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THE IMPACT OF MONETARY POLICY ON INTEREST RATE PASS – THROUGH AMONG COMMERCIAL BANKS IN GHANA

BY

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DECLARATION

I hereby declare that this paper is the result of my original work and to the best of my knowledge, contains no materials published by another person or university, except where due acknowledgement has been made in the text.

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CERTIFICATION

I hereby confirm that the supervision of this research work followed the carefully laid down procedures of the university.

……... ……

DR. EMMANUEL SARPONG-KUMANKOMA DATE

(SUPERVISOR)

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DEDICATION

This research work is dedicated to the Almighty God for His blessings upon my life and seeing me through this process. Also to my dear wife Evelyn D. Kottoh (Mrs.) for her unflinching support.

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LIST OF ACRONYMS

ADF	Augmented Dicker-Fuller
ARDL	Autoregressive Distributed Lag
ATM	Automated Teller Machines
BoG	Bank of Ghana
MPC	Monetary Policy Committee
MPR	Monetary Policy Rate
MR	Market Rate
IRPT	Interest Rate Pass Through
TBR	Treasury Bill Rate
WMR	Wholesale Market Rate

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ABSTRACT

The study explored the impact of monetary policy rate on interest rate pass-through in Ghana using the Autoregressive Distributed Lagged Model (ARDL) for the period 2003 to 2018. To achieve these objectives, time series data was obtained from Bank of Ghana's database and analysed using the ARDL estimation techniques. A significant long run cointegrating relationship was found between MPR and wholesale market rate (WMR) as well as deposit rate. Also, IRPT between MPR and WMRs, as well as deposit rate in the long run was found to be incomplete, and over pass-through to lending rate. A steady long run relationship was also found between WMRs and retail rates. In view of the objective to determine the influence of WMRs on retail rates, results further indicated an incomplete pass-through for both retail market rates (lending rates and deposit rates). Despite the incompleteness, lending rates and interbank rates respond relatively strongly to MPR changes in the short run. Lending rates however respond relatively strongly to WMR changes than deposit rates. The study advised government to free the credit and deposit markets in order to incentivize borrowers and private investors to save and/or lend money that could facilitate the free flow of money among the formal and informal sectors in the country. The study further recommends further interventions in the monetary policy transmission process to help augment the existing policy structures to strengthen the long-term relationship between the various interest rate channels.

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CHAPTER ONE

INTRODUCTION

1.1 Background of study

The cost of borrowing by businesses and individuals from banks, usually determined by countries' monetary policies, play a substantial role in the expansion or contraction of every economy. Just as fiscal policies, the monetary policy of every country is an important tool for stimulating the economy. The Central bank is primarily mandated in its monetary policy objective to maintain price stability, which positively impacts on the economy (Samba, 2013). The success of the financial sector significantly impacts on all other areas in the country; of which the rates that commercial banks lend to businesses and individuals play a vital role in the success factor. The effectiveness of any MPR depends on the success of the various interest rate channels.

Any constant deviation of market interest rate from targets set by central banks through policy rates, may raise questions on the effectiveness of the implementation process, and whether a glitch has occurred somewhere in the course of the implementation. To achieve the desired target and ensure an equilibrium relationship between monetary policy and interest rates, monetary policy officials should be well informed on the changing aspect of IRPT. This requires understanding of the basis regarding MPR influences on the general price stability of an economy (Samba, 2013). Numerous works have been conducted widely on IRPT but these studies vary across countries based on factors such as geographical location and model for analysis. Excerpts from these studies suggest that several central banks set-out short-term MPR to tackle money markets outcomes (Sander & Kleimeier, 2004). This short-term interest MPR issued by central banks to target

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inflation or maintain general price stability have been established to be very effective compared to other monetary policy interventions (Sander & Kleimeier, 2004). Effectiveness assessment were based on factors such as the computation of both wholesale and retail rates' speed of adjustment in response to MPR variations (Ozdemir,2008).

Aziakpono, Wilson and Manuel (2007) found interest rate channels in many developing and emerging market economies to be increasingly relevant, due to the difficulty by countries in achieving targets quantitatively. This is due to the less economic development as well as shallow financial markets that exists in these countries. Such situation creates challenges in the successful implementation of MPRs, and thus, affects its effectiveness. One typical country with such situation is Ghana, that is currently under the inflation targeting regime introduced in 2007 which replaced the "monetary targeting" framework (Samba, & Yan, 2009). Short-term market interest rate is currently adopted by Bank of Ghana as its operating target where any occurred changes are supposed to influence cost of funding by banks which subsequently influences retail MRs.

There have been numerous studies on IRPT but these studies vary across countries based on factors such as geographical location and model for analysis. Excerpts from these studies suggest that several central banks set-out short-term MPR to tackle money markets outcomes (Sander & Kleimeier, 2004). These short-term MPR issued by central banks to target inflation or maintain general price stability have been established to be very effective compared to other monetary policy interventions (Sander & Kleimeier, 2004). Effectiveness of assessment were based on factors such as the computation of both wholesale and retail rates' speed of adjustment in response to MPR variations (Ozdemir, 2009). Therefore, complete transmission of MPR adjustments to MRs and retail rates demonstrate monetary policy framework reliability (Bernanke & Gertler,

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1995). These variations in the MPR reflect in the daily activities of banking firms and other financial institutions. Thus, studying IRPT and its impact on countries' financial sectors cannot be underestimated.

Plethora of researches on IRPT have been found to be dominant in Euro areas and the United States of America with limited focus on emerging and developing economies, of which Ghana is no exception (Miskin, 2010). Owing to the significance of inflation targeting through policy rate adjustment and setbacks of underdeveloped financial markets, Bank of Ghana realigned its objectives in 2002 to maintain general price stability in accordance with the Bank of Ghana (BoG) Act 2002 (Act 612) subsection 3(1). This necessitates for an accurate understanding on IRPT since price stability reduces risks associated with long term financial contracts, and accordingly, aids the computation and knowledge on finest savings and investment methods (Boivin, Kiley & Miskin, 2010).

1.2 Problem Statement

Despite the increasing relevance of pass-through analysis in the monetary policy transmission process, empirical studies investigating the dynamic adjustments of interest rates in Sub-Saharan Africa is lacking significantly, especially in Ghana. The work of Ghartey (2005) and Sakyi, Mensah and Obeng (2017) are exceptions from the above statement. The former examined the effect of MPR on interest rates structure in Ghana; and the latter explored how inflation targeting framework affects interest rate transmission. This study will help to update Ghartey's analysis, as well as complement it in several ways. The study will also use more recent data on the variables in question so as to incorporate the inflation targeting period and how it affects the overall pass-

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through process in Ghana. The study will also adopt a different method of analysis known as the Autoregressive Distributive Lag (ARDL) model to enable the researcher compare findings of the study to that of the most recent study by Sakyi, Mensah and Obeng (2017) who conducted similar study but adopted a different method called the Fully Modified Ordinary Least Squares (FMOLS) model and Deprivation of Liberty Safeguards (DoLS) model in their mode of analysis in estimating IRPT during the inflation targeting regime.

It was also observed that the studies undertaken in Ghana however were either limited to inflation targeting regime or monetary targeting period (Acheampong, 2005, Kyereboah-Coleman, 2012, Akosah, 2015). Moreover, these studies did not compare the outcome of both regimes and consequently did not capture and explain the influence of wholesale MRs changes on retail rates. This paper therefore attempts to address these issues.

Furthermore, in terms of Sub-Saharan Africa, few attempts made in some other African countries on IRPT include Samba and Yan (2010) and Sanusi (2010). 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, of which this study aims at achieving. On the other hand, the Sanusi's (2010) study captured a very short period (2002M1 – 2010M4). Empirical results from such a short period may be subjected to estimation biases. This study thus, provides a specific country analysis as well as uses a longer time period to close the gap, adding to the body of limited literature on IRPT in Ghana and Sub-Saharan Africa.

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1.3 Objectives

The aim of the study is to investigate whether monetary policy adjustment impacts on IRPT among commercial banks in Ghana.

In order to achieve these overarching objectives, various analysis will be used to investigate the following specific objectives:

i. Estimate the rate of pass-through of monetary policy changes on wholesale market rates and retail rates.
ii. Assess whether BoG's monetary policies affect IRPT in the Ghanaian economy.
iii. Evaluate whether interest rate changes in the wholesale market has an influence on retail rates in Ghana.

1.4 Research Questions

i. At what pass-through rate does monetary policy changes affect wholesale market and retail rates in Ghana?
ii. Does BoG's MPRs affect IRPT in Ghana?
iii. What relationship exists between banks' retail interest rates and the WMR among commercial banks in Ghana?

1.5 Significance of the Study

The significance of this study will be in two areas; practice and research. Firstly, identifying how monetary policies affect IRPT will inform main stakeholders and also improve interest rates in the financial sector. It will largely inform policy makers of the impacts of various monetary policies

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on operations of the commercial banks and changes in the interest rate spreads over the years. This study will also add to the existing body of studies on the subject and hopefully encourage more interests in research and an in-depth study of how wholesale and retail interest rates are affected by monetary policies on a wider dimension than has been pursued in this study.

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CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter focuses on the theoretical and empirical studies related to IRPT in various economies. The chapter also discusses MPR and the process of the monetary policy transmission mechanism (MPTM). The chapter will then describe the investigation of IRPT in different countries across the world.

