INVESTIGATING THE STABILITY OF MONEY DEMAND IN NAMIBIA

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Abstract

Studies on the stability of money demand or money supply functions have received prominent attention in the literature. This is due to the importance of having stable money demand or money supply functions for economic predictions to ensure long-term economic stability. Although these functions are not the only tools for monetary policy formulation, they play an important role in the assessment of the effectiveness of monetary policy in an economy. Stability in money supply or money demand is also important to ensure price stability, as one of the key areas that central banks like the Bank of Namibia (BoN) seeks to achieve. The BoN uses exchange rate targeting to achieve economic stability. It is for this reason that exchange rate is used as the key determinant of money demand in this study.

The study employs various econometric tests to investigate the stability of money demand. The objective of the current study is to investigate whether money supply in Namibia is stable using two measures of money demand as adopted by the BoN. These measures are, M1, which refers to the total currency in the hands of the public, and M2, which includes currency plus bank deposits. The regression results show that both M1 and M2 have stable long-run relationships between income, interest rate, CPI and exchange rate. The R^2 is 0.95 for M1 and 0.93 for M2 indicating that explanatory variables explain over 90% of changes in money demand. However, M2 is relatively more stable than M1 as indicated by the CUSUM and CUSUMQ tests. The CUSUM and CUSUMQ tests further indicate that there has not been a structural break in the Namibian economy during the year 1993 to 2006. Among the different factors affecting money

demand, exchange rate, CPI, and interest rate were found to be significant determinants of money demand.

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ACKNOWLEDGEMENTS

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I, Mubusisi M Mabuku, declare here that this study is a true reflection of my own research, and that this work or part thereof has not been submitted for a degree in any other institution of higher education.

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Mubusisi M Mabuku

ACRONYMS

ADF – Augmented Dickey Fuller

AGRIBANK – Agricultural Bank of Namibia

BMA – Bilateral Monetary Agreement

BoN – Bank of Namibia

CBS – Central Bureau of Statistics

CET - Common External Tariff

CMA – Common Monetary Area

CRDF – Co-integration Regression Dickey-Fuller (CRDF)

DBN – Development Bank of Namibia

DF – Dickey-Fuller

DFIs – Development Finance Institutions

DFN – Development Fund of Namibia

DW – Durbin Watson Statistic

ECM – Error Correction Model

E-G – Engle-Granger

GDP – Gross Domestic Product

GMU – Germany Monetary Unification

IMF – International Monetary Fund

M1 – Narrow Money Supply

M2 – Broad Money Supply

MMA – Multilateral Monetary Area

MZM – Money Zero Maturity

NAD – Namibian Dollar

NAMFISA – Namibian Financial Institutions Supervisory Authority

NDC – Namibia Development Corporation

NEPRU – Namibian Economic Policy Research Unit

NHE – National Housing Enterprise

NGOs – Non Governmental Organisations

NPC – National Planning Commission

NSX – Namibian Stock Exchange

SADC – Southern African Development Corporation

SACU – Southern African Customs Union

SARB – South African Reserve Bank

TMA – Trilateral Monetary Area

USD – United States Dollar

WB – World Bank

ZAR – South African Rand

CHAPTER ONE: INTRODUCTION

1.1 Background Information

Money plays an important role in our daily lives as it is needed for human survival. In the simple version, money is defined as anything that is generally and instantly accepted in payment of goods and services and in settling debts. Since money is accepted in exchange for all things, it measures the value of all things, by comparing their prices. Thus money, by performing its essential functions, it enables money-based economies to function smoothly (Beecham, 1994).

Money serves four main important functions, namely: (i) money as a medium of exchange is the most important function where money is used as an intermediary to facilitate trade. Without money, all transactions would have to be performed in a barter system where goods are exchanged for goods. One limitation of a barter system is the double coincidence of needs between two or three trading parties, and this makes money as a medium of exchange the preferred method. Money effectively eliminates the double coincidence of wants problem by serving as a medium of exchange that is accepted in all transactions, by all parties, regardless of whether they desire each others' goods and services (http://www.cliffstotes.com).

(ii) Money is a store of value given its durability and trust people have in money. According to (http://www.cliffstotes.com), money may not even be the best store of value because it depreciates with inflation. However, money is more liquid than most other stores of value because as a medium of exchange, it is readily accepted everywhere.

Furthermore, money is an easily transported store of value that is available in a number of convenient denominations.

(iii) Money is a standard of deferred payment, which implies that money is used to pay transactions in the future given its general acceptance as a means of payment and the trust that people have in money. During periods of inflation, people may accept paper money for immediate payment, but insist on some other medium such as real goods and services or gold for deferred payment. This may be the case, due to the fact that the medium of exchange function may lose much of its value in the meanwhile (http:willian-king.www.drexel.edu).

(iv) Money also serves as a unit of account, providing a common measure of the value of goods and services being exchanged. Knowledge of the value or price of a good, in terms of money, enables both the seller and the purchaser of the good to make decisions about how much of the good to supply and how much of the good to purchase (http://www.cliffstotes.com).

Money demand is a key variable in the assessment of the effectiveness of monetary policy in any economy. Among the broad objectives that central banks target through monetary policy is the achievement of stability in prices and employment, economic growth and balance in external payments. The monetary tools used to control monetary policy are interest rates, money supply or demand and other conditions affecting the availability of credit (Pearce, 1992). Monetary theory classifies money according to three main categories, M1, which refers to currency in the hands of the public, is also known as narrow money, while M2, which includes currency plus demand deposits is known as the broad money. The third category known as M3 includes M2 plus

long-term deposits and is known as high-powered money. The M3 category is not used in Namibia and as such is not a key variable for policy actions.

However, there are minor differences in the adoption of definitions of these categories in different countries. Following the theoretical approach, the BoN defines money as follows: M1 (narrow money), comprises currency in circulation and transferable deposits. In this case, currency in circulation refers to notes and coins issued by the BoN less the amount held by commercial banks. Transferable deposits refer to the current account deposits in national and foreign currency of other financial institutions, state and local governments, public non-financial corporations, and private sector with the BoN and commercial banks. M2 (broad money) comprises M1 and other deposits, which include time and savings deposits in national and foreign currency of other financial institutions, state and local governments, public non-financial corporations, and private sector with the BoN and banks. The M2 monetary aggregate plays a key role in monetary policy in Namibia and is used for analytical purposes. It is compiled from the Banking Survey that consolidates accounts of the central bank, four commercial banks and three other banking institutions (http://www.sadcbankers.org).

The table in appendix A.11.a) presents figures on the key variables used in this paper. It shows that M1, M2, exchange rate and income have been following upward trends whilst on the contrary interest rate has been following a downward trend. The exchange rate has been increasing (depreciating) in value which then shows that more money was needed to cover imports into Namibia over that period of time, while exports were expected to lead to an increase in money demand due to the high volume at lower prices. This upward trend is in line with the increase in money demand for both M1 and

M2 over the same period (see Figure 1.1). To some extent, the CPI in Namibia follows the pattern of South Africa due to Namibia's heavy dependence on South Africa's imports.

Many researchers have suggested that the stability of money supply or money demand[1] is a desirable ingredient for the implementation of effective and appropriate monetary policy in any economy. The conduct of monetary policy is important for, amongst others, the promotion of monetary and macroeconomic stability to ensure price stability. Economic stability is important for forecasting and economic growth as it has been noted as being desirable in any economy as non-stability would hinder monetary policy by making it difficult for the authorities to predict the impact of policy-induced changes in the money demand (Humphrey, 1986).

The existence of monetary policy or its effectiveness in Namibia has been subject to debate for a long time due to Namibia's membership in the Common Monetary Area (CMA). Being a member of the CMA, the Namibia dollar is pegged on a one-to-one basis to the South African Rand (ZAR) under a fixed exchange rate regime. As a result, monetary policy in Namibia is often said to be heavily dependent on that of South Africa given the currency board arrangement. This has led to critics suggesting that in reality, Namibia does not have an effective monetary policy, raising the questions of how the BoN determines money supply in Namibia. The effectiveness of monetary policy in any economy is an empirical issue and can only be uncovered through analytical studies of this nature. The CMA's fixed exchange arrangement is a monetary union that allows the South African currency to fluctuate as a legal tender in the other CMA member countries,

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[1] Money supply or money demand is used interchangeably for economic predictions as the central bank could target any of the two indicators to control monetary policy. But the focus in this paper is on money demand.

while their currencies are legal tenders only inside their respective borders and not across borders.

Apart from being a member of the CMA, Namibia is also a member of the oldest customs union in the world, known as the Southern African Customs Union (SACU), which consists of Botswana, Lesotho, Swaziland, and South Africa as the other members. SACU was established in 1910 and has since been renegotiated to become the current SACU based on new agreements. Under SACU, a common external tariff (CET) on all goods imported into the rest of the world applies, while there is free movement of SACU manufactured products within SACU without any duties or quantitative restrictions. There is a fixed revenue-sharing formula for the distribution of customs and excise revenues within member states (http://www.sacu.int).

The presentation of Namibia's membership in the monetary and customs unions is to highlight the role money supply plays in facilitating trade among member states. Further, historical ties between Namibia and South Africa contribute to Namibia's dependence on imports of manufactured goods of which over 80% comes from South Africa. This justifies the use of ZAR as legal tender in Namibia as a lot of transactions have to be conducted between the two countries.

1.2 Statement of the Problem

The stability of the money demand function is important to ensure that the quantity of money in an economy can be predicted and related to a set of key economic variables linking money and the real economic sector. Maintaining stable prices together with the promotion of economic growth are important policy issues in developing

countries like Namibia. Owing to the country's CMA membership, the scope for an independent monetary policy is indeed limited. This implies that the Bank of Namibia generally follows similar monetary policy as pursued by the South African Reserve Bank. Figure 1.1 shows the trend of money demand for the period 1993 to 2007 in Namibia Dollar (NAD) millions, it shows an upward trend for both measures but M2 seems to have been growing faster than M1.

Figure 1.1: Trends of M1 and M2 monetary aggregates
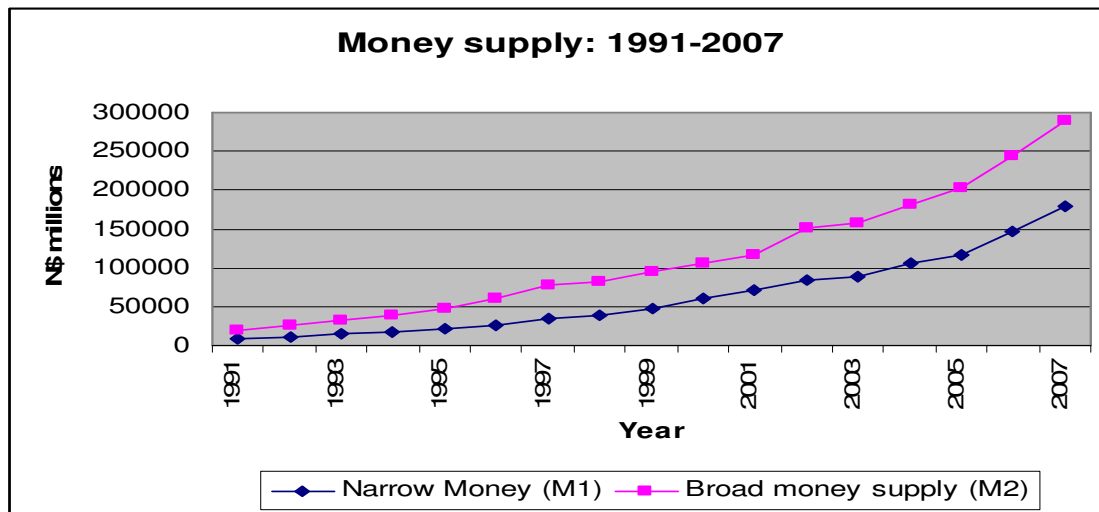
Source: Author's Own Construct

At the time of introducing the Namibia Dollar (NAD) in 1993, M1 and M2 were below NAD5 million within minimal difference between the two measures. Ten years later in 2003, the gap between M1 and M2 widened as M2 crossed the bar of over NAD150,000 million while M1 was below NAD100,000 million, showing the fast growth in demand deposits over that period.

1.3 Research Objectives

The objective of the paper is to investigate the stability of money demand in Namibia by using both M1 and M2 measures. This is very important since the usefulness of money demand function in the conduct of monetary policy depends crucially on its stability. According to Ikhide & Katjomuise (1999), money velocity (circulation) for Namibia has been steadily declining since independence reflecting largely the increasing monetisation of the economy. This presents a possibility of a structural break. The objectives of this study are three-fold as follows:

i)   find out which of the two measures of money demand, M1 or M2 is more stable;

ii)   determine whether there has been a structural break in money demand since independence; and

iii)   determine the relationship between money demand and nominal variables, such as income, CPI, exchange rate and interest rate.

1.4 Scope and Limitations of the Study

The period of study ranges from 1993 to 2006 due to limited availability of data on key variables of interest in the study. The sample size of 56 quarterly observations is large and sufficient to ensure reliable results. Studies on money demand in developing countries are often constrained by serious data limitations including inadequate monetary records.

1.5 Outline of the Study

Chapter Two provides a brief background of monetary policy in Namibia while Chapter three presents the literature review. Chapter four presents a brief description of the model, the variables and other specification issues relating to money demand. Chapter five gives descriptions on empirical results and estimation and data characteristics. Finally, Chapter six summarises the findings and the policy implications of this study together with the recommendations and areas for further research.

CHAPTER TWO: NAMIBIAN MONETARY POLICY INITIATIVES AND THE ROLE OF THE FINANCIAL SECTOR

2.1 History of Monetary Policy in Namibia

The German annexation of South West Africa, known as Namibia today, was abolished and mandated by the League of Nations after the Second World War in 1920. This led to the incorporation of Namibia into the South African monetary system. Most of the major South African banking institutions were extended to Namibia for the purpose of financing commerce and trade. The South African Reserve Bank (SARB) has maintained a branch in Namibia's capital Windhoek since 1961 and had restricted roles of amongst others, the distribution of currency (both notes and coins), exchange control and being a banker to commercial banks.

