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AN EXAMINATION OF THE DEMAND FOR MONEY IN SWAZILAND: A COINTEGRATION AND VECTOR ERROR CORRECTION MECHANISM APROACH.

BY

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ABSTRACT

Examining the money demand function is an area which has received attention at both the academic and policy discourse levels due to its impact on the effectiveness of monetary policy. Based on this background, the study examined the money demand function in Swaziland from 1994 to 2013 using quarterly data. Following the review of the theoretical and empirical literature, a model linking the money demand function to its determinants was specified. The Johansen cointegration test was utilised to examine the long-term relationship between the money demand function and its determinants. The results showed that there is a long-term relationship between the money demand function and its determinants as specified in the model. The VECM was also specified to analyse the short-term interaction between the money demand function and its determinants, the results showed that in the event that there is disequilibrium, it takes about 51% for it to correct. The CASUM and the CASUMSQ were also estimated to analyse the stability of the money demand function in South Africa. The results showed that there are periods in which the money demand function is not stable in Swaziland.

Keywords:

Money demand, Swaziland, Johansen cointegration test, Vector Error Correction Model

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CHAPTER 1

INTRODUCTION AND BACKGROUND

1.1 BACKGROUND AND CONTEXT OF THE STUDY

Establishing the factors that influence the demand for money in an economy is an area which has attracted attention within the academic field. This is understandable given the impact of the money demand on monetary policy (Treichel, 1997: 6). There are studies which indicates that the money demand function for instance helps in determining the rate of monetary expansion dependable with long-run price stability, while the interest rate semi-elasticity abets in conniving the welfare costs of inflation. The existence of a fully-fledged and stable money demand function is fundamental for the reliable transmission of the impact of changes in money supply to aggregate spending and a stable demand function for money has long been perceived as a prerequisite for the use of monetary aggregates in the conduct of policy (Goldfeld and Sichel, 1990: 300). Mishkin (2004:570) reiterated that the responsiveness of the quantity of money demanded to changes in interest rates has important implications for the relative effectiveness of monetary policy. Given a situation where the demand for real money balances which should be under the control of monetary authority is perceived with an endogenous characteristics to the other economic aggregates, the monetary authority cannot probably follow an independent monetary policy to attain the ex-ante specified targets. Also if an unstable characteristic for these money balances in the time period under investigation is estimated, this case can indicate the invalidity of the operations of the monetary authority based on these ex-ante money demand estimation results, that is, the policies based on these results can take the monetary authority to implement the wrong policies for the specified targets. As Kontolemis (2002: 3) expresses, stability of long run money demand function is an important factor of long run growth rates of monetary variables. Otherwise, disorderly or repeated velocity shocks are likely to lead to persistent deviations of growth of monetary aggregates from estimated values, which lead to errors in the formulation of monetary policy.

Treichel, (1997: 6), mentioned that, a stable money demand function in consequence guarantees that monetary policy has unsurprising impacts on macroeconomic variables and also that monetary policy proceedings are consistent with the preferred objectives of price stability and

long-run growth. Also that the stability of the money demand function improves its predictability[1]. The money demand function is considered stable if the estimated demand function is predictable; its coefficients are accurate; the out of sample estimations are fair; it is a function of relatively few variables; and the explanatory variables in the estimated function represent theoretically and economically plausible relationships between money and real economic activity.

The drift of monetary aggregates is important for monetary authorities, especially in the context of monetary targeting frameworks, in which programme yardsticks are strong-minded by confines on the monetary base or on other monetary aggregates. The demand for money function symbolizes one of the majority valuable facets of the monetary process in a market economy. The demand for money reflects the degree of willingness to possess money by economic agents (Mankiw, 1997: 476). The money demand function connects money and various other economic variables and it plays a pivotal role in the decision making process of the responsible authorities such as the central banks in dealing with monetary and other economic policies. It plays a most important function in macroeconomic studies, particularly in choosing suitable monetary policy actions. Reserve banks in many countries rely primarily on a money demand function as a technique to discover medium-term growth targets for the money supply and manipulate interest rates and reserve money to control liquidity in the economy (Treichel, 1997: 4).

Various studies have been carried out focusing on the demand for money and the consequences to monetary policy. However many studies concentrated much on the developed world though there are some few studies which dwelled on the developing world. Obviously there is a notable difference on the implications of the findings on monetary policy between the developed and developing world as a result of different financial systems. The demand for money functions under study, which classically shows the correlation between monetary aggregates, income and prices, is one of the mainly extensively examined topics in monetary economics. Sriram (1999) made a survey of literature and found out that an essential element in conducting quantity-based monetary policy is to have a stable money demand function. A significant relationship between

1 Stability refers to the actual behaviour of the parameter overtime or the uncertainty associated with the changes in the values of the parameter over time. A parameter is stable if it is constant over time or if the changes in the parameter are known with certainty (Aziakpono, 2000: 142, Laumas and Mehra, 1976: 464).

money, activity, and interest rates enables policy-driven changes in monetary aggregates to have predictable influences on output, interest rate, and prices

The demand for money for Swaziland need to be examined for monetary policy purposes, following the recent reports by the Central Bank of Swaziland, Swaziland's monetary developments continued to be characterized by sharp declines in the outcome of inflation mainly originating from resurgent international energy and food prices. This phenomenon has also been witnessed in other economies around the world including the Common Monetary Area region (CMA)[2]. Monetary policy decisions, therefore, chiefly reflected determined commitment to regaining price stability. Consequently, monetary policy tightened through a series of increases in the Central Bank policy (discount) rate over the period June 2007 to April 2008 by a cumulative 250 basis points to reach 11.5 percent. It necessitated the cumulative increase in the discount rate since 2006 to 450 basis points. The current inexorable rise in international oil and food prices, weaker lilangeni/rand exchange rate and prospects of higher wage demands have propelled outlooks of further escalation in prices of locally produced goods and services[3]. Further monetary policy tightening seems relevant for price stability in the short to medium term. Given the lagged policy response and unabated risks of the inflation outlook, analysts predict that the South African CPIX inflation rate is unlikely to rebound to its target range before 2010. The same trend is likely for Swaziland inflation since it is heavily predisposed by South Africa's inflation due to the robust trade relations that are in existence between the two countries. (Central Bank of Swaziland, 2008: 30)

1.2 STATEMENT OF THE PROBLEM

Monetary authorities rely much on a market based economy where market forces are left to operate freely in setting prices, as this can assist in disseminating monetary policies provided there is a well-defined financial system without government interventions especially in the undertaking of fiscal policies however, a market-based monetary policy depends on the existence of a market for money and foreign exchange. Specifically, reserve requirements, refinance windows, government and central bank bills and bonds, and credit allocation through banks or credit auctions are needed. If the institutional framework for monetary policy and these specific

2 CMA members are currently Lesotho, Namibia, South Africa and Swaziland.
3 Lilangeni is the Swaziland's currency which is also pegged at par to the South African rand

monetary instruments are lacking or malfunctioning, the conduct and effectiveness of monetary policy will be impeded (Slok 2002: 129).

Estimating a money demand function becomes a vital focus, as the empirical relationship represented by the money demand equation enables one to examine the interaction between monetary aggregates and other economic indicators. In addition, the Swaziland financial system has undergone fundamental changes in the past years. The implementation of various structural reforms and deregulations together with the introduction of new financial products has changed the structure of the financial system. In the view of the fact that broad money comprises a wider range of financial instruments reflecting the consequences of the financial innovations and the recent changes in the Swaziland's financial system, the study investigates money demand using a broad range of monetary aggregates.

1.3 OBJECTIVES OF THE STUDY

The objective of the study is to investigate the money demand function in Swaziland. The specific objectives include:

1. Provide a discussion on Swaziland economic growth.
2. To estimate an econometric model to analyse the determinants of money demand in Swaziland.
3. To suggest monetary policy measures based on the results from this study.

1.4 HYPOTHESIS OF THE STUDY

The hypothesis which the study seeks to accomplish can be stated as follows:

H_0: The selected set of variables does not influence the money demand significantly in Swaziland.

H_1: The selected set of variables does influence the money demand significantly in Swaziland.

1.5 SIGNFICANCE OF THE STUDY

It has come to our interest to study about the demand for money in Swaziland mainly because there are not many studies done relating to money demand as to the best of our knowledge,

maybe because the tertiary education system is not much advanced as compared to countries like South Africa.

It is also interesting also to note that the stability of money demand functions was at the centre of monetarist claims that monetary targeting should be the backbone of a non-inflationary policy stance (Drake and Chrystal, 1994). As a result, the approach of targeting monetary aggregates was adopted by various central banks all over the world. According to some evidence of what happened in the past concerning monetary targeting, one can say that the outcomes may be unsatisfactory, perhaps by reason of the dynamic interactions between monetary aggregates and other real economic variables, principally the general increase in the price level. Globally there have been major breakthroughs regarding financial innovations, transformations in the structure of the banking sector and mounting integration of global economies and deregulations in the financial systems. These developments, among other effects, gave rise to significant changes in the payment systems, growing availability of money substitutes yielding various rates of return, and accordingly have created anomalies in the [illegible] and relations.

In the middle of growing cynicism with monetary targeting, there have been significant changes in the number of central banks which are discarding monetary aggregate targeting in support of inflation targeting and among others is South Africa. Even though monetary aggregates are no longer targeted in an inflation-targeting framework, they are however used as signals of inflationary strains in conjunction with an assortment of supplementary variables. Regardless of the fact that money is no longer the crucial end of monetary policy, its function as a probable inflation gauge entails a perception of what compels its actions and how it manipulates other variables in the financial system.

Taking all these into account, one more factor which triggered this study is also the nature of monetary policy formulation in Swaziland, which is closely linked with South Africa's monetary policies since the kingdom of Swaziland falls in the CMA where the rand currency is adopted. Furthermore, we want to contribute to the economic literature in the developing countries since Swaziland is on the developing nations and this research paper helps us to understand the link between the demand for money and monetary policy formulation.

1.6 OUTLINE OF THE STUDY

This study is divided into six chapters, following chapter one which is the introduction, chapter 2 presents a brief overview of the nature of the financial system and monetary policy framework in Swaziland. This chapter also looks at some other macro-economic factors prevailing in the economy which may have direct or indirect influence on variable selection as well as model specification. Chapter 3 will follow giving a review of both the theoretical and empirical literature pertaining to demand for money. Theoretical literature reviews the relevant theories of demand for money in existence. Furthermore, empirical literature explores comprehensively at the studies done in developed and developing countries, giving preference to the studies that have been carried out in the developing world mostly in Africa. Chapter four examines the model, the variables and other model specification issues of the demand for money function. This chapter also includes wide-ranging estimation procedures to be employed in the study. Chapter 5 will present, interpret and analyse the results and finally, Chapter six provides implications to policy over and above recommendations and suggestions for further research.

CHAPTER 2

SWAZILAND'S ECONOMIC BACKGROUND

2.1 INTRODUCTION

This chapter will focused on Swaziland's financial system, macro-economic overview, financial innovation and the membership of Swaziland in the Common Monetary Area (CMA). These broad concepts will help in the identification of variables that may have an influence on the demand for money thereby can be included in the equation we will try to model. Differences in economic backgrounds of various countries give us the impression that we cannot rely on the models used by other researchers in different countries. However, there is need to examine the concepts mentioned above, and due to unavailability of credible information, we will rely much on information published by the Central Bank of Swaziland in this chapter.

2.2.1 COMMON MONETARY AREA

South Africa has a larger role in southern Africa due to its high economic activity and a high valued currency. It influences macro-economic policies within the region where its currency, the rand, is a legal tender in a few countries. According to (Masson & Pattillo, 2005) There is a monetary union in which four countries are members. These countries include South Africa, Swaziland, Lesotho and Namibia. All these four countries are members of the Southern African Development Community (SADC). Furthermore, these countries form the Common Monetary Area (CMA) which is an agreed monetary union among these four states.