2.1 The Processes of Monetary Policy Transmission Mechanism

Monetary policy, according to Karagiannis, Panagopoulos and Vlamis (2010: 9) "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". Monetary policy actions of the Central Bank begin in the banking system when the monetary authorities adjust the supply and 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 availability of bank reserves. Monetary policy is then executed by increasing or decreasing the planned federal funds rate. 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 rates) which in turn alters the spending behaviour of consumers and businesses (Karagiannis et al., 2010). The main instrument used by most Central Banks around the world is the official short-term interest rate; but other tools of monetary policy

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also exist, such as open market operations where the monetary authorities can use treasury bills to mop up or inject liquidity into the system (Wang & Lee, 2009:1270). Central Bank's altering of the official short-term interest rate is based on the assumption that, all things being equal, these changes will in turn impact on other short-term rates determined by deposit taking as well as non-deposit taking financial institutions.

Therefore, short-term interest rate changes are the first step in the transmission of monetary policy and are expected to affect consumption and investment expenditure of households and businesses through the retail rates determined by deposit taking and non-deposit taking financial institutions (Charoenseang & Manakit, 2007: 144). Thus, the process whereby changes in the MPR changes affect consumption, investment, Gross Domestic Product and other variables in the economy is known as the MPTM.

Consequently, MPR is seen as a powerful instrument possessed by monetary authorities but 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 and investment? To get this right, a thorough evaluation of the various monetary policy channels that affects the economy is not only necessary in its own right but will also help policy makers to know how much to adjust the policy tools. Without this clarification, policy makers may risk adjusting the policy tool too little or too much, and in some cases too early or too

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late, thereby increasing economic uncertainty which undermines the credibility of the Central Bank (Faure, 2006).

2.2 Monetary Policy Transmission Channels

Samba and Yan (2010:31) postulate that "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". Central Bank's aggregate demand with the short and medium term are hugely dependent on the operations of monetary policy instruments. Mishkin (1995) also noted the significance of monetary policy officials being knowledgeable on issues surrounding IRPT and MPR due to its impact on the financial sector of every economy. Monetary policy plays a significant role in helping Central Banks to attain inflation targeting through the process price determination. Thus, very imperative for Central Banks understanding the process of monetary policy mechanisms and its effect on IRPT. The Central Bank's monetary policy stances are transmitted through various monetary policy transmission channels such as interest rates, bank lending, balance sheet, asset prices, exchange rates and the expectation channels.

Figure 2.1 below is an illustration of Bank of England's mode of the MPTM in the country. Diagram shows that total demand significantly influences the MPR determination through the various transmission channels. MPR changes, ceteris paribus, have significant impact on short-term WMRs.

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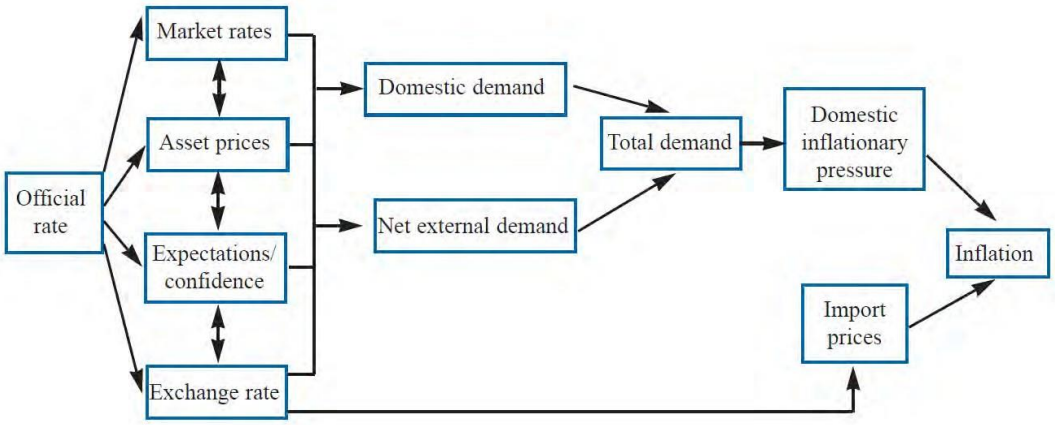
Figure 2. 1: Monetary Transmission Channel



Source: Bank of England (www.bankofengland.co.uk)

2.3 Development of Monetary Policy Framework in Ghana

Monetary policy framework has developed in many countries in response to several economic reforms, of which Ghana is no exception. "Major aspects of these reforms in Ghana were financial sector reform programme and financial sector strategic plan" (Bawumia, 2010). These reforms or monetary targets are very vital in the policy framework formulation.

The most widely applicable targeted variables are money supply and interest rate. According to Estrella and Mishkin (1995), adopting an effective monetary policy target is highly dependent on the precise evaluation made by monetary authorities; thus, imperative on the part of authorities to be well informed on issues of MPR and how it influences the financial sector.

Since independence, BoG has implemented many monetary policy regimes and in terms of key macroeconomic indicators inflation targeting regime has yielded the best performance. Under the inflation targeted regime, the economy of Ghana was more flexible to external shocks than

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monetary policy regime and the direct controls regime (Abradu-Otoo, Amoah & Bawumia, 2003). According to the new BoG's Act 2002 (ACT 612), BoG primarily aimed at maintaining stability in the general price level (section 3, sub section 1). There are two main facets of the monetary management process in Ghana. The first one is the period related to monetary controls, while the second is associated with the period where monetary policies were accepted to evolve in liberalized environment.

However, in 1983, the Ghanaian economy was liberalized which led to the abandonment where money was managed under the direct control system. "The liberalization process brought about progressive deregulatory measures raising the institutionalization of monetary management in early 1992 and paid attention mainly on the use of indirect and market-based instruments in conducting monetary policy" (Abradu-Otoo, Amoah & Bawumia, 2003). These situations led to the designation and implementation of new dimensions in the monetary management. The financial programming elements were then introduced with its foundation from the International Monetary Fund – POLAK model.

2.4 The concept of IRPT

"IRPT measures the degree to which commercial banks' policy rate adjustment influence the wholesale MRs and retail rates in both the short and long run" (Egert, Crespo-Cuaresma, & Reininger, 2007: 210). Egert et al. (2007) further expounded 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 MRs, and stage two to show how dynamics in the money MRs

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affect retail rates of banks". As a result, studies on IRPT revolves between "cost of funds approach", and "monetary policy approach" (Sander & Kleimeier, 2004).

Cost of funds approach, as established by Kapwil and Scharler (2006), emphasises on "price-setting decision" of banks. This approach mostly reveals the opportunity costs from loan issuance by financial institutions as well as the cost incurred from deposits. That is, the rate of interest paid by a borrower to obtain money through loan from financial institutions. The approach thus, indicates the impact of wholesale MRs on retail rates.

Alternatively, MPR approach establishes how MPR changes affect MRs. That is, this approach highlights how MR is affected by changes in MPR in the economy. According to Egert, Crespo-Cuaresma, and Reininger (2007), the idea of a constant yield curve enables favourable means of ascertaining the link which exist between monetary policy and MRs. For this reason, Ozdemir (2009) is of the view that, the "assessment of IRPT is based on factors such as the degree, and speed of adjustment of wholesale MRs response to policy rate adjustments". The coefficients that measures the rate of pass-through varies between zero (0) and one (1), where 0 signifies incomplete pass-through and 1 signifies "complete" pass-through. Thus, successful transmission of MPR over a specific period hinges on the degree and speed of adjustment, determined by its adjustment coefficients of 0 and 1.

2.4.1 Determinants of IRPT

One of the major determinants of IRPT is menu cost (Madsen & Yang, 1998). According to Rotemberg and Saloner (1987: 918), "menu costs usually include the costs of changing and

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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". The high cost that comes along with adjusting the price list mostly breeds price stickiness especially when policy rate changes is envisaged as temporal and marginal (Cottarelli & Kourelis, 1994; Dutta, Bergen, Levy, & Venable, 1999).

Collusive pricing behaviour is another factor that determines price rigidities (Scholnick, 1996). It enhances the sluggish of IRPT due to asymmetric price adjustment. Asymmetric price adjustment emanates from imperfect competition among banking institutions. Due to collusive price adjustment, an increase in policy rate results in a more increase in deposit rates move upward than downwards, such that immediate increases in deposit rates are seen as additional costs to be financed by banks, whereas lending rates are more inflexible downwards than upwards (Neumark & Sharpe, 1992). Reservations associated with the collusive pricing led to the outcome of "consumer behaviour hypothesis" (Scholnick, 1996). Per the hypothesis, financial institutions have limited beneficial market potential because depositors and borrowers are considered to be highly knowledgeable.

Information asymmetry and moral hazard are other determinants of an ineffective IRPT. "Information asymmetry between financial institutions and potential borrowers, paves way for adverse selection and moral hazard challenges" (Stiglitz & Weiss, 1981). For instance, consistently adjusting loan rate upwards due to policy rate increases could result in high loan default. Banks therefore exercise various other options in response to policy rate changes.

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Core deposit and relationship lending also serve as one of the determining factors of IRPT. Due to long term relationship between customers and their financial institutions, such customers receive stable retail rate devoid of any price fluctuations which results in unstable MRs (Allen & Gale, 2004). This could possibly result in interest rates smoothening, where banks and clients share risks. Delay associated with the adjustment process and risk sharing characteristics eventually limit the efficient monetary policy transmission process.

In conclusion, interest rate elasticity, bank size, clients' inertia, bank loans dependence and refinancing cost, and various other country specific factors influence IRPT (Mojon, 2000).

