to sustain full employment throughout time. Harrod and Domar separately devised their steady-growth models, while Harrod was the first to publish his idea. While the specifics of their steady development models alter, the core concept remains the same. Both of them ascribed capital accumulation to a crucial role in development. They did, however, highlight the investment process' dual function in creating revenue and expanding the economy's productive potential. Classical economists focused solely on the capacity side, while earlier Keynesian economists focused solely on the demand side, while Harrod and Domar considered both sides (Ahuja, 2013).

The pace of capital accumulation is important in influencing economic growth, according to the Harrod-Domar growth model. They started with a full-employment equilibrium level of income, and they argue that to preserve full employment, investment-generated demand must be adequate to balance the increased production provided by this investment. The relevance of this theory to this research work is that the escalation in foreign exchange has had a significant impact on capital accumulation. As a result of the current foreign exchange challenges, investment in critical sectors in Nigeria has been affected. Furthermore, such fluctuations in the rate of exchange have hurt business portfolios and output, resulting in a slowing of Nigeria's economic growth. For example, a tourist investor would require some structures to attract foreign investment. However, such structures are not manufactured in Nigeria. Thus, if an investor in the tourist sub-sector cannot afford such facilities as a result of a decline in the marginal propensity to save caused by currency fluctuations,

then investment will fall. This decrease in investment will result in a decrease in investor returns.

Empirical Issues

Previous research on the impact of currency depreciation on economic growth has produced mixed findings. Several empirical strands of evidence suggested that exchange rate devaluation may affect growth outcomes, whereas other study results revealed that exchange rate devaluation and economic growth had no meaningful link.

Using co-integration and error correction approaches, Ogunsakin (2013) looked at the causes of exchange rate behavior and their influence on Nigerian economic growth. According to the results, all of the factors analyzed (exchange rate, inflation, foreign reserves, interest rate, money supply, balance of payment, and propensity to import) were significant predictors of Nigerian economic development. According to the research, the government should maintain a more depreciated real exchange rate, a larger savings-to-investment ratio, and a lower spending-to-income ratio.

The influence of shifting foreign currency rates on the Nigerian economy was studied by Yohanna and Alkali (2015). Multiple regression approaches were employed as the major instrument of analysis, with the Central Bank of Nigeria statistics bulletin serving as a supplementary data source. Their findings demonstrated that the exchange rate of Nigeria and its economic growth had a favorable and substantial association.

Jerumeh, Akinribido, Popoola, Oke, Ogunnubi, and Okoruwa researched the impact of currency volatility on economic development potentials (2016). From 1970 to 2012, we utilized data from the World Bank's development indices. Using the Augmented Dickey-Fuller test, the researchers determined that the variables in the model were of order one, whereas export and interest rate was of order zero. Johansen co-integration tests were used to show the existence of a long-run link between variables. The exchange rate has a considerable negative influence on GDP in both the short and long term, according to the Error Correction Model findings.

In their investigation, Amassoma and Odeniyi (2016) utilized 43 years of yearly data. The Error Correction Model, the Augmented Dickey-Fuller test, the Johansen co-integration test, and a multiple regression model were all applied.

Exchange rate variations seem to have a beneficial but little influence on Nigerian economic growth in the long and near term, according to empirical findings.

Momodu and Akani (2016) wrote on currency depreciation and Nigerian economic growth. The analysis was done using the Johansen Cointegration method, which utilized multivariate estimations. As a result, there was a long-term link between the parameters. The end product of the error correction process suggested that currency depreciation and other model factors could properly explain short-term variations in economic growth. They discovered that undervaluation enhanced output and balance of payment in the short run. However, monetary effects showed a balance of payment and output was offset by an increase in price in the long run. The recommendation that monetary authorities should prevent the temporary price spike from becoming permanent was made.

Lawal, Atunde, Ahmed, and Abiola looked at the correlation between exchange rate fluctuations and Nigerian economic growth (2016). With data from the Central Bank of Nigeria statistics bulletin from 2003 to 2013, the Autoregressive Distributed Lag model was used to estimate the model. The empirical data showed that the exchange rate had no long-run influence on economic growth, although a short-run link was confirmed.

Ndubuka, Onwuka, Onyedika, and Chimezie (2019) looked examined the impact of exchange rate fluctuations on several Nigerian economic sectors, including agriculture, manufacturing, petroleum, and services. The Auto-Regressive Distributed Lagged (ARDL) model was used to examine the data, which was acquired via the CBN statistics bulletin (2016). They noticed that the exchange rate had no impact on the industries they chose. The exchange rate, on the other hand, benefited the petroleum sector and had a significant influence. According to the research, Nigeria's economy has to diversify away from oil to become a significant foreign exchange earner.

Isibor, Olokoyo, Arogundade, Osuma, and Ndigwe released an article on exchange rate management and sectoral output performance (2020). This research looked at the effects of exchange rate control on agricultural and industrial production. Using the Ordinary Least Squares approach, secondary data were evaluated from 1981 to 2015. According to the statistics, only the agricultural sector had a major positive

influence on the exchange rate. To raise the exchange rate earnings, the report recommended that measures be made to increase agricultural commodity exporters.

Nonlinear autoregressive distributed delays were employed by Olumuyiwa and Olusola (2020) to explore the asymmetric influence of currency rate changes on cross-border commerce in Nigeria. They discovered that rising exchange rates had a detrimental impact on Nigerian cross-border trade. The analysis found an unbalanced link between exchange rate and cross-border trade. Policymakers should explore models that allow for nonlinear exchange rate adjustments to implement effective devaluation policies, according to the study.

The influence of real exchange rate undervaluation on economic growth was studied by Seraj and Coskuner. (2021) using data from the Panel Cointegration Approach. Balassa Samuelson's approach was used in the research. Rodrik's claim that undervaluation has a substantial impact on a developing economy's economic growth was supported by the data. In the industrialized economy, however, the result demonstrated a negligible impact.

By contrasting the fundamental equilibrium exchange rate with the Balassa–Samuelson-based Rodrik method, Seraj, and Coskuner (2021) explored the influence of real exchange rates on economic growth. They compared the fundamental equilibrium exchange rate model to the Balassa–Samuelson-based method for 93 nations, using Dani Rodrik's work as a starting point. Rodrik's conclusions were supported by the research. The FEER findings, on the other hand, were far more important than the BS results.

Research Gap

Following a study of a range of literature linked to and pertinent to the impact of exchange rate devaluation on economic growth. Without a doubt, the undervaluation of the Nigerian currency is vital to recovering the country's economic development. In conclusion, the findings and outcomes of the empirical investigations on the subject were mixed and inconclusive. Their conclusions and evidence vary based on the nation, theories, historical period, analytical approach, and indicators employed. It is regarded to these gaps that inspired this work. As a result, the goal of

this thesis is to look at the effect of exchange rate undervaluation on Nigeria's economic growth.

CHAPTER III

Methodology

Introduction

The methodology of this thesis allows the researcher to establish empirically, the relationship that exists between exchange rate undervaluation effect and economic growth in Nigeria through process of data collection, model specification, and estimation techniques.

Research Design`

Research design provides the basis upon which time series data will be sourced and analyzed using advanced estimation techniques and procedures to test hypotheses after the relevant data have been collected. Annual secondary data from 1980 to 2020 was acquired for this research. The World Bank and Nigerian Central Bank provided the information (CBN). Variables for this thesis were extracted from the work of Seraja and Coskunerb (2021) who adopted the Balassa-Samuelson-based Rodrik model and FEER model in obtaining undervaluation effect on economic growth. However, this thesis only focused on the Fundamental equilibrium exchange rate (FEER). Thus, variables used were generated from the fundamental equilibrium exchange rate (FEER) models been used.

Model Specification

The study's implicit function is derived from the fundamental equilibrium exchange rate (FEER) model. Thus, the fundamental equilibrium exchange rate (FEER) model is presented as:

Equation 1 explained fundamental equilibrium exchange rate (FEER) model

$$\text{In } (\widehat{RER})_{it} = \beta_0 + \beta_1 \text{In}(\text{RGDPPC})_{it} + \beta_2 \text{In}(\text{TOTR})_{it} + \beta_3 \text{TOPEN}_{it} + \beta_4 \text{GOVTC}_{it}$$

$$+\beta_5 \text{INVT}_{it} + f_i + e_{it} \ldots\ldots\ldots\ldots\ldots\ldots \text{eq1}$$

Where:

RGDPPC = real GDP per capita

TOTR = terms of trade

TOPEN= trade openness

GOVTC = government consumption size as percentage of GDP,

INVT = Stands for Investment rate as a percentage of GDP

f_i = is the time dummy

e_{it} = the error term.

Equation 2 is used to compute the currency undervaluation.

$Underval_{it}$ = In (RER) – In $(\widehat{RER}_{it}$ ……..(2)

Having established the real exchange equilibrium and the fundamental equilibrium exchange rate in equations 1 as well as 2, the empirical growth model for this thesis is inline Mehdi and Cagay (2021) is given as

$$Growth_{it} = \delta_0 + \delta_1 In(RGDPPC)_{it-1} + \delta_2 Underval_{it}^{FEER} + \delta_3 In(TOTR)_{it} + \delta_4 TOPEN_{it}$$

$$+ \delta_5 GOVTC)_{it} + + \delta_6 INVT_{it-1} + \delta_7 \text{In(INFL)}_{it} + \delta_8 \text{In(LIFEX)}_{it}$$

$$+ \delta_9 Growth_{it-1} + f_i + f_i + e_{it} \text{……..eq3}$$

Where

$RGDPPC_{it-1}$ = the lag value of real GDP per capita for country i to capture the effects of convergence

$Underval^{FEER}$= Currency undervaluation based on the fundamental equilibrium exchange rate effect

TOTR = terms of trade

TOPEN= trade openness

GOVTC = government consumption size as percentage of GDP,

INFL= Inflation rate

INVT = Investment rate as a percentage of GDP

LIFEX = Life Expectancy (human capital development)

$Growth_{it-1}$= lag values of GDP growth rate to capture the effects of dynamic panel estimation

f_i and f_i = time and country dummiesdummy

e_{it} = the error term.

