

**INTEREST RATE PASS-THROUGH IN CAMEROON AND NIGERIA:
A COMPARATIVE ANALYSIS**

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ABSTRACT

One of the most important aspects of monetary policy is an understanding of the transmission process: the mechanism through which the monetary policy actions of the Central Bank impact on aggregate demand and prices by influencing the investment and consumption decisions of households and firms. Thus, commercial banks are regarded as conveyers of monetary policy shocks and are expected to adjust retail interest rates in response to policy shocks one-to-one. In practice, commercial banks adjust their retail rates in response to changes in monetary policy with a lag of several months and this delay is often viewed as an impediment on the ability of the Central Bank to steer the economy. Several reasons, such as credit rationing and adverse selection, switching costs, risk sharing, consumer irrationality, structure of the financial system, menu costs and asymmetric information are some of the causes advanced for commercial banks retail rates being sticky. In spite of the important role of pass-through analysis in the monetary policy transmission process, it has received very little attention in Sub-Saharan Africa, especially in Cameroon and Nigeria, which have implemented a series of reforms. To this end, this study gives a comparative analysis of interest rate pass-through in Nigeria and Cameroon using retail rates (lending and deposit) and a discount rate (policy rate) from January 1990 to December 2010 for Nigeria and from January 1990 to June 2008 for Cameroon. The study examines the magnitude and speed of retail rate adjustments to changes in the Central Bank policy rate as well as examining the possibility of symmetric and asymmetric pass-through in both countries. In addition, the study also investigates whether there is pass-through of monetary policy from one country to the other.

The empirical analysis employs four different types of co-integration techniques to test the presence of a long run co-integrating relationship between retail and the policy rates in order to ensure that the relationship detected is robust. Three sets of analyses are carried out in the study. Following Cottarelli and Kourelis (1994), the study employed a co-integration technique, firstly, to analyse pass-through for the entire sample, secondly, to analyse symmetric and asymmetric pass-through using a ten year rolling window analysis in an error correction framework. Finally, the policy rates were swapped around to investigate if there are transmissions of impulses from one country to the other.

Overall, evidence from the entire sample and rolling window analysis suggests that monetary policy in Cameroon is less effective. This is perhaps one of the reasons why the Banque Des

Etats De L'Afrique Centrale (BEAC) is unable to sterilise the excess liquidity of the banking sector in Cameroon. The long run pass-through of 0.72 and 0.71 for the entire sample, and the average long run pass-through for the rolling window of 0.78 and 0.76 for the lending and deposit rates, suggest that monetary policy is highly effective in Nigeria compared to Cameroon.

The empirical evidence confirmed asymmetric adjustment in six rolling windows in the lending rate in Nigeria. Three rolling windows indicated that the direction of rigidity is downward, supporting Scholnick's (1996) *collusive pricing arrangement* between banks, and the other three suggested that the lending rate is rigid in the upward direction, corroborating Scholnick's (1996) *customer reaction hypothesis*. The deposit rate in Cameroon was also found to adjust asymmetrically and the direction of rigidity is downward, supporting Hannan and Berger's (1991) *customer reaction hypothesis*. The investigation of impulse transmission between the two countries revealed that only the policy rate in Nigeria exerts some influence on the deposit rate in Cameroon. Policy recommendations are also discussed.

DECLARATION

With the exception of the references used in text, which have been duly acknowledged, this thesis is entirely my own work and has not been submitted to any other College, Technikon and University for degree purposes.

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LIST OF ACRONYMS

ACF	Autocorrelation Functions
AD	Aggregate Demand
ADF	Augmented Dicker-Fuller
ARDL	Autoregressive Distributed Lag
AS	Aggregate Supply
ATM	Automated Teller Machines
BEAC	Banque Des Etats De L’Afrique Centrale (Bank of Central African States)
BIS	Bank of International Settlement
BRIC	Brazil, China, India and Russia
CAMPOST	Cameroon Postage Office
CAR	Central African Republic
CBN	Central Bank of Nigeria
CEECs	Central and Eastern European Countries
CEMAC	Economic Community of Central African States
CFA	Franc de la Cooperation Financière en Afrique Centrale (Franc of Financial Cooperation in Central Africa)
CFC	Bank Credit Foncier (Cameroon Housing and Loan Bank)
CMA	Common Monetary Union
COBAC	Central African Banking Commission
CPR	Central Bank Policy Rate (discount rates)
CRDW	Co-integrating Regression Durbin-Watson
CRR	Cash Reserve Requirement
DFIs	Development Finance Institutions
DOLS	Dynamic Ordinary Least Squares
DSGE	Dynamic Stochastic General Equilibrium
DSX	Douala Stock Exchange
DW	Durbin-Watson
EC ⁻	Negative Residuals

EC ⁺	Positive Residuals
ECM	Error Correction Model
ECM-base	Error Correction-base Test
ECT _{t-1}	Error Correction Term
ESusu	Saving and Credit Association
FGN	Federal Government of Nigeria
EG	Engle-Granger Approach
GDP	Gross Domestic Product
GETS	General-To-Specific Approach
IFS	International Financial Statistics
IMF	International Monetary Fund
IRPT	Interest Rate Pass-Through
IS-LM	The Keynesian Investment Saving/Liquidity Preference Model showing the relationship between interest rates and real output in the goods and money market
JJ	Johansen Maximum Likelihood Approach
KIBOR	Pakistan Central Bank Policy Rate
KPSS	Kwaitkowski, Philips, Schmidt and Shin
M &A	Mergers and Acquisitions
MAL/ML	Mean Adjustment Lag
MFI	Microfinance Institutions
MIR	Newly harmonised Interest Rates Series in the Euro Zone
MPC	Monetary Policy Committee
MPR	Monetary Policy Rate
MPTM	Monetary Policy Transmission Mechanism
NIR	Net International Reserves
NRIR	Unharmonised Interest Rates Series in the Euro Zone
OLS	Ordinary Least Squares
OMO	Open Market Operations
PDL	Polynomial Distributed Lag

PT	Pass-Through
RoSCAs	Rotating Saving and Credit Associations
RR	Retail Rates (lending and deposit)
SACU	Southern African Customs Union
SAP	Structural Adjustment Programme
SARB	South African Reserve Bank
SEE	South-Eastern Europe
SMMEs	Small Medium and Micro Enterprises
SVAR	Structural Vector Autoregressive
TIAO	Interest Rate of Tenders
TVT	Stock Market Turnover Ratio
USA	United States of America
VAR	Vector Autoregressive
WAMZ	West Africa Monetary Zone

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

One of the pre-conditions for contemporary monetary policy decision making is a good understanding of the transmission mechanism, that is, the mechanism that transmits the actions of the Central Bank to the real sector and thus permits the Central Bank to fine-tune the economy in the required direction (Gigineishvili, 2011:3). This process occurs through channels and constitutes what is known as the monetary policy transmission mechanism (MPTM).

According to Samba and Yan (2010:31), MPTM describes the ways in which the monetary policy actions of the Central Bank impact on aggregate demand and prices by influencing investment and consumption decisions in the economy. It is interesting to note that the MPTM does not operate in isolation. The monetary policy stances of the Central Bank are transmitted through various links called channels of monetary policy transmission such as interest rates, bank lending, balance sheet, asset prices, exchange rates and the expectation channels. The monetary policy transmission process is complex and involves a number of stages. Faure (2006:9) summarised this process into six stages: First, a change in the Central Bank's lending rate is transmitted to the private bank-to-bank interbank market. Second, the private bank-to-bank interbank market transmits the change to other market interest rates. Third, changes in market interest rates are transmitted to asset prices, exchange rates and expectations. Fourth, these changes in asset prices, exchange rates and expectations are then transmitted to aggregate demand. Fifth, changes in aggregate demand are transmitted to money supply. Sixth, changes in money supply are finally transmitted to prices. It should be noted that the scope of this study is limited to the first and second stages of the transmission process which are relevant for the traditional interest rate channel.

A key aspect of the MPTM is the "pass-through" which describes the magnitude and speed at which the monetary policy decisions of the Central Bank influence target variables such as inflation, consumption and the level of investment. In addition, the process whereby commercial banks adjust their lending and deposit rates in response to changes in policy controlled interest rates of the Central Bank is known as interest rate pass-through (IRPT). Thus, the effectiveness of the monetary policy depends on the speed and magnitude with

which changes in the policy controlled interest rate are transmitted to retail rates (lending and deposit rates) of commercial banks (Aziakpono *et al.*, 2007:1). If pass-through is sluggish or too small to be noticed, the effectiveness of monetary policy will be compromised as the desired goal of monetary policy may not be achieved regardless of the size or magnitude of the change in the policy controlled interest rate (Aziakpono *et al.*, 2007:2). Similarly, a speedier and complete pass-through of changes in the policy interest rates to retail interest rates increases the effectiveness of monetary policy and hence the stability of the general price level. A symmetric and complete pass-through will indicate a well-functioning, efficient and competitive financial system, whereas an incomplete and asymmetric pass-through signifies market imperfections and inefficiencies (Aziakpono and Wilson, 2010:3).

Empirical studies on interest rate pass-through have proposed several reasons for the variation in the speed and magnitude of interest rate pass-through across countries over time. These reasons vary from country to country and include the structure of the financial system, which is made up of the degree of competition and bank concentration, the ownership structure of the banks, the degree of financial market openness and development (Cottarelli and Kourelis, 1994), risk sharing (Fried and Howitt, 1980; Lowe and Rohling, 1992), switching cost (Fried and Howitt, 1980; Ausubel, 1991), menu cost (Rotemberg and Saloner, 1987; Hannan and Berger, 1991; Hofmann and Mizen, 2004), asymmetric information (Stiglitz and Weiss, 1981), and adverse selection effect (Lowe and Rohling, 1992).

Early literature on interest rate adjustment emerged in the 1990s following the works of Hannan and Berger (1991) and Neumark and Sharpe (1992) which focused on the impact of market concentration on the adjustment of prices in the market for consumer bank deposits in the United States of America. With the successful launch of the European Union and the introduction of a single currency, the euro, in 1999, pass-through analysis has attracted much attention particularly in the Euro Area (see for instance, De Bondt, 2002, 2005; Sander and Kleimeier, 2002, 2004, 2006b; Hulsewig *et al.*, 2009; Kwapil and Scharler, 2010; and Marotta, 2009). Generally, these studies found considerable differences in the degree of retail interest rates adjustment to policy controlled rates in both the short-run and long-run.

It should be noted that most of the empirical studies on interest rate pass-through focused on developed and emerging economies of America, Europe and Asia. As far as Sub-Saharan Africa is concerned, empirical studies examining the degree of responsiveness of commercial

banks retail interest rates to changes in the policy controlled interest rate of the Central Bank are scant. The few exceptions include Jankee (2005); Acheampong (2005); Sander and Kleimeier (2006a); Aziakpono *et al.* (2007); Aziakpono and Wilson (2010); Sanusi (2010) and Samba and Yan (2010).

Despite the importance of pass-through analysis in the monetary policy transmission process in the economy, empirical studies investigating the dynamic adjustments of interest rates in Sub-Saharan Africa is lacking specifically on Cameroon and Nigeria that have implemented a series of financial liberalization programmes. The few attempts that have been made in these countries include Samba and Yan (2010) and Sanusi (2010) for the Economic Community of Central African States (CEMAC¹) and Nigeria respectively. Samba and Yan (2010) provided general overview of the degree of pass-through in the CEMAC region but failed to account for country specific pass-through in the region. On the other hand, the Sanusi (2010) study used a very short period (2002M1 – 2010M4). Empirical results from such a short period may be subject to estimation biases. This study gives a specific country analysis as well as used a longer time period to close the gap. As far as empirical research is concerned, no comparative study of this nature has been done between Cameroon and Nigeria. Thus, the study is the first of its kind and aims to increase empirical literature in this area of research.

1.2 GOALS OF THE RESEARCH

This study is aimed at conducting a comparative analysis of the degree of interest rate pass-through in Cameroon and Nigeria. To achieve this, the following objectives will be pursued:

- To examine the speed and magnitude of adjustment of retail interest rates to changes in policy interest rates in both countries since the implementation of the World Bank sponsored Structural Adjustment Programme (SAP) in the 1980s.
- To determine whether there is symmetry or asymmetry in the interest rate pass-through between the two countries.

¹ CEMAC is a custom and monetary union among six former French Central African countries created in 1994 and includes Cameroon, the Central African Republic, Chad, the Congo (Brazzaville), Equatorial Guinea, and Gabon.

- To examine whether there is pass-through of monetary impulses from Cameroon to Nigeria and from Nigeria to Cameroon.

1.3 MOTIVATION OF THE STUDY

The study considers Cameroon and Nigeria for the comparative analysis in view of the fact that the two countries represent the two largest economies in Central and West Africa respectively. These countries share some commonalities in the forms of trade, common border and political history². Furthermore, they are oil producing countries and belong to different economic groupings in Africa: the West Africa Monetary Zone (WAMZ) and CEMAC respectively. Further, both countries implemented the World Bank SAP around the same period (mid1980s) and operate different exchange rate systems.

1.4 METHODS

The empirical analysis will utilise monthly time series data sourced from the International Monetary Fund (IMF)/International Financial Statistics (IFS) from 1990M01 – 2010M12 for Nigeria and 1990M1 to 2008M6 for Cameroon. Retail rates used are lending and deposit rates, whereas the discount rates of both countries represent the policy rate of the Central Bank. More details will be given in Chapter Four.

To investigate the magnitude and speed of adjustment of commercial banks' response to changes in the policy rate, the study will employ co-integration techniques and the asymmetric error correction model used by Cottarelli and Kourelis (1994). This technique has been used by several researchers³ to study pass-through in the Euro Area and also in Africa. The technique has the advantage of testing for the difference in interest rate adjustment when rates are above and below their equilibrium levels as well as to determine how long it takes for the interest rates to adjust fully to changes in the policy rate (Aziakpono *et al.*, 2007:8).

To analyse the impact of the various financial and monetary reforms⁴ highlighting the role of the policy rate and the response of retail rates to changes in policy rate over time, a ten years

² Southern Cameroon (Anglophone Cameroon) was part of Nigeria until reunification in the early 1960s.

³ Toolsema *et al.* (2002); De Bondt (2002, 2005); Sander and Kleimeier (2004) and Aziakpono and Wilson (2010).

⁴ SAP started in 1988 for Cameroon and 1986 for Nigeria.

rolling window analysis will be conducted. According to Aziakpono and Wilson (2010:17) the importance of rolling window analysis lies in its ability to trace the dynamic development in pass-through over time. This is vital because other developments in the financial system and the economy as a whole apart from changes in monetary policy can also affect the pass-through. The rolling window regression technique will then be used to measure the speed of pass-through in each country after various reforms to ascertain the progress made so far and to compare the effectiveness of monetary policy in each country. Finally, the study will swap the policy rates around to investigate if there are transmissions of monetary policy shocks from one country to the other.

1.5 OUTLINE

The study will be divided into six chapters. Chapter One introduces the study, as well as the objectives and motivation of the study. Chapter Two will review the theoretical and empirical literature on interest rates rigidities and pass-through in developed, emerging and developing countries. Chapter Three presents an overview of the financial system and monetary policy framework in the two countries. In addition, an analysis of the financial structure variables will be conducted to establish the framework for the empirical estimation. Chapter Four describes the methodology, discusses the data, and describes the econometric techniques used in estimating the parameters. Chapter Five presents and discusses the results. Finally, Chapter Six summarises the study, recommends policies and suggest areas for further research.

CHAPTER TWO

THEORETICAL AND EMPIRICAL LITERATURE REVIEW

2.1. INTRODUCTION

This chapter focuses on the theoretical and empirical literature related to interest rate pass-through (IRPT) in developed, emerging and developing economies. The aim of the theoretical literature is to discuss the theories and/or determinants of IRPT. The chapter will also discuss monetary policy and the process of the monetary policy transmission mechanism (MPTM). The remainder of the chapter is organised as follows: Section 2.2 discusses monetary policy and the processes of monetary policy transmission mechanism (MPTM). Section 2.3 focuses on IRPT and deals with its theories. Section 2.4 examines factors affecting IRPT. Section 2.5 reviews the empirical literature from developed, emerging and developing economies and finally, Section 2.6 summarises and draws conclusions.

2.2. THE PROCESSES OF THE MONETARY POLICY TRANSMISSION MECHANISM

Monetary policy describes the set of laws and actions implemented by the Central Bank to facilitate the achievement of its primary goal of price stability. Thus economic theory considers monetary policy as a key instrument that governments can use to stimulate the economy (Karagiannis *et al.*, 2010:9). Monetary policy actions of the Central Bank begin in the banking system when the monetary authorities adjust the supply and/ or availability of commercial bank reserves in an effort to manipulate the short term interest rate. For example, the Federal Reserve Bank decides on an appropriate level of the overnight interbank federal funds rate and monitors this rate by manipulating the supply and/or availability of bank reserves. Monetary policy is then executed by increasing or decreasing the planned federal funds rate⁵. These actions are then passed through to the real economy such that changes in the planned federal funds rate affect retail rates (lending and deposit) which in turn alters the spending behaviour of consumers and businesses (Sellon, 2002:6-7). The main instrument used by most Central Banks around the world is the official short term interest rate but other tools of monetary policy also exist, such as open market operations where the monetary authorities can use Treasury Bills to mop up or inject liquidity into the system. Central Bank

⁵ Different terminologies are used in different countries, such as discount rate, monetary policy rate, minimum rediscount rate, repo rate, federal funds rate and official interest rate.

altering of the official short term interest rate is based on the assumption that, *ceteris paribus*, these changes will in turn impact on other short term rates determined by deposit taking as well as non-deposit taking financial institutions. Therefore, changes in the short-term interest rate are the first step in the transmission of monetary policy and are expected to affect consumption as well as investment spending of households and firms through the retail rates determined by deposit taking and non-deposit taking financial institutions (Charoenseang and Manakit, 2007:144-145; Wang and Lee, 2009:1270). The process whereby changes in the monetary policy stance affect consumption, investment, Gross Domestic Product (GDP) and other variables in the economy is known as the monetary policy transmission mechanism (MPTM). See Section 1.1.

Consequently, monetary policy is seen as a powerful tool at the disposal of the monetary authorities but it can also have unwanted consequences on the economy if not implemented well. Mishkin (1995:4) emphasises that “to be successful in conducting monetary policy, the monetary authorities must have a correct judgment of the timing and effect of their policies on the economy, hence necessitating a good knowledge of the mechanisms through which monetary policy affects the economy”. For instance, when the Central Bank pursues a loosening or tightening monetary policy stance, the question at hand is how exactly will this policy change affect real economic variables such as GDP, consumption and investment? To get this right a thorough evaluation of the various channels through which monetary policy affect the economy is not only necessary in its own right but it will also help policy makers to know how much to adjust the policy tools. Without this clear knowledge, policy makers may risk adjusting the policy tool too little or too much, and in some cases too early or too late, thereby increasing economic uncertainty which undermines the credibility of the Central Bank.

As discussed in Section 1.1 the MPTM operates through several channels and involves six stages (Faure, 2006:9). However, this analysis will be limited to the first two stages of the transmission mechanism which is relevant for the traditional interest rate channel. Nevertheless, a short overview of the various monetary policy transmission channels will be given.

2.2.1 The traditional interest rate channel

As mentioned above, monetary policy actions of the Central Bank are transmitted to the real economy through several channels. Amongst these channels economists usually identify the interest rate channel as the traditional one and the focus of the study will be on this. The popularity of the interest rate channel has increased recently with the adoption of inflation targeting as a monetary policy framework for which the interest rate is the main instrument. Thus, the banking sector and interest rates have a major role to play in determining how changes in monetary policy affect the real economy. The first stage of monetary policy transmission starts in the banking sector with a change in the supply of bank reserves by the Central Bank with the intention to influence the short term interest rates. These changes in short term interest rates are subsequently passed on to long term rates which in turn influence businesses and consumers to react depending on whether the change in bank reserves is an increase or a decrease (Sellon, 2002:5-6).

The interest rate is the core channel of the monetary policy transmission mechanism and it is deeply rooted in the Keynesian IS-LM framework. The IS-LM has been and is still the basic framework for the teaching of macroeconomics and demonstrates how monetary policy stances (expansionary or contractionary) affect aggregate demand (AD) as well as aggregate supply (AS) in the economy. Mishkin (1996:2) provides a schematic representation of this channel which can be illustrated as:

$$\text{Loosening monetary policy: } M \uparrow \Rightarrow i_r \downarrow \Rightarrow I \uparrow \Rightarrow Y \uparrow . \quad (1)$$

That is, a loosening monetary policy ($M \uparrow$) will trigger a decline in the real interest rate ($i_r \downarrow$) because of the negative relationship between money supply and interest rate, thereby making financing costs for households and firms cheaper. This increases the level of investment spending ($I \uparrow$) and aggregate output ($Y \uparrow$) will increase as well. However, the degrees to which the monetary shocks are transmitted as well as the effectiveness of the interest rates channel depend on the financial structure (to be discussed later).

According to Mishkin (1996:2) one important attribute of the interest rate channel is its stress on the real interest rate as opposed to the nominal interest rate with regard to consumption and investment decisions of firms. Besides, consumption and investment decisions are based on real long term rather than on short term interest rates. So why will short term changes in

nominal interest rate affect the real short and long term rates? The reason is that, given price stickiness, a loosening of monetary policy provoked by the Central Bank will cause the nominal short term interest rate to fall as well as the short term real rate and this also holds in a world of rational expectations. Thus, the expectations hypothesis of the term structure of interest rate states that “the long term interest rate is an average of the future expected short term interest rate” implying that a fall in the real short term interest rate will trigger a corresponding decline in the long term real interest rate (Mishkin, 1996:3). This decline in long term real interest rate will then be translated into increased expenditure on fixed investment, residential houses and durable consumer goods as well as raising total output. Furthermore, Mishkin (1996:3) argues that since it is the real interest rate that influences spending rather than nominal interest rates, this implies that monetary policy can still be used to stimulate the economy even if nominal interest rates are set at zero during a deflationary period. For example, if nominal interest rates are fixed at zero, an expansionary monetary policy ($M \uparrow$) will be able to increase the expected price level (P^e) as well as the expected inflation (π^e) which is then translated into a fall in the real interest rate ($i_r \downarrow$) even when the nominal interest rate is held at zero, thereby boosting spending through the interest rate channel. This is shown schematically as:

$$\text{Expansionary monetary policy: } M \uparrow \Rightarrow P^e \uparrow \Rightarrow \pi^e \uparrow \Rightarrow i_r \downarrow \Rightarrow I \uparrow \Rightarrow Y \uparrow. \quad (2)$$

2.2.2 Bank lending channel

This channel is based on the important role of banks in the economy, particularly in intermediation as well as in mobilising savings and channelling of resources into productive sectors of the economy. Furthermore, banks have the expertise and are well grounded to manage the problems of information asymmetry between borrowers and lenders particularly when it comes to small medium and micro enterprises (SMMEs) where information differential is prominent (Mishkin, 1996:7). Also, the bank lending channel seems to be the relevant channel for developing and emerging economies with underdeveloped financial markets because other sources of finance are scarce and in some cases may not even exist. Consequently, investors find it difficult to easily replace bank loans thereby forcing them to reduce the amount of investment expenditure. However, the success of the bank lending channel depends on the condition that banks do not protect their loan portfolio from monetary policy shocks and borrowers may not be able to completely protect their real expenditure

from changes in bank credit availability (Ramlogan, 2004:436). As Mishkin (1996:7) points out, a contractionary monetary policy will decrease bank reserves thus reducing the amount of bank loans. This increases the amount of collateral and reduces loan availability to small firms, causing a decline in aggregate spending in the economy. This can be represented as:

$$\text{Tightening policy } M \downarrow \Rightarrow \text{bank deposits } \downarrow \Rightarrow \text{bank loans } \downarrow \Rightarrow I \downarrow \Rightarrow Y \downarrow. \quad (3)$$

2.2.3 Balance sheet channel

The balance sheet channel is also known as the “net worth channel” of business firms. The balance sheet channel seems to be inactive, due to the problems of asymmetric information and moral hazard that restrict a firm’s ability to access external finance, particularly in the event of a tightening monetary policy which causes deterioration in the net worth of firms and credit worthiness (Ramlogan, 2004:436). According to Mishkin (1995:8) monetary policy can affect the balance sheet of firms in several ways. For instance, a contractionary policy ($M \downarrow$) will decrease equity prices ($P^e \downarrow$) triggering a fall in the net worth of firms, and as a consequence, investment expenditure ($I \downarrow$) and total demand ($Y \downarrow$) will fall because adverse selection and moral hazard problems have increased. This gives a schematic balance sheet of monetary transmission as:

$$\text{Contractionary policy } M \downarrow \Rightarrow P^e \downarrow \Rightarrow \text{adverse selection } \uparrow \ \& \ \text{moral hazard } \uparrow \Rightarrow \text{lending } \downarrow \Rightarrow I \downarrow \Rightarrow Y \downarrow. \quad (4)$$

Also a contractionary policy will increase interest rates leading to a weakening in the balance sheet of firms because the cash flows of firms has fallen thus giving rise to another schematic balance sheet channel as:

$$\text{Contractionary policy } M \downarrow \Rightarrow \text{cash flow } \downarrow \Rightarrow \text{adverse selection } \uparrow \ \& \ \text{moral hazard } \uparrow \Rightarrow \text{lending } \downarrow \Rightarrow I \downarrow \Rightarrow Y \downarrow. \quad (5)$$

2.2.4 Asset prices channel

Economists have identified two main channels of asset prices through which monetary policy can be transmitted: the Tobin q theory of investment and the wealth effect on consumption (Mishkin, 1996:6). According to Mishkin (1996:7) an expansionary monetary policy will raise the supply of money, making the public richer, and so they will try to decrease their liquidity holding through growing their expenses. The public therefore use this excess

liquidity on the capital market to purchase securities such as equities, thereby increasing their portfolios of equity holdings. This increases the demand for equities causing their prices to rise and making equity investment more attractive. The Keynesian view comes to the same conclusion, because a decrease in interest rates resulting from a loosening of monetary policy will make bonds less attractive than equities and lead to a rise in equity prices. In summary, an increase in equity prices ($P^e \uparrow$) also increases q ($q \uparrow$), which in turn leads to higher investment spending ($I \uparrow$). Schematically represented as:

$$M \uparrow \Rightarrow P^e \uparrow \Rightarrow q \uparrow \Rightarrow I \uparrow \Rightarrow Y \uparrow. \quad (6)$$

The wealth channel works through the effect on consumption and is derived from the Life Cycle Model (see Modigliani, 1971) where consumption expenditure is a function of the resources accumulated over lifetime and these resources consist of human capital, real capital and savings (Mishkin, 1996:7). An important element of household savings is equities and when their prices increase, the value of savings rises, thereby boosting the lifetime resources of households as well as increasing their consumption spending. Given an expansionary monetary policy, the wealth channel is given as:

$$M \uparrow \Rightarrow P^e \uparrow \Rightarrow \text{wealth} \uparrow \Rightarrow \text{consumption} \uparrow \Rightarrow Y \uparrow. \quad (7)$$

2.2.5 Exchange rate channel

The transmission of monetary policy through the exchange rate channel depends on the type of exchange rate regime in place. For instance, a flexible exchange rate transmits monetary shocks more easily to the real sector than a fixed exchange rate system because under a fixed exchange rate system, adjustments are done in the monetary sector to keep the exchange rate fixed. A schematic representation of an expansionary monetary policy through exchange rates can be given as:

$$M \uparrow \Rightarrow i_r \downarrow \Rightarrow E \downarrow \Rightarrow NX \uparrow \Rightarrow Y \uparrow. \quad (8)$$

That is, an expansionary monetary policy lowers domestic interest rates ($i_r \downarrow$) leading to a depreciation of the domestic currency ($E \downarrow$) thereby increasing net exports ($NX \uparrow$) as well as aggregate output ($Y \uparrow$) (Mishkin, 1996:5; Loayza and Hebbel, 2002:5)

2.2.6 Expectations channel

The Expectations channel is based on public expectations about the future course of monetary policy and how it will affect inflation, investment, wage setting and growth. The transmission of monetary policy through the expectations channel is the most uncertain of all the channels because it is difficult to measure expectations and it depends on how the public interprets changes in monetary policy. For instance, a reduction in the policy rate will send a signal of higher future growth and if public expectations are formed well, this will boost investors' confidence to invest and consume, leading to an increase in output (European Central Bank, 2000:47).

2.3 INTEREST RATE PASS-THROUGH

Interest rate pass-through (IRPT) measures the degree to which commercial banks alter their retail rates in response to changes in the Central Bank official interest rate both in the short and long run. Egert *et al.* (2007:210) suggest that the process of IRPT may be divided into two stages. The first stage can be used to determine how shocks in monetary policy are transmitted to short term money market rates, and stage two to show how dynamics in the money market rates affect retail rates of banks. They further argue that stage one is largely driven by the shape of the yield curve such that if the term structure remains stable, no matter the form, PT of the policy rate to market rates is expected to be proportional. On the other hand, any twists in the yield curve will definitely change the size as well as the magnitude of the PT. Intuitively, a full or complete PT occurs when changes in the official rate lead to a one-for-one change in commercial bank retail rates, and if bank rates do not adjust one-for-one, PT is said to be incomplete or sticky (Amarasekara, 2009:5).

Interest rates stickiness in the banking industry has two distinct meanings. Cottarelli and Kourelis (1994:589) note that interest rates stickiness has been used in the first instance to describe the relative inelastic nature of bank rates regarding shifts in demand for bank credits and deposits. The second meaning relates to alterations in the money market rates, that is, commercial banks adjust their rates only marginally in the short run (short run stickiness) and perhaps also in the long run (long run stickiness) in reaction to a change in the official rate. The second meaning of interest rates stickiness will be used in this study.

2.3.1 Interest rate stickiness: Theories

Given the direct effect that interest rates exercise on consumption and investment decisions of households and firms, economists and policy makers are increasingly searching for possible explanations for banks retail rates stickiness to changes in the official rate of the Central Bank. Alternatively, why do commercial banks not adjust retail rates one-for-one to changes in the policy-controlled interest rate of the Central Bank? Attempts to answer this question have led to the development of many theories, each providing a different explanation. Early such theories include the work of Stiglitz and Weiss (1981) that used credit rationing in markets with imperfect information to explain loan rate stickiness, and the *collusive pricing arrangement* and *customer reaction hypothesis* of Hannan and Berger (1991).

However, Lowe and Rohling (1992:4-5) suggested that with the growing concern to find possible causes of price stickiness in financial markets, some of the theories that have been used to explain price stickiness in the goods and labour markets can equally be used to account for retail rates stickiness in financial markets. As such, they proposed four theoretical explanations for this phenomenon, based on equilibrium credit rationing, implicit risk sharing, switching costs and consumer irrationality. These are discussed in the next section.

2.3.1.1 Equilibrium credit rationing and adverse selection

Adverse selection is a common occurrence in the financial markets and occurs when one participant is unable to get accurate information about the other. For example, firms are assumed to have more knowledge about the riskiness of their investment projects whereas the banks (lenders) do not. This difference in information disclosure introduces problems of moral hazard and adverse selection. Consequently, banks do not necessarily increase their loan rates proportionately, even if the costs of funding increases, because increasing rates may attract risky borrowers. However, if banks respond to the increase in the cost of funds by increasing the loan rates, the expected return on all investment projects may decline, because firms and investors with the safest projects are likely to be the first to withdraw from the market. Thus, the mix of applicants seeking loans changes adversely (adverse selection). In addition, as loan rates increase, borrowers' behaviour may change, inducing them to engage in more risky projects, thereby increasing the probability of default on loan repayment (increased moral hazard). If the probability of default is sufficiently high then the expected

receipts of a bank will fall with increases in loan rates. Confronted with such a dilemma, banks will choose not to increase their loan rates even when the cost of funds has increased, but may prefer to set their loan rates below the equilibrium market clearing rate and ration credit. Interest rates in this case will be sticky upward (Lowe and Rohling, 1992: 4; Stiglitz and Weiss, 1981:393).

2.3.1.2 Switching costs

Switching costs are the costs⁶ incurred by consumers as a consequence of moving from one supplier, brand or product to another. If these costs are high, consumers will prefer to stick to their existing suppliers. In the banking market one borrower is not the same as another; as such banks are concerned about the risk profile of individual borrowers. Consequently, it becomes necessary for banks to find more information about a particular borrower. This process of gathering information is not easy and involves additional costs to the banks which are usually passed onto borrowers in the form of an additional fee. To avoid these fees, borrowers will prefer not to switch from one bank to another. Lowe and Rohling (1992:6) also note that the regular search costs such as learning the different new loan rates and conditions, compiling documents, filling out applications and time involved in attending interviews with various lending agents are often more complicated in the banking than in the goods markets. This is because the bank needs to discover the risk factors associated with each borrower before issuing a loan. With this in mind borrowers will not like to change because the bank already have all the necessary documents during the first loan application and getting a second loan will be less complicated compared to applying for a loan with a new bank. This will make the level of lending rate rigid in a downward direction.

