

EXCHANGE RATE PASS-THROUGH TO IMPORT AND CONSUMER PRICES IN NIGERIA: EVIDENCE FROM THRESHOLD REGRESSION MODELS

BY

BASHIR ALIYU
M.SC/SOC-SCI/15068/2011-2012

**Being a Masters Thesis submitted to the School of Postgraduate Studies, Ahmadu Bello
University, Zaria in partial fulfillment of the requirements for the Award of Masters
Degree of Science in Economics.**

**Department of Economics,
Faculty of Social Sciences,
Ahmadu Bello University,
Zaria, Nigeria.**

NOVEMBER, 2016

DECLARATION

I hereby declare that this thesis titled, “Exchange Rate Pass-Through to Import and Consumer Prices in Nigeria: Evidence from Threshold Regression Model (1986Q1 – 2014Q4)” was done by me in the Department of Economics, Ahmadu Bello University Zaria, Nigeria under the supervision of Dr. M. M. Usman and Dr. Jibrin S. Mohammed. All information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I have fully cited and referenced all materials and results that are not original to this work. Thus, this thesis is wholly my own work and has not been published or submitted for another degree here or any other University.

Bashir Aliyu

.....

.....

(Signature)

(Date)

CERTIFICATION

This thesis titled, “Exchange Rate Pass-Through to Import and Consumer Prices in Nigeria: Evidence from Threshold Regression Model (1986 – 2014)” meets the regulation governing the award of Masters Degree of Science of the Department of Economics of Ahmadu Bello University Zaria, Nigeria and is approved for its contribution to knowledge and literary presentation.

Dr. Muhammad Muttaka Usman		
Chairman, Supervisory Committee	(Signature)	(Date)

Dr. Jibrin S. Mohammed		
Member, Supervisory Committee	(Signature)	(Date)

Dr. (Mrs.) Salamatu Isah		
Head of Deapartment	(Signature)	(Date)

Prof. Kabir Bala		
Dean, Postgraduate School	(Signature)	(Date)

DEDICATION

This thesis is dedicated to my beloved parent, Mal. Aliyu Muhammad and Malama Aljannatu Aliyu for their support, prayer and encouragement throughout the programme.

ACKNOWLEDGEMENTS

All gratitude are due to Almighty Allah for making this study a reality. I also wish to acknowledge the unflinching support I received from my parents, Mal. Aliyu Muhammad and Malama Aljannatu Aliyu; my beloved wife, Malama Zainab Shehu Sani; my sister, Malama Jamila Aliyu; and my brothers, Shamsuddeen Aliyu and Muhammad Sani Aliyu throughout the programme. To my two little children, Aliyu and Ahmad for their warm welcome whenever I returned home from school, May Almighty Allah bless you all.

A special gratitude goes to my supervisors, Dr. Muttaka M. Usman and Dr. Jubrin S. Mohammed for their scholarly contributions and guidance throughout the research period. Your valuable contributions and guidance has, in no small measure, helped in making the study a success. Equally, my appreciation goes to Dr. Sanusi Aliyu Rafindadi, who reviewed my work and made useful suggestions therein. To all the lecturers in the Department, who have taught me from my undergraduate to Masters, I appreciate your guidance. In addition, I wish to thank my course mates, especially the class representative, Mr. Usman Adamu Bello, for their support and assistance at various stages of the programme. May Almighty Allah reward you all abundantly.

I must acknowledge the immeasurable support and encouragement of my boss, Dr. Aminu Ladan Sharehu, the Director-General/Chief Executive, National Teachers' Institute Kaduna as well as my colleagues in the office, the Danmakwayon Daura, Alh. Jamilu Abdulkadir; Mal. Abdulrahman Yusuf; Mal. Abdulrahman Ahmad; Hajiya Maryam; Mal. Suleiman Dauda among others. They have been very helpful and I pray that Almighty Allah reward you all abundantly.

ABSTRACT

This study examined the exchange rate pass-through effect at the aggregate level into import and consumer prices in Nigeria between the periods 1986 and 2014. The study used the Threshold Regression statistical technique to ascertain the possibility of the presence of nonlinearity and asymmetry in the behaviour of exchange rate pass-through in Nigeria. It also considered the pass-through from exchange rate to import prices, using import data, and then the pass-through from import prices to consumer prices. The study found that Exchange Rate Pass-Through in Nigeria is incomplete, low, nonlinear, slow in speed and symmetric. The effect was discovered to be higher on import than consumer prices, implying that the pass-through effect declines along the pricing chain. These findings are useful in the design and implementation of monetary and exchange rate policies by the Central Bank of Nigeria.

TABLE OF CONTENTS

Title page.....	i
Declaration.....	ii
Certification.....	iii
Dedication.....	iv
Acknowledgements	v
Abstract.....	vi
Table of Contents.....	vii
List of Figures.....	x
List of Tables.....	xi
List of Appendices.....	xii

CHAPTER ONE: INTRODUCTION

1.1Background of the study.....	1
1.2Statement of the research problem.....	4
1.3 Research Questions	5
1.4 Research Hypothesis	5
1.5 Objectives of the study.....	6
1.6 Significance of the study.....	6
1.7 Scope of the study.....	7
1.8 Organization of the study.....	7

CHAPTER TWO LITERATURE REVIEW

2.1 Concepts of Exchange Rate Pass-through, Imports and Consumer Prices	8
2.2 Trends in Exchange Rate and Consumer Price Movement in Nigeria.....	11
2.3 Overview of Exchange Rate Policies in Nigeria 1986 – 2014	14
2.4 Overview of Macroeconomic Policies on Inflation in Nigeria 1986 – 2014.....	17

2.5 Theoretical Literature Review.....	23
2.6 Gaps in the Literature.....	31
CHAPTER THREE METHODOLOGY	
3.1 Conceptual framework	32
3.2 Theoretical Framework	34
3.3 Model Specification	36
3.4 Data Set and Sources	39
3.5 Pre-Estimation Test	40
3.6 Method of Estimation	41
3.7 Apriori Expectation	42
CHAPTER FOUR: PRESENTATION OF RESULTS, ANALYSES AND	
DISCUSSIONS	
4.1 Tests for Stationarity.....	44
4.2 Analyses of the Results	46
4.3 Exchange Rate Pass-through to Import Prices.....	48
4.4 Exchange Rate Pass-through from Import to Consumer Prices.....	50
4.5 Speed of the Pass-Through	53
4.6 Nonlinearity of ERPT in Nigeria	53
4.7 Exchange Rate Pass-through Asymmetry	53
CHAPTER FIVE: SUMMARY, CONCLUSION AND POLICY	
RECOMMENDATIONS	
5.1 Summary	55
5.2 Conclusion.....	56
5.3 Recommendations.....	56
References	58

Appendices	64
------------------	----

LIST OF FIGURES

Figure 2.1: Trends in Exchange Rate and Consumer Prices Movement (Inflation) in Nigeria (1986 – 2014)

Figure 3.1: Conceptual Framework of Exchange Rate Pass-Throgh to import and Consumer Prices

LIST OF TABLES

Table 2.1: Scheme of Events in Exchange Rate Management in Nigeria

Table 4.1: Results of Unit Root Test

Table 4.2: Result of Model Specification Criteria

Table 4.3: Result of Nonlinear Threshold Regression (Import)

Table 4.4: Result of Nonlinear Threshold Regression (Consumer Prices)

LIST OF APPENDICES

Appendix I: Results of Nonlinear Threshold Regression

Appendix II: Results of Nonlinear Threshold Regression

Appendix III: Trends of the Variables

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Globalisation has increased the openness of global economies thereby necessitating an increased focus on exchange rate pass-through with the aim of determining an appropriate monetary policy response to exchange rate fluctuations. The incidence of large fluctuations in exchange rates has informed the need for a better understanding of the determinants of transmission of exchange rate variations into import and domestic prices (Aliyu, Sanni and Duke, 2009). The concept of Exchange Rate Pass-Through (ERPT) has been well known to Economists for a long time but significant interest in the concept grew since after the Plaza Accord of 1985. This was an agreement between France, West Germany, Japan, USA and UK to depreciate the US dollar in relation to the Japanese yen and German Deutsche Mark and it was expected that the price of Japanese import in US dollar would be expensive. However, it was later observed that the price of the Japanese imports in US dollar rose only slightly or even remained unchanged and in some cases actually declined (Goldberg and Knetter in Berga, 2012). This prompted Economists' increased interest in trying to estimate the extent of speed and magnitude of Exchange Rate Pass-Through (ERPT).

Exchange Rate Pass-Through refers to the change in domestic prices that can be attributed to a prior change in the nominal exchange rate (Aliyu *et al.*, 2009). It is also generally considered as the extent to which changes in exchange rate are reflected in the prices of goods and services (Sanusi, 2010). When there is a proportionate change in domestic prices arising from a change in exchange rate, the pass-through is said to be complete. It is incomplete when the change is less than proportionate and zero pass-through occurs, when a change in exchange rate does not affect domestic prices. ERPT affects consumer prices directly through prices of imported consumer goods and indirectly through the prices of

imported intermediate goods. When the currency of the domestic country appreciates, it will lead to lower import prices of finished goods and inputs. Likewise, when the domestic currency depreciates, it will result in higher import prices which are more likely to be passed on to consumer prices. Currency depreciation also causes a rise in the prices of imported inputs which may result in the increase in the marginal cost of producers. Thus, this results to higher prices in domestically produced goods (Mohammed, 2013).

Initially ERPT was perceived to be theoretically one-to-one, i.e, hundred percent change in foreign price is wholly passed unto domestic consumer prices. This is because the Purchasing Power Parity (PPP) was based on the perfect competitive market model. However, later empirical studies have found ERPT to be incomplete (Berga, 2012). This may not be unconnected with the fact that most of the assumptions underlying the theory do not exist in reality thus, leading to contradictory outcomes from empirical studies. Some of the explanations to the incompleteness of pass-through include the exporters' Pricing-To-Market (PTM). Krugman (1987) first popularised this idea that, when there is a depreciation in the importers' currency, foreign exporters tend to reduce their export prices by reducing the margin of their profits instead of increasing the import prices in order to maintain market share. Similarly, exporters may invoice in the currency of the importer known as Local Currency Pricing (LCP). In such situations, prices do not often fluctuate with the variation in exchange rate (Goldberg and Knetter, 1997). Similarly, some studies on ERPT have found that in some cases, there tend to be higher pass-through during appreciation than during depreciation. In some situations also, there tend to be zero/low pass-through during small changes in exchanges and higher pass-through during higher changes in exchange rate. This brings about the concept Asymmetry in ERPT.

There has been a debate about the major sources of inflation in Nigeria. Exchange rate depreciation is believed to be one of the sources of inflationary trend in Nigeria. This is more

so as empirical evidence shows that there is a stronger positive relationship between autonomous exchange rate and Consumer Price Index (CPI) even though the relationship is weaker between the official rate and CPI (Adekunle, 2010). Other reasons brought forward include the persistent inflationary trend experienced in the country alongside the successive depreciation of the naira following the adoption of the Structural Adjustment Programme (SAP) in 1986.

The Structural Adjustment Programme (SAP) was introduced to among other things, correct the overvaluation of the naira through the setting up of a viable Second-tier Foreign Exchange Market (SFEM). This led to the successive depreciation of the naira from N1.56/US\$1 at the end of September, 1986 to N4.54/US\$1 in 1988. It almost double to N8.04 = US\$1 and N17.30/US\$1 in 1990 and 1992 respectively. By 1994, the de-factor pegging of the official exchange rate formalised when the naira was officially pegged at N21.88/US\$1 in 1994 Budget and the parallel market was declared illegal (Sanni, 2006). By the year 2000, when the new civilian administration of Olusegun Obasanjo came to power, the exchange rate was liberalised leading to the nose-dive of the naira to N102.1/US\$1 in 2000, N120.9/US\$1 in 2002 and 133.5/US\$1 in 2004 respectively. The naira appreciated against the USD for the first time in 2005 since 1986 to N132.1/US\$1 and later N128.7/US\$1 and N118.5/US\$1 in 2006 and 2008. It, however, skyrocketed to around N157.3/US\$1 in 2013 and later N158.6/US\$1 in 2014 (CBN statistical Bulletin, 2014).

Similarly, in 1986, the rate of inflation was 6.25%. The figure more than quadrupled in 1988 to 34.2%. There was sharp decline to 7.9% in 1990 but climbed to 44.57% in 1992. It remained around the same figure until 2002. Ascendancy in the inflation rate began afterwards from 2009. However, the rate continued to rise from 6.94% in 2000 to 12.89% in 2002, 15% in 2004. A drop was experienced in 2006 to 8.22% but rose to 11.58% and

13.72% in 2008 and 2010 respectively (IMF World Economic Outlook, 2011 and International Financial Statistics, 2012). It declines to 12.2% in 2012 and then to 8.0% in 2014 (CBN Statistical Bulletin, 2015).

A closer look at the relationship between the exchange rate and inflation in Nigeria within the period 1986 to 2014 shows a somewhat positive relationship. There were sharp falls in the inflation rate in 2006. The fall in 2006 could be linked to the Central Bank of Nigeria's financial sector reforms during the period that led to the consolidation of banks' capital base, accumulation of sizeable external reserve and appreciation of the naira against US Dollar. This signifies that there is high level of possibility that exchange rate variability may affect inflation in Nigeria. This study investigates the magnitude and speed of exchange rate pass-through to import and consumer prices in Nigeria using the Threshold Regression Model.

1.2 STATEMENT OF THE RESEARCH PROBLEM

Nigeria is an import dependent and a mono-cultural economy with oil constituting about 90% of its revenue. The country heavily depends on imports from many countries as many industries in Nigeria import their raw materials as well as massive importation of finished goods from foreign countries (Adedayo, 2012). This has renders the nation vulnerable to possible foreign inflation transmission.

Developments in the external sector of the Nigerian economy have led to the continued dwindling of crude oil receipts due to both demand and supply factors which led to the deterioration of the foreign exchange status of the naira. Concerns are on the implications of these developments on inflation or the extent of exchange rate pass-through of foreign prices to domestic and import prices. Thus, the need to empirically unravel the consequences of

these developments and provide policy recommendations for monetary policy authorities in Nigeria cannot be overemphasised.