RGDPPC

Thus, Autoregressive Distributed Lag (ARDL) model for this thesis becomes:

The Priory Expectation Regarding the Signs of the Parameters

The coefficients in equation 1 should have positive apriori expectations. As a result, the explanatory variables are projected to have a positive impact on Nigeria's economic growth. To put it another way, economic growth is predicted to have positive effect on terms of trade (TOTR), trade openness (TOPEN), and life expectancy (LIFEX). Negative or positive relationships are expected between Inflation (INFL) and economic growth in Nigeria, government consumption (GOVTC) is predicted to have positive relationship with economic growth in Nigeria. Thus, $\beta o > 0$, $\beta 1 > 0$, $\beta 2 > 0$, $\beta 3 > 0$, $\beta 4 < 0$ and $\beta 5 < 0$

Pre-Estimation Technique

Unit Root Test

The variables for this model are macroeconomic time series. Macroeconomics time series data are often trending and do not reveal their true means and variances. In this case, the researcher employed This study test for unit root test by employing the Augmented Dickey-Fuller (ADF) and Philip Perron Unit root tests to determine data stationarity because most time-series data exhibit trending behavior.

Augmented Dickey-Fuller (ADF). The testing procedure for ADF unit root is given as:

$y_f = \beta' Dt + \phi\, y_{f-1} + j=1p\psi j\Delta\, y_{f-j} + \varepsilon t$……6

Where:

Dt = deterministic term vector (constant, trend etc.)

Δy_{f-j} = approximate the Autoregressive Moving-Average (ARMA) structure of the errors.

Phillips-Perron Unit Root test. After Peter, C.B. Philip, and Pierre Perron, the Philips-Perron unit root test was named. On the Dickey-Fuller test, the Philip-Perron test was based. It addressed issues and problems like as higher-order autocorrelation and heteroscedasticity that may arise during the processing of data (Phillips & Perron, 1988). Thus, the Phillips-Perron unit root test model is given as;

$yt = c + \delta t + ay_{t-1} + e(t)$……..7

Estimation Techniques

The estimation techniques for this thesis were adopted based on the specified model and the stationarity of the variables in the thesis. Thus, regression and Autoregressive Distributed Lag (ARDL) Model estimation techniques.

Selection of Lag Order

Having gotten the ARDL model as the right methodology to be adopted for this thesis through the unit root tests performed on data. Thus, the first step in ARDL is the determination of lag length (Liew, 2000). The appropriate lag length (p) is determined based on the output gotten from different criteria like these Akaike's information criterion (AIC) as well as Schwarz information criterion (SIC) among others (Liew, 2000). The lag selected was based on the optimal lag number with a higher number of asterisks

Autoregressive Distributed Lag (ARDL) Model. Pre-tests on the data to be utilized for this thesis were undertaken after the Augmented Dickey-Fuller (ADF) and Philip Perron unit roots. At the level I(0), the data were determined to be stationary, and the first difference I(1) was judged to be significant (1). As a result, the ARDL model's adoption is justified. Whether the regressors in the model are solely I(0) and I(1) or jointly cointegrated, the ARDL technique applies (Pesaran, Shin & Smith,

2001). The standard ARDL is composed of two components; the bound test and the short run and the long-run version.

Bound Test Cointegration

The bound test cointegration is a second test to be conducted when using the ARDL model of estimation technique (Pesaran, Shin & Smith, 2001).

Decision rule: The null hypothesis of no long-run relationship is rejected if the F-statistic exceeds the upper critical value. If the F-statistic falls below the lower critical levels, the null hypothesis is accepted, implying that the series have no long-term relationship.

The Long-Run Form of Cointegration

The last tests of the ARDL model estimate approach are cointegration (short-run form) and long-run form of ARDL. After cointegration is achieved, the conditional ARDL is used in the second step of the ARDL boundaries technique. The boundaries test, pioneered by Pesaran and Shin (1999), was then used to check for long-run relationships in the model.

Post-Diagnostic Tests

Post diagnostic tests are the tests conducted after the main technique(s) has/have been concluded. The essence of the post-diagnostic test is to establish the robustness of the major technique being used in research and to correct any abnormality that might arise in the main results. The three main post-diagnostic tests for the ARDL model of estimation are; Heteroscedasticity and Multicollinearity.

Heteroscedasticity Test

Damodar (2004) noted that heteroscedasticity is said to occur when Yi's conditional variance grows as X increases. He further stated that there is heteroscedasticity when the Yi variances are not equal. Despite the fact that heteroscedasticity tests are plentiful, such as White's test, modified Breusch-Pagan test and Autoregressive Conditional Heteroscedasticity (ARCH). However, the ARCH modeling technique will be used to analyze effects left unexplained by econometrics models.

Ramsey Reset Test

The test is used to determine if non-linear combinations of fitted values adequately explain the variable's response. If the t-statistic, F-statistic, and Likelihood probability values are less than 0.05, the estimated model is not free of specification error, according to the decision criteria.

Serial Correlation

To confirm the efficiency among the variables, the Brush-Godfrey serial correlation test will be conducted. The underlying assumption of autocorrelation is that the successive values of the random are temporally independent.

Decision rule: If the p-value at a 5% level of significance is less than 0.05, we reject H_0 and accept H_1, concluding that the model has serial correlation; otherwise, accept H_0 as explained by Gujarati (2004).

.

CHAPTER IV

Data Presentation And Analysis

Results and Analysis

This chapter deals with the presentation, analysis of results and discussion of the findings based on the data collected.

Unit Root Test Result

Table 1

Unit Root Test Result

Unit Root Test						
Augmented Dickey-Fuller Test				**Philip-Perron**		
Variables	**T-statistics**	**P-value**	**Integration**	**T-statistics**	**P-value**	**Integration**
GDPGROWTH	-11.64458	0.0000	I (1)	-3.589907	0.0104	I (0)
LOGGDPPC	-7.041262	0.0000	I (1)	-6.645356	0.0000	I (1)
INF	-5.880719	0.0000	I (0)	-5.889316	0.0000	I (0)
GOVC	-4.21515	0.0107	I (1)	-3.786690	0.000	I (0)
$UNDERVAL^{FEER}$	-5.007859	0.0003	I (0)	-4.582846	0.0007	I (1)
TOPEN	-7.955722	0.0000	I (1)	-2.952510	0.0483	I (0)
LOGTOT	-6.145179	0.0001	I (1)	-6.972594	0.0000	I (1)

Source: Researcher's computation with E-views 10

In table 1, According to the Augmented Dickey-Fuller unit root, all variables are stationary at first difference except INFL and $UNDERVAL^{FEER}$ which were stationary at level.

Philips-perron unit root test shows that GDPGROWTH, INFL,GOVC, and TOPEN are stationary at a level while other variables are stationary at first difference.

Autoregressive Distributed Lag Model (Ardl) Estimation

Selection of Lag Length. The choice to pick the right lag period becomes decided with the aid of using the quantity of asterisk. (i.e., a lag with an excessive or most asterisk is greater efficient, appropriate and preferable)

Table 2

Selection of Lag Length

VAR Lag Order Selection Criteria						
Endogenous Variables: GDP GDPPC GOVC INF EXR TOPEN TOT						
Lag	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	-2467.413	NA	5.28e+46	130.2849	130.6296	130.4075
1	-2257.122	320.9702*	2.57e+43	122.5854	125.6881*	123.6893
2	-2198.480	64.81396	5.46e+43	122.8674	128.7282	124.9526
3	-2077.779	82.58527	1.31e+43*	119.8831*	128.5020	122.9496*

Source: Researcher's computation with E-views 10

In table 2, Lag 3 was chosen as a suitable lag for the analysis. This is decided based on the maximum number of asterisks found in lag 3.

Bound Test.

Result of the Bounds Test.

Table 3

ARDL Bound Test For Fundamental Equilibrium Exchange Rate Model

ARDL Bound Test			
	Critical Value Bounds		
F-Statistics	**Significance**	**Lower Bound I(0)**	**Upper Bound I(1)**
5.249800	10%	2.03	3.13
	5%	2.32	3.5
	2.5%	2.6	3.84
	1%	2.96	4.26

Table 4 establishes a long-term relationship in exchange rate $UNDERVAL^{FEER}$ version as F-value is 4.255884 higher than upper bounds I(1) at 10%, 5%,2.5% and 1% level of significance.. Thus, long-run forms of the model would be carried out, because the Null hypothesis shows that there is no co-integration between variables. Hence the ARDL long-run model was carried out.

Long-Run Version for Fundamental Equilibrium Exchange Rate Model.