2.3.1.3 Risk sharing

The theory of risk sharing describes lending rate stickiness in a situation where the borrower is more risk averse than the shareholders of the bank. In such a situation the borrower and the lender (bank) can benefit from an understanding or an implicit contract regarding the amount they will be willing to trade, and at what price and under what condition in the future (Fried and Howitt, 1980:472). Committed in this way, banks and their customers can share the risks

⁶ Made up of exit fees, search costs, learning costs, cognitive effort, equipment costs, installation and start-up costs, financial risk, psychological risk, and social risk.

concerning future uncertainty. Such an arrangement is similar to an insurance contract where the borrower who is risk averse pays an insurance premium to the bank (risk neutral) for a stable interest rate payment. Hence, the bank will charge an interest rate that is less than its marginal cost of funds and will then be compensated for the additional risk by receiving a higher average rate than would be charged for a risk neutral borrower (Lowe and Rohling, 1992:11). Borrowers treat the difference in the interest rate between a risk averse and risk neutral borrower as an insurance premium since borrowers are less likely to change to another bank because of switching costs. In addition, such an arrangement between banks and borrowers is typical in a retail banking environment as such banks aim to build and maintain close relationships with customers whereby long-time borrowers are likely to receive a stable interest rate in the future (Fried and Howitt, 1980:472).

2.3.1.4 Consumer irrationality

Ausubel (1991:70-71) notes that there is a group of consumers who borrow large sums repeatedly on the grounds that they will pay the outstanding amount on their credit card before the due date but fail to repay the full amount. These classes of consumers are less likely to go around comparing rates charged on credit cards and are therefore compelled to pay the high rates charged. In addition this group of borrowers are not sensitive to changes in interest rates and are the group of borrowers that banks prefer. A reduction in the rate charged on credit card accounts attracts only those who intend to borrow (high risk customers). Therefore, these reverse adverse selection problems make it difficult for banks to compete on credit card rates. As a result credit card rates are likely to be sticky in a downward direction (Lowe and Rohling, 1992:12). Calem and Mester (1995:1336) suggest that credit card rate stickiness can be explained by deviations from perfect competition assumptions by credit card-holders because of search costs, switching costs and banks facing adverse selection problems if they reduced the interest rate. Furthermore, banks are likely to deny applications from households with huge credit balances as these households are more liable to experience payment difficulties. Calem *et al.* (2006) also argue that despite developments in technological advancement that may have decreased search costs and enhanced credit card selection capacities, the continuous presence of switching costs and adverse selection may continue to give market power to banks with strong customer relationships.

The above theoretical explanations relate to bank and customer specific reasons for retail rates stickiness and hence pay no allegiance to the structure of the financial system. Cottarelli and Kourelis (1994:587-588) note that the efficiency of monetary policy also depends very much on structural parameters of the economy over which the Central Bank has no direct influence. Empirical evidence has shown that the financial structure of an economy plays an important role on how monetary policy shocks are transmitted as well as on IRPT (Sellon, 2002). Given this consideration, the next section discusses the structural parameters of the financial system and other related factors that seek to explain price stickiness in financial markets.

2.4 FACTORS AFFECTING INTEREST RATE STICKINESS: SOME THEORETICAL VIEWS

2.4.1 Structure of the financial system

The structure of the financial system plays a major role in the transmission of monetary policy. These structural parameters constitute those aspects of the economy which cannot be directly controlled by the Central Bank and include: the degree of competition and bank concentration in the financial markets, the ownership structure of the financial markets, the level of development and openness of the financial market (Cottarelli and Kourelis, 1994:588). The next section discusses these factors in greater detail.

2.4.1.1 The degree of competition and bank concentration

Competition within banks and with non-banks is needed for the effective transmission of monetary policy, because it reduces the non-profit maximising behaviour of banks and thereby leads to effective transmission of monetary policy. Furthermore Guntner (2010:1) argues, using the New Keynesian Dynamic Stochastic General Equilibrium (DSGE) model in a monopolistic competitive framework, that the presence of competition within the banking market decreases the spread between the policy and the lending rates as well as increases IRPT of the monetary policy. Cottarelli and Kourelis (1994:591) argue that the demand elasticity for loans is less elastic in markets where there is a smaller number of competitors, high barriers to entry or no other sources of finance such as commercial papers. Consequently, loan rates may tend to react slowly to dynamics in money market rates in the short run.

On the other hand, high banking concentration reduces IRPT because banks tend to adopt oligopolistic behaviour, causing interest rates to adjust asymmetrically. Asymmetric adjustment of retail rates can best be explained using the *collusive pricing arrangement* and *customer reaction hypothesis* (Hannan and Berger, 1991; Scholnick, 1996). The *collusive pricing arrangement hypothesis* argues that deposit rates will be rigid upwards following a cut in the official rate because an increase in the rate on deposits constitutes a cost to the banks in the form of an increased payment to depositors, whereas the lending rates will exhibit greater downward rigidity in reaction to a reduction in the official rate, because a reduction in the lending rate reduces the profit margin of banks (narrow margin between the lending and the deposit rates). Conversely, the *customer reaction hypothesis* suggests that deposit rates will be sticky downwards in the event of an increase in the official rate, for fear of customers' withdrawal or transfer of deposits to non-bank financial institutions. On the other hand, the lending rates will show greater upward rigidity when the official interest rate increases because of negative customer reaction such as default on loan repayments. Severe (2011) built a model of profit-maximising banks and argues that market concentration in the banking sector may cause many undesirable effects. However, Cottarelli and Kourelis (1994:605) remind us that the theory of contestable markets suggests that bank concentration may not be a good proxy for the actual level of competition because firms in a concentrated market may behave competitively if there are threats of new entry.

2.4.1.2 The ownership structure of the banks

The ownership structure of the banking sector of an economy has a central role to play when it comes to the transmission of monetary policy as it can affect the rigidity of interest rates. In economies where state-owned banks dominate the financial markets, interest rates adjust with a delay due to political pressure or inefficiency. This is because state-owned banks claim to operate in the interest of the public, hence they are not out to maximise profits. Where banks demonstrate profit maximising behaviour, they are expected to adjust promptly to changes in interest rates and inefficiency in the market place is penalised by market forces. But when the market forces are weak, such as barriers to entry, absence of competition from non-bank intermediaries and constraints on international capital flows, inefficiency may not be penalised and interest rates will be sticky (Cottarelli and Kourelis, 1994:592, Aziakpono and Wilson, 2010:13).

2.4.1.3 The degree of financial market openness and development

Increasing cross-border financial integration and innovations in the financial markets such as derivative instruments and securitisation has had a significant impact on the ways in which monetary policy impulses are transmitted through to the economy. According to BIS (2008:6) financial modernisation has given birth to new types of financial products as well as new instruments. For example, securitisation has produced new asset classes and opened up other sources of funding for retail and investment banks, as well as risks management techniques. These developments thus influenced the manner and relative efficacy of monetary policy instruments. The transmission of monetary policy shocks through the interest rate channel is expected to be sluggish when the domestic bond markets are underdeveloped and banks are the leading financial intermediaries of short term domestic credit and foreign currency denominated funds. As such, borrowers have no alternative sources of funding and the demand elasticity of loans tend to be inelastic (BIS, 2008:7). Alternatively, a well developed domestic bond market, money market, corporate debt securities and venture capital markets together with openness to international capital markets will result in a faster pass-through for those bank products directly competing with these markets. This means a close substitute for bank deposits and loans exists for households and firms such as short term money market instruments, long term governments bonds and unit trust funds. Therefore, banks stand the chance of losing a substantial amount of their deposits from households and firms if their retail rates are not competitive. The elasticity of deposits and loans will be elastic (Gropp *et al.*, 2007:2).

However, the extent to which domestic banks alter their retail rates to changes in the official interest rate of the Central Bank also depends on the scope to which banks rely on the accommodation facility of the Central Bank. Aziakpono and Wilson (2010:13) point out that when the financial system is sufficiently open and banks are able to access different sources of finance easily, banks' reliance on the accommodation facility from the Central Bank will be reduced. Therefore, an opened financial system may react to changes in the official interest rate with more of a delay than when the financial market is not opened.

2.4.2 Menu costs

According to Rotemberg and Saloner (1987:918), menu costs are usually taken to include the costs of changing and circulating new price lists, printing, advertising, administrative costs

and communicating the change to other branches in a situation where a firm has a large network. In addition, menu costs also include the costs of upsetting customers by means of many price changes. For this reason, menu cost models predict that firms may adjust their prices in a situation of a nominal demand shock only when the benefits from adjusting are greater than the costs of staying out of equilibrium. Moreover, since adjustment is expensive and time-consuming firms very often do not want to continually change their prices because this might have a negative impact on customer satisfaction, especially when the change is viewed as temporary by banks (Madsen and Yang, 1998:196).

2.4.3 Excess liquidity of the banking system

The banking sector's holding of excess liquidity can have adverse effects on the ability of monetary policy to influence demand conditions and, therefore, to stabilise the economy. For instance, if banks are in possession of excess reserves at the Central Bank above the required limit, any attempt by the monetary authorities to increase liquidity through an expansionary monetary policy in order to stimulate aggregate demand will prove largely ineffective. In the same manner, it becomes difficult to regulate the supply of money using the required reserve ratio. The implication is that excess liquidity of the banking sector slows down the transmission of monetary policy shocks leading to sluggishness in the IRPT (Saxegaard, 2006:4). According to Agenor and Aynaoui (2010:924) excess liquidity in the banking sector is caused by structural and cyclical factors such as an underdeveloped financial system, a high degree of risk aversion which may lead to high risk premia and low demand for credit, as well as high inflow of capital due to opening of the capital account.

2.4.4 Asymmetric information

Asymmetric information in financial markets is a result of market imperfections (incomplete information) which can have significant effects on monetary policy transmission. As discussed earlier, banks find it challenging because it becomes difficult to differentiate the relative riskiness of investment projects in a situation of information asymmetry when allocating credit. As such, lenders tend to price this into their loan contracts. Thus, the Stiglitz and Weiss (1981) model of credit rationing in markets with imperfect information shows that equilibrium in the loan market is characterised by credit rationing and that this equilibrium may not necessarily change due to changes in other interest rates.

2.4.5 Monetary policy regimes

The degree and speed of adjustment of commercial bank retail interest rates to dynamics in the official interest rate also depend on the kind of monetary policy regime in operation. For instance, under a monetary policy regime of direct control, interest rates tend to be rigid as adjustment in official rates may be motivated by political considerations (Aziakpono and Wilson, 2010:12). Meanwhile, under a liberalised monetary policy regime where interest rates and credit allocation are determined by market forces, banks will adjust faster to changes in the official interest rate because non-adjustment will be penalised by market forces. In addition, monetary policy regimes that rely more on transparency and increased accountability also reduce interest rate volatility since the market can easily predict monetary policy actions. This increases the degree of IRPT of the official rate to retail rates of the bank (Liu *et al.*, 2008:510).

2.4.6 Money market volatility, inflation and macroeconomic conditions

The prevailing macroeconomic conditions are also likely to affect the way banks adjust their retail rates to changes in money market rates. Banks find it easier to transmit changes in money market rates to lending and deposit rates during favourable economic conditions characterised by rapid economic growth. Also during high inflationary period banks are quick to alter their retail rates to changes in money market rates because prices in the markets will be changed more frequently in a high inflation environment than in a low inflationary period (Egert and MacDonald, 2009:283).

It is worth noting that the above factors and/or theories of price stickiness in financial markets are not exhaustive. There are other determinants and theories that can explain price stickiness and these vary across countries and over time, especially with the development of the financial markets.

2.5 EMPIRICAL LITERATURE REVIEW

2.5.1 Introduction

The concept of interest rate pass-through (IRPT) is quite new in empirical research and early studies emerged in the 1990s (Hannan and Berger 1991; Neumark and Sharpe, 1992 and Lowe and Rohling, 1992). Thereafter, interest in PT studies subsequently began to grow. However, the early studies only focused on asymmetries and price rigidities under an

oligopolistic market structure. The introduction and successful launch of a single monetary policy in the Euro Area in January 1999 shifted the focus of pass-through research. Attention now tended to focus on how a single monetary policy would be conducted under a situation of heterogeneous financial structure. This led to a burst of interest in PT studies in the Euro Area and elsewhere. Some examples of PT studies in the Euro Area include Mojon (2000); Toolsema *et al.* (2002); De Bondt (2002, 2005); Sander and Kleimier (2002, 2004, 2006b); Sorensen and Werner (2006); Marotta (2009) and Leuvensteijn *et al.* (2008). Irrespective of the differences in approach, most of these studies found PT to be incomplete in the short run and almost complete in the long run. Furthermore, significant differences exist in the degree of PT across countries and across banking products, and there is no clear pattern of these differences across countries.

2.5.2 Developed economies

Hannan and Berger (1991) as well as Neumark and Sharpe (1992) conducted research which focused on the impact of market concentration on the adjustment of prices in the deposit market in the United States of America (USA) and this formed the basis for empirical research into IRPT. Employing a multinomial logit model and data from 1983 to 1986, they found evidence of asymmetry in the deposit rates in the USA, that is, deposit rates are more rigid upward than downward. On average there was a 62% chance of banks reducing the deposit rates in response to a 29 basis points fall in policy rate compared to an average 39% chance of increasing deposit rates in reaction to the same size increase in the policy rate. Similar results were found by Neumark and Sharpe (1992) using a panel of 225 US banks, using partial adjustment and switching models. Consequently, Hannan and Berger (1991) developed the *customer reaction* and *collusive pricing arrangement hypotheses*⁷ to account for the observed asymmetry in deposit rates in the financial markets.

However, the above studies focused more on customer and bank specific factors as major causes of interest rate rigidities in financial markets. Dissatisfaction amongst economists and policy makers coupled with increasing concern to explore alternative explanations of price stickiness in financial markets led to renewed interest in PT research. One such landmark empirical study that changed the face of IRPT research was the seminal work of Cottarelli and Kourelis (1994) in which they relate the degree of IRPT to the structure of the financial

⁷ See Section 2.4.2 above.

system⁸. They analysed lending rates for 31 industrial and developing countries using co-integration techniques and found that cross-country differences are more pronounced in the short than in the long run. Their results showed that long run PT for the lending rates is complete with an impact multiplier of 0.97 on average, which lies between 0.75 and 1.25. Moreover, after controlling for other effects, the financial structure emerged to have a strong influence in increasing the flexibility of the lending rates. The dynamics of the lending rates adjustment also depend on the type of the lending rates used. Thus, they note that to assess the effectiveness of the monetary policy transmission mechanism, attention should be given to the structure of the financial system as well. Cottarelli *et al.* (1995) also found similar results for the Italian banking system: they found that discrepancies in the lending rates inflexibility in the Italian banking system is as a result of differences in the degree of banking concentration measured by the Herfindahl index⁹.

The Euro Zone studies such as Mojon (2000) and Schwarzbauer (2007) that examined the financial structure focused on its important role in the process of monetary policy transmission. Building on the framework of Cottarelli and Kourelis (1994), Mojon (2000) examined how differences in the financial structure across the Euro Area can contribute to national asymmetry. He analysed data from 1979 to 1998, and employed an Error Correction Model (ECM). His empirical results covering a panel of 25 credit and 17 deposit markets showed that PT varies across countries and across markets. Overall PT for credit markets was higher, ranging from 0.53 to 0.68, compared to deposit markets, which ranged from 0.18 to 0.43. Meanwhile Savings and Sight deposits exhibited the greatest degree of stickiness, ranging from 0 to 0.28. He noted that competition in the banking sector as measured by the Gual index¹⁰ has the tendency to force banks to raise deposit rates faster when the overnight money market rate¹¹ increases and competition between banks also narrows the interest rate

⁸ See Section 2.4.1 above.

⁹ The Herfindhal Index is a measurement of market concentration and is calculated as the sum of square market shares of banks. A value of less than 1000 indicates an unconcentrated market, between 1000 and 1800 signifies moderate concentration and a value above 1800 indicates high concentration. Concentrated markets are less competitive than unconcentrated markets (IMF, 2007:29).

¹⁰ An index of deregulation measures taken by the European countries between 1980 and 1995 constructed by Gual (1999) as an indicator of the intensity of competition among banks.

¹¹ The overnight money market rate is used as the policy controlled interest rates because of its correlation to various bank credit and deposit rates (Mojon, 2000).

cycle of asymmetry PT. Schwarzbauer (2007) used time-varying analysis and also found that the ratio of bank deposits to GDP or market capitalisation to GDP and the term structure of interest rates have a statistical significant impact on monetary transmission process. Furthermore, Baugnet *et al.* (2007) found bank specific and market structural variables to have a significant impact on PT in Belgium. That is, more liquid banks tend to adjust their retail rates more slowly and incompletely in response to changes in money market rates compared to less liquid banks where the adjustment is quicker and almost complete.

Other studies have documented that differences in PT in the Euro Area have converged and therefore the speed of adjustment to changes in overnight money market rates has become more homogeneous (Mojon, 2000; Toolsema *et al.*, 2002; Schwarzbauer, 2007 and Sander and Kleimeier, 2004, 2006b). However, in spite of the relative convergence confirmed by all the studies, particularly after January 1999, considerable heterogeneity in the degree of PT across countries and across retail bank products still remains high within the region. For example, Toolsema *et al.* (2002) used fully-modified ordinary least squares and rolling windows analysis to account for heterogeneity across countries and to provide more insight of the convergence debate in the Euro Area from 1980 – 2000. They found complete PT for most but not all the countries, ranging from 0.71 – 1.03. The rolling window analysis suggests that there is evidence of convergence in the long run multipliers (from 0.48 to 1.10) and the speed of adjustment is relative stable over time in most countries except in the Netherlands. Sander and Kleimeier (2006b) compared PT for the CEECs¹² and four core Euro Zone¹³ countries and found a homogeneous and complete lending rates PT for CEECs (0.91; 1.07) compared to the core Euro Zone (0.6; 0.69) for short and long term corporate lending respectively. Egert *et al.* (2007) used dynamic ordinary least squares (DOLS) and autoregressive distributed lag (ARDL) models and found similar results between CEECs and core Euro Area. In addition, Sander and Kleimeier (2004) noted that differences in legal structure in the region will continue to undermine full convergence in the Euro Zone.

Sander and Kleimeier (2002) examined the issue of asymmetric adjustment in the Euro Area using threshold ECM from 1985 to 1998. Their results revealed that the long run multipliers

¹² The Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic and Slovenia (Central and Eastern European Countries).

¹³ Germany, Finland, Ireland and Spain.

of the lending rates are close to one (from 0.87 to 1.170) in most but not for all countries and the speed of adjustment varies across countries. The authors argue that even though currency risk has been eliminated, the presence of asymmetric adjustment will continue to influence the way monetary policy is conducted within the Euro Area. Contrary to the Western Euro Area countries, the empirical evidence regarding monetary policy transmission in the South-Eastern Europe¹⁴ (SEE) is mixed. Karagiannis *et al.* (2011) used the general-to-specific (GETS) approach with data from 1999 to 2007 to test the symmetry hypothesis. They found evidence of negative asymmetric¹⁵ adjustment in the lending and deposit rates in Bulgaria and Slovenia, whereas in Greece the results confirmed the presence of symmetric adjustment¹⁶. They argued that the observed asymmetry in the SEE can be explained by the differences in the level of competition, financial development and the degree of liberalisation of the financial markets in the SEE.

Another issue that has taken centre stage in research in the Euro Area is the differences in pass-through across the various market segments. Some studies revealed that time deposits and loans to corporate enterprises adjust faster to changes in overnight money market rates whereas rates on savings account, overnight and current account deposits show the greatest degree of stickiness (Mojon, 2000; Fitzpatrick and Reilly, 2001; De Bondt, 2002; De Graeve *et al.*, 2004, 2007; Sorensen and Werner, 2006; Horvath *et al.*, 2004 and Liu *et al.*, 2011). Despite differences in the econometric techniques, these studies all found immediate PT on savings account and current account deposits to be very low, ranging from 0.03 – 0.33. However, country specific analyses provide a clearer picture of the degree of PT in the various markets than Euro Area studies. On average PT for corporate loans both short and long term, mortgages and time deposits is faster and ranged from 0.63 – 1.01; 0.70 – 1.19 and 0.44 – 0.84 respectively (see Table A1 in the appendix for details). Sorensen and Werner (2006) argue that heterogeneity across market segments may be due to the differences in the level of competition and the characteristics of bank clients. For example, corporate enterprises may depend less on bank loans to finance their activities compared to small businesses and households.

¹⁴ Greece, Bulgaria and Slovenia.

¹⁵ Banks tend to pass to depositors and borrowers only decreases in the original money market rate changes.

¹⁶ Banks tend pass to depositors and borrowers equal increases and decreases in the original Central bank and money market rate changes.

Sorensen and Werner (2006:7) also point out that the interest rates used in some empirical studies are not harmonised as such some studies often detect heterogeneity in PT which might be as a result of statistical problems. The advent of the Euro and a single monetary policy has indeed induced structural breaks in PT in the Euro Area. Studies such as De Bondt (2002, 2005) have shown that PT in the Euro Area has actually increased post January 1999 and the mean speed of adjustment has become quicker for all retail bank rates. Therefore, they argue, differences in PT in the Euro Area post 1999 may be as result of differences in credit risk consideration and the national banking systems trying to adapt to the common monetary policy. Thus, Marotta (2007, 2009) assumed multiple unknown breaks rather than artificially fixing the break in January 1999. He employed ARDL and used unharmonised (NRIR) and the new harmonised (MIR) interest rates series from 1993 to 2007. The estimated long run PT using NRIR data on average declined from 0.90 to 0.70, except for France, but the speed of adjustment to equilibrium was instead faster, rising from 0.80 to about 0.100 within a quarter. Conversely, the long run PT estimated using MIR increased on average for small loans (0.90) and was almost complete (0.97) for large loans. Hence, MIR empirical evidence suggests a more predictable outcome of monetary policy in the Euro Area over time.

Others such as De Bondt (2002; 2005) relate the high speed of adjustment in retail rates in the Euro Area post 1999 to increased competition, and a decrease in asymmetric and switching costs. Theory suggests that greater transparency in the way monetary policy is conducted as well as a well-communicated policy which can easily be predicted enhances the transmission of monetary policy shocks. Leuvensteijn *et al.* (2008) employed the “Boone indicator” to measure competition within the banking sector. They used a panel econometric technique and ECM to test the impact of banking competition as measured by the Boone indicator on long run PT from 1994 to 2006. Their results revealed that competition lowers the interest rate spreads of banks for three out of four loan products: mortgage loans (-0.03), consumer loans (-0.075) and short term loans to enterprises (-0.128) and has no significant effect on long term loans to enterprises. The above results indicate that mortgages are least affected by competition, while short term loans to enterprises are influenced the most. Liu *et al.* (2008) used a Phillip-Loretan estimator to examine the effect of policy transparency and the structure of the monetary transmission mechanism in New Zealand. Their evidence showed that the transparency of monetary policy has a positive effect on PT. Thus, they argue that increased transparency in the way monetary policy is conducted is associated with decreases

in interest rates volatility and hence the future short term interest rates become more certain, which in turn enhances the degree of PT of official rate to retail rates.

Given the dominant position of the US in the world economy, financial markets usually react to changes in US monetary policy depending on the direction of the change. Whether market reaction is driven by expectations or actual fact is a matter of empirical concern. If financial markets are efficient, then these reactions should be minimal as the market must have anticipated the change and priced it properly before the change actually occurs. Karagiannis *et al.* (2010) used the GETS with data from 1998 to 2003 to compare PT between the USA and the Euro Area. They found mixed results for the two banking systems regarding wholesale pass-through transmission and completeness: they found near complete PT for the deposit rate (0.97) and incomplete PT for the lending rate (0.42) rate in the Euro Area and incomplete long run PT (0.67 and 0.49) for deposit and lending rates in the USA. They also documented evidence of asymmetric adjustment in the retail rates in both banking markets except for loan rates in the Euro Area, and remarked that PT is sensitive to the choice of rate used as the policy interest rate. However, these results differ from those of Kwapil and Scharler (2010) who found a lower PT in the deposit markets for the Euro Area (ranging from 0.32 – 0.57) and higher PT for the US deposit markets (0.74 – 1.08) depending on the econometric method used.

Moazzami (1999) also found lending rates in the USA to be stickier (PT of 0.34) compared to Canada (PT of 0.66). Wang and Lee (2009) compared market volatility and interest rate PT between the USA and nine Asian countries using asymmetric threshold models and found complete long run PT only for USA deposit markets (0.99) and near complete for the lending rates (0.86). In the Asian countries, PT is incomplete in both markets (ranging from 0.103 to 0.86 for the deposit rate and 0.23 to 0.63 for the lending rate). Their empirical results also confirmed upward adjustment rigidity in the deposit rates in five Asian countries¹⁷ and downward adjustment rigidity in lending rate in three Asian countries¹⁸. Although all these studies suggest different explanations for their findings, it is worth noting that the financial structures emerge consistently as a major cause for the heterogeneity in retail rates

¹⁷ Hong Kong, Malaysia, the Philippines, Singapore and Taiwan.

¹⁸ Hong Kong, the Philippines and Taiwan.

adjustment. The next section reviews empirical evidence from emerging and developing economies.

2.5.3 Emerging and developing economies

The earliest study in emerging economies is the work of Scholnick (1996). Building on the framework of Hannan and Berger (1991) as well as Neumark and Sharpe (1992), Scholnick (1996) examined asymmetric adjustment in the lending and deposit rates in Singapore and Malaysia. He employed co-integration and ECM methodologies with data from 1983 to 1994 and found incomplete short run PT ranging from 0.07 to 0.12 and 0.11 to 0.12 for the deposit and lending rates in both countries. He confirmed evidence of asymmetric adjustment in the deposit rates in both countries and also extended Hannan and Berger's (1991) *collusive pricing arrangement* and *customer reaction* to relate to the lending rate discussed in Section 2.4.2 above. He observed that banks in Singapore and Malaysia tend to adjust their deposit rates downward more quickly than upward, thus supporting the *collusive pricing arrangement hypothesis* of Hannan and Berger (1991).

It is worth noting that PT studies in emerging and developing markets have no central theme. The PT studies in these two markets are not focused on a particular issue as was the case in the Euro Area. Studies that examined the dynamic adjustment of lending and deposit rates in general found incomplete short and long run PT in both markets. In addition, strong evidence of asymmetry existed in almost all of the studies reviewed. Khawaja and Khan (2008) used transfer functions and data from 1991 to 2009 to analyse lending and deposit rates in Pakistan. Their results revealed incomplete long run PT (0.43) for the lending rates and an even lower PT for deposit rates (0.16). They also confirmed evidence of asymmetric adjustment in both the lending and deposit markets. They argued that the marginal higher PT for lending rates was because of the pegging of the lending rates to the KIBOR and the low PT for the deposit rates was due to insensitivity of depositors to changes in interest rates. Furthermore, a greater part of households' income is held in either in current or savings accounts and most of these current accounts earn no interest and very little interest is paid on savings accounts. Amarasekara (2009) applied a polynomial distributed lag (PDL) and found incomplete PT in Sri Lanka except for the prime lending rates which show an average long run PT of 0.51.

Nevertheless, Ozdemir (2009) and Aydin (2007) found complete PT for both lending and deposit rates in Turkey. Regardless of the estimation method used, both found that complete PT for the lending and deposit rates ranged from 1.05 – 1.59 except for corporate loans which had a slightly lower PT of 0.63. Thus, the empirical evidence suggests that retail rates in Turkey adjust symmetrically to increases and decreases in money market rates. See Table A1 in the appendix for a complete list of the literature review.

Chong (2010) used ECM with data from 1982 to 2007 to analyse the impact of deregulation on the efficacy of monetary policy and retail rates rigidity in Hong Kong. He found the long run PT for all deposit products in the regulated period to be incomplete, ranging from 0.53 to 0.75, and tended to increase with maturity of the deposits. When a dummy variable was used to capture the effect of deregulation, the long run PT was found to be positive and significant across all the retail deposit rates, rising from 0.12 to 0.241. Evidence of asymmetric adjustment is confirmed in the deregulated period only for six months' time deposits. The long run PT was complete in the deregulated period for three and six months' time deposits but incomplete for one month, three months and one week time deposits. Wang and Thi (2010) also found evidence of asymmetric adjustment for Hong Kong and Taiwan but their finding suggests upward rigidity in the deposit rates and downward rigidity in the lending rates for both Hong Kong and Taiwan. However, the differences in results could be due to the sensitivity of the type of econometric technique and the length of the datasets.

A complete review of empirical literature on IRPT cannot be completed without a discussion of the BRIC¹⁹ economies, which are considered as one of the fastest growing emerging market economies. Karagiannis *et al.* (2009) used the GETS approach to analyse how the deposit and lending rates in the BRIC economies responded to changes in money market rates from 1998 to 2007. Their empirical results are mixed regarding monetary policy and pass-through completeness. They found almost complete long run PT (0.96) for the deposit rate and incomplete long run PT (0.48) for the lending rate in Brazil. For Russia, the long run pass-through for the deposit and lending rates was incomplete (0.61 and 0.40). Meanwhile in India, the long run PT for the lending rates overshoot by 1.21 and for China the long run PT was incomplete (0.53) for the lending rates but PT for the deposit rates was overshooting by 1.42. Despite these differences they found evidence of negative asymmetry between Brazil,

¹⁹ The BRIC economies here exclude South Africa. That is, Brazil, China, India and Russia.

India and Russia. In the case of China, their GETS econometric methodology failed to establish any meaningful results regarding the transmission process.

As noted earlier, studies on PT in Sub-Saharan Africa has been scant. Jankee's (2005) study on interest rate PT in Mauritius is amongst the earliest known studies in the region. He used an asymmetric error correction model to examine how changes in the interbank rate are transmitted to the retail lending and deposit rates of commercial banks in Mauritius from 1988 to 2003. He found incomplete long run pass-through for both the deposit and lending rates (about 0.413 and 0.242 respectively). Lending rates adjusted faster to negative shocks (about 0.803) than to positive shocks, hence lending rates adjust asymmetrically. On the other hand, the speed of adjustment for the deposit rates to changes in interbank rate was 0.641. Acheampong (2005) also found incomplete long pass-through in Ghana (0.55 for deposit rates and 0.69 for lending rates) using co-integration and ECM. In addition, his results confirmed evidence of symmetry in the lending and deposit rates to changes in money market rate.

In the Southern Africa region, a few studies such as Aziakpono *et al.* (2007), Aziakpono and Wilson (2010) and Sander and Kleimier (2006a) have used PT analysis to investigate the response of retail rates to changes in the Central Bank rate. Aziakpono *et al.* (2007) used the asymmetric adjustment framework of Hannan and Berger (1991) and Neumark and Sharpe (1992) to examine how changes in the South African Reserve Bank (SARB) official rate are transmitted to market interest rates under different regimes. They analysed data from 1973 to 2004 and found a higher long run pass-through for the lending rates (ranging from 0.90 to 1.2) compared to the deposit rates (from 0.85 to 1.09). The short run speed of adjustment was also higher for the lending rates (from 0.28 to 1.15) compared to the deposit rates (0.76 to 1.1). Their results suggest that the speed of adjustment is higher during more market oriented policy regimes than during less market oriented eras. They argue that market oriented policies are more effective in transmitting monetary policy impulses to the economy than less market oriented policies. Aziakpono and Wilson (2010) used a broader spectrum of interest rates and employed asymmetric ECM and rolling window analysis and found similar results for South Africa (see Table 1 in the appendix for more details). That is, PT was higher for the lending rates (from 0.59 – 0.86), particularly during a market oriented era. In addition, they found evidence of asymmetric adjustment in the lending and deposit rates in response to monetary policy shocks.

Sander and Kleimeier (2006a) adopted the unifying approach of Sander and Kleimeier (2004) to examine how national banks react to changes in monetary policy and also how national banks react to changes in South African monetary policy in the Southern African Customs Union (SACU)²⁰. Their findings showed that country differences are present but not dramatic. In addition, there is evidence of banking integration within the Common Monetary Union (CMA) with the Treasury-bill rate in South Africa playing a major role to influence national discount rate, national Treasury-bill rate and finally bank interest rates. The estimated long run PT for the deposit rates is incomplete across the SACU countries except for the deposit rates in South Africa that showed a full pass-through. Namibia had the lowest pass-through (0.58 with national T-bill rate and 0.49 with South Africa T-bill rate). They argue that the low pass-through in Namibia is an indication of imperfect competition in the banking market. Meanwhile the lending rates in the four countries were found to be homogeneous but not perfect.

Attention is now shifted to Central and West Africa where this study is focused. Studies on IRPT are limited, particularly for Cameroon. The only known study is that of Samba and Yan (2010) which focused on Economic Community of Central African States (CEMAC) of which Cameroon is a member. They used ARDL models and data from 1990 to 2007, and found incomplete PT for the deposit rates (0.34) whereas the PT for the lending rates overshoots in reaction to changes in the policy rate (6.21). This means that the lending rate will change by more than 600 basis points in response to a 100 basis points change in the policy rate. They argued that rigidity in retail rates can be explained partly by underdevelopment of the financial system, the presence of excess reserves, lack of competition and the absence of an active stock exchange in the CEMAC region.