Although studies were conducted on ERPT in Nigeria, they rely heavily on linear models while empirical evidences on some economies have found that ERPT could nonlinear. Again, most of the above studies did not consider the first stage in the pass-through which is to import prices but chose to jump to consumer prices. This has eluded a fundamental aspect of the pass-through mechanism that could give more comprehensive information about ERPT in Nigeria. In addition, the previous studies have not considered the possibility of the presence of Asymmetry in ERPT in Nigeria.

1.3 RESEARCH QUESTIONS

- i. What is the degree of ERPT to import and consumer prices in Nigeria?
- ii. What is the speed of ERPT to import and consumer prices in Nigeria?
- iii. Is there evidence of nonlinearity in ERPT to import and consumer prices in Nigeria?
- iv. Is there presence of asymmetry in ERPT to import prices in Nigeria?

1.4 RESEARCH HYPOTHESES

- i. There is low ERPT to import and consumer prices in Nigeria.
- ii. There is low speed of ERPT to import and consumer prices in Nigeria.
- iii. There is evidence of nonlinearity in ERPT to imports and consumer prices in Nigeria
- iv. There is the presence of asymmetry in ERPT to import prices in Nigeria.

1.5 OBJECTIVES OF THE STUDY

The specific objective of this study is to examine exchange rate pass-through to import and consumer prices in Nigeria.

Broadly, this study intends to:

- i. Estimate the degree of ERPT to import and consumer prices in Nigeria
- ii. Estimate the speed of ERPT to import and consumer prices in Nigeria
- iii. Examine if there is evidence of nonlinearity in ERPT to import and consumer prices in Nigeria
- iv. Examine if there is the presence of asymmetry ERPT to import prices in Nigeria

1.6 SIGNIFICANCE OF THE STUDY

Exchange rate movements are indeed crucial to the stability of the economy and monetary policy decisions. In a developing country like Nigeria with persistent trade deficits arising from its dependence on imports of intermediate and consumer goods, the knowledge of ERPT is important in appropriately adjusting its exchange rates to ensure competitiveness in the international market and prepare an effective expenditure switching strategy. Similarly, knowledge of Pass-through to import prices in Nigeria is very useful to monetary authorities and the use of import data in this study has given a clearer picture of the pass-through to import in Nigeria.

Knowledge of the linearity status of ERPT is of importance to monetary authorities in designing a more effective monetary policy. In addition, knowledge about the presence or otherwise of asymmetry in ERPT in Nigeria will help the monetary authorities in making an informed policy decisions, most especially as the country is faced with foreign exchange problems.

1.7 SCOPE OF THE STUDY

This study intends to study the exchange rate pass-through to import and consumer prices in Nigeria from 1986 to 2014. It intends to consider the transmission of the ERPT to import prices and also find out whether ERPT in Nigeria is symmetric or asymmetric.

1.8 ORGANISATION OF THE STUDY

This work is organised into five chapters. Chapter one consists of the general introduction, statement of the research problem, research questions, objectives of the study, significance of the study, scope and organisation of the study. Chapter two comprises the conceptual, theoretical and empirical literatures related to ERPT. Chapter three is the methodology while chapter four contains the analyses and interpretation of results. Chapter five provides the summary, conclusion and recommendations. Thereafter, the references and appendices are attached.

CHAPTER TWO

LITERATURE REVIEW

2.1 CONCEPTS OF EXCHANGE RATE PASS-THROUGH, IMPORTS AND CONSUMER PRICES

2.1.1 EXCHANGE RATE

Exchange rate has been defined as the price of one currency in terms of another. It is the rate at which one currency exchanges for another (Jhingan, 2003). It also refers to the cost of converting naira into US dollars or other foreign currencies and is determined by the demand and supply of the different currencies. They mediate any transaction between buyers and sellers of goods and services in different countries (Kishtainy, 2012). Exchange rate between two [currencies](#) is the rate at which one currency will be exchanged for another. It is also regarded as the value of one country's currency in terms of another currency (Sullivan, Steven and Shefirin, 2003). The main source of foreign exchange demand comes from importers, purchasers of foreign securities, government agencies buying foreign goods or services, basic travelling allowance and personal travelling allowances (Redmond, 2009). Economists have identified three separate concepts used for measuring exchange rate which includes:

The nominal exchange rate is the price of a currency in terms of another currency. The domestic currency terms defines exchange rate as the units of domestic currency per foreign currency, while the foreign currency term defines exchange rate as the units of a foreign currency in terms of domestic currency (Dwivedi, 2007).

The real exchange rate is the relative price of local goods to foreign goods. It is the nominal exchange rate which has been adjusted for price level between countries (Odusola, 2006). The external real exchange rate is the ratio of aggregate foreign price level or cost level to the home countries aggregate price or cost level while the internal real exchange rate measures the relative prices of two broad categories of goods; ratio of domestic price of tradable goods to non tradable goods within a country (Viser, 2004).

The effective exchange rate; is associated with a multilateral exchange rate where a country has multiple trading partner. In this case, the rate is weighted and incorporates all forms of taxes charged on import and export (Odusola, 2006). However, multilateral real exchange rate is a weighted average of the external real exchange rate index with respect to using multiple trading partners (Viser, 2004).

2.1.2 EXCHANGE RATE PASS-THROUGH

According to Goldberg and Knetter (1997) ERPT is defined as ‘the percentage change in local currency import prices resulting from a one percent change in the exchange rate between the exporting and importing countries’. Adolfson (2001) defined the term ERPT as the percentage change in import caused by an unidentified shock to the exchange rate. In the view of Mumtaz, Oomen and Wang (2006), ERPT is the percentage change in local currency import prices following a one percentage change in the exchange rate between importing and exporting countries. According to Barhoumi (2005), ERPT can statistically be represented as the elasticity of import prices to a change in exchange rates. An alteration in import prices can consequently be extended to producer and consumer prices which will end up affecting price level in the economy (Mohammed, 2013).

The degree of pass-through possibly depends on whether the exchange rate movement is caused by a genuine exchange rate shock, or whether some other disturbances to the economy generate an implicit exchange rate change. The definition in terms of import price change seems narrow. A broader definition is the transmission of exchange rate shock to the overall price level, either to the producer price index (PPI) or to the consumer price index (CPI) (Devereux and Yetman, 2002). The pass-through is also dependent on whether one defines it as partial – only measuring the direct effect on the price relation, excluding the effect on

other variables – or total – determining the entire effect an exchange rate change causes, working through every interaction of the price determination (Adolfson, 2001).

2.1.3 DOMESTIC PRICE

A domestic price level represents the current price for a specific good or service in an economy. It is the general level of prices in an economy. This may refer to consumer goods prices in which case it is measured by a Retail Price Index, or to all goods produced, including investment and government purchases as well as consumer goods, in which case it is measured by a GDP deflator (Oxford Dictionary of Economics, 2013). Government agencies or national Economists tend to look at various price levels in order to assess rising or falling prices, called inflation and deflation in economic terms, respectively. The most common domestic price level is the consumer price index. This index is common in a host of countries; it measures the prices for a basket of goods that most Economists deem necessary to individuals in the economy. Price levels can also represent a snapshot in time of prices, allowing for benchmarks among various periods.

Price levels in a single nation's economy are often the most important elements of a market. Hybrid economies, those that contain some elements of a free market and government intervention, use the money supply to control inflation. The domestic price level as computed using a consumer price index could signal the amount of inflation. When inflation increases consistently over time, the nation's government may decide to decrease the money supply. In theory, this should help control inflation and reduce its effect on the economy.

Another use of the domestic price level is the calculation of a country's gross domestic product (GDP). In the classical sense, GDP represents the market value for all goods produced by a nation. GDP tends to limit the computation of this figure to all goods produced

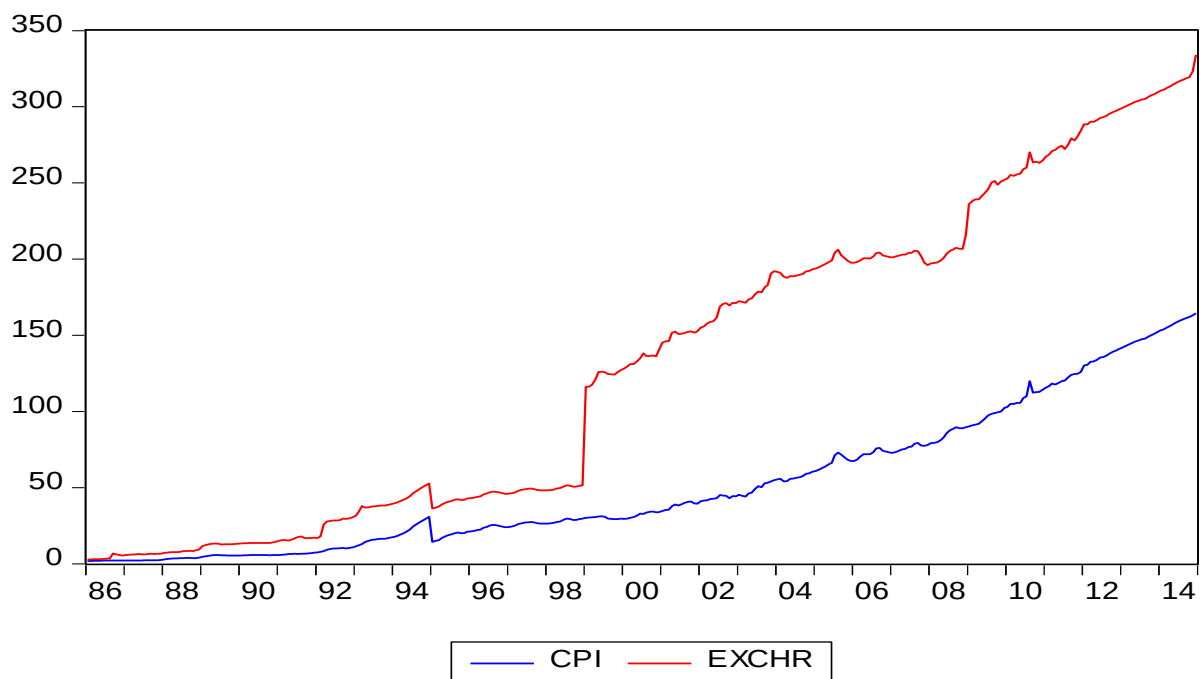
within the natural, domestic borders of the country. A country can experience GDP growth when the dollar value of these goods increases through real production output increases. Inflationary increases in this figure are not representative of true growth.

It is often difficult for an individual to compute a domestic price level. Government agencies, therefore, provide this information on a monthly, quarterly, or annual basis. Economists and other organizations can help track these figures and interpret the data. Central Banks or other agencies may provide insight into the figures. This can result in a discussion on the topic or interpretation of the data as computed (Wisegeek, 2003).

2.2 TRENDS IN EXCHANGE RATE AND CONSUMER PRICE MOVEMENT IN NIGERIA

Inflation has been a major issue to policy makers in all countries of the world and it has been at the heart of macroeconomics for as long as the discipline. The traditional Philips curve was the first evidence that showed the inverse relationship between inflation and unemployment. Freidman, (1965), however, contends that the trade-off between inflation and unemployment in the Philips curve occurs only in a short-run and at NAIRU (natural rate) such relationship does not exist. Looking at the Nigerian experience over the years, from 1986 to 2014, the inflation dynamics has been somewhat of a random walk with a lot of fluctuations.

FIG. 2.1 TRENDS IN EXCHANGE RATE AND CONSUMER PRICE MOVEMENTS (INFLATION) IN NIGERIA: 1986 – 2014



From figure 2.1, it can be seen that the period of the regime change from the fixed to flexible exchange took effect in 1985 and from the period 1986 the Naira to US Dollar exchange rate became market driven. The strength of the Naira became weakened by the high level of demand for import which was culminated by the orientation of the stage of production in the economy. The primary productive stage means that there is no value addition in chain of production in the economy. This implies that Nigeria was and still is a supplier of raw materials to the rest of the world. Therefore the primary products are exported at a cheaper price and finished products were imported at a higher cost and the net difference accrues deficits to the economy.

From the period of 1986 to 1994 the US Dollar kept appreciating against the naira gradually at a steady rate. It must be pointed out that over these periods; the US Dollar had a period slower rate of appreciation from 1986 to 1991. From the period 1994 to 1998, the exchange rate of the Naira to US Dollar was at stable state. All through during these periods, more demand for US Dollar was being stabilized by an equal demand for Naira.

The domestic currency went for a sharp fall in value relative to the value of the US Dollar in 1999. It is suggestive at this premise to infer that prevailing political situation has far reaching implication on the value of the Naira relative to the dollar in a flexible exchange regime. This is so because the period of sky rocketing value of dollar exchange rate coincided with the transition period from military to a civilian regime. Therefore, a point worthy to note is that both political and exchange rate regimes showed phenomenal effect on the exchange rate of Naira to a US Dollar. It is also note worthy that political event showed more monumental effect on the exchange rate as it encapsulated the period with fastest rate of appreciation of the US Dollar against the Naira in the entire history of the economy.

The rest of the period from year 2000 to the period of 2013 represents the periods of instability in the exchange rate of the Naira. It can be seen that the value of dollar rise at a steady rate from year 2000 to 2004 before it declined at steady pace for another period five years that ended in 2009. Based on the performance of the rising prices of the crude oil globally, it can be asserted that the surpluses from the earning of more US Dollars per barrel provided the cushioning effect for the Naira to reverse the appreciation of dollar against the naira over these periods. The adjustment in the demand for the dollar in the economy in the period of 2009 coupled with the quantitative easing policy pursued in the American economy, the dollar regained more impetus against the naira.

The inflation trend showed a steady price spikes which means that inflation dynamics has been rising steadily from 1991 to 1994 and this rise was peaked around 1995, when it took a nose dive in 1995. The trend showed an interesting pattern over the entire period. The first pattern was marked by period of steady rise and this started from 1990 and settled in 1995. The second pattern was characterized by a steeper but steady and moderate movement of prices. By 1998, exchange rate rose sharply upward before it settles to a steady rise up to

around 2005. It declines a little around 2007 before it picked up in 2008 and continues to rise steadily up to 2014. Within the period 1994 and 2014, inflation remains stable and rose steadily without any sharp rise.