2.5 Empirical Literature Review

The concept of IRPT is quite new in empirical research where such studies were found in the early studies 1990s (Hannan & Berger, 1991). Thereafter, interest in pass-through studies subsequently began to grow. However, the early studies only focused on asymmetries and price rigidities under an oligopolistic market structure. Buchs and Mathisen (2005) also stated that "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 is now on how a single MPR would be conducted under a situation of heterogeneous financial structure. This led to a burst of IRPT studies in the Euro Area and elsewhere. Some examples of pass-through studies in the Euro Area include Mojon (2000); Sander and Kleimier (2004); Marotta (2009) and Leuvensteijn et al. (2008). Irrespective of the differences in approach, most of these studies established similar findings where IRPT was found to be incomplete. Furthermore, differences were also found in pass-throughs across countries and across banking products, and there is no clear pattern of these differences across countries.

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2.5.1 Monetary Policy Changes and Rate of Pass-through to Wholesale MRs and Retail Rates

Study by Sorensen and Werner (2006) found a high rate of heterogeneity among euro area nations in long run pass-through across nations. Study investigated how pass-through of specific MR changes affect commercial banks' interest rate.

The Euro Zone studies such as Mojon (2000) and Schwarzbauer (2007) that examined the financial structure focused on the crucial role played by MPTM of economies. Building on Ozdemir's (2013) framework, whose study focused on how MPR coordination affect open market economies sought to examine how disparities in the financial systems across countries contribute to national asymmetry. His empirical results showed that pass-through varies across countries and across markets. Overall, pass-through for credit markets was higher, ranging from 0.53 to 0.68, compared to deposit markets, which ranged from 0.18 to 0.43. He noted that competitions that exist in the banking sectors have the tendency to force banks to increase rates of deposits due to an increase in the overnight money MR. Schwarzbauer (2007) used time-varying analysis and also found bank deposit ratios to significantly influence MPTM. Furthermore, Baugnet, Collin, and Dhyne (2007), found bank specific and market structural variables to have a significant impact on pass-through in Belgium. That is, more liquid banks are more inclined to regulate their retail rates at a slower pace and incompletely in order to adjust to changes in money market rates compared to less liquid banks where the adjustment is quicker and almost complete.

Another issue that has taken centre stage in research in developed countries is the differences in pass-through across the various segments of the market. Some studies revealed that time deposits and loans to corporate enterprises adjust faster to overnight money MR changes whereas savings

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accounts and overnight market rates showed a high degree of stickiness (Liu et al., 2011). Despite differences in the econometric techniques, these studies all found immediate pass-through on savings account and current account deposits to be very low, ranging from 0.03 – 0.33. On average, pass-through for corporate loans and mortgages tended to be faster and ranged from 0.63 – 1.01; 0.70 – 1.19 and 0.44 – 0.84 respectively. Sorensen and Werner (2006) argued that heterogeneity across market segments could possibly be the results of the variations in competition levels of banks. For instance, corporate enterprises may depend less on bank loans to finance their activities compared to small businesses and households. Another study revealed that, both deposit rates as well as lending rates have different response rate to interest rate adjustment across countries (Sander & Kleimeier, 2006). While interest rate transmission seems uniform and complete for lending rates, existence of heterogeneity was established across the national markets. Samba & Yu Yan (2009) application of ARDL model also produced evidence that, influence of policy rates adjustment on deposit rate generate sluggish long-run pass-through. Lending rate however demonstrated an exceeding effect in responding to monetary policy changes.

Considering Ghana, some of the works undertaken include that of Acheampong (2005), CEPA (2012), Mensah, Ohene-Yankyera, and Aidoo (2016) and Sakyi, Mensah and Obeng (2017). CEPA looked at the significance of MPR from November, 2009 to May, 2012. The findings show that MR responds significantly to changes in PR. In addition, while the interbank rates are considered very vital for deciding average bank lending rate to households and other businesses, the impact of treasury bill rate (TBR) was technically greater and very significant than the interbank rates.

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2.5.2 Link Between Wholesale MR and Retail Rate.

Neumark and Sharpe (1992) conducted research to investigate how market concentration impacts on the adjustment of price in deposit market in the USA and this formed the basis for empirical research into IRPT. Employing a multinomial logit model and data from 1983 to 1986, they found asymmetry rate of adjustment in the deposit rates in the USA. 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 to account for the observed asymmetry in deposit rates in the financial markets.

Moreover, Kapwil and Scharler (2006) empirical findings within the euro area, concluded that the influence of wholesale interest rates changes on retail rates requires time to adjust, since the immediate pass-through is much slower in comparison to the long run pass-through. With an immediate pass-through of less than 0.55 across countries, it suggests that more than half of the changes in wholesale interest rates directly influence retail rates within the short run. Further empirical studies suggest that banking institutions in euro areas protect their clients from unstable policy rate adjustment by incurring part of the changes.

Comparing the findings in euro area to the U.S market, US economy also experiences an incomplete pass-through for retail rates responds to policy rate changes (Azim Özdemir & Saygılı, 2013; De Bondt, 2005). However, the degree of pass-through tends to be higher for both short and long run than what is being experienced in the euro area. Another study by Hofmann and

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Mizen (2004), who investigated several products in the banking sectors in UK showcased an incomplete pass-through for lending rates than deposit rates.

It is important to note that studies on IRPT in emerging and developing markets have no central theme (Samba, 2013). The pass-through studies in these two markets are not focused on a particular issue as is the case in developed economies. Studies that explored the dynamic adjustment of retail rates in general found incomplete pass-through to exist in both markets. In addition, strong evidence of asymmetry existed in almost all of the studies reviewed. Khawaja and Khan (2008) also used transfer functions in their study to analyse retail rates in Pakistan. Their results revealed an incomplete long run pass-through (0.43) for the lending rates and an even lower pass-through for deposit rates (0.16). They also confirmed evidence of asymmetry in adjustment in the retail rates. Authors argued that the marginal higher pass-through for lending rates was because of the pegging of the lending rates to the KIBOR (Karachi Interbank Offered Rate) and the low pass-through 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 pass-through in Sri Lanka except for the prime lending rates which show an average long run pass-through of 0.51.

Highlighting on some of the studies in Africa, Jankee (2004), with the aid of monthly data indicated disproportionate retail rates response to money MRs changes in Mauritius. That is, the rate of retail rates' response to MR changes was found to be incomplete (very slow) especially instances of a rise in the wholesale interest rates. However, retail rates adjusted quicker to

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reduction of wholesale interest rates. De Angelis, Aziakpono and Faure (2005) works in South Africa provided an insight on links that exist between wholesale MRs and retail rates. Results computed from the study using Engel–Granger and an error correction model indicated an incomplete pass-through at all levels. The study however, did not consider examining the likelihood of unequal adjustment in bank lending rates.

2.5.3 Relationship Between MPR and IRPT

The significance of inflation targeting via policy rate adjustment had resulted in extant literature further probing into how policy rate affect IRPT over time. Majority of such studies were conducted in the developed economies with limited focus on developing economies. Findings from various studies on this subject however indicate that the impact of MPR on IRPT vary across countries.

In developing countries, transmission mechanism is mostly characterized by bank lending channel due to underdeveloped financial institutions (Mishra, Montiel, & Spilimbergo, 2010). While lapses associated with the financial system reduces competitiveness among banking institutions, Central Bank's extreme excess reserves also limit the effectiveness of MPR which consequently weakens interest rate transmission channel. Further studies on deposit rates in Malaysia and Singapore found the existence of a weak interest pass-through and presence of disproportionate changes in both countries (Scholnick, 1996). Tomasz (2003) also indicated that, profitability of banking institutions contributes to weak IRPT such that these financial firms with higher profits response faster to policy rate adjustments. Crespo-Cuaresma, Egert and Reininger (2004) study on IRPT in New EU developing Member states found incomplete pass-through for both short

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and long-run. It further showcased evidence of a relatively slight significant overreaching effect in the interbank MR.

Time series analysis was used by Kovanen (2011) to explore the dynamics of IRPT in Ghana. Results presented an incomplete pass-through to exist in the retail market. Asymmetries associated with MRs adjustment were possibly related to weak policy credibility. Moreover, Acheampong (2005) who investigated the rate at which MPR affect IRPT found an incomplete pass-through from wholesale rates to retail rates.

However, the above studies focused more on customer and factors specifically related to the banking sector 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 pass-through research. One such landmark empirical study that changed the face of IRPT research was the seminal work of Cottarelli and Kourelis (1994) who related the rate of IRPT to the financial system's financial structure. The authors (Cottarelli & Kourelis, 1994) examined the lending rate of 31 industrial and developing countries using co-integration techniques, and found that differences that existed in a cross-country finding were more noticeable in the short run compared to the long run. Their results found that a long run pass-through 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 on the plasticity of the lending rates. Dynamics of lending rates adjustment also depend on the type of the lending rates used. Thus, they note that to assess the effectiveness of the MPTM, attention should be given to the financial system's structure as well. Findings in a study by Cottarelli et al.

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(1995) also corroborated the above findings: 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 index. According to the IMF (2007), the Herfindahl Index "is a measurement of market concentration and is calculated as the sum of square market shares of bank".

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CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter explains the methods involved in the empirical analyses used in the next chapter. The chapter further explicates the research design employed in the study as well as population and data collected. It further outlined the estimation techniques employed in the analysis to achieve the set objectives delineated in the first chapter.

3.1 Research Design

"A research design is the conceptual framework within which a study would be conducted" (Dawson, 2002). According to Gray (2009:132), "research design will describe the purpose of the study and kinds of questions being addressed, techniques to be used for collecting data, approaches to selecting samples and how the data are going to be analysed". Research design is primarily aimed at "sufficing for an efficient way of collecting relevant data with barest amount of effort, time and money" (Miles, Huberman, & Saldana, 2013). Zikmund (2000) postulate that research design provides the direction and guiding principle that helps in getting relevant literature and other materials together with data collection and analysis that is vital to one's study.