Table 4

ARDL Long-run Model For Fundamental Equilibrium Exchange Rate Model

ARDL Long-run Fundamental Equilibrium Exchange Rate Model				
Variable	**Coefficient**	**Std. Error**	**T-statistics**	**Prob.**
LOGGDPPC	0.003078	0.001549	1.987835	0.0589
INVST	-3.356195	1.650793	-2.033081	0.0537
INF	-0.173153	0.060546	-2.859868	0.0089
TOPEN	-0.316805	0.159309	-1.988616	0.0488
LOGTOT	0.000010	0.000000	1.161935	0.2572
$UNDERVAL^{FEER}$	0.015390	0.008553	1.799348	0.0351
GOVC	-0.000950	0.000462	-2.056974	0.0512

In table 4, the Long-run version of the Fundamental Equilibrium Exchange Rate Model shows that in the long run, the INF has a significant and negative effect on economic growth. That is when INF grows by 1%, the GDPGROWTH rate will decrease by 17.3153%. More so,$UNDERVAL^{FEER}$ has significant and positive effect on economic growth. That is when $UNDERVAL^{FEER}$ grows by 1% , the GDP growth rate will increase by 1.5390%. TOPEN and INVST have significant and negative effects on economic growth. This implies that when TOPEN and INVST grow by 1%, the GDPGROWTH rate will decrease by 31.6805% and 335.6195% respectively. LOGGDPPC and LOGTOT have insignificant and positive effects on economic growth. Thus, when LOGGDPPC and LOGTOT grow by 1%, the GDPGROWTH rate will increase by 0.3078% and 0.0010%. GOVC has insignificant and negative effect on economic growth. That is when GOVC grows by 1%. The GDP growth rate will decrease by 0.0950%.

Short-Run Version for Fundamental Equilibrium Exchange Rate Model.

Table 5

ARDL short-run Model For Fundamental Equilibrium Exchange Rate Model

Fundamental Equilibrium Exchange Rate Model

Short-run ARDL Result for Growth Model				
Variable	**Coefficient**	**Std. Error**	**T-statistics**	**Prob.**
D(LOGGDPPC)	0.014674	0.003461	4.239777	0.0003
D(INVST)	-4.430145	1.359639	-3.258324	0.0035
D(INF)	-0.053889	0.048063	-1.121213	0.0273
D(TOPEN)	-0.106959	0.068091	-1.570813	0.1299
D(TOPEN(-1))	0.215976	0.067871	3.182167	0.0042
D(LOGTOT)	0.000010	0.000000	1.139360	0.2663
D(UNDERVAL^{FEER})	0.005741	0.007787	-0.737347	0.0448
D(GOVC)	-0.000728	0.000327	-2.226961	0.0360
CointEq(-1)	-0.766283	0.143067	-5.356100	0.0000

According to the Growth Model in table 5; the LOGGDPPC has a significant and positive effect on economic growth. More specifically, if the LOGGDPPC is 1% higher this leads to the GDPGROWTH rate increasing by 1.4674%. The UNDERVAL^{FEER} is significant and positively related to economic growth, that is, when UNDERVAL^{FEER} increases by 1% the economic growth will increase by 0.5741%. INVST, GOVC and INF have significant and negative effect on economic growth. Thus, a 1% increase INVST, GOVC and INF will leads to 443.0145%, 0.0728% and 5.3889% decrease in economic growth. TOPEN is insignificance and negatively related to economic growth, as a 1% increase in TOPEN will enact 10.6958% decrease in economic growth. LOGTOT has insignificant and positive effect on economic growth. Thus, if LOGTOT gets higher by 1%, economic growth will increase by 0.0010%. ECM shows the rate of speed to adjustment that variables will move in the long-run model and is statistically significant at 5%.

Residual Diagnostic Tests

Table 6

Residual Diagnostic Test

Residual Diagnostic Test					
Normality Test		**Heteroskedasticity**		**Serrial Correlation- LM Test**	
J-statistics	**P-value**	**F-statistics**	**P-value**	**F-statistics**	**P-value**
0.444582	0.800682	0.032291	0.8584	1.850641	0.1819

The Normality test in table 6 shows that the residuals are normally distributed as the p-value 0.800682 is greater than a 5% significance level.

White's test modified Breusch-Pagan test, and autoregressive conditional heteroscedasticity is just a few examples of heteroscedasticity tests (ARCH). The researcher employs the ARCH modeling technique. This is justified by the fact that it is simpler than other tests. Decision rule: reject the null hypothesis if the p-value is less than a 5% level of significance Gujarati (2009). The P-value for the heteroskedasticity test in table 6 is greater than 0.05 level of significance at 0.8584 so we accept the null that states that there is no heteroskedasticity.

In the table 6, the Breusch-Godfrey serial correlation test was used to confirm the effectiveness of the variables. Autocorrelation is based on the idea that the random consecutive values are temporally independent. If the p-value at the 5% level of significance is less than 0.05, we reject H_0 and accept H_1, concluding that there is no serial correlation; otherwise, accept H_0 as explained by Gujarati (2004).

The table 6 shows that the F-statistic p-value is more than 0.05 at 0.1819. The significance threshold is 5%. As a consequence, we reject the null hypothesis and conclude that there is no serial correlation in the model.

Stability Test

Ramsey Reset Test for Autoregressive Distributed Lag Model Fundamental Equilibrium Exchange Rate Regression Model.

Table 7

Stability Test: Ramsey RESET Test

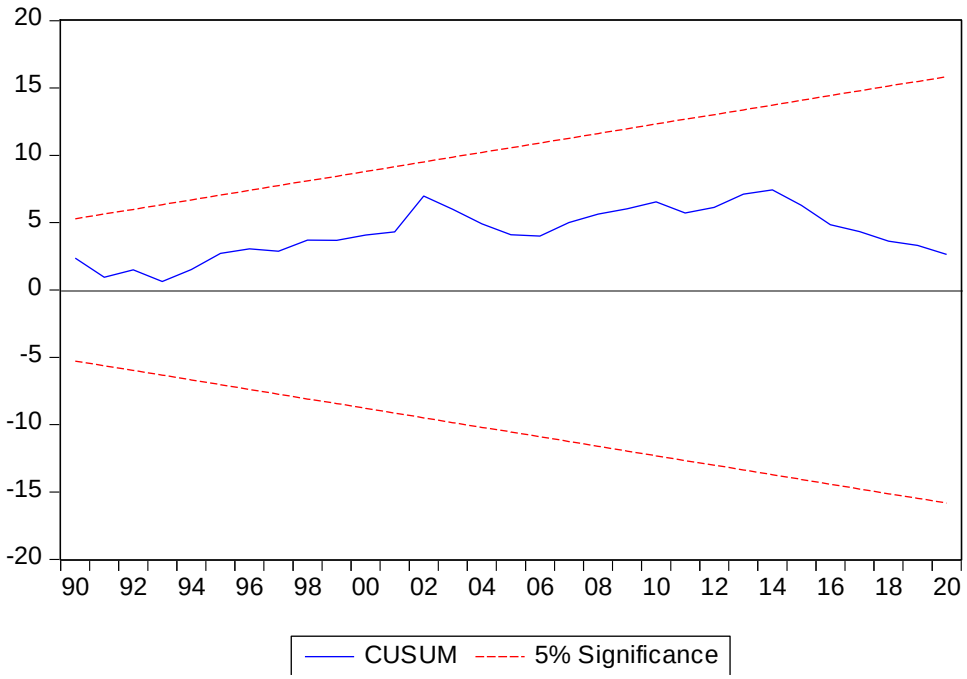
T-statistics	P-value	F-statistics	P-value
0.328920	0.7453	0.108189	0.7453

The stability result in table 7 shows that F-statistic was statistically insignificant because their respective P-values were above 0.05, indicating that the estimated model is free of specification error.

CUSUM Test

Figure 1

CUSUM Test

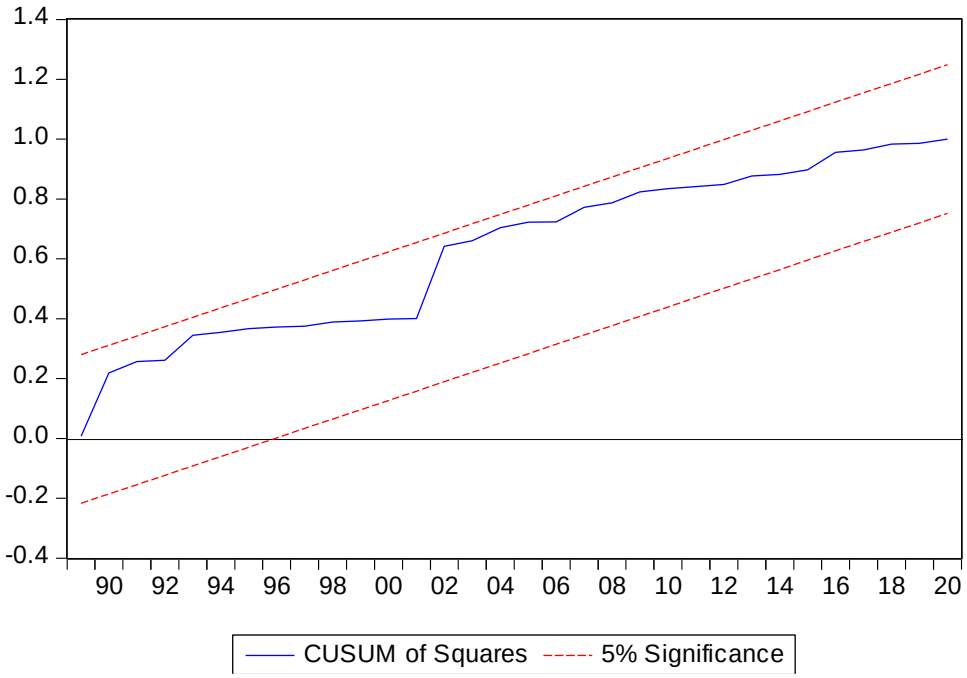


The Ramsey CUSUM test shows that the variables are stable as the fit in the two red lines that's shows the stability and the significance level at 0.05 level of significance. The CUSUM test graph shows that variables are stable at 5%.

