UNIVERSITY OF EDUCATION, WINNEBA

FINANCIAL LIBERALIZATION AND DEMAND FOR MONEY NEXUS IN GHANA

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MASTER OF PHILOSOPHY

2022

UNIVERSITY OF EDUCATION, WINNEBA

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A thesis in the Department of Economics Education,
Faculty of Social Sciences Education, submitted to the School of
Graduate Studies in partial fulfillment

of the requirements for the award of the degree of
Master of Philosophy
(Economics)
in the University of Education, Winneba

SEPTEMBER, 2022

DECLARATION

STUDENT'S DECLARATION

I, ELIJAH APPIAH, declare that this thesis, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere.

SIGNATURE: ……………………………….

DATE: ………………………………………..

SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of thesis as laid down by the University of Education, Winneba.

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Date: ………………………………………..

DEDICATION

This thesis is dedicated to my mother, Hannah Odame, who was the ultimate pillar of support for my education. Mom, you are truly missed.

ACKNOWLEDGEMENTS

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ABBREVIATIONS

ARDL	Autoregressive Distributed Lag
ADF	Augmented-Dickey Fuller
PP	Phillips-Perron
CUSUM	Cumulative Sum
CUSUMSQ	Cumulative Sum of Squares
MOSUM	Moving Sum
PNDC	Provisional National Defense Council
FINSAP	Financial Structural Adjustment Programme
FSCA	Financial Sector Adjustment Credit
GDP	Gross Domestic Product
SAP	Structural Adjustment Programme
FINSSP	Financial Strategic Plan
BGC	Bank of the Gold Coast
MPC	Monetary Policy Committee
VAR	Vector Autoregression
LIBOR	London Interbank Offered Rate
ECM	Error Correction Model
FOLS	Fully Modified Ordinary Least Squares
ECOWAS	Economic Community of West African States

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WDI	World Development Indicators
BoG	Bank of Ghana
IFS	International Financial Statistics
IMF	International Monetary Fund
FLI	Financial Liberalization Index
PCA	Principal Component Analysis
AIC	Akaike Information Criterion
BIC	Bayesian Information Criterion
UECM	Unrestricted Error Correction Model
CDH	Consolidated Discount House
SDC	Security Discount Company

ABSTRACT

This study examines the relationship between financial liberalization and demand for money in Ghana using time series data from 1984 to 2020. The study used the autoregressive distributed lags (ARDL) model to estimate the short- and long-run relationship between money demand and financial liberalization, as well as other determinants of money demand. The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests showed stationarity of all variables after first-differencing, whereas inflation was stationary at levels. The cointegration test revealed a long-run cointegrating relationship and hence an estimation of the unrestricted error correction model (UECM). The results revealed that the estimates were significant and yielded the expected signs consistent with theory, except for inflation but it was nonetheless statistically insignificant. Financial liberalization was found to have a significant positive relationship with money demand in both short and long run periods. The error correction term was found to be significant and it yielded the expected negative sign showing that 12 percent of the disequilibrium from previous annual periods converges back to long-run equilibrium in the current period. The Granger Causality test established no causal relationship between the demand for money and financial liberalization. In the end, the CUSUM, CUSUMSQ, and MOSUM plots diagnosed a stable demand for money function in Ghana. The threshold model estimated in the study revealed that financial liberalization had a positive effect on the demand for money in the initial stages until it reaches a threshold level of 29.34% where further liberalization of the financial sector affects the money demand function in Ghana negatively, and so the study recommends that the Bank of Ghana should be cautious about the degree of financial liberalization they pursue to achieve optimal money demand. If the degree of financial liberalization is below the threshold level, increasing it could stimulate money demand, but conversely, if it above the threshold level, reducing it could stabilize money demand. Since exchange rate had a significant negative relationship with money demand, the study recommends that the Bank of Ghana uses exchange rate as an intermediate target to achieve price stability in periods of inflation and recession. Again, the study recommends that since financial liberalization has a significant positive relationship with money demand, the Bank of Ghana adopts policies that ensure rigorous financial discipline to prevent future bank crises.

CHAPTER ONE

INTRODUCTION

1.0 Background to the Study

Financial liberalization is referred to as the advancement in technology that facilitates information access, trading and means of payment, and to the advent of new financial products and services, innovative forms of organization and a more established and complete financial markets (Solans, 2003). The global acceptance of financial liberalization by many countries has created avenues for financial deregulation, credit controls elimination/reduction, liberalization of international capital flows, autonomy to commercial banks, private ownership of banks, and free entry into the banking sector (Odhiambo, 2010). Financial innovations and technical advancements are now the primary drivers of the benefits of financial liberalization, since they have permitted changes in money demand.

The functioning of monetary policy in both developed and developing countries is dependent on the stability of money demand (Nachega, 2001). Much research efforts are dedicated to establishing money demand relationships in developed countries whereas relatively little analysis on the behaviour of money balances has been done in developing countries (Hodel, 2007). Money demand functions are sometimes mentioned as a standard for evaluating monetary trends. (Dreger et al., 2006).

Demand for money refers to a situation where people prefer to hold money in the form of cash instead of assets. Usually, this is known as the liquidity preference. When money demand is relatively stable, it augurs well for better predictions of monetary policy effects on macroeconomic indicators such as output, inflation, interest rate, and also tends to reduce the propensity of inflation bias (Cziraky & Gillman, 2006).

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Generally, according to Bannock (1998), demand for money is the desire to hold money in liquid form instead of other forms of wealth which include stocks, bonds, among others. This desire to hold money in cash form encompasses the three main motives for holding money: transactions, precaution, and speculative.

Africa has undergone several financial reforms in the past with most countries adopting the economic deregulation policy in the 1980s. Before the adoption of economic deregulation policy in the 1980s, it was assumed that the money demand function was relatively stable. It was also equally assumed that during economic deregulation, new financial products could cause instability in the underlying money demand relationship which predates important consequences for the operation and conduct of monetary policy (Darrat, 2009; Dadzie & Ferrari, 2019). Generally, with the advent of financial liberalization, there have been evidences of stability as well as instability of money demand especially in developing countries (Khan & Hye, 2013).

Ghana's financial sector has undergone series of reforms since 1988 which affect the country's demand for money. Ghana's first significant attempt to liberalize its economy occurred in 1983, when the Provisional National Defence Council's (PNDC) government launched the Structural Adjustment and Economic Recovery Program (Asare, 2013). There have also been some institutional reforms during this period. Prior to the financial reforms, the Ghanaian government's pre-reform policies on financial markets, coupled with economic crisis, had a significant impact on the financial system, resulting in bank distress and financial volatility (Aryeetey & Kanbur, 2005).

The Financial Sector Adjustment Programme (FINSAP), which began in 1989 and was sponsored by the World Bank's Financial Sector Adjustment Credit (FSAC), aimed to solve Ghana's financial system's institutional flaws. The objectives of FINSAP were

geared towards a reformation of the supervisory system and provident legislation, developing money and capital markets, restructuring distressed banks, and allowing public or private sector financial instruments entry into the financial markets. This was due to the inability of Ghana's financial system to ensure effective delivery of financial services (Aryeetey, 1996). The periods from late 1980s through early 1990s saw Ghana through volatile and high inflation rates which made it difficult for the control of budget deficit and rapid monetary expansion in the country. Due to the high inflation rate combined with excessive devaluation, most of the bank's share capital was wiped out, resulting in a banking crisis. (Daumont, Le Gall, & Leroux, 2004).

The current 'floating' exchange rate in Ghana, the emergence of foreign exchange bureaus, the gradual liberalization of domestic interest rates, the creation of an interbank market, and the introduction of the treasury bill all improve the quality of economic signals, alter the institutional environment, and augments the matrix of financial opportunities. This enhances the spectrum of potential causes of money demand shocks and uncertainty because the monetary authorities must now rely on new transmission mechanisms (Dobson & Ramlogan, 2001). Financial liberalization exposes the Ghanaian economy to international fluctuations under a flexible exchange rate; and may also result in a very high real interest rate especially for banks that behave in an oligopolistic manner (Owusu-Antwi, 2009).

Financial liberalization can affect the choice of monetary policy target that are monitored by central banks to gauge monetary conditions. In a developing economy like Ghana, interest rates tend to be set by administrative controls, and the central bank usually targets variables such as broad money (Adu, Marbuah & Mensah, 2013). After financial liberalization process, the stability of monetary aggregates may be reduced. Many central banks usually resort to monitoring price variables which include interest

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rates and exchange rates. In many countries, broad money targets are acknowledged as monitoring ranges, with very few central banks attempting to strictly adhere to monetary targets, or base policy actions on deviations of actual money growth from projected growth (Dekle & Pradhan, 1997).

In the 1990s, some central banks used numerical inflation or nominal GDP targets to guide monetary policy, in contrast to the previous decade's use of interest rates or money stock. Economic scholars attribute this shift to the failure of banks' monetary aggregates to serve as monetary policy guidance. Additionally, the conduct and implementation of monetary policy are predicated on the stability of the money demand function. This is critical because the money demand function is used to manage the economy's total liquidity and inflation rate (Oluwole & Olugbenga, 2007).

Financial liberalization through interest rate change, according to Lewis (1992), looks to be less of a miracle solution than its proponents typically claim. Lewis contends that having zero or constant profits in the banking sector means that rises in deposit rates are matched by increases in borrowing rates, lowering investment demand and offsetting some of the reforms advantages. Furthermore, when quantity rationing of investment is replaced with rationing through interest rates, financial liberalization leads to inflation and higher interest rates.

It is worth noting that a stable money demand function is regarded as one of the most crucial indicators in any economy. An increase in the value of money demand indicates that a country's economic conditions are improving, whereas a decline in its value indicates that economic conditions are deteriorating (Maravic & Palic, 2005). The Monetarists believe that an optimal monetary policy may be reached by targeted

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increases in money supply, and that changes in money supply affect production and the overall price level in both the short and long term (Jahan & Papageorgiou, 2014).

As a result, it is necessary to investigate the stability of Ghana's money demand function, using M2 as a proxy and other open variables such as financial liberalization, exchange rate and volatility, real interest rate, and GDP growth, among others. In such a situation, this research focuses on Laidler (1993) and Bahmani-Oskooee (2001), who emphasized that the difficulties arising from the money demand function's instability may be linked to insufficiency in modelling the function's short-run and long-run equilibrium dynamics.

1.1 Statement of the Problem

Over time, governments, researchers, and academicians have paid a lot of attention to the money demand function. "No claim in macroeconomics has attracted greater attention than the existence, at the aggregate economy level, of a stable demand for money function," wrote Laidler (1982). Thus, in macroeconomics, the study of the money demand function and its stability is critical, because a stable money demand function is required for effective monetary policy. Financial liberalization policies usually result in slow portfolio movements away from monetary assets, diminishing money demand predictability. Failure to account for changes in money demand following financial deregulation might result in monetary policy tightening or loosening which then causes instability (Johnston & Brekk, 1991).

The Central Bank of Ghana is in charge of designing and implementing monetary policy with the objective of maintaining price stability and, more specifically, ensuring the promotion and maintenance of financial and monetary stability in the country. This demonstrates how critical it is for Ghana to have a stable money demand function. Since

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2007, the Bank of Ghana's official policy framework has been 'Inflation Targeting', and is complemented by the operation of a flexible exchange rate system (Bank of Ghana, n.d.).

Financial liberalization has had a significant influence on Ghana's economy. Before the financial sector changes in 1992, the Bank of Ghana used direct controls and a fixed exchange rate mechanism to regulate the amount of money. As a result, monetary policies developed from employing direct instruments to a more market-based system where the major policy aim was targeted at the money supply (Roe and Sowa, 1997).

Money demand has both short- and long-term components. Improvement in the real sector is related to the long-term component of money demand, or the transaction demand motive for money. This indicates that the increased money supply necessary to maintain price stability can be accomplished only in the long run if it coincides with output growth. In the short run, a declining rate of money circulation may result in an increase in money demand regardless of changes in the real sector. However, regardless of output trends, the continued expansion of money supply results in increased inflationary pressures (Maravic and Palic, 2005).

Generally, Ghana focused on monetary targeting as its policy target; however, this became ineffective particularly in the short-run as global economies developed, which was accompanied by developments in the financial sector. As a result, Ghana abandoned the monetary targeting framework and instead chose inflation targeting as a monetary policy method. (Quartey and Afful-Mensah, 2014). Since 2002, Ghana has followed the price stability strategy, which entails minimal inflation and a stable exchange rate (Sowa and Abradu-Otoo, 2007). Since then, Ghana has pursued low-

inflation policies (Quartey, 2010), making the rate of inflation one of the determinants of money demand.

Nonetheless, Ghana remains a small open economy (Chiaraah, 2019). Monetary changes such as foreign interest rates and currency rates have an impact on local demand for real cash balances in open economies with flexible exchange rates. As a result, the domestic money demand functions may become unstable (Laursen and Metzler, 1950; Abbas Ali et al., 2014; Dobson and Ramlogan, 2001). This is a problem that the Ghanaian economy may face due to the country's flexible exchange rate regime. However, in Ghana, the impact of financial liberalization on money demand stability and monetary policy consequences has not been well studied (Sriram, 2001).

Mundell (1963) discovered that there is a link between money demand and the exchange rate. Mundell believed that, in addition to the usual determinants, the influence of the exchange rate on money demand must not be overlooked. Money demand functions may become unstable when capital mobility becomes less regulated and overseas trade demands expand. McKinnon (1985) proposed for a specific channel of effects known as the Currency Substitution Hypothesis, which claimed that nations with flexible exchange rates are vulnerable to external monetary shocks conveyed through international financial markets.

Researchers have been focusing on the influence of monetary reforms on money demand functions over the past three decades. (Arango and Nadiri, 1981; Bahmani-Oskooee and Pourheydarian, 1990; Bahmani-Oskooee, 1991; Chowdhury, 1997; Khalid, 1999; Bahmani-Oskooee and Rehman, 2005). These researchers have two points of view on the influence of international monetary changes on domestic money demand:

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i. Domestic currency depreciation (or foreign currency appreciation) enhances the domestic currency worth of overseas assets, resulting in an increase in a country's wealth and a rise in demand for real cash balances, according to Arango and Nadiri (1981). This suggests that depreciation of the currency has a positive impact on money demand.

ii. Bahmani-Oskooee and Pourheydarian (1990) also noted that depreciation of the domestic currency, as well as the prospect of further depreciation, may cause people to retain less domestic currency and more foreign currency, resulting in a drop in money demand. This shows that depreciation of the exchange rate has a negative influence on local currency demand. This study takes into account the two points of view and aims to explore the stability of Ghana's money demand, taking into account exchange rate changes as a key predictor of money demand.

Studies that have been done on financial liberalization and its influence on money demand show that some of these studies found the money demand to be stable (Nachega, 2001; Nabiddo, 2007; Nyorekwa, 2007; Opolot, 2007; Guloba and Osoro, 2009; Nampewo and Opolot, 2016), while others found it to be unstable (Atingi-Ego and Matthews, 1996; Kararach, 2002).

Few studies have attempted to use the Autoregressive Distributed Lags (ARDL) model for the estimation (Opolot, 2007; Nampewo and Opolot, 2016), while others have relied on other co-integration techniques such as the Engle-Granger Cointegration. Those studies that relied on the other techniques of cointegration are Bahmani-Oskooee and Rhee (1994); Khan (1994); Arize (1994); Ghaffar and Habibullah (1987); Tan (1997); Rao and Singh (2006; and Bahmani-Oskooee and Rehman (2005).

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Many empirical studies on the money demand stability had focused on developed countries and few developing countries. In the case of West Africa, there are too few studies on the stability of the money demand function. Especially in Ghana, these are some few studies so far made on the stability of the money demand function (Ando and Chappel, 2002; Dagher and Kovanen, 2011; Havi et al., 2014; Nchor and Adamec, 2016). These studies in Ghana have ignored the effect of financial liberalization on the money demand stability despite studies such as Khan and Hye (2013), James (2005) and Adil et al., (2020) found "evidences of stability as well as instability of demand for money due to financial development for developing economies" (Khan and Hye, 2013). It is important to note that Hye (2009) used M2/M1 as a proxy for financial innovation to ascertain the impact of banking sector reforms on the money demand function. Thus, the issue of incorporating financial innovation into the money demand function for Ghana becomes necessary but a financial liberalization index is constructed to serve as a proxy for financial innovation in this study. Also, there is a lack of research exploring the threshold level effect of FL on the demand for money in Ghana, leaving a significance gap in the literature.

As a result, the rationale for this study in filling the gaps in literature is to estimate the demand for money function in Ghana while incorporating financial liberalization as the key determinant of money demand - a crucial issue in the country's macroeconomic policy that has been largely overlooked by previous research. The ARDL model would be used to estimate the short- and long-run association between financial liberalization and money demand, while also taking into account other factors that influence money demand, such as the exchange rate, interest rates, GDP growth, real deposit, and inflation rate. Furthermore, the direct impact of financial liberalization on money demand, and otherwise would be established by a test for causality. Again, the study

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aims to bridge the gap by examining the threshold level effect of financial liberalization on demand for money in Ghana which would contribute to a deeper understanding of the relationship between the two variables, with significant implications for policymakers, investors, and other stakeholders in the country's financial sector.

1.2 Objectives of the Study

The major objective of the study is to investigate the effects of financial liberalization on demand for money in Ghana. However, the study has the following specific objectives:

1. To investigate the short- and long-run relationships between financial liberalization and money demand in Ghana.

2. To test the causal relationship between financial liberalization and money demand in Ghana.

3. To examine the threshold effect of financial liberalization on demand for money in Ghana.

1.3 Research Hypotheses

The hypotheses of the study are as follows:

1. H_0: There are no short-run or long-run relationships between money demand and financial liberalization.

   H_1: There are short-run or long-run relationships between money demand and financial liberalization.

2. H_0: There is no causal relationship between financial liberalization and money demand in Ghana.

H_1: There is a causal relationship between financial liberalization and money demand in Ghana.

3. H_0: Financial liberalization has no threshold effect on the demand for money in Ghana.

    H_1: Financial liberalization has a threshold effect on demand for money in Ghana.

1.4 The Scope of the Study

The scope of this research is to determine the stability of the money demand function in Ghana using the monetary aggregate M2 (broad money) in the presence of financial liberalization, as well as other factors influencing money demand, such as exchange rates, interest rates, real GDP growth, real deposit rate, and inflation rate – using annual time series data from 1988 to 2020. Broad money is used since it is better at capturing money demand stability than narrow money (Barnett and Adil, 2022). Owing to the obvious financial sector reforms (Financial Sector Adjustment Programme - FINSAP), which were part of the Structural Adjustment Program (SAP) and the Financial Strategic Plan (FINSSP), and the fact that financial liberalization in Ghana began in 1988, the time series period from 1988 through 2020 was chosen for the study.

The study focused on estimating the money demand function using the ARDL model, which included diagnostics and stability tests to back up the findings. To assess the causation between money demand and financial liberalization, the Granger Causality test was used. Since Ghana began the implementation of financial liberalization policies in the 1980s, the study found it expedient to include the start of financial liberalization in the series in order to appropriately assess and establish the stability of the money demand function over such a period.

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1.5 Significance of the Study

Although there is a great deal of research on financial liberalization, most of these studies have concentrated on evaluating the consequences of financial liberalization on economic growth (Brownbridge and Harvey, 1998; Bandiera, et al., 2000; Reinhart and Tokatlidis, 2003). As a result, the study sought to contribute to literature by assessing the stability situation of Ghana's own money demand function with financial liberalization as one of its key determinants.

Several research have looked at the link between financial liberalization and money demand in developed economies, but it appears that there are few studies on the relationship between financial liberalization and money demand in developing countries, particularly Ghana. This research adds to the literature on money demand for emerging economies. The findings of this study would be very resourceful in helping the Central Bank of Ghana and other policymakers to create and implement monetary policy actions to improve money demand stability and financial sector growth.

Additionally, the estimation of a threshold effect of financial liberalization on the demand for money would add to existing literature and other researchers can reference it to find out the extent to which financial liberalization affects demand for money in all parts of the world.

Researchers would use the findings of this study as a reference point for additional research in this area. In practice, the study would assist the Central Bank of Ghana and other agencies in revising laws and regulations in light of the findings in order to keep up with reality. Furthermore, the research is important in assessing if the findings may play a key role in guiding Ghana's financial sector toward a more robust financial sector

and its developments. Using annual data from 1988 to 2020, the study aims to investigate the demand for money function and its stability in Ghana.

1.6 Organization of the Study

The study is divided into five primary chapters, each with its own set of subsections. The first chapter covers the study's general introduction, including crucial topics like the problem statement and the study's objectives. The second chapter presents a theoretical and empirical literature survey as well as an explanation of the underlying ideas. The third chapter covers the study's methodology as well as a description of the estimating methodologies. In chapter four, the findings of the data collected are analyzed and discussed. The study's last chapter contains a summary of the findings, policy implications, recommendations, and conclusions.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.0 Introduction

This chapter focuses on a review of the study's relevant theoretical and empirical literature. A theoretical literature review, conceptual review, empirical literature review, and a conceptual framework for the investigation are all included in this chapter. Major arguments for methodological and structural data analysis are made in this study based on the key arguments and empirical gaps found in this section.

2.1 Review of Theoretical Literature

Existing theories can be identified, their connections explored, the depth to which they have been studied, and new hypotheses to test can be developed using the theoretical literature review. One of the most common uses of this format is to demonstrate a lack of adequate theories or to show that current theories are insufficient for new and emerging research problems (Sutton, 2016). This study, like any other research project, is also founded on theory. The study's two primary theories are the Financial Liberalization Theory (also known as the Mckinnon-Shaw Hypothesis) and the Quantity Theory of Money.

2.1.1 The McKinnon and Shaw Theory

Both Ronald McKinnon and Edward Shaw criticized Keynes and Tobin's leading theoretical school of financial repression in 1973. McKinnon and Shaw, these researchers, refuted Keynes and Tobin's assertions by advocating for interest rate liberalization and the elimination of other financial repression policies. Financial

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intermediaries, savers, and investors make up the authors' model. They highlighted that private-sector loans are backed by private-sector internal debt and that nominal interest rates are set, keeping the real rate below its equilibrium level (Eschenbach, 2004). This meant that saving was beneficial, but investing was adversely affected by the real interest rate.

The theory is important to this study because it recognizes an underlying link between financial sector liberalization and key macroeconomic indicators like money demand. This paradigm becomes the driving force behind financial sector expansion, with incidental consequences on Gross Domestic Product (GDP) as a result of higher demand. Economic growth is frequently measured using the log of per capita GDP in the financial liberalization thesis (Akinsola and Odhiambo, 2017), so GDP becomes an important variable that plays a critical role in the financial liberalization thesis and is thus used in this study to determine the stability of the demand for money function.

It is argued that when interest rates are driven down by either rapid inflation or a fall in the fixed nominal interest rate, saving will decline, according to Eschenbach (2004). Interest rates have an impact on whether or not people want to keep their money. As a result, the rate of change in interest rates might affect money demand. Eschenbach pinpointed that another explanation that supports the consequences of inflation is that if inflation is hedged by land ownership, a reduction in the real interest rate will increase demand for land as deposits become less attractive. Land prices rise faster than the overall price level when people move their money from bank accounts to owning land. The induced wealth effect leads to a rise in consumption and, as a result, a decrease in investment.

The relevance of the theory is again seen in the second argument suggesting that, people will be less likely to hold money in banks which affects demand for money as per the changes in inflation and interest rates. Hence, the argument of McKinnon and Shaw provides a valid ground for expansionary or contractionary monetary policies given the interests of the financial regulatory body of a country.

Hence, based on the assumptions of this theory, the study approaches the analysis by assuming a negativity in the relationship between various macroeconomic variables like interest rates and inflation on financial sector growth which impacts the demand for money (Boyd, Levine and Smith, 2001). If there is financial repression in the form of a nominal interest rate fixed below the market clearing value, Eschenbach (2004) pointed out that if just the deposit rate is fixed, there would be a substantial disparity between lending and deposit rates. This argument further positions the theory in this study and this is due to its acknowledgement of the influences of nominal interest rate on banks' ability to lend and receive deposits. This may have consequence on the liquidity of banks and overall financial sector development as well as the motives for holding money by economic actors.

Allowing deposit and lending rates to be determined by the forces of demand and supply, according to McKinnon (1973) and Shaw (1973) on the financial liberalization theory, would offer incentive for both savers and investors. Owing to the obvious predicted rise in the real interest rate, savers will be encouraged to save more, while investors will be encouraged to invest in high-yielding projects that have the potential to promote growth. The increase in the real interest rate also serves as a barrier to low-yielding investments, improving the average investment efficiency. Increases in the pace of output growth are also predicted to raise the savings rate. As a result, pursuing financial market liberalization policies is critical for the effective operation of financial

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markets, a situation that would increase all enterprises' access to capital (Akowuah, 2011).