Although Namibia has been a defacto member of the CMA through its colonialisation by South Africa, shortly after independence in 1990, Namibia became a signatory member of the CMA, thereby joining South Africa, Lesotho and Swaziland as members. Before Namibia joined the CMA, South Africa, Lesotho and Swaziland had signed a Trilateral Monetary Agreement (TMA) with some amendments made to accommodate Namibia as a new member. The amendments had to do with changing the name of the agreement to the Multilateral Monetary Agreement (MMA), making Namibia an official member of the CMA upon acceding to that agreement. On the other hand, Namibia did not have a national currency of its own, neither did it have a central bank, until 1993 (BoN, 1993). This led to Namibia and South Africa agreeing to a Bilateral Monetary Agreement (BMA) between the governments of the two countries. In

the BMA, the Rand was to continue as legal tender in Namibia and the agreement spelled out which monetary matters could be dealt with in Namibia without a central bank. In 1993, the central bank of Namibia known as the BoN was established by an Act of Parliament. This then prompted the BMA to permit the BoN to fulfill all the ordinary functions performed by a central bank.

However, the continuation of the Rand as legal tender in Namibia limited BoN's ability to implement complete central bank functions. This also meant BoN could not control the money supply, determine the interest rate or act as lender of last resort. For these reasons, BoN was seen as not being able to build up significant foreign exchange reserves. These constraints led to the need for a national currency in Namibia so that BoN could be able to perform tasks of a fully-fledged central bank in line with the stipulations of the Namibian Constitution. Preparatory work regarding the introduction of a national currency, the Namibia dollar as decided by the Namibian Government at independence continued during 1992 and the local currency was issued in September 1993. The BMA had to be changed immediately to accommodate the introduction of the Namibian national currency, and hence the BoN would become a fully-fledged central bank (BoN, 1993).

At independence in 1990, domestic financial markets were not yet developed in Namibia due to a number of reasons: (i) Firstly, most financial institutions had not changed their ways of channeling their surplus funds through their parent companies to South Africa, thereby leading to capital injection in the South African markets resulting from capital outflow from Namibia. This also meant that the same companies could borrow from their parent companies. Therefore, there was little or no urgency for them to

develop interbank market transactions. (ii) Secondly, with the South African Banks Act of 1965 having remained in force at independence, the Namibian operating commercial banks could largely meet their liquid asset requirement in the South African market. That could only change with the enforcement of the Banking Institutions Amendments. (iii) Thirdly, there was no need for the Namibian government to issue money market instruments such as Treasury Bills because of the satisfactory cash position that prevailed at the time of independence (BoN, 1993).

It is important to note that some minor monetary policy measures were undertaken in 1991 with the aim to develop the Namibian financial markets. These were aimed at provision of investment avenues for the government's surplus funds and modest credit facilities to the Namibian government and the banks in the form of overnight loans at the BoN. However the combined facility had a maximum limit, which was set equal to that of banks' permanent deposits with the BoN. The facility was available in equal amounts to both the government and banks (BoN, 1993).

In addition to that, at independence, preparation for the introduction of treasury bills commenced. It was deemed important at the time to have this instrument available as soon as was reasonably possible, since it was a necessary ingredient in the development of domestic financial market and utilization of domestic savings. These constituted the first steps in the development of the Namibian financial markets. Furthermore, the Namibian financial system continued to expand. This was evidenced when the Namibia Stock Exchange started its operations in October 1992 with the listing of a single firm. This increased to four listed firms by the end of February 1993.

2.2 Monetary Policy Strategy in Namibia

Monetary policy has been broadly described as the action of the central bank to influence short-term interest rates, supply of money and credit to achieve certain objectives. The short-term interest rates in this case refer to: firstly, the bank rate, which is the rate the BoN lends to the various commercial banks in Namibia. Secondly, it also refers to the repo rate, which is the rate at which the BoN provides liquidity for commercial banks. Thirdly, it refers to the inter-bank rate, which is the rate at which commercial banks borrow from one another. This is done through what is known as open market operations.

Apart from the open market operations, monetary policy can be conducted through what is called the discount rate mechanism in which commercial banks can borrow reserves from the discount window of the BoN. Depending on the demand for reserves by commercial banks, banks can turn to the discount window for reserves from the BoN. Banks have to pay interest for the use of such funds and this interest is referred to as the discount rate.

Another mechanism of monetary policy is through an increase or decrease in cash reserve requirements. There are however, statutory provisions which require that banks hold a certain fraction of their deposits in reserve either as cash in their vaults or as a non-interest-bearing balance at BoN. Other monetary policy approaches include supplementary reserve requirements, moral suasion, and directives in order to achieve monetary policy goals and objectives.

Generally the BoN always adjusts the interest rate to affect the money supply. Financial stability refers to efforts by the BoN concerned with promoting the

development of sound and well-managed banking and other financial institutions, as well as encouraging the development of efficient and well-functioning financial markets. The one-to-one peg between the Namibia Dollar (NAD) and the South Africa Rand (ZAR) ensures that the objective of monetary stability is achieved.

Through the current exchange rate policy arrangement, monetary policy is undertaken with a view to keeping prices (both consumer and interest rates) in line with those prevailing in South Africa. This strategy is driven by a desire to achieve and maintain stable and low levels of prices. According to Kalenga (2001), South Africa has an inflation targeting regime and as long as South Africa remains a low-inflation country, the pegged exchange rate should continue to be an appropriate intermediate target for ensuring price stability.

2.3 Exchange Rate Policy in Namibia

The exchange rate policy in Namibia is fixed and operates under a fixed exchange regime in which the NAD is fixed on a one-to-one basis to the ZAR under the CMA and the ZAR is also legal tender in Namibia. Namibia's membership to the CMA requires that a major proportion of the BoN's monetary liabilities be backed by the reserve currency, which in this case is the ZAR or other foreign assets. Namibia's CMA membership also implies that it follows the same exchange rate policy as that of South Africa. All CMA member countries apply the same exchange control regulations. There are no restrictions on foreign capital flows and capital, profits and dividends can be repatriated freely between member countries. The NAD is only convertible regionally

into the ZAR but is not convertible internationally. This implies that the NAD can only be exchanged with the CMA region but not outside the CMA member countries.

The domestic interest rates are determined by the interest rates in the currency of the country to which the domestic currency is pegged. The experience of countries with fixed exchange rate regimes has generally demonstrated that the attainment of exchange rate stability will help in ensuring that domestic prices in one country are similar to those of the pegged currency. The fixed exchange rate regime thus encourages arbitrage that tends to keep interest rates roughly at the same level in Namibia and South Africa.

According to Uanguta & Ikhide (2002), the exchange rate channel of monetary transmission is not active in Namibia as it is a country pursuing a fixed exchange rate. This is because domestic interest rates adjust in such a way that it leaves the exchange rate unchanged.

2.4 Financial Sector of Namibia

Given Namibia's close historical ties with South Africa, it is not surprising that financial sectors of the two countries are closely linked. Namibia's financial sector is one of the most sophisticated and well established financial systems in Africa. Namibia inherited a dual financial system comprising of both formal and non-formal sector at independence in 1990. According to Mushendami (2008), the formal sector is said to include a central bank (the BoN), other commercial banks, post office savings bank, insurance companies, pension funds, non-governmental organisations, asset management companies and the Namibian Stock Exchange (NSX). The non-formal sector comprises mostly of micro-lenders. Furthermore, there are a number of development financial

institutions (DFIs) in the country that warrants their own analysis. The banking sector is well established and consists of four commercial banks, all characterized by varying degrees of foreign ownership. These financial institutions play a very critical role in influencing money demand or supply movements by virtue of being money providers (in the case of banks) or money transmitters (non-banking institutions). This warrants their inclusion in the current study as they all influence money demand either directly or indirectly.

2.4.1 Bank of Namibia (BoN)

The South African Reserve Bank (SARB) performed all central bank functions in Namibia before the country attained its independence in 1990. The BoN was created by an Act of parliament in compliance with the Namibian constitutional provision under Article 128. It was established by means of Section 2 of the Bank of Namibia Act (Act No.8) of 1990. The BoN started its operations in 1990 and operates as an independent and autonomous institution, which is wholly owned by the Namibian Government. The BoN acts as a fiscal agent, banker and financial advisor to the government and serves as the official depository of Government funds and manages the issue of government securities. The BoN also advises the Namibian Government on the administration of exchange controls and it is the fiscal agency through which government deals with international organizations such as the International Monetary Fund (IMF) and the World Bank (WB). Within the framework of the CMA, the BoN conducts the usual central banking operations of controlling the supply of money in the economy. The BoN generates its profits from interest on its foreign exchange earnings and is responsible for

managing and investing the country's stock of foreign reserves. The main objectives of the BoN are to:

- promote and maintain a sound monetary, credit and financial system in Namibia;

- sustain the liquidity, solvency and functioning of the system;

- promote and maintain both internal and external monetary stability and an efficient payment system mechanism;

- regulate all banking institutions;

- serve as a banker, financial advisor and fiscal agent to the Government (http://www.bon.com.na).

2.4.2 Commercial Banks

There are four commercial banks operating in Namibia, namely: Bank Windhoek, First National Bank, NedBank (which was formerly known as the Commercial Bank of Namibia) and Standard Bank. According to Ikhide & Fitchat (2002), the post-independence commercial banking system still has very strong links with South Africa, with one bank, the Standard Bank, having 100 percent South African ownership. South African ownership in three other banks rages from 43.6 percent (Bank Windhoek) and 47.3 percent (Commercial Bank of Namibia), to 78 percent (First National Bank). In terms of infrastructure, the Namibian banking sector is well developed as compared to those of other developing countries elsewhere in the world. The conduct of all role players in the banking sector is regulated by the BoN. The commercial banks take in deposits from savers and lend this money out to borrowers for consumption or investment. These banks make profits from the difference in interest rates charged to

borrowers and that paid to depositors. This difference is known as the spread. Banks also make profits through charges levied for services they provide.

2.4.3 Development Bank of Namibia

The Development Bank of Namibia (DBN) was created by an Act of Parliament (Act No 8 of 2002) in 2002 and was launched in 2004 to contribute to the economic growth and social development of the country by providing financing in support of key development activities. The DBN was primarily formed with the aim of integrating functions that were previously assigned to Namibia Development Corporation (NDC) and the Development Fund of Namibia (DFN) (http://www.un.int). The NDC was established by the Namibia Development Corporation Act, 1993 (No. 18 of 1993) with the primary objective of providing financial and related services for sustainable operations. The DFN on the other hand was established in 1987 as the Development Fund of South West Africa/Namibia whose mission was to promote economic and social development in Namibia through extension of finance to economically viable projects and programmes (Ikhide & Fitchat, 2002). The DBN offers the much-needed start-up capital and finance to businesses for expansion through these broad facilities: public and private sectors, enterprise development and Small and Medium Enterprise (SME) finance. The minimum loan amount is set at NAD3 million with varying repayment periods depending on the type of financing facility utilised. However, financing for SMEs range from NAD250,000 to NAD3 million (http://www.dbn.com.na).

2.4.4 Agricultural Bank of Namibia

The Agricultural Bank of Namibia (AGRIBANK) was created in 1991 by the Agricultural Amendment Act of 1991. It lends money to farmers at lower than market interest rates. AGRIBANK has a narrow focus of supporting only the agricultural sector and no other rural sectors. It has two main schemes with which they give access to financial resources to poor farmers.

- Resettlement of black farmers in white farming areas: the purpose here is to resettle the more established and stronger communal farmers in the communal area. Affirmative Action long term loans are offered by AGRIBNK's funds and the government subsidises the interest rates.

- National Agricultural Credit Programme (NACP): this scheme provides loans to communal farmers and its aim is to increase the capacity of small-scale farmers so that the deficit pending of communal tenure is improved and ensure that production for subsistence farmers is increased.

AGRIBANK also avails loans for crop production, livestock and farming infrastructural development. A saving scheme has been introduced to improve the self-reliance of the bank by deposits and savings. Its mains source of funding is deposits and government funds (http://www.fao.org).

2.4.5 Post Office Savings Bank

The Post Office Savings Bank (POSB) is a division of Namibia Post and Telecommunications (NamPost) Ltd. POSB takes deposits from savers and pays them a

return generated from investing that money in low risk assets. POSB also offers competitive products such as fixed-term deposits, savings certificates and save-as-you-earn accounts. Every post office country-wide serves as a branch of POSB. Smart cards were introduced to improve service delivery in 2006. Smart card owners can use them to purchase goods at retail outlets countrywide (http://www.nampost.com.na).

2.4.6 National Housing Enterprise

The National Housing Enterprise (NHE), a parastatal under the Ministry of Regional and Local Government and Housing was created by an Act of Parliament, Act No. 5 of 1993 thereby replacing the National Building Corporation. The NHE's activities are directed by the National Housing Policy, which mandates the NHE to act as a lending institution as well as a housing developer. The NHE aims to lend to low-income house buyers at lower than market interest rates. It is both a developer and financer of affordable housing. It also seeks to provide serviced land and support people in need of low-cost housing (Ikhide & Fitchat, 2002).

2.4.7 Capital Markets

Capital markets are markets for long-term funds i.e one for transactions in long-term debt and equity obligations. These are markets for medium to long term investments (usually over a period of 1 year). The capital market is a market for securities where companies and governments seek to raise long-term funds. It includes both the stock and bond markets and consists of primary and secondary markets. The primary market is

where new stock and bonds issued are sold, while the secondary markets are where existing securities are sold and traded from one investor to another usually on an exchange.

The Namibian Stock Exchange (NSX) started its operations upon establishment in 1992. The main roles of the NSX are to help trading companies raise capital, provide a market place where shares can be traded and exert greater market discipline on companies to improve their performance. Equity, interest-bearing securities and derivatives can be listed and traded on the NSX. According to Ikhide & Fitchat (2002), the NSX's emphasis is on equities, but a number of bonds issued by government and state-owned enterprises have also been listed. The idea of a stock exchange for Namibia was focused on building an independent economy ahead of the 1990 national independence from South African occupation. Financial instruments such as equity, interest bearing securities and long-term loans are listed and traded on the exchange. The NSX is regulated by the Stock Exchanges Control Act of 1985, which was later amended in 1992. The NSX is a dual listed stock exchange overseen by the Namibia Financial Institutions Supervisory Authority (NAMFISA). Dual listing allows companies listed on the NSX to list on other stock markets as well.