The CMA is a fixed-exchange-rate arrangement that groups four countries: South Africa, Lesotho, Namibia, and Swaziland. The CMA originated as an informal arrangement during the colonial period in the early twentieth century. A currency union was formally established with the signing of the Rand Monetary Area Agreement (RMA) in 1974 by South Africa, Botswana, Namibia, and Swaziland, but Botswana withdrew in1975. That agreement was revised in April 1986 to establish the CMA of Lesotho, Swaziland and South Africa. Namibia, which became independent in 1990, joined the CMA in 1992. Under the terms of the CMA Agreement, Lesotho, Namibia, and Swaziland issue national currencies - - the loti (introduced in 1980), the

Namibian dollar (introduced in 1993), and the lilangeni4 (introduced in 1974), respectively; those currencies have been pegged (at par) to the South African rand since their introduction. In addition, the rand is legal tender in each of the other three countries. However, none of the three currencies is legal tender in South Africa. Since the rand is legal tender in the other three countries, South Africa compensates each of the countries for forgone seigniorage. With the other CMA currencies pegged against the rand, the South African monetary authorities follow a floating exchange-rate arrangement for the rand against other currencies. Monetary policy for the CMA countries is set by the South African Reserve Bank based on domestic (South African) objectives. (George, 2008).

However, According to the Central Bank of Swaziland (Larga, 2001) the important part of the CMA agreement is that Swaziland now has the liberty to delink the lilangeni from the rand, should circumstances so dictate. However, the Central Bank of Swaziland (CBS) lost the independence of its monetary policy due to membership in the CMA. Swaziland has, however, opted to maintain the peg for the simple reason that it is still in the country's best interest to do so. It is understood that pegging the lilangeni at par to the rand means any change in the international exchange rate of the rand culminates in an equivalent movement in the lilangeni. In essence, the policies pursued by the country are to a large extent influenced by South African policy pronouncements. Some recent academic work by (Frankel & Rose, 1998) on the benefits and costs of single currency areas suggests that the adoption of a common currency can improve the structural characteristics of the economies concerned, increasing trade-integration and business-cycle correlation, and enhancing the credibility of macroeconomic policies which in turn can be applicable to the case of Swaziland in the CMA.

From the works of (Van Zyl, 2001), the monetary arrangements explicitly provide for consultation. The contracting parties hold regular consultations to facilitate and ensure continued compliance with the MMA and reconcile different interests in the formulation and implementation of monetary and foreign exchange policies for the CMA. For this purpose, and any matter arising from the MMA, a Common Monetary Area Commission was established consisting of a representative and some advisers from each member country. Prior to meetings of

4 Lilangeni is the currency for Swaziland.

the SARB's Monetary Policy Committee, senior research officials from the four countries meet to exchange economic information.

The countries in the CMA are also members of the Southern African Customs Union (SACU) including Botswana. The SACU is an agreement among these countries which allows the free movement of goods and services. Also to note is that, these countries have a common external tariff with the Republic of South Africa being the custodian of a common pool where these funds are kept for distribution amongst members annually. Swaziland has a strong trade linkage with South Africa – with 80% of its imports originating from South Africa and over 50% of exports destined for that country. (Langa, 2001).

Another generally held view is that changes in the external value of the Rand (hence the Lilangeni) have contributed in part to the acceleration of the inflation rate in Swaziland. (Dlamini, Dlamini, & Nxumalo, 2001), note[illegible]te the high proportion of imports from South Africa, a large depreciation of the exchange rate increases the cost of all goods that originate outside the Common Monetary Area, such as petroleum. The exchange rate link with Swaziland prices is not surprising as approximately 20% of Swaziland's imports are directly from the rest of the world. This also means that foreign prices paid for inputs of goods and services from abroad and consumed in the process of production must be converted into domestic prices through the exchange rate.

The experience of the CMA is also somewhat mixed. On the one hand, the South African Reserve Bank has probably the highest degree of central bank independence in Africa, and since adopting an inflation targeting framework, it has been increasingly successful in delivering low inflation rates even the inflationary period of 2007-2008 where prices rose due to increase in global oil prices, South Africa's inflation managed to revert back to the bounds. On the other hand, the small member of the CMA and among others is Swaziland which experienced adverse effects on its macroeconomic balance and competitiveness due to significant swings in the rand vis-a-vis major currencies (Foulo, 2003). Botswana was able to avoid such adverse effects by leaving the rand zone in 1976 without paying a significant price in terms of monetary stability.

However, it is not clear that the political economy of the other members of CMA would deliver the same results if they were to follow such a course.

There are currently several overlapping plans for monetary integration in Africa. Some of these plans seem to be driven more by desire than realism, and completion dates have in several instances been postponed. No doubt these plans are driven by worthwhile goals of imposition of external discipline on macroeconomic policies, promotion of economic and financial integration, and more regional and even pan- African political unity.5 But the link of those with a monetary union is not always as clear cut as sometimes presumed. On the one hand, there is evidence from the CFA franc zone and other currency unions that they promote trade inside the union. Furthermore, there are several cases in history where sharing the same currency promoted financial integration. On the other hand, financial integration among members of the CFA franc zone is still at a relatively low level and the experience in the euro area has been disappointing to many. In Europe, economic and financial integration had progressed significantly before a common currency came into existence. Finally, the verdict on macroeconomic policies is mixed. Based on the experience of the CFA franc zone, (Masson & Pattillo, 2005) argue that monetary unions will not automatically provide a disciplinary effect on fiscal policies

2.2.2 The Swaziland Stock Market

The residents of Swaziland make use of the stock market as a form of alternative investment for their funds. Some use it to hedge their funds but evidence suggest that the general public do not make use of the stock market because of their liquidity problems hence they use other forms of investment like keeping their money tied in livestock. According to (Mlambo, Anglow, Ajijo, Poukouta, & Muchenje, 2005)the Swaziland Stock Market was established in June 1990 and up to 1998 operated an as over the counter single broker facility. Since 1999, it has been operating under the auspices of the Central Bank of Swaziland as a stock exchange. Efforts are currently under way to operate the Swaziland Stock Exchange (SSX) as a self-regulating organisation. The market is, however, not well developed, trade volumes are low and liquidity is a problem. Market capitalisation is low, and its share is GDP has fallen in the last two years, from 14.6 per

5 European monetary union was motivated by the perception that exchange rate volatility would be detrimental to the single market at the same time as free capital movements made pegged exchange rate regimes inoperable. In the case of Africa, institution building and external restraint on macroeconomic policies seem to be more important as motivation.

cent in December 2001 to 10.6 per cent in December 2002. However, over time, it has increased in nominal value from E500 million in 1998 to E1.2 billion in 2002.

There are currently only six listed companies on the SSX, and most of the players are institutional investors who purchase to keep. Besides equities, other instruments traded on the SSX include government and government guaranteed bonds, and debentures. The low volume and value of securities traded is a reflection of the small size of the market and the base capital of the listed companies. Also, due to limited trading opportunities and lack of a strong domestic investor base, the secondary market is undeveloped. The prospects for business in the SSX are, however, bright, especially as the government proceeds with the privatisation programme and the number of investment funds and operations expand. Foreign investors are also allowed to participate in the stock exchange without restriction. To facilitate and promote the development of the capital market, a Securities Bill has been sent to Cabinet for tabling before Parliament.

There were some notable developments during recent years. the SSX Committee (Market Committee) reviewed the Rule Book (Section 7.26) accounting for the bidding of securities on the exchange. Pursuant to concerns from stock broking firms on tick sizes, the Committee adopted proposed changes to the Rule Book. Such tick prices were scrapped, and the use of the 'historic' ruling price (RP) in quoting the SSX All-Share Price Index was also done away with. It was resolved that bid/offer prices be operational in quoting the Index in that it captures prevailing market sentiments. Section 10 of the Rule Book, dealing with capital adequacy requirements, was also reviewed. In keeping with the Financial Institutions Act (2005), the SSX Committee resolved that dealing members be required to hold base capital of E500 000. That in consequence, meant that the thirteen (13) weeks of operating costs no longer served as base capital. (Central Bank of Swaziland, 2007/2008)

Swaziland's shallow financial markets constrain economic growth, resulting in little progress in reducing high rates of poverty and inequality. Experience and research have demonstrated that finance matters for promoting growth, reducing poverty and inequality. However, Swaziland's financial intermediation through the banking system, low by regional and international standards,

has actually declined over time using standard measures of banking system depth. (International Monetary Fund, 2008).

Pension funds and insurance companies with substantial financial resources could help develop capital markets. However, these entities usually demand securities, which are normally in short supply. Limited liquidity is a major obstacle to the development of the stock market in Swaziland. In addition, the lack of attractive domestic investment opportunities has led to outflows of savings from this country into the liquid and relatively well developed markets in neighbouring South Africa. Access to such markets has benefited financial institution and individuals who are able to invest in a diversified range of products. Understanding the type of flows will help in designing policies to better manage these capital flows, allow higher interest rate and more attractive domestic investment opportunities could reduce such outflows. (International Monetary Fund, 2008)

2.2.3 **Money Supply for Swaziland**

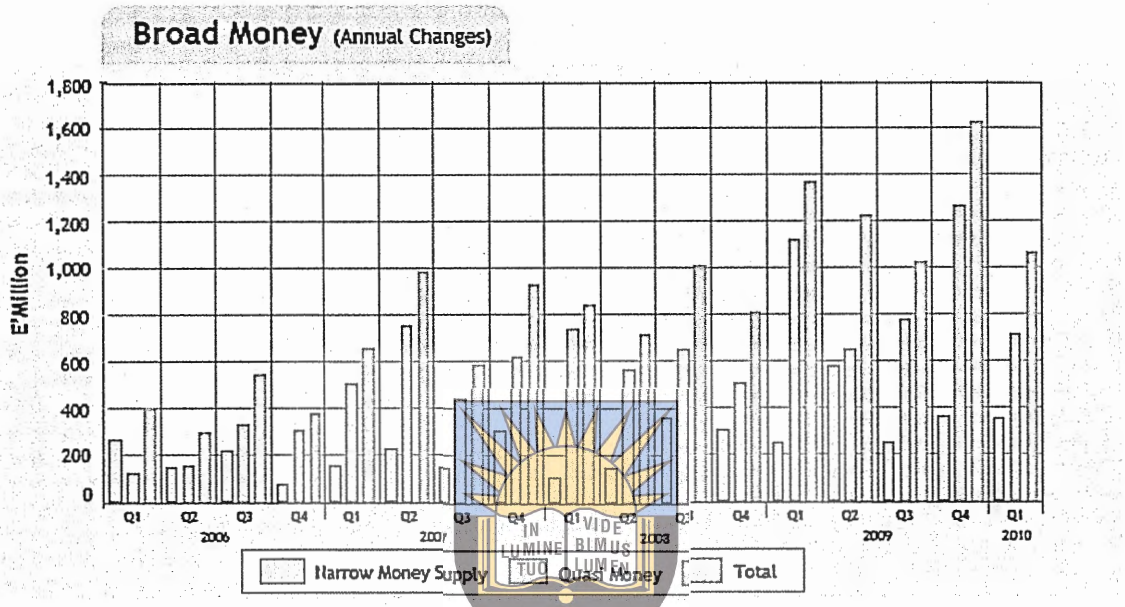
Swaziland uses the lilangeni as its national currency but its presence in the monetary arrangement makes it very difficult to influence the money supply in conducting their monetary policy, moreover, the large amount of rands circulating freely in Swaziland makes it difficult to come up with an aggregate for money supply including the rand. The CBS also agitated the same statements when it said the legal tender status of the rand was terminated in 1986 and as a result the country forfeited compensation in respect of rand currency circulating in Swaziland. However, Swaziland now had a wider scope in the management of her reserves by freeing the rand backing. Swaziland has no influence over South Africa's exchange rate policy, which is largely influenced by market forces with little regard to the needs of the Swazi economy. The rand's continued circulation alongside the lilangeni has rendered the measurement of the money supply to be understated by the amount of rands circulating within the economy. Money supply manipulation to influence economic growth and performance is therefore effectively a tool outside the scope of the authorities, for as long as the lilangeni remains pegged to the rand. Moreover, free access to the South African money and capital markets also limits the CBS's control over money supply. (Langa, 2001)

According to (Sithole, 2005),year-on-year growth in broadly defined money supply (M2), stood at 8.9 per cent at the end of November 2004, up from 7.8 per cent recorded the previous year, indicating a likely increase in inflationary pressures in the economy over time. Narrowly defined money supply (M1), however, increased by 10.8 per cent over the year, a rate exceeding that of M2 thus reflecting the reduced opportunity cost of holding deposits and the growth in domestic expenditure.