2.3 OVERVIEW OF EXCHANGE RATE POLICIES IN NIGERIA, 1986 - 2014

In 1986, the new exchange rate policy was adopted, however, exchange rate determination in Nigeria has gone through many changes. Before the establishment of the Central Bank of Nigeria in 1958 and the enactment of the Exchange Control Act of 1962, foreign exchange was earned by private sector and held in balances abroad by commercial banks that acted as agents for local exporters. The boom experienced in the 1970s made it necessary to manage foreign exchange rate in order to avoid shortage. However, shortages in the late 1970s and the early 1980's compelled the government to introduce some ad hoc measures to control excessive demand for foreign exchange.

However, it was not until 1982 that a comprehensive exchange controls were applied. These lists include the fixed exchange rate, the freely floating and the managed floating system among others. In an attempt to achieve the goal of the new exchange rate policy, a transitory dual exchange rate system (First and Second –Tier –SFEM) was adopted in September, 1986, both metamorphosed into the Foreign Exchange Market (FEM) in 1987. Bureau de Change was introduced in 1989 with a view to enlarging the scope of FEM. In 1994, there was a policy reversal, occasioned by the non-relenting pressure on the foreign exchange market.

Further reforms such as the formal pegging of the Naira exchange rate, the centralization of foreign exchange in the CBN, the restriction of Bureau de change to buy foreign exchange as an agent of CBN etc. were all introduced in the foreign exchange market in 1994 as a result of the volatility in exchange rates. Still, there was another policy reversal in 1995 to that of “guided deregulation”. This necessitated the institution of the Autonomous Foreign Exchange

Market (AFEM) which later metamorphosed into a daily; two ways quote Inter-Bank Foreign Exchange Market (IFEM) in 1999. The Dutch Auction System was reintroduced in 2002 as a result of the intensification of the demand pressure in the foreign exchange market and the persistence in the depletion of the country's external reserves. Finally, the Wholesales Dutch Auction System (W-DAS) was introduced in February 20, 2006 which has been in existence up to year 2014. The introduction of the WDAS was also to deepen the foreign exchange market in order to evolve a realistic exchange rate of the Naira.

In summary, the numerous methods of exchange regimes practiced in Nigeria hitherto include the extreme case of fixed exchange rate system, freely floating regime, adjustable peg, crawling peg, target zones, managed float and so on. A fixed exchange rate regime entails the pegging of the exchange rate of domestic currency to a unit of gold, a reference currency or a basket of currencies with the primary objectives of ensuring a low rate of inflation. This induced an overvaluation of Naira and was supported by exchange control regulations that engendered significant distortions in the economy. The major drawback of the fixed regimes, however is that it implies the loss of monetary policy discretion or independence.

The floating exchange rate regime, on the other hand implies that the forces of demand and supply will determine the exchange rate. This regime assumes the presence of an invisible hand in the foreign exchange market and that the exchange rate adjusts automatically to clear any deficit or surplus in the market. Again, the disadvantages of the freely floating regime have been documented. These include persistence exchange rate volatility, high inflation and transaction cost. Under the managed floating regimes the government intervenes in the foreign exchange market in order to influence the exchange rate, but does not commit itself to maintaining a certain fixed exchange rate or some narrow limit around it.

However, in spite of these different methods of determining exchange rate, a realistic exchange rate has not been found for naira because the existing exchange rate systems had continued to widen the gap between the official and the parallel markets and had failed to prevent disequilibrium in the foreign exchange market. It has also failed to ensure stability of the exchange rate as well as maintaining a favourable external reserve positions and consequently ensure external balances. In addition, the various exchange rate systems in used in Nigeria had also failed to eliminate or reduces the incidence of capital flight and the power to correct the sky rocketing Naira exchange rate has been missing (Stephen, 2011).

Table 2.1: Scheme of Events in Exchange Rate Management in Nigeria

S/N	Year	Event	Remark
	1959 – 1967	Fixed Parity Solely with the British Pound Sterling	Suspended in 1972
	1968 – 1972	Included the US dollar in the parity exchange	Aftermath of the 1967 devaluation of the pound and the emergence of a strong dollar.
	1973	Revert to fixed parity with the British Pounds	Devaluation of the US dollar
	1974	Parity to both pounds and dollars	To minimize the effect of devaluation of the individual currency
	1978	Trade (import) - Weighted basket of currency approach.	Tied to seven currencies; British Pounds, US Dollars, German Mark, French Franc, Japanese Yen, Dutch Guilder, Swiss Franc.
	1985	Reference on the dollar	To prevent arbitrage prevalent in the basket of currencies
	1986	Adoption of the second tier foreign exchange market	Deregulation of the economy
	1987	Merger of the first and second tier markets	Merger of rates

9	1988	Introduction of the interbank foreign exchange market	Merger between the autonomous and the FEM rates
	1994	Fixed Exchange rate	Regulate the economy
	1995	Introduction of the Autonomous Foreign Exchange Market (AFEM)	Guided Deregulation.
	1999	Re-introduction of the Inter-bank Foreign Exchange market (IFEM).	Merger of dual exchange rate, following the abolition of the official exchange rate from January 1 st
	2002	Re-introduction of the Dutch Auction System (DAS).	Retail DAS was implemented at first instance with CBN selling to end-users through the authorized users (banks)
	2006 – 2014	Introduction of Wholesale DAS	Further liberalized the market

Source: Adopted and modified from Central Bank of Nigeria Bullion (2006)

2.4 OVERVIEW OF MACROECONOMIC POLICIES ON INFLATION IN

NIGERIA, 1986 – 2014

From 1986 to 1997 inflation grew significantly. Some of the factors that contributed to the sharp increase in the general price level up to 1995 were the substantial depreciation of the Naira at the Autonomous Foreign Exchange Market (AFEM), the lag effect of upward adjustments in petroleum products prices in 1994, the impact of the Value Added Tax (VAT) and seasonal shortages in the supply of some food items. Remedial measures taken over the years to tackle the problem of inflation in Nigeria include: price controls and quantity rationing, restrictive monetary and fiscal policies, quantitative controls (quotas and tariffs), institutional reforms, and establishment of special agencies such as Wages Commission and Consumer Protection Commission. In spite of these measures inflationary pressures persisted.

The implementation of the structural adjustment programme (SAP) in 1986 and de-regulation of financial sector in Nigeria offered a lot of policy change in monetary policy development in Nigeria. The deregulation brought an establishment of exchange rate markets in 1986. In 1987, there was a removal of interest rate, unification of foreign exchange markets and liberalization of bank licensing.

The third high inflation episode started in the last quarter of 1987 and accelerated through 1988 to 1989. This episode is related to the fiscal expansion that accompanied the 1988 budget. In 1989, banks were permitted to pay interest on demand deposits, ban on credit extension based on foreign exchange deposits. In 1990, a uniform accounting standards was introduced for banks while a stabilization security to mop up excess liquidity was also introduced. In 1991, inflation fell reaching one of its lowest points, i.e 13% (CBN, 2009). There was an embargo on bank licensing while the administration of interest rate was introduced. Central Bank was also empowered to regulate and supervise all financial institutions in the economy. In 1992, privatization of government-owned banks commenced, credit control was removed in 1993, and indirect monetary instruments were introduced while in 1994, re-imposition of interest and exchange rate controls were made.

Central Bank of Nigeria has over the years used monetary targeting to achieve price stability. Open Market Operations (OMO) was complemented by cash reserve ratio and repurchase agreements. Others include: Cash Reserve Ratio and the adjustment of the Minimum Rediscount to signal the direction dictated by monetary conditions. Interest Rate Draw Back was introduced to reduce the cost of high borrowing by farmers in 2002. In 2006, broad money grew by 30.6 percent compared with a target of 27.8 percent for the year and narrow money grew by 20.3 percent. The Monetary authorities faced severe challenges maintaining price stability, particularly due to the statutory allocations to the three tiers of government

and the monetization of the excess crude proceeds, the population census and pre-election spending. Among the measures taken during this period focused on meeting the Policy Support Instrument (PSI) Target. These included the introduction of the non-discountable Special Nigerian Treasury Bills, gradual increase in interest rates at the open and discount window by a 100 basis point in June, upward adjustment of the MRR mid-year which was later replaced by the Monetary Policy Rate (MPR) introduced in December 2006 (Aliyu, et. al., 2009). MPR has remained the policy rate of the CBN up to 2014 and beyond. The monetary Policy Committee (MPC) meet quarterly to consider the appropriateness of the policy rate or otherwise and consider the need to adjust it or otherwise among other instruments.

Consequently, the focus of monetary policy during this period shifted significantly from growth and developmental objectives to price stability. The operational framework for indirect monetary policy management involved the use of market (indirect) instruments to regulate the growth of major monetary aggregates. Under this framework, only the operating variables, the monetary base or its components are targeted, while the market is left to determine the interest rates and allocate credit. Essentially, the regime involves an econometric exercise, which estimates the optimal monetary stock, which is deemed consistent with the assumed targets for GDP growth, the inflation rate and external reserves. Thereafter, market instruments are used to limit banks' reserve balances as well as their credit creating capacity.

2.5 THEORETICAL LITERATURE

2.5.1 EXCHANGE RATE PASS-THROUGH THEORIES

Economists have traditionally believed that price differentials between countries are not sustainable in the long run as market forces will equalise them and change exchange rates based on the law of one price (purchasing power parity). Thus, a complete exchange rate

pass-through was assumed on the basis of the above theoretical standpoint. However, empirical studies on exchange rate pass-through (ERPT) in both industrialised and emerging economies have been found to be generally incomplete and vary across countries depending on their size and openness (Sanusi, 2010). This led to the emergence of some theoretical literatures in the last two decades explaining why ERPT is incomplete.

2.5.2 PURCHASING POWER PARITY

A theoretical discussion on the exchange rate pass-through effect should start with the purchasing power parity (PPP) hypothesis. The PPP is the simple empirical proposition which in its absolute form, states that, once converted to a common currency, national price levels should be equal. According to the relative PPP assumptions, depreciation of one currency relative to another match the difference in aggregate price inflation between two countries concerned (Sarno and Taylor, 2002; Rogoff, 1996). The basic idea is that if goods market arbitrage enforces broad parity in prices across a sufficient range of individual goods, then there should also be a high correlation in aggregate price levels. The PPP is the generalisation of the law of one price (LOOP) which postulates that the same good should have the same price across countries if prices are expressed in terms of the same currency.

However, there is large number of studies on the ERPT effect conducted for developed countries (e.g. Marazzi, Sheets and Vigfusson 2005; Campa and Goldberg 2004; Campa et al. 2005; Gagnon and Ihrig 2004; Hahn 2003; Ihrig et al. 2006 and Mccarthy 2000) and studies conducted for developing countries (e.g. Ito and Sato 2006; Choudhri and Hakura 2006; Frankel et al. 2005; Sheefeni, and Ocran, 2013; and Canetti and Greene 1992). The prevailing consensus in all these studies is that movements in the exchange rate and prices do not go one to one in the short to medium run.

2.5.3 EXPECTATION HYPOTHESIS

Expectation also plays an important role in both CPI inflation and nominal exchange rate determination. The adaptive and rational expectation hypotheses have provided a theoretical framework to analyse asymmetric ERPT. Firms are less likely to change prices in periods of appreciation of the currency than they would want to in periods of depreciation (Maka, 2013). Firms, in an attempt to maintain market share under imperfect market condition, may prefer to reduce prices during periods of appreciation rather than increasing prices during periods of depreciation. This is because a firm in an oligopolistic market may assume that its rival would match its price if it initiates a price reduction instead of a price increase. These results in a kink in the firms perceived demand curve (Sweezy, 1939 and Hall and Hitch, 1939).

2.5.4 TIME HORIZON

In a like manner, time horizon also affects the extent to which firms respond to changes in demand same as it affects their response to exchange rate changes within the short or long run. In the short run, firms face constraints on their production capacity and can only adjust production in the long run. In such situations, firms consider their objective function of maximising profit to react to changes in market conditions. Another factor that restricts firms' ability to adjust production is trade regulations such as quotas and tariff which could affect export or import. However, foreign exporting firms that are faced with quantity adjustment rigidity in the short run may attempt to increase prices rather than reduce them as the opportunity for increasing sales in the importing country becomes limited. This occurs in cases of exchange rate depreciation and it may trigger a higher pass-through (Maka, 2013).

2.5.5 PRICING-TO-MARKET

Pricing-to-market (PTM), which refers to the pricing behaviour of firms exporting their products to a destination market following an exchange rate change, is a closely related term to ERPT. Particularly, PTM is defined as the percent change in prices denominated in the

exporter's currency due to a one percent change in the exchange rate. Thus, the greater the degree of PTM, the lower will be the extent of ERPT. In the case where there is no PTM, import prices will adjust by the same proportion as the change in the exchange rate and ERPT will be complete. On the other hand, if there is full PTM (i.e if exporters adjust prices in their currency by the same proportion as the exchange rate change but in the opposite direction) ERPT to destination market prices will be zero (Berger, 2012). Generally, if exporters alter the export prices in their own currency by a proportion smaller than the exchange rate change, then pass-through is said to be incomplete (Gbosh and Rajan, 2006 in Berger, 2012).

2.6 EMPIRICAL LITERATURE

2.6.1 EXCHANGE RATE PASS-THROUGH: OTHER COUNTRIES EMPIRICAL EVIDENCE

A number of empirical studies that were conducted to estimate exchange rate pass-through found out that ERPT was incomplete. For instance, Goldberg and Knetter (1997) found that the response of domestic prices to exchange rate movements is only partial in US. On the average, only around 60 percent of exchange rate changes are passed on to import prices in the US. However, the response of domestic US price to exchange rate fluctuations vary from sector to sector and a considerable portion of the muted price responses seem to emanate from changes in mark-ups on export prices. Also, Yang (1997) who studied the ERPT in US manufacturing industries and its cross-sectional variation found that the pass-through was incomplete and varies across industries. In the study, he found ERPT to be higher in industries with higher degree of product differentiation and a lower elasticity of marginal

cost. The study also shows a negative relationship between import share and ERPT. Similarly, Marazzi, Sheets and Vigfusson (2005) investigated ERPT to import price in US. They found a sustained decline in ERPT to US import prices from 0.5 during the 1980s to somewhere around 0.2 during the last decade (1993 – 2004).