In the case of Nigeria, PT studies are also limited and the known study is the work of Sanusi (2010) focusing on IRPT and the efficiency of monetary policy in Nigeria. Sanusi employed impulse response functions from a structural vector autoregressive (SVAR) model to derive the dynamic elasticities of PT of monetary policy rate and interbank interest rates to the lending and deposit rates. He analysed data from 2002 to 2010 and found incomplete and very low long run PT for both three and twelve months deposit rates (0.09) with a mean lag of between six to seven months for complete adjustment. On the other hand, the long run PT

²⁰ SACU – Member countries are South Africa, Lesotho, Namibia and Swaziland.

for the lending rates was incomplete and very low (0.01). Furthermore, accounting for the pre-consolidation period from 2002 – 2005 and post-consolidation from 2006 – 2010 revealed that PT of changes in the monetary policy rate to retail rates fell after the banking sector consolidation (2006 – 2010), while PT of the monetary policy rate to money market rates increased substantially. He noted that financial sector reforms instituted by the Central Bank of Nigeria were effective to increase efficiency in the wholesale money market rates but failed to remove imperfections in the lending and deposit markets. This observation is consistent with Cottarelli and Kourelis (1994: 618) who remark that policies that support banking sector mergers such as those implemented by the European countries in the 1990s may be inconsistent with competition and hence low pass-through.

2.6 SUMMARY AND CONCLUSIONS

The importance of IRPT lies in its ability to determine how effective changes in the action of the Central Bank affect real variables such as aggregate consumption, investment and economic growth. If monetary policy has to be effective, changes in the policy rate have to be fully passed through to retail rates of commercial banks, since interest rates play a pivotal role in the consumption and investment decisions of households and firms. Thus, banks are expected to be natural conveyer of the Central Bank actions to the economy, but theory suggests that very often pass-through occurs with a delay of several months to years. Factors such as risk sharing, menu costs, asymmetry information, switching costs, financial structure, and monetary policy regimes are amongst the reasons that prevent banks from being able to adjust their retail rates fully to changes in the Central Bank policy rate.

Empirical evidence shows that PT varies across countries and across market segments. Corporate and mortgage loans have the highest PT both in the short and long run, and savings and current accounts had the lowest PT. All other markets showed incomplete short and long run PT and differences in financial structure across countries stand out as the major cause of heterogeneity in PT across countries especially in the Euro Area. However, there seems to be an increase in PT in the Euro Area since the launch of the Euro in 1999. Furthermore, some evidence of asymmetry in retail rates adjustment in developed, emerging and developing countries is documented and there is no consensus yet on the pattern of PT except with the deposit markets in the USA that has showed almost complete PT in the studies reviewed.

Finally, retail rates in the developing and emerging economies showed incomplete PT and a low level of financial development as well as competition within the banking sector account for most of the retail rate stickiness and asymmetric adjustment documented in these regions.

The next chapter describes the financial systems of Cameroon and Nigeria.

CHAPTER THREE

AN OVERVIEW OF THE FINANCIAL SYSTEMS OF CAMEROON AND NIGERIA

3.1 INTRODUCTION

The main focus of this chapter is to provide a brief overview of the financial systems of Cameroon and Nigeria and their monetary policy frameworks. Thereafter, the structural parameters of the financial system of each country will be examined in relation to how each is expected to influence pass-through, thereby establishing *a priori* expectations. The remainder of the chapter is organised as follows: Section 3.2 discusses the financial system of Cameroon. Section 3.3 reviews the monetary policy framework of Cameroon. Section 3.4 provides an overview of the financial system of Nigeria and Section 3.5 presents the monetary policy framework of Nigeria. Section 3.6 provides comparative statistics of the financial structure of Nigeria and Cameroon and finally, Section 3.7 summarises and concludes the chapter.

3.2 CAMEROON'S FINANCIAL SYSTEM

Cameroon, together with the Central African Republic (CAR), Chad, Republic of Congo (Brazzaville), Equatorial Guinea and Gabon, form the Economic Community of Central African States (CEMAC). CEMAC makes up the custom and monetary union established in 1994 with the main objectives of creating a common market based on the free movement of goods and services, capital and labour, as well as to harmonising business laws and economic policies. The CEMAC region uses a common currency known as the CFA²¹ franc which was originally pegged to the French franc but is now pegged to the euro at a fixed rate of CFA Franc 656 per euro. The currency is issued by a regional Central Bank known as Banque Des Etats De L'Afrique Centrale – Bank of Central African States (BEAC) – with headquarters in Yaoundé – Cameroon (Iossifov *et al.*, 2009:6 and Saab and Vacher, 2007:4).

The financial sector of Cameroon went through a severe crisis in the 1980s which was mainly caused by a difficult economic environment, poor management, government interference in the bank lending policies, a weak judicial system and poor supervisory framework. This led to financial distress which resulted in bank liquidations and solvency problems with spill-

²¹ CFA means Franc de la Cooperation Financière en Afrique Centrale (Franc of Financial Cooperation in Central Africa)

over effects extended to microfinance institutions and development banks. The only way out of the financial distress was the adoption of the IMF and World Bank Structural Adjustment Programme (SAP) in 1988. Although the country adopted the financial reforms in 1988, effective reforms only started in the 1990s and were focused mainly on liquidation, restructuring and privatisation as well as the reduction of state ownership of banks. These reforms led to a financial system that is more market oriented and open to competition (Khan, 2010:25).

Foreign banks dominate the financial landscape of Cameroon, holding more than two-thirds of total commercial bank assets which represent about 0.20 of GDP. The Cameroon banking sector has recently undergone some revival with the entrance of new banks such as the Union Bank of Africa from Nigeria, Oceanic Bank International from Nigeria owning a 75% share in Union Bank of Cameroon, and Banque Atlantique from Ivory Coast taking over Amity Bank. In total, there are 12 commercial banks operating in Cameroon and two governments specialised financial institutions; the Postal and Savings Bank (CAMPOST) and bank Credit Foncier (CFC) in charge of housing loans. From the 12 commercial banks in operation, only three are domestically owned: Commercial Bank of Cameroon, Afriland First Bank and National Financial Credit Bank (IMF, 2007:30 and Khan, 2010:28).

There are basically three types of financial institutions in Cameroon: formal, semi-formal and informal. The formal financial institutions comprise the commercial banks and non-bank financial institutions such as insurance companies and the stock exchange that are fully regulated by the Central African Banking Commission (COBAC) (Khan, 2010:25).

Within the formal financial sector there are the non-bank financial institutions such as insurance companies including the government owned Reinsurance Company, two pension funds, a social security fund and other specialised institutions offering lease services (IMF, 2009:8-9). The money market was established in 1994 but remains poorly developed, while the bond market is almost non-existent except for government bonds that are issued from time to time to settle internal debt. The Douala Stock Exchange (DSX) was created in 1999 and started operation in 2002. Since its establishment the DSX has been inactive despite several incentive measures to attract firms, and it has failed to attain the envisaged goal of mobilising savings to finance long term investment (Khan, 2010:29). According to IMF

(2007:30), only one company was listed on the DSX by the end of 2006 and trading has been minimal.

The semi-formal financial institutions include microfinance institutions (MFIs), cooperatives, and credit unions. They are also subject to the regulatory framework of COBAC but are not required to meet the same strict prudential norms as commercial banks. For instance, regulation on the minimum capital adequacy ratio²² and large exposures are less restrictive for MFIs than for commercial banks (Khan, 2010:25). The number of MFIs in Cameroon increased tremendously after the 1989 reforms as some of the retrenched bankers set up credit and small savings institutions, and by end of 2006 there were about 490 MFIs in operation. Although they held less than 5% of the total financial assets by the end of 2005 they nevertheless played an important role in intermediation and responding to the need for credit by SMMEs and households not served by the commercial banks. Their deposits and credits are gradually rising relatively but they lack the capacity to finance long term investment (Khan, 2010:29-30).

The informal financial institutions can be further divided into two groups: non-commercial and commercial informal financial sector. The non-commercial informal financial institutions are those whose activities revolve around relatives, friends or small scale group arrangements. That is, these are solidarity groups whose success depends on mutual trust whereby each member acts as surety for the loan repayment of a trusted or a family member. The commercial informal sectors, on the other hand, are those that conduct their businesses by collecting savings, they are moneylenders and traders and most of them are not known by the monetary authorities but they play a significant role in mobilising resources and intermediation because the services of commercial institutions do not reach the majority of the rural poor (Khan, 2010:25).

3.3 THE MONETARY POLICY FRAMEWORK IN CAMEROON

As noted earlier, Cameroon is a member of the CEMAC and as such does not have an independent monetary policy. Monetary policy in Cameroon and CEMAC as a whole is formulated and implemented by the supranational regional Central Bank (BEAC). The Central Bank is in charge of issuing the currency to the six member countries, pooling and

²² The minimum amount of capital required by COBAC to ensure banks and non-bank financial institutions have sufficient funds to meet their liabilities and other risk such as credit risk, market risk and operational risk.

managing foreign exchange reserves, and ensures that the payment system in the region is functioning well. Monetary policy is formulated by a monetary policy committee (MPC) which also manages the pooled foreign exchange reserves (Iossifov *et al.*, 2009:13). The main objectives of BEAC are to maintain a fixed exchange rate regime with the euro and to maintain price stability. Nevertheless, BEAC faces a major challenge to achieve this task due to the heterogeneity in the structure of CEMAC economies particularly in relation to their over-dependence on oil exports and limited labour as well as capital mobility between countries (Saxegaard, 2006:16).

In order to ease the realisation of its principal goal of exchange rate stability BEAC adopted two monetary targets: a low inflation rate (keeping inflation below 3% per annum in the region) and an adequate foreign currency cover of the monetary base. BEAC utilises country-specific instruments ceilings on BEAC government credits, quantitative targets on BEAC refinancing of commercial banks and required reserves ratios in the implementation of monetary policy. In addition, due to differences between economies in the CEMAC region, the MPC sets differentiated required reserve ratios and quarterly targets on commercial banks refinancing by BEAC. This is to ensure it maintains enough net international reserve (NIR) coverage of base money in each CEMAC country within a desired range between 75% and 100% (Iossifov *et al.*, 2009:14 and Saxegaard, 2006:16).

BEAC uses indirect instruments in its operations since the introduction of the money market in 1994. Liquidity in the banking system is controlled through refinancing by BEAC and is supplemented by the imposition of differentiated reserve requirements (BEAC, 2010). The refinancing policy of the Central Bank is the major method of intervention and works through the money market. It is implemented as advances on securities and takes two forms: influencing the quantities (target refinancing) and prices (interest rates). The action on quantities is aimed to stop the growth of monetary aggregates because BEAC is based on a monetary programming exercise, and action on interest rates is a new policy of the Central Bank. Thus advances are granted at an interest rate (the Interest Rate of Tenders – TIAO) determined by the MPC in accordance with the objectives of monetary policy (BEAC, 2010).

Furthermore, BEAC uses negative bids to withdraw liquidity from the system. That is, a given rate is paid to commercial banks (interest rate on investment set by MPC) for the depositing of their free reserves at the Central Bank (Saxegaard, 2006:16). The greatest

problem hampering the effective implementation and the attainment of BEAC's major objectives is the existence of excess liquidity in the CEMAC region. So far, the existing monetary policy instruments have been unable to reduce excess money growth leaving the bank no choice other than to rely in part on changes in the interest rates of its lending and deposit facilities to manage monetary outcomes. Excess liquidity of the banking sector is an indication of underdevelopment of the financial markets (Iossifov *et al.*, 2009:14).

3.4 THE NIGERIAN FINANCIAL SYSTEM

The Nigerian economy is the largest in West Africa and has the most developed banking system in West Africa. Banking operations in Nigeria started far back in the 1800s and the African Banking Corporation was the first bank to be opened in 1892. The Central Bank of Nigeria (CBN), the regulator of banking activities, started operation in 1959 following the enactment of the 1958 Central Bank Act (Allen *et al.*, 2011:21).

Nevertheless, the Nigerian financial sector in the 1970s was characterised by repressive financial policies, including interest rate controls, selective credit programmes and fixed exchange rate regimes, and indigenisation programmes aimed at nationalising all foreign owned banks in Nigeria (Ndako, 2010:6).

However, these repressive and indigenisation policies were made with enormous challenges that led to the adoption of the Structural Adjustment Programme (SAP) in 1986. The 1986 SAP took the form of financial system reforms such as interest rate deregulation, institutional reforms, restructuring the operation of money and capital markets, non-deposit taking and investment houses (Ndako, 2010:6). The reforms removed the direct rationing of foreign exchange controls for the real sector, but the government retained a multiple exchange rate regime which created an avenue for arbitrage and rent seeking financial institutions with considerable access to foreign exchange auctions. This resulted in the easy entrance of new banks into the banking sector particularly those specialising in foreign exchange transactions such as merchant banks, thereby tripling the number of banks from 40 to 120 (Beck *et al.*, 2005:7).

Financial sector reform in Nigeria was a continuous process from 1986 to 2004/2005 where the mother reform took place in 2004/2005 reducing 89 banks to 25 universal banks through mergers and acquisitions (M&A). This number was further reduced to 24 banks following the

merger of Stanbic Bank Plc and IBTC Bank to form Stanbic IBTC Bank Plc by the end of December 2007 (Iganiga, 2010:65-66). Foreign ownership of Nigerian banks is very small: only four banks (Citigroup, Standard Chartered Bank of Nigeria, Stanbic IBTC and Ecobank Nigeria) out of the 24 banks operating in Nigeria are foreign owned (Allen *et al.*, 2011:21).

The financial sector of Nigeria can be categorised into three groups: financial intermediaries, capital markets and foreign investment. The financial intermediaries can further be divided into two segments: commercial banks including merchant banks and nonbank financial intermediaries (King, 2003:19).

Commercial banks overwhelmingly dominate the financial system, accounting for about 90% of the financial system assets and roughly two-thirds of total private sector credit extension. Non-bank financial intermediaries can be grouped into non-deposit taking financial institutions (lenders) and institutional investors. The former mobilise savings and channel them into different activities of the economy. They include finance companies, mortgage institutions, microfinance institutions (MFIs) and development finance institutions (DFIs). The mortgage institutions provide funding for real estate developers while the DFIs provide long term funding to support economic growth. Institutional investors include pension funds, insurance companies and discount houses and bureaux de change (King, 2003:19-22 and World Bank, 2000:24).

Nigeria is the only West African-Anglophone country with a secondary debt market and a bond index. The Federal Government of Nigeria (FGN) debt securities are issued with maturity of three to twenty years and can be accessed through the primary and secondary markets. Nigeria launched its sovereign bond index in December 2006, giving detailed information about prices of locally denominated fixed rate Federal Government Bonds (Allen *et al.*, 2011:10). Nigeria also has a vibrant and well-developed money market which constitutes one of the most active segments of Nigerian financial markets.

The Nigerian capital market (stock exchange) is the most liquid in West Africa. It was opened in 1960 as the Lagos Stock Exchange and by December 1977 it became known as “The Stock Exchange”. At the moment, there are 276 securities listed on The Exchange comprising 17 Government Stocks, 50 Industrial loans, and 209 Equity/Ordinary Share Companies, with a total market capitalisation total of 2.23 trillion naira. The buoyancy of the Nigerian Stock Exchange can probably be explained by the abolition of the 1995 Exchange

Control Act which opened the Nigerian Capital markets to foreign participation. Currently, there is no limit of foreign ownership of companies registered on the Exchange. As a result many listed companies have foreign and multinational affiliations ranging from the agricultural sector through to the manufacturing and services sector of the economy (Allen *et al.*, 2011:23).

Microfinance in Nigeria is organised on an informal setting. Basically there are two types of informal microfinance: firstly Moneylenders and Pawnbrokers, who extend credits usually at a very high interest rates compared to the formal financial sector and borrowers often surrender their land and assets as collateral. The second type is the informal saving and credit association (Esusu), also known as rotating saving and credit associations or RoSCAs, which are managed by different ethnic groups in the urban and rural areas and benefit only members of the group. Members of the association have a mandate to pay an agreed amount of money periodically and the collective funds are then partially or completely given to a member on rotational basis once the fund has reached a certain amount. The growth of the microfinance industry in Nigeria has been triggered by a large number of informal businesses and the reluctance of banks and other financial institutions to finance informal business activities. However, commercial banks and development finance institutions are major providers of capital for microfinance in Nigeria (Allen *et al.*, 2011:23).

3.5 MONETARY POLICY FRAMEWORK IN NIGERIA

Nigeria, Sierra Leone, Gambia, Ghana and Guinea belong to the West Africa Monetary Zone (WAMZ) formed in 2000 with the plan to launch a single currency, the Eco, by 2015. The main aim of the WAMZ is to establish a strong and stable currency to rival the CFA franc. However, the CFA and Eco envisage merging, giving rise to a single currency for West and Central Africa along with the creation of common Central Bank (Allen *et al.*, 2011:20).

The WAMZ is yet to form a monetary union, meaning that each country in the zone for now formulates its monetary policy as well as having a Central Bank. Thus, monetary policy in Nigeria is coordinated by the CBN which also controls the financial policies of the Federal Government. The major objective of the CBN is to achieve price stability and to support the economic policy of the Federal Government of Nigeria. To facilitate the attainment of CBN objectives, the monetary policy committee (MPC) formulates monetary and credits policies; maintains adequate external reserves to defend the value of the naira; promote monetary and

price as well as financial stability, and provides economic and financial support to the Federal Government on behalf of the CBN (Allen *et al.*, 2011:20 and CBN, 2010:5).

The MPC meets once a month to deliberate on the Monetary Policy Rate (MPR) depending on the global economic outlook. In order to maintain the domestic value of the currency through short term interest rate stability, an operating target was introduced in 2006. The MPR therefore serves as an indication rate for interbank money market transactions and other interest rates in the money markets (Allen *et al.*, 2010:36). The CBN uses Open Market Operations (OMO) as the main indirect instruments of monetary policy. OMOs are conducted through Treasury Bill auctions in the primary market and are complemented by other monetary policy instruments such as discount window operations which include standing lending and deposit facilities, repo and reserve repo operations and the use of cash reserve requirement (CRR). Furthermore, CBN also manages monetary policy through the sale and purchase of CBN bills in the primary market (CBN, 2010:1 and World Bank, 2000:35).

3.6 FINANCIAL STRUCTURE OF CAMEROON AND NIGERIA: COMPARATIVE STATISTICS

As discussed in Chapter Two, the extent to which monetary policy impulses are transmitted through to the real economy depends to a large degree on the structure of the financial system. Sellon (2002:5) argues that the impact of monetary policy on interest rates depends to a great extent on the parameters of the financial system. For example, recent changes in the structure of the United States financial markets and institutions may have changed the interest rate channel in the United States. Cottarelli and Kourelis's (1994) study is amongst the earliest to quantify the relative importance of the financial structure in the process of monetary policy transmission and hence interest rate pass-through.

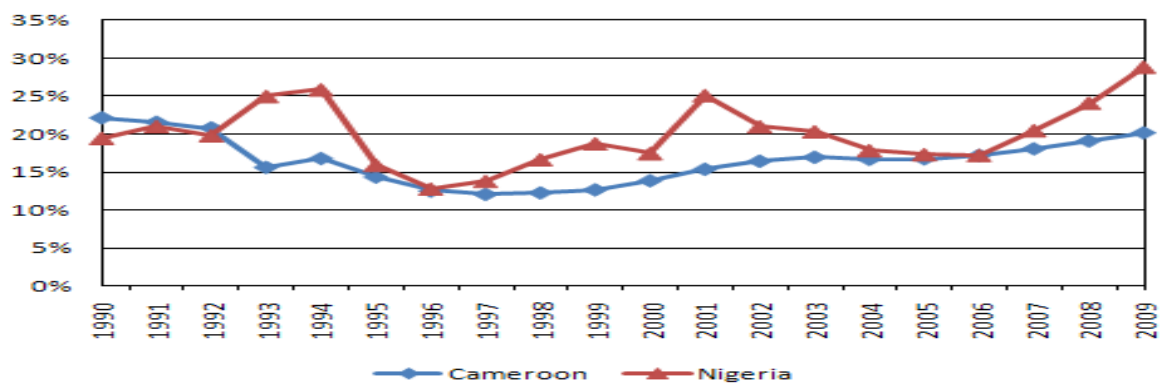
To assist our understanding of the ways financial structure influences the functioning of financial markets, Beck *et al.* (2009) compiled a series of indicators that can be used as a measuring guide. However, it should be noted that only those relevant to this study will be examined and inferences will be made based on the observed trend. Against this background, the next section explores the various financial structures of Cameroon and Nigeria. In order to mitigate the weaknesses associated with using one indicator, the study uses more than one in each case in an attempt to reduce these limitations.

3.6.1 THE SIZE OF THE FINANCIAL SYSTEM

3.6.1.1 Liquid liabilities/GDP

There are quite a number of indicators that can be used to measure the size of the financial system, as will be discussed later. The traditional measure is liquid liabilities to gross domestic product (GDP) which measures the liquidity of the financial system. According to Beck *et al.* (2009:5) this measure sums currency plus demand and interest-bearing liabilities of banks and other financial intermediaries divided by GDP. This measure includes information of all banks, bank-like and non-bank financial intermediaries, and therefore can be taken to be the most comprehensive measure of financial intermediation and has been widely use in the finance and growth literature (see King and Levine, 1993). A high value signifies increased financial depth and a low value indicates a shallow or underdeveloped financial system and is expected to have a negative impact on domestic banks ability to supply credits (Graham, 1996:11). See Figure 3.1.

FIGURE 3.1: LIQUID LIABILITIES / GDP IN CAMEROON AND NIGERIA



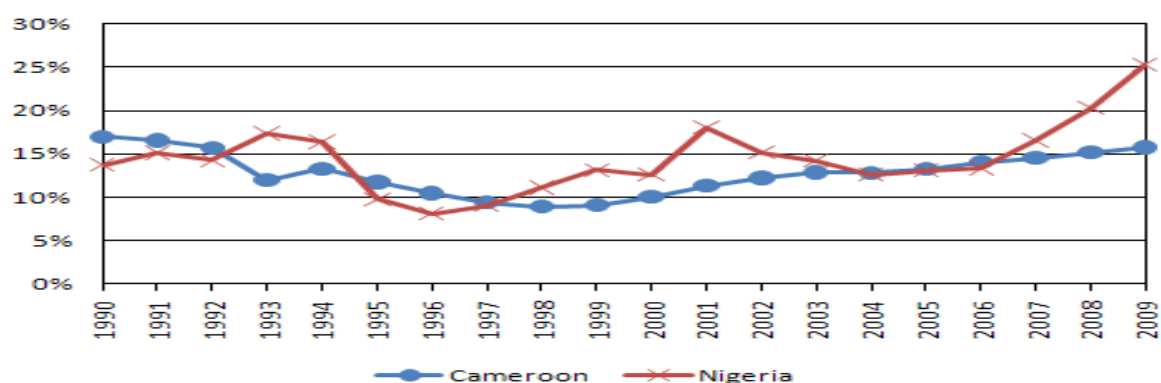
Source: Author's own estimates using the financial structure dataset of Beck *et al.* (2009).

From Figure 3.1 above, it can be seen that there is some degree of similarity between financial depth in Cameroon and Nigeria. The two markets overall have shown low levels of financial development over the 20 year period with Cameroon reaching its highest level of about 20% in 2009 compared to about 29% for Nigeria. This low level of financial development is expected to negatively affect PT, especially in Cameroon where the development trend has been consistently below the Nigerian trend except for 1990 to 1992.

3.6.1.2 Financial system deposits/GDP

A second indicator that can be used to measure the size of the financial system is the financial system deposits to GDP, which is equal to the ratio of all checking, savings and time deposits in the banking system and bank-like financial institutions to GDP. This ratio is a stock indicator of deposit resources available to the financial sector for its credit activities (Beck *et al.*, 2009:6). Figure 3.2 shows that the two markets have experienced a positive trend since 1996 with the Nigerian financial system deposits to GDP reaching about 25% in 2009 compared to about 16% for Cameroon. A low and declining ratio suggests that the existing financial resources available may not be enough to support private sector activities. Beck *et al.* (2009:6) also point out that this ratio varies positively with a country's income level, and as such low income countries will be expected to have a low ratio. Therefore, a declining ratio is expected to have a negative impact on pass-through.

FIGURE 3.2: FINANCIAL SYSTEM DEPOSITS/GDP IN CAMEROON AND NIGERIA



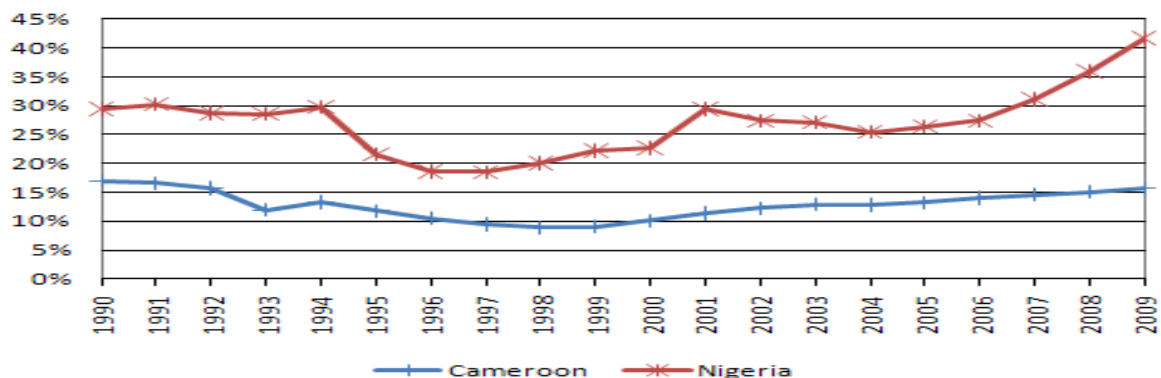
Source: Author's own estimates using the financial structure dataset of Beck *et al.* (2009).

3.6.1.3 Bank deposits/GDP

A third indicator measuring the size of the financial system is bank deposits to GDP and is limited only to deposits of deposit monetary institutions (Beck *et al.*, 2009:6). As shown in Figure 3.3, the banking sector deposits to GDP in Nigeria is consistently higher than that in Cameroon, implying that the size and depth of the banking sector in Nigeria is bigger and deeper than in Cameroon. If all bank deposits are transformed into lending, then the financial intermediation function of Cameroon banks through credit allocation to the private sector will be limited compared to Nigeria. Furthermore, the presence of an active capital market in

Nigeria is an indication of high levels of competition between banks and non-bank financial intermediaries. Thus, we expect adjustment in Nigeria to be faster than in Cameroon.

FIGURE 3.3: BANK DEPOSITS/GDP IN CAMEROON AND NIGERIA

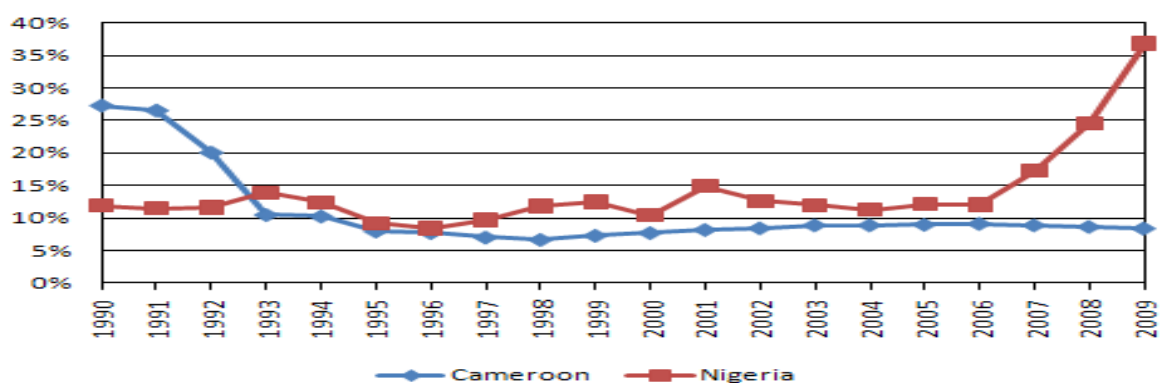


Source: Author’s own estimates using the financial structure dataset of Beck *et al.* (2009).

3.6.1.4 Private credit by deposit money banks²³ and other financial institutions/GDP

The above indicators focused on the liability side of financial institutions. However, it is also important to examine indicators on the asset side which capture the credit allocation function of financial intermediaries. One of such is private credit by deposit in money banks and other financial institutions to GDP. This is equal to the total debt of the private sector to the banks and non-bank financial institutions divided by GDP, and varies with the level of economic development (Beck *et al.*, 2009).

FIGURE 3.4: PRIVATE CREDIT BY DEPOSIT MONEY BANKS AND OTHER FINANCIAL INSTITUTIONS/GDP IN CAMEROON AND NIGERIA



²³ Deposit money banks include all financial institutions with liabilities in the form of deposits that can be transferred by cheques and/or used to make payments.

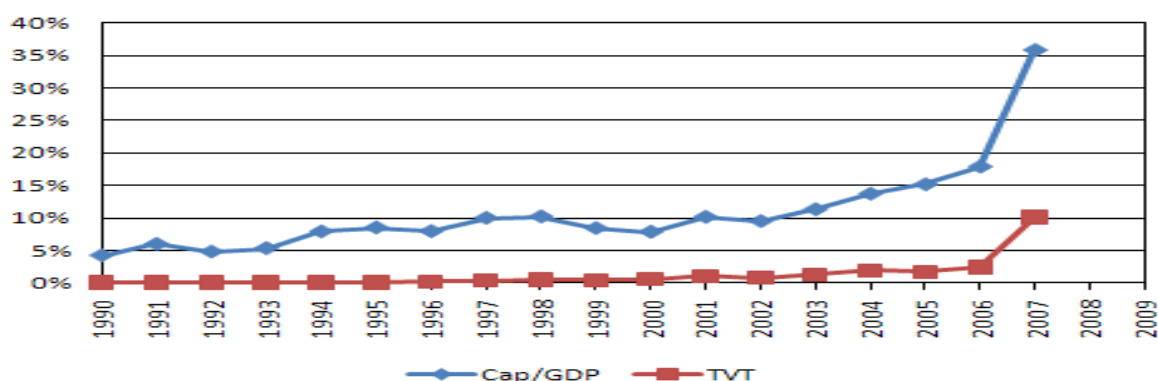
Source: Author's own estimates using financial structure dataset of Beck *et al.* (2009).

Figure 3.4 shows that this ratio has been falling for Cameroon, indicating a low level of intermediation, and has been trending below 10% since 1995. The ratio was trending between 9% and 15% in Nigeria until 2006 when it rose to about 37%. This means financial intermediation in Nigeria has been improving relative to Cameroon due to the increasing role of non-bank financial institutions such as the stock exchange, money and bond markets. These institutions in Cameroon are yet to develop to the level they are in Nigeria. Thus, pass-through is expected to be quicker in Nigeria than in Cameroon.

3.6.1.5 Stock market capitalisation/GDP and stock market turnover ratio

It is also important to determine the role that the equity market plays in the economy as an alternative source of finance to investors. A commonly used indicator is stock market capitalisation to GDP, which is the value of all listed shares divided by GDP. This measure shows the relative size of the stock exchange to the economy (Beck *et al.*, 2009:7) and stock market turnover ratio which is the ratio of the value of total shares traded to average real market capitalisation. Due to the absence of an active stock exchange in Cameroon, the analysis focuses only on Nigeria.

FIGURE 3.5: STOCK MARKET CAPITALISATION/GDP AND STOCK MARKET TURNOVER RATIO IN NIGERIA



Source: Author's own estimates using the financial structure dataset of Beck *et al.* (2009).

Figure 3.5 shows the increasing role the Nigerian stock exchange has played as an alternative source of fund for investors. Stock market capitalisation has risen from about 5% in 1990 to about 37% of GDP by 2007. However, stock market turnover ratios (TVT) have been low

and only show a marginal increase after the 2004/2005 bank consolidation. We expect pass-through to be higher in Nigeria as there will be competition between banks and non-bank financial intermediaries. Banks will tend to adjust their retail rates quicker in reaction to changes in the official rate of the Central Bank.