Broad money supply (M2) growth picked up from 9.6 per cent recorded the previous year to 15.8 per cent at the end of March 2007. The increase in money supply was partly attributed to the rise in net foreign assets as well as credit extended to the private sector. Both components of M2, namely narrow money (M1) and quasi money contributed positively to the increase in the supply of money. Quasi money reflected the highest increase of 18.3 per cent to E2 660.1 million, demonstrating an increased propensity to hold money for investment purposes. Savings and term deposits increased by 12 per cent and 20.[illegible] to reach E742.4 million and E1 917.7 million, respectively. Narrow money supply (M1) also increased but by a slightly lower margin of 11.5 per cent to E1 480.1 million. Both emalangeni in circulation and demand deposits rose by 11.1 per cent and 11.5 per cent to close at E260.2 million and E1 219.9 million, respectively.

Total bank deposits increased by E602.9 million or 18.4 per cent over the year to E3 876.3 million. Classified by ownership, corporate sector deposits recorded the highest increase of 35.8 per cent to E2 541.8 million and maintained the largest proportion of total deposits. The second largest proportion of deposits was represented by households and recorded a slight increase of 1.7 per cent to reach E957.4 million. Partly offsetting the increase were deposits by local government and statutory corporations, which fell by 27.7 per cent to E327.9 million. In the period 2009/2010, broad money supply (M2) growth moderated in line with deceleration in credit lines extended to the private sector. Yearly money supply dropped from 25.1 percent in March 2009 to 15.6 percent at the end of March 2010. At the same time narrow money showed a tremendous rise depicting an increased propensity to hold money for transactionary purposes. The period under study showed a considerable increase in the broad money (M2) figures and the following figure 2.1 illustrates this.

Figure 2.1: Broad Money (Annual changes)



Source: *Central Bank of Swaziland, Annual re* */2010*

2.2.4 Interest Rates

Interest rates have a major role to play in terms of money holdings. The cost of borrowing affects money holdings in both ways, whether borrowing or investing. By virtue of being a member of the CMA, Swaziland's interest rates, both short term and long term traces that of South Africa and this makes Swaziland restricted in terms of implementing monetary policy via the interest rate channel.

According to (Langa, 2001), given that Swaziland's membership of the CMA is characterized by the free flow of capital between member states and a de facto fixed unitary exchange rate with the South African rand (ZAR) (which eliminates the threat of exchange rate risk), it is clear that there is very little scope for Swaziland's interest rate to deviate substantially from those ruling in the CMA. If domestic rates were higher than say, those of South Africa, there would be the fear that Swaziland might attract more capital than could be absorbed, whilst the reverse could be true with Swaziland losing capital to South Africa. Despite tracking the South African interest rate structure, Swaziland's interest rate management is largely through moral suasion, where the CBS uses this instrument to encourage the local banking sector to lend to the private sector. In

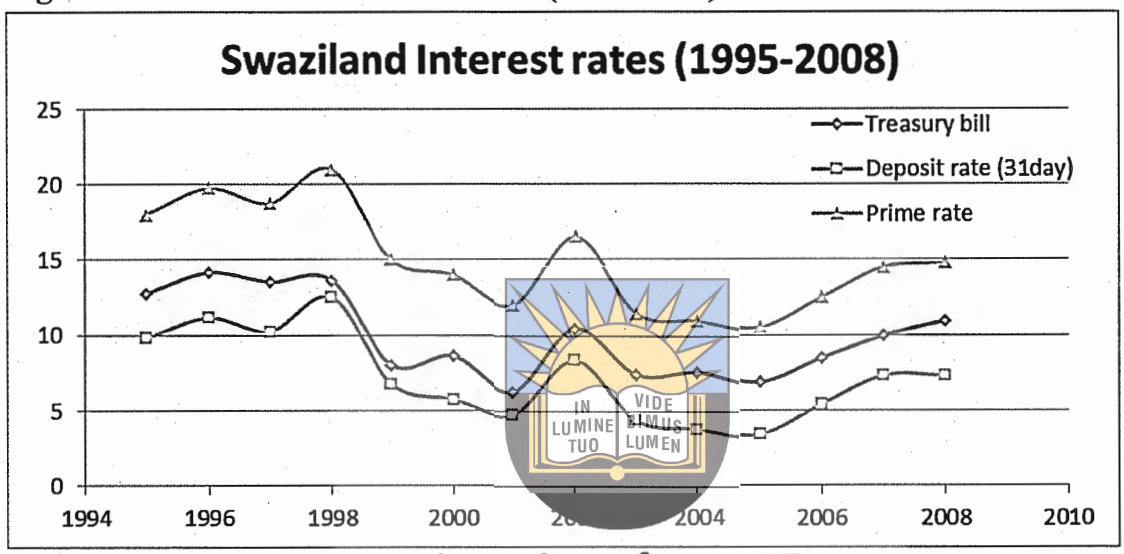
practice, there have been occurrences of wide differentials in interest rates between South Africa and Swaziland.

Although the objective is to minimize the interest rates differentials, there has been direct control on the movement of interest rates in contrast to the trend in South Africa in some years. In 1998 for instance when the rand was depreciating and interest rates were going up within the CMA, the differential between Swaziland and South Africa interest rates reached six percentage points. At that time the CBS felt that raising local rates to the SA levels would put too much pressure on the economy and be contrary to the objective of stimulating investment in the real sector. The general policy is to maintain a differential of 0.25 – 0.50 percentage points. It should be noted that this policy has serious implications. A related objective is that of ensuring that depositors are remunerated positive net returns. However, due to inflationary pressures in the past, it was not possible to remunerate depositors' positive net returns except since 1999/2000 when single-digit inflation levels were achieved particularly with regards to the huge capital flows that ensue as a response to the differential.

Taking a closer look at the behaviour of interest rates in Swaziland, the Central Bank of Swaziland (2009) reported that, over the years 2008/2009, the discount rate continued to be the Bank's main operational variable for monetary policy. The discount rate was altered on several occasions to signal policy direction as well as to steer economic growth further threatened by the worsening global financial crisis. Following pursuit of a tight monetary policy stance designed to reduce inflationary pressures, the discount rate increased by 50 basis points in April 2008 to a peak for the year at 11.5 per cent. Thereafter, the rate was unchanged up to November 2008. As inflationary pressures subsided the discount rate was reduced on four occasions in December 2008, February 2009 March 2009 and more recently in May 2009 by a cumulative 350 basis points to 8 per cent. For the first time since 2003, local interest rates were allowed to fall below those obtained in South Africa by 50 basis points. Effective June 2008, both the discount and prime lending rates were maintained below their corresponding South African rates. Rates for all types of deposits also remained lower but with narrowing spreads between them. Commercial banks' prime lending rate also increased commensurately to a peak of 15 per cent then fell to

11.5 per cent in May 2009. Changes in interest rate over the years 1995-2008 can be accounted for as follows:

Figure 2.2: Swaziland Interest rates (1995-2008)



Source: *computed from data provided by CBS (various issues)*

Interest rates show a trend of moving in the same direction over time which gives an indication that they may be following the prime rate. Deposit interest rates declined by varying margins with the general structure implicitly encouraging shorter-term relative to longer term deposits. The average 12 months deposit rates fell by a higher margin of 471 basis points to 5.29 per cent in May 2008. The spread between the domestic rate and RSA rate widened from 1.97 percentage points in March 2008 to 2.49 percentage points in May 2009. Short-term deposit rates, however, fell by a lower margin as the average 31- days deposit rates declined by 204 basis points to reach 5.26 per cent. Within this category, the spread between the domestic rate and the RSA rate also narrowed from 3.75 percentage points to 2.76 percentage points over the same period. The 91days treasury-bill rates also fell by 225 basis points from 9.88 per cent in March 2008 to 7.63 per cent in May 2009. Local treasury-bill rates were maintained slightly higher than the corresponding RSA rates for a greater part of the year under review. Average savings deposit rates fell by the lowest margin of 200 basis points over the year from 5 per cent in March 2008 to 3 per cent in May 2009. This indicates a slight improvement in the remuneration of small savers.

Moral suasion, as an instrument of monetary policy is also used by the CBS since the bank itself does not have much influence on monetary policy due to the arrangement of the CMA.

2.2.5 Swaziland's financial sector

Commencing on the Central Bank of Swaziland, it was established as the monetary authority in April 1974, empowering the bank to monitor, regulate and develop Swaziland's financial infrastructure. The Authority took on the function of a central bank in 1978 when the name was changed under the Monetary Authority (Amendment) Act of 1979 and additional powers were granted through amendment to the Acts in 1982 and 1986. Legislative amendments to the Order of 1974 provide the legal framework that enables the bank to adapt to the changing global environment and to incorporate new developments and financial supervision. The core responsibilities of the CBS include issuing the national currency, advising the government, managing the country's official reserves, and dealing in the foreign exchange markets (involves both spot trading and dealings in the forwards market) even though commercial banks may manage limited sums of forex, reverting to the central bank if necessary.

The financial sector consists of the Central Bank of Swaziland (CBS), four commercial banks, one building society, two unit trusts, two development finance institutions, 56 SCCOs, a stock exchange, over 200 pension funds (private and public), six life and insurance companies, and over 100 micro finance institutions (MFIs). In terms of GDP, as of end-2006, total assets of the financial sector—consisting of banks, SCCOs, pension funds and life and insurance companies—is estimated at 105 per cent of GDP as compared with 160 per cent of GDP for Namibia at end-2004 and 118 per cent of GDP for Botswana at end-2006.4 In US Dollar terms, the estimated size of Swaziland's financial sector at end-2006 stood at about US$3 billion as compared with $US 10.7 billion for Namibia at end-2004 and US$12 billion for Botswana at end-2006.

The banking system is largely foreign owned. Three banks, the Standard Bank, the First National Bank and the Nedbank are subsidiaries of South African banks. The largest bank is the Standard Bank while the government-owned Swazibank is the third largest commercial bank. All

commercial banks have branch networks around the country offering both personal and corporate banking services. The Swaziland Building Society is a deposit taking financial institution which offers mortgage loans, accounting for about 80 per cent of its loan portfolio, and savings and investment accounts; loans are secured and are mostly residential. All five financial institutions are regulated and supervised by the CBS. (International Monetary Fund, 2008)

Swaziland is undergoing a significant change in its financial sector. In recent years, deposit-taking Savings and Credit Cooperatives (SCCOs) have grown substantially and have increased access to finance for many low income individuals. However, growth of SCCOs is taking place without sufficient regulation and supervision, posing risks to the stability of the financial sector. On the other hand, recent reforms that open up the insurance sector to foreign competition and require insurance and pension funds increase their domestic investment holdings have the potential to deepen Swaziland's financial sector, increase its efficiency and boost economic growth, but they also pose regulatory challen[illegible]s of low returns. The banking system is financially sound and a large fully-owned government commercial bank that received a sizable recapitalization in the past faces a challenging task of meeting a dual objective of being both a commercial and a development bank while competing with other banks that are largely private (International Monetary Fund, 2008).