McCarthy (2000) conducted a comprehensive study of ERPT on the aggregate level for a number of industrialised countries which include the US, Germany, Japan, France, United Kingdom, Belgium, Netherlands, Switzerland and Sweden. He estimated a VAR model using import, producer and consumer price data from 1976 up until 1998. The findings of the study show that exchange rates and import prices have a modest effect on domestic price inflation over the post-Bretton Woods era. The pass-through is found to be stronger in countries with a larger import share. The rate of pass-through is, furthermore, shown to be positively correlated with the openness of the country and with the persistence of and exchange rate change, and negatively correlate with the volatility of the exchange rate.

Campa and Goldberg (2002) using quarterly data from 1975 to 1999 of 25 OECD countries discovered the prevalence of PCP and LCP in short run and long run pass-through elasticities respectively. At the level of an aggregate import bundle, the evidence across countries is strongly supportive of incomplete exchange rate pass-through in the short run. They also made similar conclusions about the prevalence of partial pass-through into import prices at a more disaggregated industry level. An (2006) also analysed the extent of ERPT at different stages of distribution - import prices, producer and consumer prices – for eight major industrialised countries: US, Japan, Canada, Italy, UK, Finland, Sweden and Spain. The study found incomplete ERPT in many horizons, though complete pass-through is observed occasionally. The study also revealed that the degree of pass-through declines along the

distribution chain. Thus, time needed for complete pass-through becomes longer along the distribution chain.

Zorzi, Hahn and Sanchez (2007) estimated the magnitude of ERPT in emerging economies. They found that ERPT is higher for import prices than for consumer prices implying that the degree pass-through declines along the pricing chain. Their analysis also overturns partly the conventional wisdom that ERPT is always considerably higher in ‘emerging’ than in ‘developed’ economies. In particular, they found that in low inflation emerging economies; pass-through to consumer prices is rather low just like advanced countries like US and Japan which are included in their study. In addition, they tested the Taylors (2000) hypothesis by simple correlation methods and found that positive and statistically significant connection between inflation and ERPT.

Aziz (2009) estimated ERPT into import, export and domestic prices for Bangladesh over the period 1973 to 2007. The estimated results from the full sample demonstrate that the transmission of exchange rate changes is significant and ‘complete’ to import and export prices . However, ERPT to producer and consumer prices are found to be only unity ‘partial’ implying that the degree of pass-through declines along the pricing chain. The recursive VAR suggests that response of domestic prices to exchange rate devaluation is positive and larger in the long run compared to the short run. The rolling regressions demonstrate that sensitivities of export and import prices to the exchange rate have been consistently around one until the early part of this decade.

Some of the empirical literatures of ERPT on African economies include Canetti and Greene (1992) who show that apart from monetary expansion, exchange rate movements affect consumer price inflation in sub-Saharan Africa (SSA). Particularly, they found that exchange

rates have a significant ‘Granger causal’ impact on prices in Tanzania, Sierra Leone, and Democratic Republic of Congo, which is linked to the high inflation episodes among these economies. Choudhri and Hakura (2001) in their cross country study found an incomplete pass-through for African countries during the period 1997 – 2000.

Frimpong and Adam (2010) analysed the effect of exchange rate changes on consumer prices in Ghana using VAR models based on monthly data from 1990 – 2009. In their findings, positive and insignificant long run relationship between domestic prices and exchange rate exist; implying that long run exchange rate pass-through in Ghana is zero. However, in the short run, they found low but significant pass-through. According to them, these findings reflect the impact of increased openness and tighter monetary policy pursued by the central bank of Ghana.

Sheefeni, and Ocran, (2013) employed the impulse response functions and variance decompositions obtained from a structural vector autoregressive model to study the exchange rate pass-through to domestic prices in Namibia. The results from the impulse response functions show that there is a high and long-lasting effect from changes in exchange rates to inflation in Namibia. The results from the forecast error variance decompositions also reflect that changes in the price level evolve endogenously with changes in the exchange rate. The results are in agreement with the findings of the impulse response functions regarding the significant effect of the exchange rate variable on domestic prices (inflation). They concluded that the results confirm an incomplete pass-through, indicating that the purchasing power parity theory does not hold, with regard to the price level, in the context of Namibia.

Berga, (2012) investigated the degree of ERPT and its asymmetry to import and consumer prices in Ethiopia between 1991/92 and 2010/11 using Structural Vector Autoregressive

(SVAR) and Co integrated Vector Autoregressive (CVAR). Based on SVAR analysis, the work found that ERPT in Ethiopia during the period under review was moderate, significant and persistent in the case of import price and low and short-lived in the case of consumer prices. The co integration analysis shows that there was incomplete and zero ERPT pass-through to import and consumer prices respectively in the long run.

Sanusi (2010) derived a Structural Vector Auto-regression (SVAR) model for the Ghanaian economy from which he estimated the pass-through effects of exchange rate changes to consumer prices. The model incorporates the special features of the Ghanaian economy, especially its dependence on foreign aid and primary commodity exports for foreign exchange earnings. His findings showed that the exchange rate pass-through to consumer prices is incomplete, however, significantly large. He suggests that exchange rate depreciation is a potentially important source of inflation in Ghana. Using variance decomposition analyses, he submits that monetary expansion has been more important in explaining Ghana's actual inflationary process than the exchange rate depreciation.

Maka (2013) examined asymmetric response of CPI inflation to changes in the nominal exchange rate of Ghana using the Structural Vector Autoregressive Regression (SVAR) model. Examining both symmetric and asymmetric exchange rate pass-through, the result showed that a strong evidence of a response in CPI inflation to changes in exchange rate exist. The response is not immediate but it featured prominently three months into the future and dissipates thereafter. He suggests that the pass-through to non-food prices is complete but incomplete in the case of food prices. He found that the exchange rate pass-through was asymmetric with depreciation having a positive effect on CPI inflation as expected within the first three months. Appreciation on the other hand has little impact on CPI inflation and has no statistical significance. It is evident that, the size of the changes in exchange rate does not

affect pass-through. He suggests examining the role of inflation environment in pass-through and concluded that, in periods of increasing inflation, CPI inflation responds strongly to output gap and exchange rate than in periods of decreasing inflation. The variation in CPI inflation explained by changes in exchange rate is very low due to increasing productivity which absorbs the impact.

2.6.2 EXCHANGE RATE PASS-THROUGH: NIGERIAN EMPIRICAL EVIDENCE

Empirical studies on exchange rate pass-through in Nigeria have recently received some boost using different models with varying outcomes. For instance, Aliyu et. Al. (2009) used the Vector Error Correction Model (VECM) to provide an evidence of exchange rate pass-through in Nigeria. The result found that the exchange rate pass-through to domestic prices is low, however, they reported that a slightly higher and rapid pass through exist in the import prices than in the consumer prices. The result showed that a one percent shock to exchange rate, results in 14.3 and -10.5 percent pass-through effects to import prices and consumer prices four quarters ahead, respectively. According to them, exchange rate pass-through in Nigeria declines along the price chain, and partly overturns the conventional wisdom in the literature that ERPT is always considerably higher in developing and emerging economies than in developed economies. They, however, were of the view that the exchange rate pass-through effect is expected to increase with greater degree of openness of the economy in the future, but, the fact that it was found to be incomplete implies that prices react less proportionately to exchange rate shock in Nigeria.

Adekunle (2010) adopted the correlation and Granger causality techniques to investigate the significance of the relationship between exchange rate and domestic inflation (proxy by Consumer Price Index) in Nigeria. The findings showed that there is a positive and significant relationship between exchange rate and CPI. The coefficient between autonomous

exchange rates and the consumer price index (CPI) is less significant than official rate, while the import ratio in the economy shows a near two-way balance causality with the consumer price index. The more significant one in causality is that import ratio granger causes CPI. The paper recommends a more liberalized foreign exchange market to reduce the impact of the parallel market and increase in domestic production of consumables to reduce importation of domestically substitutable goods in the economy.

Adedayo (2012) employed a distributed lag model that incorporates the first order lag of exchange rate inclusive of current output level to study the exchange rate pass through in Nigeria. The approach yielded two-variants of the adapted model and the classical ordinary least square method was used for estimation. The empirical outcomes indicated that it is only previous exchange rate of naira vis-a-vis U.S dollar that pass-through interest rate in Nigeria between 1970 and 2010, while neither current exchange rate of naira vis-a-vis U.S dollar nor previous exchange rate of naira vis-a-vis U.S dollar pass-through inflation rate in Nigeria between 1970 and 2010.

Oriavwote and Omojimate (2012) investigated ERPT to domestic prices in Nigeria using VEC model using data from 1970 to 2009. The result showed a long run relationship among the variables. It found out that exchange rate volatility induced domestic inflation in Nigeria. However, same was not true for interest rate. Thus, they recommended that exchange rate volatility should be given consideration when making policies on curbing inflation. Ogundipe, (2013) also applied the VEC model in studying the pass-through of foreign price changes on Nigerian domestic inflation. The study found a substantially large exchange rate pass-through to inflation in Nigeria. They suggested that the exchange rate has been more important in explaining Nigeria's rising inflation phenomenon than the actual money supply.

Mohammed, (2013) used SVAR to study the extent of ERPT to domestic consumer price inflation in Nigeria between 1986Q1 and 2013Q1. He found out that pass-through in Nigeria is incomplete and relatively low. Moreover, he discovered that the speed of adjustment to structural shocks, such as the exchange rate, output, monetary policy rate and money supply shocks were high and the effects of such shocks were also highly volatile.

Zubair, Okorie, & Sanusi, (2013) used SVAR to estimate the dynamic ERPT to consumer prices in Nigeria using quarterly data for the period between 1986 and 2010. Their findings reveal that during the period under review, ERPT in Nigeria was incomplete, low and fairly slow. It takes about eight quarters for the full impact of the pass-through to be passed to the economy. This is in spite of the significant size of imports on Nigeria's consumption basket which suggests, in their view, that importers practice the pricing-to-market strategy in Nigerian market. Given this outcome, they argued that Nigerian monetary authorities may consider the potential to float and the fear of adopting the floating exchange rate may be unfounded for an effective and realistic monetary policy.

Out of the seven available works reviewed on ERPT in Nigeria, three of them used VEC model. The works of Ogundipe, (2013), Oriavwote and Omojimite (2012) covered time period from 1970 to 2008 and 1970 to 2009 respectively while Aliyu et. al. (2009) covered time period between 1986 and 2007. While the latter found low ERPT to domestic prices and slightly higher in the import prices (Aliyu et. al., 2009), the former discovered substantially large exchange rate pass-through to inflation and that exchange rate volatility induces inflation in Nigeria. The seemingly contradictory outcomes from the three works above may be attributed to the difference in time frame covered by the works. Events and dynamism of economic activities that took place between 1970 and 1986 could be cause of the variation in the outcomes.

The other four studies used variety of techniques and covered different time frames. Adedayo, (2012) used Distributed Lag Model and found zero pass-through in Nigeria between 1970 and 2010. However, Adekunle (2010), used Granger Causality and Correlation to estimate the ERPT between 1986 and 2007, and he found out that the ERPT was positive and significant relationship exist between exchange rate and CPI. On the other hand, the studies of Mohammed, (2013) and Zubair, et. al. (2013) where both used SVAR model between 1986 and 2013 and 1986 to 2010 respectively found a consistent result in Nigeria. In this case, methodological differences as well as choice of variables could be an important factor in explaining these differences. However, none of the previous studies on Nigeria considered nonlinearity and asymmetry.

2.7 GAPS IN THE LITERATURE

From the various studies reviewed on ERPT on the Nigerian economy, it is clear that they rely heavily on linear models. However, some studies conducted on other economies shows that ERPT behaviour could be nonlinear. This is a gap this study set out to bridge.

Most of the studies (e.g. Adekunle, 2010; Oriavwote and Omojimate, 2012; Adedayo, 2012; Ogundipe, 2013; Mohammed, 2013) did not consider the first stage in the pass-through which is to import prices but chose to jump to consumer prices, thus missing an important part of the ERPT behaviour. This is another gap this study set out to bridge.

Again, the previous studies reviewed did not consider the possibility of the presence of Asymmetry in the behaviour of ERPT in Nigeria. This is another gap the study set out to bridge.

CHAPTER THREE

METHODOLOGY

3.1 CONCEPTUAL FRAMEWORK FOR METHODOLOGY

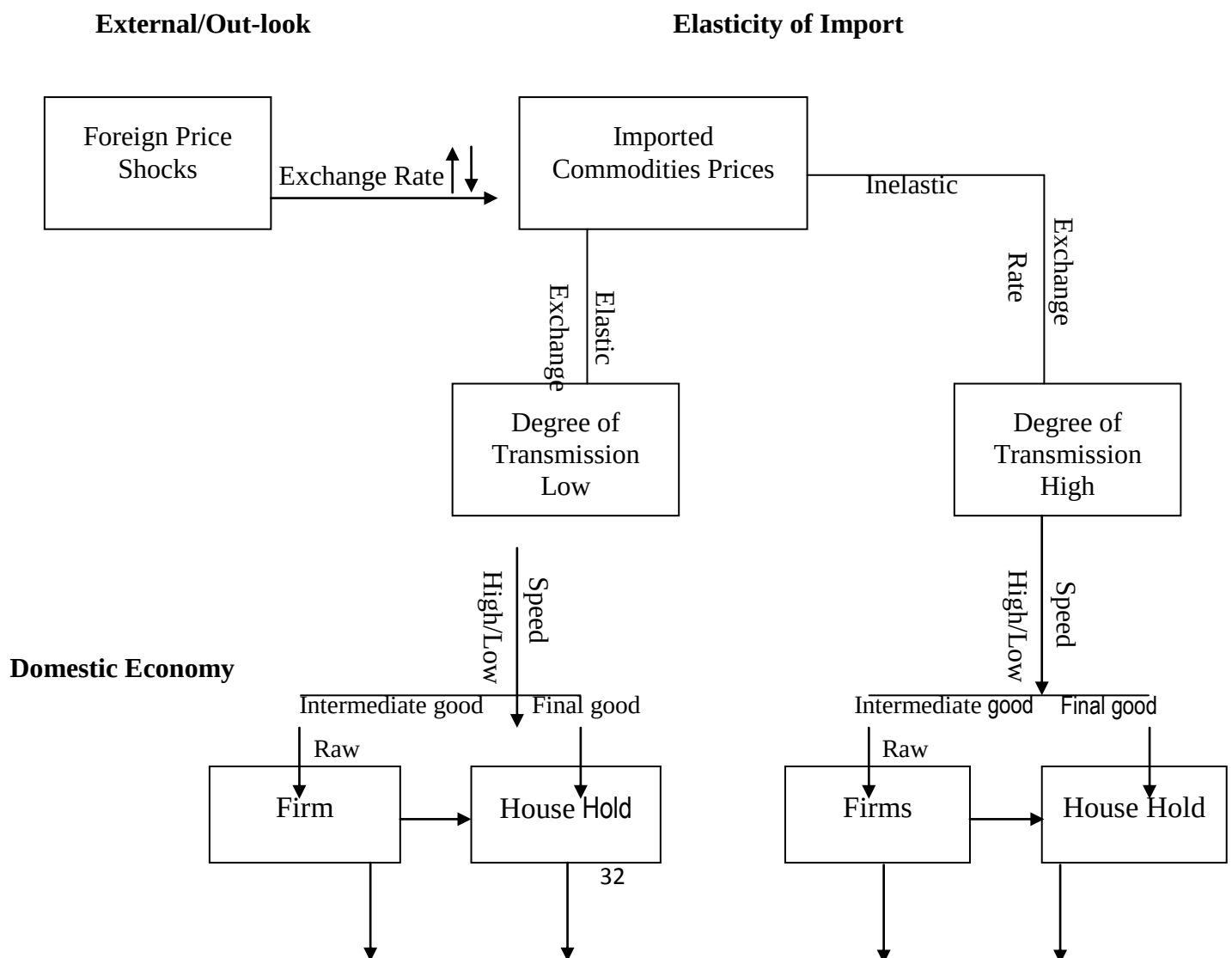
Exchange rate is a key price variable in an economy and performs dual role of maintaining international competitiveness, and serving as nominal anchor for domestic prices. It is therefore, defined as the price of one currency vis-à-vis another and is the number of units of a currency required to buy another currency (Mordi, 2006). Theoretically, it is believed that, under a floating exchange regime, exchange rate of a currency depends on the balance of payment (BOP) of a country. A favourable balance of payments raises the value of the exchange rate (appreciation) and vice-versa (Dwivedi, 2007).