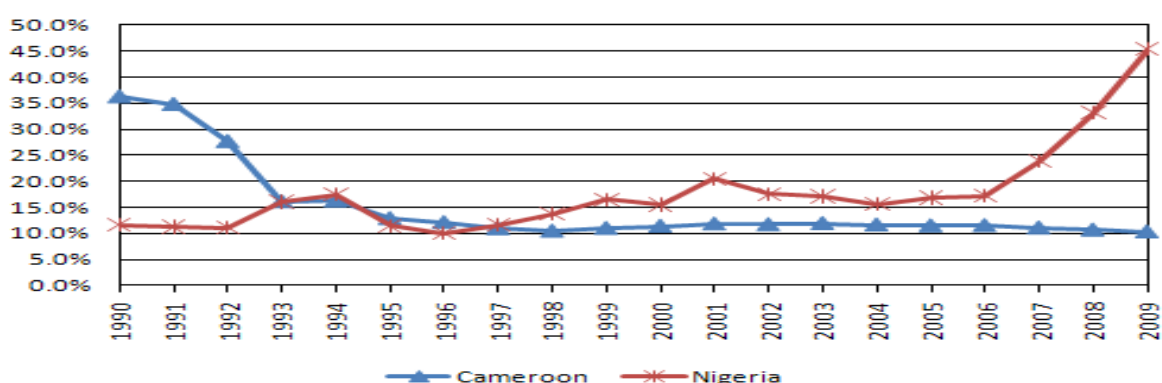
The foregoing analysis focused on the financial institutions including non-bank financial intermediaries. Although the non-bank financial intermediaries play a crucial role in the financial market, commercial banks dominate the financial systems of Nigeria and Cameroon constituting about 90% and 56.6% of total financial assets respectively (see Sections 3.2 and 3.4 above). To this end, it will make economic sense to refocus our attention on indicators that capture the role of the banking sector.

3.6.2 THE SIZE AND DEPTH OF THE BANKING SYSTEM

3.6.2.1 Deposits money bank assets/GDP

Banks are seen to play a major role in mobilising and channelling savings into productive use of the economy and also in transmitting monetary policy impulses to the real economy. To examine this important role of bank intermediation services, the study used two indicators: deposits money bank assets to GDP and bank credits to bank deposits. According to Beck *et al.* (2009:8-9), these indicators give evidence of the significant role that banks perform relative to the size of the real economy.

FIGURE 3.6: DEPOSITS MONEY BANK ASSETS/GDP IN CAMEROON AND NIGERIA



Source: Author's own estimates using the financial structure dataset of Beck *et al.* (2009).

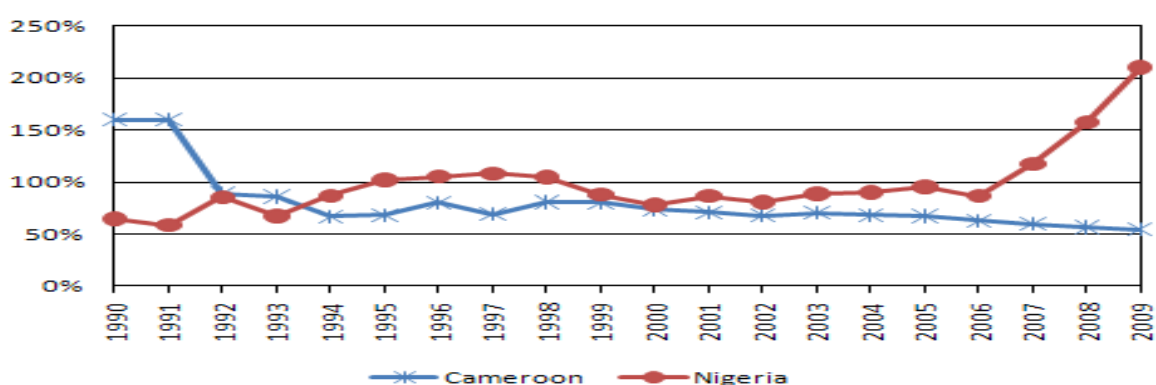
Figure 3.6 reveals some interesting historical facts about Cameroon's performance in the 1990s. Deposits money bank assets to GDP dropped from about 36% in 1990 to about 10% in

2009, reflecting banking sector restructuring, liquidations and privatisation in the 1990s, and have remained low (about 10%) up to 2010. Thus, the reforms of the 1990s are yet to yield real fruits in Cameroon to increase the role of the banking sector in intermediation services. Conversely, the ratio has been showing a positive trend in Nigeria since the 1990s, reaching about 45% by 2009 and indicating that the financial reforms instituted by the Central Bank of Nigeria have had a positive impact on financial intermediation. This means that the assets of commercial banks have been growing over time, which can then be translated into private sector credits, thus increasing the role of banks in transmitting monetary policy impulses to the real economy.

3.6.2.2 Banks credits/bank deposits and private credit by deposit money banks/GDP

We can also use bank credits/bank deposits which equal the ratio of claims on the private sector to deposits in deposit money banks (Commercial banks). This indicator determines the degree to which the savings of the economy are channelled into private sector credits by the banking sector and varies with the level of economic development. Hence, economies with underdeveloped financial markets not only mobilise and attract fewer funds but also channel a smaller proportion of the mobilised deposits into loans to the private sector (Beck *et al.*, 2009:9).

FIGURE 3.7: BANK CREDITS/BANK DEPOSITS IN CAMEROON AND NIGERIA

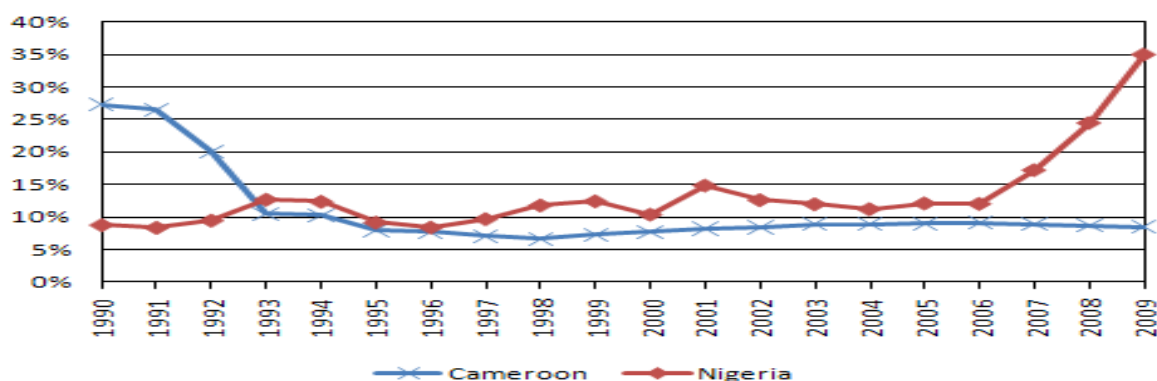


Source: Author's own estimates using the financial structure dataset of Beck *et al.* (2009).

It is evident from Figure 3.7 that financial intermediation in Cameroon has been falling since 1990 up to now. Cameroon banks have been attracting fewer and fewer credits and channelling only a small amount of these credits into private sector loans, as confirmed by the continuous decline of the ratio. Linking this to the private sector credits to GDP (see Figure

3.8) shows that private sector credits have been less than 10% since 1995. This is consistent with IMF (2007:33) findings that private sector credits to GDP in Cameroon are about 9% and to date, the value continues to fall and is estimated to be less than 9% as shown in Figure 3.8.

FIGURE 3.8: PRIVATE CREDIT BY DEPOSIT MONEY BANKS/GDP IN CAMEROON AND NIGERIA



Source: Author's own estimates using the financial structure dataset of Beck *et al.* (2009).

On the other hand, bank credits to deposits in Nigeria have been improving over time with a significant improvement of above 200% post 2004/2005 bank consolidation (Figure 3.7) which is also translated into increased private sector credits as illustrated by the positive trend of Figure 3.8. The declining bank credits to bank deposits and private sector credits to GDP in Cameroon is partially explained by the fact that Cameroon commercial banks lend only to a few creditworthy companies. Small Medium and Micro Enterprises (SMMEs) and households find it difficult to access credits from banks because they do not keep account of their activities and the lack of credit bureaus on consumer credits to assist banks with the credit risk of borrowers' further constrain credit availability (Khan, 2010:36). Relating this to economic development it will make economic sense to suggest that development in Cameroon has been on a decline as indicated by a fall in the private sector credits to GDP. Conversely, intermediation in Nigeria has been rising, indicating improvement in economic development as banks are able to channel the mobilised deposits into private sector credits thereby increasing economic output. Therefore, higher pass-through is expected for Nigeria than in Cameroon.

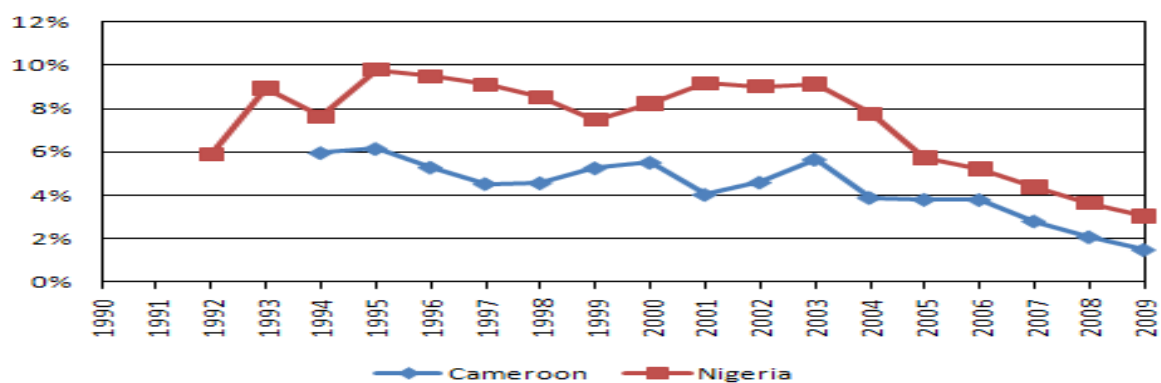
3.6.3 EFFICIENCY, COMPETITION AND CONCENTRATION OF THE BANKING SYSTEM

Competition in a financial market can be regarded as the degree to which financial markets are contestable and consumers have a wide variety of financial services to choose from, while efficiency measures the ability of financial markets to deliver high quality products and services at the lowest possible cost. Consequently, competition and efficiency complement each other because competition in the banking sector increases efficiency in financial institutions, lowers costs to clients and improves the quality as well as increasing the range of financial services provided (World Bank and IMF, 2005:18).

3.6.3.1 Bank overhead costs/total assets

According to Beck *et al.* (2009:9), efficiency can be measured using bank overhead costs which are equal to the accounting value of bank overhead costs as a share of its total assets. Figure 3.9 shows bank overhead costs/total assets of Cameroon and Nigeria.

FIGURE 3.9: BANK OVERHEAD COSTS/TOTAL ASSETS IN CAMEROON AND NIGERIA



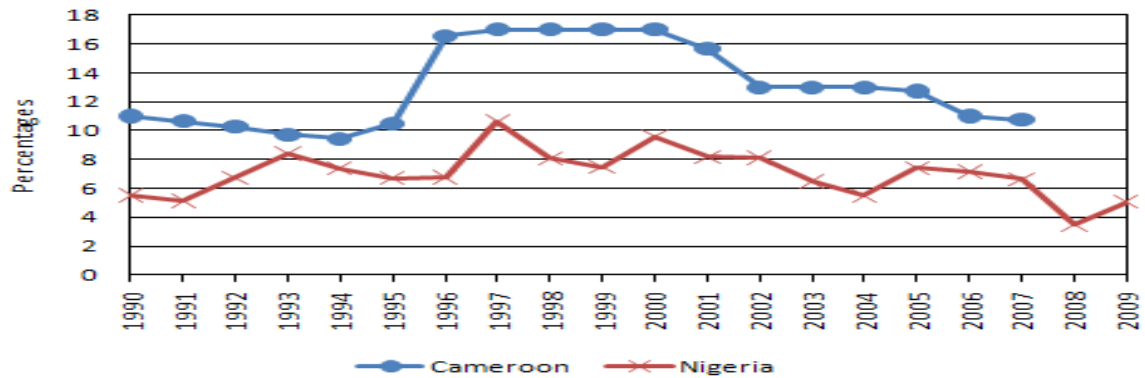
Source: Author's own estimates using the financial structure dataset of Beck *et al.* (2009).

A higher value indicates low levels of efficiency and vice versa. From Figure 3.9, it can be seen that Cameroon banks were more efficient than Nigerian banks from 1994 up to 2009 but after 2004 the level of efficiency in Nigerian banking sector improved, reflecting the banking sector consolidation of 2004/2005. However, efficiency in the two markets has been improving significantly as shown by the continuous decline in the bank overhead costs to total assets overtime.

3.6.3.2 The interest rates spread

However, efficiency can also be measured in terms of interest rates spread (Lending minus deposit rates) as shown in Figure 3.10.

FIGURE 3.10: THE INTEREST RATES SPREAD IN CAMEROON AND NIGERIA



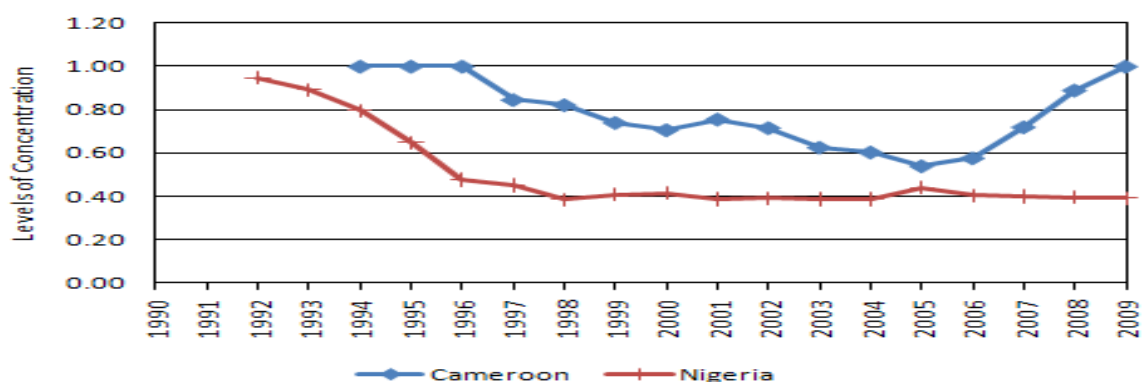
Source: Author's own estimates using data from IMF/IFS.

The high spreads of between 9% and 17% in Cameroon suggest that commercial banks pay very little for deposits and charge a higher interest rate for loans (Figure 3.10). Available evidence shows that SMMEs suffered from a credit squeeze due to limited credit history and/or paid higher interest rates than large corporations. For instance, on average loan cost is about 11% for large enterprises, 16.5% for SMMEs and 20.5% for households which indicates market segmentation and a low level of competition within Cameroon banks (IMF, 2007:35). Conversely, Nigerian banks seem to be more efficient in pricing their loans and deposits as evidenced by the narrower spread of between 3% and 11%. This is probably due to the increasing role of non-bank financial intermediaries such as the Nigerian stock exchange in intermediation. Economic theory also suggests that where an alternative source of funding is available, the elasticity of deposits and loans tends to be greater and commercial banks will adjust their retail rates more quickly to changes in monetary policy. As such, pass-through is expected to be faster in Nigeria than in Cameroon. Nevertheless, the World Bank and IMF (2005:19) noted that interest rates spread may sometimes remain high irrespective of improved efficiency in the banking system because banks need to make provision for loan losses or to charge a risk premium for lending to high-risk borrowers.

3.6.3.3 Bank concentration

The level of competition can also be measured using bank concentration ratios and bank ownership structure. Bank concentration refers here to the assets of the three biggest banks as a share of assets of all commercial banks (World Bank and IMF, 2005:19): see Figure 3.11.

FIGURE 3.11: BANK CONCENTRATION LEVELS IN CAMEROON AND NIGERIA



Source: Author's own estimates using the financial structure dataset of Beck *et al.* (2009).

The degree of bank concentration has been falling in both countries, implying that some degree of competition exists in the two markets. Nevertheless, while the concentration level fell in Nigeria over time up to 1998, it has since then maintained a constant level until 2009. In Cameroon, bank concentration also fell up to 2005 but suddenly rose after 2005. However, Cottarelli and Kourelis (1994) point out that bank concentration may not be a good measure of competition as concentrated markets may tend to behave competitively if there are threats to entry. Hence, one would expect Cameroon commercial banks to behave competitively since the banking sector is dominated by foreign banks (see Section 3.2). In addition, government ownership of banks in Cameroon reduced dramatically after the 1990s bank restructuring. According to IMF (2007:28) government shareholding at the end of 2005 was 35% in one bank and less than 30% in two other banks. Thus we expect competition within the banking sector to improve over time in Cameroon, particularly with attempts to galvanise the Douala Stock exchange in recent years. As a whole the concentration levels in the two markets are relatively low, with the level of bank concentration in Nigeria being much lower than in Cameroon.

3.7 SUMMARY AND CONCLUSION

An overview of the financial systems of Nigeria and Cameroon revealed that commercial banks dominate the financial landscape of the two markets. Nevertheless, foreign banks make up a greater proportion of commercial banks in Cameroon (nine foreign and three domestic banks) compared to Nigeria where there are only four foreign banks out of twenty-four commercial banks in operation. Non-bank financial institutions such as capital markets and development financial institutions also play a role in mobilising resources and providing long term finance, thereby increasing competition and efficiency in the banking industry. Unfortunately, this role is limited only to Nigeria as these institutions are inactive and underdeveloped in Cameroon. Meanwhile, semi-formal and informal financial institutions such as MFIs and moneylenders as well as solidarity groups operate in the two markets and play a major role in meeting the needs of those not served by the commercial banks. However, their financial capacity is limited because they cannot finance long term investment projects.

Cameroon does not have an independent monetary policy framework because it belongs to the CEMAC region. Hence, its monetary policy is coordinated by the supranational regional Central Bank (BEAC) whose main objectives are to maintain a pegged exchange rate between the CFA franc and the euro and to maintain price stability. Nigeria has an independent monetary policy framework coordinated by the Central Bank of Nigeria (CBN) but belongs to WAMZ which is expected to launch a monetary union and a single currency by 2015. The major objectives of CBN are price stability and support of the economic policy of the Federal Government of Nigeria, and MPCs in the two countries has been charged with the task of formulating policies to achieve these goals.

However, there are some differences in the way monetary policy is conducted in the two countries. Due to differences in the economies in the CEMAC region, MPC uses differentiated reserve requirements and a quarterly target on commercial banks refinancing by BEAC in the execution of monetary policy. BEAC uses indirect instruments in its operations where liquidity in the banking system is controlled through refinancing by BEAC and is complemented by the imposition of differentiated reserve requirements. Excess liquidity in the system is withdrawn by using negative bids. Nevertheless, BEAC faces a major challenge in the realisation of its goal because of excess liquidity in the CEMAC

region arising from oil revenues. In contrast, the CBN uses the short term interest rate to stabilise the value of the domestic currency and OMO is used as the main indirect instrument of monetary policy which is conducted through an auction of Treasury Bills in the primary market. As a result of active money markets, monetary policy in Nigeria is expected to be more effective than in Cameroon and monetary shocks will be transmitted quicker and hence there will be faster pass-through.

A comparative analysis of the financial structure of Nigeria and Cameroon clearly shows that financial sector development in terms of the size, depth, competition and efficiency in the Nigerian banking system outperformed that of the Cameroon banking sector. Although foreign banks dominate the financial sector of Cameroon, the absence of an active capital market means that firms and households in Cameroon have no reliable alternative sources of finance. In addition, the range of financial services offered can be limited and may be confined to savings accounts which are insensitive to interest rates changes and earn a very low rate of return. Overall, evidence from trend analysis suggests that pass-through is expected to be higher in Nigeria than in Cameroon.

The next chapter presents the methodology and the empirical framework.

CHAPTER FOUR

METHODOLOGY AND EMPIRICAL FRAMEWORK

4.1 INTRODUCTION

This chapter explains the steps involved in the empirical analyses to be used in Chapter Five. The rationale is to conduct a comparative analysis of the degree of interest rates adjustment in Cameroon and Nigeria, that is, the extent to which commercial banks in both countries adjust their retail rates (lending and deposit) in response to changes in the Central Bank rate. In addition, the study will also examine whether monetary policy impulses in Nigeria are passed-through to Cameroon and vice versa. This task will be accomplished by employing the Engle and Granger (1987) co-integration technique as well as a rolling window analysis in a symmetric and asymmetric error correction framework. Attention will be placed on the magnitude, speed and the likelihood of asymmetry adjustment in the pass-through of the Central Bank rate to the retail rates in both countries.

4.2 DATA AND METHODOLOGY

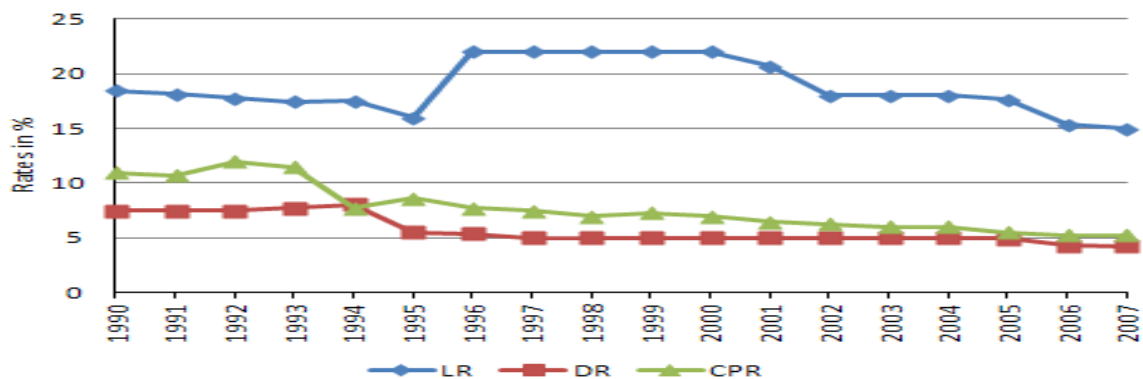
4.2.1 Definitions of data and sources

The empirical analysis uses monthly time series data sourced from the International Monetary Fund (IMF)/International Financial Statistics (IFS) from January 1990 to December 2010 for Nigeria and from January 1990 to June 2008 for Cameroon. The choice to start from 1990 is motivated by the fact that this period represents a post financial reform era for both countries (1988 for Cameroon and 1986 for Nigeria). The lending and deposit rates represent the retail rates and the discount rates represent the Central Bank policy rates for both countries. The empirical analysis will consist of three sets. The first analysis will cover the whole sample period. The second set employs a rolling window analysis with sample of ten years each (120 observations) starting from 1990M1 to 1999M12. The next window will begin from 1991M1 – 2000M12; 1992M1 – 2001M12 until 2001M1 – 2010M12. In total, there will be twelve rolling windows for Nigeria and ten for Cameroon with the last rolling window of Cameroon having 114 observations. Finally, the last set of analysis will swap the policy rates around to examine if there is pass-through of monetary shocks from Cameroon to Nigeria and vice versa. The use of the rolling window analysis is because of its ability to trace dynamics in PT

over time as well as its power to capture other important developments in the real economy that can equally influence PT (Aziakpono and Wilson, 2010:17).

Before the proper empirical analysis it will be necessary to graph the various interest rates series (retail lending and deposit rates and the Central Bank policy rates (CPR), which in this case are the discount rates) and observe their trends over time. This is shown in Figures 4.1 and 4.2 below. From Figure 4.1, it is evident that the lending and policy rates in Cameroon are trending far apart from each other, that is, the lending rate is not tracking movements in the policy rate of the Central Bank. Hence, the lending rate may not be co-integrated with the policy rate. Conversely, the deposit and policy rates move closely together and even tend to converge around 2005, thus one would expect the two rates to be co-integrated. Furthermore, the interest rate spread in Cameroon is very high because of high loan rates and low rates paid on deposits. This is as a result of a fixed limit on the lending rate of 15% (excluding risk premium) and a minimum rate on deposits of 4.25% set by BEAC. However, the fixed constraint on the lending rate was abolished in July 2008 and the minimum deposit rate reduced from 4.25% to 3.25% (Khan, 2010:26; Saxegaard, 2006:16). This means that banks can charge 15% plus a risk premium for loans but only pay 3.25% on deposits, giving a double digit spread.

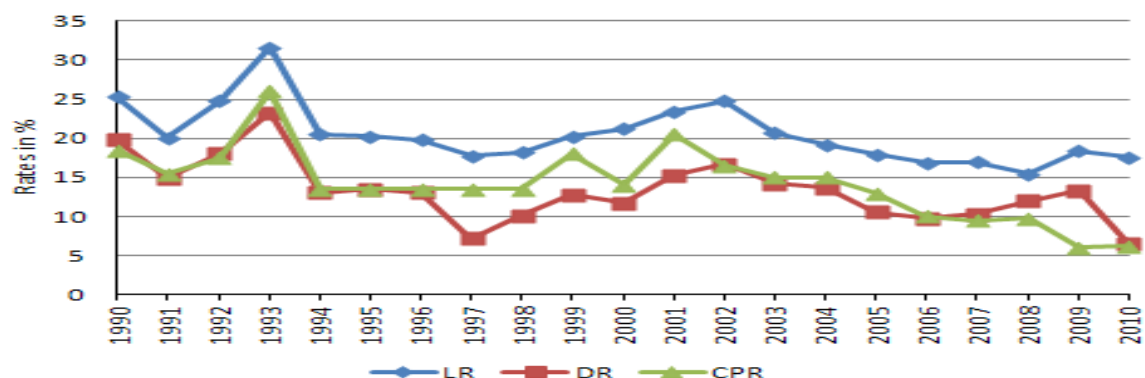
FIGURE 4.1: LENDING, DEPOSIT AND POLICY RATES TRENDS FOR CAMEROON



Source: Author's own estimates using data from IMF/IFS.

With regard to Nigeria, it can be seen from Figure 4.2 that the lending and deposit rates tracked movements in the policy rate very closely and are expected to be co-integrated and the spread is small compared to Cameroon. The narrow spread in Nigeria seems to indicate a high level of competition between banks and non-bank financial intermediaries.

FIGURE 4.2: LENDING, DEPOSIT AND POLICY RATES RATES TRENDS FOR NIGERIA



Source: Author's own estimates using data from IMF/IFS.

4.3 ESTIMATION TECHNIQUES

4.3.1 Tests for co-integration

The concept of co-integration is based on the pioneer work of Engle and Granger (1987). The notion of co-integration means movement of variables together. Brooks (2008:336) notes that many financial variables are non-stationary but tend to move together over time, implying that there exist some influences on the series, such as market forces, that tie the two series to some long run relationship. In all, a set of variables is said to be co-integrated if a linear combination of them is stationary. Hence, the presence of co-integration between two variables will suggest the existence of a long run relationship and the absence of co-integration will suggest no long run relationship between the two variables. As such, the reason of testing for co-integration is to verify if such a relationship exists and, if it does, how many co-integrating vectors are present in the relationship. As a starting point, the relationship between two series such as interest rates is commonly specified as:

$$y_t = \beta_0 + \beta_1 x_t + \varepsilon_t \quad (4.1)$$

where y_t indicates the endogenously determined retail rates (lending and deposit) of commercial banks, x_t represents the exogenously determined Central Bank policy rate or official interest rate (discount rate in the case of this study), β_0 and β_1 denote the intercept and slope coefficient or long run parameters respectively, and ε_t is the stochastic error term (Aziakpono *et al.*, 2007:8).

Equation 4.1 is the starting point in any interest rate pass-through (IRPT) analysis and can be used to estimate the short run error correction model as well as the long run co-integrating vector. But before the estimation process, the properties of the series have to be investigated as required for any study employing time series data. We begin by determining the order of integration of the retail rates, that is, by testing whether the interest series are stationary or non-stationary. Brooks (2008:318) defines a stationary series “as one with a constant mean, constant variance and constant autocovariances for each given lag”. Therefore the importance of stationarity or unit root tests is to examine the order of integration of a series as well as to avoid spurious or meaningless regression, that is, regression that has significant coefficients and high R^2 but which in a real sense is valueless (Brooks, 2008:319). Hence, stationarity and unit root tests are conducted to determine if a series is integrated of order zero $I(0)$, order one $I(1)$ or higher orders. Therefore, if the lending, deposit and discount rates are integrated of order $I(1)$, Brooks (2008:336) notes that a linear combination of them will produce residuals that are integrated of order zero, $I(0)$. This signifies the presence of a long run equilibrium relationship between the series and therefore lending, deposit and discount rates are said to be co-integrated.

Stationarity tests can be conducted using graphical analysis such as autocorrelation functions (ACF). However, the ACF method is an informal test and is based on a “rule of thumb” which says that the researcher should compute the ACF up to one-third to one-quarter of the length of sample period (Gujarati and Porter, 2009:753). To overcome this limitation, the study employs the conventional Augmented Dicker-Fuller (ADF) test (testing the null hypothesis of non-stationarity against the alternative of stationarity). The ADF is then supplemented by the Kwiatkowski, Philips, Schmidt and Shin (KPSS) test (for the null of stationarity versus non-stationarity) to examine the properties of the series²⁴. The advantage of using the KPSS test to supplement the ADF test is that the KPSS test does not suffer from small sample problems as does the ADF and since the study will be using rolling windows analysis of smaller sample sizes, the KPSS test is best suited to mitigate the low power of the ADF test (Burger, 2008:11).

If the interest rate series are found to be stationary at level, then the relationship between Central Bank policy rate (CPR) and retail rates (RR) specified as Equation 4.1 above will be

²⁴ See Brooks (2008:327-331) for further discussion on ADF and KPSS tests.

estimated using Ordinary Least Squares (OLS). Alternatively, if the interest rate series are not stationary at level, but are stationary at first difference, a co-integration test will be performed to determine whether or not the policy rate and retail rates are co-integrated. Once we know the order of integration of the interest series, the next procedure will be to test for co-integration between the interest rate series.

In order to check the robustness of the co-integration relationships between them, the study uses four different co-integration tests: the Johansen maximum likelihood approach (JJ), the Engle-Granger Approach (EG), the Co-integrating Regression Durbin-Watson (CRDW) test and the Error Correction-base test ²⁵(ECM-base).

The Engle-Granger test is based on two steps: first, estimate the main equation such as Equation 4.1 above, generate the residuals and save them. Second, test the residuals for unit roots at level and none, and if the residuals are stationary at level $I(0)$, it implies there is co-integration. Otherwise, there is no co-integration if residuals are $I(1)$. The CRDW test checks the value of the Durbin-Watson (DW) of the main model and if the value is lower than 0.511, 0.38 and 0.32 at 1%, 5% and 10% respectively for a sample of about 100, then there is no co-integration. Hence the DW is expected to be higher for co-integration to exist (Gujarati, 2003:824). The Error Correction Model (ECM) will be used in two ways: as a mechanism to check for adjustment back to equilibrium following a short run disturbance and as a test for co-integration. As a test, the ECM for each and every sample will be run assuming co-integration and then the assumption will be confirmed or rejected based on the statistical significance of the ECM coefficient. That is, the test statistics (t-stats) must be significant at the 1%, 5% or 10% level. Finally, the Johansen maximum likelihood test is based on estimating an unrestricted vector autoregressive (VAR) model and testing for co-integration based on the trace and max-Eigen statistic. If the t-statistics are greater than the critical value from Johansen's tables, then the null hypothesis that there are r co-integrating vectors is rejected in favour of the alternative hypothesis that there are $r + 1$ for λ_{trace} or more than r for λ_{max} (Brooks, 2008:339-352) where r is equal to the number of co-integrating vectors. However, the interest here is just to check for the presence or absence of co-integration and not the number of co-integrating relationships.

²⁵ See Brooks (2008:339-340) and Gujarati and Porter (2009:763) for more information about these tests.

If the CPR and the RRs are found not to be co-integrated, then Equation 4.1 will be estimated at first difference to avoid spurious regression. Conversely, if the CPR and RRs are found to be co-integrated, the EG technique will be used and then an error correction model (ECM) will be estimated to investigate the degree of PT as well as how long it takes for the retail rates to adjust to changes in the Central Bank policy rate (Aziakpono, 2010:20).

However, Kremers *et al.* (1992:1) note that when co-integration is present, the Error Correction-base test become more powerful than the Engle-Granger test because the former makes use of all available information more efficiently. Therefore, following trends in literature such as Aziakpono and Wilson (2010), where the above four methods differ, the result from the Error Correction-base test will be considered.