This study adopted the descriptive causal-comparative research design. This design "attempts to identify a causative relationship between an independent variable and a dependent variable. The relationship between the independent variable and dependent variable is usually a suggested relationship because the researcher does not have complete control over the independent variable"

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(Gall, Gall & Borg, 2007). Design thus, enabled the researcher to examine if there exist a difference in relationship between MPR and wholesale interest rates as well as retail rates. Gall, Gall and Borg (2007) further defined causal-comparative research "as a type of non-experimental investigation in which researchers seek to identify cause and-effect relationships by forming groups of individuals in whom the independent variable is present or absent… and then determining whether the groups differ on the dependent variable" (p. 306).

Furthermore, the study used selected monthly interest rates for the analysis. These interest rates are deposit rate, lending rate, interbank rate, policy rate and TBR using monthly data derived from 2003:01 to 2018:10.

3.2 Estimation Techniques

Usually monetary policy transmission mechanism (MPTM) starts from changes in MPR to wholesale MRs and subsequently to retail rates from the Central Banks to commercial banks and then to customers/investors. Therefore, adequate transmission leads to desirable effect on price stability. The primary model that links various interest rates is stated below.

$$MRt = \alpha + \beta PRt + ut \quad \text{.......................................} \quad (3.1)$$

The equation (3.1) above illustrates the long run relationship that exists between variables. MR represents market interest rates and PR represents and policy rate. α is a markup or markdown depending on the interest rate determinant (cost of funds approach), and β signifies long run pass-through. β, which signifies the long run pass-through usually ranges between zero (incomplete pass-through) and one (complete pass-through). Thus, all things being equal, a perfect market

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structure with complete transmission mechanism is supposed to have a β value of 1 (Coricelli, Egert & McDonald, 2006). This means that a β value of less than 1 signifies an incomplete transmission or pass-through, and thus, an imperfect market. Over pass-through exists where the value is greater than 1 after estimation. This situation, according to De Bondt (2005), occurs where financial institutions increase interest rates on loans "in an attempt to offset the higher risks which emanate from asymmetric information at the expense of reducing the loans issuance".

Ordinary least square (OLS) method will be adopted to verify is series are stationery at levels, using the equation above (3.1). Cases where stationarity of series is established at first difference leads to further estimation of co-integration test between the variables. Estimation then proceeds with Autoregressive distributed lag (ARDL) in occasions where series are combination of order zero or one. Therefore, to avoid false results of final analysis where series at first difference is not cointegrated, equation 3.2 is adopted in the study (Aziakpono & Wilson, 2013). Increasing number of lags provides the following estimation model in equation 3.2 according to Aziakpono and Wilson (2013):

$$\Delta MR_t = \delta_0 + \delta_1 \Delta BR_t + \delta_i \sum_{i=1}^{n} \Delta BR_{t-i} + \lambda_i \sum_{j=1}^{m} \Delta MR_{t-j} + \varepsilon_t \quad \text{…….……..…….. (3.2)}$$

In model 3.2 above, Δ represents the 1st difference equation where variables are significant following the number of selected lags. δ_0 represents the short run intercept while δ_1 illustrates the slope coefficients. The two equations above shows that the short-run pass-through from equation 3.2 (δ_1) varies from the long run pass-through from equation 3.1 (β). The existence of

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interest rate stickiness occurs when such difference is found between the short-run and the long run pass-through.

3.3 Unit Root Test

To avoid spurious results, it is important to first determine the stationarity of the data. Unit root test is a test conducted to examine if variables under consideration are stationary. That is, to determine if the series are integrated of order zero I(0), order one I(1) or higher orders. Inferences of non-stationary or spurious data are likely to be invalid because test statistics will no longer follow the 't or F' distribution. Preliminary tests using Augment Dickey Fuller (ADF) Test was used to test for the unit root.

3.4 Co-integration Test

According to Moratta (2009), "a set of variables 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 substantiate such a relationship between variables 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:

$$y_t = \beta_0 + \beta_1 \chi_t + \varepsilon_t \quad \text{..... (3.3)}$$

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Where y_t represent "the endogenously determined retail rates of commercial banks, χ_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 3.3 is the starting point in any IRPT analysis and also helps to estimate the short-run error correction model (ECM) as well as the long-run co-integrating vector.

3.5 ARDL Approach to Co-integration

The ARDL bound test approach by Pesaran, Shin and Schmit (2001) is adopted to test for co-integration for this study. This method of estimation permits to test for co-integration "whether the variables are I(0) or I(1) or a mixture of both" (Pesaran et al., 2001). The model is also known to provide unbiased long run estimate regardless of the variables being endogenous or exogenous. This is due to the absence of residual correlation and also propels reference model estimation. Equation 3.1 below provides the ARDL model adopted by the study:

$$\Delta MR_t = \delta + \sum_{i=1}^{p} \partial_i \Delta PR_{t-1} + \sum_{j=1}^{p} \varpi_i \Delta MR_{t-1} + k_1 PR_{t-1} + k_2 MR_{t-1} + \varepsilon_t \quad \ldots\ldots\ldots\ldots (3.4)$$

Where k_1 and k_2 indicates long run relationship while δ_i and $\ddot{\omega}_i$ shows the short run relationship of the model. *p* also represents the ARDL model maximum lag order selected for the study.

3.6 Selecting Appropriate Lag Length for the ARDL Model

Selecting of a suitable lag length in an ARDL model is very crucial in validating results of the final analysis. The ARDL model to co-integration is adopted when a long run relationship is found between the underlying variables. "Finding the appropriate lag length for each underlying variable

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of interest in the ARDL model is imperative as it necessitates the need to have Gaussian error terms (i.e. standard normal error terms that do not suffer from non-normality, autocorrelation, heteroskedasticity etc.). Thus, selecting the appropriate model of the long run underlying equation first requires the estimation of the optimum lag length (p) by using proper model order selection criteria such as; the Akaike Information Criterion (AIC), Schwarz Bayesian Criterion (SBC) or Hannan-Quinn Criterion (HQC)" (Pesaran et al., 2001). The model with the smallest AIC, SBC estimates is selected for the study.

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CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.0 Introduction

This chapter is dedicated to the analysis, presentation and discussion of results, which aimed at the investigation of IRPT in the Ghanaian economy. Chapter further presents results on how changes in policy rate impact on wholesale MRs (interbank rates and TBRs) as well as on retail rates (lending rates and deposit rates).

4.1 Data Description

Monthly data series on the various MRs of interest (lending, deposit, interbank, policy, and TBRs) was sourced from the bank of Ghana database between 2003:01 to 2018:10. Three (3) month savings deposit rate was used for the study's deposit rates while commercial banks base rate represented the lending rate. Also, the 91-day TBRs and interbank rates were used for the estimation.

4.2 Descriptive Statistics

"Descriptive statistics is the discipline of quantitatively describing the main features of a collection of information or the quantitative description itself" (Dawson, 2002). That is, the analysis that helps to describe or summarized data of the variables of interest in the study. For this study the descriptive statistics of the various interest rates are presented in table 4.1 below.

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Table 4. 1: Summary Statistics Variables

Variable	Deposit Rate	Interbank Rates	Lending Rate	Policy Rate	TBR_91_DAY
Mean	12.13645	17.56978	24.87962	18.0361	18.30781
Maximum	19.00000	27.22000	31.50000	27.5000	39.30000
Minimum	7.250000	6.350000	18.55000	12.5000	9.130000
Std. Dev.	2.749075	5.337460	3.374162	4.37409	6.480142
Skewness	0.146616	0.116856	0.156372	0.64610	0.305690
Observations	183	183	183	183	183

Source: Author's estimation (2019)

Table 4.1 above INTERBANK_RATE, TRB_91_DAY, POLICY_RATE, DEPOSIT_RATE and LENDING_RATE recorded monthly means of 17.57%, 18.31%, 18.04%, 12.04% and 12.14% respectively. The maximum TBR recorded from 2003:01 to 2018:10 is 39.3% with a corresponding minimum interbank rate of 6.3%. Regarding the standard deviation (Std. Dev.) the table indicates high dispersion among all the variables under consideration. TBR_91_DAY recorded the highest dispersion of 6.48% followed by INTERBANK_RATE, POLICY_RATE, LENDING_RATE and DEPOSIT_RATE in that order.

4.3 Unit Root Test

The starting point of an empirical analysis of time series data 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).

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Table 4. 2: Unit Root Test at Levels

Variable	ADF-Test	Critical Value (5%)	P-value
DEPOSIT_RATE	-2.795770	-2.876843	0.0608
INTERBANK_RATE	-1.619619	-2.876677	0.4706
LENDING_RATE	-2.002231	-2.877363	0.2858
POLICY_RATE	-1.767960	-2.876843	0.3956
TRB_91_DAY	-2.336968	-2.876759	0.1615

Source: Author's estimation (2019)

Table 4.2 above indicates the results of unit root test at levels. Results show that all the variables under considerations are non-stationary at levels since the critical values of variables at 5% level are greater than the value of their corresponding ADF test. This result leads to the accepting of the null hypothesis that no stationarity between variables. This then calls for the modification of variable's dataset in order to avoid spurious regression in the mode of analysis. Thus, the need for further ADF test until variables are found to be significant at their various p-values.