CUSUMsq Test

Figure 2

CUSUMsq Test



The CUSUMsq test in figure 2 shows that the variables are statistically stable at 0.05 level of significance. Because the blue line representing the variables are within the red lines representing the significance level.

Test of Hypothesis and Discussion of Major Findings

H_0: undervaluation has no significant impact on the growth of the Nigerian economy.

Decision Rule:

Refute the null hypothesis when the p-value is less than 5% level of significance and conclude undervaluation has an impact on the growth in Nigerian economy. The ARDL model for Fundamental Equilibrium Exchange Rate revealed a negative and insignificant relationship between the $UNDERVAL^{FEER}$ and the Economic growth, meaning that for a 1% increase in $UNDERVAL^{FEER}$ GDPGROWTH % will rise by 1.5390 percent and by 0.5741 percent in long run and short run respectively. Hence, the null hypothesis is refused, thus Undervaluation has significant impact on the GDPGROWTH % a proxy for the economic growth both in the longrun and short run.

This supported the findings of Seraj et. al. (2020); Seraj and Coskuner (2021); and Rodrik (2008), who concluded that real exchange undervaluation, had a significant impact on developing economies' economic growth.

Also, the study showed that INF had a negative but statistically significant relationship with economic growth, for every 1% increase in the Inflation rate in the economy, GDP growth will decrease by 17.3153 percent and 5.3889 percent in long run and short run respectively. In line with the findings of Seraj and Coskuner (2021), who concluded that the results of FEER had significant impact on the economic growth. As a result, it is concluded that GDP growth had a significant impact on $UNDERVAL^{FEER}$ in Nigeria.

CHAPTER V

Summary, Conclusion, And Recommendations

Summary Of Findings

This research examined the effect of exchange rate undervaluation on economic growth in Nigeria. The theoretical positions on the effect of exchange rate undervaluation on economic growth, various theories of the exchange rate, economic growth, and undervaluation were reviewed and the work was anchored on the theories of the Fundamental Equilibrium Exchange Rate Model. Based on the models, data were collected from the World Bank and the central bank of Nigeria.

The time-series data collected were subjected to the Augmented Dickey-Fuller Unit root test and Philip-Perron unit root test to avoid spurious results and the variables were stationary at a level and a first difference. Hence, justified the use of the autoregressive distributed lag (ARDL) model in estimating the equation. After the Unit root test was established and stationarity of the data were confirmed at the level and first difference, the ARDL model for the Fundamental Equilibrium Exchange Rate was analyzed using the EViews 10 [software]. The ARDL bound test was regressed, the results showed that there was co-integration results. Hence the ARDL long-run and short run models were analyzed.

The ARDL long-run result ascertained that, INF, TOPEN and INVST had a negative and significant link with the GDP growth percentage. $UNDERVAL^{FEER}$ has significant and positive effect on economic growth. LOGGDPPC and LOGTOT have insignificant and positive effects on economic growth. GOVC has insignificant and negative effect on economic growth.

The ARDL short-run result established a significant and positive effect between $UNDERVAL^{FEER}$ and economic growth. LOGTOT has insignificant and positive effect on economic growth. The ECM showed that, at 76.628 percent, the rate of speed to adjustment that variables will move in the long-run model and is statistically significant at 5% with the probability value of 0.0000.

We ran the residual diagnostics and the results showed that residuals were normally distributed, the heteroskedasticity and the serial LM test for autocorrelation showed

that both heteroskedasticity and serial correlations were non-existent in the variables. The stability test using the CUSUMsq and the Ramsey RESET test showed that the variables were stable as the blue line was well in-between the red line representing the 5% level of significance; thus, the variables were stable after conforming to economic criteria for stability testing.

Conclusion

The study looked into the effect of currency undervaluation on the economic growth in Nigeria, the results from the study is in line with the work carried out by Seraj and Coskuner (2021) saying that there is a huge economic impact on UNDERVAL of currency on the economic growth which is positive and significant in the long run and short run supporting Seraj (2021) which had both short-run and long-run impact on economic growth.

LOGTOT was found to be statistically insignificant both in the short run and long run. GOVC was insignificant in the long run but significant in the short run. TOPEN is statistically insignificant in the short run but significant in the long run. The research work made use of time series data while the work of Seraj (2021) made use of panel data covering 93 countries.

A more recent strand of literature has shown the positive effects of undervalued exchange rates on economic growth. Using a constructed index of undervaluation, Rodrik (2008) found that undervalued currencies could enhance growth; this was supported by successful cases of East Asian economies, especially China. This finding contrast sharply with the so-called Washington Consensus view that undervaluation can overheat the economy, cause excessive inflation, and adversely affect the overall economy (Berg & Miao, 2010). Some recent studies have generally buttressed Rodrik‘s (2008) findings. For instance, Gluzmann et al. (2012) and Mbaye (2012) found a positive relationship between enhanced growth and undervaluation of the exchange rate. The only area of contention relates to the mechanism by which undervaluation fosters growth.

Policy Recommendations

It is recommended that the government authority should ensure that consistent exchange rate policies that will enhance and strengthen trade openness (TOPEN) are formulated and implemented. In the same manner, government expenditure should be channeled in a productive area in such a way that its impact will be significant on the economic growth of Nigeria.

However, the study's empirical research revealed that the exchange rate is associated with production growth in a favorable manner. As a result, the government should push export promotion techniques to maintain a surplus balance of trade, as well as create a favorable environment, appropriate security, efficient fiscal and monetary policies, and infrastructure facilities to attract international investors to Nigeria.

As a result, it is suggested that the country's fiscal and monetary policy authorities develop policies and programs to guarantee that the country's currency is in high demand in the exchange market. This will boost the country's GDP and foreign profits, strengthening the currency in the exchange market, improving exchange rate stability, and lowering inflation.

Finally, understanding the function of undervaluation in growth would almost certainly need more than the growth-regression model used here, and it is suggested that additional evidence be examined to identify which channels are working more effectively, as Rapetti has pointed out (2020). The "Washington Consensus" channel, the "foreign saving" channel, and the "tradable-led development" channel were three speculative transmission routes described by Rapetti. Indeed, we expect that future studies in this subject will be focused on the consequences of these channels.

References

Aahana, S. (2019). Theories of exchange rate determination. *Journal of International Economics, 3(2), 12-17.*

Abdulhakeem, A.M.(2016). Impact of exchange rate fluctuations on agricultural exports in Nigeria. Kano: SCE .

Ahuja, H.A. (2013). Modern economics. New Delhi: S.Chand &Company PVT Ltd.

Aiyelabowo.B. (2017). Effect of revenue diversification on economic growth in Nigeria. Unpublished thesis submitted to department of economic, University of Jos.

Akinniran, T. N. & Olatunji O. V. (2018). Effects of exchange rate on agricultural export in Nigeria. *International Journal of Engineering Science Invention, 7(8), 32-40*.

Amassoma, D. & Odeniyi, B.D. (2016) The nexus between exchange rate variation and economic growth in Nigeria. *Singaporean Journal of Business Economics and Management Studies, 4(12): 8-28.*

An, P. T. H., Binh, N. T., & Cam, H. L. N. (2020). The Impact of Exchange Rate on Economic Growth–Case Studies of Countries in the Asean Region. Global Journal of Management and Business Research.

Antweiler, W.(2019). Purchasing power parity. Canada:The Pacific Rate of Exchange Rate Service.

Béreau, S., Villavicencio, A. L., & Mignon, V. (2012). Currency misalignments and growth: a new look using nonlinear panel data methods. *Applied Economics, 44(27), 3503-3511*.

Berg, A., & Miao, Y. (2010). The real exchange rate and growth revisited: The Washington consensus strikes back? Working paper, *Research Department and African Department, IMF*.

Crossref Byjus (2021).Undervaluation of currency. Retrieved from https://byjus.com/free-ias-prep/currency-devaluation/.

Cam, M. (2019). What does it mean if a currency is undervalued. Retrieved on April, 08 from https://budgeting.thenest.com/mean-currency-undervalued.

CBN (2006). Perspective of economic policy reforms in Nigeria. Abuja: Central Bank of Nigeria, 3(2), 11-12.

CBN (2020). Statistical Bulletin. Abuja: Central Bank of Nigeria, 3(2), 11-12.

Clark, P.B., & MacDonald, R. (1999). Exchange rates and economic fundamentals: A methodological comparison of BEERs and FEERs: Washington: International Monetary Fund.

Cooper, R. (1999). Exchange rate choices. Mimeo:Harvard University.

Cooper, R. (2000). Exchange rate choices. Retrieved from http://nrs.harvard.edu/urn-3:HUL.InstRepos:34307223.

Dornbusch, Rudiger (1994). Exchange rate policies in economies in transition, in approaches to exchange rate policy choices for developing and transition Economies.

Eichengeen, B. (2008). The real exchange rate and economic growth. Berkeley: University of California.