2.1.1.1 Theoretical Foundations of McKinnon's Demand for Money Function

The development of the demand for money function is also the theoretical underpinning of Mckinnon and Shaw's financial liberalization thesis. In the context that can be observed in the development of the demand for money and investment function, Mckinnon (1973) provides a complementarity hypothesis between money and capita:

$$\left(\frac{M}{P}\right) = f\left(\frac{Y}{P}, \frac{I}{Y}, d - i\right) \tag{1}$$

where M represents the stock of money, P represents the level of price, M/P represents the real money supply, Y represents the gross national product (GNP), Y/P represents the ratio of gross investment to GNP, d represents the deposit rate, I represents inflation, and $d - i$ represents the real deposit rate of interest (RR). One of the factors of the actual stock of money is the investment/income ratio.

According to Mckinnon (1973), such a structure takes into account money demand that originates directly from the process of capital formation. The first independent variable still represents the traditional transaction motive for keeping money, while the last independent variable represents the real return on holding money. The last variables $(d - i)$ effectively indicate the influence of inflation on money demand if the deposit rate is held constant for a long period while inflation changes. The partial derivative of the second explanatory variable must be positive in order for money to complement capital, as in:

$$\frac{\delta\left(\frac{M}{P}\right)}{\delta\left(\frac{I}{Y}\right)} > 0 \tag{2}$$

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If money is to be considered as a 'conduit' through which accumulation occurs, then McKinnon (1973) directs attention to the indirect relationship of $(d - i) \rightarrow M/P \rightarrow I/Y$. Money demand rises in tandem with capital productivity. The motivation to keep money is influenced by the real return; a positive real return encourages investment and the propensity to save due to the emphasis on the store of value as an importance of money. The partial derivative of the real return variable $(d - i)$ is positive and large when the desirability of holding money is strong, and this can be expressed in the form as:

$$\frac{\delta\left(\frac{M}{P}\right)}{\delta(d - i)} > 0 \tag{3}$$

The analogy in this is that a small derivative shows that financial repression is present. The following saving function can be constructed using real income and an additional variable of real rate of interest $(d - i)$ when it is found that domestic saving equates domestic investment:

$$\left(\frac{S}{Y}\right) = f\left(\frac{Y}{P}, d - i\right) \tag{4}$$

where S/Y denotes gross national saving, whereas Y/P denotes actual income. Complementarity is determined by the coefficient estimates and this may be shown in the investment function in the McKinnon (1973) structure as follows:

$$\left(\frac{I}{Y}\right) = f(R, L - i) \tag{5}$$

where R denotes the average return on physical capital and L denotes the interest rate on a loan. The complementarity impact, as illustrated by the partial derivative, is as follows if we commence from a setting of financial repression with low real cash balances:

$$\frac{\delta\left(\frac{I}{Y}\right)}{\delta(L-i)} > 0 \qquad\qquad (6)$$

If cash balances are already desirable to hold and the economy is already liquid with cash, further increases in the real deposit rate reduce the incentive to save, reversing the direction of Equation (6) and restoring money and capital to their neoclassical "competing asset" state.

McKinnon's indirect linking can be recast by replacing $(L-i)$ with M/P as an independent variable in Equation (5). Thus, the monetary variable will have a direct effect on the investment/income ratio. In such a case, the formulation becomes:

$$\left(\frac{I}{Y}\right) = f\left(R, \frac{M}{P}\right) \qquad\qquad (7)$$

Including real money supply (M/P) in the investment, Equations (4) and (7) then becomes two systems of equations used in the study on Nepal's Economy by Thornton and Poudyal (1990) on the topic "Money and Capital in Economic Development: A Test of the McKinnon Hypothesis for Nepal."

2.1.1.2 Theoretical Foundations of Shaw's Demand for Money Function

Rather than assuming a world of fiat money, Shaw's formal theoretical contribution focuses on financial intermediaries' role in economic growth. If domestic saving (S) is assumed to be equal to domestically funded investment, then McKinnon's demand for money function can be changed by substituting (I/Y) with (S/Y). According to Shaw (1973), a debt intermediation perspective (DIV) investigates the income effect of lower transaction and information costs on the creation of money and real capital. Shaw's demand for money is as follows:

$$\left(\frac{M}{P}\right) = f\left(\frac{Y}{P}, V, d - i\right) \tag{8}$$

where V denotes the vector representing the opportunity cost of holding money According to Shaw (1973), the real yield on all forms of wealth, including money, will augment the domestic savings ratio. When interest rates are fixed arbitrarily below equilibrium levels, financial intermediation is hindered.

2.1.2 Quantity Theory of Money (Fisher, Cambridge and Keynes)

The quantity theory of money is a hypothesis about what causes the most significant changes in the value of money, or spending power. Changes in the quantity of money in circulation induce changes in the value of money, according to the hypothesis. The value of purchasing power falls with abundance of money whiles on the other hand, purchasing power increases in value when money becomes relatively scarce. In summary, money stock (M) is the main determinant of price level (P) (Humphrey, 1974).

There is a money demand function that derives from the classical quantity theory of money and is encapsulated by the Fisher and Cambridge methods to real money balance measurement. Fisher's demand for money is thought to be governed by nominal income, according to Laidler (1993), however the Cambridge approach stresses that demand for money is impacted by both interest rate and nominal income.

The Keynesian theory of money demand is pioneered by Keynes and has gained very great attention in literature. The Keynesian theory of money demand is based on the link between money demand and its determinants, and it is based on the Cambridge method. Money demand is inversely proportional to the rate of interest and proportional to the level of income (Keynes, 1936).

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According to Opoku (2017), there is no consensus in the empirical literature on the variables that affect money demand today. This theory, on the other hand, offers a concept of what to consider when calculating the money demand function, such as real income, interest rate, and real inflation rate, among other things. According to Khan and Hossain (1994), Sriram (1999), and Akinlo (2006), the money demand function assumes the following structure when considering the quantity theory of money:

$$\frac{M}{P} = f(Sv, oC, X) \tag{9}$$

where M is a monetary aggregate (M1 or M2 or M3) and P denotes the price level, and M/P denotes the demand for real money balances. Sv is for a scale variable, such as income, oC stands for the opportunity cost of retaining money, such as the interest rate, and X stands for additional possible control variables. Thus, in accordance with Keynes' theory of speculative and transaction motives for holding money, this study specifies the money demand function as a function of a scale variable, the opportunity cost of holding money, and other factors.

2.2 Review of Empirical Literature

This section reviews prior empirical research and scholarly studies on the topic of financial liberalization and money demand. Significant arguments about the study are offered based on the key empirical gaps found in this section.

In the paper "Financial Liberalization and Demand for Money: A Case of Pakistan," Ejaz and Qazi (2013) looked at the impact of financial liberalization on money demand in Pakistan. These authors set out to achieve this aim since it is commonly believed that a stable money demand is required for the design and execution of monetary policy. The authors investigated the relationship between broad money (M2), a proxy for

Demand for Money, and regulated variables such as GDP growth, exchange rates, and real deposits, as well as the financial liberalization index, using the Johansen cointegration test and the Autoregressive Distributed Lag (ARDL) model. According to their results, a long-term relationship exists between wide money (M2) and financial liberalization. Financial liberalization, GDP, and actual savings rates all have a favorable effect on money demand in the long run.

Despite its robustness, Ejaz and Qazi (2013) employed Johannsen cointegration tests in their examination of the long-run association between financial liberalization and money demand. The Engle-Granger Two-Step approach could have been used to test the residuals for unit roots and the Augmented Dickey Fuller test for cointegration. Furthermore, the study's geographical scope of Pakistan raises the question of its application in the Ghanaian setting, necessitating further inquiry to validate or refute the findings.

In the paper "Interest Rates and the Demand for Credit in Ghana," Akowuah (2011) looked at the influence of financial liberalization on money demand in Ghana. Interest rates and other major macroeconomic parameters were employed as proxies for financial liberalization in the study, which took place between 1970 and 2010. The goal was to see if financial intermediation might be utilized as a tool for effective monetary policy and economic growth. The author employed the Johansen Cointegration technique to explore the issue. Interest rates, as a vehicle for financial liberalization, had a beneficial influence on domestic credit demand in the short term but a detrimental impact in the long run, according to the findings. Although increases in the real lending rate have little immediate effect on credit demand, they will certainly result in a reduction in credit demand over time. As market forces continue to push interest rates higher, regulators can take advantage of this and increase loan availability.

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The thesis concluded in 2010, during which many macroeconomic events occurred in Ghana, altering the financial environment's trajectory. Hence, further investigation is required to update this existing knowledge.

In their study "The Dynamics of Financial Liberalization on Ghana," Owusu and Odhiambo (2012) intended to investigate the influence of financial liberalization policies in Ghana's growth. The writers employed literature reviews and information from earlier investigations in their research. According to the authors, financial liberalization policies have had a good influence on money demand in Ghana as well as on overall economic progress. Financial liberalization attempts, on the other hand, have led in a slew of interrelated problems that the country must address. This includes a wide interest rate differential, an increase in foreign currency reserves, a stable weakening of the domestic currency, a sharp increase in imports, and a reduction in credit to the productive sectors of the economy, as well as the issue of high lending rates, which has hampered investment in the productive sectors. The authors implied that the transactionary motive for demanding money has led to the importation of products and services, which has had negative impacts on the economy as a whole, as a result of the growth in money demand and the desire for foreign items.

The use of literature reviews by the authors implies that the authors failed to add significant knowledge to existing research. Also, the study automatically contains all the limitations of the previous studies which makes their work not worthwhile for drawing conclusive assumptions. As a result, the study's methodology restricts its relevance in assessing the impacts of financial liberalization on money demand.

Concerning the variables used in the study, interest rates and inflation are considered as the second-choice opportunity cost variables in the money demand function. Interest

rates are found to be inversely proportional to the demand for money. Money call rates are found to be negatively correlated with money demand and that the statistical significance of interest rates used in the estimation of the money demand function has been established. Also, inflation has also been found to have a positive relationship with monetary aggregates. These have been supported by literature (Zhang, Warner and Homsy, 2017; Damardeh and Izadi, 2011).

In South Africa, Nell (2003) conducted a similar study by estimating the country's money demand function. The purpose of Nell's paper was to determine whether or not money should proceed to play a significant role in monetary policy formulation in South Africa when the country transitioned to an inflation targeting policy framework. The study used a time series period from 1968 to 1997 for the analysis. Nell (2003) found evidence of a stable M3 money demand function and also pointed out that the monetary aggregate M3 provided very little information about changes in future prices in South Africa and so may have lost its importance as a reliable indicator for the conduct of monetary policy. Nell concluded that the stock of money was endogenous and that prices determined money through a stable M3 demand for money function.

Rao and Singh (2006) also estimated the money demand function (particularly, demand for narrow money) for India and evaluated the estimation's robustness. The paper found that money demand was stable for about half a century from the period 1953 to 2003. The results obtained in their paper led to the conclusion that there was no evidence of significant effects of India's 1991 financial reforms. They mainly used VAR in the estimation after a standard PAM-based specifications in the variable levels were found to be unsatisfactory. However, in the end, they found a stable money demand function for India.

Summer (2009) analyzed the demand for money function in Iran using the Autoregressive distributed lag estimation method, and also using time series data from 1971 to 2000. The study also employed an error correction model for analyzing the short-run dynamics and test of stability for the model. The covariates used in the study included inflation rate, foreign exchange rate, gross domestic product, and interest rate. Summer found a long-run equilibrium relationship among the variables employed in the study, and also found that the gross domestic product variable had a positive impact on the demand for money whereas exchange rate and the rate of inflation had significant negative impacts on money demand in Iran.

Using panel data, Rao and Kumar (2009) made a study on the demand for money functions for fourteen Asian countries using data series from 1970 to 2005. They used two sub-samples sets and two break dates to analyze the financial reforms and its effects on these countries in Asia. The study observed that the demand for money function had been stable but again concluded that financial reforms were yet to have any significant effects on these economies. Thus, finding no evidence of money demand instability, they recommended that the central banks of these Asian countries should make use of money supply as a monetary policy instrument rather than the rate of interest in the determination of monetary policy.

Additionally, Arize and Nam (2012) further analyzed the money demand functions for Asian economies using a time series period from 1973 (Quarter 3) through 2003 (Quarter 4) for these countries – Malaysia, Thailand, Philippines, Pakistan, Sri Lanka, and Korea. Actually, they investigated the empirics surrounding the impact of exchange rates on demand for money. In the paper, they found that an increase in exchange rate led to a positive but significant effect on demand for money in the short-run as well as the long-run in each country observed in the study. They also pinpointed that domestic

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interest rates had a negative but significant effect on money demand and went on further to explain that such effects may result in market participants and monetary authorities making substantial resources reallocation. In the end, they justified the need for monetary authorization to give much attention to broad money.

Ahumada and Garegnani (2012) also estimated a money demand function for Argentina using M2 monetary aggregate as the monetary policy key variable in the study. They first used a conditional equilibrium-correction model for the estimation of money demand and then compared its forecasts obtained by methods which include naïve models, VAR in differences, 'robustified' devices, pooling of forecasts with different windows and models, and forecasting aggregates using disaggregates as well. They made evaluations over the period where the economy was unstable and uncertainty about the economic regime was prevalent. They concluded that the equilibrium correction model could be complemented with other techniques such as individual or pooled univariate AR models for best results.

Using quarterly time series spanning the period 1985 to 1999, Bahmani-Oskooee and Ng (2002) were able to estimate money demand in Hong Kong. Among the covariates examined in this study were income, interest rates and the exchange rate. The study employed an Autoregressive Distributive lag model, and the results demonstrated the confirmation of the currency substitution hypothesis effect by showing that the exchange rate coefficient is negative and statistically significant.

Malaysian money demand was also examined empirically by Mohammad et al. (2000). In actual sense, the paper examined the long-run relationship between exchange rate and demand for money demand. The paper concluded that the Johansen and Juselius (1990) tests of likelihood ratio supported the significance of the M2 monetary aggregate

in money demand but not M1. On the other hand, the paper again mentioned that the Hansen-Johansen (1992) tests of likelihood ratio did find some instability evidence in the long-run parameters and they explained that it could be attributed to the financial crisis in that region. The study went on further to state that the analysis in the study supported the empirical investigation of exchange rate and demand for money relationship.

Ibrahim (2001) measured the Malaysian money demand function and discovered that the exchange rate had a negative impact on the function. The study analyzed the roles that financial factors played on the behaviour of the monetary aggregates (M1 and M2) in Malaysia. The results revealed a stable error correction model for post 1986 M1 and M2 money demand. Ibrahim found that the sensitivity of interest rate was more inelastic but there was a reduction in the long-run income and exchange rate elasticities of the M1 and M2 demand for money aggregates.

Dritsaki (2011) uses quarterly data from 1995 (First Quarter) to 2010 (First Quarter) to examine the money demand function in Hungary using exogenous variables like income, inflation, and the exchange rate as well as endogenous monetary aggregate variables like M1 and M2. To determine whether the currency substitution hypothesis exists in Hungary, an Autoregressive distributed lag (ARDL) Bound test was used. According to the author's findings, the exchange rate coefficient is statistically significant and negatively affects both M1 and M2.

Jayasooriya (2010) used annual time series data from 1960 to 2007 to estimate the money demand function in Sri Lanka. In the dynamic model Vector Autoregression cointegration analysis used in the study, there was the inclusion of some exogenous variables such as interest rate, currency exchange rate, real output, and federal

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minimum wage. In the study, there was found to be a statistically insignificant negative relationship between exchange rate and the monetary aggregates. Pragmatic evidence suggests that exchange-rate and minimum wage fluctuations should be tied to shifts in money demand because they put economies at risk and create uncertainty about how much money will be demanded.

Pradhan and Subramanian (2003) estimated money demand function for India in the presence of structural break. By employing three steps, procedure for stability of money demand was tested with financial reforms. The results of the study confirmed that financial reforms contribute to the stability of money demand in India.

James (2005) estimated money demand for Indonesia analyzing the effects of financial liberalization (particularly, financial innovation and institutional regulations). By employing ARDL bounds testing approach by Pesaran et al. (2001), it was found that financial liberalization affects the stability of money demand.

Separate research undertaken by Epstein and Heintz (2006) from the University of Massachusetts, they found that money supply (broad money) in Ghana has relatively typical effects on output, inflation, and exchange rates. For example, a rise in the growth of money supply by 5 percent, translates to a quarter-percentage point rise in economic growth while raising inflation by only 1.5 percent points.

Niyimbanira (2013) comes out with a stable demand for money function for real M2 while using the ARDL estimate approach for South Africa from 1990-2007. However, it is observed that it took up to roughly four quarters for any monetary policy to even have real influence on the economy. On the other hand, Humavindu (2007) finds out that real M3 is stable so it should be utilized to target inflation. However, the analysis

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fails to capture the openness aspects of the economy because it does not include financial innovations (or financial liberalization).

Herve and Shen (2011) discover that real M2 is unstable in Cote d'Ivoire while utilizing annual data for the period 1980-2007, whereas, real M1 is stable throughout the same period. The study combines co-integration and error correction model approaches to evaluate the long run relationship between money supply and its determinants like real income (GDP) and interest rate. However, the study did not incorporate additional variables that affect money demand other than income and interest rate.

Kumar et al. (2013) estimate the money demand function in Nigeria using annual data for the period of 1960 to 2008. The analysis finds out that money demand is unstable during the period and that the Central Bank of Nigeria was justified to pursue a new monetary policy that emphasizes interest rates other than money supply as the key monetary policy instrument. Money demand is estimated using classical and extended specifications of M1 money demand utilizing structural change methodologies. The report does not include foreign interest rates and financial innovations in its analysis. However, the study's finding is different from Akinlo (2006) whose study employed the ARDL technique to find out whether or not $M2$ was stable in Nigeria for the period of the first quarter of 1970 through the fourth quarter of 2002. Akinlo concludes that money is co-integrated with real income, interest rate and exchange rate. The money demand function is also pretty stable. Income elasticity is positive and almost unitary; nevertheless, the interest elasticity estimates are low in absolute terms and consequently inelastic. Just like Kumar et al. (2013), the study likewise does not integrate foreign interest rate and financial innovation in its estimation.

Maniragaba (2011) concludes that Uganda's financial liberalization policies have had positive impact on money demand and economic growth. The study uses the Johansen Maximum Likelihood estimation method and an individually constructed Financial Liberalization Indicator (FLI) to capture the financial liberalization processes.

Opolot (2007) contends that Uganda's money demand is stable for the period of 1990-2004. The study also finds that financial liberalization is positively related to narrow money but negatively related to broad money while using the ARDL method of estimation. Notwithstanding, the study fails to include financial innovation effects and foreign interest rates on money demand stability in its estimation. The conclusions made by Opolot are similar to Guloba and Osoro (2009) who estimated Uganda's money demand only for the period of economic liberalization, 1991 to 2006. The study finds out that money demand is stable during the economic liberalization period for both the short run and long run.

Nachega (2001) confirms Uganda's stability of money demand during the period 1982 to 1998 using Johansen co-integration. The study captures for the opportunity cost variables using the interest rate spread between Treasury bill rates and the time and saving deposit rate, and the foreign interest rate with the London Interbank Offered rate (LIBOR). It is found out that the LIBOR is negatively related to money demand. The study also employs the dummy to capture for financial liberalization. The income elasticity of money demand is close to unity and significantly different form zero, a postulation consistent with the quantity theory hypothesis.

Akhtaruzzaman (2007) analyzed the money demand for Bangladesh by looking at the effects of globalization and financial liberalization. By employing Johansen and Juselius cointegration analysis with ECM, it was found that stability of money demand

is affected by only financial liberalization but not by globalization. Furthermore, it was established that currency substitution should be focused of policy due to its effective role in the monetary sector.

Zauhar and Kacemi (2008) investigated money demand function for the Morroco by analyzing the impact of financial liberalization on the stability of the money demand function. Employing the Johansen Maximum-Likelihood procedure, the results revealed the existence of the long-run money demand function. The stability test concluded absence of structural break in money demand function.

Financial liberalization has a substantial effect on broad money as opposed to narrow money. Dobson and Ramgolan (2001) disclose this finding for Trinidad and Tobago in the period from second quarter of 1982 through the fourth quarter of 1998. Financial liberalization may result in portfolio shifts or have an effect on the income and money demand interest rate elasticity. The study highlights the essential nature of a money demand model that takes into account the economy's openness. However, the study does not analyze the effect of financial liberalization explicitly.

Haghighat (2011) investigated money demand function for Iran by including income, inflation, exchange rate, and financial reforms as exogenous variables in the model. By using Johansen-Juselius (JJ) cointegration with error correction model technique, the study concluded that the demand for money function was stable and also stressed for inclusion of financial reforms in the model to strengthening the power of prediction.

Dunne and Kasekende (2016) estimated money demand function for 34 Sub-Sahara African countries using annual time series data for the period 1980 to 2013. By employing the panel data estimation technique, the results show that financial innovation explains money demand function in the region. They further suggested that

mobile money in the region can have important implications for the future policy design in the region.

Hsing (2007) examined function for money demand in Pakistan including GDP, domestic interest rate, and foreign interest rate as explanatory variables. Employing three techniques together - Box-Cox transformation, log-linear, and linear - empirical results confirmed that money demand is positively affected by GDP and negatively affected by both the domestic and foreign interest rates. None of the above-mentioned studies includes financial liberalization as an exogenous variable in money demand in Pakistan.

Hye et al. (2009) investigated money demand for Pakistan incorporating economic activity, inflation, financial innovation, interest rate, exchange rate, and stock prices as explanatory variables. By using Johansen cointegration and Fully Modified Ordinary Least Squares (FMOLS) methods, it is portrayed that estimated coefficient of financial innovation is positive and statistically significant in both long-un and short-run.

Khan and Hye (2013) estimated money demand for Pakistan including GDP, real deposit rate, exchange rate, and financial liberalization as explanatory variables in the model. By employing JJ cointegration and ARDL models, empirical findings confirm the significant role of financial liberalization in both short-run and long-run. Based on the evidence from the reviewed studies, financial liberalization as an independent variable is included to analyze its impact on money demand in Pakistan.

Civcir (2003) looked at the money demand function for Turkey using income, inflation, interest rates, and the expected exchange rate as independent variables. Turkish currency substitution is supported by the results of Johansen's cointegration analysis,

which emphasizes the importance of the exchange rate as an important determinant of money demand.

Baharumshah et al. (2009) used the autoregressive distributed lag (ARDL) cointegration methodology and quarterly data from 1990 (Quarter 4) to 2007 (Quarter 2) to investigate the demand for broad money (M2). The bounds testing results demonstrate the existence of a long-run stable relationship between M2 and its determinants (that is, inflation, real income, stock prices, and foreign interest rates).

Owusu (2012) examined the entire connection between all components of financial liberalization and economic growth in three nations from the Economic Community of West African States in the thesis, "Financial Liberalization and Economic Growth in ECOWAS Countries (ECOWAS)." The thesis showed support for the McKinnon-Shaw hypothesis using the ARDL limits test technique and real GDP per capita as a growth indicator, but also found that gains in future savings and investments had not been transferred into economic development in two of the analyzed nations. In two of the nations studied, the author discovered that stock market movements have little or a negative influence on economic growth. The thesis concludes that, contrary to expectations, it is not financial liberalization policies that affect economic growth in the selected ECOWAS countries, but rather increases in labor productivity, credit to the private sector in response to the demand for money for investments, foreign direct investments, capital stock, and government expenditure.

Owusu's findings need to be investigated further by isolating the nations involved in the research. This is because using averages to analyze the various ECOWAS countries might result in skewness issues, which can lead to misleading conclusions. As a result,

the present research will focus on Ghana in order to provide a clear picture of the consequences of financial liberalization on money demand in the nation.