Table 4. 3: Unit Root Test at First Difference

Variable	ADF-Test	Critical Value (5%)	P-value
D(EPOSIT_RATE)	-7.385549	-2.87843	0.0000
D(INTERBANK_RATE)	-11.72223	-2.876759	0.0000
D(LENDING_RATE)	-6.773475	-2.877363	0.0000
D(POLICY_RATE)	-6.965181	-2.877186	0.0000
D(TRB_91_DAY)	-10.15984	-2.876759	0.0000

Source: Author's estimation (2019)

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Table 4.3 shows results of unit root test at first difference. Results indicate that all the underlying variables in the table are stationary at the 5% level of significance. Results further shows that the p-values of corresponding variables are significant at the 1% level, thus, rejecting the null hypothesis of no non-stationarity. Study can then progress to the next stage of analysis (cointegration) as the requirement for unit root test have been successfully achieved.

4.4 Lag Selection Criteria

It is imperative to determine the appropriate lag selection condition of variables under study in the ARDL model when a long run relation at least have been found to exist between variables. Table 4.4 presents information on the analysis of five lag selection criteria. From the table, the optimal lag length chosen for subsequent test and estimation is 3 months based on the principle of selecting model with smallest Akaike information criterion (AIC) from list of other criteria such as the Hannan-Quinn information criterion (HQIC), Sequential Likelihood-ratio (LR), Final Prediction Error (FPE) and the Bayesian Information Criterion (SBIC).

Table 4. 4: Lag Selection Conditions

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1573.444	NA	921.5063	18.17751	18.32276	18.23643
1	-814.922	1464.732	0.181116	9.642782	10.07851*	9.819541*
2	-792.1545	42.91805	0.167628	9.564994	10.29121	9.859594
3	-764.429	**50.98942***	**0.146622***	**9.430218***	10.44693	9.842658
4	-757.2201	12.92638	0.162468	9.531265	10.83846	10.06154

Source: Author's estimation (2019)

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4.5 Cointegration Test

Cointegration test is exercised at this stage is to decide the existence of long run relationship between set of variables based on unit root test at first difference in Table 4.3. The series are classified to be cointegrated since components of the time series have a unit root and there exists a linear combination of these series that is stationary. Therefore, the application of cointegration as an econometric concept is expected to offer basis for establishing the existence of a long-run equilibrium among underlying economic time series that converges over time. This delivers an effective statistical and economic foundation for empirical error correction model analysis, which generates both short and long-run information in modeling variables.

4.5.1 Influence of Monetary Policy Changes on Wholesale MRs and Retail Rates

To estimate the impact of policy rate on wholesale MRs and retail rates, ARDL bounds test was conducted where the value of the f-statistic was compared against the upper and lower bound critical values of each MR at the 5% and 10% significance level. Table 4.5 below indicates results of analysis of ARDL bounds test between policy rate and the individual MRs (deposit rate, lending rate, interbank rate and TBR)

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Table 4.5: ARDL Bounds Test (independent variable: Policy rate)

Dependent variable	F-statistics	5%		10%	
	For Two Variables	I(0)	I(1)	I(0)	I(1)
D(DEPOSIT_RATE)	6.834317	4.94	5.73	4.04	4.78
D(INTERBANK_RATES)	7.564982	4.94	5.73	4.04	4.78
D(LENDING_RATE)	1.499914	4.94	5.73	4.04	4.78
D(TBR_91_DAY)	7.426864	4.94	5.73	4.04	4.78

Source: Author's estimation (2019)

The ARDL bounds test in table 4.5 above shows the value of the f-statistic to be greater than the upper bound critical values of the individual MRs [I(1)] at both the 5% and 10% level of significance, except for lending rate whose upper bound critical value of 5.73 (at 5% significance) is greater than the f-statistic value (1.50). Per the principles governing the interpretation, when F-statistic is greater than upper bound critical value, it means that the variable has a long run connection (i.e. H_0 is rejected). On the other hand, instances where F-statistic is below the lower bound critical value, H_0 consequently cannot be rejected (no cointegration). It can therefore be noted that, F-statistics estimates for D(DEPOSIT_RATE), D(INTBANK_RATE) and D(TBR_91_DAY) are greater than the upper bound at both 5% and 10% level of significance. This suggests failure to accept Null hypothesis (of no cointegration), and alternatively suggesting that, the variables in the three equations (deposit, interbank rate and TBR) are cointegrated and converge to long run equilibrium. However, F-Statistic for D(LENDING_RATE) which falls outside the lower bound indicates that the null hypothesis cannot be rejected (that is, the absence of cointegration). This means that all the underlying market interest rates excluding lending rates

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are cointegrated, thus, indicating the existence of a steady-state long-run relationship between policy rate and deposit rate, interbank rate and TBR. According to Pesaran et al (2001), the null hypothesis of no cointegration in such instances should be rejected in favour of the alternate hypothesis for all variables (except lending rate). Thus, all variables (deposit, interbank rate and TBR) with the exclusion of lending rate are found to have stable long run relationship with policy rate. This is an indication that changes in MPRs have long term effect on wholesale MRs and deposit rates in Ghana.

Results (cointegrated equations) from this stage paves way for the reparameterization of ARDL model into an ECM.

4.6 Error Correction Model

The existence of cointegration between variables necessitates the estimation of an error correction model to examine the short run adjustments with long run equilibrium relationship among the variables, which includes the reparameterised ARDL model into ECM. Reparameterised result provided the short-run and long run relationship of the underlying variables.

4.6.1 Does BoG's Monetary Policy Affect IRPT in The Ghanaian Economy?

Analysis was again conducted to access how MPR affects IRPT in Ghana. This was done by performing a long-run coefficient analysis between Policy rate and the other four MRs indicated in table 4.6 below. This examines the rate of pass-through (whether complete or incomplete) in the country. Study then proceeded to perform the error correction test which explains the extent to which disequilibrium in a particular year is being corrected the next year. That is, the degree at which every imbalance in preceding period is being adjusted.

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Table 4. 6: Long-Run Coefficients Analysis (Independent variable: Policy rate)

Dependent Variable	Coefficient	t-statistic	P-value
Deposit rate	0.418185	2.949078	0.0036
Interbank rate	0.965869	6.550780	0.0000
Lending rate	1.192591	1.414499	0.1590
TRB_91_DAY	0.333716	0.853391	0.8946

Source: author's estimation (2019)

Table 4.6 above provides summarize long run coefficients analysis between policy rate and wholesale MRs as well as retail rates. The long run pass-through for deposit rate and lending rate and TBR are 0.42, 0.75 respectively. The values recorded explains the rate at which the underlying variables react to interbank changes in the long run or seek to define demand elasticity of retail rates with respect to interbank changes.

Table 4. 7: Speed of Adjustment coefficients (Policy Rate and Wholesale/Retail Rates)

Error Correction	Coefficient	Std error	t-statistic	P-value
DEPOSIT RATE	-0.083465	0.026025	-3.207172	0.0016
INTERBANK_RATE	-0.128587	0.032963	-3.900951	0.0001
TRB_91_DAY	-0.066093	0.017100	-3.865113	0.0002

Source: author's estimation (2019)

Table 4.7 above provides summarized estimates of the normalized co-integrating pass-through. The long run pass-through for interbank, deposit, lending rate and TBR are 0.97, 0.42, 1.19 and 0.33 respectively. The values recorded explains the rate at which the underlying variables responds to policy rate changes in the long run or seek to define market interest rates elasticity of demand in relation to policy rate changes. Therefore, interbank rates tend to have the highest

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pass-through response rate of 0.97 to policy changes in the long run. However, both TBR and deposit tend to have weak long run pass-through. Per the rules of the theorem, all the long run pass-through values (β) are expected to be to be between zero and one, ($0 \leq \beta \leq 1$) (Pesaran et al., 2001). 'Zero' showcases an incomplete long run pass-through whereas 'one' indicates complete long run pass-through. More than 1 suggest an over pass-through. In this regard, it is evident that all the cointegrated underlying variables depicts an incomplete pass-through.

The incompleteness can be attributed to market imperfections, menu cost, and information asymmetry. It is worthy to note that, even though the pass-through can either be complete or incomplete, most empirical findings indicate an incomplete pass-through, however, the exact incomplete pass-through figures varies widely across countries. This may be as a result of the scope and peculiar factors.

Considering the above incomplete long run pass-through coefficients, the current finding corroborates findings of Donnay and Degryse (2001), Crespo-Cuaresma, Egert and Reininger (2004), Mishkin (2010) and Mishra, Montiel, and Spilimbergo (2010) in developed economies. Focusing on Ghana, especially under inflation targeting period, the incomplete pass-through results in both the retail and WMR are evident in the works of Acheampong (2005), Kovanen (2011), Akosah (2015) and Sakyi, Mensah and Obeng (2017).

Mishra, Montiel, and Spilimbergo (2010) further explained that "deficiencies in the financial system and high concentration among banks reduces competitiveness, while large excess reserves make central banks' monetary policies less effective and impairs the interest rate channel which hugely impacts on the pass-through of interest rates across many developing countries". For

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instance, in reference to the Ghanaian economy, Buchs and Mathisen (2005) expounded that the development of the nation's domestic capital markets has created new investment opportunities such as stocks, treasury bills and bonds in Ghana. Additionally, new payment systems, such as credit and debit cards, have made significant advancement in Ghana and are likely to decrease the demand for physical cash in daily transactions. "Modern payment technology and electronic banking are also expanding banking services to rural communities deprived of such options in the country" (IMF, 2011). Instability is more likely to rise when such changes in the financial system cause significant shifts in the monetary policy transmission mechanism, complicating its implementation and thus, significantly impacting on the pass-through rate of such policies and interest rates over the years.