4.3.2 Empirical pass-through analysis

It is worth noting that pass-through analysis is based on the seminal work of Cottarelli and Kourelis (1994) which later attracted others to use pass-through analysis in studies (see for instance Weth, 2002; Aydin, 2007; Sander and Kleimeier, 2004, 2006a, 2006b; Aziakpono *et al.*, 2007 and Aziakpono and Wilson, 2010). According to Sander and Kleimeier (2006a:216), interest rate pass-through is an effective methodology to examine the process of monetary policy transmission because of its potential to capture how quickly and how completely changes in monetary policy are transmitted to the deposit and lending rates of commercial banks. Thus, following Sander and Kleimeier (2004, 2006a), the empirical model based on co-integration methodologies can be specified as:

$$RR_t = \beta_0 + \sum_{i=1}^{k^*} \beta_{RR,i} RR_{t-i} + \beta_1 CPR_t + \sum_{i=1}^{n^*} \beta_{CPR,i} CPR_{t-i} + \mu_t \quad (4.2)$$

where RR_t denotes the retail rates of commercial banks (lending or deposit), CPR_t represents the Central Bank policy rate (in this case discount rates), k^* and n^* indicate the optimal lag lengths determined using the AIC criterion, allowing for a maximum of four lags (Sander and Kleimeier, 2006a:218), β_0 represents the intercept or the credit risk premium in the case of the lending rate (Marotta, 2009:192), β_1 denotes the impact multiplier and μ_t is the error term. The impact multiplier β_1 measures the immediate adjustment in the retail rates within the current month in response to changes in the policy rate. If the value of $\beta_1 < 1$ it indicates sluggish adjustment (which is also known as interest rate stickiness) and if $\beta_1 = 1$, then the

immediate PT is complete and monetary policy is said to be very effective (Sander and Kleimeier, 2004:465). Reasons for interest rate stickiness were discussed in Section 2.3.1.

Conversely, the long run PT parameters can be estimated if there is a co-integration relationship between the retail rates (RR_t) and discount rates (CPR_t). If the co-integration tests detect the presence of a long run stable relationship, then the long run parameters can be estimated from:

$$RR_t = \theta_0 + \theta_1 CPR_t + \varepsilon_t \quad (4.3)$$

where θ_0 and θ_1 denote the long run intercept and slope coefficients respectively. If $\theta_1 = 1$, it indicates complete pass-through, while $\theta_1 < 1$ means incomplete pass-through, and if $\theta_1 > 1$, the long run pass-through overshoots. This situation in the lending markets is interpreted as a state where banks increase their lending rates as a counterbalance for the low probability of loan repayments rather than reducing loan supply (De Bondt, 2005:45). It is interesting to note that Equation 4.2 specified above is applicable for the interest rates series that are stationary at levels $I(0)$ but if the interest rates series are found to be non-stationary, $I(1)$, then the empirical pass-through model of Equation 4.2 is estimated at first difference to avoid spurious regression as given below (Sander and Kleimeier, 2004:464):

$$\Delta RR_t = \beta_0 + \sum_{i=1}^{k^*} \beta_{RR,i} \Delta RR_{t-i} + \beta_1 \Delta CPR_t + \sum_{j=1}^{n^*} \beta_{CPR,j} \Delta CPR_{t-j} + \varepsilon_t \quad (4.4)$$

where Δ represents the first difference operator of lending and deposit rates, k^* and n^* are number of lag lengths, β_0 and β_1 are again the short run intercept and slope coefficients respectively and ε_t is the disturbance term. If Equation 4.4 is estimated at first difference the problem of spurious regression is avoided but information about the long run relationship will be lost. However, Sander and Kleimeier (2004:464) note that this information can be recovered if the retail rates (RR) and the Central Bank policy rate (CPR) are co-integrated, that is, the long run is estimated directly from Equation 4.3 provided that co-integration is present between the series. Alternatively, following Kwapil and Scharler (2010:243), the long run pass-through can also be calculated from Equation 4.4 as:

$$\theta = \left(\sum_{i=0}^k \beta_1 \right) / \left(1 - \sum_{j=0}^n \beta_{RR,i} \right) \quad (4.5)$$

where $\beta_{RR, i}$ is the coefficient of the retail rates (lending or deposit), and β_1 denotes the coefficient of the policy rate. As noted earlier, $\theta = 1$ implies full pass-through, otherwise there is incomplete pass-through.

4.3.3 Equilibrium error correction model (ECM)

Intuitively, an error correction model means that a fraction of the disequilibrium from one period is adjusted in the next period. Hence, Engle and Granger (1987:255) note that “an error correction model for a two variable system would relate the change in one variable to past equilibrium errors as well as to past changes in both variables”. Thus, the Granger Representation theorem states that “if two variables; say retail rates and Central Bank policy rates are co-integrated, then their relationship can be expressed as an equilibrium error correction model” (Gujarati and Porter, 2009:764). The simple logic behind this theorem is that we cannot talk of adjustment back to the long run equilibrium (error correction) in the event of short run disturbance if there is no long run relationship existing between the interest rates series. If such a relationship is found, then Equation 4.4 above is augmented with lag values of the error term ε_t as shown below:

$$\Delta RR_t = \beta_0 + \sum_{i=1}^{k^*} \beta_{RR,i} \Delta RR_{t-i} + \beta_1 \Delta CPR_t + \sum_{j=1}^{n^*} \beta_{CPR,j} \Delta CPR_{t-j} + \beta_{ECT} ECT_{t-1} + \varepsilon_t \quad (4.6)$$

where Δ denotes the first difference operator, β_{ECT} represents the coefficient of the error correction term (ECT_{t-1}) and measures the speed of adjustment back to equilibrium. The coefficient should be statistically significant and negative, indicating that there are market forces at work to reinstate long run equilibrium following a short run disturbance (Aziakpono *et al.*, 2007:9). The other parameters are as defined above. Once the short run and speed adjustment coefficients have been estimated from Equation 4.6 the next step will be to know how long it takes for the retail rates to return to long run equilibrium. This process is known as the mean adjustment lag (MAL). The next section explores this issue further.

4.3.4 Mean adjustment lag: symmetric and asymmetric error correction framework

According to Doornik and Henry (1994, in Scholnick, 1996:489), the mean adjustment lag can be calculated from Equation 4.6 above as:

$$ML = (1 - \beta_1) / \beta_{ECT} \quad (4.7)$$

However, Scholnick (1996:489) criticised Equation 4.7 on the basis that the model assumes that the mean adjustment lag is symmetrical when the lending or deposit rates are beyond or less than their equilibrium level. Thus, Scholnick (1996:490) suggested that the right approach to examine asymmetric adjustment is to divide the residuals (denoted as EC in this case) taken from the co-integration regression into EC^+ and EC^- , representing the error term when the residuals are above and below their equilibrium levels respectively. That is:

$$EC^+ = EC, \quad \text{if } EC > \mu$$

$$EC^+ = 0, \quad \text{if } EC < \mu \text{ and} \quad (4.8)$$

$$EC^- = EC, \quad \text{if } EC < \mu$$

$$EC^- = 0, \quad \text{if } EC > \mu \quad (4.9)$$

where μ denotes the mean of the residuals (EC). The asymmetric specification in equations 4.8 and 4.9 are then incorporated as separate dummy variables into Equation 4.6 (error correction model) to derive the short run asymmetric dynamic equation as:

$$\Delta RR_t = \beta_0 + \beta_1 \Delta CPR + \varphi_i \sum_{i=1}^{k^*} \Delta CPR_{t-i} + \lambda_j \sum_{j=1}^{n^*} \Delta RR_{t-j} + \delta_1 EC_{t-1}^+ + \delta_2 EC_{t-1}^- + \varepsilon_t \quad (4.10)$$

where δ_1 and δ_2 indicate the coefficients of the error correction terms when the lending and/or deposit rates are beyond or below their equilibrium respectively. Hence from Equation 4.10, the mean adjustment lag is defined as:

$$ML^+ = (1 - \beta_1) / \delta_1 \quad (4.11)$$

$$ML^- = (1 - \beta_1) / \delta_2 \quad (4.12)$$

Equation 4.11 applies when the asymmetric adjustment lag in the lending/and or deposit rate is greater than the equilibrium mean, and Equation 4.12 denotes a situation when the asymmetric adjustment lag in the lending /and or deposit is lower than the equilibrium mean. Asymmetric adjustment is then tested using the Wald test with $\chi^2(1)$ distribution proposed by Scholnick (1996:490) by imposing the restriction that $\delta_1 = \delta_2$ and if $\delta_1 = \delta_2$ we fail to reject the null hypothesis of no asymmetry. Otherwise, we reject the null and conclude that there is evidence of asymmetry adjustment.

4.4 CONCLUSION

This chapter has outlined the empirical issues involved in the estimation and interpretation of interest rate pass-through coefficients. The first step in the empirical analysis of IRPT is to specify the basic model and verify the properties or the order of integration (whether the series is stationary at levels or at first difference) of the times series using the conventional ADF and KPSS techniques. The importance of testing for stationarity is to avoid the problems of spurious regression. Once the order of integration has been established, the study utilises four different methods to test the presence of co-integration relationships between the interest rates series. However, in cases where the four disagree in terms of the co-integration, the result from the error correction base test is considered, because it uses all available information more efficiently in the determination of co-integration than the Engle-Granger test.

Furthermore, the study analyses IRPT using a rolling window analysis in a symmetric and asymmetric error correction framework in order to examine whether the financial reforms instituted by Nigeria and Cameroon since the 1990s have improved the PT of monetary shocks to the real economy. Finally, a Wald test is used to investigate whether adjustment of retail rates to changes in Central Bank rate is symmetric or asymmetric. The next chapter applies this framework in Cameroon and Nigeria using monthly data in order to achieve the objectives of the study outlined in Chapter One.

CHAPTER FIVE

EMPIRICAL RESULTS

5.1 INTRODUCTION

This chapter focuses on the presentation and discussion of results of the interest pass-through analysis described in Chapter Four. Section 5.2 presents the Unit root results and Section 5.3 presents results of the co-integration tests. Section 5.4 discusses the analyses of interest rate pass-through results and Section 5.5 summarises and concludes the chapter. Summary results are presented in the Appendix.

5.2 UNIT ROOT TESTS

The starting point of an empirical analysis of this nature usually begins with the investigation of the properties of the time series. That is, a test of whether the interest rate series are stationary at level or at first difference using Augmented Dicker-Fuller (ADF) and Kwiatkowski, Philips, Schmidt and Shin (KPSS) tests. The study conducted unit root tests for the entire sample period as well as for the sub-sample rolling windows for both countries. Results from the entire sample are presented in Table A2 in the appendix. The ADF test suggests that the null hypothesis of unit root (non-stationarity) could not be rejected, meaning the lending, discount and deposit rates are non-stationary at level. These results were verified further by the KPSS test where the null hypothesis of stationarity at level was rejected. Nevertheless, the KPSS test failed to reject the null hypothesis of stationarity at first difference, indicating that the interest series are stationary at first difference, that is, the series are integrated of order I(1) for both countries.

For the rolling windows analysis, the results are presented in Table A3 and A4 in the appendix. The ADF test failed to reject the null hypothesis of unit root (non-stationarity) at level in all twelve windows for Nigeria. The KPSS further validated these results by rejecting the null hypothesis of stationarity at level. However, the ADF test rejected the null hypothesis of non-stationarity at first difference, meaning the interest rates series are all stationary at first difference signifying integration of order I(1). In contrast, the ADF test rejected the null hypothesis of unit root at level for rolling windows five and eight for the discount and deposit rates in Cameroon. These results were also confirmed by the KPSS test where the null hypothesis of stationarity could not be rejected at level, suggesting the discount and deposit

rates were $I(0)$. Conversely, the ADF test rejected the null hypothesis of non-stationarity at first difference for the other remaining rolling windows and the KPSS test also failed to reject the null hypothesis of stationarity at first difference. Thus, apart from rolling windows five and eight, the rest of the rolling windows are stationary at first difference, $I(1)$.

5.3 TESTS FOR CO INTEGRATION

As noted in Chapter Four, the study used four different co-integration test techniques to ensure the relationship detected is robust. A summary of these tests are presented in Table 5.1. The study conducted a co-integration test for the entire sample as well as for each rolling window for both countries. For Nigeria, only the JJ test failed to reject the null hypothesis of no co-integration between the lending and policy rates, and again the JJ and CRDW tests failed to reject the null hypothesis of no co-integration between the deposit and policy rates. The ECM-base and EG tests rejected the null in both cases, confirming the presence of a long and stable relationship between the policy and retail rates. On the other hand, all the four techniques failed to reject the null hypothesis of no co-integration between the lending and policy rates in Cameroon. This is consistent with the evidence from Figure 4.1 in Section 4.2.1. However, three out of the four techniques rejected the null hypothesis of no co-integration between the policy and deposit rates, indicating a stable long run relationship between the policy and the deposit rates.

TABLE 5.1: SUMMARY OF CO-INTEGRATION FOR THE ENTIRE SAMPLE FOR NIGERIA AND CAMEROON

	Sample period		Co-integration tests				Conclusion
	From	To	JJ	EG	CRDW	ECM-base	
Nigeria							
Lending Rate	1990M1	2010M12	No	Yes	Yes	Yes	Yes
Deposit Rate	1990M1	2010M12	No	Yes	No	Yes	Yes
Cameroon							
Lending Rate	1990M1	2008M6	No	No	No	No	No
Deposit Rate	1990M1	2008M6	Yes	Yes	No	Yes	Yes

NB. JJ-Johansen test; EG-Engle-Granger test, CRDW - Co integration Regression Durbin Watson test and ECM-Error Correction Based test. NB Section 4.3.1 of Chapter Four describes the above methods in great detail.

Analyses of the rolling window for Nigeria revealed the presence of co-integration across all the twelve rolling windows for the lending and deposit rates (see Table 5.2). For the lending rate, the JJ failed to reject the null hypothesis of no co-integration in seven out of the twelve windows and CRDW in five, whereas the EG and ECM-base tests rejected the null hypothesis of no co-integration in all twelve windows. Hence, there is strong evidence in favour of a long and stable relationship between the lending and policy rates in each rolling window. For the deposit rate, the JJ and CRDW failed to reject the null hypothesis of no co-integration between the deposit and policy rates in twelve and six windows respectively. Again, the EG and ECM-base tests rejected the null hypothesis of no co-integration in all twelve windows. As noted in Chapter Four, where the four techniques differ, the ECM-base test result overrides the others. Consequently, the presence of a strong long and stable relationship between the deposit and policy rates was confirmed in all twelve rolling windows.

TABLE 5.2: ROLLING WINDOWS CO-INTEGRATION TEST RESULTS – NIGERIA

Rolling windows for Nigeria							
Interest rates	Rolling windows		Co integration tests				CONCLUSION
	From	To	JJ	EG	CRDW	ECM	
Lending rate	1990	1999	No	Yes	Yes	Yes	Yes
Lending rate	1991	2000	No	Yes	Yes	Yes	Yes
Lending rate	1992	2001	No	Yes	Yes	Yes	Yes
Lending rate	1993	2002	Yes	Yes	Yes	Yes	Yes
Lending rate	1994	2003	No	Yes	No	Yes	Yes
Lending rate	1995	2004	Yes	Yes	No	Yes	Yes
Lending rate	1996	2005	Yes	Yes	No	Yes	Yes
Lending rate	1997	2006	Yes	Yes	Yes	Yes	Yes
Lending rate	1998	2007	No	Yes	No	Yes	Yes
Lending rate	1999	2008	Yes	Yes	Yes	Yes	Yes
Lending rate	2000	2009	No	Yes	Yes	Yes	Yes
Lending rate	2001	2010	No	Yes	No	Yes	Yes
Deposit rate	1990	1999	No	Yes	No	Yes	Yes
Deposit rate	1991	2000	No	Yes	No	Yes	Yes
Deposit rate	1992	2001	No	Yes	Yes	Yes	Yes
Deposit rate	1993	2002	No	Yes	Yes	Yes	Yes
Deposit rate	1994	2003	No	Yes	No	Yes	Yes
Deposit rate	1995	2004	No	Yes	No	Yes	Yes
Deposit rate	1996	2005	No	Yes	Yes	Yes	Yes
Deposit rate	1997	2006	No	Yes	Yes	Yes	Yes
Deposit rate	1998	2007	No	Yes	Yes	Yes	Yes
Deposit rate	1999	2008	No	Yes	Yes	Yes	Yes
Deposit rate	2000	2009	No	Yes	No	Yes	Yes
Deposit rate	2001	2010	No	Yes	No	Yes	Yes

The co-integration test for rolling windows for Cameroon presents some interesting results. Surprisingly, there is co-integration between the lending and policy rates in nine out of the ten rolling windows (see Table 5.3 below). The CRDW and JJ test failed to reject the null hypothesis of no co-integration in ten and eight out of ten windows respectively, whereas the EG and ECM-base tests failed to reject the null hypothesis only in one out of ten windows. In all, nine windows detected co-integration between the lending and policy rates. Conversely, the JJ, EG, CRDW and ECM-base tests failed to reject the null hypothesis of no co-integration between the deposit and policy rates in four, three and two out of the ten rolling windows respectively. Hence, eight windows confirmed co-integration between the deposit and policy rates.

TABLE 5.3: ROLLING WINDOWS CO-INTEGRATION TEST RESULTS – CAMEROON.

Rolling windows for Cameroon							
Interest rates	Rolling windows		Co integration tests				CONCLUSION
	From	To	JJ	EG	CRDW	ECM	
Lending rate	1990	1999	No	Yes	No	Yes	Yes
Lending rate	1991	2000	No	Yes	No	Yes	Yes
Lending rate	1992	2001	No	Yes	No	Yes	Yes
Lending rate	1993	2002	No	Yes	No	Yes	Yes
Lending rate	1994	2003	Yes	No	No	No	No
Lending rate	1995	2004	No	Yes	No	Yes	Yes
Lending rate	1996	2005	Yes	Yes	No	Yes	Yes
Lending rate	1997	2006	No	Yes	No	Yes	Yes
Lending rate	1998	2007	No	Yes	No	Yes	Yes
Lending rate	1999	2008	No	Yes	No	Yes	Yes
Deposit rate	1990	1999	Yes	Yes	Yes	Yes	Yes
Deposit rate	1991	2000	Yes	Yes	Yes	Yes	Yes
Deposit rate	1992	2001	Yes	Yes	Yes	Yes	Yes
Deposit rate	1993	2002	Yes	Yes	Yes	Yes	Yes
Deposit rate	1994	2003	Yes	Yes	Yes	Yes	Yes
Deposit rate	1995	2004	No	Yes	Yes	Yes	Yes
Deposit rate	1996	2005	Yes	Yes	Yes	Yes	Yes
Deposit rate	1997	2006	No	Yes	No	Yes	Yes
Deposit rate	1998	2007	No	No	No	No	No
Deposit rate	1999	2008	No	No	No	No	No

NB: See Section 4.3.1 of Chapter Four for full description and how the decisions on co-integration are made.

5.4 ANALYSES OF INTEREST RATE PASS-THROUGH RESULTS

This study estimates the parameters of pass-through using a sample of 21 years and 18 years for Nigeria and Cameroon respectively. Due to data constraints for the lending rate in Cameroon that was available only up to June 2008, the data for the deposit and discount rates was reduced to June 2008 to match the period for the lending rate. This means the sample period for Cameroon runs from 1990M1 to 2008M06 and from 1990M1 to 2010M12 for Nigeria. This gives twelve rolling windows for Nigeria and ten for Cameroon of ten years (120 observations) with the last window for Cameroon having 114 observations. The study employed three different types of analyses. First, it estimates interest rate pass-through for the entire sample for both countries. Secondly, the parameters of interest rate pass-through were estimated using a ten-year rolling window taking into account the possibility of symmetric and asymmetric adjustment in both the lending and deposit rates for both countries. Finally,

the study changed the policy rates around to investigate the possibility of monetary policy shock transmission from Nigeria to Cameroon and vice versa. The next section presents and discusses these results.

5.4.1 ANALYSES OF THE ENTIRE SAMPLE

5.4.1.1 Short and long run pass-through analyses

The short run pass-through (immediate pass-through), also known as the impact multipliers, measures the immediate reaction of commercial banks to a change in the policy rate of the Central Bank. The immediate pass-through conveys important information to monetary authorities as it determines how much of the change in policy rate is transmitted by commercial banks to the real economy. Therefore, the short run pass-through gives an indication of the effectiveness of monetary policy. As stated in Section 4.3.2, a short run coefficient of one or close to one means that pass-through is faster or rapid and hence monetary policy is said to be effective, and less than one means otherwise. In addition, an extreme case may occur when the short run coefficient is more than one. In such a situation, we say that the short run pass-through “overshoots”.

The estimated coefficients for the lending and deposit rates (Table A5 in the appendix) show that the immediate pass-through is faster for the lending rate (0.71) than for the deposit rate (0.50) for Nigeria. However, despite the higher pass-through for the lending rate, overall pass-through is sluggish in the short run. For the long run pass-through, the estimated coefficients are almost similar (0.72 and 0.70 for lending and deposit rates respectively). This again means long run pass-through is sluggish or incomplete. The error correction mechanism (ECT_{t-1}) shows that about 13% of disequilibria in the credit market are corrected every month, whereas only 8% of disequilibria in the deposit market are adjusted per month. In addition, evidence from Wald test (Table A6 in the appendix) indicates that the pass-through mechanism for the lending and deposit rates is symmetric for Nigeria.

With regard to Cameroon, only the short run pass-through was estimated because all the techniques failed to detect any long run relationship between the lending and policy rates (see Table 5.1). The estimated short run pass-through for the lending rate is quite high (about 0.70), which is similar to that of Nigeria but is incomplete or rigid (see Table A6 in the appendix). The government interference by fixing the lending rate at 15% excluding the risk

premium charged by banks and minimum deposit rate of 4.25% and subsequently reduced to 3.25% can distort the relationship. Such interventions are forms of financial repression and the prevailing lending and deposit rates may not be a true reflection of the market conditions (the forces of demand and supply). Secondly, the movement from the fixed peg exchange rate with the French Franc to a new fixed peg to the euro currency in January 1999 may have caused a break in the data at this period (see Iossifov *et al.*, 2009; Saab and Vacher, 2007; Khan, 2010 and Saxegaard, 2006). However, testing for structural breaks in the data is beyond the scope of this study.

Conversely, the short run pass-through for the deposit rate is very rigid at about 0.27 and the long run is incomplete at 0.55. This means that commercial banks pass on only 27% of any change in the Central Bank policy rate to the deposit rate in the short run and about 55% in the long run. The error correction model (ECT_{t-1}) indicates that about 11% of short disequilibrium in the deposit market is adjusted per month (Table A5 in the appendix). The Wald test for asymmetric adjustment reported in Table A6 in the appendix suggests that the pass-through mechanism in the deposit market is asymmetric and adjustment is rigid in a downward direction. This corroborates Hannan and Berger's (1991) *customer reaction hypothesis*. That is, if commercial banks perceive negative reaction to come from depositors because of a reduction in the rates paid on deposits, then they will be slow to reduce rates paid on deposits in response to an increase in the policy rate. A second objective of the study was to investigate the possibility of symmetric and asymmetric adjustment using asymmetric error correction framework in a rolling window analyses. The next section presents results of these analyses, starting with the short run pass-through of the rolling windows.

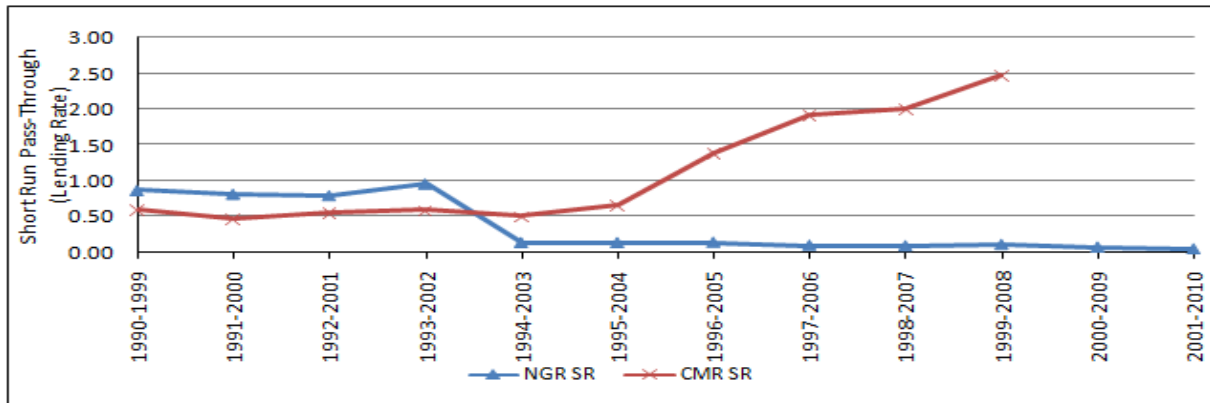
5.4.2 ANALYSES OF ROLLING WINDOWS

5.4.2.1 Short run pass-through of rolling windows

This study conducts a rolling window analysis of ten years interval (120 observations) with windows running from 1990M1 to 1999M12 for both countries. Results from both countries are reported in Tables A7 and A8 in the appendix. Figure 5.1 illustrates graphical plots of the estimated immediate pass-through (impact multipliers) for the lending markets in Nigeria and Cameroon. The vertical axes of Figures 5.1 and 5.2 represent the short run pass-through coefficients of the lending and deposit rates respectively and the horizontal axes represents

the rolling windows periods. The short run coefficients are extracted from Tables A7 and A8 respectively.

FIGURE 5.1: SHORT RUN PASS-THROUGH – LENDING RATE



Source: Author’s Estimation

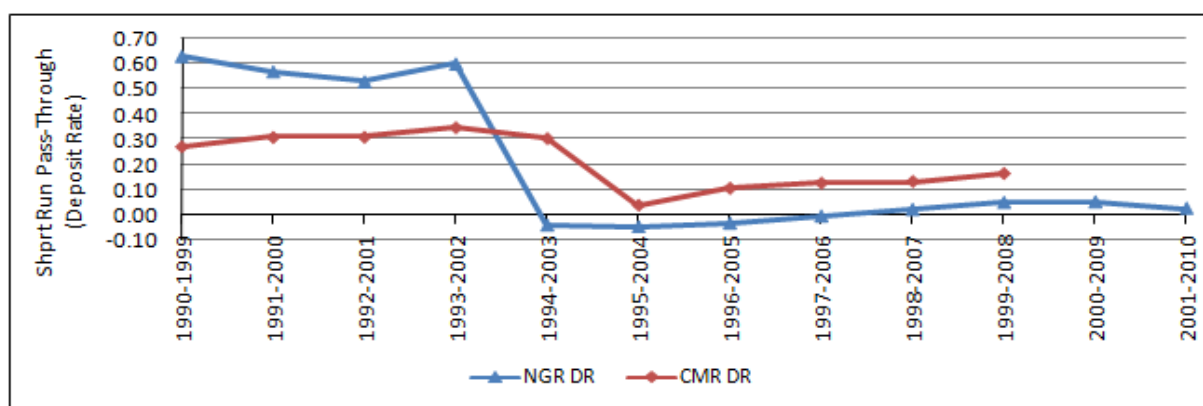
A positive slope means that the short run pass-through is high and thus monetary policy is said to be effective, and vice versa with a declining slope. However, a value greater than one means the short run “overshoots”. Figure 5.1 shows that the immediate pass-through in the lending market in Nigeria was quite high for four rolling windows (0.87, 0.82, 0.80 and 0.96) but subsequently dropped from 0.96 in rolling window four to 0.13 in rolling window five and reached the lowest value of 0.05 in the last rolling window (2001-2010). A likely explanation for this low immediate pass-through observed in the lending market in Nigeria starting from rolling window five can be attributed to the bank distress and failures that started in 1994 to 1998 and up to 2004 which eventually led to the consolidation of banks in 2004/2005 (Cowryasset, 2009:8). This reduced the number of commercial banks from 89 to 25 through mergers and acquisitions. The full effect of this reform is captured by rolling windows eleven and twelve (2000-2009 and 2001-2010) with short run pass-through of 0.07 and 0.05 respectively. These results are consistent with Cottarelli and Kourelis’s (1994: 618) observation that financial reforms that encourage bank mergers and acquisitions may reduce competition and result in low pass-through. Sanusi (2010:13) also documented very low pass-through elasticities of the lending and deposit rates after post consolidation but noted a substantial increase in pass-through of monetary policy to the money market rates post consolidation period. However, empirical evidence indicated that the banking sector consolidation has rejuvenated the Nigerian banking sector as it attracted over \$1 billion in

foreign investment and credit to the private sector rose to about 72% annualised within twelve and the first four months in 2007 respectively (Cowryasset, 2009:10).

Conversely, the short run pass-through for the lending rate in Cameroon is very low: on average 0.56 for the first six windows and overshoots in the last four windows (that is, 1996-2005, 1997-2006, 1998-2007 and 1999-2008) to 1.39, 1.92, 2.01 and 2.48 respectively. This can be interpreted as an over-reaction by commercial banks in response to a change in the policy rate by the Central Bank. The overshooting in Cameroon could be as a result of BEAC intervention in the lending market and also due to the underdeveloped nature of the financial sector in Cameroon (see Khan, 2010 and Saxegaard, 2006). Comparatively, the short run pass-through is higher in Nigeria than in Cameroon from rolling windows one to four and in Cameroon, the immediate pass-through is higher than in Nigeria only for rolling windows five and six (excluding the overshoot windows).

As for the short run pass-through of the deposit rate in both countries, a pattern can be observed from Figure 5.2. The short run pass-through in Nigeria is higher than in Cameroon from rolling window one to four (1990-1999, 1991-2000, 1992-2001 and 1993-2002). On the other hand, short run pass-through in Cameroon exceeds that in Nigeria from the fifth to the tenth rolling window. Overall, evidence from the graphical plot suggests that short run pass-through is rigid in the two markets but trended in the same direction over time.

FIGURE 5.2 : SHORT RUN PASS-THROUGH – DEPOSIT RATE



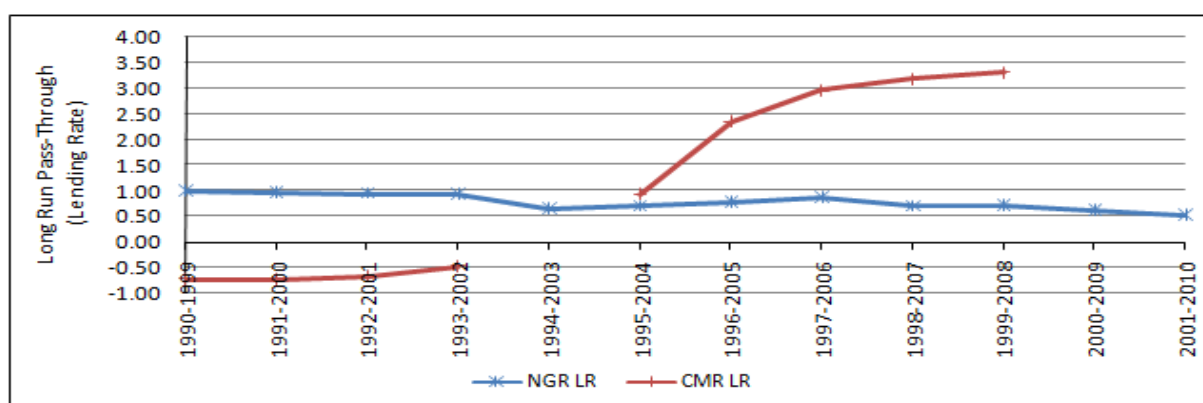
Source: Author's Estimation.

5.4.2.2 Long run pass-through of rolling windows

Figures 5.3 and 5.4 illustrate visual plots of the estimated long run pass-through for the lending and deposit rates for Nigeria and Cameroon respectively. The vertical axis now

measures the long run pass-through for the lending and deposit rates and the horizontal axis represents the rolling window sub-periods. Again the long run coefficients are taken from Tables A7 and A8 respectively. It is evident from Figure 5.3 that long run pass-through for the lending rate in Nigeria is complete in the first three rolling windows (1.01, 0.97, 0.95) and near complete in window four (0.94). However, pass-through declined to 0.64 in window five and continued until the last rolling window recording the lowest long run pass-through of about 0.52. A closer look at the magnitude of the long run pass-through in the pre-consolidation (first five rolling windows) and post-consolidation (from sixth to twelfth window) era of the Nigerian banking sector revealed that on average, pass-through declined from 0.90 before consolidation to about 0.70 after the consolidation. Here, we observed the long run effect of the 1994 to 1998 bank distress and failures as well as the banking sector consolidation of 2004/2005. This results are consistent with Sanusi (2010) who made a similar observation using a structural vector autoregressive (SVAR) model.