Eke, I.C., Eke, F.A., & Obafemi, N.O. (2015). Exchange rate behaviour and trade balances in Nigeria: An empirical investigation. *International Journal of Humanities and Social Science*,8(1), 71-78.

Elbadawi, I., Kaltani, L., & Soto, R. (2009). Aid, real exchange rate misalignment and economic performance in sub-Saharan Africa.

Eme O.A,,& Johnson, A.T.(2011).effects of exchange rate movements on economic growth in Nigeria.*CBN Journal of Applied Statistics, 2(2), 1-14.*

Farok, C. (2019). Currencies: undervalued versus overvalued. NewYork: Rutgers Business School.

Faruqee, H.(1989). Long-run determinants of the real exchange rate: A stock-flow perspective. *Staff Papers, International Monetary Fund, 42(1), 80-107.*

Fischer, Stanley, (2001), Exchange Rate Regimes: Is the Bipolar View Correct? , IMF, mimeo.

Frankel,J.(1999). A panel project on purchasing power parity. Amsterdam. North Holand

Gala, P. (2007). Real exchange rate levels and economic development: theoretical analysis and econometric evidence. *Cambridge Journal of economics, 32(2), 273-288.*

Hinkle, L. E., & Monteil, P. J. (1999). Exchange rate misalignment: Concepts and measurement for developing countries. Oxford University Press

Isibor A.,Olokoyo, F., Arogundade, M., Osuma, G., & Ndigwe, C. (2021). Exchange rate management and sectoral output performance. Ogun: Convenant University.

Jerumeh T.R, Akinribido B.B, Popoola O.A., Oke M.A., Ogunnubi C. and Okoruwa V.O (2016). Effect of currency fluctuations on the economic growth potential of Nigeria. *European Journal of Business and Management,8 (1), 1-12.*

Jhingan, M. L. (2003). Macroeconomic theory (Eleventh Revised Edition). New Delhi, India: Vrinda Publications Ltd.

Jhingan, M. L. (2006). The economic of development and planning. Delhi: Vrinda Publication Ltd.

Jhingan, *M.L (*2007). The Economics of development and planning. 39th Edition. Delhi, Vrinda publication Ltd.

Lawal, A. I., Atunde, I. O., Ahmed, V. & Abiola, A. *(*2016), "Exchange. rate fluctuation and the Nigeria economic growth" EuroEconomica,. 35(2),127-142.

Lipsey, R. G., & Chrystal, K. A. (2007). Economics Oxford University Press.

Mejía-Reyes, P., Osborn, D. R., & Sensier, M. (2010). Modelling real exchange rate effects on output performance in Latin America. *Applied Economics, 42(19), 2491-2503*.

Mehare, A., & Edriss, A.K (2013). Evaluation of the effect of exchange rate variability on the export of Ethiopia's agricultural product: A case of coffee, national council of applied economic research (NCAER), *Journal of Applied Economic Research,*7(2), 171-183.

Mbutor, O.M., & Al-Hassan, U.I. (2013). Nigeria 2002-2012: high economic growth rate, high incidence of poverty, Why? *Journal of Central Bank of Nigeria, 36(3), 13-22.*

Mitchell, C. (2020). Floating exchange rate. Retrieved from https://www.investopedia.com/terms/f/floatingexchangerate.asp.

Momodu, A.A.A.A., & Akani,F.N.(2016). Impact of Currency Devaluation on Economic Growth of Nigeria. *International Journal of Arts and Humanities, 5(1):151*.

Montiel, P. J., & Serven, L. (2008). Real exchange rates, saving and growth: is there a link*?* Policy research working paper 4636, *World Bank*. Crossref

Narayan,S., & Perron, P. (1995).Unit root tests in ARMA models with data dependent methods for the selection of the truncation lag, *Journal of the American Statistical Association, 90(429), 268-281.*

Ndubuka,V.C., Onwuka,K., Onyedika, C. & Chimezie, I.C. (2019). Impact of exchange rate fluctuation on selected economic sectors of the Nigerian economy. *International Journal of Sustainable Development & World Policy, 8(1), 21-36.*

Nouira, R., & Sekkat, K. (2012). Desperately seeking the positive impact of undervaluation on growth. *Journal of Macroeconomics, 34(2), 537-552*.

Ochejele, J. J. (2007). *Economic analysis*. Jos: Ichejum Press.

Ogunsakin, S. (2013). The causative factors in exchange rate behaviour and its impact on growth of Nigerian economy. *European Scientific Journal*, 9(7), 288-199.

Olumuyiwa, T.A., & Olusola, M.O. (2020). Asymmetric effect of exchange rate changes on cross-border trade in Nigeria. *Future Business Journal, 6(8), 21-29*.

Papanikos, G. T. (2015). The real exchange rate of euro and Greek economic growth. *The Journal of Economic Asymmetries, 12(2), 100-109.*

Perron,P.(1994).*Unit root and structural change in macroeconomic time series. Cointegration for the applied Economist*. London: Macmillan.

Pesaran, M.H. and Shin, Y. (1999). An autoregressive distributed lag modelling approach to cointegration analysis. *Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium*. Cambridge: Cambridge University Press.

Pesaran, M.H., Shin, Y., & Smith, R.J. (2001). Bound testing approaches to the analysis of level relationships. *Journal of Applied Econometric, 3(16), 289-326.*

Phillips, P.& Perron.P.(1988). Testing for a unit root in time series regression. *Biometrika.* 75(1),,335–346

Polak,J.J. (1957).Monetary analysis of income formation and payments problems. *IMF Staff Papers, 6(1),1-50.*

Rapetti, M. (2020). The real exchange rate and economic growth: A survey. *Journal of Globalization and Development, 11(2).12-19.*

Rodrik, D. (2008). The real exchange rate and economic growth. *Brookings papers on economic activity, 2008(2), 365-412.*

Seraj, M., & Coskuner, C. (2021). Real exchange rate effect on economic growth: comparison of fundamental equilibrium exchange rate and Balassa–Samuelson based Rodrik approach. *Journal of Applied Economics, 24(1), 541-554.*

Seraj, M., Coskuner, C., Akadiri, S. S., & Bahadori, N. (2020). the impact of real exchange rate undervaluation on economic growth: evidence from panel cointegration approach. https://doi.org/10.21203/rs.3.rs-16924/v1

Thirlwall,A.P. (1980). Balance-of-payments theory and the United Kingdom experience. Canterbury, UK: University of Kent.

Todaro, M. P., & Smith, S. C. (2006). Economic development,Ninth University Press.

Udenwa T.A & Uwaleke J.U. (2015). Understanding Nigerian financial system,. Port harcourt: Pearl Publishers.

Vaz, P. H., & Baer, W. (2014). Real exchange rate and manufacturing growth in Latin America. *Latin American Economic Review, 23(1), 2.*

Yohanna,A. & Alkali, M. (2015).Effect of fluctuating foreign exchange rate on the Nigeria.

World Bank (2020). World development indicators. Washington: World Bank.

Appendices

Appendix A

A: DATA

Year	GDPGROWTH %	UNDERVAL	RER	GDPPc	TOT	TOPEN	INF	GOVC
1980	4.20	-106.22	182.049	874.4	0.00	48.571314	12.419662	0.00
1981	-13.13	-145.08	175.6338	2180.1976	7105284656920.34	18.171726	219.00284	2.47
1982	-6.80	-163.42	165.4955	1843.9094	4966144467202.66	13.779833	14.802552	3.14
1983	-10.92	-235.19	154.1202	1222.6293	3812341793214.13	10.044969	19.56895	3.30
1984	-1.12	-380.89	155.8823	902.21585	4818110101168.32	9.3805412	5.6536641	3.47
1985	5.91	-328.72	153.8494	882.52	5443935692616.27	10.391979	6.9277691	3.64
1986	0.06	-199.31	144.3038	639.01312	105093440907.60	9.1358457	5.4154526	3.82
1987	3.20	64.35	148.3333	598.26486	-585822374530.19	19.495335	19.669476	3.99
1988	7.33	70.05	155.3527	549.23743	-987975338563.53	16.94061	20.177126	4.90
1989	1.92	79.83	156.1317	474.23204	1368528563097.37	34.182617	28.969673	5.46
1990	11.78	76.47	147.4708	567.52865	822610685964.24	30.92474	6.6689419	6.04
1991	0.36	107.99	168.0444	502.91414	1528800139596.67	37.021605	18.863907	7.20
1992	4.63	149.97	199.7059	477.17762	1272059939003.66	38.227388	46.752355	18.55
1993	-2.04	286.53	340.9322	270.22397	727840677733.89	33.719755	41.639059	27.01