According to (Genesis Analytics, 2004), the banking sector is dominated by three South African banks but there are also a local bank and building society in operation. Unlike the foreign banks, the local banks do not currently make use of electronic infrastructure such as automatic teller machines (ATMs) to expand their access points. Banking is concentrated in the main centres and on the highest income levels with very little banking penetration beyond the main towns. The three foreign banks have a very limited view of what they consider to be the bankable market and do not consider a significant expansion of the client base as a feasible option. The domestic banks have a broader view on the market, clearly understand their client base and have, therefore, been quite innovative in trying to provide products that meet their needs. Examples of this are systems for using cattle as collateral and ways of using Swazi National Land as collateral. These initiatives, although laudable, have been hampered by generally poor administration and too much focus on credit.

In the absence of formal providers, a large and vibrant cooperative sector has emerged that has built up a substantial asset and member base and is even considering starting a formal cooperative bank. Despite being quite formalised and organised under an apex body, the exact extent of this movement has only recently become known to the Central Bank who is now taking a much closer look at regulating this sector which has, until now, been self-regulated. Banking sector regulation by the central bank is rudimentary but enforced to a reasonable level and the most effective regulation in the country.

The Swazi banking system is sound, well capitalized with low nonperforming loans though higher than the rest of the SACU countries. The development of a sound financial sector lays a background for economic development (Levine, 1997). Many banks have low nonperforming loans, except for one bank. The central bank is actively working with the bank to improve compliance. Loans of the banking system are skewed towards sugar-related industries (70 per cent of all loans). However, the exposure re[illegible]on large and sectoral-clients are met by all banks. In addition, the three largely South African-owned banks, which have the most exposure to sugar-related industries, conduct regular risk assessments and hedge their risks through their parent companies. (CBS Annual Report 2006/2007)

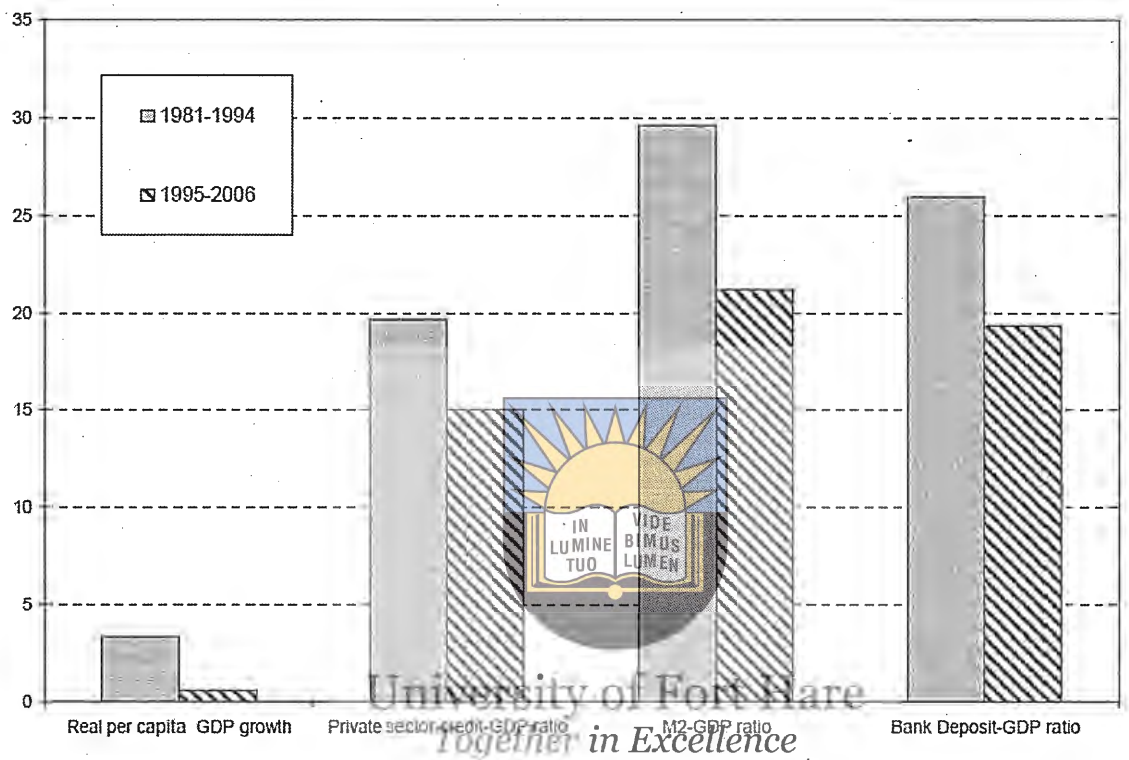
Swaziland pension funds and additional institutional investors vie directly with the financial sector with regards to lending. Faced with the internal investment obligation of 30 per cent, pension funds and insurance companies are loaning directly to some industry participants, predominantly the sugar and electricity sectors, at market rates. Like in any of these SACU members, investment opportunities also include investing in low-yielding government paper, in low-interest housing loans, and even in building low-rent housing units. The Non-Bank Financial Institutions (NBFIs) inject liquidity into the local banking sector by keeping some assets invested in term-deposits (average return of 10 per cent), rather than investment abroad. The benchmark rate of return is 5 per cent in real terms. The large share of investments, however, continues to be in South Africa, where, over the last three years returns averaged about 9 per cent. More recently, these returns have started to decline because of the slowdown of the South African economy.

The insurance industry is still a *de jure* monopoly but in practice several South African insurers are selling insurance policies to Swazi citizens5. Legislation has been in development for the last decade to unbundle the monopoly but has still not been passed. Insurance regulation falls under the jurisdiction of the Ministry of Finance and is practically unregulated. Micro lending is currently unregulated although there are plans to change this. Political involvement in this industry is slowing the implementation of regulation (Genesis Analytics, 2004).

The depth of the Swazi banking system is at the lowest end of the spectrum among its peer groups based on three widely-used measures of financial depth (Figure 2.3). Ratios of M2, M3 and bank deposits to GDP are well below all income groups, the SSA average as well as other members of the SACU.5 However, Swaziland's banking sector, as measured by the ratio of private sector credit to GDP—another widely used measure of financial depth—is deeper, exceeding levels recorded by the SSA and low income countries. This over performance is a recent phenomenon. Between 1998 and 2004 Swaziland's credit-GDP ratio was below both the SSA and low income countries while it has been trending down consistently till 2001. Swaziland's eventual catch-up and overtaking of these groups since 2004 occurred as a result of the combination of low interest rates and strong prospects for Swaziland's textile and sugar industries.

The banking sector of Swaziland has shown considerable changes over time. The documented evidence shows a comparison between GDP and monetary variables as shown in Figure 2.3

Figure 2.3 Banking Sector Depth and Economic Growth (in per cent)



Sources: International Financial Statistics, World Development Indicators, and staff estimates.

2.2.6 Recent Financial Developments and Financial Innovation

The financial sector is coming up with new ways of doing business in the global economy. Financial innovation as defined by (Bailey, 2005:24) refers to development in the institutions of finance made in response to changes in the environment in which the institutions exist. The process of financial innovation involves institutional adaptation and evolution even when the functions of the system remain the same. (Mishkin, 2004:237), added that financial innovation occurs in response to changes in demand and supply conditions. However, because the financial industry is more heavily regulated than other industries, government regulation is a much greater spur to innovation in this industry. Government regulation leads to financial innovation by creating incentives for firms to skirt regulations that restrict their ability to earn profits. Edward Kane, an economist at Boston College, describes this process of avoiding regulations as "loophole mining." The economic analysis of innovation suggests that when the economic

environment changes such that regulatory constraints are so burdensome that large profits can be made by avoiding them, loophole mining and innovation are more likely to occur.

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Although activity levels of plastic cards are relatively low when compared to cheque activities in Swaziland, the governor of the CBS (2009) hinted that the development of a local clearing switch for domestic Automated Teller Machines (ATM)/ Point of Sale (POS) activities will be explored during the upcoming financial year (2010). This would entail local settlement of domestic inter-bank transactions (mainly card transactions) as opposed to settlement of domestic transactions through third party service providers in the Republic of South Africa. This arrangement will enable Swaziland to manage and control her own domestic risk exposures associated with payment systems. (Dlamini, 2009).

2.2.7 Recent monetary developments

Many countries were affected by the global financial crisis which became deeper in the recent years. According to the Central Bank of Swaziland (2007), the most prominent feature of monetary developments during the fiscal year ending 2006/2007 was a gradual rise in the inflation trend fuelled, in part, by resurgent international oil prices and a notable depreciation of the lilangeni/rand against major currencies. To curb the threat of inflation, in line with the Bank's objective of maintaining price stability, a tight monetary policy stance was pursued as in

the rest of the CMA central banks. The central bank made use of the interest rate channel in their monetary policy and they made sure they maintained economic growth and investment and at the same time reducing the cost of borrowing.

Interest rates continued to be the operational variable for monetary policy implementation and were closely aligned with those obtained in South Africa. The local discount rate remained at par with the SARB's repo rate. Lending rates of the two countries were also at the same level. Some rates, namely Treasury bill rates have been to a great extent maintained at higher levels than those obtained in South Africa and this has made local investment more attractive. However, rates for all types of deposits remained comparatively lower and generally negative in real terms. For the period 2008/2009, there were major setbacks in terms or inflationary pressures due to higher international energy and food prices; this led to a tightening of the monetary policy in the first half or year 2008.

The central bank also reported changes in their monetary policy of the second half of 2008 to a period in 2009. There was an about-turn, however, during the second half of the year 2008 as global inflation dwindled due to declining commodity prices as a result of weak global demand fuelled by the international financial turmoil. As Swaziland like most African countries relies on commodity exports, the depressed commodity prices showed a solemn threat to economic growth. Policy exertions were, therefore, geared towards vindicating the negative growth prospects.

The Central Bank of Swaziland, in line with a number of global and regional Central Banks relieved monetary policy aggressively since December 2008 and more recently in May 2009. Commercial banks following the policy announcement by the Central Bank also adjusted the structure of their interest rates accordingly. Prime lending rates were reduced by similar margins as the discount rate. Long-term deposits interest rates fell more sharply than short-term rates probably reflecting optimism regarding prospects for inflation. It was encouraging to note that some deposit rates, particularly for small savers fell by a lower margin than the discount rate. However, given the double-digit average annual inflation rate of 12.6 per cent, real returns to depositors remain in negative territory.