2.3 Conceptual Framework

According to Camp (2001), a conceptual framework is a framework that the researcher feels best explains the natural course of the subject under investigation. Again, Osanloo and Grant (2016) pinpointed that the conceptual framework describes the link between a study's primary concepts from a statistical standpoint. It is organized in a logical order to help in the creation of a picture or visual representation of how the concepts in a study connect to one another. The study's conceptual framework is then developed based taking into consideration the study's objectives. Figure 2 displays this conceptual framework.
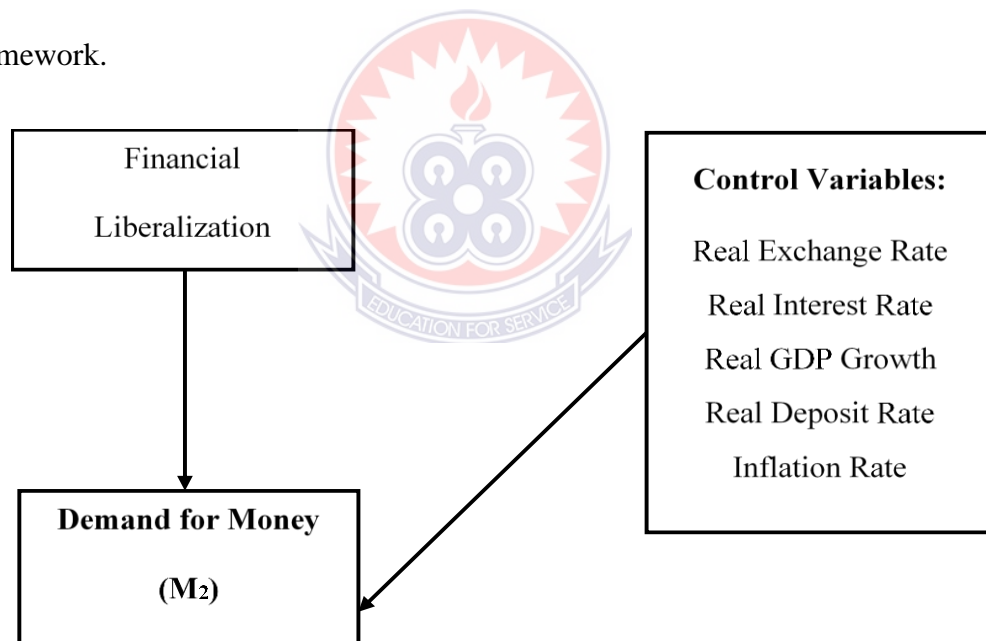
Figure 1: Conceptual Framework Adapted from Ejaz and Qazi (2013)

Although financial liberalization is likely to have a major positive or negative impact on money demand, important macroeconomic variables such as the real exchange rate, real deposit rate, real interest rate, GDP growth rate, and inflation rate may also have an impact on money demand. Thus generally, the study deems it necessary to include

these variables to determine the stability of money demand in Ghana, with financial liberalization as one of the main measurements of the impact.

2.4 Conceptual Review

The literature on the financial liberalization and money demand nexus is reviewed in this section. This section is based only on the conceptual framework and essential concepts that are pertinent to the investigation of the relationship between financial liberalization and demand for money. Since the Central Bank of Ghana (Bank of Ghana) is solely the monetary authority in the country, the study therefore gives an overview of the monetary authority and its evolvement since independence till date. Other relevant topics were reviewed where possible.

2.4.1 Bank of Ghana

During the colonial era, the Bank of Ghana was originally called the Bank of the Gold Coast (BGC). The Bank of Ghana was formally birthed on March 4, 1957, just two days before the proclamation of political independence, by the Bank of Ghana Ordinance (No. 34) of 1954, which was enacted by the then-British Parliament. The new central bank's primary objectives were to maintain price stability; to issue and redeem bank notes and coins; to influence the credit market in order to promote monetary stability in Ghana; to ensure the stability of the newly established currency (the Cedi); and to serve as an advisory body to the government on monetary matters. The Bank of Ghana emerged independent and free of political intervention in 2002, following the passage of the Bank of Ghana Act.

The Monetary Policy Committee (MPC) is the division of the Bank of Ghana responsible for instituting monetary, credit, and financial policy with the primary

objective of price stabilization. The committee establishes an interest rate, dubbed the Monetary Policy Rate, that they believe is commensurate with an inflation target. The group, which is comprised of seven members, meets six times a year to evaluate the economy.

In the medium term, the Bank of Ghana's objective is to maintain inflation in the single digits. The inflation objective of less than 1% is stated in annual rates of inflation based on the Consumer Price Index. On a periodic basis, the MPC makes public the reasoning and rationale that underpins its judgments via a press release.

In Ghana, the history of monetary policy and administration may be divided into two separate periods: the period of restrictive monetary controls and the period of liberalized monetary policy. Prior to 1983, when significant financial system reforms began, the Bank of Ghana maintained a highly controlled monetary management regime. The strict control entailed the establishment of global and sectoral lending limits on individual commercial banks, which had to be congruent with political and macroeconomic objectives such as inflation and trade balance. Restriction was ineffectual and resulted in several inefficiencies in the economy and financial markets. With the introduction of economic liberalization in 1983, the centralized control system of monetary management was forced to be abandoned.

Liberalization included a progressive sequence of deregulatory action. These initiatives resulted in the Bank of Ghana conducting monetary policy through the use of indirect and market-based mechanisms, adding a new dimension to the way monetary management was developed and implemented. The Bank of Ghana Law, Act 2002, established the central bank's independence in discharging its monetary policy

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responsibilities in 2002. Additionally, the Bank may employ any instruments it deems necessary to accomplish its fundamental objective of price stability (Quaicoe, 2014).

2.4.2 Concept of Financial Liberalization

While several conceptions exist for what financial liberalization involves, according to most reports, financial liberalization entails official government policies aimed at deregulating credit and interest rate caps, lowering access barriers to international financial markets, privatizing financial institutions, and removing restrictions on cross-border financial transactions (Bumann, Hermes and Lensink, 2013). Financial liberalization is the process of removing government intervention from capital markets. As a result, financial liberalization has a domestic as well as an international component. Bumann, Hermes and Lensink mentioned that in general, liberalization focuses on implementing or expanding the market's pricing structure, as well as enhancing market competition conditions.

Conceptually the main objective of financial liberalization is to improve resource allocation and management in an economy. Liberally performing financial sector contributes to the economic development in an economy. The real economy is closely inter-linked with financial sector in terms of monetary and fiscal policies. Financial liberalization results positive effects influencing, among other thing, trade and growth in the real economy. However, financial liberalization may have some worsening consequences in terms of instability. For instance, with an easy entry to financial institutions, the number of financial institutions including banks can increase. They may hoard nonperforming loans, unbalanced portfolios of assets and liabilities, and many collapses as seen in Philippines in 1996 (Zaidi, 2006).

Several pro-liberalization points have been presented in the literature. Most of these points are predicated on the neoclassical assumption that markets are the most effective means of allocating finite capital. McKinnon's (1973) and Shaw's (1973) important writings launched the discussion on financial industry liberalization in 1973. The writings of both researchers were published in response to government measures aimed at controlling and manipulating capital markets, a technique known as financial repression. Interest rate ceilings, government-directed loans, and bank incentives were among the measures used, resulting in excess demand and insufficient resource allocation.

The financial reforms can interpret the trend behaviour of money velocity at different stages of the development in an economy. Bordo and Jonung (1990) find that technical progress has two influences on the trend behaviour of money in financial sector dominating at its specific stage of the development. During the first stage, rise in the monetization characterizes the economy and demand deposits and cash are rapidly used for transactions avoiding earlier dependence on the barter trade. Consequently, transaction demand for balances increases more than income and the negative trend characterizes the velocity. During the second stage, financial liberalization introduces a wide range of highly liquid and tradable securities substituting money as a store of value. The money balances are economized with growing funds transfer and financial innovations in the economy. Consequently, money balances grow slowly in relation to volume of transactions and positive trend characterizes the velocity over the time. Hence, the trend behaviour of velocity takes the form of U-shaped pattern. Money demand function cannot be modelled easily with such patterns.

According to McKinnon (1973) and Shaw (1973), these policies were to blame for the weak growth rates seen by many industrialized countries throughout the 1950s and

1960s. They both argued in favor of capital market liberalization, saying that it would result in more and more productive expenditure, resulting in higher rates of economic development. In the 1990s, when the role of financial institutions in economic growth became a hot issue in the literature, some researchers expressly simulated the link between finance and development, while others studied the empirical evidence for these models.

2.4.3 Financial Reforms and Liberalization in Ghana

In recent decades, numerous nations have modified their domestic capital markets, and these reforms were triggered by local and international events in a variety of ways. When it was considered that government actions aimed at controlling capital markets – called "financial repression" in the literature – were inhibiting the effective functioning and expansion of financial institutions, they came under protest in the United States (Bumann et al., 2013). The idea that stagnating wage growth and economic slump are connected to financial repression measures has gained momentum since the early 1970s (McKinnon, 1973; Shaw, 1973). The globalization of economies, particularly capital markets, has put pressure on governments to consider more liberal financial market rules. The magnitude of these shifts raises worries regarding international liberalization's potential influence on economic development (Bumann et al., 2013).

The banking sector reformation was included in Ghana's Economic Recovery and Structural Adjustment Program, which began in 1983. Interest rate and credit ceilings were eliminated, state-owned banks were privatized, the financial system was expanded to include new domestic and foreign institutions, and regulatory and supervisory structures were improved (Takyi and Obeng, 2013).

Ghana's financial system is divided into three parts, similar to that of most developed countries: the formal sector (primarily commercial and investment banks, as well as insurance companies), the informal sector (moneylenders, brokers, family and friends), and the semi-formal sector (moneylenders, brokers, family and friends), and the semi-formal sector (moneylenders, brokers, family and friends, moneylenders, traders, family and friends, cooperatives, microfinance institutions). Despite the fact that all three were hit by financial restructuring, the formal sector was the worst hit (Takyi and Obeng, 2013). The changes were implemented in stages, beginning with the removal of interest rate ceilings and reorganization of the foreign currency system in the 1980s and moving to bank privatizations and increased bank rivalry in the 1990s.

As a result of the reform, the number of banks operating in Ghana has increased significantly. Prior to the reform, according to the Bank of Ghana, there were just seven banks; by 1998, however, this number had more than doubled (Takyi and Obeng, 2013). Ghana had 27 banks, 17 of which were foreign-owned, and 61 non-bank financial firms by 2009, five years following the establishment of the universal banking program (excluding credit unions and co-operatives). Furthermore, capital adequacy criteria were frequently met as a consequence of recapitalization and the off-loading of non-performing assets as a result of banking industry restructuring. Many of the benefits of better operations and administration that resulted from the changes is enjoyed by rural and community banks (Bumann et al., 2013). Members of the rural community in Ghana own these banks by share-purchase schemes (Takyi and Obeng, 2013).

They arose in the mid-1970s under the Bank of Ghana's protection as a result of the government's adoption of the "Akuafo cheque" policy for paying cocoa farmers instead of cash, and their numbers grew rapidly during the 1980s as a result of the government's implementation of the "Akuafo cheque" policy for paying cocoa farmers instead of cash

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(Bumann et al., 2013). However, the solvency of these institutions deteriorated as a result of rapid inflation, economic recession, mismanagement of funds, and natural disasters, with only 23 of the 123 rural banks qualifying as adequate by the time of the second Financial Structural Adjustment Programme (FINSAP II – 1992–95).

Rural banks were gradually rebuilt as part of the reform process, and by 2005, there were 121 of them again, though they were overwhelmingly clustered in only four regions of Ghana (Bumann et al., 2013). In order to address the financial demands of the rural population, new policies were implemented. This entailed banks providing donor programmes to community-based organizations or establishing relationships with "susu collectors" (Takyi and Obeng, 2013).

"Susu collectors" have been exposed to the banking culture and granted access to expanded credit outlets that can be re-lent to customers, which has helped both sides. As a result, rural banks gained access to a larger savings pool as well as a valuable source of knowledge about borrowers, lowering rates. Rural and community banks now operate throughout even the rural areas of Ghana as a decentralized network of licensed institutions. Ghana's financial system has steadily deepened as a result of the reforms (Bumann et al., 2013). Between 1983 and 1999, traditional indicators such as the liquid assets-to-GDP ratio, which is defined as currency plus demand and interest-bearing liabilities of banks and other financial intermediaries, grew significantly (from 11 percent to 22 percent) before reaching at 30 percent in 2006. This metric is commonly used to include a broad measure of intermediation (Obeng-Amponsah et al., 2019). As a proportion of GDP, bank loans to the private sector surged from 3% in 1986 to 16% in 1998, then to 27% in 2006.

This trend is comparable to that of other nations' financial liberalizations, in which the banking industry grew by initially lending to the government, which was considered secure, before giving credit to riskier private persons, but credit was initially scarce in Ghana due to bank restructuring and the writing off of bad debts (Yeboah et al, 2011).

2.4.4 Demand for Credit

In a society, credit serves to bridge the gap between a company's financial demands and its financial assets. It may also be utilized to directly improve the well-being of the poor (consumption smoothing, which reduces their vulnerability to short-term income shocks) (Akowuah, 2011) and to boost productive potential by allowing the poor to invest in their human and physical resources. According to Akowuah, credit demand may be separated into three types: perceived credit demand, prospective credit demand, and reported credit demand. A scenario in which enterprises who feel they are cash-strapped claim finance as a restriction exemplifies perceived credit demand. Potential demand is defined as a desire for credit that is not fulfilled due to market flaws and structural obstacles.

A written request for financial help at a specific rate of interest is referred to as revealed demand. Asset demand theories such as transaction, precautionary, and portfolio models can be used to model the demand for loans to the private sector. Most credit demand evaluations involve a measure of economic activity, such as actual GDP or industrial productivity, as well as borrowing costs (bank lending rates) and theoretical inflation. The research is divided on how economic behavior drives credit demand (Maiti and Vukovic, 2020). A number of empirical studies have found a positive relationship between economic performance and credit demand, based on the theoretical premise that high economic growth would have a positive impact on

projected wages and earnings, and thus on households' and businesses' overall financial conditions (Akowuah, 2011).

Economic progress enables private sector actors to sustain larger levels of debt and, as a result, to use credit to finance rising consumption and expenditure. As a result, bank loans are likely to be in high demand during periods of expansion, with companies wanting to boost output and customers ready to spend in the prospect of rising salaries (Owusu, 2012). Furthermore, as activity and efficiency goals rise, a greater number of projects will become lucrative in terms of predicted net present value, resulting in a bigger demand for loans to fund them. However, any observational studies conducted in the United States do not support the presence of a persistent link between credit and such behaviors (Adu, Marbuah, and Mensah, 2013).

Such writers also claim that if there is a link between the two variables, it is unfavorable (Akowuah, 2011). An improvement in present productivity, according to these authors, leads to a rise in sales and, eventually, profitability. Businesses may prefer internal finance during boom cycles by plowing back income and minimizing the relative amount of external financing, according to this notion (Owusu and Odhiambo, 2012). This notion is supported by the Pecking Order theory, which states that efficient organizations that generate cash internally may have less need for external capital (Akowuah, 2011).

During recessions, on the other hand, when both family disposable income and firm profitability are predicted to decline, consumers and firms might raise their demand for bank credit to compensate for the reduced income and profits (Adu, Marbuah and Mensah, 2013). As a result, the link between credit demand and economic activity is a

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topic for further investigation. The cost of loans, which is represented in bank lending interest rates, is another factor that influences credit demand (Akowuah, 2011).

The link between loan expenditure (interest rate) and credit demand, on the other hand, is skewed. Some argue that the connection is unbalanced, while others feel it is (Akowuah, 2011). High interest rates, according to those who believe there is a negative relationship between credit demand and interest rates, diminish credit demand, and only a limited number of borrowers with high-risk projects will have their demand satisfied (Owusu, 2012). Credit demand is influenced by a few other key elements. These are supply-side variables like collateral requirements or procedural specificities that cause financial market rationing and restrict some customers from adopting one service over another. According to Sharma and Zeller (1997), such constraints dissuade many Ghanaian households from applying for structured loans. It is worth noting that, while these are important factors, they are challenging to capture in this study owing to estimate and data constraints.

2.4.5 Household Credit and Financial Liberalization

Households can drain their financial reserves in a classic life cycle plan, save when future income is predicted to grow, and invest when future income is expected to decline. Borrowing and leasing assist to spread consumption out throughout the course of a product's life cycle (Seefeldt, 2015). Given that family income is often hump-shaped, with higher income for prime-age families and lower income for those in earlier and later life, borrowing may be higher for younger households and drop, possibly non-linearly, as the household ages. Households anticipating higher income growth should be more inclined to borrow than those expecting lower income growth, for a variety of reasons. While income-growth prospects differ for a variety of reasons, one of the

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primary criteria that divides high-growth families from low-growth households is education (Yeboah et al., 2011).

Relaxing the premise that financial markets are ideal and limiting households' freedom to invest against projected future profits at will adds to the simple model's complexity (Yeboah et al., 2011). Regardless of whether the limitation is binding or not, the incidence of credit among such households would be lower (Cesa-Bianchi, Ferrero, and Rebucci, 2018). When liquidity restrictions are binding, they may impose an upper limit or ban on the amount that households can borrow; when they are non-binding, the prospect of a binding restriction in the future encourages households to invest more than they would otherwise in order to build up a cushion of financial reserves in case the liquidity restriction becomes binding. Such buffer stock balances will be observationally comparable to precautionary balances held by families to satisfy uncertain future income sources when marginal utility is convex (Yeboah et al., 2011).

Payment rationing may also be a fair solution by credit providers to issues with imperfect details and the risk of borrowers defaulting. According to Stiglitz and Weiss (1981), asymmetric knowledge about debtors' likelihood of default leads to a situation in which interest rates do not properly reflect risk, allowing borrowers with high default probabilities to enter the market at the expense of their counterparts with low default probabilities. In such cases, creditors may employ credit rationing as an alternative to allocating credit. Of course, creditors can try to lessen the risk of default by requiring borrowers to put up collateral as collateral for any loan. Land, owner-occupied homes, livestock, and other durable items, for example, may be utilized in this way, with the premise that credit would be more common among families with collateral than among those without (Stiglitz and Weiss,1981). Financial liberalization has an effect on

household lending decisions in this context because it removes government restrictions on the financial market (Allgret, Courbis and Dulbecco, 2003).

Interest rate ceilings, government ownership of financial intermediaries, credit rationing, and capital flow and exchange rate limitations are all instances of government-imposed regulations. Financial liberalization aims to increase credit supply and access by mobilizing deposits and investment through the privatization of state-owned banks, the relaxation of laws restricting foreign bank ownership and participation, and the implementation of market-determined interest and exchange rates (Yeboah et al., 2011). Higher interest rates are thought to boost the incentive to save, allowing more cash to be allocated to higher-yielding assets and smoothing consumption (Claessens et al., 2016). It is suggested that liberalization promotes transparency and openness, lowering unfavorable selection and moral hazard, and so improving capital market liquidity issues.

Formal financial institutions in industrialized nations consider that dealing with the weak, small and medium-sized firms, and those engaged in informal economic activity is more costly, according to Chigumira (2010). Due to high default rates and the processing of small debts, the formal sector is hesitant to lend to many families. As a result, credit is either granted informally, where high interest rates balance the high risk of default, or by family and acquaintances, where substitute contractual arrangements can be formed. Liberalization has often been promoted on the basis of increasing credit to rural families. The informal and formal businesses can work together to tackle problems including a lack of knowledge about the borrower and a high marginal cost (Claessens et al., 2016).

2.4.6 Real Exchange Rate

The actual exchange rate is frequently used to evaluate a market's worldwide attractiveness (Maitah, Kuzmenko and Smutka, 2016). It is also known as the currency competition index, and it correlates with competitiveness in a negative way. When a country's currency is highly competitive, the value of the country's index continues to plummet. It is a well-known view that the volatility of exchange rate must impact cash flows that are expected from the corporate and also the performance of it by creating adjustments in the domestic currency denominated profits and activities on the international front together with term of competition for the firms (Ofori-Abebrese, Baidoo and Osei, 2019).

Exchange rates do affect the demand for currency as well as financial performance of a country when the rate of the exchange in the currency have various levels and has an immediate impact on the price of import including the cost of production and also the Consumer Price Index (CPI). Changes in the exchange rate are passed on to domestic pricing through the cost of imported consumer products, intermediary goods, and local goods and services dominated by foreign currencies, affecting the rate at which currency is required for transactions (Cerra, 2019). Because Ghana is a net importer, depreciation of the Cedi does not benefit the economy. As a result of the depreciation of the Cedi, higher production costs are incurred as a result of higher imported prices for raw materials and machines used in the production of goods and services, as well as higher prices for imported consumer goods, resulting in inflation and affecting money demand in Ghana.

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2.4.7 Economic Growth

Economic growth, and for that matter, Gross Domestic Product (GDP) is the most extensively used macroeconomic indicator, and it is used to measure all of a country's economic activity. The economy's growth rate limits the expansion of industries in Ghana, as well as their profitability. It calculates the total quantity of services and completed items in monetary terms, as well as the strength of a country's manufacturing sector, at a specific point in time (Seth, 2021). GDP is typically calculated on an annual basis and includes all consumption by private and public contributions, government expenditures, exports and imports, and investments that take place inside a recognized region.

GDP is a key measure of a country's fiscal health, and it may be computed in two separate approaches. The first approach is to add up everyone's earnings over a period of time, and the second technique is to add up the worth of all the goods and services produced in the country for a particular year (Kodongo, 2011). It should be mentioned that the rate of growth of the country's GDP is a deciding element in the amount of credit needed. Economic growth can lead to increased investment demand and also increase loan demand which again increases demand for money. Thus, it is expected that economic growth affects money demand positively. Some empirical studies also observed such effects (Kraft, 2006; Brissims et al., 2014). In this study, GDP per capita was used to capture economic growth.

2.4.8 Interest Rate

Interest rate refers to the amount that is charged on borrowed money. The interest rate constitutes a percentage gain in the overall amount borrowed by the party involved. The amount of interest charged for each unit of time in a set period, which is usually one

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year, is referred to as interest rates. The rates of interest are many and there is not one single particular rate of interest. The different rates of interest do dignify the potency and enthusiasm that borrowers have in the meeting of their responsibilities and the simplicity that the borrowers' promissory bond, debenture, mortgage or other indications of indebtedness can be converted into monetary terms (Baidoo and Yusif, 2019).

It is the rate at which the person lending the money and the debtor are taxed and guaranteed by the confidence with which investors embrace the appropriate fiscal and monetary institutions. The return on assets such as government bonds in the economy is also represented by the overall borrowing interest rates (Kodongo, 2011). Higher interest rates do not stimulate borrowing on one hand while encouraging savings on the other. The expectation for this variable is such it is anticipated to have a negative relationship with money demand, as lower interest rates should increase credit demand and otherwise (Egert et al., 2006).
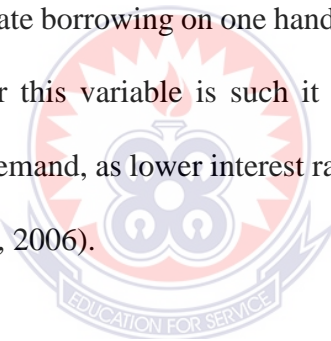
2.4.9 Inflation Rate

The Reserve Bank of New Zealand defines inflation as an increase in average prices across the economy, according to Labonte (2011). It might also imply that the money loses its worth. It can also refer to a stable increase in the overall price or a stable decrease in the worth of money. The most common reason of inflation is the availability of too much money to buy goods and services, or the economy's demand appears to be exceeding supply. However, Labonte further mentioned that the increase in pricing is due to an increase in the cost of products and services, not in the cost of assets. The scenario generally arises when an economy is so strong that there are severe labor,

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market, and material shortages. There have been heated disputes throughout the years about whether inflation helps or hurts economic growth (Mwakanemela, 2013).

Inflation may lower the value of an investment if the returns are insufficient to compensate for inflation, and it can also amplify the economy's 'boom-and-bust' cycles. In addition, there is a long-term positive association between inflation and economic growth (Sattarov, 2011). Inflation, according to Hami (2017), has a negative impact on financial depth while having a favorable impact on the ratio of total deposits in the banking system to nominal GDP. It is clear that inflation has an impact on the relationship between growth and the financial sector.

Financial intermediation is more difficult as a result of inflation since the flow of information about real return on investments is less available. This forces lenders to concentrate on short-term objectives while expanding their portfolios, and a major amount of the loans will eventually be utilized to meet operational costs (Rousseau and Yilmazkuday, 2009). As a result, the connection between inflation and financial growth is a major concern in developing nations, including Ghana (Ozturk and Karagoz, 2012).