FIGURE 5.3: LONG RUN PASS-THROUGH – LENDING RATE



Source: Author's Estimation

Conversely, long run pass-through for Cameroon has been negative for the first four rolling windows (-0.72, -0.73, -0.67 and -0.47). This period corresponds to the early 1990 to 1995 financial reforms that focused on liquidation, restructuring and privatisation of state-owned banks (1995 to 1997) and the third phase initiated in 2004 targeting mostly non-bank financial institutions. This period is characterised by bank insolvency and high non-performing loans. As a result, by the end of 2005, five of Cameroon's leading commercial banks were technically insolvent with more than half of their loans to the private sector declared non-performing (IMF, 2007:32). Thus, if non-performing loans can be used as a proxy for the degree of risk in the credit market, then large amounts of non-performing loans

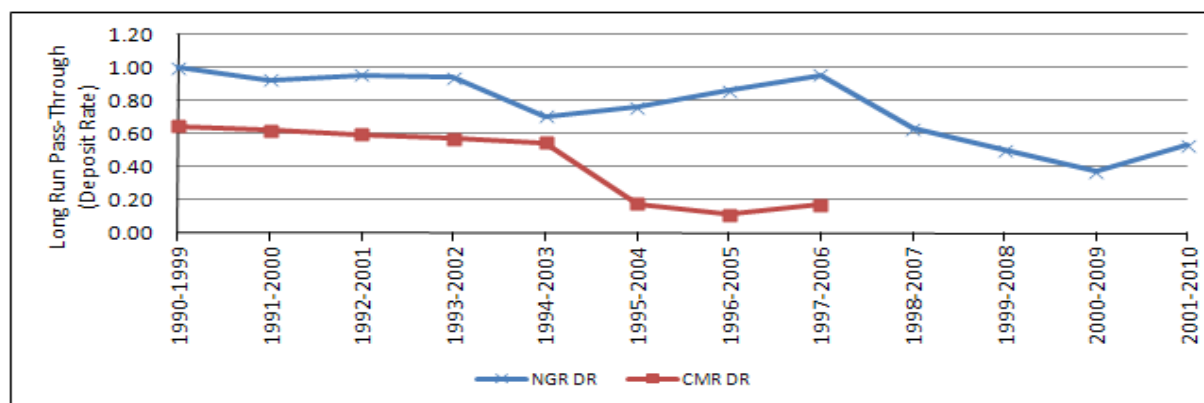
will be associated with high risk premiums demanded by commercial banks (Gigineishvili, 2011:16 and De Bondt 2005:45). This will ultimately be transmitted into high lending rates leading to overshoots, as observed in the case of Cameroon. Overall, the long run pass-through in the lending market in Cameroon is difficult to interpret, suggesting that the lending rate is not tracking moments in the Central Bank policy rate (see Figure 4.1 of Section 4.2.1), that is, from negative pass-throughs to overshoots except for rolling window five (1995-2004). The gap (1994-2003) indicates the window where no co-integration was found. Samba and Yan (2010) also found overshoots in the lending rate of about 621% in the CEMAC region of which Cameroon is a member. Baugnet *et al.* (2007:19) also experienced difficulties interpreting their results because the long run pass-through for consumer loans in Belgium were negative and overshooting, ranging from -0.93 to 1.75. This seems to suggest market imperfections, lack of oversight and monitoring of banking sector activities by the regulatory authorities and an indication of less effective monetary policy.

Furthermore, the overshoots of between 2.36 to 3.32 in the lending market in Cameroon is evidence of the fact that banks are predominantly the only funding source for SMME and corporate enterprises indicating low levels of financial development. This means there is a low level of competition in the lending market from non-bank financial intermediaries. Consequently, the absence of an alternative source of finance for prospective investors in Cameroon may have compelled borrowers to accept a high rate on loans as demonstrated by the overshoots in Figure 5.3.

On the other hand, Nigeria has active capital and money markets where prospective investors can access alternative sources of funds. This implies that investors can substitute bank loans for other funding sources, therefore the lending market faces tough competition. As established in Chapter Three, evidence clearly showed that pass-through in the lending market is higher in Nigeria than in Cameroon. This seems to be evidence of competition between banks and non-bank financial intermediaries as well as of high levels of financial development compared to Cameroon. It is also worth mentioning that pass-through analyses are also sensitive to the type of rate used as policy rate. Consequently, administered rates such as a discount rate used in the study may be influenced by political and other administrative hurdles when it comes to adjustment. As such, using the discount rate as a signal of monetary policy may lead to a more sluggish transmission mechanism than using the money market rate (Cottarelli and Kourelis, 194:595).

Turning to the long run pass-through (Table A7 in the appendix) of the deposit rate, complete pass-through is observed for the first rolling window in Nigeria (1.0) and near complete from the second to the fourth rolling window (0.93, 0.96 and 0.94 respectively). Nevertheless, subsequent rolling windows had lower pass-through compared to the first four except for rolling window eight with a pass-through of 0.96. Meanwhile, the last three rolling windows has the lowest pass-through (0.50, 0.37 and 0.53 respectively) compared to the first nine rolling windows. Again the negative corresponding effects of 1994 to 1998 as well as 2004/2005 discussed in Section 5.4.2.1 were felt in the deposit market. Nonetheless, the average long run pass-through of about 0.76 signifies the high level of competition existing between banks and non-bank financial intermediaries for deposits, giving rise to a high long run pass-through as shown in Figure 5.4.

FIGURE 5.4: LONG RUN PASS-THROUGH – DEPOSIT RATE



Source: Author's Estimation

Alternatively, the long run pass-through for the deposit rate is incomplete or sluggish for all the rolling windows with an average pass-through of 0.60 for the first five rolling windows in Cameroon (Table A8 in the appendix). But pass-through for subsequent rolling windows (six to eight) is much lower (0.18, 0.11 and 0.17 respectively) but trends in the same direction as the long run pass-through in Nigeria. No co-integration relationship existed in rolling windows 1998-2007 and 1999-2008, indicating that there are no long run pass-through coefficients for these windows. Similar low and incomplete pass-throughs in deposit rate have been documented by Jankee (2005) in Mauritius using asymmetric error correction models, Khawaja and Khan (2008) in Pakistan, Acheampong (2005) in Ghana, and Sander and Kleimier (2006a) for the SACU countries, with only South Africa having a relatively high pass-through because of the high level of financial development.

A critical look at Figures 5.3 and 5.4 reveals that there is no relationship between the lending market in Nigeria and Cameroon but there seems to be a strong relationship between the deposit market in Nigeria and Cameroon. In addition, the empirical evidence ties in with the a priori expectation in Chapter Three. Pass-through is relatively higher in Nigeria than in Cameroon because of differences in the level of financial system development.

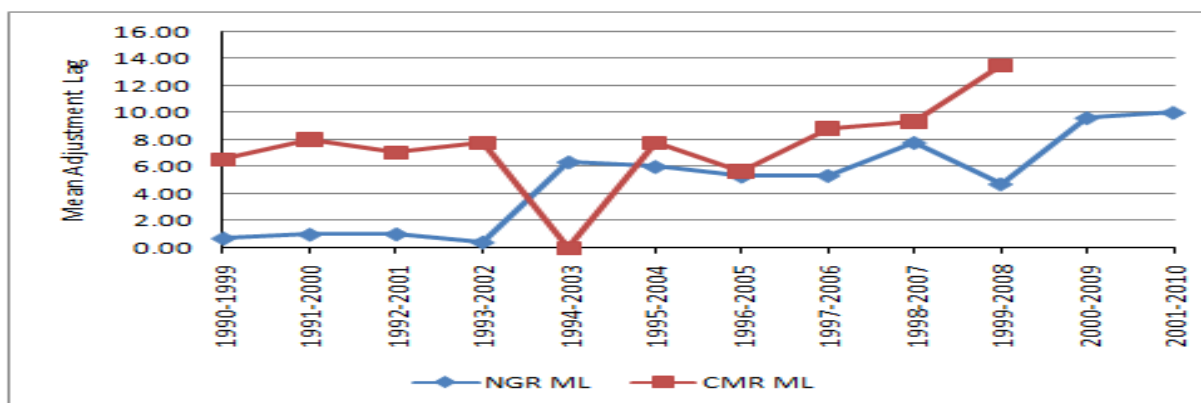
As stated in Chapter Two, the degree of interest rate pass-through also depends largely on the type of exchange rate regime, with a flexible exchange rate predicted to have a higher pass-through and fixed rates a lower degree of pass-through. The two countries under study operate different exchange rate systems and thus provide an opportunity to test the theoretical predictions. Giginishvili (2011:8) analysed pass-through for over 70 countries with flexible and fixed exchange rate regimes and concluded that pass-through is higher in the long run but not in the short run for countries operating a flexible exchange rate regime. Taking a snapshot of the short and long run estimated parameters for Nigeria revealed this to be the case. On average, the short run pass-through for the lending and deposit rates is about 0.36 and 0.20 respectively, whereas the long run on average for the lending and deposit rates is about 0.78 and 0.76 respectively (Table 7 in the appendix). Consequently, we conclude that the high pass-through observed in Nigeria over the period of study compared to Cameroon is also because of its flexible exchange rate regime.

5.4.2.3 Symmetric MAL of rolling windows in the ECM

The mean adjustment lag (MAL) measures how long it takes the retail rates to adjust fully. This is of concern to monetary authorities because it gives an indication of the time lag. Hence, a low MAL indicates a quicker adjustment and hence effective monetary policies as shocks in the monetary policy are transmitted onto the retail rates within a short time frame. Conversely, a high value of MAL signifies a rigid adjustment and means it takes a longer period before the effects of monetary shocks impact fully onto retail rates. As a result, the specific objective of such a monetary policy may not be realised in time. Figures 5.5 and 5.6 plots the MAL of the lending and deposit rates in months on the vertical axis and the rolling windows sub-periods on the horizontal axis for both countries. The MAL values are extracted from Tables A7 and A8 in the appendix. A declining slope indicates a faster adjustment and a positive slope implies sluggish adjustment. It is evident from Figure 5.5 that complete adjustment occurred within a year in both countries (both graphs oscillating between 0.74 to

10.97 months) except for the last rolling window in Cameroon which took about 13.5 months to adjust fully. Thus, a comparison of the two countries suggest that on average the mean adjustment lag is lower for lending market in Nigeria (about 4.9 months) while it takes on average about 7.23 months for the lending rate in Cameroon to adjust fully.

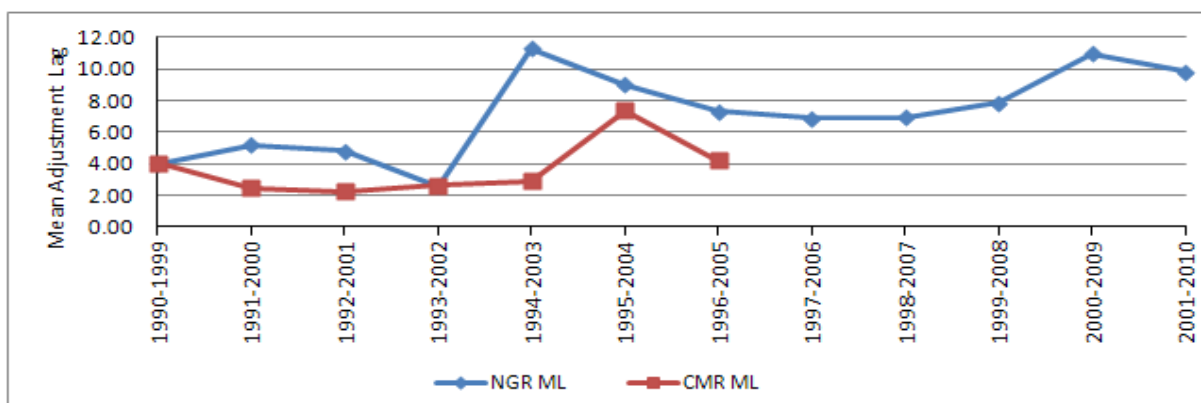
FIGURE 5.5: MEAN ADJUSTMENT LAG – LENDING RATE



Source: Author’s Estimation

Figure 5.6 shows that the MAL for the deposit rates in Cameroon is slower than in Nigeria (the MAL curve for Cameroon being below that of Nigeria). That is, on average the mean adjustment lag is about 7 months in Nigeria and about 4 months in Cameroon. The lower mean adjustment lag in Cameroon (values between 2.3 to 7.4 months) suggests that the deposit rate adjusts fully and quickly in Cameroon. This could be as result of the recent increase in the number of foreign banks (including Nigerian banks) into the banking sector of Cameroon, increasing the level of competition for deposits in the deposit market with the possibility of some banks opening foreign savings accounts for their clients to enable them earn higher returns on their deposits.

FIGURE 5.6: MEAN ADJUSTMENT LAG – DEPOSIT RATE



Source: Author's Estimation

One interesting observation common between Nigeria and Cameroon is that short and long run pass-through as well as the mean adjustment lag bears some resemblance in the deposit markets of the two countries. Hence, one can argue that there is evidence to suggest that the deposit markets in the two countries have some resemblance.

5.4.2.4 Asymmetric MAL of rolling windows in the ECM

Unlike the mean adjustment lag, the asymmetric mean adjustment lag seeks to measure the speed of adjustment back to equilibrium when the retail rates (lending and deposit) are below or above their equilibrium levels. The coefficients of the positive and negative residuals are estimated using Equation 4.10 given in Chapter Four. The framework of Scholnick (1996) is then applied to test for asymmetry using the Wald test with $\chi^2(1)$ distribution, by imposing a restriction that the coefficients of the positive and negative residuals are equal ($\delta_1 = \delta_2$), that is, testing the null hypothesis of no asymmetry versus asymmetry. If the P-value of the Wald test is significant (small P-value), it indicates that there is evidence of asymmetric adjustment and if the P-value is insignificant (large P-value), then we say the adjustment process is symmetrical. Full details of positive (ML^+) and negative (ML^-) residuals for the lending and deposit rates for both countries are presented in Tables A9 and A10 in the appendix.

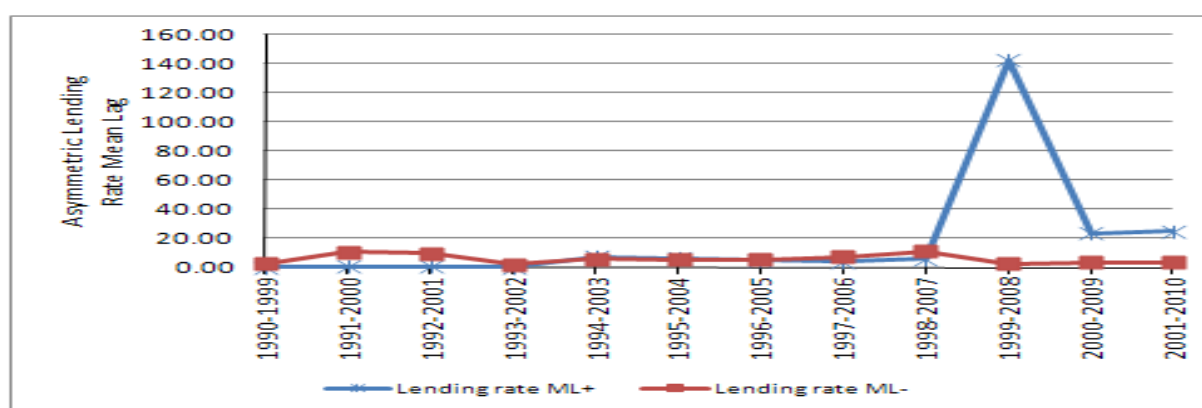
Figures 5.7, 5.8, 5.9 and 5.10 plot the ML^+ and ML^- coefficients for the lending and deposit rates for Nigeria and Cameroon respectively. The vertical axes measures the the speed of adjustment back to equilibrium when the lending and deposit rates are below or above their mean equilibrium level (ML^+ and ML^-) and the horizontal axes the rolling windows sub-periods. The values of ML^+ and ML^- are obtained from Tables A9 and A10 in the appendix.

In the case of Nigeria, the empirical evidence from Wald test (Table A9 in the appendix) regarding asymmetric and symmetric mechanism is mixed. For instance, in six rolling windows out of twelve, the null hypothesis of no asymmetry could not be rejected and in the other six rolling windows, the null hypothesis was rejected. Asymmetric adjustment is found in first three rolling windows (1990-1999, 1991-2000 and 1992-2001) and the direction of rigidity is downward, corroborating Scholnick's (1996) *collusive pricing hypothesis*. That is, commercial banks in Nigeria are reluctant to decrease the lending rate for fear of breakdown in the collusive arrangement in response to a reduction in the policy rate, therefore banks

consider the cost of breakdown before adjusting prices. Furthermore, asymmetric adjustment is again confirmed in the last three rolling windows (1999–2008, 2000–2009 and 2001–2010) and the adjustment rigidity is now upward supporting Scholnick’s (1996) *customer reaction hypothesis*. This implies that commercial banks are slow to increase the lending rate in response to an increase in the policy rate for fear of negative customer reaction such as default on loan repayments. In such a circumstance, banks provide implicit insurance to its customers against a credit shock by absorbing part of the monetary policy shocks in an effort to smooth out interest rate payments on loans. This situation is common in retail banking to build and maintain long term relationships with long term customers receiving low rates on loans through an implicit “risk sharing” agreement (Fried and Howitt, 1980; Lowe and Rohling, 1992) as discussed in Section 2.3.1.3 of Chapter Two. The spike in rolling window ten (1999–2008) means that the lending rate will decline faster when above its equilibrium in response to a cut in the policy rate (upward rigidity).

With regard to Cameroon, out of the ten rolling windows, co-integration was established in nine (see Table 5.3) and empirical evidence from the Wald test (Table A10 in the appendix) indicated that the null hypothesis of no asymmetry could not be rejected in all the nine windows. Thus, the pass-through of lending rate in Cameroon is symmetrical.

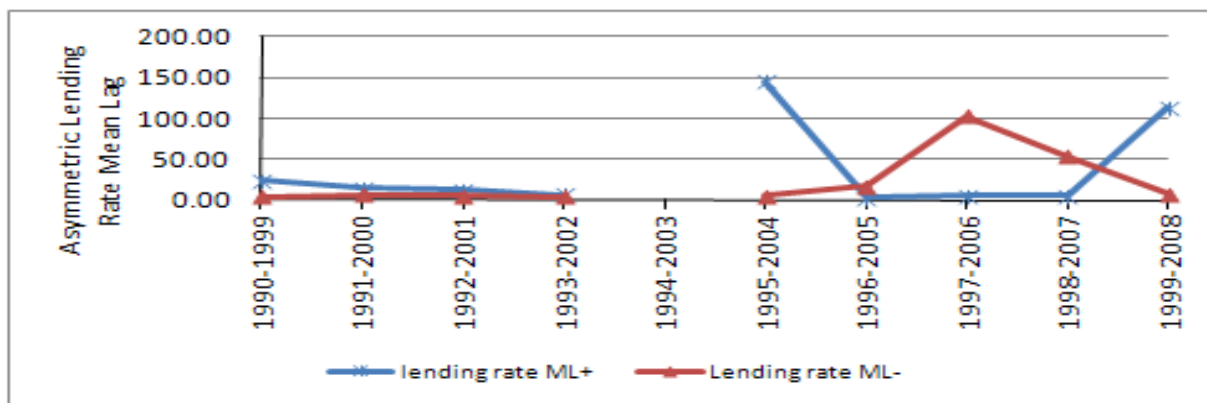
FIGURE 5.7: ASYMMETRIC ADJUSTMENT OF ROLLING WINDOWS – LENDING RATE IN NIGERIA



Source: Author’s estimation

The break between 1993–2002 and 1995–2004 in Figure 5.8 represents the rolling window where no co-integration was established and in such a situation no ML^+ and ML^- can be estimated.

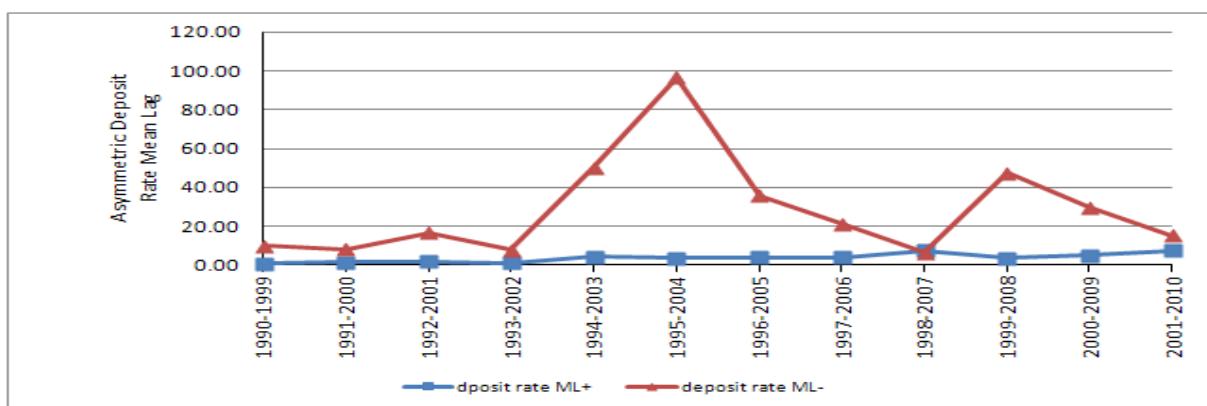
FIGURE 5.8: ASYMMETRIC ADJUSTMENT OF ROLLING WINDOWS – LENDING RATE IN CAMEROON



Source: Author's estimation

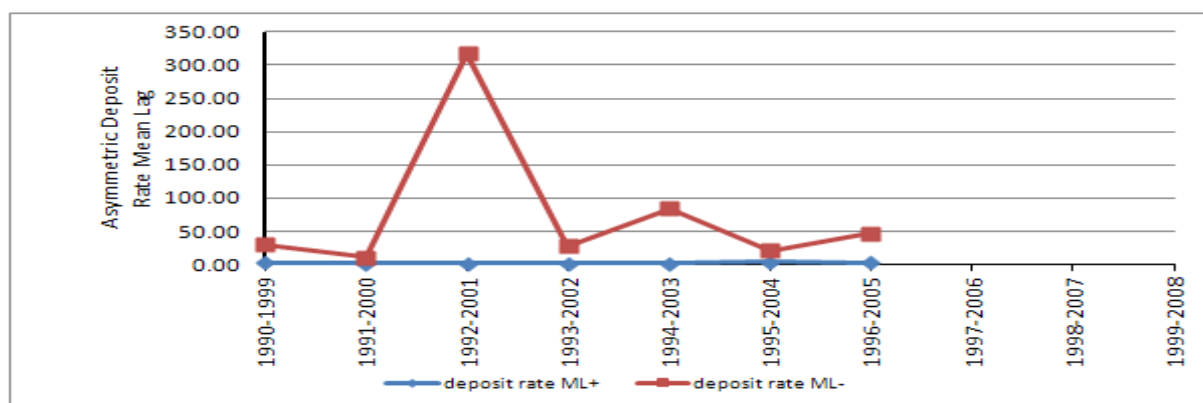
Figures 5.9 and 5.10 plot the positive and negative residuals of deposit rates in Nigeria and Cameroon. Unlike the lending rate, the empirical evidence regarding symmetric and asymmetric adjustment in the deposit markets is clear cut. In the case of Nigeria, the empirical evidence from the Wald test (Table A9 in the appendix) revealed that the null hypothesis of no asymmetry could not be rejected in ten out of the twelve windows, that is, the pass-through mechanism in the deposit market in Nigeria is symmetric.

FIGURE 5.9: ASYMMETRIC ADJUSTMENT OF ROLLING WINDOWS – DEPOSIT RATE IN NIGERIA



Source: Author's estimation

FIGURE 5.10: ASYMMETRIC ADJUSTMENT OF ROLLING WINDOWS – DEPOSIT RATE IN CAMEROON



Source: Author's estimation

In the case of Cameroon, seven out of the ten rolling windows indicated the presence of co-integration (Table 5.3). However, analyses showed that the co-integration relationship established in rolling window eight (1997-2006) is weak because the error correction term is not statistically significant even at 10% level. Meanwhile, for 1998-2007 and 1999-2008 rolling windows, no co-integration existed at all between the policy and deposit rates. Thus, out of the seven windows that detected co-integration, six out of the seven rejected the null hypothesis of no asymmetry (Table A10 in the appendix), thereby confirming evidence of asymmetric pass-through in the deposit market in Cameroon. The direction of adjustments rigidity is stronger downward, corroborating Hannan and Berger's (1991) *customer reaction hypothesis*, that is, if commercial banks perceive negative reaction to come from customers because of a reduction in the rates paid on deposits, then they will be slow to reduce rates paid on deposits in response to an increase in the policy rate. Scholnick (1996) also found asymmetric pass-through for the deposit markets in Singapore and Malaysia.

5.5 TRANSMISSION OF MONETARY POLICY IMPULSES

To investigate whether there are impulse transmissions between the two countries, the policy rates were interchanged and the lending and deposit rates equations were estimated. With the increasing internationalisation of banks and integration of global financial markets, knowledge of cross-border transmission of monetary shocks across the two countries can assist bankers on portfolio diversification. The next section presents the results of these analyses.

5.5.1 Monetary policy impulses from Cameroon

To investigate whether there is pass-through of monetary policy impulses from Cameroon to Nigeria, the study used the policy rate of Cameroon as the independent variable in the lending and deposit rates equations. Results are reported in Table A11 in the appendix. Testing for co-integration between the lending rate in Nigeria and Cameroon policy rate using the four techniques discussed earlier confirmed the presence of a long run relationship. Only the Co-integration Durbin Watson test failed to reject the null hypothesis of no co-integration but the other techniques rejected the null hypothesis (see Table A11 in the appendix). The estimated short run pass-through is negative and overshoots (-1.38) whereas the long run pass-through is complete (0.98). This seems to suggest strong interdependence of monetary policy between the two countries. However, estimates from the error correction model (ECT_{t-1}) showed that such a relationship is weak as the t-statistics of the error correction model are statistically insignificant. Thus, for a stable long run relationship to exist the error correction term must be statistically significant (negative coefficient and significant t-statistics).

For the deposit rate equation, only the Error Correction-base model rejected the null hypothesis of no co-integration between the deposit rate in Nigeria and the policy rate in Cameroon. The remaining three failed to reject the null hypothesis. However, as stated in Section 4.3.1, we accept the presence of co-integration between the interest rate series. Again the short run pass-through is negative and overshoots (-1.06) whereas the long run pass-through is full (1.02), suggesting the presence of impulse transmission from Cameroon to Nigeria. Nevertheless, such a relationship of impulse transmission is again weak because the error correction term is statistically insignificant. Hence, in both the lending and deposit rates equations the empirical evidence is weak concerning the possibility of impulse transmission from Cameroon to Nigeria.

5.5.2 Monetary policy impulses from Nigeria

In order to investigate whether there is pass-through of monetary policy shocks from Nigeria to Cameroon, we repeat the above process but now use the policy rate in Nigeria as the independent variable in the lending as well as in the deposit rates equations (see Table A11 in the appendix). The Johansen, Co-integration Durbin Watson and Error Correction-base tests all failed to reject the null hypothesis of no co-integration between the Nigerian policy rate and the lending rate in Cameroon. Only the Eagle-Granger test rejected the null hypothesis.

Thus, we rule in favour of the Error Correction-base test that there is no co-integration between the policy rate in Nigeria and the lending rate in Cameroon.

However, analysis of the deposit rate equation seems to indicate the presence of a relationship. The co-integration test results from Johansen, the Eagle-Granger and Error Correction-base all rejected the null hypothesis of no co-integration and only the Co-integration Durbin Watson failed to reject the null hypothesis. Thus, we conclude that there is a co-integration relationship between the Nigerian policy rate and the deposit rate of Cameroon. The estimated short run pass-through is very low (-0.5) and the long run pass-through is also low (0.16). Contrary to the weak relationship found earlier, the policy rate of Nigeria seems to have some influence on the deposit rate of Cameroon. The coefficient of the error term (ECT_{t-1}) is statistically significant at 1% level (see Table A11 in the appendix), suggesting a stable long run relationship. That is, about 3% of disequilibrium in the short run is reversed every month, implying that if there is a change in monetary policy in Nigeria, about 3% of the shock will be transmitted to the deposit market in Cameroon. These results are consistent with the earlier relationship established between the short and long run pass-through, the mean adjustment lag and the asymmetric mean adjustment lag. Hence, the empirical evidence seems to suggest that monetary policy impulses from Nigeria are passed-through only to the deposit market in Cameroon.

5.6 CONCLUSION AND SUMMARY

The comparative analysis of pass-through between Nigeria and Cameroon revealed that there are great differences in the loan markets of the two countries but the deposit markets showed some degree of association. The pass-through estimated for the entire period for the deposit rates for both countries is incomplete in the short and long run. The short and long run pass-through for Cameroon is very rigid (0.27 and 0.55 respectively) whereas the pass-through for the short and long run in Nigeria is a little higher but still rigid (0.50 and 0.70 respectively). Conversely, the short and long run pass-through for the lending rate in Nigeria is incomplete (0.71 and 0.72 respectively). No comparison between the lending rates of the two countries was made because the lending and policy rates in Cameroon were not co-integrated.

The empirical evidence from the rolling windows analysis indicated that the long run pass-through in the lending and deposit markets in Nigeria on average are similar, 0.78 and 0.76 respectively. The long run pass-through is complete for the lending rate in the first rolling

window (1.01) and near complete (0.97, 0.95 and 0.94) in the second, third and fourth windows. Meanwhile, the short run pass-throughs are rigid and incomplete (0.36 and 0.22 on average for the lending and deposit rates). No meaningful analysis is possible with the lending rate in Cameroon as pass-through is characterised by overshooting except of rolling window six (1995-2004) with a long run pass-through of 0.95. Nevertheless, overshooting in the loan market signifies a situation where banks charged a high-risk premium to cover the cost of non-performing. Conversely, long run pass-through for the deposit rate is rigid and incomplete (0.43 on average) and the short run is much lower 0.21. Again, the long run pass-through for the deposit rate in Nigeria on average is higher (0.76) compared to 0.43 on average in Cameroon but the short run pass-throughs in the two markets are almost the same (0.22 and 0.21 on average for Nigeria and Cameroon respectively).

Overall, evidence from the entire sample and rolling window analysis suggests that monetary policy in Cameroon and CEMAC region as a whole is ineffective. This is perhaps one of the reasons why BEAC is unable to sterilise the excess liquidity in the region. Alternatively, the long run pass-through of 0.72 and 0.71 for the lending and deposit rates for the entire sample, as well as an average of 0.78 and 0.76 for the rolling window, suggests that monetary policy is highly effective in Nigeria compared to Cameroon.

The mean adjustment lag (MAL) is shorter on average (about 4.9 months) in the lending market in Nigeria compared to about 7.23 months in Cameroon. In Cameroon, MAL is shorter for the deposit rate (about 3.7 months) compared to about 8.3 months in Nigeria on average. The empirical evidence regarding symmetric and asymmetric pass-through in the lending market is mixed in Nigeria. That is, six rolling windows confirmed evidence of asymmetric adjustment, with three windows (1990-1999, 1991-2000 and 1992-2001) indicating downward rigidity in the lending rate hence, supporting Scholnick's (1996) *collusive pricing arrangement hypothesis*. This seems to suggest some evidence of oligopolistic behaviour in the Nigerian banking industry. The other three windows (1999-2008, 2000-2009 and 2001-2010) suggested that the lending rate is rigid upward, corroborating Scholnick's (1996) *customer reaction hypothesis* and suggesting evidence of competition. On the other hand, the pass-through mechanism in the lending market in Cameroon is symmetrical.

With regard to the deposit rate in Nigeria, evidence indicates that the deposit rate adjusts symmetrically to increases or decreases in the policy interest rate of the Central Bank. On the other hand, evidence from the Wald test confirmed asymmetric adjustment in the deposit rate in Cameroon. The adjustment rigidity is in the downward direction, which corroborates Hannan and Berger's (1991) *customer reaction hypothesis*.

Evidence from the interchange of the policy rate however indicated that the policy rate in Nigeria exerts some small influence on the deposit market in Cameroon and no influence from the policy rate of Cameroon on the deposit market in Nigeria. This could possibly be because of Nigerian banks gaining entrance into the banking sector of Cameroon in recent years. The lending markets of the two countries are independent of each other as evidence revealed no impulse transmission between the two countries.

CHAPTER SIX

SUMMARY AND CONCLUSION

6.1 SUMMARY FINDINGS OF THE STUDY

The centrepiece of this study is to give a comparative analysis of interest rate pass-through between Cameroon and Nigeria: a study that digs deep into how the monetary policy actions of the Central Bank are transmitted to the real sector. Monetary authorities can only judge the impact of their actions if they have a good knowledge of the various ways through which the monetary policy shocks are transmitted to the real sector. In addition, since banks are conveyers of the monetary policy shocks through their intermediation and other related functions, information about the forces that drive bank's behaviour and market reaction to changes in the Central Bank actions is crucial to strengthen monetary policy effectiveness. Accordingly, the study briefly discussed the various channels of the monetary policy transmission mechanism, and reviewed four theories of interest rate rigidities as well as other factors affecting commercial banks interest rate stickiness.

A broad survey of literature from the European Union, USA, emerging markets, Asian countries and Sub-Saharan Africa revealed that pass-through differs greatly across countries and markets regardless of the econometric technique used in the estimation process. These marked differences in pass-through have recently attracted considerable research attention, especially in the Euro zone Area, and this focus is gradually spreading out to other regions such as the African continent though such studies are still scant. Amongst the factors identified in the surveyed literature, the structure and the level of development of the financial markets stand out as major causes of the observed differences in the pass-through across countries and markets. Thus, countries with developed financial markets such as capital and money markets tend to have a high pass-through while countries with underdeveloped financial markets exhibit low pass-through. Furthermore, the factors that affect the degree of pass-through are not static but vary overtime and tend to disappear with the development of the financial system. Pass-through analysis is sensitive to the choice of interest rate used as the policy rate.