2.4.8 Insurance Companies

Insurance is a form of risk management whose main objective is to hedge against the risk of a contingent loss. It is sometimes defined as the equitable transfer of the risk of a loss from one entity to another in consideration of a premium. Therefore Insurance companies manage different risks for both commercial and personal clients. Their role is

to indemnify clients whenever there is a loss to either their property or lives. Insurance premium is paid in consideration of an insurance cover. There are two types of insurance in Namibia, one is what is often referred to as short-term and the other is long-term insurance. Short-term insurance is cover for non-life business for a period of up to 12 months, while long-term insurance is life insurance for periods longer than 12 months. Life insurance companies sell life insurance, annuities and pension products while non-life or general insurance companies sell other types of insurance. As at the end of 2005, there were sixteen long-term insurers, fourteen short-term insurers and one reinsurer (Mushendami, 2008).

2.4.9 Pension Funds

Pension funds are pools of assets forming an independent legal identity that are bought with contributions to a pension plan for the exclusive purpose of financing pension plan benefits. Pension funds are important shareholders of listed and private companies. According to Ikhide & Fitchat (2002), pension and provident funds are non-profit making institutions which administer employees' and employers' provisions against the day they are no longer physically or mentally able to work. The Government Institutions Pension Fund (GIPF) is the largest in Namibia and it administers the Namibian government employees' pension money. There are several other small pension funds administered by external fund administrators. Alexander Forbes is the largest pension fund administrator for non-government employees.

2.4.10 Unit Trusts

Ikhide & Fitchat (2002) define a unit trust as an investment mechanism that provides a large number of investors with the means to participate in a diversified portfolio of investments. Unit trusts are also open-ended investments whose underlying value of assets is always directly represented by the total number of units issued multiplied by the unit price, less the transaction or management fee charged and any other associated costs. Unit trusts in Namibia are regulated by the Unit Trust Control Act, 1981 (No. 54 of 1981). An Ikhide & Fitchat (2002) state that the first unit trust in Namibia was launched by Sanlam in 1994, almost 21 years after the first unit trust was established in South Africa. Since the establishment of the first unit trust in Namibia, the industry as a whole has continuously increased its assets over the years. In 1994, the total assets were NAD24 million, by 1995 this figure more than doubled to NAD52 million. The figure was NAD85 million by 1996, NAD213 million by 1997 and NAD260 million by 1998. Some of the known unit trust companies operating in Namibia are Old Mutual Unit Trust Management Company, Standard Bank Unit Trust Management Company, Sanlam Unit Trust Management Company and Investec Namibia.

2.4.11 Micro-Lenders

Namibia is characterised by two distinct specialised types of micro-lending institutions, term and cash lenders. Term lenders offer term loans up to a maximum of four years (fourty-eight months), whilst cash lenders extend credit for a period of up to a month (usually thirty days). Micro-lenders in Namibia are not allowed to take deposits from the public; their services are based on the provision of small loans to a variety of

customers. There were only thirty-four operators in 2002 while they were hundred and seventy in 2005, making the micro-lending sector as one of the fastest growing in Namibia. Micro-lenders require no collateral from borrowers, they use payroll deductions in the case of term lenders and the retention of Automatic Teller Machine (ATM) cards together with their pin codes in the case of cash lenders as security for the loans.

CHAPTER THREE: LITERATURE REVIEW

3.1 Introduction

The aim of this chapter is basically to present the various theories and empirical studies on money demand. It also gives brief discussions of exchange rate and inflation targeting regimes which are very important in this study. Namibia follows an exchange rate targeting regime while South Africa follows an inflation targeting regime. The chapter is divided into four parts, namely: (i) conceptual framework and theoretical literature review (ii) exchange rate targeting, (iii) inflation targeting, (iv) empirical literature.

3.2 Conceptual Framework and Theoretical Literature Review

Money demand and money supply have received the attention of prominent economists in the literature of Economics in general and in Monetary Economics in particular. The early theories of monetary economies are discussed briefly in the sub-sections that follow:

3.2.1 Keynesian Liquidity Preference Theory

This was popularized by John Maynard Keynes in his book on the General Theory of Employment, Interest and Money in 1936. This focus was on money demand and emphasized the importance of interest rates. The theory is concerned with the question of why people hold money. The theory is based on three motives of holding

money. (i) The transactions motive: Keynes emphasised that in addition to the classical approach, where individuals are assumed to hold money because it is a medium of exchange that is used to carry out everyday transactions, this component of the demand for money is determined primarily by the level of people's transactions. According to Laidler (1985), Keynes confined the use of the term transactions motive to describing the necessity of holding cash to bridge the gap between receipts and planned regular payments. His beliefs were based on the premise that those transactions were proportional to income. This depends on the level of income, as income rises, money demand also rises. (ii) The precautionary motive: Keynes recognized that people hold money as a cushion against an unexpected need. This means that money is held for emergencies in this case i.e. to cater for car breakdown, job losses, unexpected bills etc. (iii) The speculative motive: Keynes believed that people also hold money as a store of wealth. This introduced the notion of uncertainty into money holding and for that reason; Keynes argued that uncertainty about the future especially the rate of interest may influence the demand for money. This motive assumed a two asset-world where wealth is held in the form of money or bonds. Keynes believed that money is a perfectly liquid asset and, as such, earns no interest while bonds pay a stream of future income. He referred to this reason for holding money as the speculative motive as he believed that wealth is closely related to income. All the three motives can be put together mathematically in a demand for money Equation known as the liquidity preference function as follows:

$$\frac{M_d}{P} = f(i, Y) \tag{3.1}$$

Where:

- $\frac{M_d}{P}$ is the demand for real money balances

- i is the interest rate

- Y is the real income

He stressed that the demand for real money balances is negatively related to interest rate. This implies that the demand for real money balances increases with a decrease in interest rate. However, the demand for real money balances is positively related to real income, and hence the demand for real money balances increases with increase in real income. Keynes's theory of the demand for money implies that velocity fluctuates with interest rate movements. This is arrived at by the derivation of the liquidity preference function for velocity *PY/M* where *PY* is the nominal level of income while *M* is equal to the demand for money in nominal terms (M_d). The liquidity preference Equation 3.1 above can now be written as:

$$\frac{P}{M_d} = \frac{1}{f(i, Y)} \tag{3.2}$$

Multiplying both sides of Equation 3.2 by Y and letting *Md = M* (money market equilibrium) and then solving for velocity yields:

$$V = \frac{PY}{M} = \frac{Y}{f(i, Y)} \tag{3.3}$$

Where *V* is the velocity of money.

Due to the negative relationship between demand for money and interest rates, velocity follows interest rate movements such that it increases with increase in interest rates. This implies that substantial interest rate fluctuations lead to substantial fluctuations of the velocity of money (Laidler, 1985).

3.2.2 Friedman's Quantity Theory of Money (QTM)

Friedman's quantity theory of money relates the quantity of money to nominal income and it is based on two assumptions. Firstly it assumes that V (from equation 3.3) is constant in the short run. This is due to velocity's dependency on institutions and technology that change slowly. Secondly, quantity (Q) is at full employment level. This is as a result of the assumption that the economy is at full employment at least in the short-run. Friedman's QTM can be expressed mathematically as an Equation of exchange as follows:

$$MV = PQ \tag{3.4}$$

Where:

- M, is the quantity of money;

- P, is the price level;

- Q, is the level of output; and

- V, is the velocity of money, which refers to the number of times that money is used to purchase output

The Equation of exchange states that total spending, which is given by MV, equals what is bought, given by PQ. According to Mishkin (2007), the Equation of exchange

states that the quantity of money multiplied by the number of times that this money spent in a given year must equal nominal income. It illustrates an equilibrium condition in which money is held simply to facilitate transactions.

3.2.3 Irving Fisher's Quantity Theory

Fisher's analysis on the transactions velocity of circulation of money, which simply refers to the rate at which money passes from hand to hand, begins with a simple identity. There are always two parties to each transaction, represented by a seller and a buyer. This implies that the value of sales must equal the value of receipts for the aggregate economy. This further implies that the value of sales must be equal to the number of transactions conducted over a period of time multiplied by the average price. This can all be expressed mathematically as follows:

$$M_S V_T \equiv PT \tag{3.5}$$

Where:

- M_S, is the quantity of money supply;
- V_T, is the number of times money turns over or money's transactions velocity of circulation;
- P, is the price level; and
- T, is the volume of transactions

This is also known as the Equation of exchange. This Equation can be transformed into a relation of quantity theory of money. This is a theory based on the determination of the price level and can be shown as follows:

$$\overline{M_S}\,\overline{V_T} = P\overline{T} \tag{3.6}$$

The bars signify that they are constants and the bar on the quantity of money supply ($\overline{M_S}$) signifies that it is an exogenous variable. The demand for nominal money depends on the current value of the transactions. The supply of nominal money is exogenously given, and equilibrium dictates that the demand must equal supply. This can be shown mathematically as follows:

$$M_d = k_T P\overline{T} \tag{3.7}$$

$$M_d = \overline{M_S} \tag{3.8}$$

Combining the two Equations above yields the following:

$$M_S \frac{1}{k_T} = \overline{M_S}\,\overline{V_T} = P\overline{T} \tag{3.9}$$

Where

$$\overline{V_T} \equiv \frac{1}{k_T} \tag{3.10}$$

The main issue of interest for the Equation of exchange is that the equilibrium value of money velocity depends on k which is the equilibrium value of velocity of money (Laidler, 1985).

3.2.4 The Cambridge Approach

Modeling the demand for money using the Cambridge approach was popularized by Marshall and Pigou. This approach shifts the attention to the question, what determines the amount of money an individual agent would wish to hold, given that the desire to conduct transactions makes money holding desirable? In the Cambridge

approach, the key determinant of people's taste for money holding is the fact that money is a convenient asset to possess as it is universally accepted in exchange for goods and services. The more transactions an individual undertakes, the more money he will want to hold and this is similar to Fisher's approach.

The emphasis in Fisher's approach was on people's desire to hold money, while the emphasis in the Cambridge approach is the need to hold money. This presents the major difference between the Cambridge monetary approach and the Fisher's model. Depending on the volume of transactions an individual is willing to conduct, the demand for money varies with the level of his wealth and with the opportunity cost of holding money. This opportunity cost of holding money simply refers to the income forgone by not holding other assets. Pigou particularly chose to simplify this approach by assuming that for an individual, the level of wealth, the volume of transactions and the level of income move in stable proportions to one another over the short-run. According to Laidler (1985), Marshall and Pigou argued that, other things being equal, the demand for money in nominal terms is proportional to the nominal level of income for each individual and for the aggregate economy as well. They illustrated their arguments mathematically by starting with the demand equation for money as follows:

$$M_d = kPY \qquad\qquad (3.11)$$

The above Equation can be combined with an equilibrium condition in the money market (see Equation 3.8) and yields the following equation:

$$\overline{M_S}\frac{1}{k} = \overline{M_S}\,V = PY \qquad\qquad\qquad (3.12)$$

This is very similar to Fisher's equation (Equation 3.9), but it is important to note that V does not represent the transactions velocity of circulation of money but it represents the income velocity. This is similar saying V does not represent the number of times a unit of money physically turns over, but rather it is the rate of circulation relative to the rate of production of real income. Fisher's approach may be regarded as providing a theoretical model of the money market, which implies a constant equilibrium velocity of circulation in the short-run. The Cambridge approach places its emphasis on the rate of interest and expectations because these variables are expected to vary significantly in the short-run (Laidler, 1985).

3.2.5 The Monetary Inter-Temporal Model

The monetary inter-temporal model is concerned with money being held because it is needed to buy some goods and services that cannot be purchased on credit. This model starts with the concept of neutrality of money, under which a one-time change in the money supply has no real consequences for the economy. This implies that consumption, investment, output, employment, real interest rate and economic welfare all remain unaffected. However, money is only neutral in the long-run and changes in the money supply will tend to have real effects on the economy in the short-run.

In this model, there is a representative household which holds money to purchase some cash goods. This household also can purchase credit goods by means of credit cards and the household always pays its credit card bill at the end of the period. Let

M_d denote demand for money in nominal terms while $\dfrac{M_d}{P}$ will be determined by factors determining the future demand for cash goods. The determinants of the demand for money are as follows:

- The current real demand for money increases when real income, *Y*, increases. This will increase lifetime wealth and thereby increase demand for future cash goods;

- The current real demand for money increases when future real income ,*Y'*, increases, this increases with lifetime wealth;

- The current real demand for money decreases when the nominal interest rate, *R*, increases. The nominal interest rate refers to the opportunity cost of holding money.

The real demand for money can be written mathematically as:

$$\frac{M_d}{P} = L(Y,R) \qquad\qquad (3.13)$$

Where *L(Y,R)* increases in current income and at the same time decreases in the nominal interest rate (*R*). We can take the fisher relation:

$$R = r + i \qquad\qquad (3.14)$$

Where

- *r,* is the real interest rate; and

- *i*, is the inflation rate.

The real demand for money function shown in Equation 3.13 can then be expressed as:

$$\frac{M_d}{P} = L(Y, r + i) \tag{3.15}$$

Equation 3.15 above shows that real money demand increases with real aggregate income Y but decreases with both the real interest rate and the inflation rate i anticipated between the current and future periods. Multiplying both sides of Equation 3.15 above by P yields:

$$M_d = PL(Y, r + i) \tag{3.16}$$

This final Equation simply refers to a nominal money demand Equation (Williamson, 2002).

3.3 Exchange Rate Targeting

Exchange rate targeting, inflation targeting or money supply targeting are among the most common techniques used in the literature to ensure macroeconomic stability. Exchange rate targeting involves the control of the exchange rate to achieve certain economic targets of economic growth, employment and price levels. Exchange rate is been defined as the price of one currency (usually referred to as the domestic currency) expressed in terms of another currency (which is usually foreign currency). It is important to distinguish between nominal and real exchange rates before going into tackling how countries target exchange rates. Nominal exchange rate refers to the relative price of one currency expressed in terms of another, whilst real exchange rate is obtained by multiplying the nominal exchange rate by the ratio of the domestic and foreign price levels. Mathematically, this can be expressed as follows:

RER = E (P/P*), where E is the nominal exchange rate expressed as units of foreign currency per units of domestic currency unit, P is the domestic price level and P* is the foreign price level. Nominal exchange rate is normally observed in the financial markets, but real exchange rate is not, and is instead approximated (Belongia & Chystal., undated). Exchange rate is a highly volatile variable as it fluctuates often, following the pattern of international trade of the country with its trading partner. This is the case of market free-floating exchange rate.