2.5 Chapter Summary

The body of empirical literature has been evaluated on the impact of financial liberalization in various forms on money demand. The empirical literature reviewed have shown how money demand is affected by financial reforms and there is substantial evidence which backs this study to use broad money (M2) as a proxy for money demand. The empirical review of literature so far clearly shows that less work has been done on financial liberalization and money demand in Ghana. Even most studies conducted look at the stability of the money demand function and use determinants such as real income, exchange rate, interest rate, among others; but they fail to

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incorporate financial liberalization to assess the impact it has on the stability of the money demand function. Financial reforms have continuously led to the creation of short-term money assets and that had contributed to instability in some economies, and hence, necessitating the need to have this study conducted for Ghana. Overall, this section included a review of the empirical literature as well as the study's main theoretical foundation. This study aimed to contribute to the literature and bridge the empirical gaps on the issue of financial liberalization and money demand in Ghana, based on important empirical gaps such as methodology, sample observation years, and geographical scope.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter explained how to solve a research problem in the framework of a research study in a methodical approach. The research topic, study design, population, sample and sampling processes, data sources, data collecting procedure, and data processing and analysis are all covered in this chapter. The method for analyzing data and the rationale that underpins its use are also discussed.

3.1 Research Philosophy

A research philosophy is a set of beliefs about how evidence on a topic should be collected, processed, and applied (Saunders, Lewis, and Thornhill, 2019). Only observable phenomena were employed in this study since they give trustworthy data and facts, data gathering is highly organized, and measurement is quantitative. Many writers differentiate and address four primary research philosophies in their works: positivist research philosophy, interpretivist research philosophy, pragmatic research philosophy, and realistic research philosophy.

The researcher, in the positivist research philosophy, is an impartial analyst who works independently and dissociates herself from personal ideals. According to the interpretivist research theory, understanding the social world in principle is difficult, hence it should be understood subjectively. The research philosophy of a pragmatist is based on facts and is primarily defined by the study topic, with practical findings being the most essential. Positivism assumes that the researcher's environment and events of interest are objective, external, and unrelated to him. Owing to the fact that the events

of interest are objective, external, and independent of the researcher, this study follows the positivist worldview.

3.2 Research Design

Explanatory research was used in this work. Explanatory research, according to Saunders, Lewis, and Thornhill (2019), focuses on researching a scenario in order to explain (rather than merely describe) the relationships between the variables. The goal of this research is to determine and explain the impact of financial liberalization on Ghana's money demand.

A research design, according to Cooper, Schindler and Sun (2006), is the general strategy or framework that directs the researcher's activity. This aids the researcher in making well-informed judgments on the research approach that is most suited to the project. Since the researcher has no influence over the variables, a descriptive survey research approach allows the researcher to bring a population's characteristic to bear and test hypotheses without manipulation or bias (Saunders et al., 2009). Longitudinal research examines variables throughout time, whereas cross-section research examines data collected on the study population at a specific point in time (Saunders et al., 2015).

A causal research design, according to Sekaran and Bougie (2011), establishes a causation and effect link between study variables, as it does in the current study. According to Kerlinger and Lee (2000), a causal research design, also known as an explanatory research design, is used when a study tries to understand how various phenomena behave by identifying the contributing variables that cause the change in the variable without performing any further analysis on the variable. According to Saunders et al. (2009), combining several research strategies into a single study yields the best results. As a result, descriptive and causal study methodologies were used to

investigate the relationship between financial liberalization and demand for money in Ghana.

3.3 Sources of Data

Annual time series data spanning from 1988 to 2020 were used for the study. The data were sourced from the Bank of Ghana (BoG), and the World Development Indicators (WDI). Data on real interest rate was sourced from BoG, while real GDP growth, real exchange rate, inflation rate, deposit rate, and broad money were sourced from WDI. Data on Financial Liberalization Index (FLI) was also constructed from financial liberalization policy variables using Principal Component Analysis (PCA). The financial liberalization policy variables include: exchange rate, regulatory and legal reforms, institutional restructuring, capital account liberalization, demonetization, monetary control, interest rate, capital market establishment, secondary reserve requirement, and universal banking.

3.4 Theoretical Model Specification

The money demand function is based on Keynes' revision of the Cambridge version of the Quantity Theory of Money, and it is derived from several research (Khan and Hossain, 1994; Sriram, 1999; Akinlo, 2006; Kallon, 2009; Bathalomew and Kargdbo, 2009; Omotor and Omotor, 2011). The money demand function is defined as:

$$\frac{M}{P} = f(Sv, oC, X) \tag{10}$$

where M is a monetary aggregate (M1 or M2 or M3) and P denotes the price level, and M/P denotes the demand for real money balances. Sv is for a scale variable, such as income, oC stands for the opportunity cost of retaining money, such as the interest rate, and X stands for additional alternative control variables. Thus, in accordance with

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Keynes' theory of speculative and transaction motives for holding money, this study specifies the money demand function as a function of a scale variable, the opportunity cost of holding money, and other factors.

3.5 Empirical Model Specification

The study used multiple time series estimates based on the Autoregressive Distributed Lag (ARDL) co-integrated approach to explain the impact of financial liberalization and other factors on money demand. After a unit root test revealed that variables were stationary at different levels, the model was chosen. Unlike other cointegration approaches, the ARDL does not require that all of the variables under investigation be integrated in the same order. As a result, whether the underlying regressors are entirely I(0), entirely I(1), or mutually co-integrated, ARDL can be used (Pesaran and Shin, 1999).

The ARDL model is favored over other models, such as Engle and Granger's (1987) two-step technique, in that it is applicable regardless of whether the level of variables to be evaluated is integrated of order one, zero, or mutually integrated. Another intriguing feature of the ARDL model is that it gives reliable findings regardless of sample size and also offers unbiased long-run model estimates and valid t-statistics whether or not endogenous regressors are present (Damane, Sekanti and Molapo, 2018).

Finally, the model allows for the construction of an error correction model (ECM) using simple transformations, resulting in short-run adjustment while maintaining long-run equilibrium without compromising long-run information (Nkoro and Uko, 2016).

From a theoretical standpoint, the real money balance(s) is a function of the scale variable, the opportunity cost of holding money, and other covariates. As a result, the

money demand function [with money demand as the dependent variable and broad money (M2) as a proxy] appears in the form:

$$M2 = f(FLI, RER, RIR, GDP, RDep, InfR) \tag{11}$$

where FLI stands for Financial Liberalization Index (which was constructed using Principal Component Analysis as explained in the Appendix A), RER represents Real Exchange Rate, RIR denotes Real Interest Rate (proxied by Monetary Policy Rate), GDP is Gross Domestic Product per Capita, RDep is Real Deposit Rate, and InfR represents Inflation Rate (proxied by Inflation, GDP Deflator). The parameter e_t denotes the error term. The above model is written more explicitly as:

$$(M2)_t = \beta_0 + \beta_1 FLI_t + \beta_2 RER_t + \beta_3 RIR_t + \beta_4 GDP_t + \beta_5 RDep_t + \beta_6 InfR_t + e_t \tag{12}$$

The estimated ARDL model used here is compatible with Pesaran et al. (2001) and Damane et al., 2018; and the estimated model represented in the double log form was defined as follows:

$$\ln(M2)_t = \beta_0 + \beta_1 FLI_t + \beta_2 RER_t + \beta_3 RIR_t + \beta_4 \ln GDP_t + \beta_5 RDep_t + \beta_6 InfR_t + u_t \tag{13}$$

where ln(M2) and ln(GDP) are the natural logarithms of real money balances (broad money [M2]) and GDP per capita, respectively, β's are the coefficients for the variables studied; and u_t is the error or residual term.

An Autoregressive Distributed Lag (ARDL) bounds cointegration test proposed by Pesaran et al. (2001) would be used to see if there is a long-run relationship among the variables. The following is the study's ARDL model:

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$$
\begin{aligned}
\Delta \ln(M2)_t = {} & \Omega_0 + \Omega_1 \ln(M2)_{t-1} + \Omega_2 FLI_{t-1} + \Omega_3 RER_{t-1} + \Omega_4 RIR_{t-1} \\
& + \Omega_5 \ln GDP_{t-1} + \Omega_6 RDep_{t-1} + \Omega_7 InfR_{t-1} + \Omega_8 Trend \\
& + \sum_{j=1}^{m} \Gamma_{1j} \Delta \ln(M2)_{t-j} + \sum_{j=0}^{n} \Gamma_{2j} \Delta FLI_{t-1} + \sum_{j=0}^{o} \Gamma_{3j} \Delta RER_{t-1} \\
& + \sum_{j=0}^{p} \Gamma_{4j} \Delta RIR_{t-1} + \sum_{j=0}^{q} \Gamma_{5j} \Delta lnGPD_{t-1} + \sum_{j=0}^{r} \Gamma_{6j} \Delta RDep_{t-1} \\
& + \sum_{j=0}^{s} \Gamma_{7j} \Delta InfR_{t-1} \, u_t \qquad\qquad (14)
\end{aligned}
$$

When performing the bounds test, it is required to estimate the above equation, which is done using the ARDL estimation approach. The Bayesian Information criterion was primarily used to find the best lag for each variable. In this chapter, under descriptive and inferential statistics, further details concerning the estimation methods and diagnostic tests were covered.

The Error Correction Model (ECM) is then estimated based on the findings obtained after running the cointegration test. This test measures the time it takes to return to long-run equilibrium after a short-term shock. This ECM model provides for both long-run and short-run estimation of factors affecting money demand. The ECM estimation procedure is divided into two phases. The error correction term (ECT) is calculated by regressing the independent variables on the dependent variable and subtracting the actual value of the dependent variable from the estimated value in the first step. This is depicted below.

$$
ECT = \ln(M2)_t - (\Omega_0 + \Omega_1 T + \Omega_1 FLI_t + \Omega_2 RER_t + \Omega_3 RIR_t + \Omega_4 \ln GDP_t +
$$

$$
\Omega_5 RDep_t + \Omega_6 InfR_t) \qquad\qquad (15)
$$

The trend term is used because the variables are trending, and it is significant in the study. Equation 6 is then used to determine the ECM by incorporating the ECT into Equation 12.

$$
\Delta \ln(M2)_t = \lambda_0 + \lambda_1 \Delta FLI_t + \lambda_2 \Delta RER_t + \lambda_3 \Delta RIR_t + \lambda_4 \Delta \ln GDP_t + \lambda_5 \Delta RDep_t +
$$

$$
\lambda_6 \Delta InfR_t + \omega ECT_{t-1} + u_t \qquad\qquad (16)
$$

The ECT coefficient (ω) represents the rate of adjustment. This value is predicted to be negative and critical for the restoration of long-run equilibrium following an external shock. The value must be in the range of 0 to 1, with 0 indicating no adjustment and 1 indicating full adjustment one period after the shock. If the sign of the value is positive, however, it indicates that there is no convergence to equilibrium following an exogenous shock. Exogenous shock, according to Asongu (2014), causes a permanent divergence from equilibrium and so the error correction term shows the speed at which the system corrects itself when there is a shock to that system.

Table 1: Measurement and Operational Definitions of Variables

Variable	Operationalization	Measurement	Research Support
Money Demand	Broad Money (M2) in current local currency units	The value of a person's assets in the form of money or a form that can be easily exchanged for commodities.	Niyimbanira (2013); Nchor and Adamec (2016); Tule (2020)
Financial Liberalization (FL)	Financial Liberalization Index (*FLI*)	Constructed using PCA from FL policy variables such as exchange rate, universal banking, institutional restructuring, interest rate, among others.	Adam (2009); Caprio et al. (2001); Laeven (2003); Shrestha and Chowdhury (2006)
Real Exchange Rate	Real Effective Exchange Rate Index (2010 = 100) (*RER*)	The nominal effective exchange rate (a measure of a currency's value versus a weighted average of many foreign currencies) is divided by a price deflator or cost index to get the real effective exchange rate.	Samreth (2008); Mansaray and Swaray (2012); Sekantsi and Molapo (2018)

Table 1 Continued

Real GDP Growth	GDP per capita (constant LCU) (*GDP*)	GDP divided by population during the midpoint of the year. Depreciation of manufactured assets is not taken into account in this calculation. The data is in local currency.	Nchor and Adamec (2016); Mansaray and Swaray (2012); Sekantsi and Molapo (2018)
Real Interest Rate	Central Bank Policy Rate (annual percentage) as proxy (*RIR*)	The monetary policy approach that is based on short-term market interest rates in order to ensure price stability.	Nchor and Adamec (2016); Sekantsi and Molapo (2018); Folarin and Asongu (2017)
Inflation rate	Average Inflation Rate (Inflation – GDP Deflator, annual percentage as proxy) (*InfR*)	The rate of price change in the economy as a whole is assessed by the yearly growth rate of the GDP implicit deflator. GDP implicit deflator is the ratio of current local currency GDP to constant local currency GDP.	Mansaray and Swaray (2012); Warue (2013); Rosengren (2014); Folarin and Asongu (2017)
Real Deposit Rate	Deposit Interest Rate (annual percentage) as proxy (*RDep*)	The average interest rate on one year term deposits offered by the commercial banks to the household sector.	Seck and El Nil (1993); Ejaz and Qazi (2013)

Source: Author's Construct, 2022

3.6 Data Analysis

The collected gathered were inspected for missing data, cleaned and transformed to commence analysis. Data analysis was done with use of the R programming software – a software mainly used for advanced statistical analysis.

3.6.1 Descriptive and Inferential Statistics

The maximum, minimum, standard deviation, and mean of the data under consideration were determined using descriptive statistics. In addition, inferential analysis was used to assess the effects and causation of the variables being investigated. The researcher used the ARDL model to examine the data in order to establish the extent to which financial liberalization and other factors explained the variations in money demand in Ghana. The Error Correction Mechanism (ECM) was employed as the estimating approach, and the results were presented and analyzed utilizing a combination of tables, graphs, and figures.
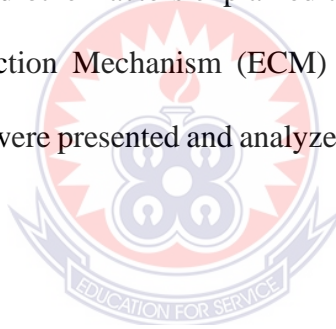
3.6.2 Diagnostic Tests

Various diagnostic tests were performed using the R programming language before the inferential analysis. Stationarity test, multicollinearity test, co-integration test, optimum lag determination, normality test, heteroscedasticity test, autocorrelation test, model specification test, and stability test were among the tests performed.

The study used six diagnostic tests to assess the model's fitness and took remedial measures if needed. Unit root test, multicollinearity test, residual testing (normality, heteroscedasticity, and autocorrelation tests), model specification test (Ramsey-Reset test), stability test (CUSUM test), and co-integration test (ARDL Bound test) were among the tests carried out. These are detailed in this ensuing section.

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3.6.2.1 Stationarity/Unit Root Test

The study used a Stationarity Test to evaluate whether model was appropriate for the estimation. When there is a consistent pattern across time or an inclination moving around the average value, data is stationary (Gujarati and Porter, 2009). The time series data should be stationary to avoid incorrect inferences from non-stationary regressions. When two non-stationary series are regressed on each other, the likelihood of discovering a spurious association is quite high (Washington, 2014).

To establish the existence of a unit root, the study used Augmented Dickey-Fuller (ADF), comparable to Kiptoo (2010), expressing the null hypothesis (H0: non-stationary/ unit root present). If the ADF test statistic is smaller than the Mackinnon critical value at the 5% significance level, the null hypothesis is rejected, showing that the data is stationary and hence does not have unit roots. The use of the Autoregressive Distributed Lag (ARDL) model to estimate the extent of the relationship between financial liberalization and money demand, as well as other factors affecting money demand in Ghana was predicted by this stationarity test, in which some variables were integrated of order zero I(0) and others were integrated of order one I(1).

3.6.2.2 Co-integration Test

The co-integration test assesses if the variables will converge to some kind of equilibrium in the long run. Co-integration, according to Nkoro and Uko (2016), is an econometric term that investigates the presence or absence of a long-run equilibrium among convergent economic time series. As a result, it establishes a more robust statistical and basis for error correction model, which incorporates both short and long-term knowledge about variables in a model.

A disadvantage of differencing a non-stationary time series in order to attain stationarity, according to Kiptoo (2010), is that it leads in the loss of important long-term relationships between variables. To conduct a relevant study, the researchers devised a method that allowed them to define the relationship in terms of variable levels while avoiding the problem of spurious relationships. The way to solve this issue was co-integration. Co-integration is a long-run relationship between two non-stationary series integrated of the same order. This suggests that throughout time, a linear combination of non-stationary variables might occur. The presence of co-integration indicates that the variables will eventually converge to some form of equilibrium in the long run. Co-integration has been discovered in a number of studies (Kiptoo, 2010; Washington, 2014).

The Bound co-integration testing approach was used to determine if co-integration existed or not. The null hypothesis is phrased as follows in order to define the Bounds test technique for cointegration:

H_0: There is no cointegration existing in the model.

The decision criterion for this test is to reject the null hypothesis if the Wald F-statistic (that is, the calculated F-statistic) is greater than the upper critical value, implying that there is co-integration and hence a long-run relationship in the model. When the Wald F-statistic is between the lower and upper limit critical values, it becomes inconclusive, however if the Wald F-statistic is below the lower bound critical value, the null hypothesis is rejected.

3.6.2.3 Determination of Optimal Lag

A lag, according to Gujarati and Porter (2009), is a latency in responding to a dependent variable's dependency on another explanatory variable. The shortest lag of the Akaike

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Information Criterion (AIC) and the Schwarz Information Criterion (SIC) were used to determine the best lag for this investigation.

3.6.2.4 Normality test

The Shapiro-Wilk test was used to examine if the error terms were normally distributed around a zero mean. Following the null hypothesis H0 that the error term follows a normal distribution, the Shapiro-Wilk test was performed. The null hypothesis is rejected if the Shapiro-Wilk statistic's p-value (probability value) is less than the 5 percent significance level; otherwise, it is not rejected.

3.6.2.5 Heteroscedasticity Test

Heteroscedasticity occurs when the variance of each error term varies depending on the independent variable's value (Babulo and Hassen, 2005). Because the variances and errors are underestimated, hypothesis testing becomes inaccurate. To test for heteroscedasticity, this study employed the Breusch Pagan-Godfrey test statistic, which is a chi-squared test. Homoscedasticity refers to the fact that the variance of errors is constant across all observations, implying that there is no heteroscedasticity. The null hypothesis for the test is formulated thus:

H_0: There is homoskedasticity (no heteroskedasticity) in the model.

Decision Rule: Reject H_0 if p-value is less than significance level of 5 percent. Otherwise, do not reject H_0. This test is done to ensure that hypotheses testing is accurate and the variance and standard errors are accurate.

3.6.2.6 Autocorrelation Test

The assumption of autocorrelation is that an independently distributed error term for one observation (or period) is unrelated to the error term for another observation (or

period), that is, there is zero covariance. Contrary to this, the assumption of error term independence will not hold (San et al., 2015). Breusch-Godfrey (or LM) Test for Serial Correlation was utilized following the null hypothesis stated as:

H_0: There is no autocorrelation in the model.

If the p-value is less than the 5 percent significance level, the null hypothesis is rejected leading to the conclusion that autocorrelation exists in the model. The study examined if any variable should be excluded from the model after the residual tests.

3.6.2.7 Model Specification Test

The Ramsey RESET test was used to ensure that no essential variables were left out of the model definition. The test is similar to ones used by Kiptoo (2010) and Ting et al. (2015). The null hypothesis states that:

H_0: The model is correctly specified

If the p-value is less than the 5 percent significance level, we reject the null hypothesis and conclude that the model was misspecified. Otherwise, the null hypothesis should not be rejected.

3.6.2.8 Stability Test

The model's stability was tested using the cumulative sum (CUSUM), cumulative sum of squares (CUSUMSQ), and moving sum (MOSUM) tests. CUSUM test uses recursive residuals and is plotted against break points, according to Bahmani-Oskooee and Ng (2002). The null hypothesis that all coefficients in the error correction model are stable cannot be rejected if the plot of CUSUM, CUSUMSQ, and MOSUM statistics remains within the critical bounds of the 5 percent significance level.

3.7 Granger Causality Test

Granger causality is a powerful tool in time-series analysis that allows you to test for causation between variables. One of the fundamental goals of empirical econometrics is to investigate causal relationships between economic variables. Given two variables X and Y, X Granger-causes Y if Y can be predicted better using both X and Y histories than using only Y's history. One implication of the Granger representation theorem, according to Engsted and Johansen (1999), is that if non-stationary variables are cointegrated, one of the series must granger-cause the other. Using the Granger Causality test and the following models, the study examines the causal relationship between money demand (LM2) and financial liberalization index (FLI).

$$\Delta(LM2)_t = \gamma_0 + \sum_{i=1}^{n} \lambda_i \, \Delta(LM2)_{t-i} + \sum_{j=1}^{m} \omega_i \, \Delta FLI_{t-j} + u_t \tag{17}$$

$$\Delta FLI_t = \gamma_0 + \sum_{j=1}^{m} \psi_i \, \Delta FLI_{t-j} + \sum_{i=1}^{n} \varphi_i \, \Delta(LM2)_{t-i} + v_t \tag{18}$$

Where, u_t and v_t are mutually uncorrelated white noise disturbance terms such that $(t \neq t')$ for LL t and t', $\Delta(LM2)_t$ and ΔFLI_t are the log of money demand and financial liberalization index, n and m are the optimal lag order. The lag orders are determined so as to minimize both AIC and BIC.

3.8 Threshold Model of Money Demand and Financial Liberalization

At this point, the study determines the financial liberalization threshold beyond which a rise in financial liberalization will affect the money demand stability and may cause it to be unstable. Adopting the threshold model used by Younus (2012), the threshold model takes a quadratic functional form as follows:

$$\ln(M2)_t = \beta_0 + \beta_1 FLI_t + \beta_2 FLI_t{}^2 + \beta_3 RER_t + \beta_4 RIR_t + \beta_5 \ln GDP_t + \beta_6 RDep_t +$$
$$\beta_7 InfR_t + u_t \tag{19}$$

where a square term of the financial liberalization index ($FLI_t{}^2$) was included but other variables are as defined in equation 3.

Expectations are that the linear term of the financial liberalization variable has a positive sign in order to capture the positive effect of financial liberalization on money demand whereas the squared term is expected to have a negative sign and should rather reflect the negative impacts on money demand. A significant positive linear term effect, and a significant negative squared term combines to show that the effect of financial liberalization on demand for money is an inverted U-shape curve. This is in view of the fact that the positive effects of financial liberalization on money demand shifts to negative when financial liberalization tends to exceed a certain threshold level. The peak of the quadratic curve serves to identify the threshold level or turning point after which the marginal effect of financial liberalization on money demand becomes negative.

Thus, the significance of the linear and square terms of the financial liberalization variable were assessed, and if both coefficients are found to be significantly different from zero, then the peak of the quadratic function can be identified. The turning point corresponding to the financial liberalization threshold level can be calculated by applying the rule of optimization where the first-order differentiation of money demand with respect to financial liberalization is set to zero:

$$\frac{\partial \ln(M2)_t}{\partial FLI_t} = \beta_1 + 2\beta_2 FLI_t = 0 \tag{20}$$

Equation 8 is then solved to obtain the turning point beyond which the financial liberalization effect on demand for money becomes negative:

$$FLI_t{}^* = \frac{-\beta_1}{2\beta_2} \tag{21}$$

3.9 Chapter Summary

This chapter outlines the methodology of the study and expounds on the research methodology and specifies the theoretical model based on the Keynes Quantity Theory of Money. This was predicated by the contribution of Mckinnon (1973) and Shaw (1973) towards the formulation of the money demand function in the literature. Additionally, an empirical model formulation predates the estimation by the Autoregressive Distributed Lag Model. The section highlights on what model diagnostics are necessary for assessing the model to be estimated. Also, the section proposed a threshold model that determines the financial liberalization threshold effect on the demand for money in Ghana.
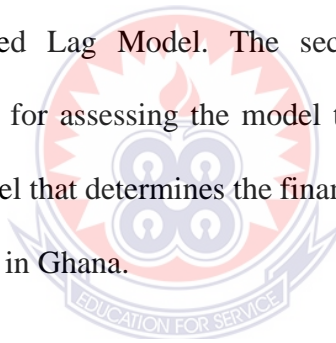
CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Introduction

The study's econometric analysis, findings, and discussion are presented in this chapter. The summary statistics offer statistical information about the variables in this study. The Autoregressive Distributed Lags (ARDL) technique, created by Pesaran and Shin (1999), applies the Bounds testing approach and the Unrestricted Error Correction model (UECM) to co-integration analysis for the formulation of long- and short-term relationships. The serial correlation, heteroscedasticity, and normality of residuals are all checked using model diagnostics. The money demand function will be examined for structural breaks to see if it was reasonably stable, and the causal link between money demand and the financial liberalization index will be assessed using the causality test - Granger causality test. The study would then cover the threshold effect of financial liberalization on the demand for money in Ghana.