2.2.8 Economic developments

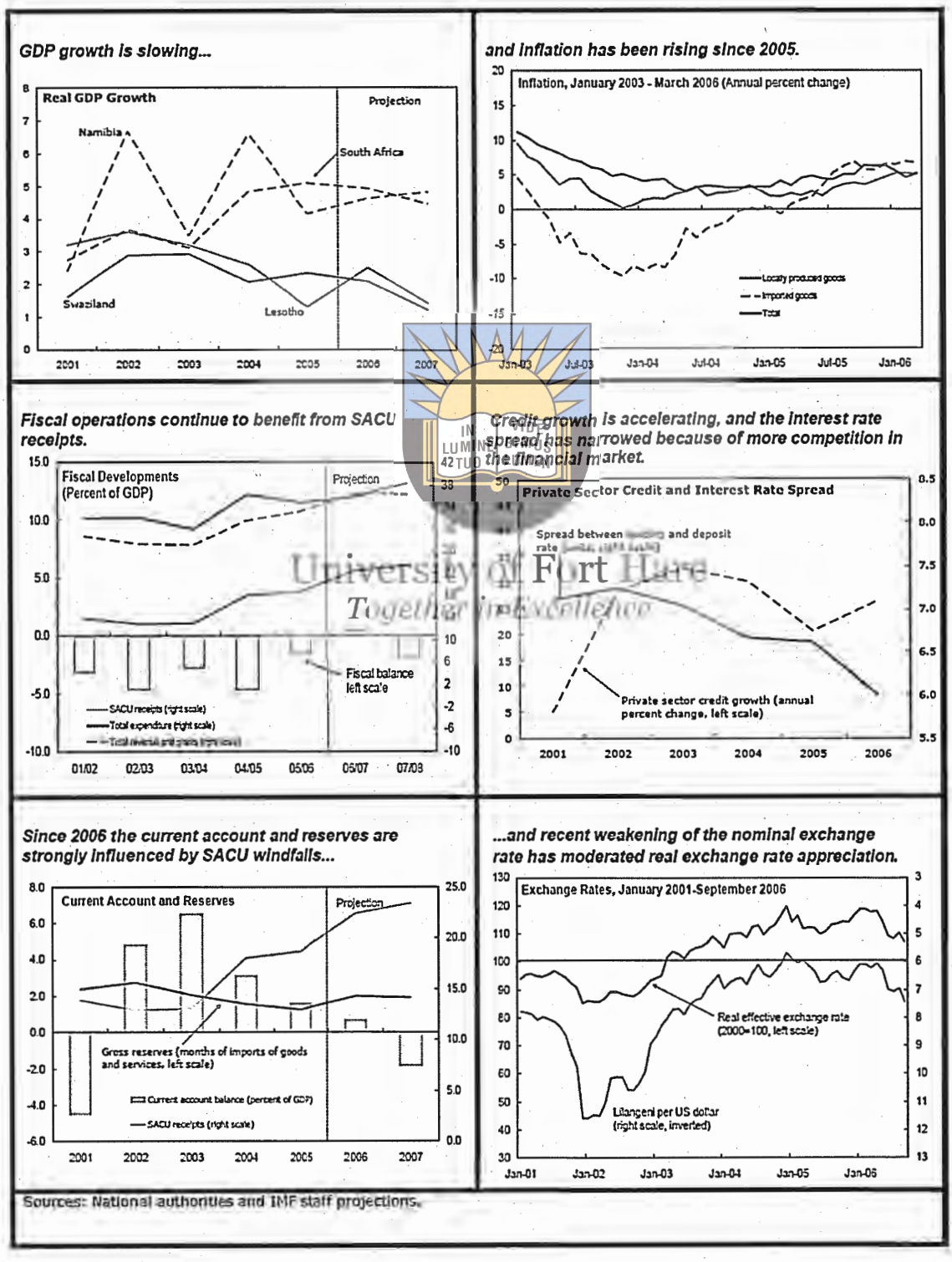
Swaziland is a small landlocked country that has built an economy around being the gateway to South Africa in the era of sanctions. Sanctions are now long gone, but Swaziland has not succeeded in creating economic sectors that can serve as engine of growth. The population is still largely dependent on subsistence farming which mostly takes place on land they cannot own as it belongs to the king. Asset building and household formation is hindered by the inability to accumulate capital through property or housing. The absence of substantial assets and, thereby, collateral prevent credit extension by the private sector.

According to a study by (Mlambo, Anglow, Ajijo, Poukouta, & Muchenje, 2005), Swaziland is currently facing a serious socio-economic situation characterised by a sluggish economic performance, high levels of poverty and inequality, high HIV/AIDS infection rate, growing unemployment, and challenges in the area of governance. In 2003 real GDP increased by 2.9 per cent, which was marginally higher than the 2.7 per cent recorded in 2002. The poor economic performance partly reflects low agricultural production, a slowdown in manufacturing output and declining FDI inflows. Domestic savings and investment rates are relatively low and respectively averaged 21.6 and 19.5 per cent of GDP between 2000 and 2003. Also, about a third of the labour force is unemployed. The state of *public finances* is a major challenge to the authorities. The overall budget deficit increased from 4.8 per cent of GDP in 2002/2003 to 5.8 per cent in 2003/2004. Civil service wages and salaries are by far the largest component of total expenditure, accounting above 50 per cent of recurrent expenditure. Inflation has steadily declined from an average of 11.2 per cent in 2002 to 7.4 per cent in 2003, and a further decline to 4.8 per cent in the first quarter of 2004. The external current account position remains weak and for the third consecutive year, the country recorded an overall balance of payments deficit in 2003, and is not expected to have improved in 2004. Swaziland has a sustainable public debt level, estimated at 31.3 per cent of GDP in 2003 and a debt service below 3 per cent of GDP.

There has been a notable change in the inflation rate for Swaziland in the period under study. Various explanations have been given in trying to explain the causes of the increases and decreases in the inflation rate measured by the Consumer Price Index (CPI). Some of the reasons

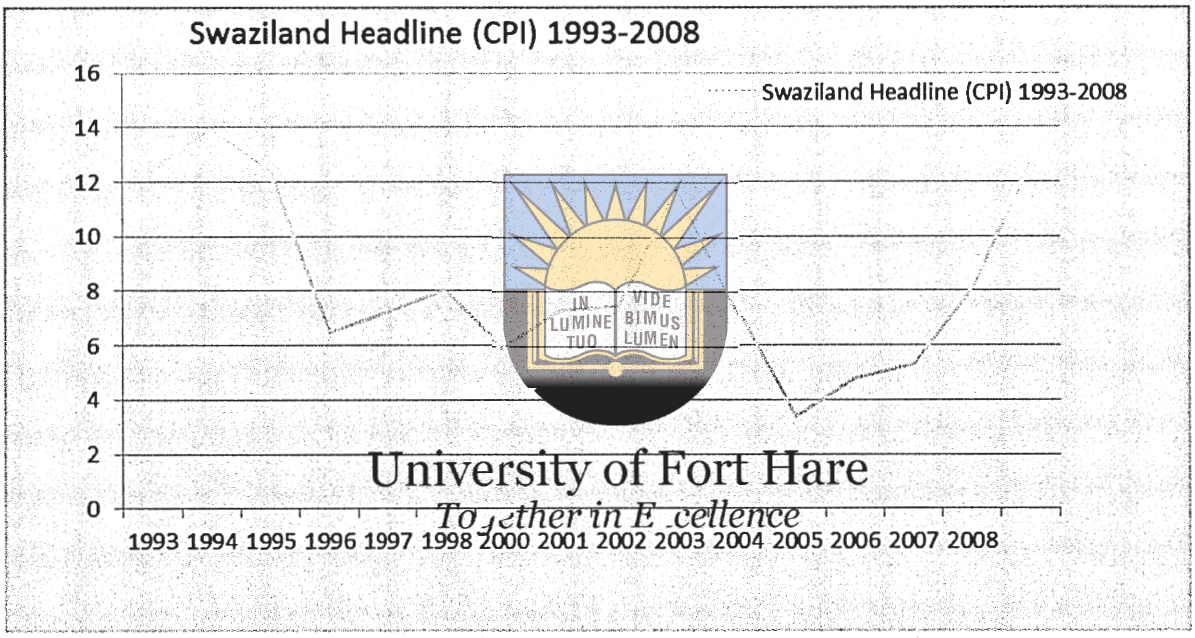
include the imported inflation from South Africa since the Swaziland currency is pegged to the South African rand hence increases in prices in South Africa makes prices of goods and services higher in Swaziland. This can also be supported by the fact that Swaziland buys more than 80% of their imports from South Africa and China and the rest of the world shares the remaining 20%. Recent developments in the economy of Swaziland which ranges from Gross Domestic product, Inflation, fiscal operations, credit growth, current accounts and exchange rate prior to 2008 are summarised in Figure 2.4 as follows

Figure 2.4 Swaziland Recent Economic Developments



From the figures published by the central bank of Swaziland, the researcher plotted CPI figures on a graph to clear give a trend in the inflation rates of Swaziland. Figure 2.5 illustrates the movements in the CPI figures in the period 1993-2008.

Figure 2.5 Swaziland's inflation in the period 1993-2008



Source: Computed from Data series provided by CBS, various issues.

Figure 2.2 above shows substantive increases and decreases in inflation. From 1994-1996, inflation fell sharply from the levels of about 14% to 6.5% followed by a moderate rate in the band of 6% to 8% in the period 1996 to 2001. Furthermore, the CPI rose sharply in the period 2001 to 2002 to reach a level of about 11.7%. In the subsequent two years, CPI fell heavily from a high of 11.7 to about 3.4% and this did not end there as tables turned when inflation started to rise again sharply until it reached high levels of about 12.6% which we witnessed being accelerated by the rising global oil prices and food prices recently. Another potential cause of inflation that could be looked at in the Swaziland context is a rise in imported raw material prices and other goods and services costs caused by external shocks (leading to increased foreign prices of imports) or domestic currency depreciation. In the case of rising import prices and exchange rate depreciation, the major justification for including these variables is that they determine the

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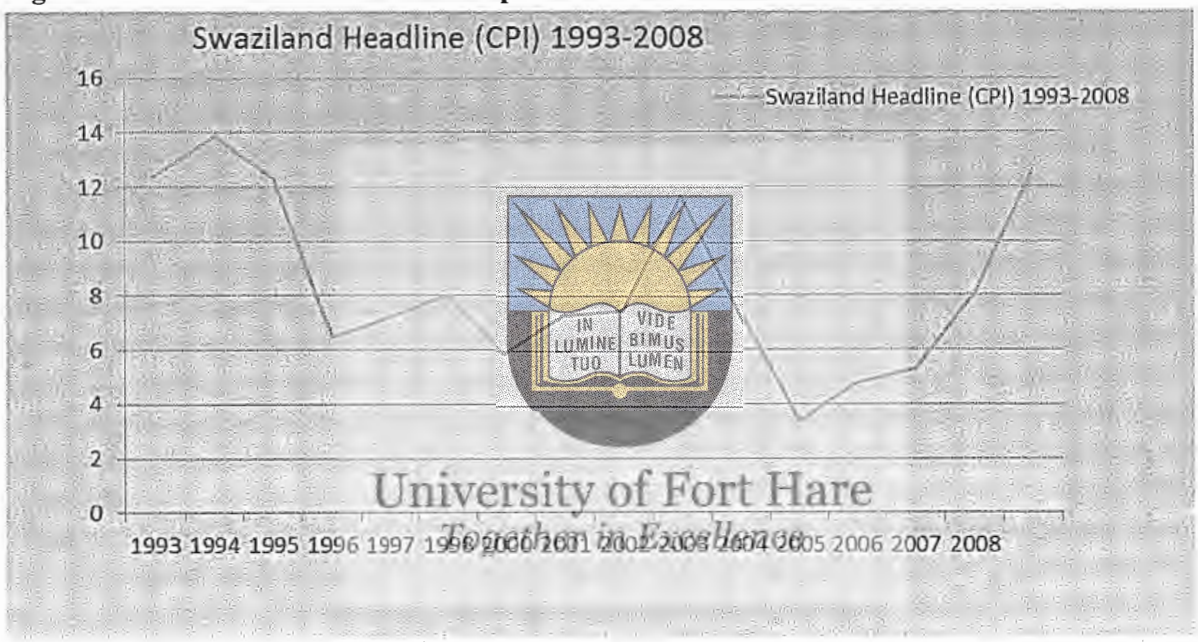

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export competitiveness of the economy. However, in an open and import dependent economy, where domestic inflation is largely determined by foreign prices and nominal exchange rate depreciation, the initial improvement of export competitiveness resulting from depreciation may eventually be offset by the consequent increase in prices.