1994	-1.81	184.65	285.2083	321.32067	-913574534914.68	23.059236	43.296464	31.29
1995	-0.07	77.23	237.2826	408.18104	-558325582425.44	39.528378	75.401653	36.15
1996	4.20	18.22	225.6716	461.51962	1246724256339.08	40.257729	26.49109	37.23
1997	2.94	-12.42	223.5294	479.98376	595252347504.60	51.461011	5.0553459	40.32
1998	2.58	-43.48	229.4416	469.43055	-2248981229179.45	39.278607	6.0093443	66.10
1999	0.58	149.87	219.0476	497.84157	-273268975535.92	34.457831	13.430572	75.84
2000	5.02	150.82	220.9607	567.93072	4431445463970.25	48.995599	22.673737	149.97
2001	5.92	141.48	219.646	590.38182	3384761438989.74	49.6805	10.076477	163.92
2002	15.33	121.16	199.5565	741.74749	3778308084809.98	40.035169	21.10905	154.18
2003	7.35	130.79	204.44	795.38623	4963213550738.00	49.334965	9.8043238	129.03
2004	9.25	116.33	191.6491	1007.8743	4791984370339.27	31.89587	22.368341	867.71
2005	6.44	82.39	169.6607	1268.3835	8168225229903.40	33.05946	19.858495	1,050.78
2006	6.06	51.56	143.0097	1656.4248	14841989460570.90	42.566566	23.864381	1,556.98
2007	6.59	44.71	135.2392	1883.4614	7007039956393.18	39.336932	7.099731	3,276.30
2008	6.76	21.82	121.3883	2242.8719	4984939605345.95	40.796835	7.9213872	3,767.27
2009	8.04	40.67	133.3249	1891.3353	-404776841705.36	36.05871	0.6860989	3,759.39
2010	8.01	17.07	117.0722	2280.4373	0.00	43.320757	16.342766	4,832.15

2011	5.31	19.12	119.6436	2487.598	-4653635925822.18	53.277958	9.7784581	5,412.01
2012	4.23	-0.88	109.6436	2723.8222	-2504021313705.67	44.532368	9.9476367	5,953.21
2013	6.67	-13.16	104.2328	2961.5494	-4006309358487.06	31.04886	4.9647457	5,796.44
2014	6.31	-20.46	103.9964	3098.9858	-6001375583291.99	30.885194	4.6626229	6,639.38
2015	2.65	-5.63	113.4545	2687.4801	-11247625044109.90	21.332652	2.8636651	5,648.95
2016	-1.62	20.71	130.9375	2176.0028	-14638018329009.10	20.722519	9.5436701	5,522.95
2017	0.81	47.43	148.2322	1968.5654	-15086231504138.50	26.347599	11.118918	5,059.38
2018	1.92	41.12	150.2604	2027.7785	-13217532056040.20	33.007833	10.228485	7,234.46
2019	2.21	12.04	135.1079	2229.8587	-15962319156009.80	34.023878	10.384779	8,115.02
2020	-1.79	10.17	127.6238	2097.0925	-12746182831039.00	25.399789	7.849142	13,431.82

B: DATA FOR USED FOR AND UNDERVALUATION

Year	Ppp	Non tradeable	RER=(N/PPP)	RER(ESTIMATED)	UNDERVALUATION
1980	0.204	37.138	182.0490196	288.27561	-106.2265904
1981	0.213	37.41	175.6338028	320.71899	-145.0851872
1982	0.222	36.74	165.4954955	328.92026	-163.4247645
1983	0.233	35.91	154.1201717	389.3106	-235.1904283
1984	0.238	37.1	155.8823529	536.77431	-380.8919571
1985	0.239	36.77	153.8493724	482.57899	-328.7296176
1986	0.237	34.2	144.3037975	263.62335	-119.3195525
1987	0.24	35.6	148.3333333	83.979059	64.35427433
1988	0.241	37.44	155.3526971	85.296481	70.0562161
1989	0.243	37.94	156.1316872	76.296636	79.83505124
1990	0.257	37.9	147.4708171	70.999168	76.47164912

1991	0.225	37.81	168.0444444	60.049645	107.9947994
1992	0.204	40.74	199.7058824	49.733815	149.9720674
1993	0.118	40.23	340.9322034	54.394777	286.5374264
1994	0.144	41.07	285.2083333	100.55374	184.6545933
1995	0.184	43.66	237.2826087	160.05061	77.2319987
1996	0.201	45.36	225.6716418	207.44259	18.22905179
1997	0.204	45.6	223.5294118	235.95535	-12.42593824
1998	0.197	45.2	229.4416244	272.92399	-43.48236563
1999	0.21	46	219.047619	69.174845	149.872774
2000	0.229	50.6	220.9606987	70.140114	150.8205847
2001	0.226	49.64	219.6460177	78.158826	141.4871917
2002	0.248	49.49	199.5564516	78.394314	121.1621376
2003	0.25	51.11	204.44	73.648856	130.791144
2004	0.285	54.62	191.6491228	75.313629	116.3354938
2005	0.336	56.67	168.6607143	86.26623	82.39448429
2006	0.412	58.92	143.0097087	91.445508	51.56420074
2007	0.439	59.37	135.23918	90.52913	44.71004995
2008	0.497	60.33	121.38833	99.561236	21.82709398
2009	0.397	52.93	133.324937	92.653796	40.67114103
2010	0.485	56.78	117.0721649	100	17.07216495
2011	0.505	60.42	119.6435644	100.51896	19.12460436
2012	0.547	59.97	109.6343693	110.51879	-0.884420713
2013	0.567	59.1	104.2328042	117.40127	-13.16846577
2014	0.563	58.55	103.9964476	124.45724	-20.4607924
2015	0.495	56.16	113.4545455	119.09373	-5.639184545
2016	0.416	54.47	130.9375	110.21851	20.71899
2017	0.379	56.18	148.23219	100.79893	47.43325997
2018	0.384	57.7	150.2604167	109.13049	41.12992667
2019	0.417	56.34	135.1079137	123.0663	12.04161367
2020	0.404	51.56	127.6237624	117.45367	10.17009238

APPENDIX B

RESULTS

GDP [ADF]

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

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-11.64458	0.0000
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

GDP [PP]

Null Hypothesis: GROWTH_ has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.589907	0.0104
Test critical values:	1% level	-3.605593	
	5% level	-2.936942	
	10% level	-2.606857	

GDPPC [ADF]

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

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.041262	0.0000
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

GDPPC [PP]

Null Hypothesis: D(LOGGDPPC) has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.645356	0.0000
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

INF [ADF]

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

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.880719	0.0000
Test critical values:	1% level	-3.605593	
	5% level	-2.936942	
	10% level	-2.606857	

INF [PP]

Null Hypothesis: INF has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.889316	0.0000
Test critical values:	1% level	-3.605593	
	5% level	-2.936942	
	10% level	-2.606857	

UNDERVAL^{FEER} [ADF]

Null Hypothesis: UNDERVAL has a unit root
Exogenous: Constant
Lag Length: 6 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.007859	0.0003
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

UNDERVAL^{FEER} [PP]

Null Hypothesis: D(UNDERVAL) has a unit root
Exogenous: Constant
Bandwidth: 15 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.582846	0.0007
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

GOVC[ADF]

Null Hypothesis: D(GOVC) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 4 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.215415	0.0107
Test critical values:	1% level	-4.243644	
	5% level	-3.544284	
	10% level	-3.204699	

GOVC[PP]

Null Hypothesis: GOVC has a unit root
Exogenous: None
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		3.786908	0.9999
Test critical values:	1% level	-2.624057	
	5% level	-1.949319	
	10% level	-1.611711	

TOT [ADF]

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

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.970569	0.0000
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

TOT [PP]

Null Hypothesis: D(LOGTOT) has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.972594	0.0000
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

TOPEN [ADF]

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

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.955722	0.0000
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

TOPEN [PP]

Null Hypothesis: TOPEN has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*

Phillips-Perron test statistic		-2.952510	0.0483
Test critical values:	1% level	-3.605593	
	5% level	-2.936942	
	10% level	-2.606857	
Prob(F-statistic)	0.009374		

LAG SRLECTION

VAR Lag Order Selection Criteria
Endogenous variables: GDPGROWTH_ LOGGDPPC INVST INF TOPEN TOT UNDERVAL^{FEER} GOVC
Exogenous variables: C
Date: 02/12/22 Time: 03:21
Sample: 1980 2020
Included observations: 38

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-2467.413	NA	5.28e+46	130.2849	130.6296	130.4075
1	-2257.122	320.9702*	2.57e+43	122.5854	125.6881*	123.6893
2	-2198.480	64.81396	5.46e+43	122.8674	128.7282	124.9526
3	-2077.779	82.58527	1.31e+43*	119.8831*	128.5020	122.9496*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

BOUND TEST

ARDL Bounds Test
Date: 02/12/22 Time: 01:43
Sample: 1982 2020
Included observations: 39
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	K
F-statistic	5.249800	7

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.03	3.13
5%	2.32	3.5
2.5%	2.6	3.84
1%	2.96	4.26

Test Equation:
Dependent Variable: D(GDPGROWTH_)
Method: Least Squares

Date: 02/12/22 Time: 01:43
Sample: 1982 2020
Included observations: 39

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDPPC)	0.017414	0.004417	3.942607	0.0006
D(INVST)	-4.106194	1.748396	-2.348550	0.0274
D(INF)	0.008921	0.024123	0.369810	0.7148
D(TOPEN)	-0.111683	0.086871	-1.285621	0.2108
D(TOPEN(-1))	0.198585	0.085767	2.315415	0.0295
D(UNDERVAL^{FEER})	0.003969	0.009317	0.426020	0.6739
C	78.32311	36.58658	2.140761	0.0427
LOGGDPPC(-1)	0.002163	0.002610	0.828546	0.4155
INVST(-1)	-2.602470	1.341665	-1.939731	0.0643
INF	-0.093296	0.067428	-1.383646	0.1792
TOPEN(-1)	-0.268457	0.126180	-2.127572	0.0438
LOGTOT(-1)	6.88E-14	2.18E-13	0.315977	0.7548
UNDERVAL^{FEER}(-1)	0.014945	0.008842	1.690352	0.1039
GOVC(-1)	-0.000752	0.001093	-0.688465	0.4978
GROWTH_(-1)	-0.709600	0.187778	-3.778926	0.0009