4.1 Descriptive Statistics

Descriptive statistics are useful for providing a basic overview of data distribution and statistical information about the variables used in the study. Data visualization also gives a visual representation of the factors studied. The display of time series plots in Appendix B reveals trends, seasonality, and stationarity.

4.1.1 Summary Statistics of Variables

Table 2 shows the summary statistics for the essential variables involved. All of the variables in the study have positive average values, as shown in the table. All of the

variables are also positively skewed, with the exception of the financial liberalization index, which is negatively skewed. Note that the summary statistics for the money demand variable (M2) has been converted into its scientific format with three significant digits.

Table 2: Summary Statistics of Variables

	M2	FLI	RER	RIR	GDP	RDep	InfR
Mean	1.90e+10	7.07	108.50	24.06	3429.81	17.64	23.99
SD	3.12e+10	1.78	32.04	9.55	1032.64	7.92	14.61
Min	1.55e+08	2.63	64.65	12.50	2300.94	8.89	9.97
Q1	2.34e+08	6.39	85.05	16.00	2574.21	12.08	14.96
Median	2.61e+09	6.55	100.00	21.50	3013.32	14.32	18.63
Q3	2.29e+10	8.72	129.75	27.00	4461.97	23.15	30.13
Max	1.21e+11	8.72	175.07	45.00	5434.56	35.76	80.75
MAD	3.84e+09	3.22	38.26	8.15	822.69	4.50	6.99
IQR	2.26e+10	2.33	44.70	11.00	1887.76	11.06	15.17
CV	1.64	0.25	0.30	0.40	0.30	0.45	0.61
Skewness	1.77	-0.71	0.52	0.79	0.64	0.91	2.00
Kurtosis	2.21	-0.41	-0.89	-0.34	-1.16	-0.47	4.72

Notes: SD = Standard Deviation, Min = Minimum value, Max = Maximum value, Q1 = First Quartile, Q3 = Third Quartile, MAD = Mean Absolute Deviation, IQR = Interquartile Range, CV = Coefficient of Variation

Source: Author's Computation using R Software 4.1.2

4.2 Stationarity or Unit Root Tests of Variables

In time series modeling, it is critical to perform a test to assess the stationarity of variables and to ensure that they are not integrated to a higher order than one. This is done to guarantee that higher integrated orders do not cause spurious regression, and it also ensures that the estimation process is reinforced with unit root testing. Before using the ARDL technique to co integration and the Granger-causality test, the unit root test

was used to study the stationary features of the data.

The variables were studied first and primarily by visually inspecting their trends. All variables, excluding inflation, were non-stationary at levels, according to the plots in Appendix B. On the other hand, as shown visually in Appendix B, all variables are stable at initial differences.

The Augmented-Dickey Fuller (ADF) and Phillips-Perron (PP) tests were also used on the variables in levels and first differences to establish the order of integration for all of the variables. The tests were run first with intercept and no time trend in the models, and then with intercept and time trend in the models to ensure that their order of integration was correct.

The Schwartz-Bayesian Information Criterion (BIC) and Akaike Information Criterion (AIC) were used to automatically determine the best lag structure for the tests. These criteria are the most common standard ways of choosing the best lag structure that suits the model to be estimated. It provides a more convenient way of presenting the true model, especially the BIC criterion. When the p-value is relatively less than 0.05 significance level, the null hypothesis of no unit roots is rejected, and this choice is based on MacKinnon (1991) critical values as well as the p-values. The ADF test for unit roots with intercept-only model is shown in Table 3.

Table 3: ADF Test for Stationarity with Intercept and No Time Trend

	Levels			First Difference		
Variable	ADF Statistic	Lag Order	P-value	ADF Statistic	Lag Order	P-value
LM2	-3.92	2	0.0100	-4.47	0	0.0000
FLI	-3.00	0	0.0482	-4.50	0	0.0000
RER	-2.05	3	0.3110	-3.84	3	0.0000
RIR	-1.58	3	0.4840	-3.81	1	0.0000
LGDP	0.07	2	0.9560	-3.13	0	0.0386
RDep	-1.46	0	0.5260	-4.64	1	0.0000
InfR	-5.30	0	0.0100	-8.66	0	0.0000

Notes: Stationary if p-value is less than 0.01, 0.05, or 0.10 levels.

Source: Author's Computation using R Software 4.1.2

All of the variables, with the exception of log of money demand, financial liberalization index, and inflation rate, are non-stationary at their current levels, according to the results. However, all of the variables became stationary at the first difference because the null hypothesis for the presence of unit roots is rejected since the p-values of the ADF statistic are significant at the 1 percent level for all variables except the log of GDP, which becomes stationary at the 5 percent level. As a result, the log of money demand and the rate of inflation are integrated to order zero I(0), whereas the remaining variables are integrated to order one I(1). Also, the results of PP test for unit roots with intercept-only model are presented in Table 4.

Table 4: PP Test for Stationarity with Intercept and No Time Trend

	Levels			First Difference		
Variable	PP Statistic	Lag Order	P-value	PP Statistic	Lag Order	P-value
LM2	-3.85	3	0.0000	-4.51	2	0.0000
FLI	-2.97	3	0.0506	-4.93	2	0.0000
RER	-1.81	3	0.3990	-4.89	2	0.0000
RIR	-1.49	3	0.5150	-5.67	2	0.0000
LGDP	0.95	3	0.9900	-3.18	2	0.0345
RDep	-1.49	3	0.5140	-5.49	2	0.0000
InfR	-5.29	3	0.0000	-15.4	2	0.0000

Notes: Stationary if p-value is less than 0.01, 0.05, or 0.10 levels.

Source: Author's Computation using R Software 4.1.2

The intercept-only model's log of money demand and inflation rate are stationary at levels and at the 1 percent significance level, according to the PP test at levels in Table 4. At a 10 percent level, financial liberalization was also found to be stationary. All of the variables are stationary at 1 percent level, except for the log of GDP, which becomes stationary at 5 percent level. In the test of stationarity at the intercept-only model, the log of money demand and inflation rate are integrated of order zero I(0), while the remaining variables are integrated of order one I(1). Moreover, the results of the ADF test for stationarity with both constant and time trend are shown in Table 5.

Table 5: ADF Test for Stationarity with Constant and Trend

	Levels			First Difference		
Variable	ADF Statistic	Lag Order	P-value	ADF Statistic	Lag Order	P-value
LM2	-0.41	2	0.9800	-5.11	3	0.0000
FLI	-2.58	2	0.3380	-5.32	0	0.0000
RER	-4.72	3	0.0100	-4.85	0	0.0000
RIR	-3.56	3	0.0521	-5.58	0	0.0000
LGDP	-1.94	3	0.5850	-2.92	2	0.0215
RDep	-2.41	1	0.4030	-4.60	1	0.0000
InfR	-5.64	0	0.0100	-4.91	0	0.0000

 Notes: Stationary if p-value is less than 0.01, 0.05, or 0.10 levels.

Source: Author's Computation using R Software 4.1.2

The real exchange rate and inflation rate are stationary at levels and at the 5 percent level, according to the test for stationarity with both constant and trend model. At levels, the remaining variables were non-stationary. Except for the log of GDP, which becomes stationary at a 5 percent level at the first difference, other variables are stationary at a 1 percent level at first differences. At the constant and trend models, the real exchange rate and inflation rate are integrated of order zero $I(0)$, while the remaining variables are integrated of order $I(0)$. Table 6 shows the results of the PP test for stationarity with both constant and trend model.

Table 6: PP Test for Stationarity with Constant and Trend

	Levels			First Difference		
Variable	**PP Statistic**	**Lag Order**	**P-value**	**PP Statistic**	**Lag Order**	**P-value**
LM2	-0.06	3	0.0000	-5.25	2	0.0000
FLI	-2.47	3	0.3810	-5.39	2	0.0000
RER	-2.93	3	0.2100	-4.83	2	0.0000
RIR	-2.29	3	0.4450	-5.60	2	0.0000
LGDP	-1.76	3	0.6570	-3.13	1	0.0203
RDep	-2.21	3	0.4750	-5.46	2	0.0000
InfR	-5.70	3	0.0000	-15.20	2	0.0000

Notes: Stationary if p-value is less than 0.01, 0.05, or 0.10 levels.

Source: Author's Computation using R Software 4.1.2

The log of money demand and the inflation rate are stable at the 1 percent level, as per Table 6, but the other variables are non-stationary. Except for the log of GDP, which becomes stationary at the 5 percent level, other variables become stationary at first differences at the 1 percent level. This indicates that the log of money demand and the inflation rate are of order zero I(0), whereas the other variables are of order one I(1).

Both ADF and PP tests suggest that the log of money demand and inflation rate are integrated of order zero I(0), whereas the rest of the variables are integrated of order one I(1), as seen in the findings above. Consequently, the ARDL model may now be used for estimation, as the test results have proved the lack of I(2) integration order.

4.3 ARDL Model Estimation

Since the tests of stationarity reveals the absence of I(2) integration orders, the ARDL model is then estimated. The appropriate lags might be calculated based on the AIC and

BIC using the Bounds test for cointegration. The study adopted the lag structure based on the BIC criterion, which is a good criterion, because the criterion seeks for models with the best likelihood of being true models so the BIC was used for the optimum lags' selection. The AIC is similar to the BIC, but instead of focusing on whether or not a true model exists, it focuses on how well the model predicts future data (Burnham and Anderson, 2004; Kuha, 2004). The ARDL model results in shown in Table 7.

Table 7: ARDL Model Results

ARDL model (1, 2, 0, 1, 2, 1, 1) selected based on BIC				Outcome: LM2
Covariate	**Estimate**	**Standard Error**	**T-values**	**P-values**
Constant	0.2408	0.8796	0.2740	0.7878
L(LMD, 1)	0.8843	0.0274	32.2790***	0.0000
FLI	0.1114	0.0367	3.0390***	0.0080
L(FLI, 1)	-0.0875	0.0483	-1.8100*	0.0891
L(FLI, 2)	-0.0517	0.0369	1.4000	0.18074
RER	-0.0031	0.0008	-3.9880***	0.0010
RIR	-0.0054	0.0024	-2.2460**	0.0392
L(RIR, 1)	-0.0084	0.0028	-2.9580***	0.0093
LGDPg	0.1906	0.5278	0.3610	0.7228
L(GDPg, 1)	-1.0910	0.7845	-1.3910	0.1834
L(GDPg, 2)	1.1927	0.5382	2.2160**	0.0415
DepR	0.0074	0.0033	2.1970**	0.0431
L(DepR, 1)	0.0072	0.0027	2.7010**	0.0157
InfR	-0.0010	0.0009	-1.0960	0.2892
L(InfR, 1)	0.0022	0.0009	2.4580	0.0258
Residual Standard Error	0.0472		F-Statistic [14, 16]	6327
Multiple R-Squared	0.9998		P-value	0.0000
Adjusted R-squared	0.9997			

Notes: ***, **, * denote significance level at 1%, 5% and 10%, respectively.

Source: Author's Computation using R Software 4.1.2

Table 7 shows the results of the estimated ARDL model. The results show that the first lag of the log of money demand had a positive relationship with money in the current period, and this relationship was statistically significant at 1% level with a p-value of 0.0000. Financial liberalization index (FLI) had a positive relationship with money demand in the current period and second lag, but a negative relationship in the first lag. The coefficient of FLI was significant in both current and first lag periods but insignificant in the second lag period. Real exchange rate had a negative relationship with money demand in the current period, and its coefficient was statistically significant at 1% level. Interest Rate was also found to have a statistically negative relationship with money demand in the current period and first lag as well. GDP was statistically significant only in the second lag period and had a positive relationship with money demand. The deposit rate also had a significant positive relationship with money demand in the current period and first lag. Finally, inflation rate had an insignificant negative relationship with money demand in the current period, but a statistically positive relationship with money demand in the first lag period. Generally, the multiple and adjusted coefficients of determination were approximately 99 percent, and overall, the model was statistically significant at 1 percent level.

Nonetheless, the Bounds test for cointegration would reveal what relationship (long-run or short-run) exists among the variables, so the next section discusses this test of cointegration and the results thereof.

4.4 Bounds Test for Cointegration

The first stage in an ARDL analysis is to check for long-run relationships in the model. The Wald Bounds-test for cointegration is performed by the Bounds F-test (Pesaran et al., 2001). Table 8 shows the result of the cointegration test.

Table 8: Bounds Test for Cointegration Results

	90% Level		95% Level		99% Level	
F-Statistic	**I(0)**	**I(1)**	**I(0)**	**I(1)**	**I(0)**	**I(1)**
49.5769***	1.99	2.94	2.27	3.28	2.88	3.99

Notes: ***, **, * denote significance level at 1%, 5% and 10%, respectively.

Source: Author's Computation using R Software 4.1.2

The null hypothesis of no cointegration is rejected, as shown in Table 7. This is because the F-statistic is greater than the upper bound critical values at 90 percent, 95 percent, and 99 percent confidence levels, respectively. These findings suggest that the model contains cointegration, implying that there is a long-run relationship between money demand and its determinants.

4.5 Short-Run and Long-Run Relationship

The test of cointegration revealed a long-run relationship between money demand and its determinants, so the long-run and short-run parameters of the unrestricted error correction model (UECM) of the underlying ARDL model based on the Schwartz Bayesian Information Criterion were estimated, and the results are presented in Tables 9 and 10, with the time-period relationships explained afterwards.

4.5.1 Short-Run Results

The UECM model provides insights into both the short-run and long-run dynamics of the relationship between money demand and its determinants. Table 9 presents the estimated short-run coefficients of the UECM, offering a detailed look at how changes

in the variables impact money demand in the short term. The results provide valuable information for policymakers and investors interested in understanding the immediate effects of financial liberalization on money demand in Ghana.

Table 9: Estimated Short-Run Coefficients of UECM

UECM of the underlying ARDL model				Outcome: LM2
Covariate	**Estimate**	**Standard Error**	**T-values**	**P-values**
Constant	0.2408	0.8796	0.2740	0.7877
d(FLI)	0.1114	0.0367	3.0390***	0.0078
d(L(FLI, 1))	-0.0517	0.0369	-1.4000	0.1807
d(RIR)	-0.0054	0.0024	-2.2460**	0.0392
d(LGDP)	0.1906	0.5278	0.3610	0.7228
d(L(LGDP, 1))	-1.1927	0.5382	-2.2160**	0.0415
d(DepR)	0.0074	0.0033	2.1970**	0.0431
d(InfR)	-0.0010	0.0009	-1.0960	0.2892
Residual Standard Error	0.0472		F-Statistic [14, 16]	6.7920
Multiple R-Squared	0.8560		P-value	0.0002
Adjusted R-squared	0.7299			

Notes: ***, **, * denote significance level at 1%, 5% and 10%, respectively.

Source: Author's Computation using R Software 4.1.2

From Table 9, the coefficient reveals that financial liberalization has the theorized positive impact on money demand in the short run, which is consistent with the long-run findings. The coefficient of financial liberalization was found to be statistically

significant at the 5 percent level, implying that a 1 percent rise in financial liberalization accounts for an 11.14 percent increase in money demand in Ghana in the short run.

However, the findings also demonstrate that real interest rates and money demand have a statistically significant negative relationship. In the short run, the coefficient shows that a 1 percent increase in the real interest rate reduces Ghana's money demand by 0.54 percent. This conclusion is similar to those of Mutluer and Barlas (2002) and Nchor and Adamec (2016), who showed that interest rates had a negative association with money demand and that interest rates had a short-run influence on the level of money demand.

Furthermore, the coefficient of the relationship between GDP and money demand was negative and statistically significant at the 5 percent significance level. Thus, products produced by Ghana in a particular year have a 1.19 units negative impact on money demand at lag 1 in the short run, but have a positive impact on money demand in the long run (Ejaz and Qazi, 2013; Nchor and Adamec, 2016).

Table 9 further reveals that the deposit rate and money demand have a statistically significant but positive connection. In the short run, a 1 percent increase in the deposit rate increases Ghana's money demand by 0.74 percent, as per the coefficient.

Finally, the inflation rate coefficient is not statistically significant at any of the standard levels of significance, although it does have a negative sign. This suggests that the rate of inflation has no effect on Ghana's money demand. This is in contrast to the findings of Nduka and Chukwu (2014), who discovered a significant negative relationship between money demand and inflation in Nigeria; however, because this is not the case in Ghana in this study, it begs the question of whether inflation has any effect on money demand in Ghana.

4.5.2 Long Run Results

After establishing the short-run dynamics of the relationship between money demand and its determinants, the long run results of the UECM model offering insight into the long-run parameters are discussed. Thus, Table 10 presents the estimated long-run coefficients of the UECM model, which capture the relationship between money demand and its determinants in the long term.

Table 10: Estimated Long-Run Coefficients of UECM

UECM of the underlying ARDL model				Outcome: LM2
Covariate	Estimate	Standard Error	T-values	P-values
ECM(-1)	-0.1157	0.0274	-4.2230***	0.0006
L(FLI, 1)	0.0756	0.0222	3.4080***	0.0036
RER	-0.0031	0.0008	-3.9980***	0.0010
L(RIR, 1)	-0.0138	0.0029	-4.6900***	0.0002
L(LGDP, 1)	0.2923	0.1508	1.9390*	0.0704
L(DepR, 1)	0.0145	0.0037	3.9530***	0.0011
L(InfR, 1)	0.0012	0.0012	0.9980	0.3332
Residual Standard Error	0.0472		F-Statistic [14, 16]	6.7920
Multiple R-Squared	0.8560		P-value	0.0002
Adjusted R-squared	0.7299			

Notes: ***, **, * denote significance level at 1%, 5% and 10%, respectively.

Source: Author's Computation using R Software 4.1.2

Table 10 reveals that the multiple coefficient of determination (R-squared) is 0.8560, indicating that financial liberalization and other determinants account for about 86 percent of the variation in money demand. The adjusted R-squared also demonstrates that the determinants can explain 73 percent of the variation in money demand. The goodness of fit and relevance of financial liberalization factors in predicting

fluctuations in Ghanaian money demand were verified. Following the F-statistic (14, 16 = 6.7920) and corresponding P-value of 0.0002, the model's significance is validated at the 1 percent level. This demonstrates that financial liberalization has a significant explanatory power on Ghana's money demand.

Furthermore, at the 1 percent level, the coefficient of financial liberalization is statistically significant, and the coefficient value suggests that a 1 percent rise in financial liberalization accounts for a 7.56 percent increase in money demand in Ghana in the long run. This implies that financial liberalization plays a substantial role in the specification of money demand and has the potential to stimulate money demand growth in Ghana, at least for the study period. The findings are similar to those of Khan and Hye (2013), who discovered a positive association between financial liberalization and money demand in Pakistan, and hypothesized that financial reforms led to an increase in money demand.

Notwithstanding this, there is a statistically negative and significant relationship between real exchange rates and money demand. The coefficient indicates that a 0.03 percent increase in the real exchange rate has a negative influence on Ghana's money demand in the long run. This indicates that pegging the exchange rate by the Bank of Ghana's monetary unit must be done with caution, as results reveal a decline in money demand as the exchange rate rises. This conclusion is consistent with the findings of Nkalu (2020), which similarly indicated a significant negative relationship between the exchange rate and money demand in Ghana.

The findings also demonstrate that real interest rates and money demand have a statistically significant negative relationship. In the long run, a 1 percent increase in the real interest rate reduces Ghana's money demand by 1.38, as per the coefficient. As the

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statistics show, the relationship between money demand and interest rate is often negative, indicating that consumers would prefer to keep assets that produce higher returns on their money rather than hold money. According to Baidoo and Yusif (2019), interest rates in Ghana had no substantial impact on money demand. On the contrary, this analysis supports the empirical notion of a negative relationship between money demand and interest rate found in the Keynesian money demand function, and the results affirm that it is statistically significant. Nchor and Adamec (2016) observed a negative relationship between money demand and interest rate in Ghana, confirming the results.

Likewise, the coefficient of the relationship between economic growth as measured by GDP and money demand has the predicted positive sign and is statistically significant at the 5 percent level of significance. As a result, if all products produced in Ghana rise by 1 percent, money demand grows by 0.29 percent, indicating that economic expansion drives money demand in Ghana. This is supported by Nchor and Adamec (2016), who looked at the stability of Ghana's money demand function and discovered that, in the long run, economic growth had a significant positive relationship with money demand. This favorable effect of economic growth on money demand (money balances), as shown by Kallon (2009), and Batholomew and Kargbo (2010), supports the transaction motive for holding money.

Table 10 demonstrates that the real deposit rate and money demand have a statistically significant positive relationship. In the long run, a 1 percent increase in the deposit rate increases Ghana's money demand by 1.45 percent, as the coefficient shows. Finally, the inflation rate coefficient is not statistically significant at any of the standard levels of significance, although it does have a positive sign. This indicates that the rate of inflation in Ghana has no bearing on money demand and needs to be taken a critical

look at if it is to be used for any policy target. This is in line with results from the study by Femi (2014) which revealed that inflation has no major impact on money demand.

The findings of Ghana's estimated error-correction model of financial liberalization using the ARDL approach are presented in Table 10. The Schwartz Bayesian Information Criterion is used to pick the best model. The findings reveal that the error correction component (ECM_{t-1}) has the predicted negative sign and is extremely significant at all levels, namely 1 percent, 5 percent, and 10 percent. This once again verifies the model's co-integration relationship between the variables. The ECM refers to the pace at which the dynamic model adjusts to reestablish equilibrium after a disruption. The bigger the error correction coefficient (in absolute terms), the faster the variables reach an equilibrium in the long run when shocked, according to the rule of thumb in the report thereof (Acheampong, 2007; Djebbouri, Abdelkarim, and Abderrahmane, 2019).

The error correction term (-0.1157) indicates the speed of adjustment towards the long-run equilibrium relationship between financial liberalization and the demand for money in Ghana. A negative error correction term implies that any deviation from the long-run equilibrium is corrected at a speed of 11.57% in the following period. This means that if there is a shock to the system that temporarily pushes the demand for money away from the long-run equilibrium relationship, the error correction term suggests that the system will correct itself by 11.57% in the next period, moving back towards the long-run equilibrium.

The long-run findings show that any shock-induced disequilibrium in the system may be addressed in the long run by the error correction term. As a result, the following is the error correction term that estimates the short-run adjustments to equilibrium:

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$$ECM = LM2 - 0.0756FLI + 0.0031RER + 0.0138RIR - 0.2923LGDP -$$

$$0.0145DepR - 0.0012InfR - 0.2408C \hspace{4cm} 13$$

4.6 Model Diagnostics and Stability Tests

To determine how well the ARDL model performed, diagnostic tests are necessary to determine how well the model really performed. The serial correlation or autocorrelation test, functional form, normality of residuals, heteroscedasticity, and structural stability or breaks are among these tests (Demirhan, 2020). The model performed well in these tests, as shown in Table 10.

Table 10: Model Diagnostics and Stability Tests

Diagnostic	Test Type	Test Statistic	P-values
Autocorrelation	Breusch-Godfrey (LM) Test	0.5822	0.4650
		1.0120	0.3144
Heteroscedasticity	Ljung-Box (X^2) Test	15.492	0.7476
Normality	Breusch-Pagan (BP) Test	0.9635	0.3589
Model Misspecification	Shapiro-Wilk (W) Test	2.3604	0.1308
	Ramsey's RESET Test		

Notes: Reject H_0 if p-value < 0.05

Source: Author's Computation using R Software 4.1.2

4.6.1 Autocorrelation Test

The autocorrelation test was carried out to examine whether residuals are correlated across time or not. Time series analysis necessitates that those residuals be not correlated across time. In such a case, the Breusch-Godfrey (LM) and Ljung-Box (X^2)

tests were employed to establish such facts. The null hypothesis stipulates that no serial correlation or autocorrelation exists. According to the results in Table 10, the observed probability values for both tests are 0.4650 and 0.3144, respectively, indicating that these values are more than 0.05 and so rejecting the null hypothesis and establishing that no serial correlation exists.

4.6.2 Heteroscedasticity Test

When the variances of the error terms are not constant, heteroscedasticity arises, causing the estimators' output to be unbiased and consistent yet inefficient.

The Breusch-Pagan-Godfrey test was used to assess heteroscedasticity, and the findings are shown in Table 10. If the F-statistic value exceeds the critical levels or the probability value is less than 0.05, the null hypothesis of no heteroscedasticity (that is, homoskedasticity) is rejected. The null hypothesis is rejected, suggesting that the model is homoscedastic, based on the observed probability significance (0.7476) being larger than 0.05.