Structural factors are also believed to influence the rate of inflation in Swaziland. Examples of these are the weather conditions, and protective industrial and trading policies of the government. It can be argued that government protects infant industries from intra currency area trade and regulates domestic marketing of agricultural products by quantitative import restrictions through import permits or licensing. These policies are believed to have created monopolistic and oligopolistic structures of firms, which usually set their prices well above border prices. The general feeling is that these policies may be highly inflationary as prices of some of the controlled items have risen quickly in Swaziland. Weather conditions, crop failures or drought are some of the structural factors believed to have a direct impact on the inflation rate in Swaziland given that food items carry the biggest weight in the computation of the CPI (24.5%). During good weather (rainy agricultural year), prices are in general expected to fall in the future and vice versa. For example, a rise in Swaziland's inflation rate during the year 2000 is believed to have been partially a result of the floods experienced during the first three months of 2000. Since these variables cannot be easily quantified, and their impact is only significant in one-off periods, it was decided not to include these variables but to assign, where appropriate, structural dummies to account for their effects. (International Monetary Fund, 2008).

2.3 Conclusion

The chapter has focused on discussing the developments in economic growth as well as other macroeconomic factors in Swaziland. Monetary regimes which the country has undergone through were also discussed. The link between Swaziland and other SACU countries, as well as how they have influenced developments in Swaziland were highlighted. The analysis indicated that Swaziland has been influenced greatly by developments in other countries.

CHAPTER THREE

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

3.1 INTRODUCTION

This chapter presents the various theories and empirical studies on money demand. The first part of the chapter reviews theoretical literature, mostly theories which have been postulated by economists, for money demand and the second reviews the numerous empirical researches on money demand, both in developed and developing countries, including Swaziland and other countries in the Common Monetary Area (CMA).

3.2 THEORETICAL LITERATURE REVIEW

There is an assorted continuum of money demand theories which discourse a comprehensive array of suppositions. These theories convey forward the link between the quantity of money demanded and a group of economic variables. The monetary relationships established in the demand for money function are an upshot of an extensive progression of theoretical development. This theoretical advancement is centred on the evolution of the meaning and functions of money. Money is defined as the medium of exchange and the standard unit in which prices and debts are expressed (Ritter *et al.*, 1997: 7), also defined as anything that is generally accepted in payment for goods or services or in the repayment of debts (Mishkin, 2004:44). It serves basically four functions: medium of exchange, store of value, unit of account and source of deferred payment (Laidler, 1969: 39-62, Wesche, 1996: 2). Demand for money is the demand for real money balances; it is the amount of real cash balances that economic entities are willing to hold at any specific time.

The four major functions of money were used to formulate the theories of money which is, the theoretical development of money demand from the classical to the post-Keynesian economists, (Teigen, 1971: 74). The focal theories that illuminate the study of demand for money are: the classical quantity theory of money (which is explained by the Fisher's equation of exchange and the Cambridge approach); the Keynesian theory which clarifies the three motives for holding money, namely transactions, precautionary and speculative motives; the post-Keynesian theories of money demand (recent theories), being the inventory-theoretic approach, precautionary

demand for money approach, money as an asset approach (Buffer stock models) and consumer demand theory approach. The sections that follow discuss these theories, starting with the quantity theory of money, then the Keynesian theory and lastly the post-Keynesian theories.

3.2.1 Quantity theory of money

The quantity theory of money owes its origins to the classical economic theory, which states that all markets for goods continuously clear and relative prices adjust flexibly to ensure that equilibrium is reached. Therefore, the economy is assumed to be always at full employment levels, except for temporary deviations caused by real disturbances, and the role of money is simply to serve as the unit to express prices and values. Money facilitates the exchange of goods and services and its use satisfies double coincidence of wants, that is, it acts as medium of exchange. Money is neutral; it does not influence the determination of relative goods prices, real interest rates and aggregate real income. The role of money as a store of value is regarded as limited under the classical assumption of perfect information and negligible transaction costs. The classical economists, however, recognized that some particular quantity of real money holdings would be needed by the economic units to undertake certain special circumstances. This therefore led to the formulation of the quantity theory of money.

The quantity theory of money explains the role of money as a medium of exchange. In this classical work, it is stated that money affects nothing but the price level (Ritter *et al.*, 1997: 404). The quantity theory postulates a direct and proportional relationship between the quantity of money and the price level. The theory has two alternative but equivalent expressions. The first version is the "the equation of exchange" associated with Irving Fisher (1911, in Laidler, 1969: 43) and the second is the "Cambridge approach" or cash balance approach. Both versions view money as a means of exchange and propose models of the transactions demand for money.

The equation of exchange (also called the quantity equation) is commonly used to express the classical theory of inflation. The equation of exchange is often derived from the definition of velocity of money. Velocity is the average rate at which money changes hands in the economy. The equation of exchange stresses the concept of transactions velocity of circulation of money.

This shows the average number of times a unit of money is used in carrying out transactions in a given period.

This well-known equation of exchange as formulated by Irving Fisher (1911, in Laidler, 1969: 44) is stated as:

$M_S V_T = PT$ ..... (3.1)

Where

M_S is the quantity of money in circulation

V_T is the velocity of circulation or rate of turnover

P is the price level and

T is the volume or number of transactions (Laidler, 1969: 44).

The equation of exchange says that total spending (MV) equals what is bought (PT) (Ritter *et al.*, 1997: 405). It is an equilibrium condition which shows that money is held simply to facilitate transactions and has no intrinsic satisfaction.

In the equation of exchange M_S is the active variable. V_T and T are taken as constants; therefore changes in P result from changes in M_S. The money supply causes the price level to change. The variable V_T takes cognizance of the technological factors and the institutional arrangements of the monetary system and is assumed to be constant in the short run. M_S *and* T are assumed to be determined independently. Therefore, at equilibrium, the equation can be written as:

$\bar{M}\bar{V} = P\,\bar{T}$ .....
(3.2)

Where bars over, M_S, V_T *and* T indicate that the variables are independently determined. By treating $\bar{M}$ as exogenous and having $\bar{V}$ and $\bar{T}$ as constants, the price level will vary in direct proportion to the quantity of money. Fisher's approach simply postulates that the demand for

money arises as a result of individual's need to trade with one another. It leads directly to the macroeconomic theory of the demand for money.

A school of economists called quantity theorists assumes that velocity is relatively stable; suggesting that the percentage change in V is always zero. They also assume that the percentage change in Y is at the long-term growth rate of real GDP, approximately 3 per cent. With these assumptions the inflation rate (percentage change in P) will always be 3 per cent less than the growth rate of the money stock (percentage change in M). If the money stock grows at 10 per cent a year, the inflation rate will be 7 per cent a year. Therefore, inflation is an exact mathematical function of the money stock growth rate, and the equation of exchange furnishes us with a theory of inflation. Empirical evidence bears out the close correspondence between money stock growth and inflation, but there is still room for some economists to argue that increases in the inflation rate force authorities to increase monetary growth, instead of the other way around. The limitation of the Fisher approach is that velocity is not fixed; even in the short run it is unstable. It is, therefore, not independent of changes in money supply. In the real world, changes in money supply are not wholly absorbed by changes in price level (Day, 1958: 252). This approach also fails because empirical evidence does not often support the direct and proportional relationship between money supply and the price level. An example is in the case of economic depression.

An alternative version of the equation of exchange is the Cambridge approach, also known as the *"cash balance approach"*. This other prototype does not tie the volume of money holding to overall transactions in the economy, contrary to the Fisher approach. It somewhat looks at what regulates the amount of money an individual would wish to hold given the fact that the desire to undertake transactions makes money holding desirable. The approach relates the quantity of money to nominal income and emphasizes the importance and role of money demand in determining the effects of money supply on the price level (Laidler, 1969: 47-50).

The Cambridge approach is different to Fisher's equation of exchange in three ways. First, it introduces choice making behaviour of individuals rather than market equilibrium. Fisher's

approach looks at what determines the amount of money an economy needs to carry out given volume of transactions, whereas the Cambridge approach looks at what determines the amount of money an individual agent will wish to hold given the desire to conduct transactions. Secondly, in the Cambridge approach, money is held as part of total assets for the services that it provides. It is a store of value; its demand is a function of wealth. In the Fisher approach, it is only viewed as a medium of exchange. Lastly, Cambridge economists point out the role of wealth and opportunity cost in determining the demand for money (Laidler, 1969: 50).

The Cambridge economists identified money as a medium of exchange and proceeded to say that the amount of money held as a medium of exchange is a function of nominal income (PY). The other motive for holding money is that money is used as a store of wealth and furthermore, the amount of money held as a store of wealth is also a function of nominal income (PY)

The formalized Cambridge approach model is

$$M_d = kPY \quad \text{(3.3)}$$

Where:

M_d is the demand for money in nominal terms

PY is the nominal level of income

k is the fraction of spending that people have and own in the form of money balances.

When all other things are equal, M_d is proportional to the nominal level of income for each individual. The variable might depend on other variables reliant on individual choice or taste such as interest rate (opportunity cost) and wealth. If there is money market equilibrium, that is handling $\bar{M}s\ V = PY$, the following expression can be obtained $M_s * [1/k] = \bar{M}\,sV = PY$ .Since in equilibrium $M = M_s = M_d$, we then can have $MV = PY$, that is, an equivalent expression to quantity theory formulation.

The variable V in this expression represents the income velocity of circulation and is determined by the institutional and technological factors, unlike in Fisher's approach explained above; Increases in quantity of money result in a proportional increase in P at full employment level, with the assumption that real income Y and V are fixed. This notable emphasis of the demand for real money balances in determining the equilibrium price level with a given quantity of money by the Cambridge approach influenced the Keynesian and post-Keynesian theories that were formulated after the classical quantity theory.

The significant properties of this theory are that it agrees that money is a medium of exchange and can be held for transaction tenacities, it recognizes the store of value functions and successfully draws attention to the possible effects of interest rates and expectation on demand for money (Laidler, 1969: 39-62). The theory also relayed the philosophy of former theory from the aggregate economic factors to the individual's choice making comportment. The theory, however, fails to unequivocally treat interest [illegible] defining element for demand for money relatively; interest rates are inferred in the optimizing conduct of individuals.

The Cambridge equation indicates that money demand is proportional to nominal income. Considering that k can be written as 1/V and that both k and V are treated as constants, the Cambridge equation and the classical money demand function appear to be identical. However, a major difference, in addition to analysing the motives behind money demand, is in the role that the interest rate plays in money demand. Although the interest rate does not appear in the Cambridge equation, interest rate changes could cause short-run fluctuations in k. Although their analysis led them to an equation identical to Fisher's money demand equation, their approach differed significantly. Instead of studying the demand for money by looking solely at the level of transactions and the institutions that affect the way people conduct transactions as the key determinants. In Cambridge model, individuals are allowed some flexible in their decisions to hold money and are not completely bound by institutional constraints such as whether they can use credit cards to make purchases. Accordingly, the Cambridge approach did not rule out the effects of interest rates on the demand for money.

The classical Cambridge economists thought that two properties of money make people want to hold it: (1) its utility as a medium of exchange; (2) its utility as store of wealth. Cambridge economists agreed with Fisher that demand for money would be related to the level of transactions and there would be a transactions component of money demand proportional to nominal income. As far as money functions as a store of wealth, the Cambridge economists suggest that the level of people's wealth also affects the demand for money. They believed that wealth in nominal terms is proportional to nominal income, they also believed that wealth component of money demand is proportional to nominal income.

3.2.1.1 The Debate on Money Velocity

This section gives a brief overview of the debate which raged on between the theorists. Even though the Cambridge equation looks like Quantity Theory (k =1/V), it is significantly different. The Cambridge equation marks the beginning of an on-going debate about the behaviour of V.

The classical economists (and monetarists) argued that velocity is constant or stable and at the same time velocity is independent of interest rate. This is not in line with the view of the Cambridge economists who had the same view with the Keynesians on this velocity debate. They argued that Velocity is unstable and is affected by interest rates. However, with the surfacing of empirical evidence, it has been discovered that Classical economists had no data to observe the actual behaviour of Velocity. The data became available after the Great Depression and economists realised that velocity was far from being constant as they suggested.