R-squared	0.701396	Mean dependent var	0.290769
Adjusted R-squared	0.527210	S.D. dependent var	4.764847
S.E. of regression	3.276298	Akaike info criterion	5.495028
Sum squared resid	257.6190	Schwarz criterion	6.134859
Log likelihood	-92.15305	Hannan-Quinn criter.	5.724594
F-statistic	4.026705	Durbin-Watson stat	2.332305
Prob(F-statistic)	0.001366		

LONG RUN AND SHORT RUN VERSION

ARDL Cointegrating And Long Run Form
Dependent Variable: GDPGROWTH_
Selected Model: ARDL(1, 1, 1, 2, 2, 0, 1, 0)
Date: 02/12/22 Time: 02:23
Sample: 1980 2020
Included observations: 39

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOGGDPPC)	0.014674	0.003461	4.239777	0.0003
D(INVST)	-4.430145	1.359639	-3.258324	0.0035
D(INF)	-0.053889	0.048063	-1.121213	0.0273
D(TOPEN)	-0.106959	0.068091	-1.570813	0.1299
D(TOPEN(-1))	0.215976	0.067871	3.182167	0.0042
D(LOGTOT)	0.000010	0.000000	1.139360	0.2663
D(UNDERVAL^{FEER})	0.005741	0.007787	-0.737347	0.0448
D(GOVC)	-0.000728	0.000327	-2.226961	0.0360
CointEq(-1)	-0.766283	0.143067	-5.356100	0.0000

Cointeq = GROWTH_ - (0.0031*LOGGDPPC -3.3562*INVST -0.1732*INF
-0.3168*TOPEN + 0.0000*TOT + 0.0154*UNDERVAL^{FEER} -0.0010*GOVC +
101.8223)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGGDPPC	0.003078	0.001549	1.987835	0.0589
INVST	-3.356195	1.650793	-2.033081	0.0537
INF	-0.173153	0.060546	-2.859868	0.0089
TOPEN	-0.316805	0.159309	-1.988616	0.0488
LOGTOT	0.000010	0.000000	1.161935	0.2572
$UNDERVAL^{FEER}$	0.015390	0.008553	1.799348	0.0351
GOVC	-0.000950	0.000462	-2.056974	0.0512
C	101.822332	45.981895	2.214401	0.0370

RAMSEY RESET

Ramsey RESET Test
Equation: UNTITLED
Specification: GDPGROWTH_ GDPGROWTH_(-1) LOGGDPPC LOGGDPPC(-1) INVST
INVST(-1) INF INF(-1) INF(-2) TOPEN TOPEN(-1) TOPEN(-2) LOGTOT
$UNDERVAL^{FEER}$ $UNDERVAL^{FEER}$ (-1) GOVC C
Omitted Variables: Squares of fitted values

	Value	Df	Probability
t-statistic	0.328920	22	0.7453
F-statistic	0.108189	(1, 22)	0.7453

F-test summary:

	Sum of Sq.	Df	Mean Squares
Test SSR	0.744702	1	0.744702
Restricted SSR	152.1788	23	6.616470
Unrestricted SSR	151.4341	22	6.883369

Unrestricted Test Equation:
Dependent Variable: GDPGROWTH_
Method: ARDL
Date: 02/12/22 Time: 03:41
Sample: 1982 2020
Included observations: 39
Maximum dependent lags: 3 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (3 lags, automatic):
Fixed regressors: C

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDPGROWTH_(-1)	0.220230	0.151576	1.452934	0.1604
LOGGDPPC	0.013740	0.004530	3.033097	0.0061
LOGGDPPC(-1)	-0.011670	0.003898	-2.993638	0.0067
INVST	-3.938007	2.040065	-1.930334	0.0666
INVST(-1)	1.747806	1.080764	1.617195	0.1201
INF	-0.049266	0.050999	-0.966013	0.3445
INF(-1)	-0.025470	0.020048	-1.270421	0.2172
INF(-2)	-0.058592	0.018403	-3.183802	0.0043
TOPEN	-0.092942	0.081483	-1.140640	0.2663

TOPEN(-1)	0.076126	0.077840	0.977984	0.3387
TOPEN(-2)	-0.194592	0.094969	-2.049014	0.0526
LOGTOT	9.37E-14	1.71E-13	0.548164	0.5891
UNDERVAL^{FEER}	-0.006327	0.008139	-0.777321	0.4452
UNDERVAL^{FEER} (-1)	0.016376	0.008640	1.895275	0.0713
GOVC	-0.000719	0.000335	-2.145803	0.0432
C	67.28360	43.40394	1.550172	0.1354
FITTED^2	0.010630	0.032317	0.328920	0.7453

R-squared	0.830237	Mean dependent var	3.441026
Adjusted R-squared	0.706773	S.D. dependent var	4.845054
S.E. of regression	2.623617	Akaike info criterion	5.066261
Sum squared resid	151.4341	Schwarz criterion	5.791403
Log likelihood	-81.79209	Hannan-Quinn criter.	5.326436
F-statistic	6.724531	Durbin-Watson stat	2.411937
Prob(F-statistic)	0.000033		

*Note: p-values and any subsequent tests do not account for model selection.

Heteroskedasticity Test: ARCH

Heteroskedasticity Test: ARCH

F-statistic	0.032291	Prob. F(1,36)	0.8584
Obs*R-squared	0.034055	Prob. Chi-Square(1)	0.8536

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 02/12/22 Time: 03:31
Sample (adjusted): 1983 2020
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.886495	1.147508	3.386900	0.0017
RESID^2(-1)	0.029815	0.165917	0.179698	0.8584

R-squared	0.000896	Mean dependent var	4.004692
Adjusted R-squared	-0.026857	S.D. dependent var	5.720005
S.E. of regression	5.796306	Akaike info criterion	6.403515
Sum squared resid	1209.498	Schwarz criterion	6.489703
Log likelihood	-119.6668	Hannan-Quinn criter.	6.434180
F-statistic	0.032291	Durbin-Watson stat	2.001353
Prob(F-statistic)	0.858397		

Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.850641	Prob. F(2,21)	0.1819
Obs*R-squared	5.843827	Prob. Chi-Square(2)	0.0838

Test Equation:
Dependent Variable: RESID

Method: ARDL
Date: 02/12/22 Time: 03:25
Sample: 1982 2020
Included observations: 39
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDPGROWTH_(-1)	0.238227	0.191963	1.241005	0.2283
LOGGDPPC	-0.002685	0.003656	-0.734384	0.4708
LOGGDPPC(-1)	0.002305	0.003427	0.672519	0.5086
INVST	1.075512	1.435042	0.749464	0.4619
INVST(-1)	-0.505101	1.033251	-0.488846	0.6300
INF	-0.025038	0.049088	-0.510053	0.6153
INF(-1)	0.014623	0.020925	0.698803	0.4923
INF(-2)	0.002130	0.014665	0.145248	0.8859
TOPEN	-0.013653	0.066533	-0.205210	0.8394
TOPEN(-1)	0.010549	0.073281	0.143958	0.8869
TOPEN(-2)	0.020775	0.066736	0.311307	0.7586
LOGTOT	-1.01E-13	1.25E-13	-0.809391	0.4274
UNDERVAL^{FEER}	-0.008222	0.008854	-0.928581	0.3637
UNDERVAL^{FEER} (-1)	0.005393	0.008194	0.658214	0.5176
GOVC	-0.000193	0.000333	-0.581094	0.5674
C	-15.03358	28.22852	-0.532567	0.5999
RESID(-1)	-0.685837	0.363394	-1.887311	0.0730
RESID(-2)	-0.108039	0.230231	-0.469262	0.6437

R-squared	0.149842	Mean dependent var	5.11E-15
Adjusted R-squared	-0.538382	S.D. dependent var	2.001176
S.E. of regression	2.482089	Akaike info criterion	4.960116
Sum squared resid	129.3761	Schwarz criterion	5.727914
Log likelihood	-78.72226	Hannan-Quinn criter.	5.235595
F-statistic	0.217723	Durbin-Watson stat	2.257706
Prob(F-statistic)	0.998800		