If a country's productive capacity is low, its import will be high thereby exposing it to the influence of foreign prices. The prices of imported goods are no doubt affected by the prices of the exporting country in varying proportion. Most developing countries like Nigeria are characterised with high dependence on import of consumer products and industrial inputs. In the case of consumer products, the prices consumers will pay for the products in the domestic

market depend on the inflation status of the exporting country and the ERPT of the importing country and the effect is direct. Similarly, the prices of the imported industrial inputs will also form part of the prices of the domestic industrial outputs (consumer products). Thus, the higher the proportion of import in the basket of consumer products of a country, the higher the chances of the country to be exposed to imported inflation.

The need to understand the exchange rate pass-through in Nigeria is underpinned by the fact that Nigerian economy is external sector driven such that shocks from global commodity markets have serious implications on the economy (Aliyu, et al, 2009). The crude oil price shock that forced the CBN to devalue the naira in the last quarter of 2014 a classical example.

FIG. 3.1: CONCEPTUAL FRAMEWORK OF EXCHANGE RATE PASS-THROUGH TO IMPORT AND CONSUMER PRICES



Source: Author's sketch (2016).

3.2 THEORETICAL FRAMEWORK

Purchasing power parity (PPP) appears to be the most suitable theoretical framework in ERPT studies due to its macroeconomic perspective over other alternatives like the Pricing-To-Market (PTM) of Paul Krugman. Following Berga, (2012), the study adopts the PPP as a theoretical framework which is a theory of exchange rate determination and a way to compare the average costs of goods and services between countries. The theory assumes that the action of importers and exporters, motivated by cross country price differences, induces changes in the spot exchange rate. In another vein, PPP suggests that transactions on a country's current account, affect the value of the exchange rate on the foreign exchange market. PPP theory is based on an extension and variation of the "law of one price" as applied to the aggregate economy. To explain the theory it is best, first, to review the idea behind the law of one price.

The law of one price says that identical goods should sell for the same price in two separate markets when there are no transportation costs and no differential taxes applied in the two markets. The idea behind the law of one price is that identical goods selling in an integrated market, where there are no transportation costs or differential taxes or subsidies, should sell at

identical prices. If different prices prevailed, then there would be profit-making opportunities by buying the good in the low price market and reselling it in the high price market. If entrepreneurs acted in this way, then the prices would converge to equality.

Of course, for many reasons, the law of one price does not hold even between markets within a country. The price of items will also be different in other countries when converted at current exchange rates. The simple reason for the discrepancies is that there are costs to transport goods between locations, there are different taxes applied in different states and different countries, non-tradable input prices may vary, and people do not have perfect information about the prices of goods in all markets at all times. The purchasing power parity theory is really just the law of one price applied in the aggregate, but, with a slight twist added. If it makes sense from the law of one price that identical goods should sell for identical prices in different markets, then the law ought to hold for all identical goods sold in both markets.

As proposed by Berga, (2012), the starting point to study the link between exchange rate and domestic prices is the law of one price (LOP) which states that the price of identical commodities sold in different market should be the same when it is converted into the same currency (Pilbeam, 1998). The LOP is mathematically expressed as follows:

$$P_t = E_t P_t^* \dots\dots\dots (3.1)$$

Where P_t is the domestic price index, E_t is the nominal exchange rate (defined as domestic currency per unit of foreign), and P_t^* represents foreign prices. (Relative) purchasing power parity tests use price indices across countries to test whether this relationship holds. If we consider the LOP in logarithmic form we will have the following:

$$p_t = \gamma e_t + \lambda p_t^* \dots\dots\dots (3.2)$$

Where p_t , p_t^* and e_t are the natural logarithm of import price, export price and nominal exchange rate respectively. The LOP implies that $\gamma = \lambda = 1$ in which case changes in the exchange rate completely pass through to the domestic price of the traded good. This simple expression forms the basis of analyzing the long run pattern of ERPT.

Based on this fundamental relationship various researchers developed different more advanced models to analyze the degree of pass-through. According to Goldberg and Knetter (1997) and Campa and Goldberg (2002) ERPT studies consider the extent to which exchange rate movements are passed-through into traded goods prices, or absorbed in producer profit margins or mark-ups. Often these studies look at indices of industrial concentration or market power to explain pass-through differences or PTM. Based on this, their analysis starts from the following basic model:

$$P_t = \gamma e_t + \varepsilon_t \dots\dots\dots (3.3)$$

Where, ε_t is an error term and γ is the ERPT coefficient. The extent of pass-through coefficient is based on the value of γ . A one to one response of import prices to exchange rate is known as a complete ERPT ($\gamma=1$) while the case where pass - through coefficient is less than 1 ($\gamma < 1$) is known as partial or incomplete ERPT

3.3 MODEL SPECIFICATION

From the above, we proceed with construction of the model which is rooted from the functional relationship embedded in the Purchasing Power Parity (PPP) framework. The suggestion that short-run price adjustment in markets is influenced by changes in the variable

cost and that of the long-run adjustment to both variable and fixed cost is assumed in the import price dynamics.

$$p^{imp} = f(\Delta e, \pi, y) \quad (3.4)$$

The above Eq.3.4 shows that import price (p^{imp}) is a function of change in nominal exchange rate (Δe), consumer price index (CPI) denoted by (π) and aggregate output change (y). Keeping other factors affecting import prices constant, for the purpose of identifying the exchange rate pass-through to import price, the expression is captured as:

$$\ln p_t^{imp} = f(\ln e_{t-i}) \quad (3.5)$$

Where $i = (1, 2 \dots n)$. Eq. (3.5) is the functional relationship denoted by f between the log of import prices ($\ln p_t^{imp}$) and the log of nominal exchange rates ($\ln e_{t-i}$). It says that the prices of imports in the economy are determined by the lag value of nominal exchange rates. Appreciation in exchange rates may reduce the import prices while depreciations may lead to increase in the imports prices. Therefore the model is expressed as follows:

$$\ln p_t^{imp} = \alpha_0 + \alpha_1 \ln p_{t-1}^{imp} + \alpha_2 \ln e_t + \alpha_3 \ln \pi_t + \alpha_4 \ln y_t + \varepsilon_t \quad (3.6)$$

Where $\ln p_t^{imp}$ is the log of import prices, $\ln e_t$ is the log of nominal exchange rate, $\ln \pi_t$ is the log of inflation, $\ln y_t$ is the log of aggregate output and ε_t is the error term. Having internalized the lag dependent variable in Eq. (3.6), the equation becomes a Self-Exciting threshold model (SETAR). Using the indicator function $\mathbf{1}(\cdot)$ which is a dummy variable, we have the expression as:

$$\ln p_t^{imp} = \alpha_0 + \alpha_1 \ln p_{t-1}^{imp} + \alpha_2 \ln e_t + \alpha_3 \ln \pi_t + \alpha_4 \ln y_t + \sum_{j=0}^m \mathbf{1}(q_t, \gamma) \cdot \delta_j Z_t + \varepsilon_t \quad (3.7)$$

Where q_t is the threshold variable, $ln e_t$ is the nominal exchange rate, while $ln p_t^{imp}$ denotes import price variable and γ represents the threshold values, Z_t is a variable that coefficient could change across regime, and a delay variable “ δ ”. In a condensed back-shift operator eq. (3.4) is same as:

$$ln p_t^{imp} = X'_t \alpha + \sum_{j=0}^m 1, (q_t, \gamma) \cdot \delta_j Z_t + \varepsilon_t \quad (3.8)$$

Where $X'_t \alpha = \alpha_0 + \alpha_1 ln p_{t-1}^{imp} + \alpha_2 ln e_t + \alpha_3 ln \pi_t + \alpha_4 ln y_t$ The nonlinear coefficients $\alpha_0, \alpha_1, \alpha_2, \delta, \gamma$ from eq.(3.8) is now condensed as α, δ, γ which can be estimated as:

$$s(\alpha, \delta, \gamma) = \sum_{t=1}^r \left(ln p_{t-1}^{imp} + X'_t \alpha - \sum_{j=0}^m 1, (q_t, \gamma) \cdot \delta_j Z_t \right) \quad (3.9)$$

The result of the estimates of eq. (3.6) is presented in Appendix II. We however started by estimating the optimal number of regimes using a model search section criteria.

On the other hand, inflation is a function of many variables among which are:

$$\pi = f(\Delta e, p^{imp}, y) \quad (3.10)$$

Where consumer price index (CPI) denoted by (π) , while $ln p_t^{imp}$ denotes import price variable and Δe denotes change in nominal exchange rate, and aggregate output change (y) . Keeping other factors affecting import prices constant, for the purpose of identifying the exchange rate pass-through from import prices to consumer prices, the expression is captured as:

$$ln \pi_t = f(ln p_{t-i}^{imp}) \quad (3.11)$$

Where $i = (1, 2 \dots n)$. Eq. (3.11) is the functional relationship between consumer prices (CPI) and the import prices as is the case in the above. Therefore the model is also expressed as:

$$\ln \pi_t = \beta_0 + \beta_1 \ln \pi_{t-1} + \beta_2 \ln e_t + \beta_3 \ln p_t^{imp} + \beta_4 \ln y_t + u_t \quad (3.12)$$

Where $\ln \pi_t$ is the log of CPI, $\ln e_t$ is the log of nominal exchange rate, $\ln p_t^{imp}$ is the log of import prices, y_t is the log of aggregate output and u_t is the error term. Having internalized the lag dependent variable in Eq. (3.12), hence the equation becomes a Self-Exciting threshold Autoregressive model (SETAR) with a delay “ d ”, we have the expression as:

$$\ln \pi_t = \beta_0 + \beta_1 \ln \pi_{t-i} + \beta_2 \ln e_t + \beta_3 \ln p_t^{imp} + \beta_4 \ln y_t + \sum_{j=0}^m 1, (q_t, \gamma) \cdot \delta_j Z_t + u_t \quad (3.13)$$

Where q_t is the threshold variable, $\ln p_t^{imp}$ is the import prices, Z_t is the variable that coefficient could change across regime and γ represents the threshold values. In a condense back-shift operator eq. 3.13 is same as:

$$\ln \pi_t = X'_t \beta + \sum_{j=0}^m 1, (q_t, \gamma) \cdot \delta_j Z_t + u_t \quad (3.14)$$

Where $X'_t \beta = \beta_0 + \beta_1 \ln \pi_{t-1} + \beta_2 \ln e_t + \beta_3 \ln p_t^{imp} + \beta_4 \ln y_t$. The nonlinear coefficients $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \delta, \gamma$ from eq.(3.10) is now condensed as β, δ, γ which can be estimated as:

$$s(\beta, \delta, \gamma) = \sum_{t=1}^r \left(\ln p_{t-1}^{imp} + X'_t \beta - \sum_{j=0}^m 1, (q_t, \gamma) \cdot \delta_j Z_t \right) \quad (3.15)$$

The result of the estimates of eq. (3.15) is presented in Appendix II.

3.4 DATA SET AND SOURCES

The important objective of this study is to identify how the transmission of persistent fluctuations in the exchange rate into import and consumer prices takes place. These three variables are the core of our empirical analysis. It is thus assumed that exchange rate shocks are initially passed into import prices and then to producer prices which will finally lead to a reaction in consumer prices. The model includes nominal GDP as a measure of the domestic economic activity (demand shock). The choice of nominal GDP is to enable observation of detailed fluctuations in the aggregate output.

Similarly, monthly import data is included in the model to determine the magnitude and effect of the exchange rate pass-through into import prices; while monthly data of consumer price index (CPI) is equally included in the model to measure the magnitude and effect of exchange rate pass-through on consumer prices. In addition, the study also used the Monthly Nominal Effective Exchange Rate of the Naira to measure the exchange rate fluctuations. It is considered the right choice for the study especially when the total effect of the exchange rate changes is measured in a country with diversified trading partners whose distinct currencies may vary differently (Ito and Sato, 2006).

The data used in this study is basically from secondary sources. We use monthly time series data from the Central Bank of Nigeria statistical bulletin and Annual Reports (various issues). These monthly observations cover time period extending from January, 1986 to December, 2014. This time period is strategically selected because it excludes periods of rigidities in exchange rate determination following the commencement of floating exchange rate regime in the country that was ushered in by the Structural Adjustment Programme (SAP, 1986).