With exchange rate targeting, the issue has often been one that concerns the stabilization of the nominal value of the exchange rate with special emphasis on reducing the adverse trade effects of exchange rate variability with a free floating exchange rate system. However, arguments that volatile exchange rates impede trade because of the increased uncertainty they generate have found little or no empirical support in the literature (Belongia & Chystal., undated). Furthermore, economic theory does not demonstrate that reducing exchange rate variability contributes to an improved economic performance. Exchange rate targeting has not been an easy tool in trying to reach macroeconomic stability. The main problem has been that only nominal exchange rate are observed in the world financial markets and as such, exchange rate targets are also expressed in nominal terms. Policymakers in this case often find it difficult to distinguish whether changes in the nominal exchange rate are due to nominal or real sources.

It has been documented that to maintain target values for nominal exchange rates, domestic monetary policy needs to have two options. First, it must pursue either an expansionary monetary policy that will produce only an increase in domestic inflation

rate, or secondly, it must pursue contractionary monetary policy that will exacerbate an underlying economic downturn (Belongia & Chystal, undated).

The BoN has been pursuing an exchange rate targeting framework as the Namibia dollar and the South African Rand are one-to-one. A country that chooses a fixed exchange rate system subordinates its monetary policy to the exchange rate objective and is not effectively able to target directly any other nominal variable, such as the rate of inflation (Masson *et.al.*, 1998). This is the option the BoN adopted, following its limited power to effectively influence money supply in the fixed exchange regime with South Africa. Exchange rate targeting in Namibia is said to have credible and sufficient back up reserves (Heita, 2008). It is important to note that Namibia's monetary policy objective is to support the fixed exchange rate between the Namibia dollar and the South African Rand. This policy has been effective in attaining the ultimate monetary policy objective of price stability (http://www.sadcbankers.com).

3.4 Inflation Rate Targeting

Inflation rate targeting is an important tool that can be employed to curb against unstable and high inflation rates. It is based on the premise that the main goal of monetary policy in any country must be the attainment and preservation of a low and stable inflation rate. According to Masson *et al.*, (1998), the notion of inflation targeting has been debated in the literature and has been widely accepted of late, due to agreement on the following four basic proportions:

- In the medium-to-long run, an increase in money supply is neutral. This means an increase in money supply has lasting effects only on the price level and not on output or employment.

- In terms of either the allocation of resources or long-run growth in output or both, high and variable inflation is said to be costly.

- In the short-run, money supply is said to be non-neutral. This means monetary policy has important transitory effects on a number of real variables, including output and unemployment. There are misunderstandings with regards to the nature and size of those effects including their time frame, and the means by which monetary impulses get transmitted within the economy.

- Monetary policy affects the rate of inflation with lags of uncertain duration and varying length. The lags normally make it difficult for the central bank in controlling inflation on a period by period basis.

From the literature, inflation targeting is regarded as one of the best policy frameworks to improve the effectiveness of monetary policy. An inflation targeting framework can be seen as one that can improve the effectiveness of monetary policy. This is the case when one considers the design, implementation and performance of monetary policy as compared to other procedures that central banks normally follow in that they lack transparency. The first requirement for any country considering the adoption of inflation targeting is that the central bank should have a considerable degree of independence. Secondly, the monetary authorities should refrain from targeting the

level or path of any other nominal variable, such as wages or nominal exchange rate (Masson *et al*., 1998).

According to Masson *et al*., (1998), New Zealand is credited as being the first country to pursue an inflation-targeting framework to curb against price instability. Other notable developed countries that have adopted the inflation targeting regimes include Canada, the United Kingdom, Sweden, Finland, Australia and Spain. These countries have been found to possess similar characteristics. Inflation targeting in these countries are forward looking in that it offers the benefit to offset foreseeable deviations of future inflation from the specified targets. Inflation targeting is often used as a tool to improve the credibility of the general framework of macroeconomic policy. Those countries use short term interest rates as their main operating instrument and rely on well-developed financial markets to alter long term rates and in transmitting the effects of the changes to aggregate demand and inflation. Price stability plays an important role in ensuring macroeconomic stability of any economy.

South Africa adopted the inflation targeting framework aimed at maintaining a target of 3-6% in early 2000. With inflation targeting in South Africa, monetary policy aimed at reducing inflation and thereby improve international competitiveness. According to Heita (2008), inflation targeting in Namibia is not such an attractive option given that 65% of Namibia's inflation is imported from South Africa. This implies that Namibia is then likely to import the benefits from inflationary target measures implemented in South Africa. The BoN can play a role in influencing 35% of the inflation that is generated locally but cannot influence the remaining 65% of the inflation imported from South Africa.

There are some notable problems with the adoption of inflation targeting in the developing world. Developing countries tend to have high interest rates and in situations like that, fiscal and monetary policies become inseparable. This implies that such countries do not meet the requirements for adopting inflation targeting frameworks. In these situations, comprehensive stabilization policy coupled with fiscal consolidation, tightening of monetary policy and institutional reforms will achieve a lasting reduction in inflation.

3.5 Empirical Literature

Many Economists have written numerous papers on money demand and supply for different countries around the globe. However, literature on money supply or money demand in Namibia is limited, with the exception of Katjomuise & Ikhide (1999) in their study on estimating the demand for money Namibia. They suggested that M2 exhibits greater stability relative to M1. They used M2 as the dependent variable, with expected inflation and real income (GDP) as the independent variables.

Felmingham & Zhang (2000) did a study of the long run demand for broad money in Australia and suggested a stable long run based on the broad definition, M2 relationship for Australia. Nell (1999) carried out a study on the stability of money demand in South Africa for the period 1965 to 1997 and found the following: the first findings are that there existed a stable long-run demand for money function based on M3 in South Africa. Secondly, he found that the demand for M1 and M2 displayed parameter instability following financial reforms since 1980. Similar results for M3 were suggested

by Humavindu (2007) in his study on estimating the demand for money in South Africa when he showed that M3 was more stable than M2.

Ewing & Payne (1999) established that income and the interest rate are not sufficient for the formulation of a long-run stable demand for M1 and M2 in Chile. The stability of money supply is crucially important in the conduct of monetary policy in an economy as supported by these empirical works on other countries.

A stable money demand function would thus mean that the quantity of money is related to some key economic variables. It is important to note that there was low monetization at independence as compared to other periods and this may suggest the possibility of a structural break in Namibia during the period of review. There is a strong possibility that changes in the financial environment may have rendered unpredictable short-run deviations of money supply from their long-run equilibrium.

Lutkepohl *et.al.,* (1999) investigated the stability and linearity of a German M1 demand function and made two conclusions: First, the empirical evidence pointed towards a stable linear relationship between M1 money, income, interest rate and inflation before the German Monetary Union (GMU) in 1990. Second, the GMU has scarcely disrupted that stable linear relationship between variables. Overall, their results seemed to suggest that M1 may not be a suitable intermediate target for monetary policy in Germany.

Teles & Zhou (2005) in their study on a stable money demand: looking for the right monetary aggregate concluded that M1 is not an appropriate measure of money, following the regulatory reforms and innovation in electronic payments since the early 1980s. They suggested using an alternative that is a more appropriate measure of money,

that is, money zero maturity (MZM), the long-run relationship between money and its opportunity cost will be preserved.

Hamori (2008) analysed the empirical analysis of the money demand function in the Sub-Saharan Africa, using annual data on 35 countries from 1980 to 2005. He found that there exists a co-integration relation with respect to money demand in the Sub-Saharan African region over the period from 1980 to 2006, regardless of whether M1 or M2 is used as the money supply measure. The study also suggested that due to the existence of a stationary relationship between money supply, output and price level, in attempting to control the price level (or output), the reliability of money supply as a target variable holds.

3.6 Conclusion

The chapter presents the reviews of both theoretical and empirical literature. The literature reviewed show that the key determinants of money demand are interest rate, inflation and income. These findings are supported by common theories, such the Keynesian Model, the Classical model, which assumes that output is constant in the short run and many others. However, since Namibia follows a policy of exchange rate targeting, the current study employs the exchange rate as one of the key variables in the regression analysis. Since exchange rate is not a common variable used in previous work, findings of this variable will remain an empirical issue.

CHAPTER FOUR: RESEARCH METHODOLOGY

4.1 Introduction

The study employs econometric techniques to determine the stability of the demand for real money in Namibia using both M1 and M2 for the period 1993 to 2006. Quarterly time series data from 1993 to 2006 is used to investigate stationarity of all the variables. Stationarity exists when a series' mean and variance do not vary in any systematic way through time. If time series data are non-stationary, then there could be statistical problems arising from misleading results in using important test statistics, which are central to the interpretation of econometric results. The important test statistics includes the t statistic, F statistic, coefficient of determination, R^2 and the Durbin-Watson (DW) statistic. The study makes use of the Engle-Granger co-integration technique to establish long-run and short-run relationships between the money measures M1 and M2 and the different variables used as their determinants.

4.2 Data Sources and Estimation Techniques

The study uses quarterly secondary data obtained from the Bank of Namibia and the Central Bureau of Statistics (CBS) section of the National Planning Commission (NPC). The period of study ranges from 1993:Q1 to 2006:Q4; representing a sample size of 56 quarterly observations. The study uses econometric techniques of unit root to test for stationarity of time series data. Among these approaches is the Augmented Dickey-Fuller (ADF) test followed by the Engle-Granger (E-G) process of co-integration.

Further, the CUSUM and CUSUMQ tests are performed to test for structural break, followed by regression models using CPI, exchange rate, interest rates and income as determinants of money demand.

4.3 Model Specification

The theoretical models reviewed in chapter three forms the basis for the model developed in the current study. However, the model includes exchange rate as one of the key variables given that the BoN targets exchange rate. The model is presented as follows:

$$m = f(y, cpi, r) \tag{4.1}$$

Where:

- m, is the real money demand (M1 or M2);

- y, is the real output (scale variable);

- cpi, is the rate of inflation; and

- r, is the nominal interest rate.

The model given in Equation 4.1 can be restated with the inclusion of the exchange rate variable in log linear form as follows:

$$\ln M_t = \alpha_0 + \beta_0 \ln Y_t + \beta_1 \ln R_t + \beta_2 \ln Cpi_t + \beta_3 \ln ER_t + \mu_t \tag{4.2}$$

The variables given in Equation 4.2 are described in Table 4.1 with their expected signs based on economic theory. The subscripts are suppressed for convenience.

Table 4.1: Descriptions of variables in the study

Variable	Description of Variables	Expected Signs
M	Real money demand, M1 or M2	Not applicable
Y	Gross Domestic Product (GDP) in real terms	Positive
R	Bank rate as a proxy for nominal interest rate	Negative
Cpi	Rate of inflation	Negative
ER	Exchange rate between the United States Dollar and the Namibia Dollar	Positive

Source: Author's own construct.

General economic theory serves as a guide for the above listed expected signs. Money demand increases with increases in real income and exchange rate, while it decreases with increasing interest rate and the CPI. Different studies on money demand and money supply not often included exchange rate as one of the variables for consideration in stability analysis. The BoN's focus is on the exchange rate targeting and thus this study adopts the exchange rate variable according to the BoN's monetary approach of targeting exchange rate.

4.4 Definitions of Variables

This section gives descriptions of variables employed in this study. Money demand is according to the definitions of both M1 and M2 as adopted by the BoN. A measure of real money can be arrived at by deflating the nominal variable by an index, such as the Gross National Product (GNP) or Gross Domestic Product (GDP) deflators or the CPI can be used as a proxy for the true price deflator. However, the use of the GDP deflator may in some cases not be very appropriate. This is the case as it might be heavily influenced by the primary sector output such as the mining industry which constitutes a larger share of total output in Namibia.

A Consumer Price Index (CPI) is used instead of GDP deflator as a proxy for the true price deflator and this is appropriate in Namibia where price controls are not in place. Price controls may extort the CPI in that it is arrived at by taking heavily weighted officially set prices. One advantage of using the CPI is that it is readily available in monthly and quarterly series as opposed to the GDP deflator, which is only available on an annual basis. The other advantage is that the CPI includes imports while excluding exports.

The GDP refers to the total value of goods and services produced within the borders of a country in one year. This study also adopts real GDP as a measure of real income. This choice of variable is supported by availability of GDP data for the period 1993:Q1 to 2006:Q4. The exchange rate employed in the study has been included to capture the currency substitution effect. This effect refers to holding foreign currency as a substitute for the domestic currency. The exchange rate is simply the price of foreign currency expressed in terms of the domestic currency. This is included in the study as it is an important variable in the BoN's monetary policy. It affects money demand in one way or the other.

The interest rate employed in the study is the bank rate, which is the rate at which the BoN lends money to the commercial banks when they are temporarily short of cash. CPI is the index capturing the general and sustained increase in prices of goods and services in an economy. The Central Bureau of Statistics (CBS) collects information relating to prices of a variety of goods and services every month and uses this data to calculate price changes for those sets of goods and services. Inflation is an important

variable in this study as it reduces the purchasing power of people's disposable income, and as such affects money demand in the economy.

4.5 Stationarity

Stationarity in variables is very important in econometric analysis especially when one is to study the behavioural pattern of different time series. A series is said to be stationary if the following three conditions are simultaneously satisfied:

- the mean is constant through time, that is,

$$E(X_t) = \mu \tag{4.3}$$

- the variance is constant through time, that is,

$$Var(X_t) = E[(X_t - \mu)] = \sigma^2 \tag{4.4}$$

- the covariance depends only upon the number of periods between two values, that is,

$$Cov(X_t, X_{t+k}) = E[(X_t - \mu)(X_{t+k} - \mu)] = \gamma_k \tag{4.5}$$

Stationarity is a very important characteristic as models containing variables that are non-stationary could lead to spurious (misleading) regression results. These could lead to incorrect conclusions being made thus leading to incorrect policy formulations. However, the problem of non-stationarity can be addressed by differencing the variables a number of times to generate stationarity (Gujarati, 2003).