Moreover, results from table 4.7 indicates low speed of adjustment for short run pass-through towards long run pass-through for the variables found to have a long-term relationship with PR. Establishing emphasis on the ECt (speed of adjustment) from table 4.7, the coefficient on the ECM terms are found to be significantly negative as expected. "The ECt shows how much of the disequilibrium is being corrected, that is, the extent to which any disequilibrium in the previous period is being adjusted" (Gray, 2009). The low speed of adjustment recorded indicates MRs inflexibility to policy rate changes. For example, deposit rate (DDEPOSIT_RATE) speed of adjustment (ECt) of 0.083 suggest that, the previous year's errors will be amended in the existing year at an adjustment speed of 8.3%. This means that whenever the actual value of deposit rate falls below the value consistent with the long-term equilibrium, changes in the independent variable helps bring it to long term equilibrium level. Even though speed of adjustment for all the underlying variables are significant at 5 % significant level, sluggish speed of adjustment is

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evident. Speed of adjustment ranges between 12.8% and 6.6%. Among the underlying variables, interbank rate recorded the highest speed of adjustment of 12.9%, followed by deposit rate value of 8.3% and TBR recording the lowest speed of adjustment. Interbank rate recording the highest may indicate banking firms have adequate information when trading among themselves.

4.6.2 Influence of Wholesale MRs Changes on Retail Rates

The study also aimed at examining the effect that wholesale MRs (treasury bill and interbank rate) have on retail rates (deposit and lending rate). The ARDL bounds test presents results of analysis in tables 4.8 and 4.9 below.

Table 4. 8: ARDL Bounds Test (independent variable: Interbank rate)

Dependent variable	**F-statistics**	**5%**		**10%**	
	For Two Variables	I(0)	I(1)	I(0)	I(1)
D(DEPOSIT_RATE)	11.84015	4.94	5.73	4.04	4.78
D(LENDING_RATE)	5.030687	4.94	5.73	4.04	4.78

Source: Autor's estimation (2019)

Table 4.9: ARDL Bounds Test (independent variable: Treasury bill rate)

Dependent variable	**F-statistics**	**5%**		**10%**	
	For Two Variables	I(0)	I(1)	I(0)	I(1)
D(DEPOSIT_RATE)	15.95010	4.94	5.73	4.04	4.78
D(LENDING_RATE)	12.64882	4.94	5.73	4.04	4.78

Source: Autor's estimation (2019)

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Table 4.8 (ARDL bounds test) shows that deposit rate is cointegrated with interbank rate at both 5% and 10% confidence interval while lending rate is cointegrated at the 10% confidence interval. Table 4.9 also shows that deposit and lending rate are cointegrated with TBR at both 5% and 10% confidence interval. Per the principles governing the interpretation, when F-statistic is greater than the upper bound critical value, it suggests variables are cointegrated (i.e. H0 is rejected), and vice versa.

It can therefore be noted that, F-statistics estimates for D(DEPOSIT_RATE) and D(LENDING_RATE) tend to be greater than the upper bound at the 5% and 10% p value for both wholesale MRs (treasury bill and interbank rates). This suggests failure to accept the null hypothesis of no cointegration; and alternatively suggesting that, the variables in the equations of tables 4.8 and 4.9 (deposit rate and lending rate) are cointegrated with wholesale MRs and converge to long run equilibrium. Results from this stage paves way for the ARDL model to be reparameterised into ECM.

Long-Run Coefficients Relationship between Wholesale MRs and Retail Rates

Analysis further progressed to conduct a long run coefficient analysis between wholesale MRs and retail rates. Tables below presents results of the analysis.

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Table 4.10: Long-Run Coefficients Analysis (Independent variable: Interbank Rate)

Dependent Variable	Coefficient	t-statistic	P-value
Deposit rate	0.427208	4.944295	0.0000
Lending rate	0.766459	3.029067	0.0028

Source: Author's estimation (2019)

Table 4. 11: Long-Run Coefficients Analysis (Independent variable: Treasury Bill Rate)

Dependent Variable	Coefficient	t-statistic	P-value
Deposit rate	0.404033	5.471929	0.0000
Lending rate	0.850529	3.771624	0.0002

Source: Author's estimation (2019)

Table 4. 52: Speed of Adjustment coefficients (Independent variable: Interbank Rate)

Error Correction	Coefficient	Std error	t-statistic	P-value
Deposit Rate	-0.125985	0.025818	-4.879665	0.0000
Lending Rate	-0.038992	0.012258	-3.181069	0.0017

Source: author's estimation (2019)

Table 4. 63: Speed of Adjustment coefficients (Independent variable: Treasury Bill Rate)

Error Correction	Coefficient	Std error	t-statistic	P-value
Deposit Rate	-0.128897	0.022759	-5.663607	0.0000
Lending Rate	-0.046140	0.009148	-5.043945	0.0000

Source: author's estimation (2019)

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Reparameterising the ARDL model into ECM via simple linear transformation provide short and long run information for analysis. Table 4.10 provides a summarised long run coefficient analysis between interbank and retail rates. The long run pass-through for deposit and lending rate are 0.43 and 0.77 respectively. The values recorded explains the rate at which the underlying variables react to interbank changes in the long run or seek to define demand elasticity of retail rates with respect to interbank changes. Lending rates tend to have the highest pass through rate of 0.77 response to interbank changes in the long run. The results conform to the work Kwapil and Scharler (2010).

Table 4.11 correspondingly, showcases long run coefficients analysis between TBR and retail rates. Deposit rate long run pass-through is 0.41 whereas that of lending rate is 0.82. This is an indication that changes in TBR has the tendency to influence lending rates significantly than deposit rates. The significant influence of TBR on lending rate doubles that of deposit rate recorded. Even though the results indicate an incomplete pass-through for retail rates, the influence of interbank rates on the retail rates are higher than what was recorded by Acheampong (2005).

For table 4.12 and 4.13, slow speed of adjustment is evident even though the speed of adjustment for all the underlying variables are significant at 5% confidence intervals. The speed of adjustment is between 12.6% and 3.8% for deposit rate and lending rate respectively on table 4.12. This means that the current year's error between interbank rate and retail rates will be corrected the following year at an adjustment speed of 12.6% and 3.8%. As Aziakpono et al. (2007) are of the view that "a negative and statistically significant adjustment coefficient would imply that any short-run

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deviation of the official and retail rate from their long-run equilibrium is corrected in the adjustment of bank rates". Same applied to the speed of adjustment between TBR and retail rates at an adjustment speed of 12.9% and 3.6% for deposit and lending rates respectively.

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CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

The chapter presents a brief overview of the major findings covered in this study. It further provides policy recommendations as well as conclusion on the entire study.

5.1 Summary

The study sought to investigate the effect of monetary policy rate on IRPT in Ghana for the periods 2003 to 2018. IRPT illustrates influence of policy rates changes on wholesale MRs and retail rates.

Monthly series data comprising of lending, deposit, interbank, policy, and TBRs were sourced from bank of Ghana's database between the periods of 2003:01 to 2018:10 were used for the study. The study tested for stationarity among the variables using the ADF test and the results indicated that the variables were integrated of orders zero and one [I(0) and I(1)] at first difference. As a result, the ARDL approach was then employed. Based on the bounds test, there was evidence of cointegration and hence, the study proceeded to estimation of the ECM which accesses the long run and short run effects of the independent variables on the dependent variables.

From the long run findings, MPR showed a significant long run impact on WMRs and deposit rate. That is PR was found to be significant in determining interbank rate, TBR as well as deposit rate especially in the long run. Wholesale MRs also had a steady long run relationship with retail rates.

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The study also revealed an incomplete pass-through in commercial bank's deposit rate and TBR, while interbank rate was almost complete.

Finally, the error correction coefficients were found to be negative and significant at the 1% significance level, implying that the model was stable and that the economy would quickly adjust back to equilibrium should there be any shock resulting from the independent variables.

5.2 Conclusions

Findings from analysis to estimate how policy rate influences the various MRs indicated an incomplete pass-through for both wholesale MRs and retail rates. Results also indicated an incomplete pass-through of policy rates changes on wholesale MRs and retail rates in the short run. Furthermore, short run pass-through towards long run pass-through also indicated a very low speed of adjustment following results from the error correction model. According to Hannan and Berger (1991), such incomplete pass-through as well as asymmetric price adjustment results from collusive pricing behavior which emanated from imperfect competition among banking institutions.

Furthermore, results also indicated an incomplete pass-through between wholesale MRs and retail rates in the long run. Findings also showed a very weak short run pass-through between wholesale MRs and retail rates. This finding may be attributed to market imperfections where deposit rates are considered highly inelastic upwards than downwards (Hannan & Berger, 1991).

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5.3 Recommendations

From the results obtained money supply is an important variable in influencing the various interest rates in the country. Considering the illustration of weak monetary policy transmission, Central Bank of Ghana must institute measures to calibrate existing mechanisms. The Central Bank must also ensure that the significance of policy rate as an operating tool to achieving general price stability is not totally discarded during its policy amendment. Rather, further interventions seem necessary to augment the existing policy structures since transmission process is dominated by bank lending channel.

Due to level of influence of policy rate adjustments on retail rates, monetary authorities must limit the pace at which monetary policy is tightened. This is expected to boost the confidence of business firms to access capital from financial institutions.

The government should completely free the credit and deposit markets. The low rate paid on deposits and high rates on lending may act as a disincentive for people to save or lend money from banks which 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), as well as increase the range of financial products offered to customers.

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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.

5.4 Recommendations for Further Studies

IRPT is also affected by a host of factors and the study could 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.

The study also recommends further research work by incorporating the effects of other monetary policy channel such as exchange rate and asset price channel on wholesale MRs and retail rates. This will enhance the central bank of Ghana's formulation of monetary policy adjustment.