4.6.3 Normality Test

The Shapiro-Wilk (W) test was used to check for normality of the residuals. The p-value for this test should be higher than the criterion of significance. The null hypothesis states that the data does not differ from that of a normal distribution, whereas the alternative hypothesis states that the data does deviate from that of a normal distribution (not normally distributed). Table 10 shows the normality findings, which demonstrate that the p-value (0.3589) was more than 0.05, showing that the data was normally distributed.

4.6.4 Model Misspecification

The Ramsey's RESET Test was used to check for any model misspecification and stability of the UECM model. The alternative hypothesis is that the data is misspecified, while the null hypothesis is that the data is not misspecified. The model misspecification findings in Table 10 reveal that the p-value (0.1308) was greater than 0.05, indicating that the data was not misspecified.

4.6.5 Model Stability

The model's stability is investigated using the recursive Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMQ) methods. The study gains the benefit of incorporating a Moving Sum (MOSUM) chart because R software was used for the analysis, which also provides greater insight into the model's stability. The main distinction between CUSUM and MOSUM is that recursive CUSUM is computed over all previous observations, whereas recursive MOSUM is computed over a rolling window of prior data (Jank, Shmueli and Wang, 2008). As a result, the recursive MOSUM necessitates the presentation of lengthy series and is more sensitive to local deviations from stability (Demirhan, 2020). Figure 3 shows the graphs for the recursive CUSUM, CUSUMQ, and MOSUM functions.
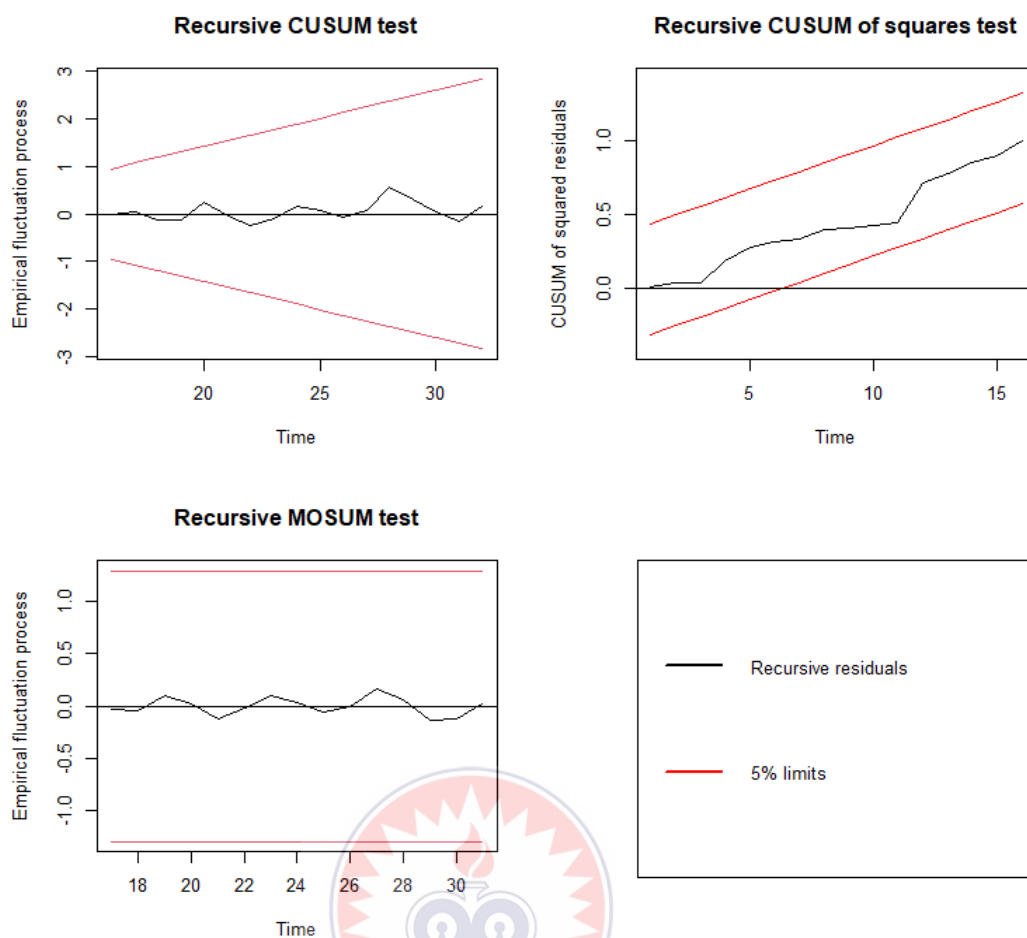
Figure 2: Stability Plots (CUSUM, CUSUMSQ, MOSUM Charts)

The null hypothesis that the model is stable is not rejected if the recursive CUSUM, CUSUMSQ, and MOSUM statistics are plotted against the critical boundaries of the 5 percent significance level, as shown in Figure 3. The CUSUM, CUSUMSQ, and MOSUM residuals all fall within the 5 percent critical limits, implying that the money demand function coefficients are stable.

4.7 Granger Causality Test

The Granger Causality Test was used to determine the direction of causality after testing for long and short-run relationships using ARDL estimates. The causal results between financial liberalization and money demand in Ghana are shown in Table 11.

Table 11: Granger Causality Interrelationships

	F-statistic	p – value
Financial liberalization does not Granger-cause money demand	2.2536	0.1251
Money demand does not Granger-cause financial liberalization	1.2921	0.2917

Notes: ***, **, and * represent 1%, 5%, and 10% level of significance, respectively.

The study sought to examine whether financial liberalization granger causes money demand and/or otherwise. To achieve this objective, two null hypotheses were constructed.

H_{01}: Financial liberalization does not granger-cause money demand

H_{02}: Money demand does not granger-cause financial liberalization

The null hypothesis, H_{01}, that financial liberalization does not granger-cause money demand, was developed to achieve this goal. If the probability value is less than 0.05, the null hypothesis is rejected; otherwise, it is not rejected (fail to reject). Because the p-value is 0.1251, which is larger than 1 percent, 5 percent, and 10 percent levels of significance, the results suggest that financial liberalization does not cause money demand. The findings are in line with those of Abuhabel and Olanrewaju (2020), who found that LCPS (credit to the private sector), a financial liberalization variable, did not granger-cause money demand.

The null hypothesis, H02, that money demand does not granger-cause financial liberalization was created to accomplish the next. If p is less than 0.05, the null hypothesis is rejected; otherwise, it is not rejected (fail to reject). Furthermore, because the p-value (0.2917) is larger than 1 percent, 5 percent, and 10 percent levels of

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significance, the results suggest that money demand does not granger-cause financial liberalization.

4.8 Estimated Threshold Model

The estimated ARDL model in this chapter established a positive and linear effect of financial liberalization on demand for money, and thus, it becomes imperative that the study proceeds to determine the financial liberalization threshold level beyond which a rise in financial liberalization will cause the money demand function to decline. Results of the estimated threshold model is displayed in Table 12.

Table 12: Estimated Threshold Model

Covariate	Estimate	Standard Error	T-values	P-values
Constant	-0.5804	1.5669	-0.3700	0.7163
L(LMD, 1)	0.8807	0.0285	30.9140***	0.0000
FLI	0.1823	0.1171	1.5570**	0.0402
L(FLI, 1)	0.0868	0.0493	1.7620*	0.0984
L(FLI, 2)	0.0536	0.0377	1.4200	0.1761
FLIsq	-0.0055	0.0087	-0.6390**	0.0325
RER	-0.0027	0.0010	-2.6160**	0.0195
RIR	-0.0054	0.0024	-2.2290**	0.0415
L(RIR, 1)	-0.0090	0.0030	-2.9590***	0.0098
LGDPg	0.2304	0.5415	0.4250	0.6766
L(GDPg, 1)	-1.1447	0.8038	-1.4240	0.1749
L(GDPg, 2)	1.2864	0.5677	2.2660**	0.0387
DepR	0.0075	0.0034	2.1930**	0.0445
L(DepR, 1)	0.0066	0.0028	2.3360**	0.0338
InfR	-0.0009	0.0010	-0.9310	0.3668
L(InfR, 1)	0.0024	0.0010	2.4950**	0.0248
Residual Standard Error = 0.0481			F-Statistic [14, 16]	= 5686
Multiple R-Squared	= 0.9998		P-value	= 0.0000
Adjusted R-squared	= 0.9996			

Notes: ***, **, * denote significance level at 1%, 5% and 10%, respectively.

Source: Author's Computation using R Software 4.1.2

From Table 12, it was shown that the coefficient of the linear term for financial liberalization, FLI, was positive (0.1823), whereas the coefficient of the square term, FLIsq, was negative (-0.0055). These signs of the coefficients of the linear and square terms were expected, and the coefficients were statistically significant at 5 percent level. Thus, the coefficients suggest that financial liberalization seems to be increasingly affecting the demand for money until it reaches a point where the effect on money demand is negative. So, the relationship established between financial liberalization and demand for money may be said to non-linear and depicted by a U-shaped curve. As a result, it can be confirmed from the hypothesis that there does exist a threshold level effect of financial liberalization on the demand for money in Ghana, and so above this threshold level is a detriment to the stability of the money demand function.

When examining the relationship between money demand and financial liberalization, it is crucial to consider the presence of a threshold effect. To identify this effect, the partial derivative of money demand with respect to financial liberalization was calculated and set equal to zero, satisfying the first-order condition for optimization. This procedure allowed for the determination of the turning point by solving for the value of the Financial Liberalization Index (FLI) in the equation. Additionally, to ensure accurate results, the analysis accounted for both the current and lagged values of financial liberalization during the differentiation process. Thus, it is essential to take into account all relevant variables and conditions when investigating the threshold effect in the relationship between money demand and financial liberalization. Thus:

$$\frac{\partial \ln(M2)_t}{\partial FLI_t} = 0.1823 + 0.0868 + 0.0536 + 2(-0.0055)FLI_t = 0$$

$$\Rightarrow \qquad 0.3227 - 0.011FLI_t = 0$$

Now, solving for FLI_t in the equation above, the turning point yields:

$$0.011FLI_t = 0.3227$$

$$FLI_t = \frac{0.3227}{0.011}$$

$$FLI_t = 29.3364$$

Therefore, the study concludes that the threshold level of financial liberalization is 29.3364. So, it suggests that the positive effect of financial liberalization on the demand for money in Ghana reaches its peak at the threshold level of 29.34% after which any advancement in the liberalization of the financial sector tends to have a negative effect on money demand.

4.9 Chapter Summary

The time series characteristics of the variables employed in the study, as well as the data for estimation, were evaluated in this chapter, and the findings were discussed. To test for stationarity, the ADF and PP tests were applied, which demonstrated that the series' first differences gave the predicted stationarity and resulted in the series being integrated of order one, I(1). A cointegration test was also carried out, which demonstrated a long-run relationship in the model, indicating that the model should be estimated using Autoregressive Distributed Lag Models and an Unrestricted Error Correction Model. The Schwartz-Bayesian Information Criterion chose the best lag structure for the model automatically using the R software.

According to the results of the UECM model, the error correction term returned the predicted negative sign with a value of -0.1157, indicating that the pace at which the model returns to stability following a shock is approximately 12%. The speed of adjustment is a term used to describe this number. All factors, with the exception of

inflation, were shown to have a significant influence on money demand in both the short and long run, with the predicted signs. The model's residuals were found to be normally distributed, with no evidence of serial correlation. The model's specifications were also confirmed to be correct accordingly. Overall, the CUSUM, CUSUMSQ, and MOSUM charts shown in the section confirmed that the model was relatively stable.

Additionally, it was revealed from the results of the threshold model that the coefficient of the linear term for financial liberalization was positive and statistically significant, whiles the coefficient of the square was negative and statistically significant as well – all at 5 percent level. So, it shows that there is indeed a threshold level effect above which further financial liberalization has a negative effect on the money demand function in Ghana. The threshold level was found to be 29.34%.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

The summary, conclusions, and recommendations from the study's discussions are presented in this chapter. The summary gives a quick overview of the study, including the problem statement, objectives, methodology, and findings, while the conclusion discusses the implications of the results. The chapter then makes recommendations and also outlines the limitations encountered in the study, as well as give directions for further research on the subject.

5.1 Summary

The study looked into the relationship between financial liberalization and money demand in Ghana, with a particular focus on the stability of Ghana's money demand function. Annual time series data from 1988 through 2020 were used in the research. This study is important because studies have revealed evidence of both stability and instability of money demand functions in the presence of financial liberalization and it becomes imperative that the situation in Ghana is assessed. It was reported that during economic deregulations, new financial products introduced cause instability in money demand relationships (Darrat, 2009; Dadzie and Ferrari, 2019). Thus, the study finds it expedient to investigate whether or not Ghana's money demand function has been stable since financial liberalization was introduced in 1988.

The study looked at the short- and long-run relationships between money demand and financial liberalization, as well as other factors that influence money demand. In this context, the Autoregressive Distributed Lag model approach to cointegration was used

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to investigate the short- and long-run dynamics of money demand, as well as their determinants. The model was then used to determine if Ghana's money demand function was stable or not, in order to address the second objective. Finally, the study used the Granger Causality Test to look into the causal relationship between financial liberalization and money demand.

Financial liberalization index, real exchange rate, real interest rate, GDP per capita, real deposit rate, and inflation rate were among the variables considered in the study. Notably, R version 4.1.2 was used for all tests and estimations.

The initial step in the estimation process was to use the Augmented-Dickey Fuller (ADF) and Phillips-Perron (PP) tests to check for the variables' stationarity properties. After taking the first difference, the unit root tests indicated that all of the variables were stationary, but inflation was even stationary at level. The ARDL technique to cointegration was then used to investigate the long-run and short-run relationships. The following are the study's findings:

i.   The cointegration test demonstrated a long-run relationship between money demand and financial liberalization, as well as the other determinants of money demand, including the real exchange rate, real interest rate, GDP per capita, real deposit rate, and inflation rate.

ii.   The model also revealed a short-run relationship between money demand and these variables - the real interest rate, GDP per capita, real deposit rate, and inflation rate. The outcomes of the short-run and long-run were found to be consistent. Except for inflation, the computed coefficients likewise returned the predicted signs, but it was not statistically significant.

iii.   There was also no causal relationship between money demand and financial liberalization, per the Granger Causality Test conducted.

According to the findings of the model estimated using the ARDL technique, the financial liberalization index, GDP per capita, real deposit rate, and inflation rate all have a positive influence on money demand, except that inflation was not statistically significant in the model. Money demand has a significant negative relationship with the real exchange rate and the real interest rate.

The existence of a long-run relationship between the variables was further confirmed by the negative but significant coefficient of the lagged error correction term, whose value implies that approximately 12 percent of the disequilibrium from previous annual periods converges back to long-run equilibrium in the current period.

The model diagnostics indicated that the model passed all of the tests and that the residuals did not have any serial correlation, and that the model was appropriately specified. Furthermore, the residuals' variance was determined to be homoscedastic, and the residuals were also normally distributed. These findings were found to be significant at all levels of significance. Within the 5 percent critical bounds, the CUSUM, CUSUMSQ, and MOSUM plots all indicated model stability.

Also, the threshold model results revealed that the coefficient of the linear term of financial liberalization was positive and statistically significant at 5 percent level, and that of the square term was negative and statistically significant at 5 percent level. So, it describes a situation where the effect of financial liberalization on the demand for money in Ghana is positive, but reaches a turning point where any further advances in financial liberalization tends to have a negative effect on money demand. The turning point was found to be 29.34%.

5.2 Conclusions

The money demand function's stability precedes effective monetary policy, and so researchers have found it useful to investigate the stability of money demand functions in various countries (Nachega, 2001; Nabiddo, 2007; Opolot, 2007; Haghighat, 2011; Kumar et al., 2013; Nampewo and Opolot, 2016). The relationship between money demand and financial liberalization has also sparked curiosity, since data suggests that money demand functions are both stable and unstable when financial liberalization occurs (Khan and Hye, 2013). Given the raging experiences of the financial world and its accompanying consequences, policymakers develop an interest in this as the regulations of money supply as well as the motives for holding money are balanced to ensure a quality standard of living through the formulation of good policies such as monetary policies. As a result, the study looked into the relationship between money demand and financial liberalization, as well as the money demand function's stability. The following are the conclusions reached so far as a result of the investigation, as well as its findings:

i. The analysis is consistent with empirical literature in that it establishes a short- and long-run relationship between money demand and financial liberalization, as well as other factors that influence money demand. Financial liberalization had a significant positive relationship with money demand in the long run. Money demand was shown to have a positive link with factors such as GDP per capita, real deposit rate, and inflation rate, all of which were statistically significant, with the exception of the inflation rate. Financial liberalization had a significant positive relationship with money demand in the short run. In the short run, GDP per capita and the real deposit rate both exhibited a significant positive relationship with money demand. According to the results, the

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coefficient of determination is 0.8560, indicating that the variance in financial liberalization and other determinants account for around 86 percent of the variation in money demand. With a p-value of 0.0002, the model was statistically significant at the conventional levels of significance.

ii.   Furthermore, the study discovered no causality between money demand and financial liberalization, despite the fact that the estimated ARDL model revealed a significant positive relationship in both the short and long run. This affirms the popular statistical phrase that "correlation does not imply causation."

iii. Following the Shapiro-Wilk and Breusch-Pagan tests, it was discovered that the estimated model's residuals were normally distributed and homoscedastic, respectively. The LM test also revealed that there was no serial correlation, and the Ramsey's RESET test revealed that the model was correctly specified.

The stability plots (CUSUM, CUSUMSQ, and MOSUM) all revealed that the money demand function, taking into account financial liberalization, was still stable. Thus, this finding fills the gap in the literature and shows a stable money demand function in Ghana.

Last but not least, the results of the threshold model revealed that the hypothesis confirms an existence of a threshold level effect of financial liberalization on the demand for money in Ghana. Thus, the effect of financial liberalization on demand for money is positive in the initial stages until it reaches a threshold level of 29.34% where further liberalization of the financial sector tends to have a negative effect on money demand.

5.3 Recommendations

The following recommendations are made based on the findings of the study.

Since the real exchange rate has been found to have a significant negative relationship with money demand, it is recommended that the Government and Bank of Ghana use the exchange rate as an intermediate target to achieve price stability, as it can help attract long-term capital inflows, which is critical for a developing country like Ghana. For instance, if inflation is rising, the Bank of Ghana can increase the exchange rate to decrease the demand for money, which can help reduce inflation. Similarly, if there is a recession, the Bank of Ghana can decrease the exchange rate to increase the demand for money and stimulate economic activity.

Furthermore, financial liberalization was shown to have a positive significant effect on money demand, and the demand for money yet remains stable in Ghana. To avoid future financial crises, the Ghanaian government should develop policies that assure rigorous financial discipline and the establishment of a strong financial supervisory system at both the national and financial institution levels.

Also, the study's findings suggest that Ghana's money demand function is stable post-liberalization, implying that the Bank of Ghana may continue to use monetary targeting as its monetary policy framework. In their research on inflation-targeting and monetary policy, Bleaney, Morozumi, and Mumuni (2019) found that the inflation rate in Ghana has been persistently high since the implementation of the inflation-targeting regime in 2007. This calls into doubt the effectiveness of inflation-targeting as the monetary policy tool for Ghana. As a result, the Government of Ghana and the Bank of Ghana should examine, modify, adopt, and execute policies that strengthen monetary targeting as the primary monetary policy framework since the post-liberalization money demand

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stability supports predictable impacts of money supply changes on macroeconomic variables, increasing monetary targeting's reliability as a policy tool.

Finally, the study found that the optimal degree of financial liberalization for Ghana is below 29.34%. This means the government and central bank should be cautious about the degree of financial liberalization they pursue to achieve optimal money demand. If the degree of financial liberalization is below the threshold level, increasing it could stimulate money demand. Conversely, if it is above the threshold level, reducing it could stabilize money demand.

5.4 Limitations of the Study

The study's main limitation is the lack of data. The study used annual data from 1988 to 2020 which equaled 33 series, as available and also in consideration of the fact that financial liberalization was implemented in 1988. Making use of more data would have provided more insight into the extent to which financial liberalization affect the stability of the money demand function. Thus, it is expedient that researchers advance the study into the financial liberalization and money demand nexus when more data becomes available.

Another limitation in the study is that financial liberalization has some social impacts for an economy that were not considered. For instance, monetary policy frameworks have been dynamically altered to improve economic conditions, such as in Ghana, when the Bank of Ghana switched from a monetary to an inflation-targeting framework. The research did not look into the impact of financial liberalization on inflation, which would have offered insight into Ghana's situation, where the aim is to keep inflation from escalating.

5.5 Direction for Future Research

Regarding the limitations, future research should consider using quarterly data to explore the link between financial liberalization and money demand, as well as the investigate the stability of Ghana's money demand function at the occurrence of financial liberalization. The use of more data would help solidify the findings of the study and give room for establishing facts from this study or provide grounds for adding more to the research on the study.

Furthermore, implementing financial liberalization has both benefits and costs for a country. Future study should focus on how financial liberalization affects employment, because a liberalized financial sector might possibly offer additional job possibilities due to the proliferation of financial institutions with low to no entry barriers. Ghana's unemployment situation is deteriorating by the day, and researchers should investigate the impact of financial liberalization on unemployment. Researchers should also look at how to accurately measure the benefits and costs of financial liberalization in a given economy.

Finally, while the inflation rate variable exhibited a positive long-run association with money demand but a negative short-run relationship in the short-run, it was insignificant in both time periods. Thus, future research could re-examine the data on inflation rate so as to achieve the expected results and significance.

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APPENDICES

APPENDIX A

FINANCIAL LIBERALIZATION INDEX CONSTRUCT

Using Principal Component Analysis (PCA), the financial liberalization index (FLI) was constructed in a similar fashion compared to the studies by Caprio et al. (2000) and Laeven (2003). Table 13 outlines the components of FLI and their processes of implementation.

Appendix A1: Components of Financial Liberalization Index

Indicator	Definition	Track Changes	Year
ER	Exchange Rate	Multiple system of exchange rate determination	1983
		Introduction of two-window system of determining exchange rate	1986
		Adoption of a unified system	1987
		Development of small-scale interbank market	1990
		Full liberalization	1992
RLRef	Regulatory and Legal Reforms	Revision of the Banking Law (PNDCL 225)	1989
		Revised Bank of Ghana Law (PNDCL 291) enacted	1992
		Enactment of Bank of Ghana Financial Institutions (Non- Banking) Law (PNDCL 328)	1993
INSTres	Institutional Restructuring	Creation of Consolidated Discount House (CDH)	1987
		Formalization of money market and the creation of Security Discount Company (SDC)	1991
		Mergers and liquidation of banks and divestiture of public sector shareholding in some of the banks	1995

Appendix A1 Continued

CALib	Capital Account Liberalization	Full liberalization of capital account	2006
DM	Demonetization	Ghana is demonetized	1982
MC	Monetary Control	Independence of Central Bank	1992
IRate	Interest Rate	Abolition of the maximum and minimum deposits, except the minimum saving deposit rate	1987
		Abolition of minimum lending rates for commercial banks	1988
		Commercial banks determined their own lending rate freely	1989
		Abolition of 20 per cent mandatory lending to agriculture	1990
		Fully liberalization of policy variable	1991
CME	Capital Market establishment	Establishment of Ghana's capital market	1989
		Resumption of Ghana Stock Exchange	1990
		Foreign investment participation with restriction	1993
		Restrictions removed from foreign investment	2006
SRR	Secondary Reserve Requirement	Slashing of secondary reserve requirement for banks	2006
UB	Universal Banking	Permission for banks to expand to other sectors	2006

Source: Financial Liberalization Policy Variables as Adapted from Adam (2009)

In order to construct the FLI, each component of the financial liberalization policy variables is given an arbitrary value between 0 and 1 inclusive as a function of its implementation over time. As a result, a completely liberalized component has a value

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of 1, whereas a component that is not liberalized has a value of 0. Partial values are assigned equivalent to $\frac{\alpha}{n}$ to capture instances of partial and phase-wise gradual liberalization of a specific component, where n is the number of phases required to complete the liberalization process; and α denotes the phase completed ($\alpha = 1,2,3,\ldots,n$). Table 14 shows the policy variables and the values assigned to them per the implementation of the liberalization process.