4.5.1 Test for Stationarity

There are two approaches for testing for stationarity of a variable. The first method involves looking at the plot of the variable to see if there is an obvious trend in the data. The second method, which is more preferred involves performing the Dickey-Fuller (DF) tests of stationarity by testing the hypothesis that a serie is unit root (AR(1)). Regression analysis in respect of the DF test is done according to three different forms as follows:

$$\Delta Y_t = \delta Y_{t-1} + \mu_t \tag{4.6}$$

$$\Delta Y_t = \beta_1 + \delta Y_{t-1} + \mu_t \tag{4.7}$$

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \mu_t \tag{4.8}$$

Equation 4.6 shows that Y_t is a random walk, Equation 4.7 shows that Y_t is a random walk with drift while Equation 4.8 shows that Y_t is a random walk with drift around a stochastic trend. The null hypothesis in all the three equation is that $\delta = 0$, which implies presence of a unit root, hence the non-stationarity in the time series. The alternative hypothesis is that δ is less than zero, implying stationarity in the time series. The subscript t refers to time or the trend variable. The decision of rejecting the null hypothesis confirms stationarity in the time series. The DF test has a disadvantage of being based on the AR(1) process only and it assumes that the error term, μ_t, is not correlated with μ_{t-1}. This makes the DF test not a very useless test whenever the error terms (μ_t and μ_{t-1}) are correlated. The problem of having correlated error terms is solved by augmenting the three forms above by including a lagged dependent variable ΔY_t. This

refers to a new test, called the Augmented Dickey-Fuller (ADF) test. This specifically refers to the transformation of Equation 4.8 above to the following regression model:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} \sum_{i=1}^{m} \alpha_i \Delta Y_{t-i} + \varepsilon_t \qquad (4.9)$$

Where α_i is a white noise error term. The main aim of the ADF is to ensure that the error term in Equation 4.9 is serially uncorrelated through the inclusion of enough terms. The null hypothesis remains the same for both the DF and the ADF tests.

4.6 Co-integration

Co-integration refers to a long-run relationship of variables linked to form an equilibrium relation when individual series are non-stationary in levels, but become stationary with differencing. This implies that if two or more series are non-stationary, given that a linear combination of them is stationary, then the series are said to be co-integrated. Two or more series are co-integrated when they have comparable long-run properties. This implies that although individual series could be unstable and diverge from each other in the short-run, they may converge towards a long-run equilibrium value. Co-integration is very important as it provides a way of eliminating the problem of spurious regressions in non-stationary series. It also helps in identifying both the long and short-run relationships.

4.6.1 Testing for Co-integration

Co-integration seeks to avoid spurious regressions of non-stationary series as highlighted earlier. Two non-stationary series are said to be co-integrated if they tend to move together through time. This study adopts the Engle-Granger (E-G) two step approach in testing for univariate co-integration. This approach tries to investigate the possibility of co-integration in bivariate models. When a set of economic variables are co-integrated, a statistical foundation is laid which enables the use of an Error-Correction Model (ECM). The null hypothesis is usually that the two series are not co-integrated while the alternative hypothesis is that the two series are co-integrated. These hypotheses can be formulated formally as follows:

H_0: X and Y are not co-integrated, this implies that μ_i's are I(1); versus

H_1: X and Y are co-integrated, this implies that μ_i's are I(0)

The decision is made based on the following condition: if the test statistic is less than its critical value, then the null hypothesis is rejected, and hence, the alternative hypothesis is accepted. The test of co-integration is applied to residuals from which the co-integration regression Dickey-Fuller (CRDF) test is performed. Let's consider:

$$\hat{u}_t = \rho \hat{u}_{t-1} + w_t \tag{4.10}$$

Subtracting $\hat{u}_{t-1}$ from both sides of (10) yields:

$$\Delta \hat{u}_t = (\rho - 1)\hat{u}_{t-1} + w_t \tag{4.11}$$

Or

$$\Delta \hat{u}_t = \alpha \hat{u}_{t-1} + w_t$$

Where $\alpha = \rho - 1$

It is worth noting that there is no constant in the regression. The null hypothesis is no co-integration against the alternative hypothesis that X and Y are co-integrated. This implies that we test for:

H_0: $\alpha = 0$ (hence $\rho = 1$) and $\hat{u}_t$ is I(1); versus

H_1: $\alpha = 1$ (hence $\rho < 1$) and $\hat{u}_t$ is I(0)

Equation 4.11 above is estimated by OLS. The test statistic is calculated as the t-statistic associated with the coefficient on the residuals, given as t = $\dfrac{\alpha}{SE(\hat{\alpha})}$.

The decision to reject the null hypothesis is based on the following condition; if calculated value of test statistic is greater than critical value, then the null hypothesis of no co-integration is rejected. This means that X_t and Y_t are co-integrated.

4.7 Model Diagnostic Testing

This section presents various econometric diagnostic tests, which can be adopted to investigate whether a certain model is a reasonable fit for the data. One of the main reasons for diagnostic testing is to determine whether the model conforms to the classical assumptions of the Ordinary Least Squares (OLS) regressions such as normality, no serial correlation, homoscedasticity and correct functional form. The diagnostic tests are shown by the various statistics, such as the coefficient of determination, R^2, the D-W statistic, the F-statistc and others.

The R^2 simply helps give an indication of how well the sample regression line fits the data. An R^2 equal to one indicates a perfect fit of the sample data while an R^2 equal to

zero indicates that there is no relationship between the dependent and the explanatory variables. This implies that the higher the R^2, the better the regression model. It also shows how much of the dependent variable is explained by the independent variables in the study.

The Jargue-Bera (JB) test for normality is performed to test the null hypothesis that the error term is normally distributed. This test follows a chi-square distribution with two degrees of freedom. The normality of the error term allows the use of hypothesis testing for statistical inference.

4.8 Testing for Structural Stability

This study employs the CUSUM and CUSUM of squares (CUSUMQ) to test for stability of the Namibian money demand. Although the long-run relationship may have been confirmed through the co-integration test, it is possible that some changes in the Namibian economy may have rendered unpredictable short-run deviations of money demand from the long-run equilibrium values. The CUSUM test is very important in detecting systematic changes in the regression coefficient, while the CUSUMQ test is crucial when the consistency of the regression coefficient is sudden. For the two tests, existence of parameter stability is established whenever the cumulative sum of the residual lies between the two critical (dotted) lines.

CHAPTER FIVE: INTERPRETATION OF RESULTS

5.1 Results

This chapter presents the results of the models given in chapter four. Before running the regression models showing the long run and short run relationships, it is necessary to test for stationarity (unit root) of the variables, followed by the test for co-integration. A test of co-integration involves assessing the long-run relationships among variables. An error-correction model (ECM) uses the same variables in difference form and includes the lagged residual from the long-run model as an explanatory variable. The stability of the model is then examined to see whether any structural break exists in the model during the period of study. When working with time series data, the first step is always to take a look at the graphical plots of the variables. This approach depicts the trend of a variable to see whether it is stationary or not. Time series regressions require the data to be stationary, implying that the mean, variance and covariance of the data series must not depend on the time in which they are observed.

5.2 Graphical Analysis

The behavior of all variables in the model can be examined from graphical plots given in Figures 5.1 and 5.2 respectively. The plots give an idea on whether there are structural breaks or drifts. It is also helpful in examining trends and stationarity of the data. It is against this background that all variables in the model are plotted against time to give an idea about each variable's movements over time.
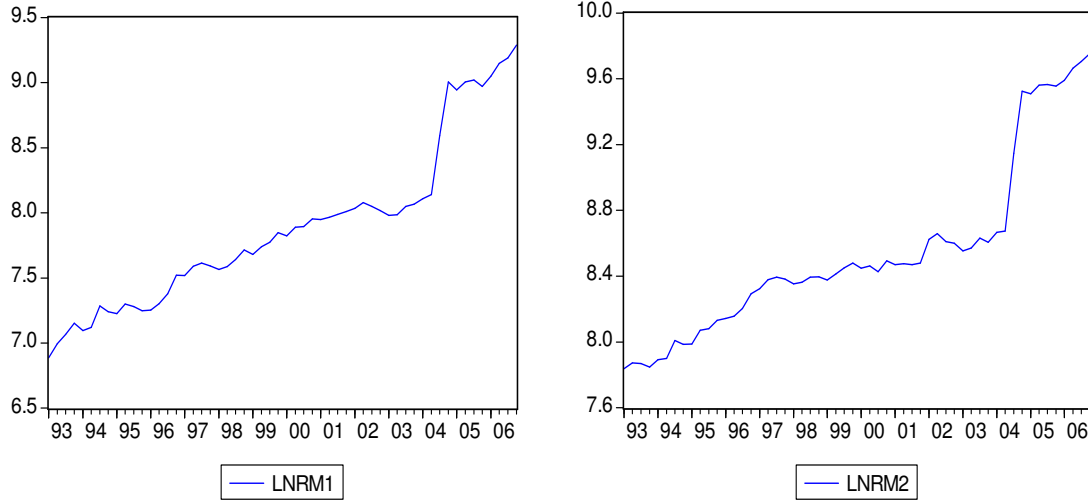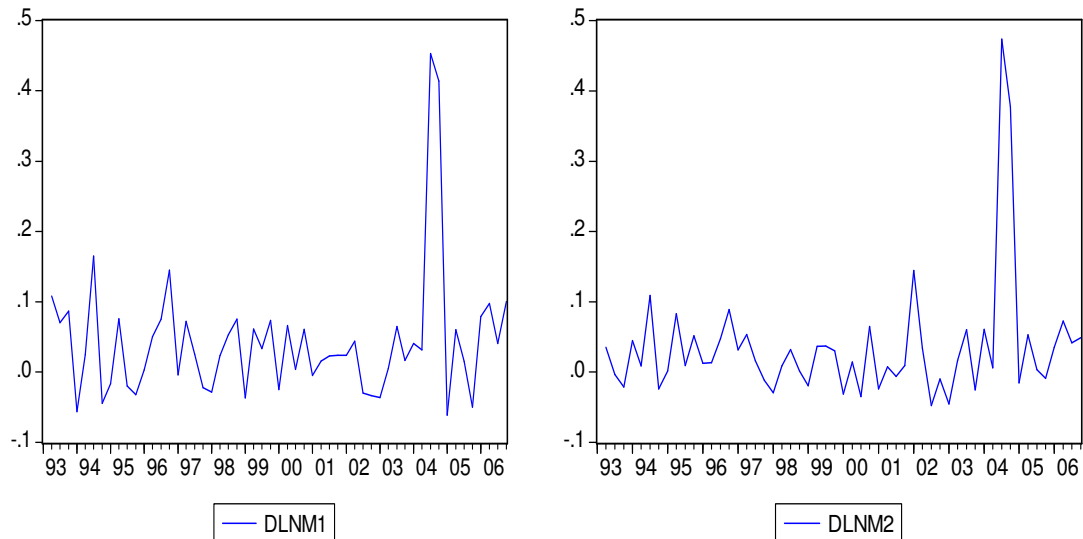
Figure 5.1: Plot of Variables in levels

Figure 5.1 shows that M1 and M2 series are non-stationary in log transformation as they are increasing over time. Non-stationarity is indicated by the fact that none of the above Figures fluctuate round a zero mean which is supposed to be an indicator of stationarity.

Figure 5.2: Plots of Variables in first differences

The above plots for differenced M1 and M2 have a constant mean, thereby indicating stationarity in both M1 and M2. However, this alone is not sufficient, hence there is a need to test for co-integration in variables by performing unit root tests. The results of the Augmented Dickey-Fuller (ADF) test are given in Section 5.3.

5.3 Unit Root Tests

For the ADF test, the null hypothesis is that there is a unit root in the time series and the time series is not stationary. Rejection of the null hypothesis implies that the level is stationary. Table 5.1 presents the results with constant; and with constant and trend respectively.

Table 5.1: Results of unit root test

Variable	Constant	Constant &Trend	Level of integration
ln M1	-0.938799	-2.63615	I(1)
ln M2	-0.858982	-2.26782	I(1)
ln Y	0.122142	-5.37223	Inconclusive
ln Cpi	-2.05117	-1.69822	I(1)
ln R	-1.4737	-3.07963	I(1)
ln ER	-1.60031	-1.31749	I(1)
Δ ln M1	-5.73853	-5.69244	I(0)
Δ ln M2	-5.31677	-5.35886	I(0)
Δ ln R	-4.35735	-4.29185	I(0)
Δ ln Cpi	-4.73574	-5.0661	I(0)
Δ ln Y	-9.12911	-9.18969	I(0)
Δ ln ER	-3.91262	-3.94611	I(0)

Note: I(1) refers to non-stationary series which has to be differenced once to generate a stationary series while I(0) refers to Stationary series. Critical value at 5% with 56 observations is -2.1937 with no trend and -3.4904 with trend.

Table 5.1 above suggests that at 5% level of significance, the ADF tests did not reject the hypothesis of non-stationarity for all variables tested in levels, except for lnY which produced inconclusive results. This requires performing the ADF tests by differencing the variables at least once. First, differencing rejects the hypothesis of non-stationarity for both regressions with trend and wit no trend. The critical value with trend is -2.1937 and with trend is -3.4904 which are both less than (in absolute value) the

estimated values for the differenced series given in table 5.1. This implies that the hypothesis of unit root is rejected.

5.4 Empirical Results

5.4.1 Long-run Estimation

The results show that there is a long-run relationship between M1 and its respective covariates. Tables 5.2 and 5.3 present the results of the two long-run Ordinary Least Squares (OLS) regression equations as given by the dependent variables M1 and M2 respectively.

Table 5.2: Long-Run equation for M1

Variable	Coefficient	Standard Error	T-Value	Prob*
C	-6.958722	2.146723	-3.241555	0.0021
Ln ry	3.123282	0.308442	10.12600	0.0000
Ln r	0.104589	0.123523	-0.846716	0.4011
Ln er	0.625565	0.135585	4.613837	0.0000
Ln cpi	-2.908727	0.211151	-13.77560	0.0000
$R^2 = 0.95$				
RSS = 1.042				
*Results are significant at 5%.				

The results presented in table 5.2 suggest that real money demand (M1) is significantly influenced by real income, interest rate, CPI and the exchange rate. Theory suggests a positive relationship between real income and money demand and this is also confirmed by the results above. This means that an increase in real income leads to an

increase in money demand. The negative relationship between money demand and the CPI is observed and also in line with theory. The sign of interest rate also conforms to economic theory. The results further confirm a positive relationship between exchange rate and money demand as expected. The R^2 of 0.95 is reasonable high and suggests that in the long-run about 95 percent of variations in money demand are explained by the variation in real income, interest rate, CPI and exchange rate.