CUSUM TEST

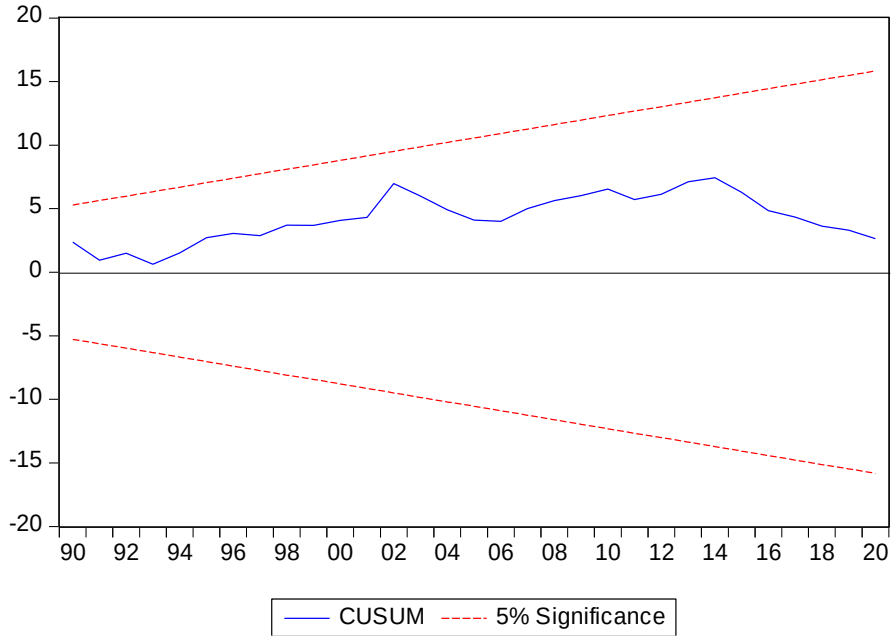
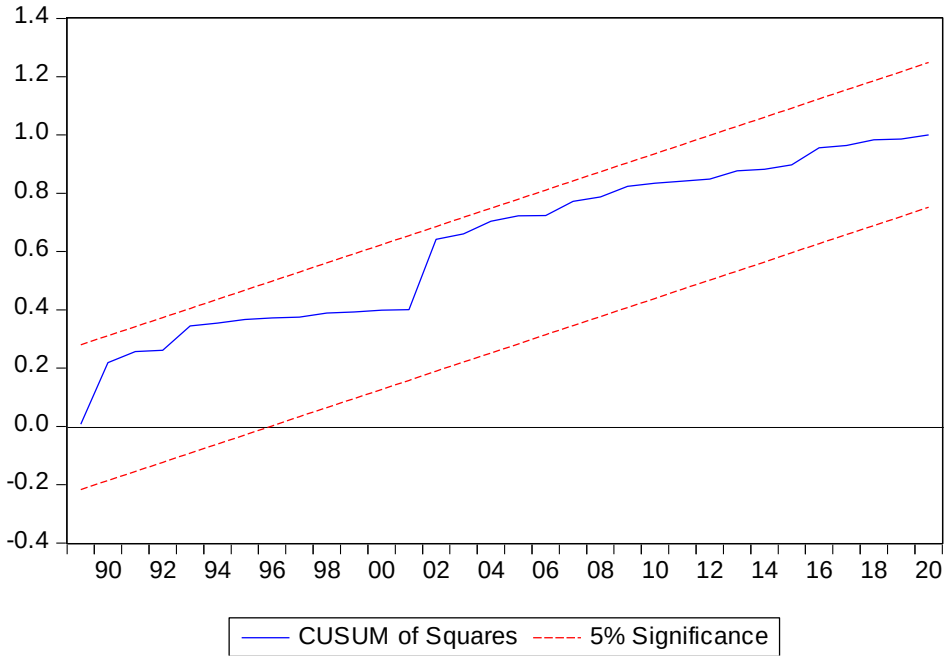
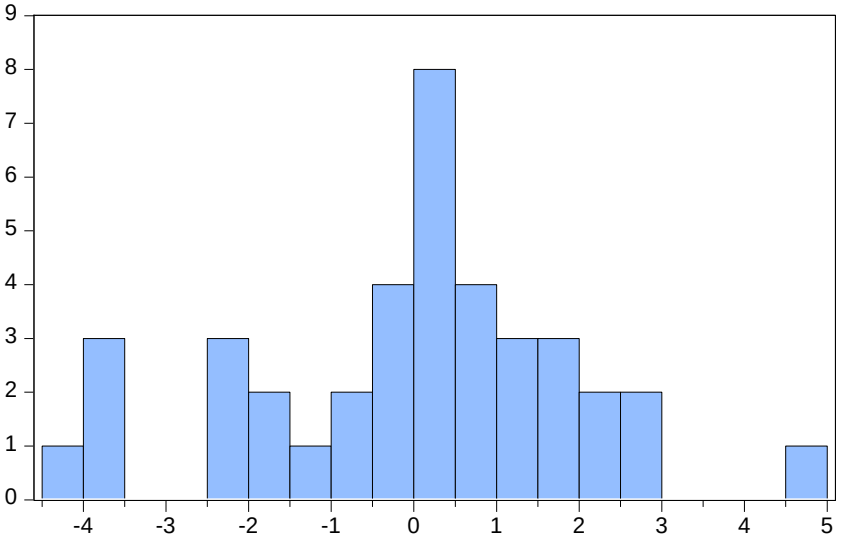


Figure 2: CUSUMsq Test



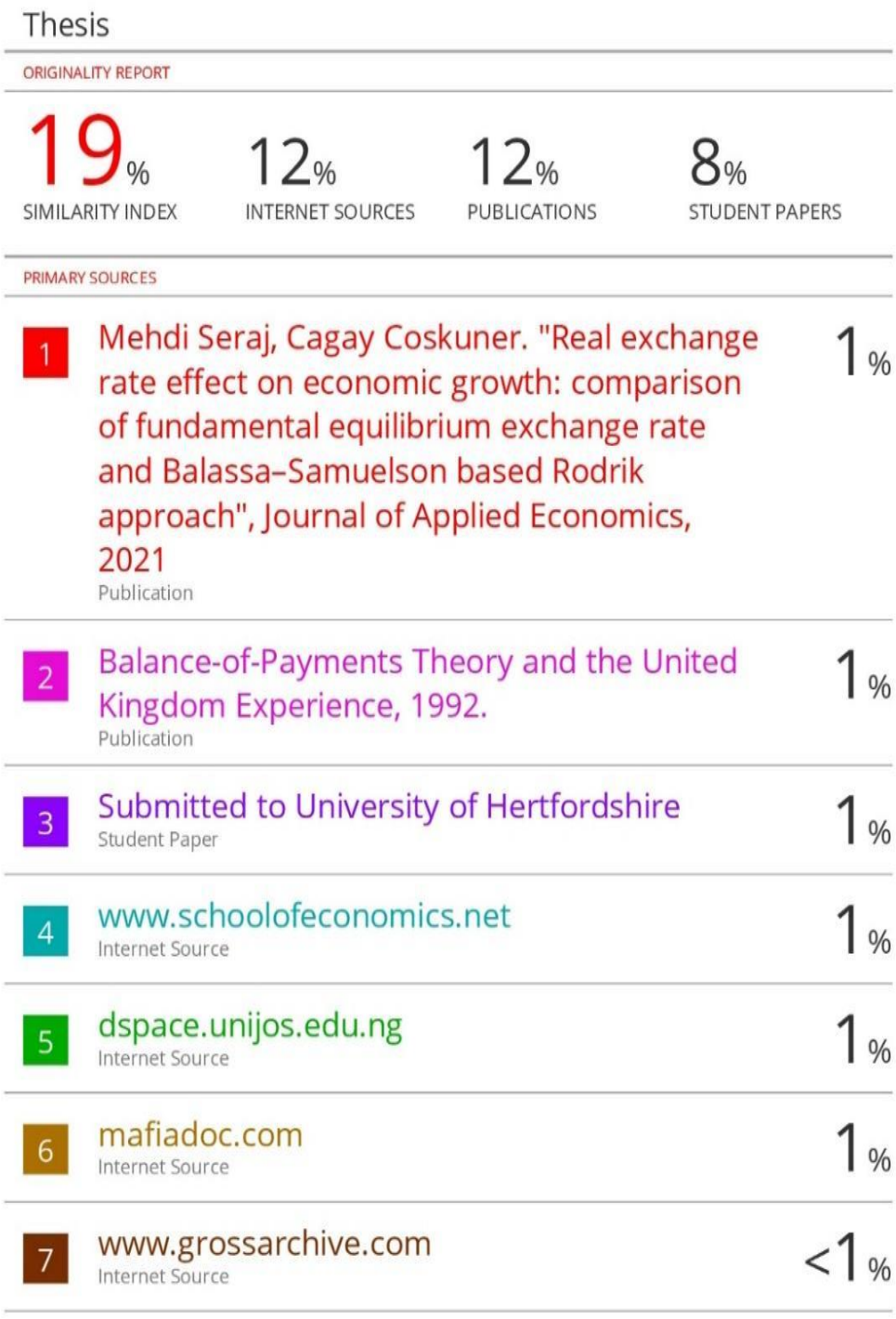
NORMALITY TEST



Series: Residuals	
Sample 1982 2020	
Observations 39	
Mean	5.11e-15
Median	0.169796
Maximum	4.811963
Minimum	-4.230820
Std. Dev.	2.001176
Skewness	-0.259502
Kurtosis	3.064997
Jarque-Bera	0.444582
Probability	0.800682

Appendix C

Turnitin Similarity Report



Thesis

ORIGINALITY REPORT

19%	12%	12%	8%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Mehdi Seraj, Cagay Coskuner. "Real exchange rate effect on economic growth: comparison of fundamental equilibrium exchange rate and Balassa–Samuelson based Rodrik approach", Journal of Applied Economics, 2021 Publication	1%
2	Balance-of-Payments Theory and the United Kingdom Experience, 1992. Publication	1%
3	Submitted to University of Hertfordshire Student Paper	1%
4	www.schoolofeconomics.net Internet Source	1%
5	dspace.unijos.edu.ng Internet Source	1%
6	mafiadoc.com Internet Source	1%
7	www.grossarchive.com Internet Source	<1%

Appendix D

Ethics Committee Approval

Lisansüstü Eğitim enstitüsü Müdürlüğü'ne;

Tezin yazılıp hazırlanmasında etik kurallarına aykırı hiçbir unsurun yer almadığını tez danışmanları olarak beyan ederiz.

Prof.Dr.Hüseyin ÖZDEŞER (Supervisor)

Yrd.Doç.Dr.Mehdi SERAJ(Co-Supervisor)