Trend analysis of the financial sector indicators of Cameroon and Nigeria indicates a high level of financial sector development in Nigeria in terms of the size, depth, competition and

efficiency compared to Cameroon. In addition, commercial banks dominate the financial sector of the two countries, with Cameroon's financial market dominated by foreign banks.

Results from the whole sample revealed that the short and long run pass-through are incomplete in Nigeria for both the lending and deposit rates. The short and long run pass-through in the lending market are similar (0.71 and 0.72 respectively) whereas the short run is lower (0.50) than the long run (0.70) in the deposit market. The lending and policy rates in Cameroon failed to co-integrate, hence only the short run was estimated and it appears to be slightly high (about 0.70) but is incomplete. The short and long run pass-through in the deposit market is low and incomplete (0.27 and 0.55 respectively). The lack of co-integration between the lending and policy rates could be as a result of the government's repressive policies through fixing maximum lending and minimum deposit rates which may not be in line with market determined rates. The test for asymmetric adjustment revealed that adjustments in the lending and deposit markets in Nigeria are symmetric, suggesting some degree of efficiency and a well-functioning monetary policy, although pass-through in the two markets is incomplete. Conversely, pass-through of monetary policy in Cameroon is asymmetric in the deposit market signifying market imperfections, inefficiencies and a less effective monetary policy.

The empirical evidence from the rolling window analysis of Nigeria and Cameroon indicates that the lending markets differ markedly whereas the deposit markets bear some resemblance. The long run pass-through for lending rate is complete for the first and second rolling windows (1.01 and 0.97) and near complete for rolling windows three and four (0.95 and 0.94). This certainly reflects the impact of the various reforms undertaken in the late 1980s and 1990s, such as the establishment of the Nigeria Deposit Insurance Corporation in 1988 to protect the banking sector against bank runs and to install public trust in the Nigerian banking system. The passing of the Central Bank Act of 1991 empowered the Central Bank to design and implement monetary and financial policies. The introduction of prudential guidelines in 1990 aimed at ensuring a sound banking system, deregulation of the interest rates in 1992 and the introduction of universal banking in 2001 helped to level the playing ground for retail and wholesale banks to interact (Iganiga, 2010:68-69). The deposit market experienced the same positive impact and the long run pass-through was also complete for the first window (1.00) and near complete in the second to fourth rolling windows (0.93, 0.96 and 0.94).

However, the long run pass-through for the lending and deposit rates dropped suddenly from 0.94 to 0.64 and 0.71 in rolling window five for the lending and deposit rates respectively and since has not reached the level of the first four windows in both markets. The period from 1994-1998 and through to 2006 was characterised by major events such as the bank failures of 1994-1998 which eventually led to the 2004/2005 banking sector consolidation as well as the introduction of the monetary policy rate in 2006. Available evidence showed that the banking sector consolidation of 2004/2005 is highly associated with a decline in pass-through in both the lending and deposit rates. The full effect of this reform is captured by rolling windows eleven and twelve corresponding to the long run pass-through of 0.61 and 0.52 for lending rate and 0.37 and 0.53 for the deposit rate. The short run pass-through for these periods in both markets is equally very low, less than 0.10. In summary, the long run pass-through for the lending and deposit rates ranged from 1.01 to 0.52 and 1.00 to 0.53 respectively. Sanusi (2010) also found a very low pass-through of the monetary policy rate to retail lending and deposit rates but a high pass-through of the monetary policy to money market rates post consolidation. The evidence corroborates Cottarelli and Kourelis's (1994) observation that policies that reduce the size of the banking sector through mergers and acquisitions may impede pass-through.

With regard to long run pass-through for the lending rate in Cameroon for the various rolling windows, estimates are difficult to interpret (from low of -0.72 to overshoots of 3.32) whereas the short run pass-through is incomplete and ranged from 0.47 to 0.65 for the first six windows. Thereafter, the short run pass-through subsequently overshoots from 1.92 to 2.48 in rolling windows seven to ten. The periods of low long run pass-through correspond to the first and second phases of the financial reforms (first four windows) dominated by poor credit quality of commercial banks to the private sector and the 50% devaluation of the CFA franc against the French franc in 1994. Finally, the 2004 non-bank financial reforms saw long run pass-through improve to 0.95 but after this period, pass-through overshoots suggesting inefficiencies and market imperfections in the credit market. The short and long run pass-through in the deposit market is very low and incomplete ranging from 0.4 to 0.35 and 0.11 to 0.65 respectively. Generally, the empirical evidence suggest that the Structural Adjustment Programmes implemented so far are yet to reposition the financial sector to perform its function of intermediation and risk transformation effectively.

Overall, evidence showed that pass-through is higher in Nigeria in both markets than in Cameroon. This may be as a result of a high degree of competition between banks and non-bank financial intermediaries and the adoption of a flexible exchange rate system as opposed to the fixed exchange rate and a low level of competition in Cameroon banking sector.

The mean adjustment lag (MAL) showed that it takes on average about 4.9 months for lending rates to adjust fully in Nigeria and about 7.23 months in Cameroon. However, the mean adjustment lag is shorter for the deposit rate in Cameroon (about 3.7 months) compared to 8.3 months in Nigeria on average. The empirical evidence from the Wald test for asymmetric adjustment in the lending rate is mixed. Asymmetric adjustment is confirmed in six rolling windows, with three windows (1990-1999, 1991-2000 and 1992-2001) indicating a downward rigidity, supporting Scholnick's (1996) *collusive pricing arrangement* between banks. The other three windows (1999-2008, 2000-2009 and 2001-2010) indicated that the lending rate is rigid in the upward direction, corroborating Scholnick's (1996) *customer reaction hypothesis*. On the other hand, tests of asymmetric adjustment for the lending rate in Cameroon suggest that the lending rate adjustment is symmetric. This seems to be conflicting given the no co-integration of the lending and policy rates for the entire sample and the low pass-through and overshooting observed in the rolling window analysis.

However, evidence from the Wald test confirmed that the deposit rate adjustment in Nigeria is symmetric. This is consistent with the evidence from the entire sample. Meanwhile, in Cameroon, asymmetric adjustment is confirmed in the deposit rate and the direction of adjustment rigidity is downward, supporting Hannan and Berger's (1991) *customer reaction hypothesis*. This also is consistent with the asymmetric test result for the entire sample.

Finally, analysis of the impulse transmission indicated that the policy rate in Nigeria exerts some small influence on the deposit market in Cameroon and no influence from the policy rate of Cameroon on the deposit market in Nigeria. The small influence could possibly be because of Nigerian banks gaining entrance into the banking sector of Cameroon in recent years.

6.2 POLICY RECOMMENDATIONS

The overall assessment of the degree of pass-through between Nigeria and Cameroon shows a lower pass-through in Cameroon than in Nigeria in the lending and deposit markets. In

addition, evidence suggests that the Structural Adjustment Programme implemented by the Cameroonian authorities is yet to reposition commercial banks to effectively perform their intermediation role and to promote growth in country. Thus, to ensure that commercial banks play a crucial role in intermediation and thus boosting economic growth, the Cameroon government needs to tackle the following.

Firstly, the government should completely free the credit and deposit markets. Although the loan market was liberalised in June 2008, the minimum constraint on deposits is still applicable. The low rate paid on deposits may act as a disincentive for people to save and could lead to money being transferred from the formal to informal financial sectors such as credit unions and solidarity saving groups. This can make it difficult for the Central Bank to determine exactly the amount of money in circulation as most of the money hardly enters the formal financial sectors.

Furthermore, the governments and the monetary authorities should encourage the use of technology in the banking sector such as internet and cell phone banking and Automated Teller machines (ATM), which are almost, absent amongst some commercial banks in Cameroon, as well as increase the range of financial products offered to customers. The increased use of technology increases the scope of the financial sector development which has a positive impact on the pass-through of the monetary policy.

Secondly, the governments of Nigeria and Cameroon in partnership with their respective Central Banks should create a financial database for consumer credit to facilitate the task of commercial banks to access the creditworthiness of potential borrowers. This will reduce the amount of non-performing loans as well as improving the credit quality of banks, which in turn increases banks' role of financial intermediation. The increase in the number of non-performing loans increases the risk premium, making credit expensive, and as a result banks will end up with excess reserves which impact negatively on pass-through.

Thirdly, the Cameroon government in partnership with the Central Bank should intensify the effort to activate the Douala Stock Exchange and speed up the development of money and bond markets. The development of these markets will provide alternative sources of funding to investors as well as investing to depositors, thereby increasing the level of competition between banks and non-banks. Subsequently, the increase in competition will ensure that the

lending and deposit rates track movements in the discount rate of the Central Bank, increasing monetary policy transmission and hence increase pass-through.

In addition, through the money market, the Central Bank can make the discount rate effective by creating artificial liquidity shortages in the money market thereby making commercial banks indebted to the Central Bank on a daily basis. That is, banks with surplus funds at the end of the trading day will lend to banks in red at the interbank rate to help deficit banks to comply with their reserve requirements at the Central Bank. This will effectively mop up excess liquidity within the banking sector. Furthermore, the Cameroon government should start to issue securities and the Central Bank should create a market in securities by issuing securities for its own portfolio to manage the excess liquidity of the government and banking sector.

Finally, as noted by Sanusi (2010) and confirmed by the present study, the pass-through of monetary policy after the Nigerian banking sector consolidation has actually declined due to inefficiencies in the retail markets. As a remedy, the Central Bank of Nigeria should intensify its effort to boost competition within the retail sector of the market in order to dismantle the oligopolistic tendencies developing in the banking industry as well as enhancing monetary policy effectiveness. It is important to note that the above recommendations are focused only on the financial sectors as identified by the study. Attention should be given to macroeconomic variables as well as the legal structure to ensure a proper functioning of the financial sector.

6.3 AREAS FOR FURTHER STUDIES

As stated in Chapter Two, pass-through is also affected by a host of factors and the study did not model all these factors. Thus, a potential area of research is to model the effect of credit quality, bank concentration, openness and development of the financial sector, excess liquidity and exchange rate regimes on the pass-through of monetary policy.

Secondly, the study also noted that pass-through analysis is sensitive to the choice of rate used as the policy rate and a discount rate adjustment may be subject to political considerations when it comes to adjustment. Thus, future studies can explore this further by using more retail rates such as various rates on lending and deposits as well as using more

wholesale rates such as money market and discount rates in a comparative analysis framework.

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Appendix.

Table A1: Summary of empirical interest rate pass-through studies

Study	Countries	Year	Variables Used		Estimation Method(s)	Pass-through		Speed of Adjustment	Asymmetric Adjustment		Remark(s)
			Policy Rate	Market Interest Rates		Short-run (Immediate)	Long-run		Present	Increase Decrease	
Liu <i>et al.</i> (2008)	New Zealand	1994M8-2004M12	Official cash rate (OCR). Overnight interbank rate	Lending, and deposit rates	Philips-Lorentan and SECM (structural error correction), ARDL	Incomplete. 0.2, 0.24, 0.44 for floating, base lending and time deposit respectively	Almost complete. 0.81 for 2 years bond to the 2-year fixed mortgage; 5-year bond and 5-year fixed mortgages (0.91)	Faster for floating rate about 0.55	Yes	Overall retail rates adjust asymmetrically	Long-term PT of retail rates varies across financial products. Short-term rates show higher degree of PT and faster adjustment speed than long-term rates. Increased transparency has lowered market volatility and hence enhance MP effectiveness.
Liu <i>et al.</i> , (2011)	New Zealand	1989M1-2009M5	Official cash rate (OCR), overnight interbank rate	Lending and deposit rates	Engle-Granger ECM	Higher for mortgage than for base business lending	Average higher for mortgages (1.2) than base lending rates (1.0)	MAL for mortgage is 1.7 months and 3.3 months for base lending rates	Yes for mortgage but not for business lending	Faster when mortgage rates are below equilibrium	Adjustment of business lending rates in response to cost of funds is slower than that of floating mortgages in both short and long run.
Aziakpono and Wilson (2010)	South Africa (SA)	1980-2007	Bank rate	Lending and deposit rates	ECM and asymmetric ECM	Incomplete and varies across the market interest rates	LR 0.59-0.86; rates. T-bill (0.65), MMR (0.68) and gov't bond rate declined from 0.41-0.04	Varies overtime and the lending rates has the highest speed	Yes	Banks are more rigid to adjust lending rate upwards but fast to adjust deposit rates downwards.	Evidence suggests that monetary policy is more effective in an era of liberal financial policy compared to less liberal era as indicated by high PT
Aziakpono <i>et al.</i> (2007)	South Africa	1973M1-2004M8	Discount or repo rate	Lending rates and NCD	EG cointegration, ECM, and Asymmetric error correction model	Lending rates (0.28-1.1) and deposit rates (0.76-1.1)	Complete. Lending rates (0.90-1.2); deposit rates (0.85-1.1)	MAL for lending rates (0.25-2.2) and deposits (0.01-1.7) months	Weak evidence	Evidence supports faster downward adjustment when market rates are above equilibrium than upward adjustment when they are below.	PT is faster during era of more market oriented monetary policy regimes, suggesting that market oriented regime will be more effective than less market oriented policies.
Sander and Kleimeier (2006a)	SACU [CMA(SA, Lesotho, Namibia, Swaziland), Botswana]	1991M1-2005M5	T-Bill and discount rates	Prime lending and deposit rates	(TAR), (M-TAR) models	SR stickiness for deposit rates	Complete PT for SA loan rates. Namibia has the lowest PT for deposits 0.58; 0.49 national and SA t-bill respectively	Deposit rates take about 3 months to adjust to long run equilibrium	Yes	Deposit rates adjust in the downward direction faster than upward. An indication of imperfect competition.	CMA Banking markets show some degree of integration with the SA t-bill rates playing an important role to drive the national policy and market and bank interest rates. IRPT in CMA is rather homogenous for the

											lending rate but not perfect and less homogenous for deposit rate.
Karagiannis <i>et al.</i> (2011)	Southern-eastern Europe (SEE)	1999-2007	Central Bank and money market rates	Lending and deposit rates	GET and ECM	Not reported	Not reported	Symmetric for Greece	Mixed	Asymmetry present in Bulgaria and Slovenia whereas Greece supports symmetry	Evidence is mixed with regards symmetry hypothesis and monetary policy transmission.
Karagiannis <i>et al.</i> (2010)	Europe and USA	1994-2007 for USA, and 1998-2003-EU	Discount rate, federal fund rate, Central Bank rate and MMR	Deposit and lending rates	Disaggregated GETS	Incomplete	EU complete (0.97) and incomplete for US (0.67).	The speed of adjustment depend on the type of rates used as the policy rate	Mixed	Asymmetry found for loan rates in the Euro Area	Empirical evidence for the two banking systems is mixed in relation to PT and completeness.
Egert <i>et al.</i> (2007)	5-Central and Eastern European and 3 Euro Area Countries	1994M1 to 2005M12	Individual country's policy rate	Deposit and lending rates	Dynamic OLS, ARDL, EG, VAR	Incomplete	Complete for lending (1.05) and deposit rates (1.01) in Czech only	PT is low overnight deposits (0.73)	Yes	Asymmetry found between retail and market rates depending on the direction of policy.	PT in CEE-5 on average is similar and are more comparable with those in Spain and is higher than in the core EU countries.
Wang <i>et al.</i> (2009)	US and Asia	1994-2004	Money market rates	Lending and deposit rates	TAR, MTAR, EC-EGARCH(1,1)-M		US deposit markets (0.99); lending (0.86).	High only for US deposit markets	Yes Asian countries lending and deposit rates	Lending rates adjust faster when the policy rate is rising. Deposits are rigid in the upward direction.	PT is complete only for US deposit markets. All other markets have incomplete PT (0.10-0.86) deposits and (0.23-0.63) for lending rates.
Kwapil and Scharler (2010)	USA and EU Area	1995-2003	Money market rates	Lending and deposit rates	EG and ARDL	Incomplete	US: DR (0.74-1.01); LR (0.57-0.73). EU: DR (0.32-0.58) and LR (0.48-0.73)	Sluggish adjustment for the Euro Area in the deposit markets	No	Evidence of symmetric adjustment on USA and in the Euro Area.	US deposit markets is more efficient than the Euro Area. The lending rates in the two markets seem to adjust almost the same.
Moazzami	US and Canada	1969-1995	Money market rates and Treasury Bill rates	Lending rates	Error Correction Model (ECM)	Canada 0.66 and USA 0.34	Complete for USA	Speed and magnitude of adjustment depend on the type of retail rate used as the policy rate	NA	NA	LR multipliers are equal to unity for US irrespective of the type of money market rates used. For Canada, LR multipliers are unity when policy rate is the T-B and less than unity when overnight is used.
Hofmann and Mizen (2004)	UK	1985M-2001	Base rates	13 deposits and mortgages rates	Nonlinear least squares (NLLS)	Incomplete	Complete LRPT for deposit and incomplete for mortgage rates	Between 5-9% of disequilibrium is corrected per month for deposits and 15-28% disequilibrium is corrected for	NA	NA	The speed of adjustment of retail rates to base rates is faster when the gap between the two widens and adjustment is slow when the base rate is moving in the direction to close the gap. The main driver of PT are expected

								mortgage per month			change when the gap between the base and retail rates is growing in absolute size.
Mojon (2000)	Six EU countries	1979-1999	Money market rate	17 deposit and 15 credit rates	ECM and cointegration	Complete for credit (0.73-0.97) than mortgage (0.27-39)	LR (0.53-0.68) for credit. Deposits (0.18-0.43). saving/sight deposit (00-0.28)	Faster for credit than for deposit rates	Observed within each market segment	NA	PT varies across countries and across market. High competition from other sources of finance increase PT. High volatility of MMR reduces PT.
Toolsma <i>et al.</i> (2002)	EU	1980M1-2000M1	Policy rate of each country, interbank rates	Lending rate	Fully modified OLS and rolling windows ECM	Not reported	Complete in most countries and varies from 0.90-1.03	Has become relative stable overtime in most countries except the Netherlands	NA	NA	Major differences exist in PT amongst countries, evidence of weak convergence of monetary policy transmission.
Sander and Kleimeier (2004)	EU	1993M1-2003M10		Lending and deposit rates	Unifying VAR and cointegration	Incomplete for both methods	0.69-0.73 (cost of fund), 0.6-7 (monetary approach). incomplete	Faster for mortgages, consumer loans, short loans to enterprises	Present in deposit rates	Mortgage adjust symmetrical Faster downwards for time deposit	SRPT has become homogenous across EU (integration). EU has undergone structural changes but does not coincide with single currency in EU.
Sander and Kleimeier (2002)	EU	1985M1-1998M12	Money market rate	Lending rates	ECM, TAR, Band-TAR, M-TAR	Incomplete (0.7)	LR is complete and ranged from 0.866-1.179 but not for all countries	Varies across countries	Yes	NA	Speed of adjustment varies across countries and the nature is heterogeneous, differences in PT can be explained by differences in financial structures.
Sander and Kleimier (2006b)	EU and CEECs	1993M1-2003M12-CEECs and 1996M1-2003M6-Euro zone	One-month money market rate	Lending and deposit rates	Unifying VAR and ECM	Higher for corporate loan markets	Complete for CEECs, 0.91 for short term corporate loan, 1.07 for long term corporate loans	Homogenous PT in CEECs. PT in CEECs on average is faster (0.91; 1.07) SR and LR corporate loan than in EU (0.6;0.69) for SR and LR	No	NA	Little evidence of convergence either towards an aggregate EU zone PT or towards a role model. Still early to talk about convergence. SR multiplier has fallen while LR multiplier has increased.
Marotta (2009)	EU	1993M1-2003M9	Interbank rate	Lending rate	ARDL and ECM	NA	Decline from 0.9 to 0.7 except for France. PT values remain wide from 0.59-1.25 to 0.6-1.1 with a cluster around 0.7.	Speed of adjustment has increased rising from 80% to about 100% within a quarter.	NA	NA	Speed of adjustment increases in most countries except for Portugal from 0.34 to 0.57 excluding Germany.
Marotta	EU	1993M1-	Money	Lending	ARDL and	NA	Fallen from 0.9-	Varies from	NA	NA	PT is faster using the MIR

(2007)		2003M9 And 2003M1- 2007M3	market rate	rate	ECM		0.7 except for France. harmonised data (MIR):0.9 for small loans,0.97 for large loans	0.59-1.25 to 0.6-1.1 with a cluster around 0.7. using MIR LRPT ranges from 0.77-1.02 and 0.82-1.14			data compared to unharmonised. Most EU countries undergone some structural changes in preparation for the single monetary policy.
De Bondt (2005)	Euro area	1996M1 – 2001M5	EONIA(the euro overnight index average)	Deposit and loan rates	ECM,VECM and VAR models	Incomplete about 50% for deposit and lending rates	Complete 100% for lending rates	Complete only for official interest rate to market interest rates up to 3 months maturity	NA	NA	Faster retail bank interest rate pass-through in the euro area since the introduction of the euro in 1999.
De Bondt (2002)	EU	1996M1-2001M5	EONIA(the euro overnight index average)	Lending and deposit rates	ECM framework	Incomplete 0.5	Complete especially for lending rates	Overnight deposits and deposits redeemable (3 months) are the most sticky in EU.LRPT of 0.4	NA	NA	PT varies across retail rates in Euro area. Increase competition and interest rate elasticity, decrease switching and information asymmetry has increased PT since 1999.
Leuvensteijn <i>et al.</i> (2008)	EU	1992-2004 and 1994M1-2006M3	Money market rate	Lending and deposit rates	ECM and Boone indicator	Faster in markets where competition is high	Faster for mortgage, loans to enterprises and time deposits	Bank interest rates spreads on mortgage, consumer and short term loans to enterprises is lower in highly competitive markets	NA	NA	Stronger competition in the loan markets lowers banks' loan rates. Country specific LR and SRPT differ greatly. Competition have a tendency to contain bank loans in line with other market rates.
Sorensen and Werner (2006)	EU	1999-2004	Market rate for each country	Lending and deposit rates	Dynamic Seemly Unrelated (DSUR) models	Incomplete but not reported	Mortgages 1.17; consumer loans 0.38; short term loans to enterprises 0.71; long term loans to enterprises 0.71; current account 0.15;time deposit 0.84. NB averages LTPT	Corporate loans adjust faster, followed by mortgages. Consumer and current accounts are very sticky.	NA	NA	Strong evidence of market segmentation and lack of integration in euro area. Difficult to see a clear trend when comparing PT across countries. Main issue is maturity matches and dataset used (harmonised and unharmonised).
Hulsewig <i>et al.</i> (2009)	EU	1990-2002	Money market rate	Lending rates	New Keynesian DSGE, VAR	Incomplete 0.54	Incomplete 0.41	Slow and incomplete	NA	NA	Prices changes by firms greatly affect the movement in lending rates.
Fitzpatrick and Reilly (2001)	Ireland	1980-2001	One month money market rate (MMR)	Lending rates	ECM	incomplete	Incomplete and varies from 0.92 for prime rate to 0.54 for consumer	Varies greatly across lending rates	NA	NA	Accounting for structural changes improves the adjustment speed as well as PT.

							loans				
Baugnet <i>et al.</i> (2007)	Belgium	2003M1-2006M9	Money market rates	Deposit and lending rates	Partial adjustment model	Complete on average for loans; 0.95 for NBFI and 0.75 for households	Short term loans 0.83 (mortgages) and 0.78 loans to NBFI; long terms loans 0.6 (mortgages); 0.8 NBFI	On average 0.95 for loans categories to NBFI and 0.75 for loans to households	NA	NA	Belgian commercial banks adjust retail rates in reaction to changes in money market rate relatively fast but incomplete. Less liquid banks adjust retail rates faster.
De Graeve <i>et al.</i> (2004)	Belgium	1993M1-2002M12	Money market rates	Lending and deposit rates	ECM and ARDL	Incomplete; 0.4 for consumer credit, loans 0.8	Complete for mortgage 0.92 and investment loans 1.01	More complete for firm and consumer loans with longer maturities	NA	NA	The launch of EU has resulted in less competitive pricing in the banking sector noticeable for consumer products.
De Graeve <i>et al.</i> (2007)	Belgium	1993M1-2002M12	Money market rates	Deposit and lending rates	Panel cointegration and ECM	Incomplete. 0.19-0.98-lending; 0.02-0.95-deposit rates	Incomplete. Ranges from 0.66-0.99-lending; 0.53-0.98-deposit rates	Almost complete for corporate loan (0.94); 0.91 consumer loans	No evidence	NA	Corporate loans are more complete (SRPT of 0.77) compared to consumer loans (LRPT of 0.65). Demand and savings deposits are the stickiest.
Weth (2002)	Germany	1993M4-2000M12	Money market rates	Lending and deposit rates	ECM and ARDL	0.36 for current account and 0.58 for credits	Ranges from 0.52-0.91 for corporate lending	Mortgages adjust almost complete from 0.78-0.91	NA	NA	Large banks and banks with few savings deposits adjust lending rates faster because their scope of setting interest rates is limited.
Horath <i>et al.</i> (2004)	Hungary	1997M1-2004M4	Money market rate	Lending and deposit rates	TAR and ECM	Incomplete. 0.56 corporate loans and 0.32 corporate deposits	Corporate loans (0.98); corporate deposits (0.87)	Consumer credits adjust slow and incomplete signalling low interest rate elasticity.	Yes	Faster upwards adjustment for household deposits to changes in MMR	The degree and speed of adjustment on both Corporate deposits and loans show stronger transmission than the corresponding interest rates on household loans.
Aydin (2007)	Turkey	2001M6-2005M5	Money market rate	Lending rate	Panel cointegration and ECM	Corporate loan=0.22, housing loan = -0.16, cash = -0.22 and automobile loan = -0.64	Corporate=0.63, housing = 1.59, cash = 1.07 and automobile loan = 1.08	Adjustment for corporate loan = 1.19, housing = 2.90, cash = 1.67 and automobile loans = 0.84	NA	NA	SRPT estimates are insignificant except for cash and automobile loans. Long runs PT are very high for all types of loans when the credit market is functioning effectively.
Ozdemir (2009)	Turkey	2001M1-2007M6	Money market	Lending and deposit rates	Symmetric and asymmetric ECM	LR = 0.35 DR = 0.12	LR=1.19 and DR = 1.05	Lending and deposit rates adjust downward slowly	No	Evidence of symmetry in lending and deposit rates is supported	Evidence shows that Turkish banks adjust fully their retail rates in reaction to innovations in money market rates.
Amarasekara	Sri Lanka	1990M6-	Call money	Lending	Polynomial	LR = 0.18	LR = 0.51	Only prime	No	NA	PT of changes in MMR to

(2009)		2004M4	market and policy interest rates	and deposit rates	distributed lag and cointegration	DR very low (0.006-0.046)		lending show a marginal PT of 0.51 and other rates are sticky			retail rates of commercial banks in Sri Lanka is incomplete and sticky.
Chong (2010)	Hong Kong	1982M8-2007M8	Money market rate	Deposit rates	EG , ECM and TAR models	NA	Regulated period: DR ranged from 0.53-0.76 and deregulated complete but not for all rates (0.68-0.98)	ML in the regulated era is 2.7 months DR is above equilibrium and ML is 11.5months in deregulated era	Yes in both periods	Upward rigidity in saving and time deposits during regulated and downward rigidity in 6-month time deposit only	Evidence shows that the removal of interest rate rules has linked deposit rates closely with market interest rates. Deregulation has increased consumer welfare due to increased competition in deposit markets.
Khawaja and Khan (2008)	Pakistan	1991M6-2008M6	Treasury bill rate	Deposit and lending rates	Transfer function approach	Incomplete	LR= 0.43; DR = 0.16 incomplete	About 83% of changes in 6-month t-bill is passed to 6 months KIBOR in the first month	Yes for lending and deposit rates	More rigid for deposit rates since it is not pegged to any rates	PT of LR is much faster than DR because of the pegging of corporate rate to the KIBOR rates. Low PT for DR is due to insensitivity to interest rates changes by depositors.
Karagiannis <i>et al.</i> (2009)	Brazil, Russia, India and China (BRIC)	Brazil: 1998M1-2007M8; Russia 1998M1-2007M9 and 1998M3-2007M7-China	Central Bank and money market rates	Lending and deposit rates	GET and ECM	Not reported	Brazil (DR=0.96, LR=); Russia (DR=0.61, LR=0.40); India (LR=1.21); China (LR=0.53, DR=1.42)	NA	Yes	Loan rates adjust Upward faster and deposits also adjust downward faster.	Empirical results are mixed regarding the transmission of monetary policy shocks and the degree of PT in Brazil, India and Russia. Great variation also exists in the three economies. No meaningful results were obtained with the GETS methodology in China
Jankee (2005)	Mauritius	1988Q1-2003Q3	Interbank Money market rate	Lending and deposit rates	Johansen cointegration ,TAR, M-TAR	LR=0.24 DR=0.41	Not reported	ECM model LR = -0.601 DR= -0.641	Only for lending rate	Lending rate adjust faster to decreases in the margins (about 80%)	PT is faster for DR compared to LR. Asymmetry found only for lending rate.
Acheampong (2005)	Ghana	1994M9-2004M2	Money market rate	Lending and deposit rates	Cointegration, symmetric and asymmetric ECM	LR=0.26, DR=0.22	LR=0.55, DR=0.69	NA	No	NA	Monetary policy transmission through the interest rate channel is weak (low SR and LRPT).
Samba and Yan (2010)	CEMAC	1990M1-2007M12	Discount rate	Lending and deposit rates	ARDL	LR=0.67 DR=0.37	LR=6.21 DR=0.34	LR= -0.00216 DR= -0.036	Yes for both markets	NA	Incomplete long run PT for deposits but lending rate overshoot in the long run.
Sanusi (2010)	Nigeria	2002M1-2010M4	Interbank money market rate	Lending and deposit rates	Structural VAR (SVAR)	PT 3 and 6 months DR=0.09' LR =0.01	Not reported	3 and 6 months deposits adjustment takes 6-7months	NA	NA	PT of lending and deposit decline after the banking sector consolidations but PT of monetary policy to

								and 12 moths for prime LR			money market rates actually increased.
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Table A2: Unit roots test – entire sample

Sample period: 1990-2010				Sample period: 1990M1-2008M6			
Nigeria				Cameroon			
CPR				CPR			
ADF	Level	Intercept	-1.58	ADF	Level	Intercept	-1.32
		Intercept & trend	-2.41			Intercept & trend	-3.26 ^c
	1st Diff	Intercept	-15.35 ^a		1st Diff	Intercept	-11.04 ^a
		Intercept & trend	-15.34 ^a			Intercept & trend	-11.02 ^a
KPSS	Level	Intercept	0.98	KPSS	Level	Intercept	1.67
		Intercept & trend	0.23			Intercept & trend	0.15 ^c
	1st Diff	Intercept	0.05 ^a		1st Diff	Intercept	0.04 ^a
		Intercept & trend	0.03 ^a			Intercept & trend	0.04 ^a
LR				LR			
ADF	Level	Intercept	-2.46	ADF	Level	Intercept	-1.66
		Intercept & trend	-3.06			Intercept & trend	-1.89
	1st Diff	Intercept	-19.93 ^a		1st Diff	Intercept	-14.62 ^a
		Intercept & trend	-19.89 ^a			Intercept & trend	-14.70 ^a
KPSS	Level	Intercept	0.89	KPSS	Level	Intercept	0.43 ^b
		Intercept & trend	0.08 ^a			Intercept & trend	0.39
	1st Diff	Intercept	0.04 ^a		1st Diff	Intercept	0.22 ^a
		Intercept & trend	0.04 ^a			Intercept & trend	0.04 ^a
DR				DR			
ADF	Level	Intercept	-2.47	ADF	Level	Intercept	-1.53
		Intercept & trend	-3.89			Intercept & trend	-2.04
	1st Diff	Intercept	-8.06 ^a		1st Diff	Intercept	-15.35 ^a
		Intercept & trend	-8.04 ^a			Intercept & trend	-15.33 ^a
KPSS	Level	Intercept	0.79	KPSS	Level	Intercept	1.51
		Intercept & trend	0.13			Intercept & trend	0.27
	1st Diff	Intercept	0.05 ^a		1st Diff	Intercept	0.08 ^a
		Intercept & trend	0.05 ^a			Intercept & trend	0.05 ^a

Note: a=significant at 1%; b=significant at 5% and c=significant at 10%

ADF (H: 0 ~ Unit Root) Critical Values: 1% (-3.464643), 5% (-2.876515), 10% (-2.574831)

KPSS (H: 0 ~ Stationarity) Critical Values: 1% (0.739), 5% (0.463), 10% (0.347)