Table 5.3: Long-Run equation for M2

Variable	Coefficient	Standard Error	T-Value	Prob*
Ln ry	2.228479	0.068175	32.68740	0.0000
Ln r	-0.180314	0.081002	-2.226048	0.0304
Ln er	0.666039	0.115132	5.785016	0.0000
Ln cpi	-2.503362	0.159058	-15.73865	0.0000
$R^2 = 0.93$				
RSS = 1.129087				
*Results are significant at 5%.				

The results obtained from the regression of M2 are given in table 5.3. They show that interest rates and CPI have negative significant impacts on money demand, while income and exchange rates have significant positive effects on money demand as expected. All variables have expected signs, and the t-values are statistically significant at 5%. The results obtained from M2 perform relatively better than those from M1. The R^2 of 0.93 is reasonable high and suggests that in the long-run about 93 percent of variations in money demand are explained by the variation in real income, interest rate, CPI and

exchange rate. The other long-run equations for both M1 and M2 are given in the appendix A4.a and A.4.b.

5.4.2 Short-Run Estimation

The co-integration test on the residuals for the M1 regression gives an estimated value of -3.547114, which is greater than the critical tau statistic of -1.95 in absolute values. Similarly, the estimated value of -2.111558 obtained for the residuals of M2 regression show that co-integration exists between M2 and its explanatory variables. The estimated regression equations for short-run Error Correction Models (ECM) for both M1 and M2 are:

$$\Delta \ln M_t = 0.045 - 1.016\Delta \ln Cpi_t + 0.221\Delta \ln ER_t - 0.169ECM(1)_{t-1} \qquad (5.1)$$

$$\Delta \ln M_t = 0.037 - 1.056\Delta \ln Cpi_t + 0.196\Delta \ln ER_t - 0.077ECM(2)_{t-1} \qquad (5.2)$$

Where Δ is the difference operator while ECM(1) and ECM(2) are the residuals from the two regression equations respectively. The coefficient of lagged residuals of the ECM for M1 indicates that roughly over 16% of the deviations from the ECM would adjust towards its long-run equilibrium on average. Similarly, the coefficient of the coefficient of lagged residuals of the ECM for M2 indicates that nearly 8% of the deviations from the ECM would adjust towards its long-run equilibrium on average.

5.4.3 Diagnostic Tests

The Lagrange Multiplier (LM) test for autocorrelation in the residuals up to order 3 presents no problem with regards to autocorrelation for M2. This implies that the null
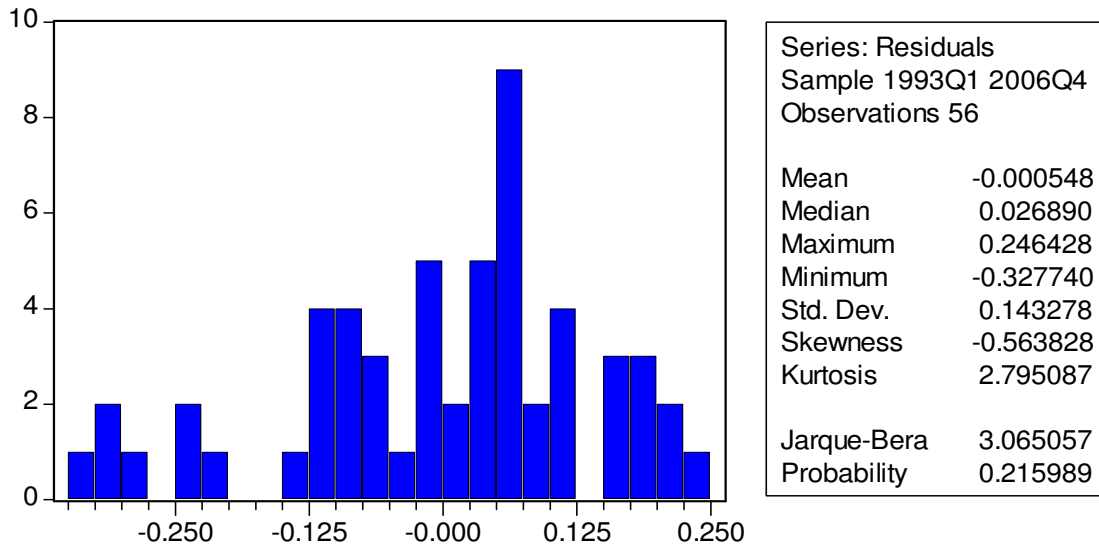
hypothesis of no autocorrelation is not rejected at the 5% significance level. However, the LM test up to order 3 conducted on M1 presents the problem of autocorrelation as the null hypothesis is rejected at the 5% significance level.

The two models in this study obtained R^2 of 0.95 and 0.93 respectively. This means 95% of variations in M1 money demand are explained by the variations in real income, exchange rate, CPI and interest rate as well as the residual error term. Similarly, 93% of variations in M2 money demand are explained by variations in real income, exchange rate, CPI and interest rate.

Figure 5.3: Jargue-Bera Normality Graph for M1
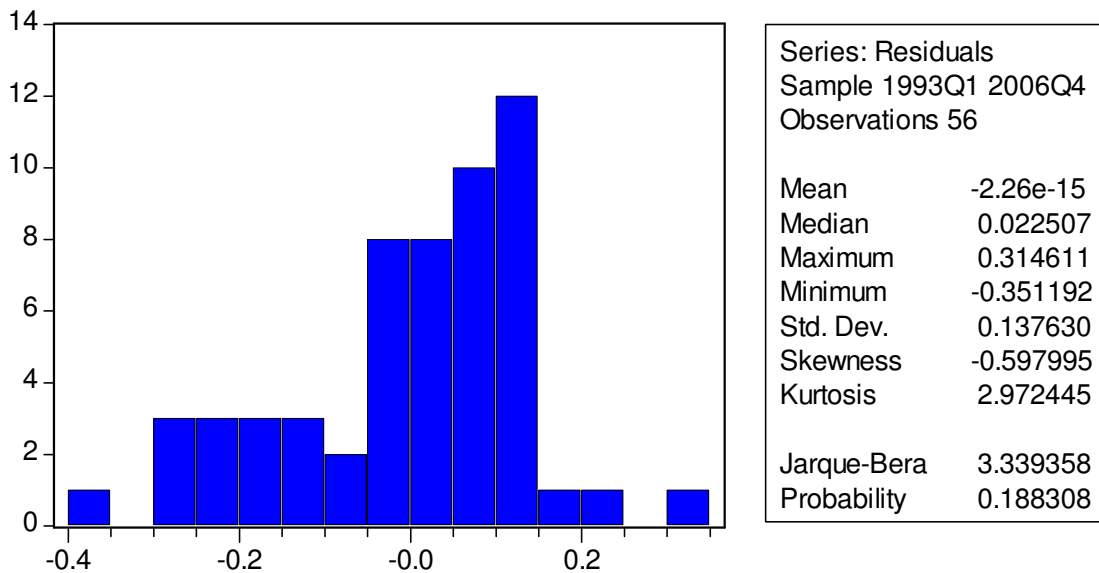
According to the Jargue-Bera (JB) test for M1 shown in Figure 5.3, the error term is normally distributed. This is shown by the JB coefficient of 3.339358, with probability of 0.188308, which implies that the hypothesis that the error term is normally distributed is not rejected at 5%.

Figure 5.4: Jargue-Bera Normality Graph for M2

Series: Residuals	
Sample 1993Q1 2006Q4	
Observations 56	
Mean	-0.000548
Median	0.026890
Maximum	0.246428
Minimum	-0.327740
Std. Dev.	0.143278
Skewness	-0.563828
Kurtosis	2.795087
Jarque-Bera	3.065057
Probability	0.215989

The Jargue-Bera (JB) test for M2 shown in Figure 5.4 implies that the error term is normally distributed. This is shown by the JB coefficient of 3.065, with probability of 0.21598, showing that the hypothesis that the error term is normally distributed is not rejected at 5%.

5.4.4 Stability Tests

The CUSUM and CUSUMQ plots indicate that both M1 and M2 are statistically well within the 5% critical bounds. The results do not indicate any structural breaks in the regression coefficients. This implies stability in all coefficients of the regression equations for the two measures of money demand. The Ramsey's RESET (Regression Specification Error Test) test is based on the null hypothesis that the functional form is adequate. The results do not reject the null hypothesis of correct model specification.
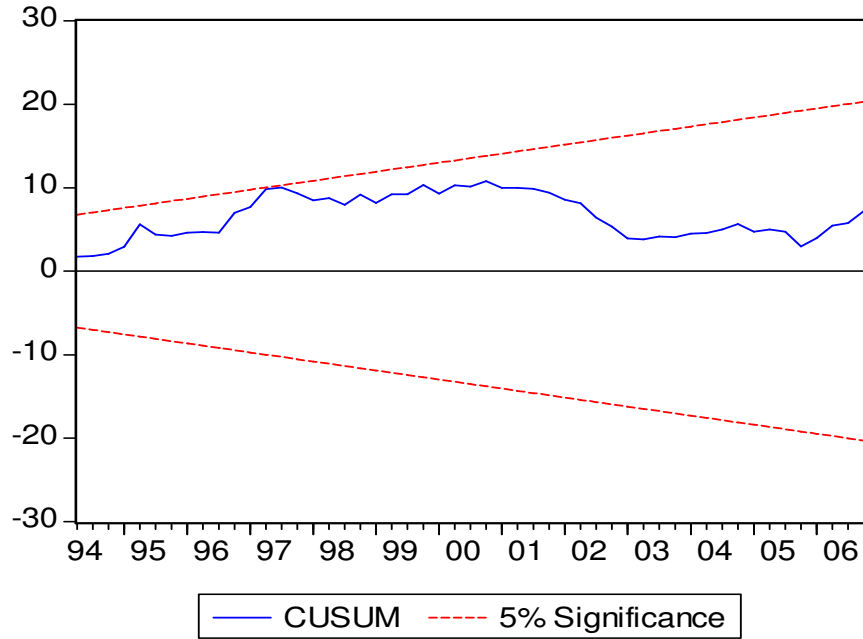
Figure 5.5: CUSUM plot for M1

Figure 5.5 shows that M1 lie within the 5% critical bounds (dotted lines) for the CUSUM test, which implies that, it is stable.
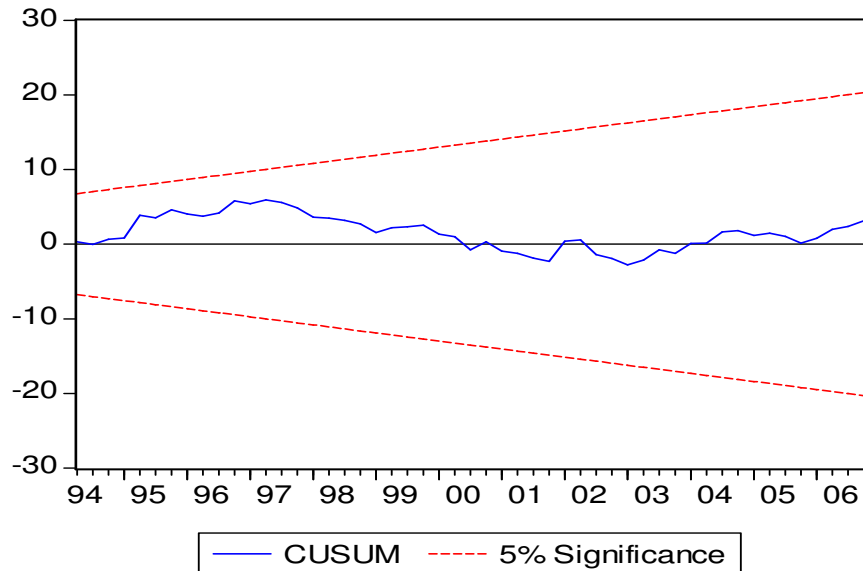
Figure 5.6: CUSUM plot for M2

Figure 5.6 shows that M2 also lie within the 5% critical bounds for the CUSUM test and this implies that it is stable. However, the results point out that M2 is relatively more stable than M1 as M2 is more centred around zero than M1. Tests for structural changes are necessary as there may be a structural change in the relationship between the regressand and regressors. The CUSUM and CUSUMQ tests are useful in detecting systematic changes in the regression coefficient. These tests also helps find out whether the coefficients of the Error Correction Model (ECM) are stable over the sample period. The CUSUM and CUSUMQ plots for both M1 and M2 presented indicate that there has not been a major structural change for the period 1993 to 2006.

CHAPTER SIX: SUMMARY, CONCLUSION AND RECOMENDATIONS

6.1 Conclusions

The main objective of this paper is to investigate the stability of money demand by using both narrow money (M1) and broad money (M2) measure as defined by the BoN. The analyses are to serve as policy tools that guide Namibian authorities on the conduct of monetary policy and its effectiveness. Further, the study is concerned with finding out which of the two measures of money supply, M1 or M2 is more stable. The results show stability of M1 and M2. The CUSUM and CUSUMQ tests further indicate that M2 is relatively more stable than M1, since M2 is more centred around zero, while M1 is above zero for both tests. This is similar to the conclusion arrived at by Katjomuise & Ikhide (1999) in their study on estimating the demand for money in Namibia. They found that M2 exhibits greater stability relative to M1. Further stability results show that there were no major structural changes during the period of study.

Lastly, the paper seeks to determine the relationship between money demand and other nominal variables of interest in the study. Results show significant positive relationship between money demand and income, and exchange rate, which means that, increases in these variables leads to increase in money demand as expected. The results further show that increases in CPI and interest rates lead to decreases in money demand as expected.

6.2 Recommendations and Policy Implications

The relative stability of M2 to M1 implies that authorities should focus on M2 for policy formulation. This is more appropriate since M2 captures more monetary components. The positive significant impact of exchange rate is an indicator that increases (depreciation) in the exchange rate increases money demand as people need more money to trade in goods and services. For Namibia to continue to target exchange rate, there is a need to have sufficient foreign reserves to back the exchange rate. This seems to be working for Namibia, given its membership in the CMA.

The relationship between real money demand and real income is positive and significant for both M1 and M2. This is in line with economic theory. The Ordinary Least Squares (OLS) regression on M1 indicates that all the variables produce the correct signs as expected. However, interest rate is not significant. The OLS on M2 shows that all variables are statistically significant and possess the correct signs.