3.5 PRE-ESTIMATION TEST

There were two preliminary test conducted prior to the estimation of the model. The first test is the stationary test which allows checking for the presence of unit root. The study adopts two variant test of the stationarity test. The Augmented Dickey Fuller (ADF) and Philip Perron test (PP). The use of two variant stationarity tests was necessary in order to provide a confirmatory test to see if there is a presence of outliers that may not be captured using a single particular test. The second preliminary test is the model selection criteria test which will be important in determining number of regimes in the period under review and the threshold variable using the Sum of Square Residual (SSR). T

3.6 METHOD OF ESTIMATION

In estimating the specified SETAR model, this study uses the threshold estimation technique in line with Krager and Kugler, (1993). Chappel, Padmore, Mistry and Ellis (1998). Balke and Wohar, (1998), Posedel and Tica, (2007), Ismail and Isah, (2006) and Bello, Maji and Sanusi (forthcoming). The justification for the use of the threshold estimation is predicated upon a number of factors. One of which is centred on the broad objective of the study which is a short-run dynamics in prices as against long-run equilibrium. Since the study precludes a long-run study which the threshold estimation is anchored on, strength of the threshold estimation is the inherent in the ability of a SETAR model to provide an important attribute that allows for having both estimates of the Autoregressive (AR) linear component and the nonlinear component which is responsible in switching the dependent variable (domestic inflation) from one regime to the other. The technique also provides a superior feature in telling the duration of time periods that exist between any two successive regimes.

As a non-linear time series model, we have chosen the self-exciting threshold autoregressive model proposed by Tong and Lim (1980) and Tong (1983) because this type of model is capable of producing dynamic asymmetric processes. Obviously in order to estimate the

model it is necessary to choose a threshold. Enders (2004) and Chan (1993) offer quite intuitive three step methodology for threshold selection process:

- i. First step is to sort the threshold variable from lowest to the highest value. In our sample threshold variable is a change in nominal exchange.
- ii. Second step is to estimate a TAR model using successive values of nominal exchange rate changes as thresholds. After estimation sum of squared residuals are saved for every observation (threshold) of nominal exchange rate change.
- iii. Third step is to create a graph of successive values of sum of squared residuals. If there is a single threshold, there should be a single trough in the graph.

With respect to model selection criteria, according to Enders (2004) the model with lowest sum of squared residuals and according to Shen and Hakes (1995) the model with highest t-ratio is the model that represents nonlinear data generating process most accurately (Posedel and Tica, 2007). Furthermore the model was afterwards subjected to stability test to check whether the estimated model is stable or not. The inference for the stability was drawn on the basis of cusum and cusum square test.

3.7 APRIORI EXPECTATION

From the above models, the target coefficients from equation 16 include, α_0 , α_1 , α_2 , δ , and γ where α_0 denotes the intercept of the function, α_1 , α_2 , α_3 , α_4 are the coefficients of the variables affecting or determining the dependent variable (in this case import prices). These coefficients explain the magnitude of the respective variables effect on the import prices, in the case of equation 16. Of greater relevance is α_2 which is the coefficient of the nominal exchange (Δe). The value of α_2 determines the magnitude of the pass-through from exchange rate to import prices in equation 16. The greater the coefficient, normally expressed

in percentage, the higher the pass-through and vice versa. γ , denotes the threshold variable which shows the point at which a regime change takes place from one regime to another while δ denotes the speed of the transition from one regime to another. In other words, it shows how long it takes to pass-through from exchange rate to import prices based on eq. 16.

Similarly, the target coefficients from equation 22 include, β_0 , β_1 , β_2 , β_3 , β_4 , δ , and γ where β_0 , denotes the intercept of the function, β_1 , β_2 , β_3 , and β_4 are the coefficients of the variables affecting or determining the dependent variable (in this case consumer prices). These coefficients explain the magnitude of the respective variables' effect on the consumer prices, in the case of equation 22. Of more importance is β_3 which is the coefficient of the import prices ($\ln p_t^{imp}$). The value of β_3 determines the magnitude of the pass-through from import prices to consumer prices in the case of equation 22. The greater the coefficient, normally expressed in percentage, the higher the pass-through and vice versa. γ , denotes the threshold variable which shows the point at which a regime change takes place from one regime to another while δ denotes the speed of the transition from one regime to another. In other words, it shows how long it takes to pass-through from import prices to consumer prices.

CHAPTER FOUR

PRESENTATION OF RESULTS, ANALYSES AND DISCUSSION

This chapter presents and discusses the results of the empirical analyses based on the econometric frameworks used in the study. First, the results of the various preliminary tests that should be undertaken before and after the estimation of the models are presented.

4.1 TESTS FOR STATIONARITY

In analysing time series data, testing for stationarity is a vital element and condition. This is so because results obtained by using non-stationary time series may be spurious whereby they may indicate a relationship between variables which does not exist. In order to obtain consistent and reliable results, non-stationary data have to be transformed into stationary data. Non-stationary process usually has a variable variance and a mean that does not remain near, or returns to a long-run mean over time, the stationary process, on the other hand, reverts around a constant long term mean and has a constant variance independent of time.

It is advisable to plot the time series under study as the first step in the analysis of time series. Such a plot gives an initial clue about the likely nature of the time series. The graphs are in appendix III. From the graphs, the first impression that we get is that at levels, almost all of the time series shown in the figures appeared trending upward, but with a mild fluctuation in the case of CPI and nominal GDP. There is a bit more upswings in the case of Exchange rate and imports. This suggests that the mean of all the variables might be changing which perhaps implies that they are not stationary at levels. Such preliminary intuitive analysis is an important starting point to begin with before formal tests of stationarity.

The preliminaries conducted on the series are unit root test and the lag selection criteria. The unit root test was carried out using the Augmented Dickey Fuller (ADF) and the Philips Perron (PP) which were used to determine stationarity in the data. The lag selection criteria were applied to determine the appropriate number of regimes and the optimal lag value to be used in the model. The results are presented in table 4.1 and 4.2 respectively:

TABLE 4.1: RESULT OF UNIT ROOT TEST

Variables	ADF		PP		Comment
	Levels	First diff.	Levels	First diff.	
<i>lnπ</i>	0.185 (0.998)	-18.593 (0.000)	0.985 (0.999)	-18.593 (0.000)	I(1)
<i>lnimp</i>	-4.002 (0.009)		-10.60 (0.000)		I(0)
<i>lnexr</i>	-1.937 (0.632)	-17.481 (0.000)	-2.089 (0.549)	-17.509 (0.000)	I(1)
<i>lny</i>	2.402 (1.000)	2.908 (0.045)	2.696 (1.000)	-9.169 (0.000)	I(1)

Source: Authors computations (2016)

The result presented in Table 4.1 shows the outcome of the unit root test conducted. Both the Augmented Dickey Fuller (ADF) and the Philip Perron (PP) indicated the presence of unit root at levels in the inflation, exchange rate and aggregate output data. However, the data indicates stationarity at first difference for both ADF and PP. Conversely the import data

revealed stationarity at levels. This result suggests that there is no significant variation in the stationarity result in the series using the two different methods.

Following Enders (2004) and Chan (1993) intuitive three step methodology for threshold selection process as expressed in Chapter Three, Table 4.2, presents the determination of the optimal lag length and the corresponding regimes that fit into the model. From the result shown in Table 4.2, it can be seen that the lag length of five (5) periods is the optimal lag as suggested by the minimum Sum of Squared Residuals (SSR) of the model which was found to be 3.003.

Table 4.2: Result of Model Selection Criteria

Threshold		
Variable	SSR	Regimes
<i>lnπ</i>(-5)	3.003658	4
<i>lnπ</i>(-4)	3.055398	4
<i>lnπ</i> (-3)	3.292515	4
<i>lnπ</i>(-6)	3.336788	4
<i>lnπ</i>(-2)	3.345040	4

Source: Author's computations (2016)

The results of the model selection also suggest the presence of four (4) regimes in the series which covers from 1986 to 2014. The number of regimes used is followed as suggested from the selection criteria.

4.2: ANALYSES OF THE RESULTS

The result of the sequential determined non linear thresholds is as presented in Tables 4.3 and 4.4. From table 4.4, it can be observed that four (4) threshold values were estimated. The first

threshold value of 2.33% represents the lowest threshold value estimate. This value represents the inflationary threshold in the economy and by extension it signifies that inflationary trend prevails linearly over 81 month without switching to a new regime until it reaches the threshold value at 2.33%. The threshold at this value means general price rise must be kept at less than the threshold of 2.33% and any further increase in the general price level which exceed or equals this threshold will trigger a regime change in inflationary trend.

Furthermore the result shows that the monetary policy regime that maintains price stability below the threshold value of 2.33% must be inclined to managing the stability of the exchange rate as well as the output rise that could emanate from the accommodative posture of the CBN. This finding supports that of Sanusi and Bello (2015) and it follows from the result which indicates that both coefficient of exchange rate and output growth are statistically significant at 1%, 5% and 10% level. However, the coefficient of import is not statistically significant which suggest that price shocks that can trigger a regime change at the estimated threshold stems from either of exchange rate shock or output accommodation by the monetary authority. Consequently because the coefficient of the import is not significant, it means that the monetary authority should not bother about import to trigger a regime change at the estimated threshold.

The result of the second price regime exists between the threshold value of 2.33% and 3.23%. Also the result shows that inflation switches into this regime when inflation equals 2.33 but less than 3.23% and the length of the regime spans for 48 months. At this regime all the variables appear to be statistically significant at 1%, 5% and 10%. This implies that the threshold variable (inflation) can be triggered to a new regime by any of import, output and/or exchange rate. However, fall in importation adds to deficit supply in the economy and by extension inflate the demand side inflation for imported goods. This conforms to the

notion that higher demand for imported product can spell a more pressure on the domestic prices.

Within the span of fifty three (53) months, a new price regime was established between the threshold value of 3.32% and 3.59%. This regime is triggered when inflation values equal or is greater than 3.23% but remains below 3.56% threshold value. This appears to be the regime with the shortest threshold difference (between the lower and the upper threshold). This short threshold difference implies that inflation dynamics will inadvertently be less restrictive in switching to another regime and therefore monetary authorities are more faced with faster price changes as a result of inflationary shock that emanate from imported commodities and expansionary policy that accommodates output rise. When such output accommodation is validated by the CBN, this inflationary threshold will be short lived. The last threshold value of 3.56% happens to be the most stable regime that lasted for about 137 months (about 12 years) without another regime change.

From the results in Appendices I and II, the various test statistics show that the models are robust and significant. The results reported 99% R-squared and Adjusted R-squared in Appendix I and 96% R-squared and Adjusted R-squared in Appendix II respectively. The F-statistics, AIC, Schwarz criterion, and Hannan-Quinn criteria were all significant in the two models as shown in the two Appendices I and II.

4.3: EXCHANGE RATE PASS-THROUGH TO IMPORTS PRICES

The result of the sequential determined non linear thresholds showing ERPT to imports prices is as presented in Table 4.3:

TABLE 4.3: RESULT OF NONLINEAR THRESHOLD REGRESSION

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$lnp_t^{imp} (-5) < 9.632836$ -- 105 obs				
lne_t	1.045416	0.125529	8.328073	0.0000
lny_t	0.298400	0.104312	2.860654	0.0045
$9.632836 \leq lnp_t^{imp} (-5) < 10.98592$ -- 72 obs				
lne_t	-0.096643	0.070581	-1.369260	0.1719
lny_t	1.019640	0.055558	18.35277	0.0000
$10.98592 \leq lnp_t^{imp} (-5) < 12.35084$ -- 70 obs				
lne_t	0.020075	0.190295	0.105493	0.9161
lny_t	1.006641	0.131532	7.653210	0.0000
$12.35084 \leq lnp_t^{imp} (-5)$ -- 72 obs				
lne_t	1.484706	0.320738	4.629030	0.0000
lny_t	0.115342	0.202560	0.569419	0.5695
Non-Threshold Variables				
α_0	4.788829	0.173205	27.64827	0.0000

Source: Author's Computation (2016)

From Table 4.3, it can be observed that four (4) threshold values were estimated. The first threshold value of 9.63% represents the lowest threshold value estimate. This value represents the threshold from the exchange rate pass-through to import prices linearly over 105 months before switching to a new regime at the threshold value of 10.99%. It follows from the result which indicates that both coefficients of exchange rate and output growth are statistically significant at 1%, 5% and 10% level. However, price shocks that can trigger a regime change at the estimated threshold stems from either of exchange rate shock or output accommodation by the monetary policy. There is a high exchange rate pass-through to import prices of about 104% of the exchange rate variation.

The result of the second import price regime exists between the threshold value of 9.63% and 10.99%. Also, the result shows that exchange rate pass-through switches into this regime when import prices equals 9.63% but less than 10.99% and the length of the regime spans for

72 months. At this regime the only variable that appears to be statistically significant at 1%, 5% and 10% is output. This implies that the threshold variable (import price) can be triggered to a new regime by only increase in output demand. The implication is that exchange rate passes through to import prices is zero in this regime. The price shocks that can trigger a regime change at the estimated threshold can only come from output demand increase.

Within the span of seventy two (72) months, a new price regime (third) was established between the threshold value of 10.99% and 12.35%. This regime is triggered by import prices equals or greater than 10.99% but remains below 12.35% threshold value. The regime lasted for 70 months before reaching to the next threshold. At this regime also, the only variable that appears to be statistically significant at 1%, 5% and 10% is output. Exchange rate pass-through to imports prices is also zero at this regime. The price shocks that can trigger a regime change at the estimated threshold can only come from output demand increase. Similarly, after the 70 months of the third regime, the fourth regime sets in when imports price rose to a threshold of 12.5%. In this regime, which lasted about 72 months, exchange rate is the only variable that appears to be statistically significant at 1%, 5% and 10%. There was a high exchange rate pass-through to imports prices at about 148% of the exchange rate variation. We reject the null hypothesis that there is low ERPT to import prices in Nigeria.