Table A3: Summary of unit roots test of rolling window analysis for Nigeria

			1990-1999	1991-2000	1992-2001	1993-2002	1994-2003	1995-2004	1996-2005	1997-2006	1998-2007	1999-2008	2000-2009	2001-2010
Nigeria			W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12
CPR														
ADF	Level	Intercept	-2.0906	-2.0379	-1.9172	-2.2892	-1.4109	-2.064	-1.3023	-0.8942	-0.7289	-0.6981	-0.2575	-0.2862
		Intercept & trend	-2.0415	-2.1211	-1.842	-2.3404	-2.304	-2.0623	-1.1008	-1.1683	-2.0740	-3.4357 ^c	-2.2234	-3.6741 ^b
	1st Diff	Intercept	-10.3807 ^a	-10.3002 ^a	-10.4106 ^a	-10.2763 ^a	-8.9513 ^a	-8.9513 ^a	-9.0946 ^a	-7.8730 ^a	-9.6053 ^a	-9.9821 ^a	-11.0938 ^a	-10.9202 ^a
		Intercept & trend	-10.3539 ^a	-10.2638 ^a	-10.3980 ^a	-10.2825 ^a	-8.9481 ^a	-8.9563 ^a	-9.1651 ^a	-8.0448 ^a	-9.7518 ^a	-9.9905 ^a	-11.1075 ^a	-10.9454 ^a
KPSS	Level	Intercept	0.2992 ^c	0.2000 ^c	0.2079 ^a	0.2140 ^b	0.7845	0.5395 ^c	0.2758 ^a	0.2861 ^a	0.6801 ^c	1.0743	1.1620	1.1978
		Intercept & trend	0.1068 ^b	0.1297 ^b	0.1890 ^c	0.2005 ^c	0.0909 ^a	0.1677 ^c	0.2398	0.2411	0.2230	0.1520 ^c	0.1183 ^c	0.0429 ^a
	1st Diff	Intercept	0.0674 ^a	0.0578 ^a	0.0860 ^a	0.1336 ^a	0.0975 ^a	0.1036 ^a	0.1652 ^a	0.2505 ^a	0.2372 ^a	0.1636 ^a	0.1064 ^a	0.1326 ^a
		Intercept & trend	0.0520 ^a	0.0570 ^a	0.0460 ^a	0.0662 ^a	0.0730 ^a	0.0580 ^a	0.0510 ^a	0.0381 ^a	0.0431 ^a	0.0692 ^a	0.0417 ^a	0.0836 ^a
LR														
ADF	Level	Intercept	-2.5709 ^c	-2.5325 ^c	-1.8912	-2.7021 ^c	-1.6433	-1.5583	-1.3654	-1.2794	-1.0818	-1.0383	-1.3578	-1.1985
		Intercept & trend	-2.8706	-2.8222	-1.8913	-2.6680	-1.7885	-1.5020	-1.2713	-1.3598	-1.9790	-2.9267	-1.8592	-2.1282
	1st Diff	Intercept	-13.400 ^a	-13.6176 ^a	-13.6260 ^a	-13.4955 ^a	-10.9321 ^a	-10.8972 ^a	-10.8725 ^a	11.1825 ^a	-10.7057 ^a	-14.6337 ^a	-14.7635 ^a	-14.6054 ^a
		Intercept & trend	-13.3469 ^a	-13.5612 ^a	-13.5805 ^a	-13.4644 ^c	-10.8912 ^a	-10.8658 ^a	10.8660 ^a	-11.2783 ^a	10.8260 ^a	-14.6896 ^a	-14.7076 ^a	-14.5456 ^a
KPSS	Level	Intercept	-0.5355 ^c	0.4029 ^c	0.4191 ^b	0.2717 ^b	0.5457 ^c	0.3975 ^b	0.2780 ^a	0.3015 ^a	0.5137 ^c	0.8963	0.9374	0.9022
		Intercept & trend	0.1021 ^b	0.1143 ^c	0.2129 ^c	0.2578	0.1637 ^c	0.1516 ^b	0.2318	0.2900	0.2594	0.1875 ^c	0.1300 ^c	0.2238
	1st Diff	Intercept	0.0754 ^a	0.0982 ^a	0.1271 ^a	0.1375 ^a	0.1330 ^b	0.1488 ^a	0.1826 ^a	0.2060 ^a	0.3536 ^b	0.2328 ^a	0.1181 ^a	0.0680 ^a
		Intercept & trend	0.0714 ^a	0.0971 ^a	0.1087 ^a	0.1046 ^a	0.1353 ^b	0.1266 ^b	0.1165 ^b	0.0847 ^a	0.0959 ^a	0.1107 ^a	0.1088 ^a	0.0715 ^a
DR														
ADF	Level	Intercept	-2.0485	-1.9058	-2.0873	-2.4343	-1.6151	-2.2441	-2.0533	-1.8937	-1.7317	-1.8388	-1.6806	-1.3709
		Intercept & trend	-2.5326	-2.5920	-1.9827	-2.3364	-1.8734	-2.5016	-2.0734	-1.6438	-1.9920	-2.2340	-1.8245	-2.8544
	1st Diff	Intercept	-5.2032 ^a	-4.9010 ^a	-13.7990 ^a	-13.9314 ^a	-13.8723 ^a	-13.5929 ^a	-13.3324 ^a	-14.3590 ^a	-14.9386 ^a	-15.0161 ^a	-15.4888 ^a	-14.2818 ^a
		Intercept & trend	-5.1949 ^a	-4.8826 ^a	-13.8063 ^a	-13.9621 ^a	-13.8261 ^a	-13.5375 ^a	-13.2857 ^a	14.4461 ^a	-14.9763 ^a	-14.9662 ^a	-15.4203 ^a	-14.5014 ^a
KPSS	Level	Intercept	0.7808	0.6615 ^c	0.5137	0.2859 ^b	0.3658 ^b	0.4325 ^c	0.3570 ^b	0.3201 ^a	0.2934 ^a	0.4312 ^c	0.3881 ^c	0.6892 ^c
		Intercept & trend	0.0923 ^a	0.1174 ^c	0.2180	0.2464	0.1652 ^c	0.1154 ^b	0.1520 ^c	0.2604	0.2304	0.1457 ^b	0.1263 ^b	0.0963 ^a
	1st Diff	Intercept	0.0727 ^a	0.0914 ^a	0.1439 ^a	0.0954 ^a	0.0694 ^a	0.0674 ^a	0.1039 ^a	0.1433 ^a	0.1638 ^a	0.0977 ^a	0.0686 ^a	0.1816 ^a
		Intercept & trend	0.0632 ^a	0.0864 ^a	0.0763 ^a	0.0463 ^a	0.0530 ^a	0.0664 ^a	0.0900 ^a	0.0435 ^a	0.1638 ^a	0.0840 ^a	0.0683 ^a	0.0932 ^a

Table A4: Summary results of unit roots test of rolling window analysis for Cameroon

			1990-1999	1991-2000	1992-2001	1993-2002	1994-2003	1995-2004	1996-2005	1997-2006	1998-2007	1999-2008
Cameroon			W1	W2	W3	W4	W5	W6	W7	W8	W9	W10
CPR												
ADF	Level	Intercept	-1.4324	-1.5055	-1.4807	-2.2159	-5.22424 ^a	-0.8234	-1.4278	-0.5087	-0.7784	-0.5654
		Intercept & trend	-2.6811	-2.6832	-2.7526	-3.6089 ^a	-5.88431 ^a	-4.6638 ^a	-4.0608 ^a	-3.5546 ^b	-3.6460 ^b	-3.4432 ^c
	1st Diff	Intercept	-7.9431 ^a	-7.8799 ^a	-7.8770 ^a	-7.5610 ^a	-	-10.5781 ^a	-10.7805 ^a	-11.2009 ^a	-11.1320 ^a	-10.7609 ^a
		Intercept & trend	-7.9283 ^a	-7.8460 ^a	-7.8770 ^a	-7.5769 ^a	-	-10.5535 ^a	-10.7613 ^a	-11.1580 ^a	-11.0844 ^a	-10.7145 ^a
KPSS	Level	Intercept	0.8993	1.0147	1.0126	0.9695	1.0445	1.2335	1.3037	1.2846	1.2789	1.1940
		Intercept & trend	0.1537 ^c	0.1169 ^b	0.1726 ^c	0.2224	0.1677 ^c	0.0576 ^a	0.0723 ^a	0.1490 ^c	0.0589 ^a	0.0935 ^a
	1st Diff	Intercept	0.0747 ^a	0.0471 ^a	0.0449 ^a	0.0889 ^a	0.3476 ^b	0.1520 ^a	0.0648 ^a	0.0302 ^a	0.0306 ^a	0.0712 ^a
		Intercept & trend	0.0535 ^a	0.0470 ^a	0.0460 ^a	0.0293 ^a	0.1201 ^b	0.1006 ^c	0.0488 ^a	0.0203 ^a	0.0305 ^a	0.0711 ^a
LR												
ADF	Level	Intercept	-1.6059	-1.2809	-1.5848	-1.6072	-1.5440	-1.9718	-0.5650	-0.2535	-0.6495	-0.9789
		Intercept & trend	-2.3056	-2.3076	-1.4262	-1.3586	-1.5747	-2.4720	-2.2193	-2.3894	-2.5775	-2.4102
	1st Diff	Intercept	-10.6935 ^a	-10.6202 ^a	-10.6405 ^a	-10.6376 ^a	-11.3152 ^a	-10.7774 ^a	-10.9071 ^a	-10.9898 ^a	-10.9898 ^a	-10.7137 ^a
		Intercept & trend	-10.6504 ^a	-10.5814 ^a	-10.6536 ^a	-10.6624 ^a	-11.3044 ^a	-10.9424 ^a	-10.8952 ^a	-11.0044 ^a	-10.9488 ^a	-10.6670 ^a
KPSS	Level	Intercept	0.9164	0.9143	0.8162	0.4551 ^b	0.2846 ^a	0.3612 ^b	1.0965	1.1603	1.1750	1.1065
		Intercept & trend	0.1319 ^b	0.1280 ^b	0.1594 ^c	0.2334	0.2758	0.2437	0.1576 ^a	0.1027 ^c	0.0730 ^a	0.0868 ^a
	1st Diff	Intercept	0.0499 ^a	0.0750 ^a	0.1535 ^a	0.1600 ^a	0.1274 ^a	0.3035 ^a	0.1019 ^a	0.1137 ^a	0.0609 ^a	0.0539 ^a
		Intercept & trend	0.0508 ^a	0.0662 ^a	0.0980 ^a	0.0657 ^a	0.0652 ^a	0.0765 ^a	0.0614 ^a	0.0531 ^a	0.0541 ^a	0.0513 ^a
DR												
ADF	Level	Intercept	-1.0698	-1.0965	-1.3102	-1.7617	-5.0911 ^a	-2.2915	6.0611	-6.1885 ^a	0.1020	-0.1090
		Intercept & trend	-1.9943	-1.8873	-1.6756	-1.6337	-4.2173 ^a	-1.5012	-5.6448 ^a	-6.3588 ^a	-1.2758	-1.5690
	1st Diff	Intercept	-11.2308 ^a	-11.2102 ^a	-11.2102 ^a	-11.2313 ^a	-	-11.5692 ^a	-14.9295 ^a	-	-10.9385 ^a	-10.6608 ^a
		Intercept & trend	-11.1826 ^a	-11.1629 ^a	-11.1799 ^a	-11.2663 ^a	-	-11.7977 ^a	-14.8896 ^a	-	-11.0826 ^a	-10.7328 ^a
KPSS	Level	Intercept	1.0672	1.0402	0.9713	0.8291	0.6701 ^c	0.7272 ^c	0.6087 ^b	0.5652 ^c	0.7709	0.8586
		Intercept & trend	0.1200 ^c	0.1287 ^b	0.1930 ^c	0.2406	0.2258	0.2445	0.1686 ^c	0.1897 ^c	0.2532	0.2489
	1st Diff	Intercept	0.0688 ^a	0.0816 ^a	0.0942 ^a	0.1426 ^a	0.5842 ^c	0.0937 ^a	0.0934 ^a	0.1751 ^a	0.3097 ^a	0.2444 ^a
		Intercept & trend	0.0691 ^a	0.0800 ^a	0.0694 ^a	0.0473 ^a	0.1641 ^c	0.0479 ^a	0.1111 ^a	0.1647 ^c	0.0752 ^a	0.0834 ^a
Note: a=significant at 1%; b=significant at 5% and c=significant at 10%												
ADF (H: 0 ~ Unit Root) Critical Values: 1% (-3.464643), 5% (-2.876515), 10% (-2.574831)												
KPSS (H: 0 ~ Stationarity) Critical Values: 1% (0.739), 5% (0.463), 10% (0.347)												

Table A5: Summary of pass-through for entire sample

Summary of IRPT for Nigeria and Cameroon whole sample													
	Sample period		Co-integration tests				Long run PT		Short run PT		ECT _{t-1}		ML
	From	To	JJ	EG	CRDW	ECM	Coeff	t-stats	Coeff	t-stats	Coeff	t-stat	
Nigeria													
Lending rate	1990M1	2010M12	No	Yes	Yes	Yes	0.72	21.84	0.71	9.55	-0.13	-3.55	-2.46
Deposit rate	1990M1	2010M12	No	Yes	No	Yes	0.70	17.07	0.50	6.91	-0.08	-2.80	-6.35
Cameroon													
Lending rate	1990M1	2008M6	No	No	No	No			0.70	5.76			
Deposit rate	1990M1	2008M6	Yes	Yes	No	Yes	0.55	44.26	0.27	7.29	-0.11	-4.01	-6.49

Table A6: Summary of Asymmetric Pass-through for entire sample

Asymmetric error correction terms												Summary	
Countries	Sample Period		ECT ⁺ _{t-1}		ECT _{t-1}		Wald Test		Mean Lag		PT	Adjustment	Hypothesis
	From	To	Coeff	t-stat	Coeff	t-stat	F-stat	PV	ML ⁺	ML ⁻	mechanism	rigidity	
Nigeria													
Lending rate	1990M1	2010M12	-0.169	-2.98	-0.06	-0.82	0.93	0.34	-1.87	-5.10	symmetric	downward	collusive pricing arrangement
Deposit rate	1990M1	2010M12	-0.143	-2.53	-0.02	-0.34	1.73	0.19	-3.42	-26.71	symmetric	downward	customer reaction
Cameroon													
Lending rate	1990M1	2008M6	no co-integration was found between lending and policy rate in Cameroon										
Deposit rate	1990M1	2008M6	-0.211	-4.55	0.022	0.390	7.158	0.008	-3.42	32.87	asymmetric	downward	customer reaction

Table A7: SR, LR and MAL for rolling windows – Nigeria

Summary of IRPT of rolling windows for Nigeria											
Interest rates	Rolling windows		Intercept		Long run PT		Short run PT		ECT _{t-1}		ML
	From	To	Coef.	t-stat	Coef	t-stats	Coef	t-stat	Coef	t-stat	
Lending rate	1990	1999	5.49	6.00	1.01	18.34	0.87	8.95	-0.20	-3.14	0.74
Lending rate	1991	2000	5.89	6.42	0.97	17.36	0.82	8.44	-0.20	-3.12	1.02
Lending rate	1992	2001	6.23	6.83	0.95	17.50	0.80	8.24	-0.20	-3.24	1.05
Lending rate	1993	2002	6.26	7.72	0.94	19.68	0.96	10.54	-0.19	-2.88	0.44
Lending rate	1994	2003	10.66	12.39	0.64	11.81	0.13	1.23	-0.14	-3.20	6.37
Lending rate	1995	2004	9.52	10.77	0.70	12.64	0.13	1.23	-0.14	-3.30	6.03
Lending rate	1996	2005	8.09	9.69	0.78	14.84	0.14	1.34	-0.16	-3.52	5.32
Lending rate	1997	2006	6.46	7.85	0.87	16.71	0.10	1.11	-0.16	-3.58	5.37
Lending rate	1998	2007	9.30	13.66	0.70	16.02	0.09	1.17	-0.11	-3.02	7.81
Lending rate	1999	2008	8.98	14.11	0.72	17.30	0.11	0.93	-0.18	-3.30	4.75
Lending rate	2000	2009	11.05	17.97	0.61	14.28	0.07	0.57	-0.10	-1.85	9.64
Lending rate	2001	2010	12.51	22.17	0.52	12.41	0.05	0.35	-0.09	-2.09	10.03
Deposit rate	1990	1999	-1.77	-1.52	1.00	14.40	0.63	7.39	-0.09	-2.03	3.99
Deposit rate	1991	2000	-1.20	-1.05	0.93	13.39	0.57	6.94	-0.08	-1.90	5.18
Deposit rate	1992	2001	-1.84	-1.60	0.96	13.97	0.53	5.82	-0.09	-1.96	4.84
Deposit rate	1993	2002	-1.88	-1.81	0.94	15.36	0.60	6.21	-0.17	-2.68	2.55
Deposit rate	1994	2003	1.69	1.23	0.71	8.14	-0.04	-0.23	-0.09	-2.06	11.31
Deposit rate	1995	2004	0.83	0.57	0.76	8.42	-0.05	-0.25	-0.11	-2.47	9.02
Deposit rate	1996	2005	-1.07	-0.80	0.86	10.21	-0.03	-0.18	-0.14	-2.80	7.31
Deposit rate	1997	2006	-2.85	-2.30	0.96	12.32	0.00	-0.03	-0.14	-2.84	6.87
Deposit rate	1998	2007	2.86	3.18	0.63	10.94	0.02	0.16	-0.14	-2.65	6.94
Deposit rate	1999	2008	5.21	6.32	0.50	9.33	0.05	0.36	-0.12	-2.29	7.88
Deposit rate	2000	2009	7.59	9.94	0.37	7.02	0.05	0.35	-0.09	-1.83	10.97
Deposit rate	2001	2010	5.47	7.90	0.53	10.32	0.03	0.16	-0.10	-2.15	9.84

Table A8: SR, LR and MAL for rolling windows – Cameroon

Summary of IRPT of rolling windows for Cameroon											
Interest rates	Rolling windows		Intercept		Long run PT		Short run PT		ECT _{t-1}		ML
	From	To	Coeff.	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat	
Lending rate	1990	1999	25.90	26.90	-0.72	-7.20	0.60	4.11	-0.07	-2.45	6.58
Lending rate	1991	2000	26.35	32.63	-0.73	-8.46	0.47	3.33	-0.07	-2.49	8.04
Lending rate	1992	2001	25.81	31.98	-0.67	-7.48	0.55	3.39	-0.07	-2.15	7.05
Lending rate	1993	2002	23.86	26.95	-0.47	-4.52	0.59	3.35	-0.06	-1.98	7.79
Lending rate	1994	2003	NA	NA	NA	NA	0.50	2.07	NA	NA	NA
Lending rate	1995	2004	13.33	6.95	0.95	3.53	0.65	1.78	-0.06	-2.07	7.81
Lending rate	1996	2005	4.01	5.02	2.36	20.43	1.39	4.93	-0.09	-2.57	5.68
Lending rate	1997	2006	0.02	0.02	2.97	30.07	1.92	6.04	-0.11	-2.64	8.86
Lending rate	1998	2007	-1.38	-2.29	3.19	33.80	2.01	6.25	-0.11	-2.67	9.37
Lending rate	1999	2008	-2.20	-3.48	3.32	32.65	2.48	7.10	-0.11	-2.62	13.53
Deposit rate	1990	1999	0.35	1.58	0.65	28.19	0.27	5.31	-0.17	-3.92	4.06
Deposit rate	1991	2000	0.49	3.32	0.62	39.22	0.31	6.23	-0.27	-4.68	2.49
Deposit rate	1992	2001	0.72	5.36	0.60	39.82	0.31	6.24	-0.29	-4.91	2.27
Deposit rate	1993	2002	0.94	7.01	0.57	36.22	0.35	6.59	-0.24	-4.20	2.63
Deposit rate	1994	2003	1.18	7.86	0.55	28.82	0.31	4.31	-0.25	-4.33	2.89
Deposit rate	1995	2004	3.84	30.44	0.18	9.97	0.04	0.87	-0.13	-2.52	7.37
Deposit rate	1996	2005	4.25	42.36	0.11	7.88	0.11	1.66	-0.22	-3.47	4.19
Deposit rate	1997	2006	3.78	27.66	0.17	8.50	0.13	2.94	-0.02	-0.63	48.03
Deposit rate	1998	2007	NA	NA	NA	NA	0.13	3.03	NA	NA	NA
Deposit rate	1999	2008	NA	NA	NA	NA	0.16	3.35	NA	NA	NA

Table A9: Asymmetric error correction and ML of rolling windows – Nigeria

Asymmetric error correction terms and the mean adjustment lags of rolling windows for Nigeria													
Asymmetric error correction terms											Summary		
Interest rates	Rolling windows		ECT ⁺ _{t-1}		ECT ⁻ _{t-1}		Wald Test	Mean Lag			PT mechanism	Adjustment rigidity	Hypothesis
	From	To	Coeff	t-stat	coeff	t-stat	F-stat	PV	ML ⁺	ML ⁻			
Lending rate	1990	1999	-0.3745	-3.05	-0.06	-0.57	2.73	0.10	0.40	2.47	asymmetric	downward	collusive pricing arrangement
Lending rate	1991	2000	-0.3648	-3.34	-0.02	-0.17	3.56	0.06	0.55	10.61	asymmetric	downward	collusive pricing arrangement
Lending rate	1992	2001	-0.3954	-3.53	-0.02	-0.20	4.20	0.04	0.56	9.94	asymmetric	downward	collusive pricing arrangement
Lending rate	1993	2002	-0.3653	-2.83	-0.05	-0.51	2.54	0.11	0.32	2.19	symmetric	downward	collusive pricing arrangement
Lending rate	1994	2003	-0.1315	-1.45	-0.14	-1.78	0.05	0.82	7.38	5.78	symmetric	upward	customer reaction
Lending rate	1995	2004	-0.1334	-1.57	-0.15	-1.82	0.01	0.90	6.44	5.70	symmetric	upward	customer reaction
Lending rate	1996	2005	-0.1671	-2.08	-0.15	-1.80	0.02	0.89	5.01	5.66	symmetric	downward	collusive pricing arrangement
Lending rate	1997	2006	-0.2109	-2.71	-0.11	-1.49	0.61	0.44	4.09	7.58	symmetric	downward	collusive pricing arrangement
Lending rate	1998	2007	-0.145	-2.11	-0.08	-1.01	0.29	0.59	6.14	11.37	symmetric	downward	collusive pricing arrangement
Lending rate	1999	2008	0.00627	0.07	-0.36	-3.85	5.52	0.02	142.73	2.46	asymmetric	upward	customer reaction
Lending rate	2000	2009	0.03974	0.47	-0.27	-2.69	4.09	0.04	23.34	3.38	asymmetric	upward	customer reaction
Lending rate	2001	2010	0.03809	0.47	-0.26	-2.71	3.79	0.05	24.94	3.72	asymmetric	upward	customer reaction
Deposit rate	1990	1999	-0.3181	-2.46	0.03	0.41	3.55	0.06	0.98	10.07	asymmetric	downward	customer reaction
Deposit rate	1991	2000	-0.264	-2.13	0.04	0.51	2.51	0.11	1.40	8.22	symmetric	downward	customer reaction
Deposit rate	1992	2001	-0.2415	-1.86	0.02	0.23	1.51	0.22	1.72	16.71	symmetric	downward	customer reaction
Deposit rate	1993	2002	-0.3176	-2.49	0.04	0.40	2.83	0.09	1.11	7.98	asymmetric	downward	customer reaction
Deposit rate	1994	2003	-0.2342	-2.07	0.02	0.21	1.88	0.17	4.23	50.14	symmetric	downward	customer reaction
Deposit rate	1995	2004	-0.2612	-2.43	0.01	0.11	2.27	0.13	3.79	96.76	symmetric	downward	customer reaction
Deposit rate	1996	2005	-0.2553	-2.49	-0.03	-0.28	1.69	0.19	3.82	35.76	symmetric	downward	customer reaction
Deposit rate	1997	2006	-0.2351	-2.55	-0.04	-0.47	1.43	0.23	4.06	21.27	symmetric	downward	customer reaction
Deposit rate	1998	2007	-0.1314	-1.37	-0.15	-1.27	0.01	0.92	7.37	6.46	symmetric	upward	collusive pricing arrangement
Deposit rate	1999	2008	-0.2393	-2.32	0.02	0.17	1.82	0.18	3.78	47.39	symmetric	downward	customer reaction
Deposit rate	2000	2009	-0.1859	-2.08	0.03	0.31	1.74	0.19	5.02	29.90	symmetric	downward	customer reaction
Deposit rate	2001	2010	-0.1318	-1.50	-0.06	-0.69	0.19	0.66	7.35	15.21	symmetric	downward	customer reaction

Table A10: Asymmetric error correction and MAL of rolling windows – Cameroon

Asymmetric error correction terms and the mean adjustment lags of rolling windows for Cameroon													
Asymmetric error correction terms											summary		
Interest rates	Rolling windows		ECT ⁺ _{t-1}		ECT ⁻ _{t-1}		Wald Test		Mean Lag		PT Mechanism	Adjustment Rigidity	Hypothesis
	From	To	Coeff	t-stat	Coeff	t-stat	F-stat	PV	ML ⁺	ML ⁻			
Lending rate	1990	1999	-0.02	-0.23	-0.10	-1.99	0.44	0.51	23.65	4.62	symmetric	upward	customer reaction
Lending rate	1991	2000	-0.04	-0.41	-0.09	-1.93	0.16	0.69	15.02	6.65	symmetric	upward	customer reaction
Lending rate	1992	2001	0.00	-0.03	-0.10	-1.72	0.31	0.58	112.03	5.02	symmetric	upward	customer reaction
Lending rate	1993	2002	0.06	0.43	-0.12	-1.49	0.69	0.41	6.73	3.66	symmetric	upward	customer reaction
Lending rate	1994	2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lending rate	1995	2004	0.00	0.04	-0.09	-1.66	0.49	0.48	145.86	5.29	symmetric	upward	customer reaction
Lending rate	1996	2005	-0.14	-2.20	-0.03	-0.43	0.94	0.33	3.52	16.70	symmetric	downward	collusive pricing arrangement
Lending rate	1997	2006	-0.20	-2.24	0.01	0.09	1.29	0.26	5.00	102.38	symmetric	downward	collusive pricing arrangement
Lending rate	1998	2007	-0.22	-2.21	0.02	0.17	1.38	0.24	4.92	53.59	symmetric	downward	collusive pricing arrangement
Lending rate	1999	2008	-0.21	-2.15	-0.01	-0.13	1.21	0.27	113.79	7.33	symmetric	upward	customer reaction
Deposit rate	1990	1999	-0.25	-3.78	-0.02	-0.23	2.35	0.12	2.91	29.46	symmetric	downward	customer reaction
Deposit rate	1991	2000	-0.48	-5.39	0.07	0.53	9.25	0.00	1.46	10.72	asymmetric	downward	customer reaction
Deposit rate	1992	2001	-0.46	-5.21	0.00	-0.02	6.18	0.01	1.51	317.11	asymmetric	downward	customer reaction
Deposit rate	1993	2002	-0.37	-4.26	-0.02	-0.19	3.73	0.05	1.79	27.30	asymmetric	downward	customer reaction
Deposit rate	1994	2003	-0.42	-4.79	0.01	0.08	6.41	0.01	1.82	84.67	asymmetric	downward	customer reaction
Deposit rate	1995	2004	-0.27	-2.68	0.05	0.39	2.66	0.10	3.46	20.63	asymmetric	downward	customer reaction
Deposit rate	1996	2005	-0.33	-3.55	0.02	0.13	2.64	0.10	2.80	46.43	asymmetric	downward	customer reaction
Deposit rate	1997	2006	-0.01	-0.11	-0.02	-0.55	0.03	0.86	116.66	36.41	symmetric	upward	collusive pricing arrangement
Deposit rate	1998	2007	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Deposit rate	1999	2008	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table A11: Monetary policy impulses transmission between Cameroon and Nigeria

Monetary impulses in Cameroon transmitted to Nigeria retail rates												
Summary of IRPT for Impulses from Cameroon to Nigeria whole sample												
Sample period		Co-integration tests				Long run PT		Short run PT		ECT _{t-1}		
From	To	JJ	EG	CRDW	ECM	Coeff	t-stats	Coeff	t-stats	Coeff	t-stats	
Nigeria (Cameroon policy rate and Nigerian retail rates)												
Lending rate	1990M1	2010M12	Yes	Yes	No	Yes	0.98	12.13	-1.38	-4.49	-0.05	-1.74
Deposit rate	1990M1	2010M12	No	No	No	Yes	1.02	11.50	-1.06	-3.71	-0.05	-1.79
Cameroon (Nigerian policy rate and Cameroon retail rates)												
Lending rate	1990M1	2008M6	No	Yes	No	No	no co-integration was found between Nigerian policy rate and lending rate in Cameroon					
Deposit rate	1990M1	2008M6	Yes	Yes	No	Yes	0.16	7.50	-0.05	-4.68	-0.03	-2.80
Nigeria policy rate has some influence on deposit rate in Cameroon.												

Figure A1: Short and Long Run Pass-through – Lending rate

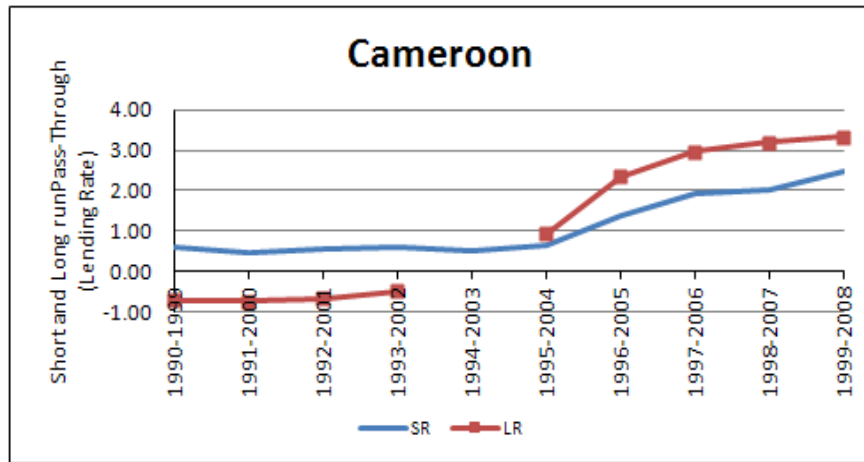


Figure A2: Short and Long Run Pass-through – Deposit Rate

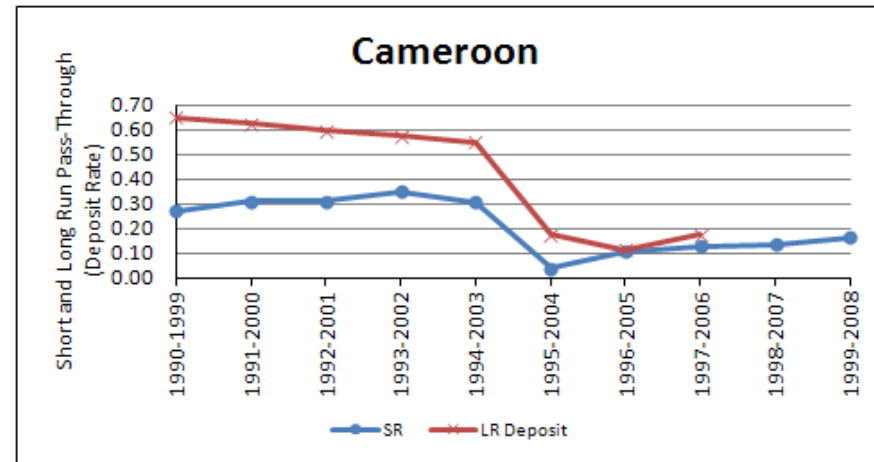


Figure A3: Short and Long Run Pass-through – Lending Rate

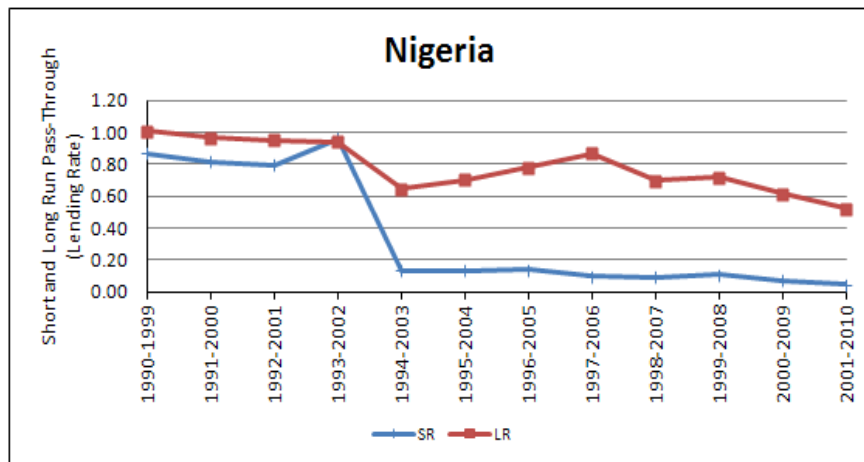


Figure A4: Short and Long run Pass-through – Deposit rate