6.3 Areas for Further Research

The current study used the bank rate as a proxy for the interest rate due to data limitations, for future empirical work, one may consider a different choice of other opportunity cost variable i.e. treasury bills or the lending rate. It is also advisable to increase the sample size depending on availability of data so that the more accurate and reliable results are achieved. Namibia's GDP is heavily dependent on the mining sector hence GDP may not serve as the best proxy for income. Other alternatives such as GNP and household disposable income may be considered as a proxy for income.

REFERENCES

Bank of Namibia.(1990). .*Annual Reports*. Windhoek, Namibia.

Bank of Namibia.(1991). .*Annual Reports*. Windhoek, Namibia.

Bank of Namibia.(1992). .*Annual Reports*. Windhoek, Namibia.

Bank of Namibia.(1993). .*Annual Reports*. Windhoek, Namibia.

Beecham, B.J.(1994).*The Monetary and Financial System.* Third Edition, London

Belongia M.T. and Chrystal K.A, (undated) "*The pitfalls of Exchange Rate Targeting:*

    A Case Study from the United Kingdom"

Ewing B. T. and Payne J. E, (1999) "*Long-run Money Demand in Chile*" Journal of

    Economic Development, Vol.24.No.2, pp 177-190.

Felmingham B and Zhang Q, (2000) "The Long Run Demand for Broad Money in

    Australia subject to Regime Shifts

Gujarati D N, (2003) "*Basic Econometrics*". Fourth Edition, McGraw-Hill, Inc.

Hamori S, (2008) "*Empirical Analysis of the Money Demand Function in Sub-Saharan*

    Africa" Economics Bulletin, Vol. 15, No. 4 pp. 1-15

Heita D, (2008, September 18) *"Banks Got It Wrong*. New Era. pp 1-2

Humavindu R. K, (2007) "*Estimating the Demand for Money in a developing country:*

    the Case of South Africa". *Unpublished Masters Thesis.* University of Namibia,

    Windhoek, Namibia.

Humphrey T M, (1986) "*Essays on Inflation*", Fifth Edition, Richmond, Virginia, Federal

    Reserve Bank of Richmond.

Ikhide S I and Katjomuise K, (1999) "*Estimating the Demand for Money in Namibia*"
Bank of Namibia Occasional Paper, No.1, Bank of Namibia, Windhoek

Ikhide S and Fitchat S, (2002) *"The Financial System in Namibia",* First Edition,
Gamsberg Macmillan Publishers, Windhoek, Namibia

Kalenga P, (2001) "*Monetary Policy Framework in Namibia",* Conference Paper on
Monetary Policy Frameworks in Africa

Likukela M, (2007) "*An Econometrics Analysis of the Determinants of Inflation in
Namibia". Unpublished Maters Thesis.* University of Namibia. Windhoek,
Namibia.

Lutkepohl H, Terasvirta and Wolters J, (1999) "*Investigating Stability and Linearity of a
German M1 Demand Function"* Journal of Applied Econometrics, Vol 14, No. 5,
pp511-525

Masson P R, Savastano M A and Sharma S, (1998) "*Can Inflation Targeting Be a
Framework for Monetary Policy in Developing Countries?".* Finance and
Development.

Mishkin F S, (2007) *"The Economics of Money, Banking and Financial Markets"* Eighth
Edition, Pearson Education, Columbia University, United States of America

Mushendami P L, (2008) "*Financial Development and Economic Growth in Namibia"
Unpublished Maters Thesis.* University of Namibia. Windhoek, Namibia.

Nell K S, (1999) "*The Stability of Money Demand in South Africa, 1967-1997*"
Department of Economics, Keynes College, University of Kent, Canterbury,Kent.

NEPRU, (1999) "*The Namibian Economy", A NEPRU Viewpoint.* No. 26

Pearce D. W, (1992) "*The MIT Dictionary of Modern Economics*"

Republic of Namibia, (1998) "*National Accounts 1982-1997*". Central Bureau of

    Statistics, National Planning Commission, Windhoek

Republic of Namibia, (2007) "*National Accounts 1996-2006*" Central Bureau of

    Statistics, National Planning Commission, Windhoek

Teles P and Zhou R, (2005) *"A Stable Money Demand: Looking for the right Monetary*

    Aggregate" 1Q/2005, Economic Perspective, Federal Reserve Bank of Chicago.

Tsheople T, (2006) "*The Demand for Broad Money (M2) in Botswana" Masters Thesis*

    Rhodes University, Grahamstown, South Africa

Uanguta E and Ikhide S, (2002) "*Monetary Policy Transmission Mechanism in Namibia*"

    Bank of Namibia Working Paper, No.2, Bank of Namibia, Windhoek, Namibia

Williamson S D, (2002) "*Macroeconomics",* Pearson Education Inc, Boston, United

    States of America

http:www.bon.com.na

http:www.dbn.com.na

http://en.wikipedia.org/wiki/Capital_markets

http://www.nsx.com.na/about.php

http://en.wikipedia.org/wiki/Pension_fund

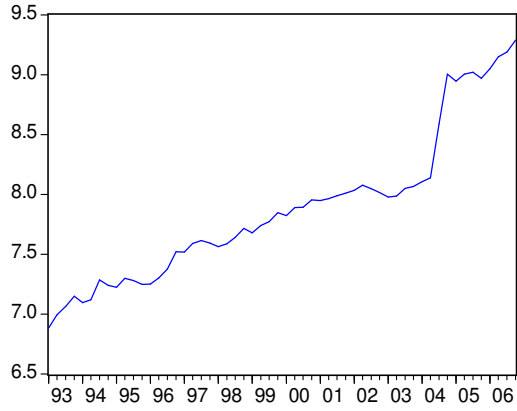http://www.fao.org/ag/ags/agsm/banks/banks/namibia.htm
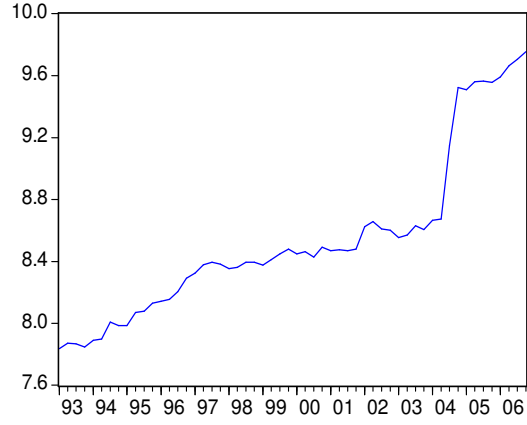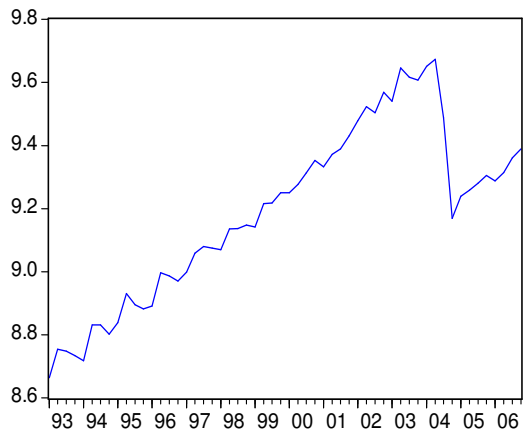
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APPENDIX

A.1: Plot of Variables in levels
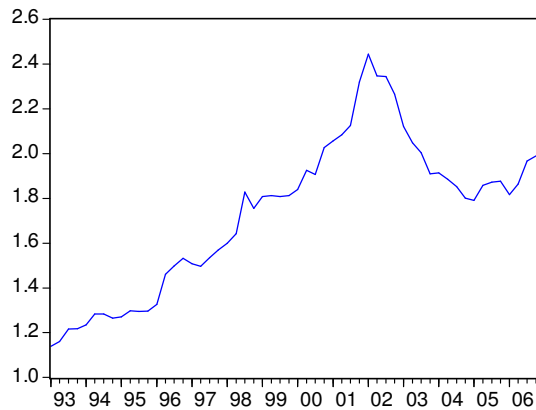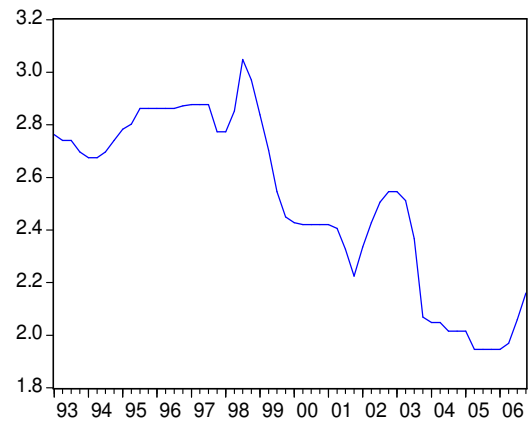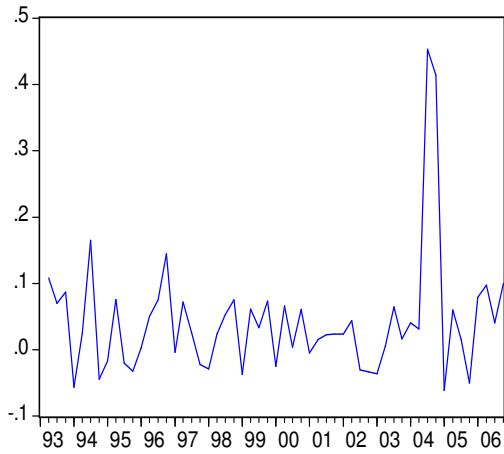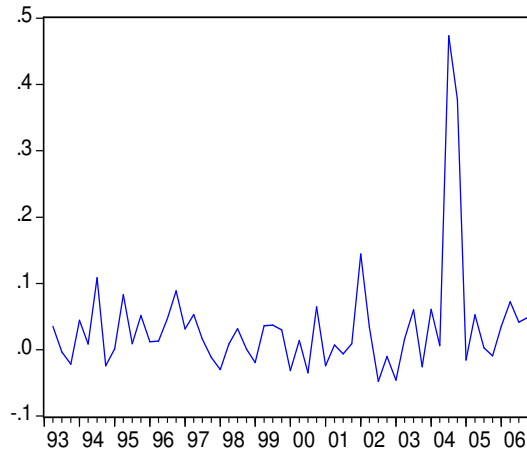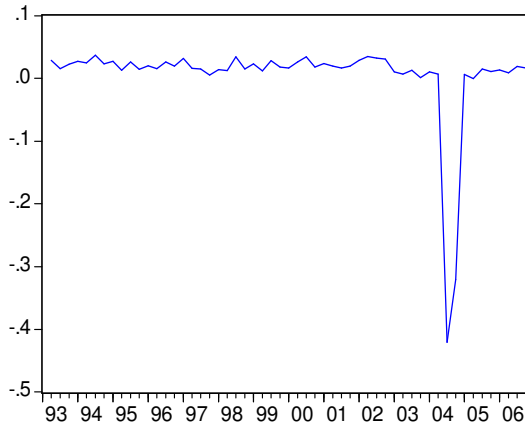

LNRM1

LNRM2

LNRY
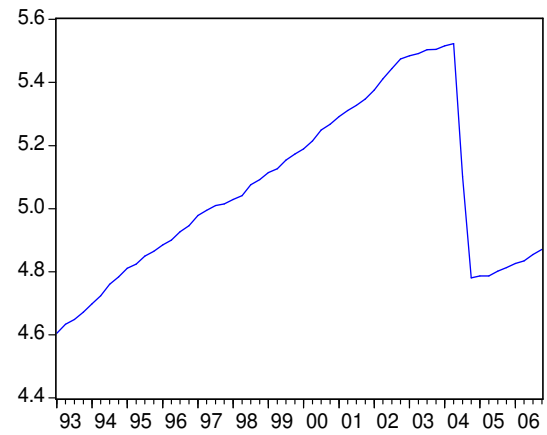
LNCPI

LNER

LNR

A.2: Plots of variables in first differences
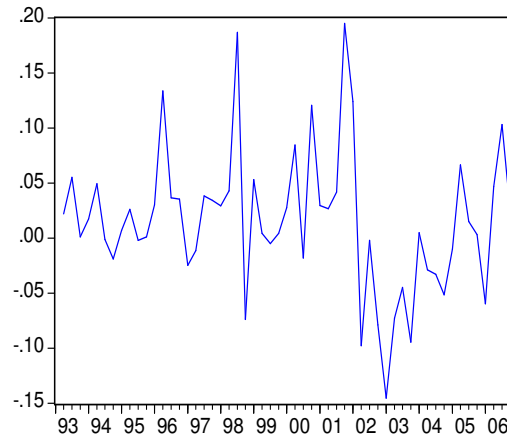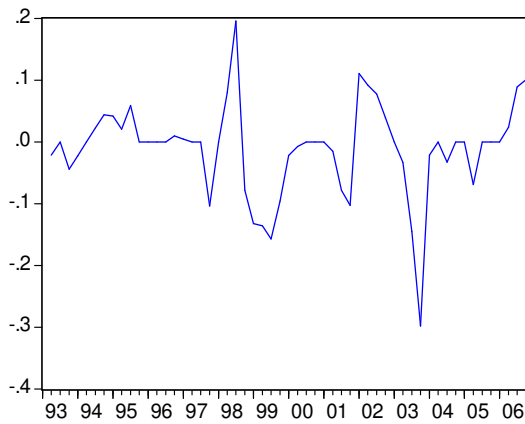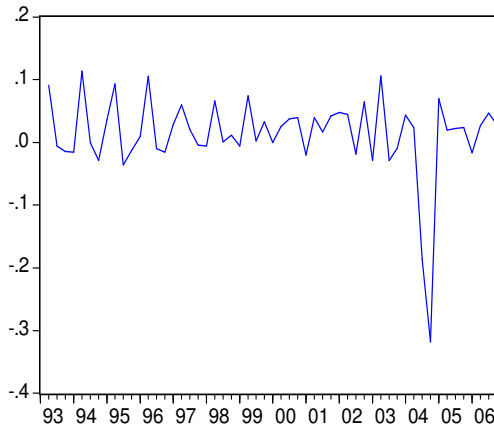

DLNM1

DLNM2

DLNCPI

DLNER

DLNR

DLNY

A.3.a: Equation 2 Results (M1)