4.4 EXCHANGE RATE PASS-THROUGH FROM IMPORTS PRICES TO CONSUMER PRICES

From the estimated specification in Table 4.4, there is the consumer price index (CPI) as the threshold variable. In this model, all parameters are subject to regime switching. There are about four regimes in the estimated model as shown in the Table 4.4:

TABLE 4.4: RESULT OF NONLINEAR THRESHOLD REGRESSION

Variable	Coefficient	Std. Error	t-Statistic	Prob.
----------	-------------	------------	-------------	-------

$\ln\pi_t (-5) < 2.334697$ -- 81 obs				
$\ln p_t^{imp}$	-0.052141	0.034980	-1.490595	0.1371
$\ln y_t$	0.710221	0.064799	10.96038	0.0000
$\ln e_t$	0.242892	0.052979	4.584669	0.0000
$2.334697 \leq \ln\pi_t (-5) < 3.238678$ -- 48 obs				
$\ln p_t^{imp}$	-0.266245	0.037386	-7.121430	0.0000
$\ln y_t$	0.462993	0.041743	11.09159	0.0000
$\ln e_t$	1.353786	0.091786	14.74936	0.0000
$3.238678 \leq \ln\pi_t (-5) < 3.569532$ -- 53 obs				
$\ln p_t^{imp}$	0.179850	0.037553	4.789170	0.0000
$\ln y_t$	0.390806	0.080702	4.842600	0.0000
$\ln e_t$	0.013021	0.026096	0.498951	0.6182
$3.569532 \leq \ln\pi_t (-5)$ -- 137 obs				
$\ln p_t^{imp}$	0.002710	0.023528	0.115162	0.9084
$\ln y_t$	0.624451	0.031180	20.02756	0.0000
$\ln e_t$	0.127708	0.052025	2.454715	0.0147
Non-Threshold Variables				
β_0	-0.918685	0.149549	-6.143037	0.0000

Source: Author's Computation (2016)

According to the above estimation results, there is nonlinearity in the pass-through given by the successive regime switches in the model. The pass-through from import prices to consumer prices is zero in the regime when the economy was below the threshold. This regime lasted for about seven years (i.e 1986 to 1993) out of the 28 years scope of this research. The first threshold value of 2.33% represents the lowest threshold value estimate. Inflationary trend in this regime could be attributed to the other variables.

In the second regime, the result indicates that all the coefficients of exchange rate, imports and output growth are statistically significant at 1%, 5% and 10% level. The result of the

second price regime exists between the threshold value of 2.33% and 3.23%. Also the result shows that exchange rate pass-through switches into this regime when inflation equals 2.33% but less than 3.23% and the length of the regime spans for 48 months. This implies that the threshold variable (import price) can be triggered to a new regime by all the three variables, i.e import prices, output demand and exchange rate. There is import prices pass-through to consumer prices of about 27% in this regime. The pass-through in this case, however, is positive (i.e, an exchange rate appreciation) which results in a reduction in consumer prices following a negative relationship it exhibited with inflation. Fall in inflation adds to deficit supply in the economy and eventually inflates the demand side inflation. Thus, the inflationary trend within this regime can be attributed to other variables.

However, in the third regime, it appears that the pass-through declined substantially from the preceding regimes to around 1.3%. This low pass-through could be attributed to the fixed exchange rate regime adopted by the Abacha administration from 1993 to 1998 – the period that the third regime falls into by about three years (1996 – 1998). Additionally, the regime switched from 3.23% to 3.56%. The regime spans across 53 months of the scope of the research. At this regime the variables that appear to be statistically significant at 1%, 5% and 10% are output and import prices. This implies that the threshold variable (import price) can be triggered to a new regime by an increase in either domestic output demand or import prices or both. The fourth regime shows a zero import price pass-through to consumer prices. At this regime the variables that appear to be statistically significant at 1%, 5% and 10% are output and exchange rates. This implies that the threshold variable (import price) can be triggered to a new regime by an increase in either domestic output demand or exchange rate or both. We accept the null hypothesis that there is low ERPT from import prices to consumer prices.

4.5 SPEED OF THE PASS-THROUGH

From the results of the sequential determined non linear thresholds in Tables 4.3 and 4.4, the speed of the exchange rate pass-through to imports and consumer prices is slow. For instance, Pass-through from exchange rate to import prices is complete (about 104%) in the first regime but precipitated over the period of 105 months before it is passed to the consumer prices at a lower rate in the second regime. The low speed is why it could not be passed to consumer prices in the first regime until the second and third regimes respectively. It took about 247 months duration for the effects to dissipate. Similarly, there was a zero pass-through from exchange rate to import prices which took about 212 months to manifest or be transmitted to consumer prices in the fourth regime of the estimated model. This finding is consistent with that of Aliyu, et. al. (2009). We accept the null hypotheses that ERPT to import and consumer prices are low.

4.6 NONLINEARITY OF ERPT IN NIGERIA

According to the above estimation results, there is nonlinearity in the exchange rate pass-through to imports and consumer prices in Nigeria. This is evident by the successive regime switches in the model. There are about four regime switches across the period under review showing the nonlinear behaviour of the ERPT in Nigeria.

4.7 EXCHANGE RATE PASS-THROUGH ASYMMETRY

Asymmetry in exchange rate pass-through is identified from two sources: 1. Size of the variation in the exchange rate (i.e, small or large changes) 2. Direction of the exchange rate change (i.e, appreciation or depreciation). From the results of the sequential determined non linear thresholds in Tables 4.3 and 4.4, it is evident that there is no asymmetry in the exchange rate pass-through in Nigeria within the period covered by this research. This is evident in its absence either in terms of appreciation/depreciation or in terms of size of the

change in the exchange rate. It should be noted that exchange rate in Nigeria has witnessed a longer period of successive depreciation of about 20 years from 1986 before it witnessed a slight appreciation around 2005/2006 and few insignificant others before 2014. Thus, ascertaining asymmetry with respect to direction may not be easily established due to the absence of substantial appreciation within the period under review. Thus, accept the null hypothesis that there is symmetry in ERPT to import prices in Nigeria.

CHAPTER FIVE

SUMMARY, CONCLUSION AND POLICY RECOMMENDATIONS

5.1 SUMMARY

It was recognised in the literature that the degree of ERPT is a very important issue in designing trade and monetary policies. The pass-through relationship between exchange rate changes and prices of imported and consumer goods determine the degree of current account adjustment and international competitiveness achieved from variations in the exchange rate. Importantly, the effectiveness of the exchange rate policy tool for import reduction or export promotion depends on the degree of pass-through to import and consumer prices, regardless of several other factors. On monetary policy, the exchange rate is considered as one of the

major transmission channels of monetary policy. Theoretical and empirical literature suggests that in an open economy, fluctuations in the exchange rate affect inflation through direct changes in import prices as well as through aggregate demand which is subject to changes in the relative price between foreign and domestic commodities.

This informs the imperative of examining the ERPT status of the economy to enable the monetary authorities appropriately situate its role in policy decisions. The study was motivated by the obvious gap on pass-through to import prices, asymmetry, and nonlinearity, among others from the review of fewer previous studies available on the subject matter in Nigeria. It covered a time period from 1986 to 2014 which is about 28 years. Nonlinear Threshold Regression Model was used and the findings were consistent with many of the previous studies. It was able to disaggregate the pass-through effects from exchange rate to imports prices and from import prices to consumer prices. It also examines the speed and magnitude of the pass-through at the two levels as well as asymmetry.

5.2

CONCLUSION

The degree of ERPT to import and consumer prices was estimated using the Threshold Regression Model. Evidence from the analysis, covering the period 1986Q1 to 2014Q4 reveals that exchange rate pass-through to import prices is substantial and complete, while pass-through from import prices to consumer prices is low, slow in speed and incomplete. The second part of the result is consistent with the findings of Aliyu, et. al. (2009), Mohammed, (2013) and Zubair, et. al. (2013) where they all found low pass-through to consumer prices for Nigeria in their respective studies. This is in spite of disaggregating the pass-through chain; the ultimate effect on consumer prices in the economy remains consistent with the findings of major previous studies in Nigeria and the literature on African countries, for example, Ghana as found in Sanusi (2010). One interpretation of this low and slow

exchange rate pass-through is that importers to Nigeria practice the so-called pricing-to-market strategy.

However, one important exclusive finding from the study is the substantial and complete pass-through to import prices. Due to the slow pace in the speed, the effect from the import prices to consumer prices dissipates along the transmission chain thereby passing smaller portion unto the consumer prices. Again, the study also found symmetry in the pass-through to import prices since no evidence of asymmetry either in terms of appreciation/depreciation or in terms of size of the change in the exchange rate.

5.3 POLICY RECOMMENDATIONS

From the findings of this study, an important policy recommendation is that, Nigerian monetary authorities may consider a more flexible exchange rate policy that will achieve the required external adjustments which may not endanger the macroeconomic goal of achieving price stability in the economy. This is necessary given the obvious rigidities in the foreign exchange market – a situation that permits speculations and arbitrage as a result of the stickiness of the official rate that warranted the continuous widening of the gap between the official and the parallel market rate. The fear of the possible inflationary effect of a downward devaluation of the naira to its appropriate (equilibrium) price may not be a source of concern since the exchange rate pass-through is low and the speed is slow.

This study also recommends that, despite the low and slow pass-through, there is the need for fiscal authorities to come up with policies that will continue to strengthen the domestic production which will assist in reducing the level of the import components thereby reducing the level of pass-through further. Strengthening domestic production, however, requires the encouragement of the production of commodities we have competitive advantage and increase in massive requisite infrastructural development such as electricity, rail

transportation and other investment incentives that would boost the economy through broad-based policies that would improve income distribution, generate employment and reduce poverty hence stimulate domestic demand.

Since ERPT is nonlinear, there is the need for the monetary authorities to monitor the pattern in of movement in order to provide the appropriate monetary policy response. There is also the need for the monetary authorities to continue to pursue stable and predictable monetary and fiscal policies, since historically, money had played greater role in the inflationary process than exchange rate variations. It is imperative to state that, achieving this would go a long way in ensuring that the CBN achieves its mandate of maintaining price and monetary stability, as well as sustained economic growth.

REFERENCES:

- Adedayo, A. O. (2012). Exchange Rate Pass-Through in Nigeria: A Dynamic Evidence. *European Journal of Humanities and Social Sciences*. 16 (1):785 – 801(pdf). Available at: <http://creativecommons.org/licenses/by-nc/3.0>.
- Adekunle, A. K. (2010). Exchange Rates and the Consumer Price Index in Nigeria: A Causality Approach. *Journal of Emerging Trends in Economics and Management Sciences (JETEMS)* 1 (2): 114-120 (pdf). Available at: jetems-scholarlinkresearch.org.
- Adolfson, M. (2001). Monetary Policy with Incomplete Exchange Rate Pass-Through. *SverigesRiks Bank Working Paper Series*, No. 127.
- Aliyu, S.U.R., Yakub, M.U., Sanni, G.K. and Duke, O.O. (2009). “Exchange Rate Pass-Through in Nigeria: Evidence from a Vector Error Correction Model”, JEL Classification: F31, F41.

- An, L. (2006). Exchange Rate Pass-Through: Evidence Based on Vector Autoregression with Sign Restrictions. Department of Economics, University of Kentucky.
- Aziz, N. (2009). Exchange Rate Pass-Through to Import, Export and Domestic Prices: Evidence from a Developing Country. Department of Economics, University of Birmingham, UK.
- Balke, N.S. and Wohar, M. E. (1998). "Nonlinear dynamics and covered interest parity". *Empirical Economics* 23, 535-559.
- Barhoumi, K. (2006). "Differences in long run exchange rate pass-through into import prices in developing countries: An empirical investigation". *Economic Modelling*. 23: 926-951
- Berga, H. (2012). Exchange Rate Pass-Through to Import and Consumer Prices: Evidence from Ethiopia. A Masters Thesis, School of Graduate Studies, Addis Ababa University, Ethiopia. June.
- Black, J., Hashimzade, N. and Myles, G. (2012). *Oxford Dictionary of Economics*. 4th edition. Oxford University Press.
- Canetti, E. And Greene, J. (1992). Monetary Growth and Exchange Rate Depreciation as Causes of Inflation in African Countries: An Empirical Analysis. *Journal of African Finance and Economic Development*, 1:37-62.
- Campa, J. and Godlberg, L.. (2002). Exchange Rate Pass-through into import prices: a Macro or Micro Phenomenon (pdf), NBER Working paper 8934, Vol. 17 PP.139 – 176. University of Chicago Press. May. Available at: <http://www.nber.org./Chapters/c6982>
- Chappel, D. Padmore, J. Mistry, P. and Ellis, C. (1998). A Threshold Model for the French franc/deutschmark exchange rate. *Journal of forecasting* pg. 463-475.
- Choudhri, E. U., and. Hakura, D. S. (2001). "Exchange Rate Pass-Through to CPI: Does the Inflationary Environment Matter?" IMF Working Paper 01/194 (Washington: International Monetary Fund).

- Devereux, M. and Yetman, J. (2002). Price Setting and Exchange Rate Pass-Through :Theory and Evidence. Djustment and Monetary Policy, Proceedings of a conference held at the Bank of Canada, Ottawa: Bank of Canada. PP. 71-347.
- Dornbusch, R. (1987). "Exchange Rates and Prices," American Economic Review 77 (March 1987), 93-106.
- Dunn, R and Mutti, J. (2004): "International Economics". Sixth Edition. Routledge ,London. United Kingdom.
- Dwivedi, D. N. (2007):"Macro Economics Theory and Policy". 2nd Edition. Tata- McGraw Hill publishing Company ltd. New Delhi, India.
- Enders, W. (2004). *Applied Econometric Time Series*, John Wiley & Sons, Inc.
- Friedman, M. and Schwartz, A. J. (1965), *The Great Contraction 1929–1933*, Princeton: Princeton University Press, [ISBN 0-691-00350-5](#)
- Frimpong, S. and Adam, A. M. (2010). "Exchange Rate Pass-Through in Ghana "International Business Research, 3(2), pp. 186 – 192.
- Gbosh, A. and Rajan, R.S. (2006). Exchange Rate Pass-Through in Asia: What does the Literature Tell us? George Mason University and Claremont Graduate University.
- Goldberg, P., and Knetter, M. (1997). "Goods Prices and Exchange Rates: What Have We Learned?" Journal of Economic Literature, Vol. 35, No. 3, pp. 1243–1272.
- Goldfajn, L. And Wang, S. (2000). "The Pass-Through from depreciation to inflation: a panel study". Central Bank of Brazil, Working Paper No. 5.
- Hardwick, P., Khan, B., and Langmead, J. (1997). An Introduction to Modern Economics. Third Impression. 4th Edition. New York: Addison Wesley Longman Publishing.
- Ismail, M. T. & Isa, Z. (2006). "Modelling Exchange Rates Using Regime Switching Models". Sains Malaysiana 3 (2): 55 – 62.