To one side from the equation of exchange and the Cambridge approach to the discussion of factors affecting demand for money, the neoclassical economists suggested, a variety of factors that are thought to affect the demand for money. They proposed among others: the uncertainty about the future, anticipated inflation (hypothesized to be negatively related to money demand), wealth (balance sheet) constraint. Interest rates were only identified as a determinant of opportunity cost of holding money and their role was never explicitly stated until the development of the Keynesian liquidity preference theory. The Keynesian theory which is to be discussed in the subsequent section accentuated the connotation of interest rate sensitivity of demand for money.

3.2.2 Keynes's Liquidity Preference Theory

Keynes (1930 and 1936, in Teigen, 1971: 79) developed a theory of money demand which he called liquidity preference theory. Keynes abandoned the classical view that velocity was a constant and emphasized the importance of interest rates. He postulated that there are three motives that are behind the demand for money: the transactions motive, the precautionary motive, and the speculative motive.

The transactions motive is similar to Fisher's and the Cambridge approaches. It agrees that money is there for the services it provides and to the extent that $M_d = f(Y)$ is a certain proportion of income. Keynes emphasized that this component of the demand for money is determined primarily by the level of people's transactions. The transactions demand for money arises from the lack of synchronization of receipts and disbursements. In other words, people aren't likely to get paid at the exact instant you need to make a payment, so between pay checks people keep some money around in order to buy goods and services. Keynes believed that these transactions were proportional to income, like the classical economists, he considered the transactions component of the demand for money to be proportional to income.

There is a stable relationship between the level of income and money demanded for transaction purposes. Individuals at any particular time hold sufficient funds to bridge the gap between non-receipts and payments. Individuals are uncertain about the payments they may want or make and they will hold money to guard against the unexpected (Teigen, 1971: 79). Keynes also recognized people hold money not only to carry out current transactions, but also as cushion against an unexpected need. Because people are uncertain about the payments the might want, or have, to make. If people don't have money with which to pay, they will incur a loss. When you are holding precautionary money balances, you can take advantages of the sale. Keynes believed that the amount of precautionary money balances people want to hold is determined primarily by the level of transactions that they expected to make in the future and that these transactions are proportional to income. So he considered the demand for precautionary money balances to be proportional to income. This precautionary motive, to guard against unplanned expenses, also creates the demand for money. This is because money serves as a medium of exchange in this motive and the amount of money demanded will obviously depend on the level of income.

Therefore, the precautionary demand for money provides an emergency plan for unforeseen expenses.

Keynes also postulated that individuals will hold money in order to speculate or for the purpose of investment. This speculative motive shows Keynes's significant contribution to the theory of money demand. Keynes, however, focused on one variable, the future level of the interest rate, especially the future yield on bonds (Teigen, 1971: 78). According to Keynes, bonds were the alternative assets to holding money. Money provides zero interest, whereas bonds provide interest income and capital gain. The analysis of speculative motive depends on expectation in the movements of future interest rates. When interest rates rise, the price of a bond falls. Therefore, if individuals expect interest rates to rise, they expect the price of the bond to fall and hence suffer a negative capital gain. Money and bonds are considered perfect substitutes, according to this theory. Individuals can hold their wealth either in money or in bonds. The price individuals are willing to pay to acquire bonds [illegible] the rate of interest that will be earned. The transactions motive and the precautionary motive for money emphasized medium–of-exchange function of money, for each refers to the need to have money on hand to make payments. Keynes agreed with the classical Cambridge economists that money is a store of wealth and called this reason for holding money the speculative motive. He also considered that wealth is tied to closely to income; the speculative component of money demand would be related to income. Keynes believed that interest rates have an important role to play in influencing the decisions regarding how much money to hold as a store of wealth.

Keynes divided the assets that can be used to store wealth into two categories: money and bonds. He also asked why individuals would decide to hold their wealth in the form of money rather than bonds. Keynes assumed that the expected return on money was zero in his time, unlike today. For bonds, there are two components of the expected return: the interest payment and the expected rate of capital gains. As we know, when interest rates rise, the price of a bond falls. If you expected interest rates to rise, you expect the price of the bond to fall and suffer negative capital gains. In this case, people would want to store their wealth as money because its expected return is higher; its zero return exceeds the negative return on the bond. Keynes assumed that individuals believe that interest rates gravitate to some normal value. When interest rates are

below the normal value, people expect the interest rate on bonds to rise in the future and so expect to suffer capital loss on them. Therefore, people will be more likely to hold their wealth as money rather bonds, and the demand for money will be high. And contrariwise, they will be more likely to hold bonds than money, and the demand for money will be quite low. Therefore, money demand is negatively related to the level of interest rates.

The introduction of interest rate in the money demand by Keynes led to the function being represented as follows:

$M_d = f(y, i)$ ..... (3.4)

Where

M_d is the demand for real money balance

y is real income

i is the interest rate

The above equation shows that demand for money is a function of interest rates and income. According to Keynes, low interest rates will lead to high money demand because people will prefer to hold money and expect interest rates to increase, hence if there is a decrease in the price of bonds and no one would want to hold bonds (Ritter *et al.*, 1997: 441). The theory simply states that there is a negative relationship between money demand and interest rates. Interest rates determine the allocation between money and bonds. When interest rates are very low, individuals in the economy will expect interest rates to go up in the future, and hence, prefer to hold money in whatever quantities supplied. The link between interest rate (i) and income (y) is obtained through the negative relationship between bond prices and interest rates. However, when the economy is in the liquidity trap, that is, the flat portion of money demand function, the interest elasticity of money demand can be infinite (Sriram, 1999: 9).

Rendering to the Keynesian theory, how much money to keep for transaction, precautionary and speculative motives is determined by the level of income and most importantly the interest rate.

His main empirical legacy in this area was the introduction of interest rates into the demand for money, primarily via the speculative motive.

Keynes assumed that the expected return on money was zero in his time, unlike today. For bonds, there are two components of the expected return: the interest payment and the expected rate of capital gains. As we know, when interest rates rise, the price of a bond falls. (Mishkin, 2004: 69) If you expected interest rates to rise, you expect the price of the bond to fall and suffer negative capital gains. In this case, people would want to store their wealth as money because its expected return is higher; its zero return exceeds the negative return on the bond. Keynes assumed that individuals believe that interest rates descend to some normal value. When interest rates are below the normal value, people expect the interest rate on bonds to rise in the future and so expect to suffer capital loss on them. Therefore, people will be more likely to hold their wealth as money rather bonds, and the demand for money will be high. And contrariwise, they will be more likely to hold bonds than mo[illegible] demand for money will be quite low. Therefore, money demand is negatively related to the level of interest rates. (Mishkin, 2004: 523)

The demand for real money balances is negatively related to the interest rate, and the demand for real money balances and real income Y are positively related. Keynes thought that the demand for money is related not only to income, but also to interest rates. Because the transactions motive and precautionary motive demand for money is positively related to real income Y, speculative motive demand for money is negatively related to interest rate i, the demand for real money balances M^d/P can be rewritten as

$$\frac{Md}{P} = L_1(Y) + L_2(i) \quad \text{(3.5)}$$

Where L_1 means the transactions demand for money; L_2 means the speculative demand for money. By deriving the liquidity preference function for velocity PY/M, we can see that Keynes's theory of the demand for money implies that velocity is not constant but instead fluctuates with movements in interest rates. The liquidity preference equation can be rewritten as:

$$\frac{P}{Md} = \frac{1}{f(i,Y)} \quad \text{(3.6)}$$

Multiplying both sides of this equation by Y and recognizing that M^d can be replaced by M because they must be equal in money market equilibrium, velocity is solved for:

$$V = \frac{PY}{M} = \frac{Y}{f(i,Y)} \quad \text{(3.7)}$$

Keynes's liquidity preference theory of the demand for money indicates that velocity has substantial fluctuations as well. Keynes's conclusion that the demand for money is related not only to income but to the interest rates is a major departure from Fisher's quantity theory of money, in which interest rates have no effect on the demand for money, but it is less of a departure from the Cambridge approach, which did not rule out the possible effects of interest rates (Mishkin, 2004: 537). However, the classical Cambridge economists did not reconnoitre the unambiguous effects of interest rates on the demand for money. The influence by Keynes about the effects of level of income and interest rate on money demand led to the formulation of other theories which emphasized the three motives of holding money, namely: transactions, speculation and precaution. The following section examines these post Keynesian theories of money demand.

3.2.3 Post Keynesian theories of money demand

As a continuation from the previous section, the post-Keynesian theories are an upshot of predominantly two characteristics of money, the medium of exchange and store of value functions. The role of money as a medium of exchange leads to transactions models of which inventory models assume a known level of transactions and certainty and the precautionary demand models that treat net inflows as uncertain. The store of value role leads to portfolio models where money is considered as being part of the portfolio of assets held by an individual. Therefore, these two functions of money lead to a conjecture of theories that are based on motives for holding money. There are, nevertheless, other post-Keynesian theories that utterly flout the three motives of holding money and scrutinise the demand for money in a consumer demand theory approach. However, they assume that populaces hold money. The most shared characteristics of the post-Keynesian theories of money demand is that they endeavour to

rearticulate the simple Keynesian demand for money function in such a way as to make empirical analysis more significant. The following sub-sections discuss the main features of these post-Keynesian approaches, namely: the inventory-theoretic, precautionary demand for money, buffer stock and the consumer demand theory.

3.2.3.1 Inventory–theoretic approach

The inventory-theoretic approach associated with Baumol (1952) in Mankiw (1997: 486) and Tobin (1956) in Mankiw (1997: 486) analyses the costs and benefits of holding money. Money is viewed as an inventory held to make transactions. The inventory-theoretic models assume that there exist two stores of value: money and interest bearing alternative assets. It is also assumed that there is a cost in switching between money and the alternative asset. The benefit of holding money is convenience: for example, avoiding going to the bank every time a person wishes to buy something. The cost of this convenience is the forgone interest they would have received had they left the money on less liquid financial assets that paid interest. The assumption under this approach is that money is used to make every payment and all the relevant information is known with certainty.

The individual has to balance his allocation of money in interest earning assets and holding money which does not earn interest. However, if an individual allocates part of his money to interest earning asset, there are brokerage costs that might be incurred when these interest earning assets have to be sold to finance transactions. Therefore, a higher average holding of money minimizes these brokerage costs, but this means greater forgone earnings on interest. The balance between the increase in transaction costs incurred in selling an interest earning asset and interest income forgone as a result of holding higher cash balances leads to the formula:

$$M* = \sqrt{\frac{(a^{\circ}y)}{2r}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots$$

(3.8)

Where

M* is real money balances

a° is transaction costs

y is real income

r is the rate of interest (Sriram, 1999b:10).

The above "square-root formula" states that optimal demand for real money balances is directly proportional to transaction costs (a^{b}) and real income (y). M*, the demand for real money balances, is however inversely proportional to the interest rate (r). The individual agent minimizes the sum of brokerage costs and interest forgone. The importance of this approach is that it introduces the optimization behaviour of individuals in demand for money, the trade-off between money and alternative interest earning assets. The basic analysis of this approach is that there is an opportunity cost of holding money, that is, the forgone interest that can be earned on other assets. There is also a benefit to holding money, the avoidance of transaction costs.

The weaknesses of this approach are that: (1) although it assumed that money is used for transactions (payments), it failed to provide a convincing microeconomic foundation as to why people use money and (2) the assumption that receipts and payments are known with certainty might not be true in the real world. These weaknesses lead us to the precautionary demand for money approach, which introduces some t[illegible]n the analysis of demand for money (Sriram, 1999b: 11-12). Baumol (1952) and Tobin (1956) independently developed similar demand for money models, which demonstrated that even money balances held for transactions purposes are sensitive to the level of interest rates. They considered a hypothetical individual who receives a payment once a period and spends it over the course of this period in developing their models. In their models, money which earns zero interest is held only because it can be used to carry out transactions. The conclusion of the Baumol-Tobin analysis is as follows: as interest rates increase, the amount of cash held for transaction purposes will decline, which in turn means that velocity will increase as interest rates. The transactions component of the demand for money is negatively related to the level of interest rates.