Appendix A2: Financial Liberalization Policy Variables

Year	CALib	CME	DM	ER	MC	INSTres	IRate	RLRef	SRR	UB
1970	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0
1982	0	0	1	0	1	0	0	0	0	0

Appendix A2 Continued

1983	0	0	1	0.2	1	0	0	0	0	0
1984	0	0	1	0.2	1	0	0	0	0	0
1985	0	0	1	0.2	1	0	0	0	0	0
1986	0	0	1	0.4	1	0	0	0	0	0
1987	0	0	1	0.6	1	0.33	0	0	0	0
1988	0	0	1	0.6	1	0.33	0.2	0	0	0
1989	0	0.25	1	0.6	1	0.33	0.4	0.33	0	0
1990	0	0.5	1	0.6	1	0.33	0.6	0.33	0	0
1991	0	0.5	1	0.8	1	0.66	0.8	0.33	0	0
1992	0	0.5	1	1	1	0.66	1	0.66	0	0
1993	0.33	0.75	1	1	1	0.66	1	1	0	0
1994	0.33	0.75	1	1	1	0.66	1	1	0	0
1995	0.33	0.75	1	1	1	1	1	1	0	0
1996	0.33	0.75	1	1	1	1	1	1	0	0
1997	0.33	0.75	1	1	1	1	1	1	0	0
1998	0.33	0.75	1	1	1	1	1	1	0	0
1999	0.33	0.75	1	1	1	1	1	1	0	0
2000	0.33	0.75	1	1	1	1	1	1	0	0
2001	0.33	0.75	1	1	1	1	1	1	0	0
2002	0.33	0.75	1	1	1	1	1	1	0	0
2003	0.5	0.75	1	1	1	1	1	1	0	0
2004	0.5	0.75	1	1	1	1	1	1	0	0
2005	0.5	0.75	1	1	1	1	1	1	0	0
2006	1	1	1	1	1	1	1	1	1	1

Appendix A2 Continued

2007	1	1	1	1	1	1	1	1	1	1
2008	1	1	1	1	1	1	1	1	1	1
2009	1	1	1	1	1	1	1	1	1	1
2010	1	1	1	1	1	1	1	1	1	1
2011	1	1	1	1	1	1	1	1	1	1
2012	1	1	1	1	1	1	1	1	1	1
2013	1	1	1	1	1	1	1	1	1	1
2014	1	1	1	1	1	1	1	1	1	1
2015	1	1	1	1	1	1	1	1	1	1
2016	1	1	1	1	1	1	1	1	1	1
2017	1	1	1	1	1	1	1	1	1	1
2018	1	1	1	1	1	1	1	1	1	1
2019	1	1	1	1	1	1	1	1	1	1
2020	1	1	1	1	1	1	1	1	1	1

Source: Author's Construct

The composition of the FLI from above and computed using the PCA is expressed in the form:

$$FLI_t = w_1 CALib_t + w_2 CME_t + w_3 DM_t + w_4 ER_t + w_5 MC_t + w_6 INSTres_t +$$

$$w_7 IRate_t + w_8 RLRef_t + w_9 SRR_t + w_{10} UB_t \qquad (22)$$

The weightiness of the component is determined by the relevant eigenvector of the principal component and is represented by the parameter w_i. Table 15 shows the eigenvalues and eigenvectors of the relevant FLI policy variables.

Appendix A3: Principal Components of the FLI Policy Variables

Variables	Eigenvectors (λ_k)		
	λ_1	λ_2	λ_3
CALib	0.898	0.423	0
CME	0.981	0	-0.166
DM	0.780	-0.472	0.411
ER	0.950	-0.267	0
MC	0.780	-0.472	0.411
INSTres	0.959	-0.123	-0.267
Irate	0.945	-0.175	-0.255
RLRef	0.947	-0.111	-0.278
SRR	0.739	0.640	0.206
UB	0.739	0.640	0.206
Eigenvalues	**7.687**	**1.576**	**0.649**

Source: Author's Computation using R Software 4.1.2

From the computation of the principal components of the financial liberalization policy variables, the importance of the components can also be estimated. Thus, the importance of the principal components is also shown in Table 16.

Appendix A4: Importance of the Components

	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9	PC10
SD	2.773	1.255	0.805	0.195	0.175	0.113	0.064	0.053	0.000	0.000
VAR	0.769	0.158	0.065	0.004	0.003	0.001	0.000	0.000	0.000	0.000

Notes: SD – Standard Deviation, VAR – Proportion of Variance

Source: Author's Computation using R Software 4.1.2

Table 16 shows that the first principal component explains approximately 77% variation in the components. Plotting a scree plot for the components and corresponding eigenvalues gives the figure below.
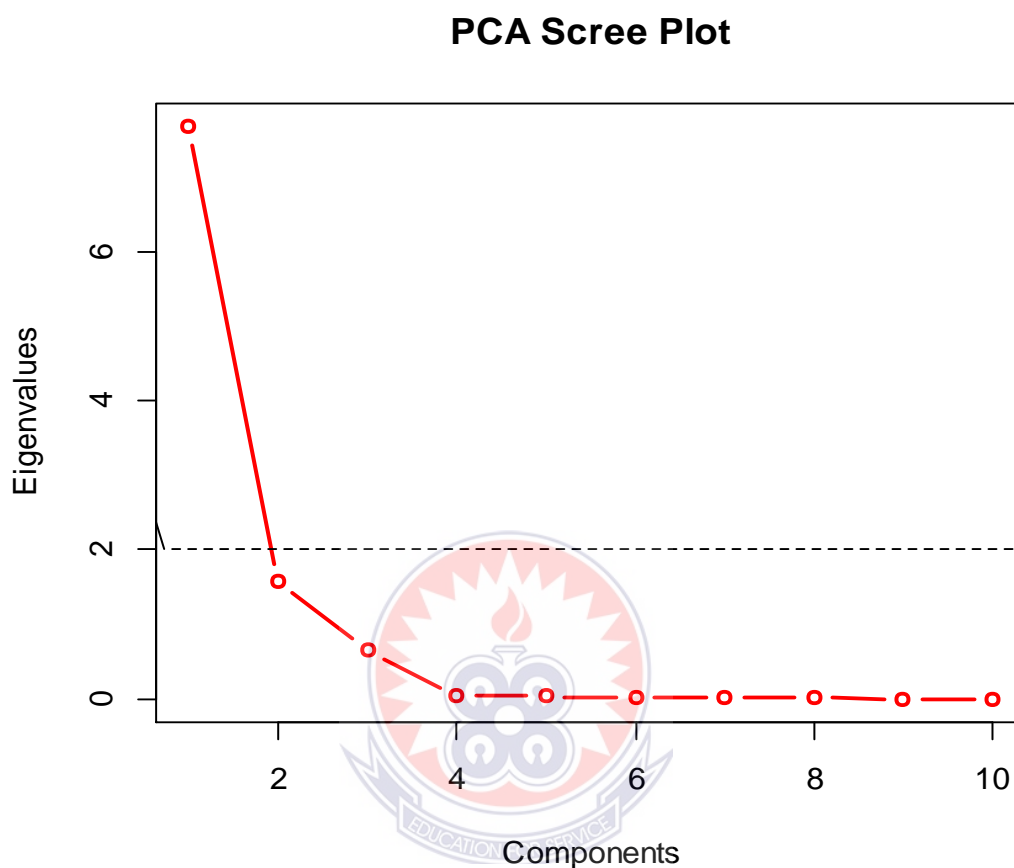
PCA Scree Plot

Figure 3: Scree Plot of Principal Components

From Table 15, the first principal component (λ_1) explains approximately 77% of the total variance and the weights (w_i) of each value of the principal component (λ_1) is substituted into the policy variables of the composition of the FLI in equation (22). Thus, the equation of FLI becomes:

$$FLI_t = 0.898CALib_t + 0.981CME_t + 0.780DM_t + 0.950ER_t + 0.780MC_t$$
$$+ 0.959INSTres_t + 0.945IRate_t + 0.947RLRef_t + 0.739SRR_t$$
$$+ 0.739UB_t \qquad (23)$$

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Now, the values of CALib, CME, DM, ER, MC, INSTres, Irate, RLRef, SRR, and UB

for each year in Table 14 are substituted into equation (14) to calculate the FLI. The

FLI is calculated and presented in Table 17.

Appendix A5: Financial Liberalization Index (FLI) for Ghana

Year	CALib	CME	DM	ER	MC	INSTres	IRate	RLRef	SRR	UB	FLI
1980	0	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0	0
1982	0	0	1	0	1	0	0	0	0	0	1.56
1983	0	0	1	0.2	1	0	0	0	0	0	1.75
1984	0	0	1	0.2	1	0	0	0	0	0	1.75
1985	0	0	1	0.2	1	0	0	0	0	0	1.75
1986	0	0	1	0.4	1	0	0	0	0	0	1.94
1987	0	0	1	0.6	1	0.33	0	0	0	0	2.446
1988	0	0	1	0.6	1	0.33	0.2	0	0	0	2.635
1990	0	0.25	1	0.6	1	0.33	0.4	0.33	0	0	3.382
1991	0	0.5	1	0.6	1	0.33	0.6	0.33	0	0	3.816
1992	0	0.5	1	0.8	1	0.66	0.8	0.33	0	0	4.512
1993	0	0.5	1	1	1	0.66	1	0.66	0	0	5.203
1994	0.33	0.75	1	1	1	0.66	1	1	0	0	6.067
1995	0.33	0.75	1	1	1	0.66	1	1	0	0	6.067
1996	0.33	0.75	1	1	1	1	1	1	0	0	6.393
1997	0.33	0.75	1	1	1	1	1	1	0	0	6.393
1998	0.33	0.75	1	1	1	1	1	1	0	0	6.393
1999	0.33	0.75	1	1	1	1	1	1	0	0	6.393
2000	0.33	0.75	1	1	1	1	1	1	0	0	6.393

Appendix A5 Continued

2001	0.33	0.75	1	1	1	1	1	1	0	0	6.393
2002	0.33	0.75	1	1	1	1	1	1	0	0	6.393
2003	0.5	0.75	1	1	1	1	1	1	0	0	6.546
2004	0.5	0.75	1	1	1	1	1	1	0	0	6.546
2005	0.5	0.75	1	1	1	1	1	1	0	0	6.546
2006	1	1	1	1	1	1	1	1	1	1	8.718
2007	1	1	1	1	1	1	1	1	1	1	8.718
2008	1	1	1	1	1	1	1	1	1	1	8.718
2009	1	1	1	1	1	1	1	1	1	1	8.718
2010	1	1	1	1	1	1	1	1	1	1	8.718
2011	1	1	1	1	1	1	1	1	1	1	8.718
2012	1	1	1	1	1	1	1	1	1	1	8.718
2013	1	1	1	1	1	1	1	1	1	1	8.718
2014	1	1	1	1	1	1	1	1	1	1	8.718
2015	1	1	1	1	1	1	1	1	1	1	8.718
2016	1	1	1	1	1	1	1	1	1	1	8.718
2017	1	1	1	1	1	1	1	1	1	1	8.718
2018	1	1	1	1	1	1	1	1	1	1	8.718
2019	1	1	1	1	1	1	1	1	1	1	8.718
2020	1	1	1	1	1	1	1	1	1	1	8.718

Source: Author's Construct

APPENDIX B

PLOTS OF TIME SERIES VARIABLES
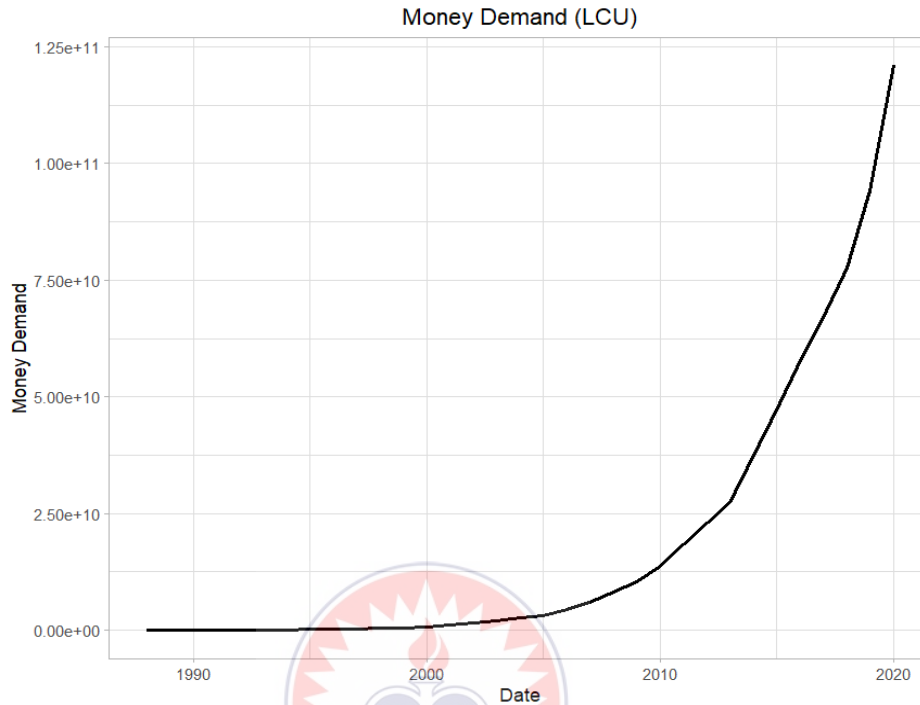
Figure 4: Plot of Money Demand
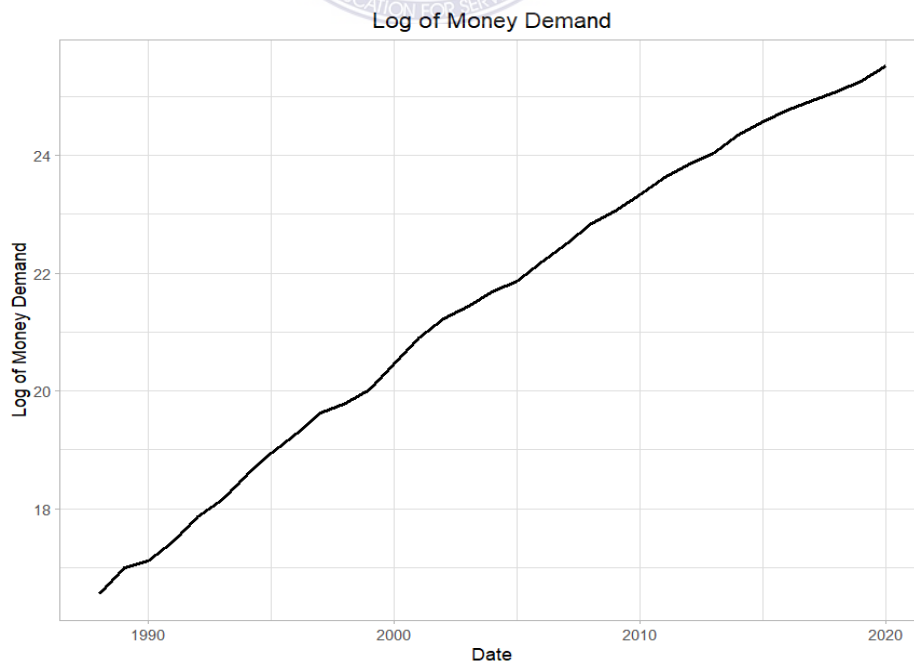
Figure 5: Plot of Natural Logarithm of Money Demand

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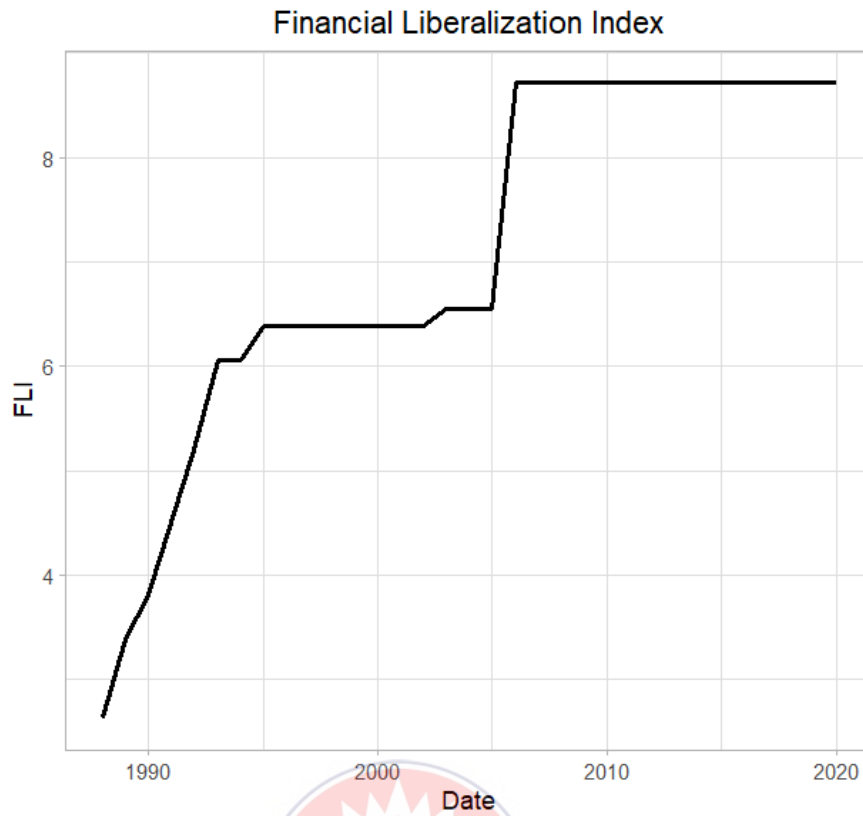
Figure 6: Plot of Financial Liberalization Index
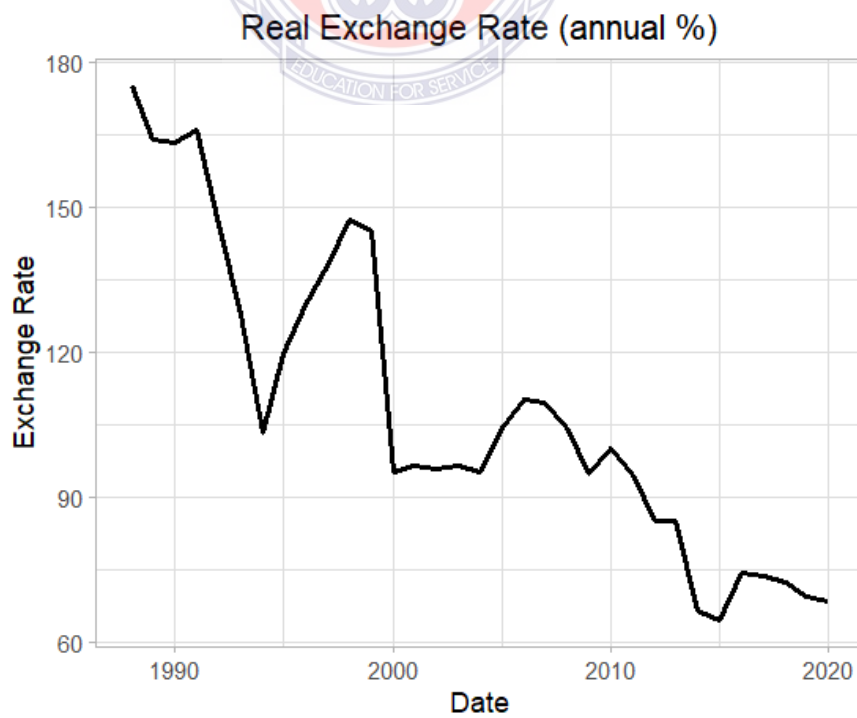
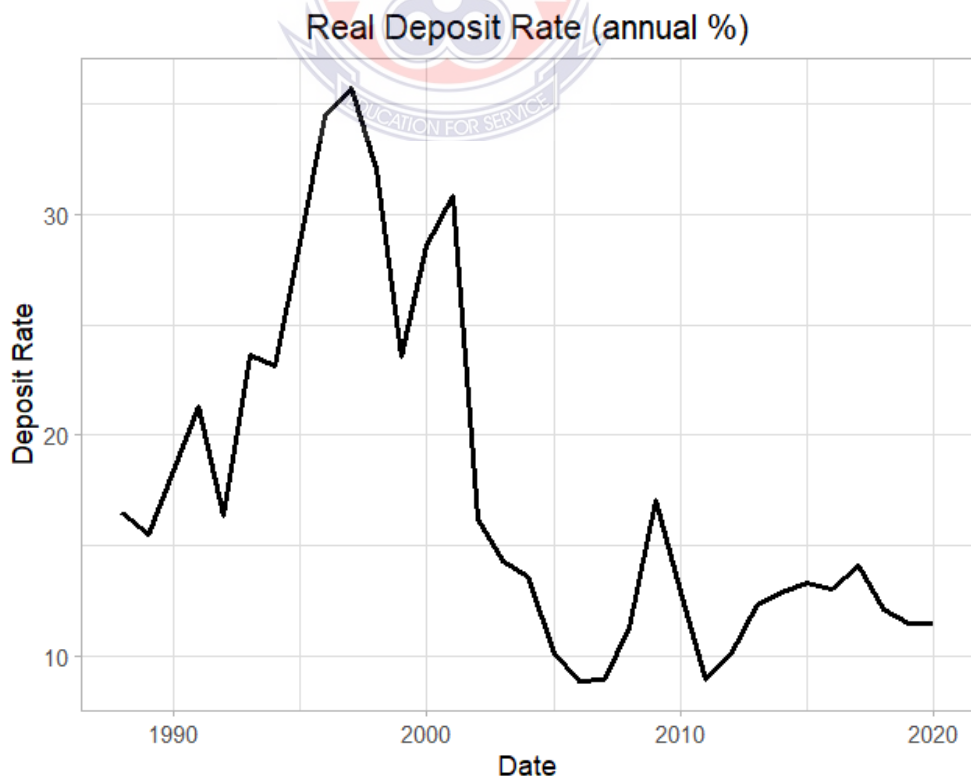**Figure 7: Plot of Real Exchange Rate (Annual Percentage)**
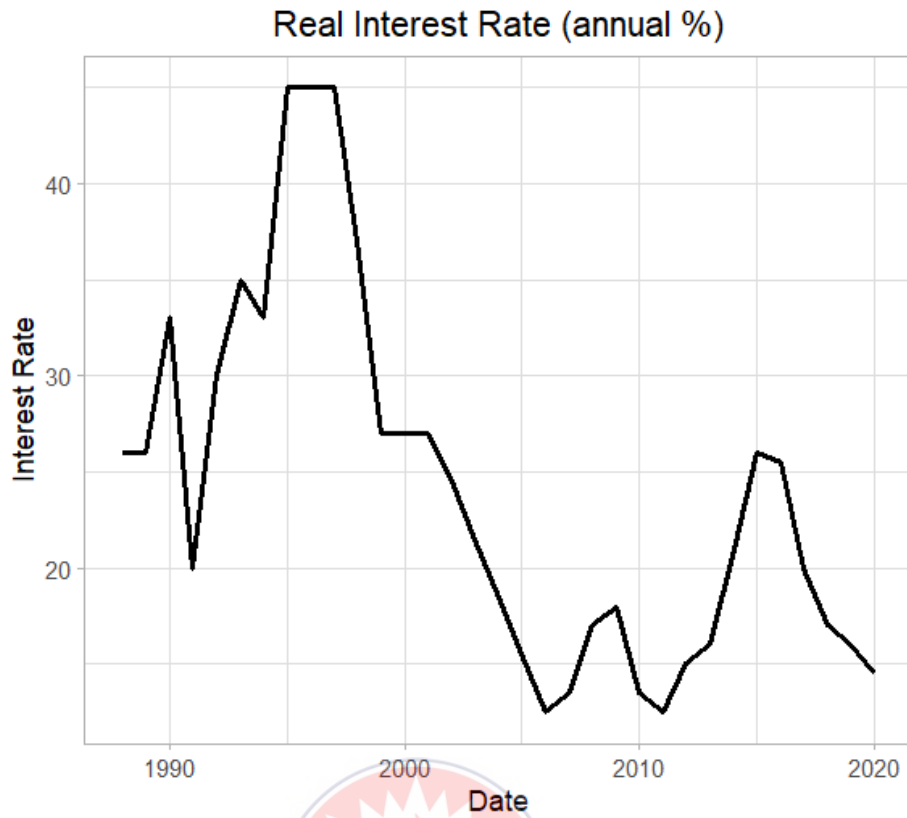
Figure 8: Plot of Real Interest Rate (Annual Percentage)
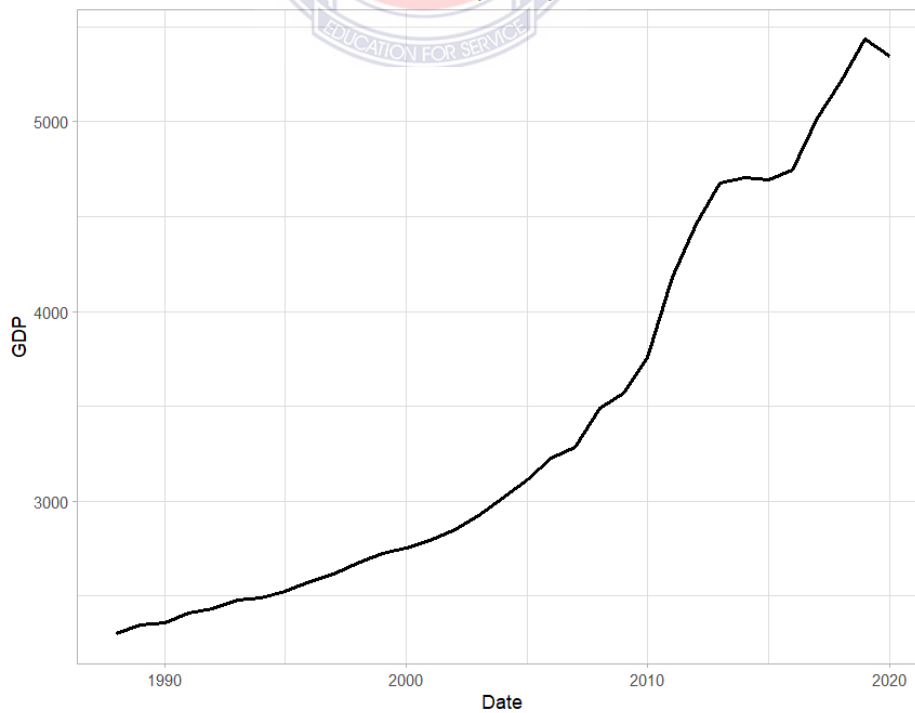
Figure 9: Plot of GDP per Capita
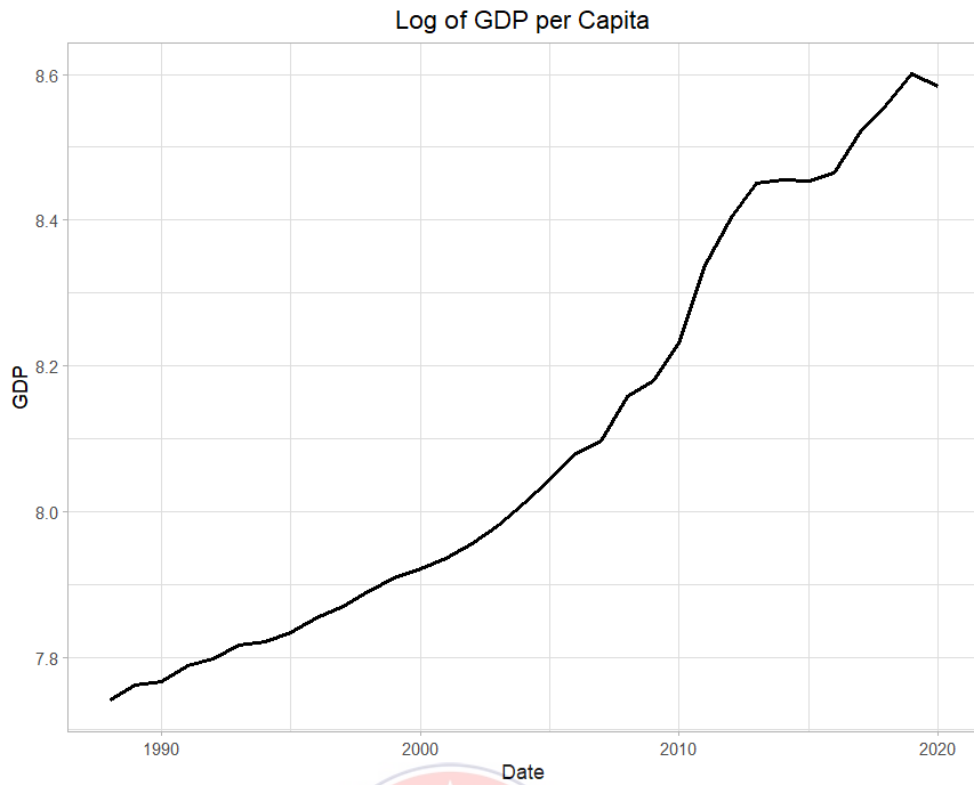
Figure 10: Plot of the Natural Logarithm of GDP of Per Capita
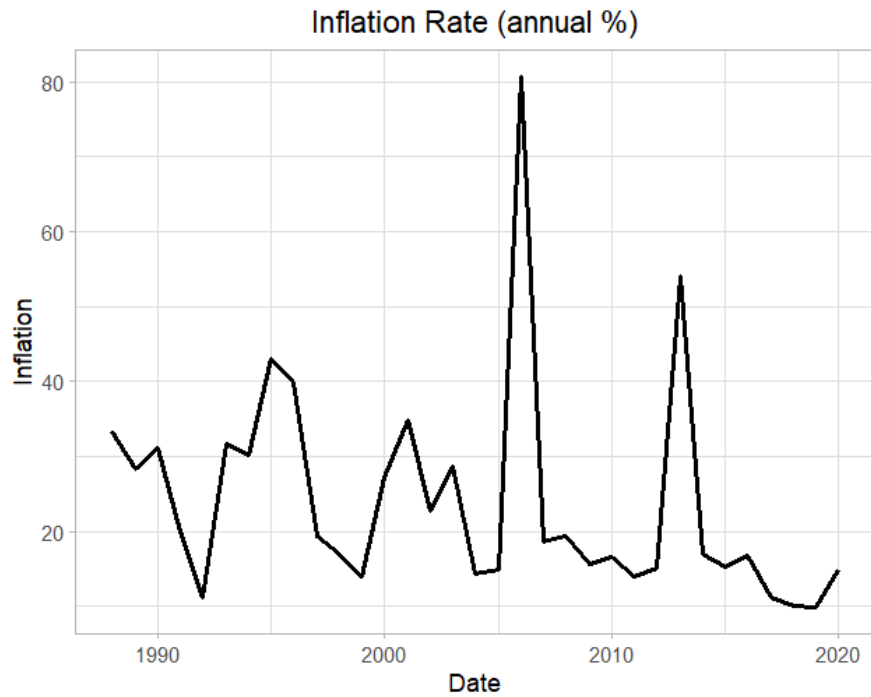