Dependent Variable: LNRM1
Method: Least Squares

Sample: 1993Q1 2006Q4
Included observations: 56

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNRY	3.123282	0.308442	10.12600	0.0000
LNR	-0.104589	0.123523	-0.846716	0.4011
LNER	0.625565	0.135585	4.613837	0.0000
LNCPI	-2.908727	0.211151	-13.77560	0.0000
C	-6.958722	2.146723	-3.241555	0.0021

R-squared	0.952538	Mean dependent var	7.882155
Adjusted R-squared	0.948816	S.D. dependent var	0.631743
S.E. of regression	0.142925	Akaike info criterion	-0.967943
Sum squared resid	1.041810	Schwarz criterion	-0.787108
Log likelihood	32.10241	F-statistic	255.8861
Durbin-Watson stat	1.196759	Prob(F-statistic)	0.000000

A.3.b: Equation 2 Results (M2)

Dependent Variable: LNRM2
Method: Least Squares

Sample: 1993Q1 2006Q4
Included observations: 56

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNRY	2.228479	0.068175	32.68740	0.0000
LNR	-0.180314	0.081002	-2.226048	0.0304
LNER	0.666039	0.115132	5.785016	0.0000
LNCPI	-2.503362	0.159058	-15.73865	0.0000

R-squared	0.927997	Mean dependent var	8.543952
Adjusted R-squared	0.923843	S.D. dependent var	0.533958
S.E. of regression	0.147354	Akaike info criterion	-0.923208
Sum squared resid	1.129087	Schwarz criterion	-0.778540
Log likelihood	29.84983	Durbin-Watson stat	0.586127

A.4.a: Equation 3 (M1)

Dependent Variable: LNRM1
Method: Least Squares

Sample: 1993Q1 2006Q4
Included observations: 56

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNR	-0.413562	0.085448	-4.839899	0.0000
LNER	0.874820	0.121452	7.202998	0.0000
LNRY	2.146699	0.071918	29.84920	0.0000
LNCPI	-2.441415	0.167790	-14.55040	0.0000

|			
R-squared	0.942759	Mean dependent var	7.882155
Adjusted R-squared	0.939457	S.D. dependent var	0.631743
S.E. of regression	0.155443	Akaike info criterion	-0.816321
Sum squared resid	1.256458	Schwarz criterion	-0.671653
Log likelihood	26.85699	Durbin-Watson stat	0.647808

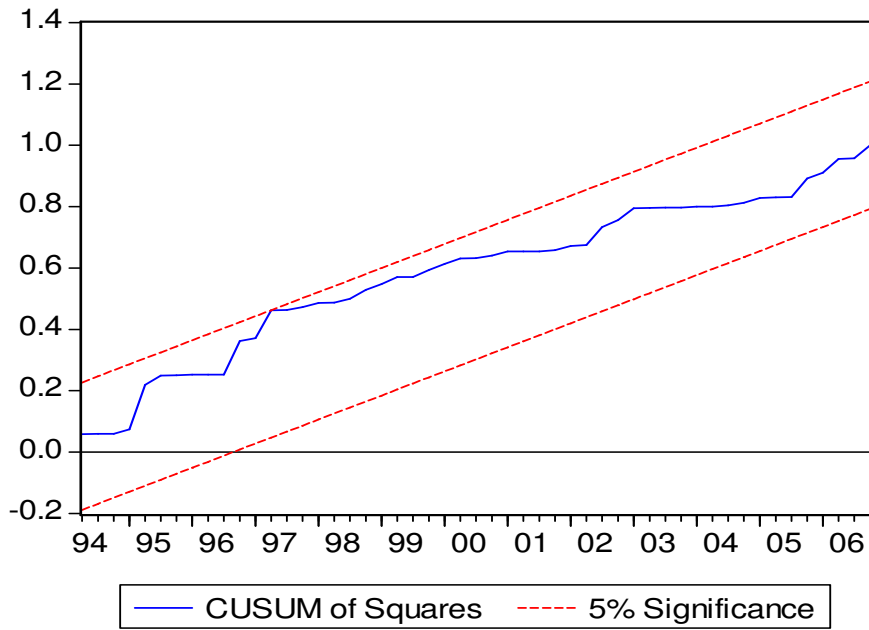## A.4.b) Equation 4 (M2)

Dependent Variable: LNRM2
Method: Least Squares

Sample: 1993Q1 2006Q4
Included observations: 56

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNRY	3.199415	0.289363	11.05675	0.0000
LNR	0.126873	0.115883	1.094836	0.2787
LNER	0.418225	0.127198	3.287986	0.0018
LNCPI	-2.967972	0.198090	-14.98295	0.0000
C	-6.918485	2.013938	-3.435302	0.0012

R-squared	0.941527	Mean dependent var	8.543952
Adjusted R-squared	0.936941	S.D. dependent var	0.533958
S.E. of regression	0.134085	Akaike info criterion	-1.095644
Sum squared resid	0.916915	Schwarz criterion	-0.914809
Log likelihood	35.67804	F-statistic	205.3012
Durbin-Watson stat	1.226897	Prob(F-statistic)	0.000000

A.5 Residual Plots

LNRM1 Residuals

LNRM2 Residuals
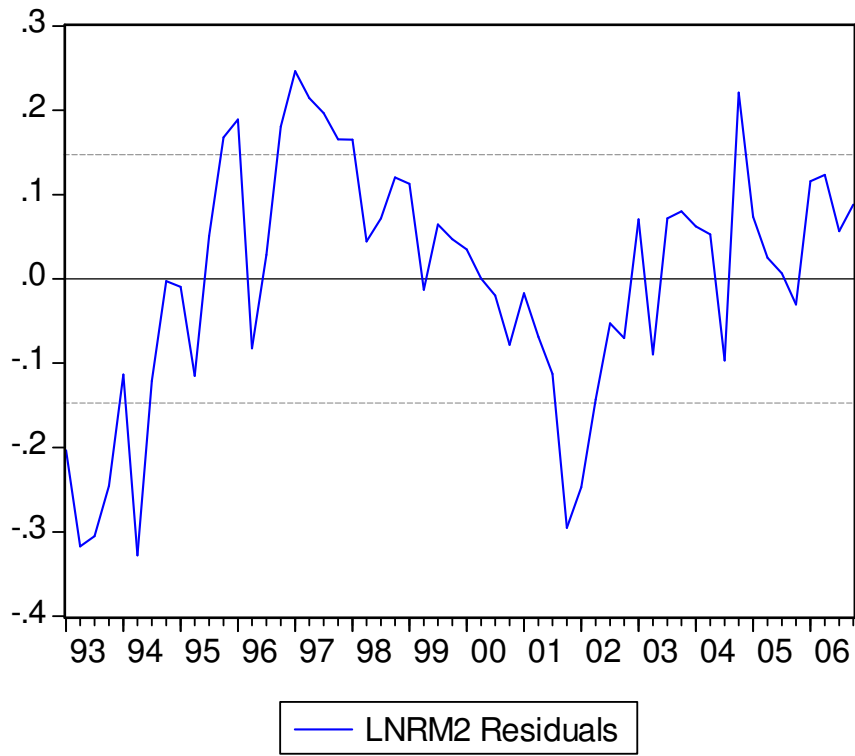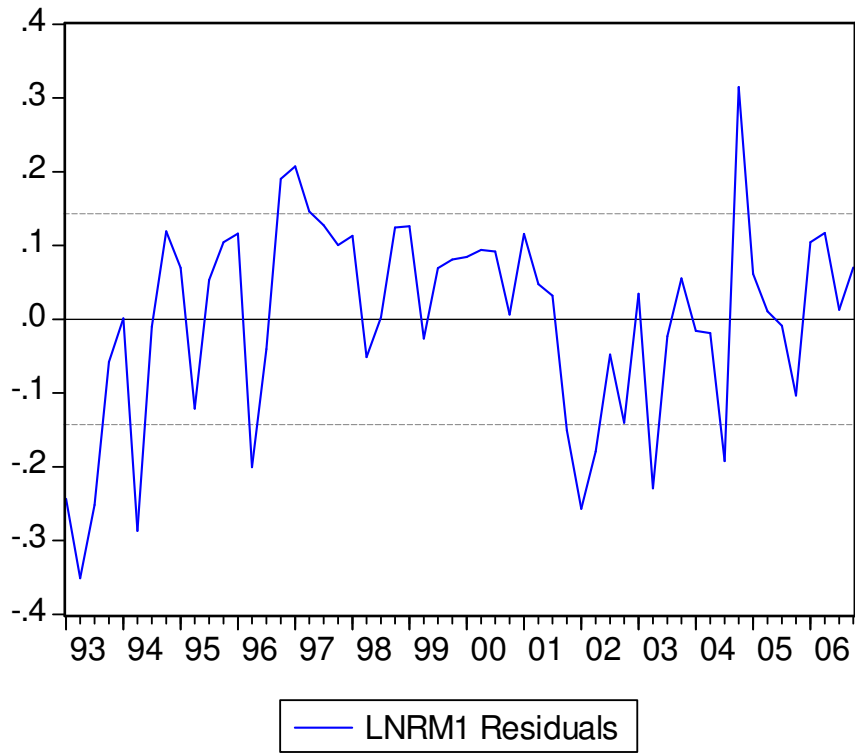
A.6.a) CUSUM of squares (CUSUMQ) Plot M1

A.6.b) CUSUM of squares (CUSUMQ) Plot M2
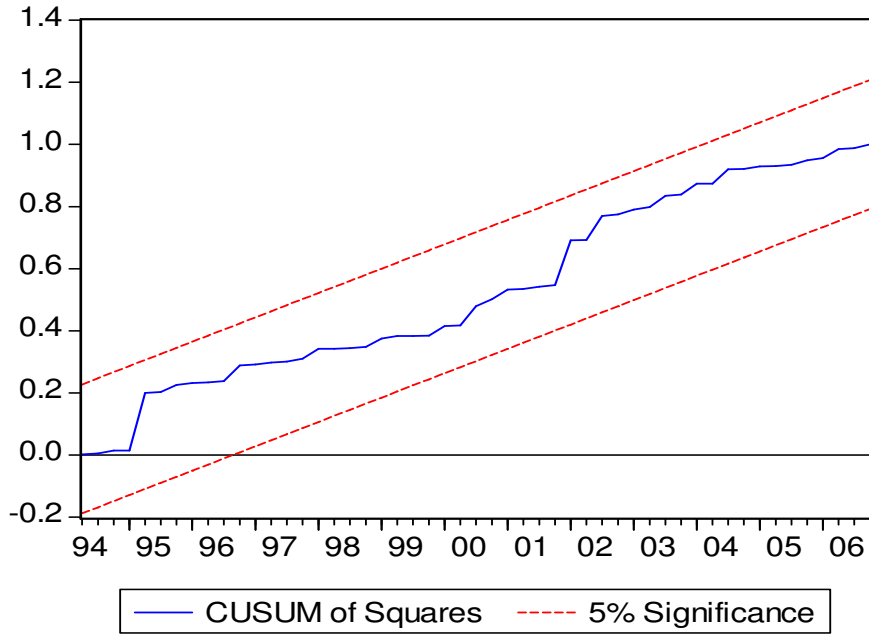
A.7.a) ECM for M1

Dependent Variable: D(LNRM1)
Method: Least Squares

Sample (adjusted): 1993Q2 2006Q4
Included observations: 55 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNCPI)	-1.015718	0.087676	-11.58486	0.0000
D(LNER)	0.220720	0.103854	2.125280	0.0384
RESM1(-1)	-0.168907	0.047618	-3.547114	0.0008
C	0.044928	0.006575	6.832791	0.0000

R-squared	0.748622	Mean dependent var	0.043656
Adjusted R-squared	0.733835	S.D. dependent var	0.091659
S.E. of regression	0.047288	Akaike info criterion	-3.195171
Sum squared resid	0.114044	Schwarz criterion	-3.049183
Log likelihood	91.86721	F-statistic	50.62730
Durbin-Watson stat	2.017732	Prob(F-statistic)	0.000000

A.7.b) ECM for M2

Dependent Variable: D(LNRM2)
Method: Least Squares

Sample (adjusted): 1993Q2 2006Q4
Included observations: 55 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNCPI)	-1.055998	0.071099	-14.85251	0.0000
D(LNER)	0.195611	0.082581	2.368703	0.0217
RESID01(-1)	-0.076666	0.036308	-2.111558	0.0396
C	0.036775	0.005322	6.910034	0.0000

R-squared	0.813518	Mean dependent var	0.034868
Adjusted R-squared	0.802549	S.D. dependent var	0.086273
S.E. of regression	0.038336	Akaike info criterion	-3.614914
Sum squared resid	0.074952	Schwarz criterion	-3.468927
Log likelihood	103.4101	F-statistic	74.16171
Durbin-Watson stat	1.957361	Prob(F-statistic)	0.000000

A.8.a) ARCH Test for M1

ARCH Test:

F-statistic	1.312271	Probability	0.257229
Obs*R-squared	1.329199	Probability	0.248948

A.8.b) ARCH Test for M2

ARCH Test:

F-statistic	0.018824	Probability	0.891403
Obs*R-squared	0.019541	Probability	0.888828

A.9.a) White Heteroscedasticity Test for M1

White Heteroskedasticity Test:

F-statistic	0.787897	Probability	0.583784
Obs*R-squared	4.931136	Probability	0.552675

A.9.b) White Heteroscedasticity Test for M2

White Heteroskedasticity Test:

F-statistic	4.954229	Probability	0.000512
Obs*R-squared	21.03426	Probability	0.001809

A.10.a) Ramsey RESET Test for M1

Ramsey RESET Test:

F-statistic	0.002040	Probability	0.964156
Log likelihood ratio	0.002244	Probability	0.962220

A.10.b) Ramsey RESET Test for M2

Ramsey RESET Test:

F-statistic	0.665660	Probability	0.418439
Log likelihood ratio	0.727395	Probability	0.393729

A.11.a) Trends of key Variables

Variable	1991	1994	1997	2000	2003	2006
Exchange rate (NAD/USD)	2.76	3.55	4.61	6.87	7.57	6.77
Income (GDP)	7,119	10,919	13,665	15,100	17,069	19,854
Interest rate	19.67%	14.83%	17.31%	11.27%	10.92%	7.67%
M1	7,956	18,285	34,865	60,019	89,084	147,231
M2	20,305	39,015	76,830	105,741	157,529	244,682

Source: BoN, CBS & NEPRU.

Note: The 1991 figures for exchange rates are based on the ZAR as the official currency in Namibia before introduction of the NAD.