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REFERENCES

Abradu-Otoo, P., Amoah, B., & Bawumia, M. (2003). An investigation of the transmission mechanisms of monetary policy in Ghana: a structural vector error correction analysis. *Bank of Ghana, Working Paper, 2*

Acheampong, K., (2005). *Bank interest rate channel of monetary policy transmission in Ghana*. Working Paper, 10. Accra: Bank of Ghana.

Agenor, P. R., & Aynaoui, K. E. (2010). Excess liquidity, bank pricing rules, and monetary policy. *Journal of Banking and Finance*. *34*, 923-933.

Akosah, N. K. (2015). *Is the monetary policy rate effective? Recent evidence from Ghana.* Working Paper No. 14. Economics Section, Graduate Institute of International and Development Studies. Available on: https://ideas.repec.org/p/gii/giihei/heidwp14-2015.html

Allen, F., & Gale, D. (2004). Competition and financial stability. *Journal of Money, Credit, and Banking*, *36*(3), 453-480.

Amarasekara, C. (2009). The impact of monetary policy on economic growth and inflation in Sri Lanka. *Staff Studies*, *38*(1).

Arslanturk, Y., Balcilar, M., & Ozdemir, Z. A. (2011). Time-varying linkages between tourism receipts and economic growth in a small open economy. *Economic Modelling*, *28*(1), 664-671.

Aydin, H. I., (2007). *Interest rate pass-through in Turkey. Central Bank of the Republic of Turkey*. Working Paper, No: 07/05. Research and Monetary Policy Department, Central Bank of the Republic of Turkey. Available on: https://ideas.repec.org/p/tcb/wpaper/0705.html

Aziakpono, M. J. and Wilson, K. (2013): "Interest rate pass-through and monetary policy regimes in South Africa". AERC Working Research Paper No 259. Nairobi: AERC

Aziakpono, M. J., Wilson, M. K., & Manuel, J. (2007). Adjustment of commercial banks' interest rates and the effectives of monetary policy in South Africa. *The African Finance Journal*. *9*(1)1-20.

Azim, O. K., & Saygılı, M. (2013). Economic uncertainty and money demand stability in Turkey. *Journal of Economic Studies*, 40(3), 314-333.

Bahmani-Oskooee, M., Kutan, A. M., & Xi, D. (2013). The impact of economic and monetary uncertainty on the demand for money in emerging economies. *Applied Economics*, *45*(23), 3278-3287.

University of Ghana http://ugspace.ug.edu.gh

Baugnet, V., Collin, M., & Dhyne, E. (2007). *Monetary policy and the adjustment of Belgian private banks interest rates: An econometric analysis*. National Bank of Belgium. Available: http://www.ecb.int/events/pdf/conferences/mir/BaugnetCollinDhyne.pdf.

Bawumia, M. (2010). *Monetary Policy and Financial Sector reform in Africa: The experience of Ghana*. Bradenten, FL: BookLocker.

Berger, A. N., & Udell, G. F. (1992). Some evidence on the empirical significance of credit rationing. *Journal of political economy*, *100*(5), 1047-1077.

Bernanke, B., & Gertler, M. (1995). Agency costs, net worth, and business fluctuations. *The American Economic Review*, 14-31.

Boivin, J., Kiley, M. T., & Mishkin, F. S. (2010). How has the monetary transmission mechanism evolved over time? NBER Working Paper 15879. Available at: https://www.scirp.org/(S(351jmbntvnsjt1aadkposzje))/reference/ReferencesPapers.aspx?ReferenceID=579815

Borio, C., & Fritz, W. (1995). *The response of short-term bank lending rates to policy rates: a cross-country perspective*, BIS Working paper no 27, May. Available on: https://econpapers.repec.org/paper/bisbiswps/27.htm

Brooks, C. (2008). *Introductory econometrics for finance (2nd Ed.).* The ICMA Centre, University of Reading. New York: Cambridge University Press.

Buchs, T., & Mathisen, J. (2005). *Competition and Efficiency in Banking: Behavioral Evidence from Ghana*, IMF Working Paper 05/17 (Washington, D. C: International Monetary Fund). Available on: https://www.imf.org/en/Publications/WP/Issues/2016/12/31/Competition-and-Efficiency-in-Banking-Behavioral-Evidence-from-Ghana-17930

Calem, P. S., Gordy, M. B., & Mester, L. (2006). Switching costs and adverse selection in the market for credit cards: New evidence. *Journal of Banking and Finance*, *30*, 1653-1685.

CEPA. (2012). Ghana economic review and outlook. Accra: Centre for Policy Analysis (CEPA). Available on: https://www.cepa.org.gh/publications/GhanaOutlook2012118.pdf

Charoenseang, J., & Manakit, P. (2007). Thai monetary policy transmission in an inflation targeting era. *Journal of Asian Economics*, *18(*1), 144-157.

Chong, B. S. (2010). Interest rate deregulation: Monetary policy efficacy and rate rigidity, *Journal of Banking and Finance*, *34(*6), 1299-1307.

Chong, B. S., Liu, M.-H., & Shrestha, K. (2006). Monetary transmission via the administered interest rates channel. *Journal of Banking & Finance*, *30*(5), 1467-1484.

University of Ghana http://ugspace.ug.edu.gh

Coricelli, F., Égert, B., & MacDonald, R. (2006). *Monetary transmission mechanism in Central and Eastern Europe: Surveying the Empirical Evidence,* Work in Progress. Finance and Consumption Conference, European University Institute.

Cottarelli, C., & Kourelis, A. (1994). *Financial structure, bank lending rates and the transmission of monetary policy.* IMF Working Papers, 41(4), 587–623. Available: http://www.jstor.org/stable/3867521

Cottarelli, C., Ferri, G., & Generale, A. (1995). *Bank lending rates and financial structure in Italy: A case study*. IMF Staff Papers, September, 42(3), 670-700.

Crespo-Cuaresma, J., Egert, B., & Reininger, T. (2007). Interest rate pass- through in central and Eastern Europe: reborn from ashes merely to pass-away. *Journal of Policy Modelling*, *29*, 209-225.

Dabla-Norris, E., & Floerkemeier, H. (2006). *Transmission mechanisms of monetary policy in Armenia: evidence from VAR analysis*. IMF Working Paper no 06/248, November.

Dawson, C. (2002). *Practical Research Methods: A User-friendly Guide to Mastering Research Techniques and Projects*. Oxford: How to Books Ltd.

De Angelis, C., Aziakpono, M., & Faure, A. P. (2005). The transmission of monetary policy under the repo system in South Africa: an empirical analysis. *South African journal of economics*, *73*(4), 657-673.

De Bondt, G. (2005). Interest rate pass-through: empirical results for the Euro area. *German Economic Review*. *6*(1), 37-78.

De Graeve, J., De Jonghe, O., & Vennet, V. R. (2007). Competition, transmission and bank pricing policies: Evidence from Belgium loan and deposit markets. *Journal of Banking and Finance*, *31*,259-278.

Dutta, S., Bergen, M., Levy, D., & Venable, R. (1999). Menu costs, posted prices, and multiproduct retailers. *Journal of Money, Credit, and Banking*, *31*, 683–703.

Egert, B., & Macdonald, R. (2009). Monetary transmission mechanism in central and Eastern Europe: Surveying the surveyable. *Journal of Economic Survey*, *23*(2)277-327.

Eita, J. H. (2012). Explaining Interest Rate Spread in Namibia. *International Business & Economics Research Journal, 11*(10), 1123 – 1132.

Engle, R. F., & Granger, C. W. (1987). Co-integration and error correction: representation, estimation, and testing. *Econometrica: journal of the Econometric Society*, 251-276.

Estrella, A., & Mishkin, F. S. (1995). *The term structure of interest rates and its role in monetary policy for the European Central Bank*. Working Paper No. 5279. Cambridge:

University of Ghana http://ugspace.ug.edu.gh

Massachusetts Avenue. Retrieved from National Bureau of Economic Research: https://www.nber.org/papers/w5279

Faure, A. P. (2006). *Money, Interest and Monetary Policy*. Cape Town: Quoin Institute.

Flannery, M. J. (1982). Retail bank deposits as quasi-fixed factors of production. *The American Economic Review, 72*(3), 527-536.

Gall, M. D., Gall, J. P., & Borg, W. R. (2007). *Educational research, an introduction (Eighth ed.)*. Boston: Pearson.

Gray, D. E. (2009). *Doing research in the real world*. Los Angeles: SAGE.

Hannan, T. H., & Berger, A. N. (1991). The rigidity of prices: Evidence from banking industry. *The American Economic Review, 81(*4), 938-945.

Hannan, T., & Berger, A. (1991). The rigidity of prices: Evidence from banking industry. *American Economic Review, 81*(4), 938–945.

Hendry, D. F., & Doornik, J. A. (1994). Modelling linear dynamic econometric systems. *Scottish Journal of Political Economy, 41*(1), 1-33.

Hofmann, B., & Mizen, P. (2004). Interest rate pass-through and monetary transmission: Evidence from individual financial institutions' retail rates. *Economica, New Series*. *71*(281), 99-123.

Hulsewig, O., Mayer, E., & Wollmershauser, T. (2009). Bank behaviour, incomplete interest rate pass-through, and the cost channel of monetary policy transmission. *Economic Modelling*. *26*, 1310-1327.

Iacoviello, M. (2005). House prices, borrowing constraints, and monetary policy in the business cycle. *The American Economic Review*, *95*(3), 739-764.