- International Monetary Fund, (2012). International Financial Statistics. (Online). Available at: <http://www.indexmundi.com/facts/nigeria/official-exchange-rate#sthash.yeUkpoi1.dpuf>. (Accessed ...).
- International Monetary Fund, (2011). World Economic Outlook. IMF
- Jhingan, M. L. (2003). Advanced Economic Theory. Revised and Enlarged Edition. Delhi: Vrinda Publications Ltd.
- Kishtainy, N. (2014). Economics in Minutes. Quercus Editions Ltd. 55 Baker Street, South Block, London.
- Krager, H. and Kugler, P. (1993). Nonlinearities in foreign exchange markets: A different perspective. Journal of Econometrics. 119-147. MR1409037.
- Krugman, P. (1986). "Pricing to Market When the Exchange Rate Changes," in Real-Financial Linkages Among Open Economies. ed. by Sven W. Arndt and J. David Richardson, pp. 49–70 (Cambridge, Massachusetts: MIT Press).
- Krugman, P. and Obstfeld, M. (2003): "International Economics: Theory and policy". Sixth Edition. Elm Street Publishing Services Inc. Boston, USA.
- Maka, E. D. (2013). Asymmetric Pass-Through of Exchange Rate Changes to CPI Inflation in Ghana. International Journal of Economics, Finance and Management, ISSN 2307-2456. 5 (2) . PP. 338 – 350. August. Available at: <http://www.ejournalofbusiness.org>.
- Marazzi, M., Sheets, N. and Vigfusson, R. (2005). "Exchange Rate Pass Through to US Import Prices: Some New Evidence", Federal Reserve Board of Governors, International Finance Discussion Paper no: 833, April.
- McAdam, P. and William, A. (2004). "Supply, Factor Shares and Inflation Persistence: Re-examining Euro-area New-Keynesian Phillips Curves". Oxford Bulletin of Economics & Statistics, 66, pp. 637-670
- McCarthy, J. (2000). "Pass-Through of Exchange Rates and Import Prices to Domestic Inflation in Some Industrialized Economies". Federal Reserve Bank of New York Staff Report no. 111 (September).

- Mohammed, A. A. (2013). Exchange Rate Pass-Through to Domestic Consumer Prices in Nigeria: A Structural Var Approach. A Masters Thesis at Cankaya University Graduate School of Social Science Economics.
- Mordi ,C. N. (2006):“Challenges of exchange rate volatility in Economic Management in Nigeria”.CBN Bullion, Volume. 30, No.3. pg 17-25. Central Bank of Nigeria.
- Mumtaz, H, O. and Wang, J. (2006). “Exchange rate pass -through into UK Import Prices” Working Paper No: 312. Bank of England. [Online].
- Odusola, A. (2006):“Economics of exchange rate Management”. CBN Bullion, Vol. 30, No.3. Central Bank of Nigeria.
- Oguanobi, R. C., Akamobi A. A. and Agu, C. C. (2014). Cross-Border Transmission of Interest Rate Shocks: A VAR Analysis of the Nigerian Economy. Journal of Economics and Sustainable Development. ISSN 2222-1700 (Paper) ISSNn2222-2855 (Online) 5 (7). Available at: www.iiste.org.
- Ogundipe, A. A. and Samuel, E. (2013). Exchange Rate Pass-Through to Consumer Prices in Nigeria. Journal of Business Management and Applied Economics, Vol. II Issue 4. July. Available at: www.scientificpapers.org.
- Ohno, K. (1989). “Export Pricing Behaviour of Manufacturing: a US-Japan comparison”. IMF Staff Papers, 36. Pp. 550-579.
- Omojinite, B. U., and Oriavwote, U. E. (2012). An Empirical Investigation of Exchange Rate Pass-Through into Domestic Prices in Nigeria. European Journal of Economics and Finance and Administrative Sciences. ISSN 1450 – 2275 Issue 45. Available at: <http://www.eurojournal.com>.
- O'Sullivan, A. and Sheffrin, S. M. (2003). Economics: Principles in action. Upper Saddle River, New Jersey 07458: Pearson Prentice Hall. p. 458. ISBN 0-13-063085-3.
- Otaki, M. (2010). “A Pure Theory of Aggregate Price Determination”. DBJ Discussion Paper series No. 0906. Institute of Social Science, University of Tokyo.

- Pollard, P. and Coughlin, C. (2004). "Size Matters: Assymmetric Exchange Rate Pass-Through at the Industrial Level". University of Nottingham, Research Paper Series no. 2004/13.
- Posedel, P. and Tica, J. (2007). "Threshold Autoregressive Model of Exchange Rate Pass through Effect: The Case of Croatia". February. A working paper series paper no. 07 Vol. 15. Department of Economics, University of Zagreb, Croachia.
- Rogoff, K. and Obstfeld, M. (1995): "The mirage of fixed exchange rate". Journal of Economic Perspective. Volume 9.No.4.pg 73-96.
- Sanni, H. T. (2006): "Sustaining the current exchange rate regime in Nigeria." CBN Bullion, Volume 30, No.3. Central Bank of Nigeria.
- Sanni, H.T. (2006). The Challenges of Sustainability of the Current Exchange Rate Regime in Nigeria, CBN Journal Vol. 30 No. 3 July – Sept.
- Sanusi, A, R. (2010). "Exchange Rate Pass Through To Consumer Prices In Ghana: Evidence From Structural Vector Auto Regression" MPRA Paper, No, 29491 March. Available at: <http://mpr.ub.uni-muenchen.de/24491/> PP. 25 – 46.
- Sims, C. (1986). "Are Forecasting Models Usable For Policy Analysis?" Quarterly review, Federal Reserve Bank of Minneapolis.
- Sheefeni, J. and Ocran, M. (2013). Exchange Rate Pass-Through to Domestic Prices in Namibia: SVAR Evidence. Journal of Economic and Financial Sciences. /JEF/ Vol. 7(1), PP. 89-102. April.
- Stock, J. H., and Watson, M. W. (2001) "Vector Auto regressions", Journal of economic perspective, volume No; 15, 101-115.
- Stephen, B. A. (2011). The Exchange Rate Determination in Nigeria: The Purchasing Power Parity Option, Mathematical Theory and Modelling www.iiste.org ISSN 2224-5804 (Paper) ISSN 2225-0522 (Online) Vol.1, No.2, 2011

Taylor, J. B. (2000). “Low Inflation, Pass-Through, and the Pricing Power of Firms”
European Economic Review, June volume 44 issue 7 pp. 1389-1408.

Tong, H. (2010). Threshold models in time series analysis – 30 years on. Statistics and its interface. Vol. 4 123-127.

Viser, H. (2004): “International Monetary Economics”. Third Edition. Edward Elgar Publishing Ltd. Cheltenham. United Kingdom.

Wisegeek, (2003). Common Answers for Common Questions (Online). Available at:
<http://www.wisegeek.com/what-is-domestic-price-level.htm> (Accessed).

Zorzi, M., Hahn, E. And Sanchez, M. (2007). Exchange Rate Pass-Through in Emerging Markets. European Central Bank Working Paper No. 739.

Zubair, A., Okorie, G. and Sanusi, A. R. (2013). Exchange Rate Pass-Through to Domestic Prices in Nigeria: An Empirical Investigation. Central Bank of Nigeria Economic and Financial Review, Vol. 51 (1). March.

APPENDIX I

Result Of Nonlinear Threshold Regression

Dependent Variable: LOGCPI
Method: Threshold Regression
Date: 05/07/16 Time: 19:41
Sample (adjusted): 1986M06 2012M12
Included observations: 319 after adjustments
Threshold type: Bai-Perron tests of L+1 vs. L sequentially determined
Thresholds
Threshold variables considered: LOGCPI(-2) LOGCPI(-3) LOGCPI(-4)
LOGCPI(-5) LOGCPI(-6)
Threshold variable chosen: LOGCPI(-5)
Threshold selection: Trimming 0.15, Max. thresholds 5, Sig. level 0.05
Threshold values used: 2.334697, 3.238678, 3.569532
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGCPI(-5) < 2.334697 -- 81 obs				
LOGIMPRT	-0.052141	0.034980	-1.490595	0.1371
LOGNGDP	0.710221	0.064799	10.96038	0.0000
LOGEXCHR	0.242892	0.052979	4.584669	0.0000
2.334697 <= LOGCPI(-5) < 3.238678 -- 48 obs				
LOGIMPRT	-0.266245	0.037386	-7.121430	0.0000
LOGNGDP	0.462993	0.041743	11.09159	0.0000
LOGEXCHR	1.353786	0.091786	14.74936	0.0000

3.238678 <= LOGCPI(-5) < 3.569532 -- 53 obs				
LOGIMPRT	0.179850	0.037553	4.789170	0.0000
LOGNGDP	0.390806	0.080702	4.842600	0.0000
LOGEXCHR	0.013021	0.026096	0.498951	0.6182
3.569532 <= LOGCPI(-5) -- 137 obs				
LOGIMPRT	0.002710	0.023528	0.115162	0.9084
LOGNGDP	0.624451	0.031180	20.02756	0.0000
LOGEXCHR	0.127708	0.052025	2.454715	0.0147
Non-Threshold Variables				
C	-0.918685	0.149549	-6.143037	0.0000
R-squared	0.992781	Mean dependent var	3.273996	
Adjusted R-squared	0.992497	S.D. dependent var	1.177484	
S.E. of regression	0.101991	Akaike info criterion	-1.687972	
Sum squared resid	3.183042	Schwarz criterion	-1.534532	
Log likelihood	282.2315	Hannan-Quinn criter.	-1.626694	
F-statistic	3506.616	Durbin-Watson stat	0.505481	
Prob(F-statistic)	0.000000			

APPENDIX II

Result Of Nonlinear Threshold Regression

Dependent Variable: LOGIMPRT

Method: Threshold Regression

Date: 06/12/16 Time: 11:28

Sample (adjusted): 1986M06 2012M12

Included observations: 319 after adjustments

Threshold type: Bai-Perron tests of L+1 vs. L sequentially determined
Thresholds

Threshold variable: LOGIMPRT(-5)

Threshold selection: Trimming 0.15, Max. thresholds 5, Sig. level 0.05

Threshold values used: 9.632836, 10.98592, 12.35084

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGIMPRT(-5) < 9.632836 -- 105 obs				
LOGEXCHR	1.045416	0.125529	8.328073	0.0000
LOGNGDP	0.298400	0.104312	2.860654	0.0045
9.632836 <= LOGIMPRT(-5) < 10.98592 -- 72 obs				
LOGEXCHR	-0.096643	0.070581	-1.369260	0.1719
LOGNGDP	1.019640	0.055558	18.35277	0.0000
10.98592 <= LOGIMPRT(-5) < 12.35084 -- 70 obs				
LOGEXCHR	0.020075	0.190295	0.105493	0.9161
LOGNGDP	1.006641	0.131532	7.653210	0.0000

12.35084 <= LOGIMPRT(-5) -- 72 obs

LOGEXCHR	1.484706	0.320738	4.629030	0.0000
LOGNGDP	0.115342	0.202560	0.569419	0.5695

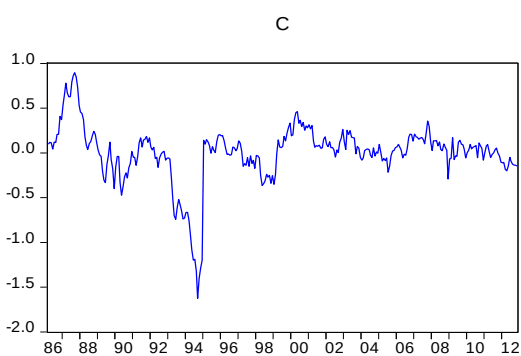
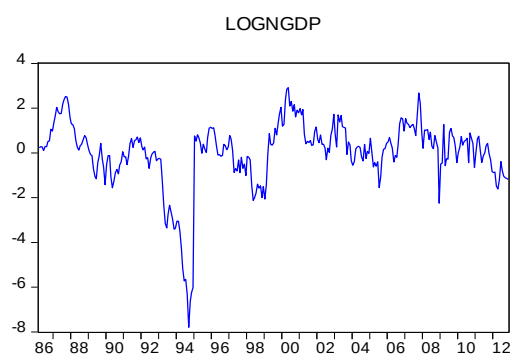
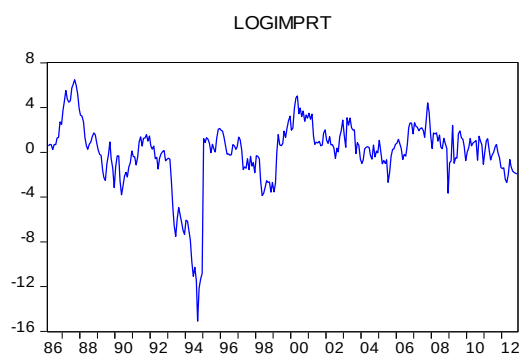
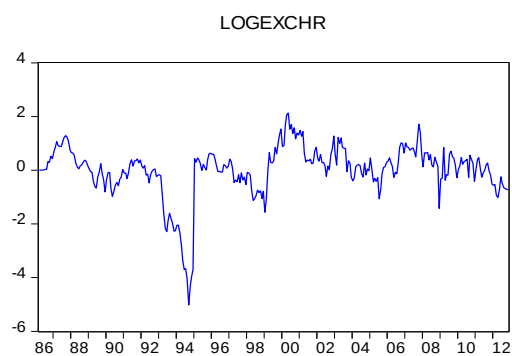
Non-Threshold Variables

C	4.788829	0.173205	27.64827	0.0000
---	----------	----------	----------	--------

R-squared	0.969031	Mean dependent var	10.57093
Adjusted R-squared	0.968232	S.D. dependent var	2.019550
S.E. of regression	0.359955	Akaike info criterion	0.822131
Sum squared resid	40.16593	Schwarz criterion	0.928359
Log likelihood	-122.1300	Hannan-Quinn criter.	0.864555
F-statistic	1212.517	Durbin-Watson stat	1.201309
Prob(F-statistic)	0.000000		

APPENDIX III`

A. TRENDS OF THE VARIABLES



B. STABILITY TEST CURVE