Figure 11: Plot of Real Deposit Rate (Annual Percentage)

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Figure 12: Plot of Real Inflation Rate (Annual Percentage)
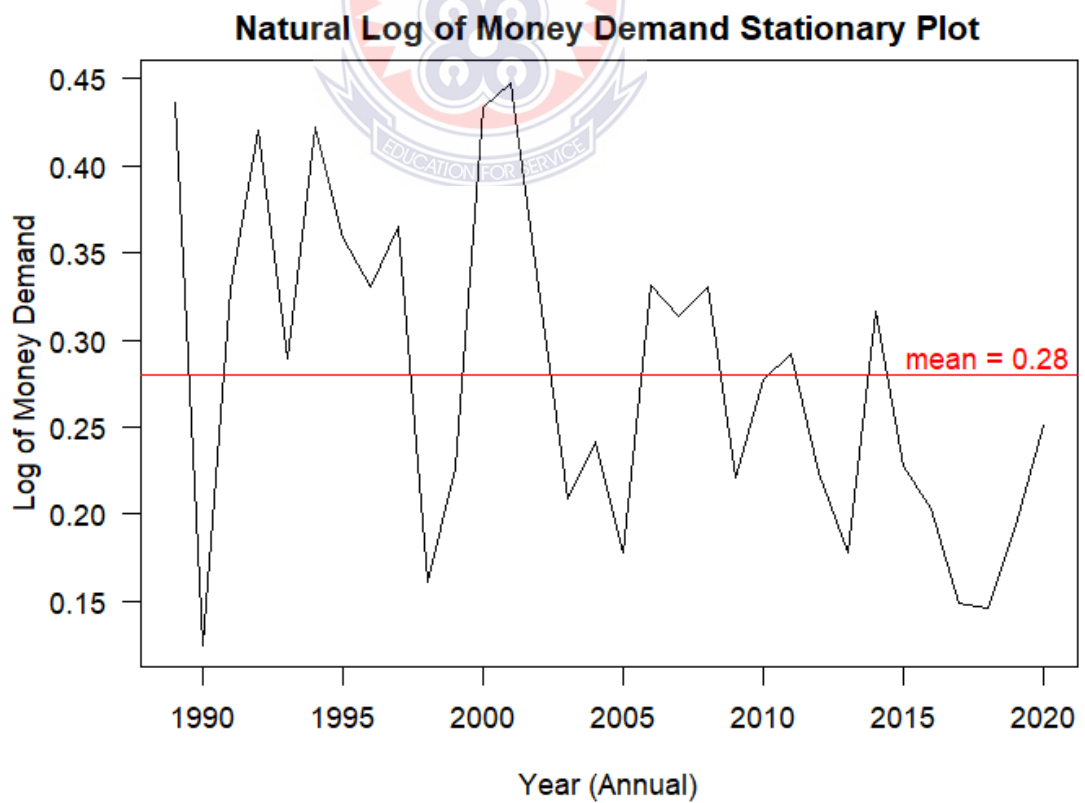
Figure 13: Natural Log of Money Demand Stationary Plot
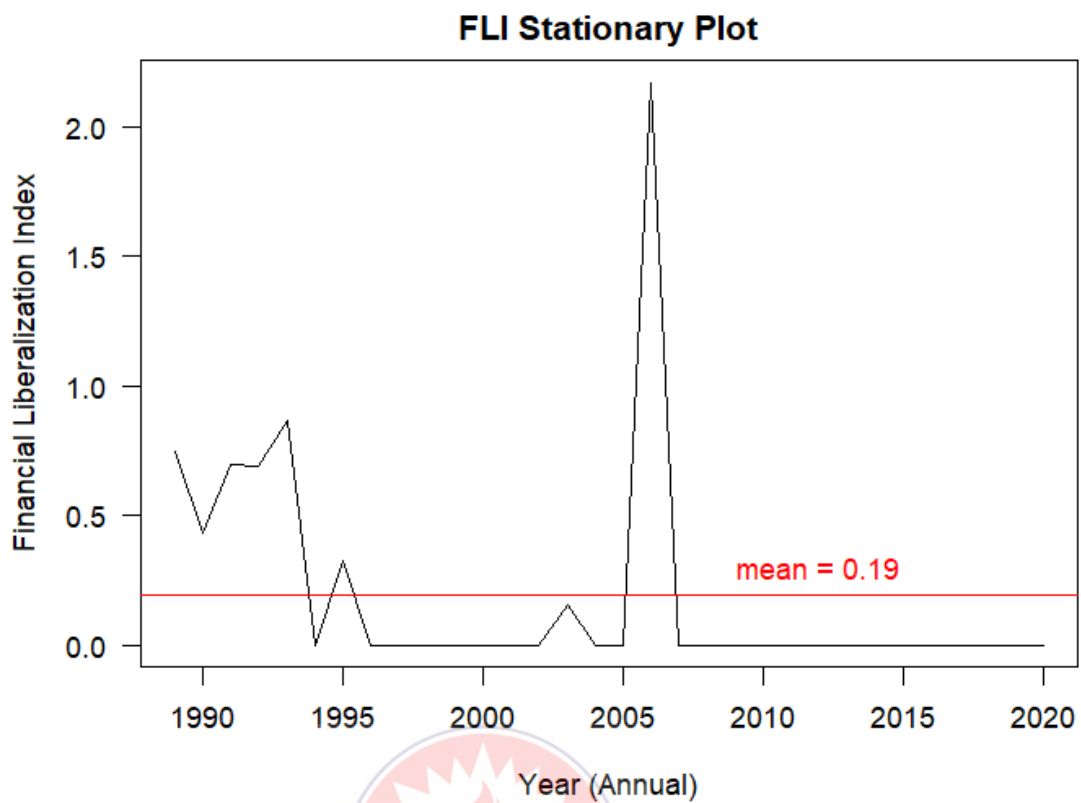
Figure 14: Financial Liberalization Index Stationary Plot
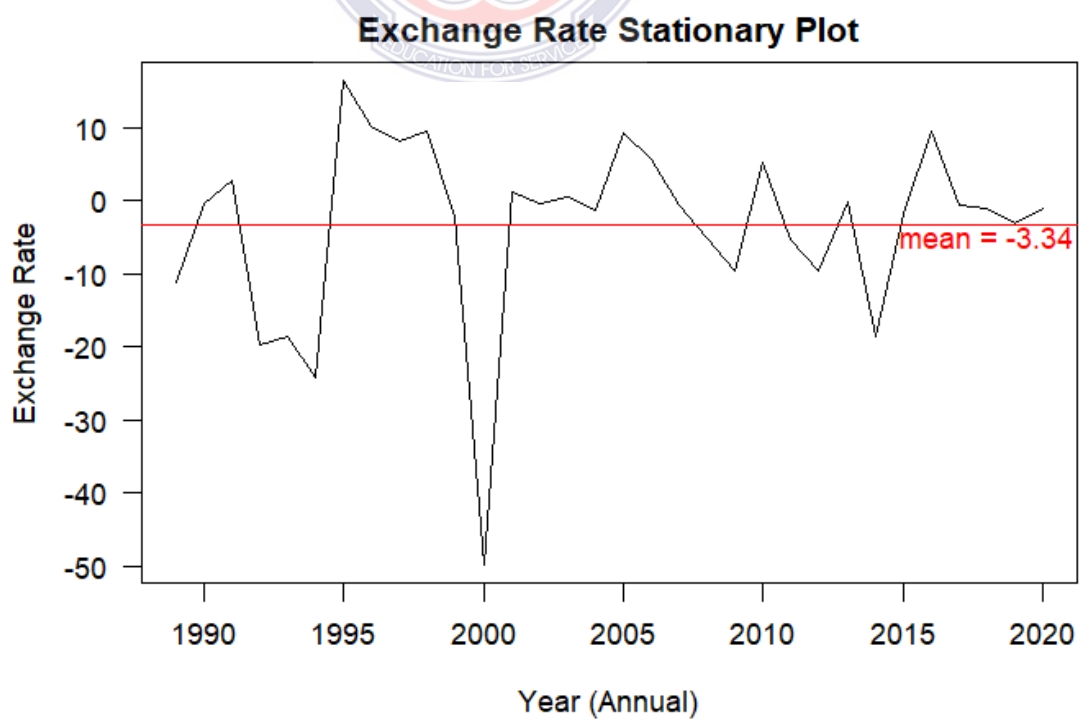
Figure 15: Exchange Rate Stationary Plot
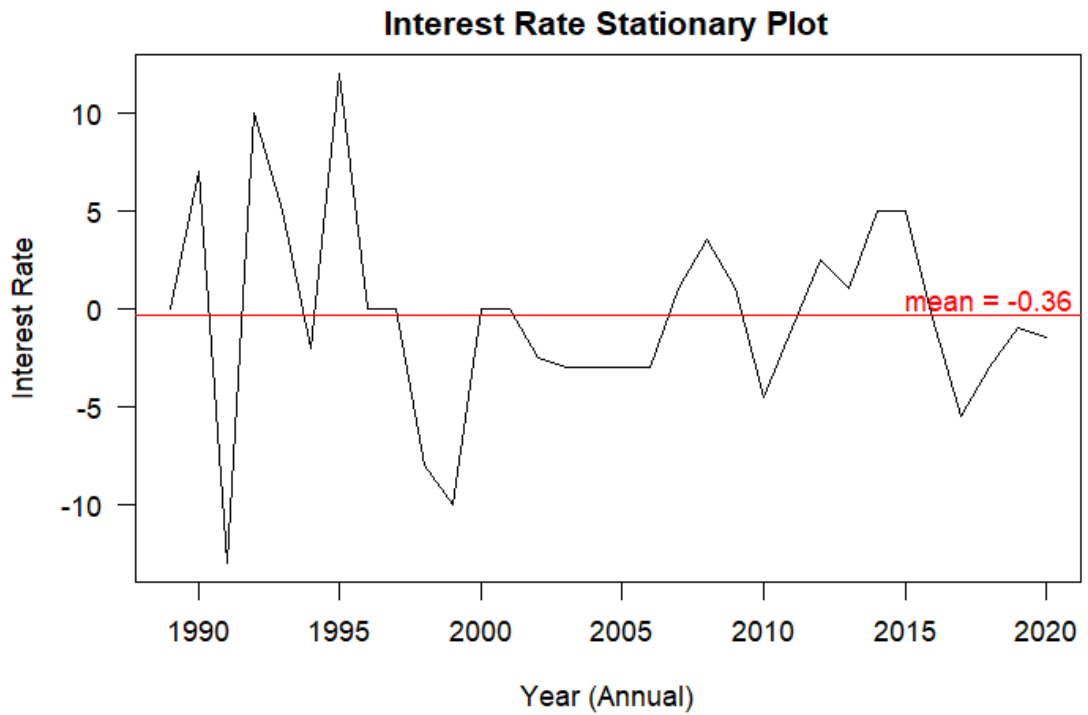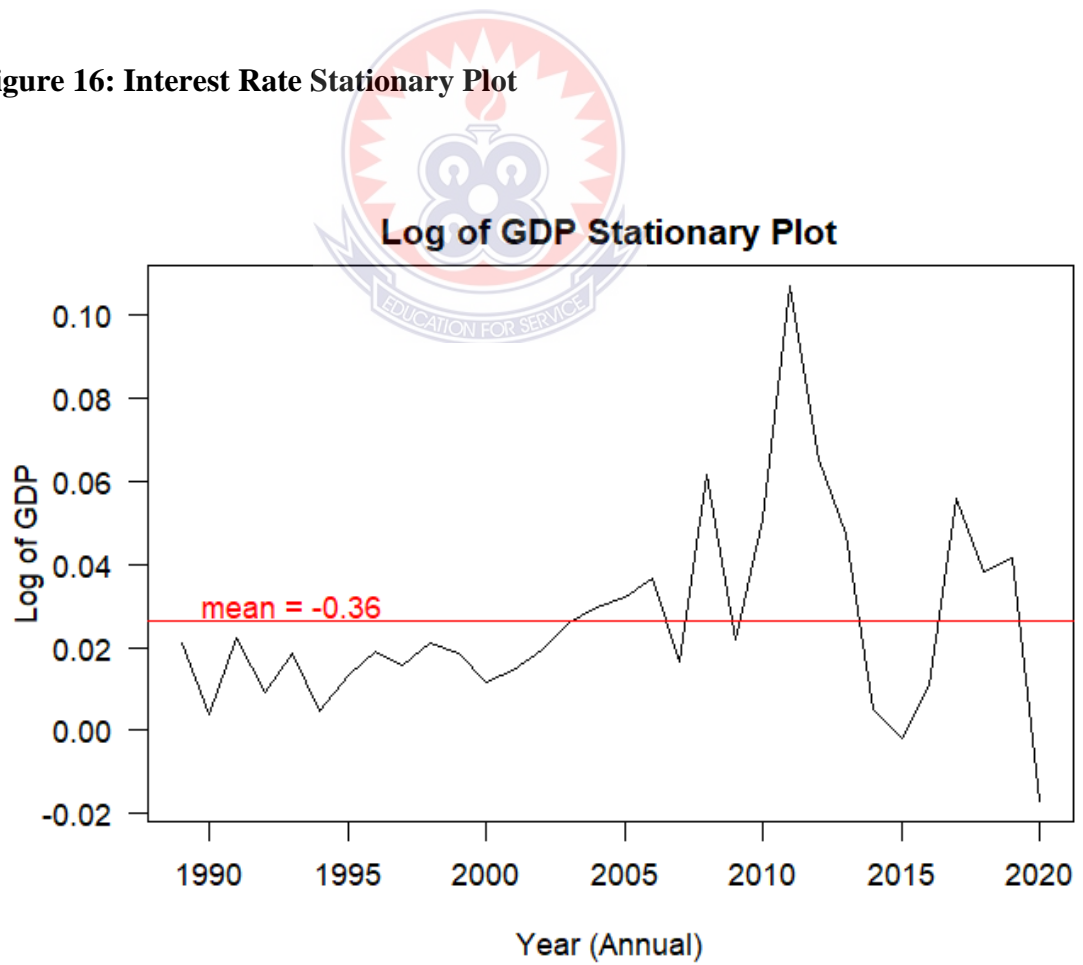
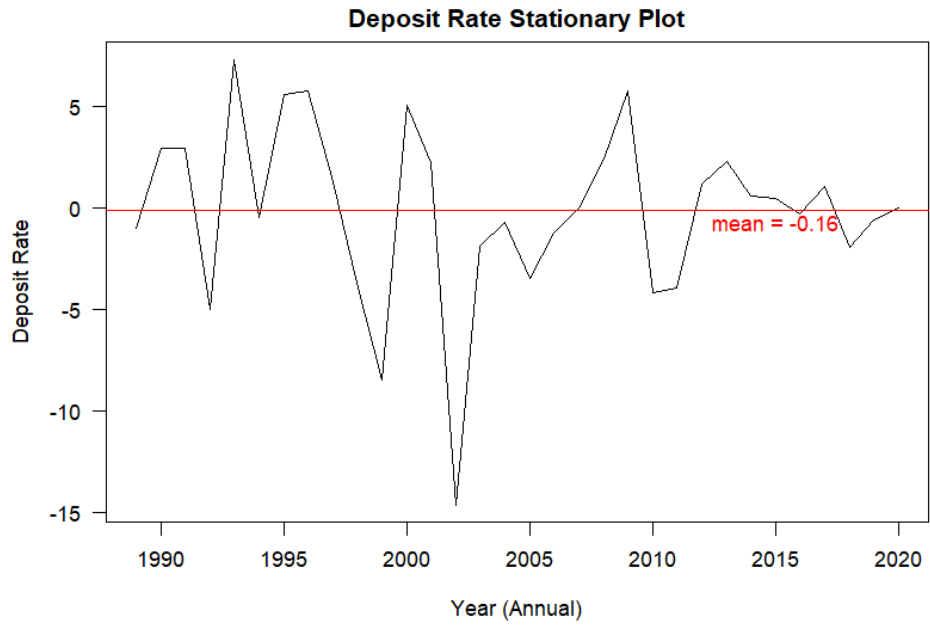**Figure 16: Interest Rate Stationary Plot**
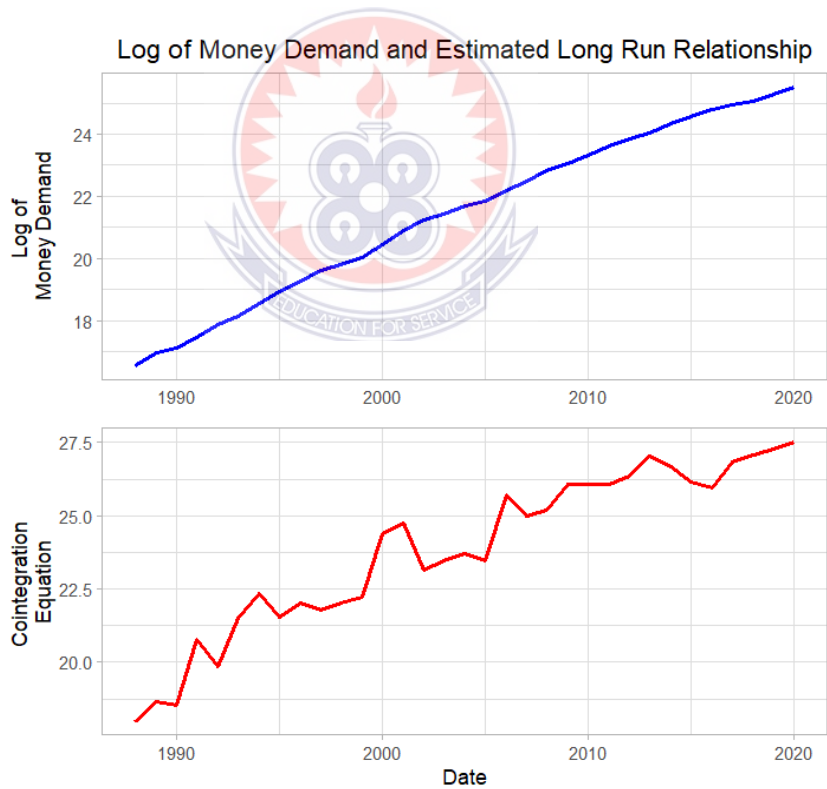

Figure 17: Natural Logarithm of GDP Stationary Plot

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Figure 18: Deposit Rate Stationary Plot

Figure 19: Estimated Long-Run Relationship and Money Demand