Iganiga, B. O. (2010). Evaluation of the Nigerian financial sector reforms using behavioural models. *Journal of Economics*. *1*(2), 65-75.

International Monetary Fund (2011). *Ghana: Financial System Stability Assessment Update*, IMF Country Report 11/131, Washington.

International Monetary Fund. (2007). *Cameroon selected issues*. IMF country Report No.07/287. Available on: http://www.imf.org

Jankee, K., (2004). Nonlinearities in the adjustments of commercial banks' retail rates to interbank rates: The case for Mauritius. *The IUP Journal of Financial Economics*, *3*(3), 37-53.

University of Ghana http://ugspace.ug.edu.gh

Johansen, S., & Juselius, K. (1990). Maximum likelihood estimation and inference on co-integration with applications to the demand for money. *Oxford Bulletin of Economics and statistics*, *52*(2), 169-210.

Kapwil, C., & Scharler, J. (2006). Limited Pass-Through from Policy to Retail Interest Rates: empirical Evidence and Macroeconomic Implications. Oesterreichische National bank (OeNB). *Monetary Policy and the Economy*, Q4/06.

Karagiannis, S., Panagopoulos, Y, & Vlamis, P. (2011). Symmetric or asymmetric interest rate adjustments? Evidence from South-eastern Europe. *Review of Development Economics, 15*(2), 370-385.

Karagiannis, S., Panagopoulos, Y., & Vlamis, P. (2010). Interest rate pass- through in Europe and the US: Monetary policy after the financial crisis. *Journal of Policy Modelling, 32*,323-338.

Karagiannis, S., Panagopoulos, Y., & Vlamis, P. (2009). *The emerging BRIC economies: Evidence from the interest rate transmission mechanism*. Oxford, UK: St. Hugh's College, Oxford University.

Khawaja, M. I., & Khan, S. (2008). Pass-through of change in policy interest rate to market rates. *The Pakistan Development Review*, *47*, 4 Part II: 661-674.

King, R. G., & Levine, R. (1993). Finance and growth: Schumpeter might be right. The *Quarterly Journal of Economics*, *108*(3), 717-737.

Kovanen, A. (2011). Monetary Policy Transmission in Ghana: Does the Interest Rate Channel Work? *Journal of political economy*, *105*(2), 211-248.

Kremers, J. J. (1989). US federal indebtedness and the conduct of fiscal policy. *Journal of Monetary Economics, 23*(2), 219-238.

Kwapil, C., & Scharler, J. (2010). Interest Rate Pass-Through, Monetary Policy Rules and Macroeconomic Stability, *Journal of International Money and Finance*, *29*, 236-51.

Kyereboah-Coleman, A. (2012). Inflation targeting and inflation management in Ghana. *Journal of Financial Economic Policy*, *4*(1), 25–40.

Leuvensteijn, M. V., Sorensen, C. K., Bikker, J. A., & Van Rixtel, A. A. R. (2008). Impact of bank competition on the interest rate pass-through in the euro area. *ECB Working Paper series* No: 885.

Liu, M., Dimitri M., & Alireza T. (2008). Monetary Policy Transparency and Pass-Through of Retail Interest Rates, *Journal of Banking and Finance*, *32*, 501-11.

University of Ghana http://ugspace.ug.edu.gh

Liu, M., Dimitri, M., & Alireza, T. (2011). Monetary Policy Transparency and Pass-Through of Retail Interest Rates, *Journal of Banking and Finance, 32*, 501-11.

Madsen, J., & Yang, Y. (1998). Asymmetric price adjustment in a menu-cost model. *Journal of Economics, 68*, 3:295-309.

Marotta, G. (2009). Structural breaks in the lending interest rate pass-through and the euro. *Economic Modelling, 26*, 191-205.

Matthew B. Miles, M. B., A. Michael Huberman, A. M., & Saldana, J (2013). *Qualitative Data Analysis: A Methods Sourcebook and The Coding Manual for Qualitative Researchers*. Thousand Oaks, CA: SAGE.

Mensah, O. J., Ohene-Yankyera, K., & Aidoo, R. (2016). Constraints to growth of micro and small-scale enterprises in Ghana: A case of street food enterprises. *Journal of Development and Agricultural Economics, 8*(10), 241-250.

Mishkin, F. S. (1995). " Symposium on the Monetary Transmission Mechanism. *The Journal of Economic Perspectives, 9*(4), 3-10.

Mishkin, F. S. (2010). Symposium on the monetary transmission mechanism. *The journal of economic perspectives, 9*(4), 3-10

Mishra, P., Montiel, P. J., & Spilimbergo, M. A (2010). *Monetary Transmission in Low Income Countries*. Centre for Economic Policy Research, Discussion Paper Series, 7951.

Mojon, B. (2000). *Financial structure and the interest rate channel of ECB monetary policy.* European Central Bank Working Paper, European Central Bank, No. 40.

Neumark, D., & Sharpe, S. (1992). Market structure and the nature of price rigidity: Evidence from the market for consumer deposits. *The Quarterly Journal of Economics*. *107*(2), 657-680.

Nkoro, E., & Uko, A. K. (2016). Exchange Rate and Inflation Volatility and Stock Prices Volatility: Evidence from Nigeria, 1986-2012. *Journal of Applied Finance and Banking*, *6*(6), 57.

Ozdemir, B. K. (2009). Retail bank interest rate pass-through: The Turkish experience. International Research. *Journal of Finance and Economics, 28*,7-15.

Ozdemir, N. (2013). Effects of monetary policy coordination on small open economies. *Emerging Markets Finance and Trade, 49*(3), 124-136.

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

Ramlogan, C. (2004). The transmission mechanism of monetary policy: Evidence from the Caribbean. *Journal of Economic Studies, 31*(5), 435-447.

University of Ghana http://ugspace.ug.edu.gh

Raunig, B., & Scharler, J. (2009). Money Market Uncertainty and Retail Interest Rate Fluctuations: A Cross-Country Comparison. *German Economic Review*, *10*(2), 176-192.

Sakyi, D., Mensah, O. I., & Obeng, S. K. (2017). Inflation Targeting Framework and Interest Rates Transmission in Ghana: An Empirical Investigation, *Journal of African Business*, *18*(4), 417-434

Samba, M. C. (2013). Monetary Policy Effectiveness under the CEMAC Area: Empirical Evaluation. *International Journal of Advances in Management and Economics*, *2*, 55-64.

Samba, M. C., & Yan, Y. (2009). Interest rate pass-through in the Central African Economic and Monetary Community (CAEMC) area: Evidence from an ADRL analysis. *International Journal of Business and Management*, *5*(1), 31.

Sander, H., & Kleimeier, S. (2004). Convergence in Euro-zone retail banking? What interest rate pass-through tells us about monetary policy transmission, competition and integration? *Journal of International Money and Finance*, *23*,461-492.

Sander, H., & Kleimeier, S. (2006b). Convergence of interest rate pass-through in a wider euro zone. *Economic Systems*, *30* (2006), 405-423.

Sander, H., & Stefanie Kleimeier, S. (2006). Interest Rate Pass-Through in the Common Monetary Area of the SACU Countries, *South African Journal of Economics*, *74*(2), 215-229.

Sanusi, A. R., (2010). Interest rate pass-through and the efficiency of monetary policy in Nigeria: 2002-2010. National Conference on State of the Nigerian Economy, November 2010. Available at: https://ssrn.com/abstract=1790719

Sarpong, D., Winful, E. C., & Ntiamoah, J. (2013). Determinants of Wide Interest Margins in Ghana. Panel EGLS Analysis. *African Journal of Business Management, 7*(35), 3535-3544.

Scholnick, B. (1996). Asymmetric adjustment of commercial bank interest rates: evidence from Malaysia and Singapore. *Journal of International Money and Finance, 15*(3), 485-496.

Scholnick, B. (1996). Asymmetric adjustment of commercial banks interest rates: Evidence from Malaysia and Singapore. *Journal of International Money and Finance*, *15*(3), 485–496.

Schwarzbauer, W. (2007). *Financial structure and its impact on the convergence of interest rate pass-through in Europe*. A time-varying interest rate pass-through model. European Network of Economic Policy Research Institutes, Working Paper No. 51/February.

Sorensen, C. K., & Werner, T. (2006). *Bank interest rate pass-through in the euro area: a cross country comparison*. European Central Bank. Working Paper Series No. 580/January 2006.

University of Ghana http://ugspace.ug.edu.gh

Stiglitz, J. E., & Weiss, A. (1981). Credit rationing in markets with imperfect information. *American Economic Review, 53* (6): 393-410.

Tai, P. N., Sek, S. K., & Har, W. M. (2012). Interest rate pass-through and monetary transmission in Asia. *International Journal of Economics and Finance, 4*(2), 163

Tomasz, C. (2003). *Interest rate pass-through in the Polish banking sector and bank-specific financial disturbances*. MPRA Paper No. 5133. Online at http://mpra.ub.uni-muenchen.de/5133/

Toolsema, L. A., Sturm, J. E., & De, H. J., (2002). *Convergence of Pass-through from Money Market to Lending Rates in EMU: New Evidence*. CCSO Centre for Economic Research, Groningen. Working Paper No.2002/6.

Wang, K. M., & Lee, Y. M. (2009). Market volatility and retail interest rate pass-through. *Economic Modelling, 26*: 1270-1282

Wang, K. M., & Thi, T. B., (2010). Asymmetric pass-through and risk of interest rate: An empirical exploration of Taiwan and Hong Kong. *Applied Economics*. *42*, 659-670.

Zikmund, W. G. (2000). *Business Research Methods (6th ed.)*. Dryden Press.