3.2.3.2 Precautionary demand for money approach

The precautionary demand for money framework postulates that people are uncertain about the payments they might want, or have to make, hence there is demand for money balances for these unknown expenditures (Sriram, 1999b: 12). People do hold money for this precautionary motive. The more money the person holds, the less likely that the person incurs the costs of illiquidity. There is, however a trade-off between money and interest. That is, the more money the person

holds, the more interest is forgone. The precautionary demand for money approach argues that people optimize the amount of money held for precautionary purposes by thoughtfully weighing the interest costs versus the advantage of not being caught insolvent. Therefore, the precautionary demand for money is negatively related to interest rates.

The precautionary money demand models introduced an element of uncertainty, unlike the inventory models which assumed that receipts and payments are known with certainty. The other implication of precautionary models is that an increase in the overall volume of transactions would lead to a less than proportional increase in money holding (Sriram, 1999b: 12).Having known that there are lots of benefits of holding precautionary money balances, but weighed against these benefit must be the opportunity cost of the interest forgone by holding money. The more money an individual holds, the less likely he or she is to incur the costs of illiquidity. But the more money the person holds, the more interest he or she is giving up. As interest rates rise, the opportunity cost of holding precautionary [illegible]ses, and so the holdings of these money balances fall. Therefore, the precautionary demand for money is negatively related to interest rates.

3.2.3.3 Buffer-stock models/Portfolio models

The buffer-stock models recognize the role of money as a store of value. They consider demand for money in the framework of a portfolio choice problem. The buffer stock models state that the individual wealth-holder allocates his portfolio between money treated as a risk free asset and assets with an uncertain rate of return. The buffer stock models place a major emphasis on risk and expected returns of the other assets. Money is viewed as providing liquidity for transactions and rendering safety. These models show the relationship between interest rates and the demand for real money. The importance of wealth and liquidity are noted as other key variables in determining the demand for money.

The portfolio demand theories argue that under the assumption of expected utility maximization, the optimal portfolio can be shown to depend on wealth and on the properties of the utility function and the distribution function for the return on the risky asset. The degree of risk aversion and the mean and variance of the return on the risky asset are of particular importance.

An individual would hold part of his/her wealth in the form of money in his/her portfolio because the rate of return on holding money is more certain compared to that of holding interest earning assets. It is less risky to just hold money alone compared to holding alternative assets. The difference in the risk may be due to the fact that alternative assets are affected by market price volatility, while money is not. The individuals will only want to face the risk because of the reward offered by the alternative assets, which exceeds those offered by holding money. Given a menu of assets available in a country, money pays a zero return, and if there is a riskless asset which is paying a positive rate of return (e.g. a savings deposit), then money will not be held (Goldfeld and Sichel, 1990: 310). However, the risk-averse economic entities would want to include some money in an optimally structured portfolio. Risk-aversion behaviour, however, does not alone provide the basis for holding money.

Portfolio theories predict that the demand for money depends on the risk and return offered by money and alternative assets. The portfolio [illegible] demand for money can, therefore, be formulated as:

$(M/p)^d = L\ (rs, rb, \pi^e, W)$ ..... (3.9)

Where

rs is the expected real return on stock

rb is the expected real return on bonds

π^e is the expected inflation rate

W is real wealth

M is the quantity of money

P is the price level

M/p is the quantity of money measured in units of constant purchasing power (Mankiw, 1997: 484).

This function simply shows, for example, that an increase in the expected real return on stock (rs) and/or the expected real return on bonds (rb) reduces money demand because alternative

assets become attractive. An increase in expected inflation rate (π^e) reduces money demand because money becomes less attractive. An increase in real wealth (W) will obviously raise money demand because higher wealth means a larger portfolio. The demand function can, therefore, be simplified as, $L(y, i)$ where, y is a proxy for real wealth (W) and $i = rb + \pi^e$ i.e. sum of real return on bonds and expected inflation.

Although the buffer-stock models recognise the role of money as a medium of exchange, its ability to act as a store of value makes it possible to facilitate the inter-temporal shift of consumption possibilities (Sriram, 1999b: 14). Therefore, these models present money as an asset rather than a means of exchange to facilitate transactions. The major criticism of these models is that they fail to explain the observed tendency for agents to hold money when other assets exist which are devoid of nominal risks but pay positive interest rates (Sriram, 1999b: 14).

3.2.3.4 Consumer theory approach

The consumer theory approach examines money using the consumer demand theory, where goods are held because an individual derives utility from them. The theory of consumer demand is the derivation of demand functions by considering a model of utility-maximisation behaviour coupled with underlying economic constraints (Varian, 1992: 94). Consumer behaviour in economic analysis is conveniently summarised by means of a utility function, where the utility function is a way to describe preferences. Therefore, a rational consumer will always choose the most preferred bundle from the set of affordable alternatives. In order for the function to be well-defined, it is assumed that there is a unique bundle that maximises utility. The theory emphasises the importance of income and prices in achieving a certain demand function. The approach basically answers the question: how much money would a given consumer need at the price, say P, to be as well off as he could be by consuming the bundle of goods, say X (Barnett *et al.*, 1992: 2093)

The consumer theory approach also argues that real goods (physical goods) are included in the economic agent's portfolio choice, since they yield a stream of services (Sriram, 1999a: 14). Therefore, the expected rate of return on physical goods can be measured by the expected rate of

inflation. This variable then plays an important role in the demand for money theoretical analysis. The consumer demand theory approach has been able to suggest that a good part of the problem of the "missing money"9 episode may be the way money was measured both in the choice of component groupings and in the method of aggregating over those groupings. That is, the way the demand model's capabilities relate to the general optimizing behaviour of economic agents (Barnett *et al.*, 1992: 2115). When developed through data produced from the Divisia index it can capture those movements in money holding that are due to changes in the relative prices among assets (Barnett *et al.*, 1992: 2115).

The consumer demand theory approach provides a consistent framework for analysing portfolio choice and offers greater insights into results from aggregate studies of demand for money than the motives approach. This is achieved by incorporating restrictions of demand theory in such a manner as to assure consistency with the optimizing behaviour of economic agents (Barnett *et al.*, 1992: 2088, Feige and Pearce, 1977: 441). This allows for a docile approach and provides for testing of the key adages of choice theory, hence a better elucidation of the role of nominal interest rates, inflation, and wealth in the demand for money function.

3.2.4 Conclusion

Having provided a comprehensive theoretical review, it can be concluded that these diverse demand for money theories share common important scale variables. They establish a relationship between the quantity of money demanded and a set of economic variables. The developments started with the classical economists, who stated that money serves as a numeraire. For the classical economists, the quantity of money provided an explanation of movements in the price level: movements in the price level result solely from changes in the quantity of money. Then, the Cambridge economists explicitly stressed the demand for money as a public demand for money holdings and formally established the relationship between the demand for real money and real income. The Keynesian theory further developed the money demand theory based on the three motives that prompt people to hold money and introduced the role of interest rates in determining the demand for real money balances.

The post-Keynesian theories, starting with the inventory-theoretic approach, emphasised the transactions costs under certainty while the precautionary demand for money approach introduced the concept of uncertainty. The buffer stock models or portfolio approach evaluated the demand for money under the portfolio optimisation framework. Lastly, the consumer demand theory analysed the demand for money under the utility maximisation framework.

Although these theories analyse demand for money differently, they consider a similar set of variables to explain demand for money. The main variables that drive money demand are income, interest rate, the price level, wealth of the economic unit and the changes in these variables over time. The differences arise in terms of using the proper scale variables and opportunity cost of holding money. Therefore, empirical investigation may shed some light on these matters and provide an indication on which specification is more likely to be better. The next section therefore looks at the empirical literature on demand for money.

3.3 EMPIRICAL LITERATURE REVIEW

3.3.1 Introduction

There are wide ranging discussions in the literature about the estimation of money demand function in developed and developing countries. However, the initial work was primarily confined to industrial countries, especially the United Kingdom and the United States of America, while much work has and is still been done in developing countries. The ever changing financial reforms and advancement made in time series econometric investigation stimulated the revisiting of the money demand functions. The purpose of this section is to review relevant issues concerning the empirical studies on demand for money in order to help in the formulation of the demand function for Botswana. There are, however, differences in the demand functions between countries due to a number of factors including but not limited to, the level of financial development, existing financial assets, macroeconomic and institutional environment.

A lot of empirical work has been done by different scholars on demand for money and these include Laumas and Mehra (1976), Barnett (1990), Hafer and Jansen (1991), Adam (1991), Cuthbertson and Barr (1991), Baba *et al.* (1992), Wesche (1996) and Sriram (1999a), among others, in developed countries. The majority of these empirical works identified three main

issues in empirical literature relevant to modelling and estimation of demand for money. The three main issues are: (1) Monetary aggregation, that is, the definition of money stock; (2) appropriate scale and opportunity cost variables; and (3) functional forms or the framework chosen (Sriram, 1999a: 17, Laumas and Mehra, 1976: 463). These issues are discussed in some detail in the sub-section that follows. This section is divided into three sub-sections: empirical issues, studies conducted in developed countries, studies in developing countries.

3.3.2 Empirical issues

The following three sub-sections discuss the issues involved in the estimation of demand for money function as identified by various studies and the summary of results in such studies, especially in developed countries.

3.3.2.1 Monetary aggregation

Many empirical studies contributed to the debate about the correct measure of money to be used in estimating the demand for money function, especially from a policy standpoint. Therefore, from a policy maker's perspective, the importance of a measure of money is only insofar as how it conveys information about the behaviour of objective variables, such as prices and output (Pill and Pradhan, 1994, in Wesche, 1996: 8).There are extensive discussions in the demand for money literature regarding which measure of money yields a stable demand for money function. In countries where the banking system is weak and the level of financial sector development is low, narrow money seems to indicate a reliable stable demand for money function. However, the narrow money function shift over time as a result of evolving financial system and institutional structure, hence researchers argue for the use of broad money as it yields a more reliable long run relationship in a changing financial system (Hafer and Jansen, 1991: 156, Sriram, 1999b: 7). With this unsettled question in mind, researchers have investigated several measure of money to establish the one which can serve as a better guide to monetary policy, that is, the measure that produces a reliable and predictable stable demand for money function.

The different types of measures are M1, M2 and M3, for example. Different studies used either one of the above or a combination of two and in some cases all three measures have been used. Baba *et al.* (1992) used M1 in their study of demand for money in United States of America;

Adam (1991) used M3 in his study of financial innovation and demand for money in the United Kingdom from 1975 to 1986. Data availability also plays a significant role in the measure of money used which will be an issue in the study of Swaziland. Some studies investigated both M1 and M2 demand function in their analysis. Hafer and Jansen (1991) and Laumas and Mehra (1975) are example of such studies.

The narrow money (M1) is generally the form of monetary aggregate which includes currency plus demand deposits at the commercial banks. The broad money (M2) includes items in M1 plus time and saving deposits. Some studies estimated the demand for money function by exclusively using M1 and argued that broader aggregates might muddy the interest rate's effects. The other argument was that M1 is more amenable to control by the monetary authorities (Sriram, 1999a: 19). As a result of the innovation in the financial system and the changes in institutional framework, most empirical studies shifted from using M1 to using M2 in order to capture the effect of new instruments. Broad [illegible] produces a more stable function than narrow money when new financial instruments are included in the estimation (Goldfeld and Sichel, 1990: 317). M2 is considered to be a preferable measure with which to evaluate the long run economic impact of a change in monetary policy (Hafer and Jansen, 1991: 166).

These vague issues of which monetary aggregation result in stable demand for money function led to the introduction of the study of demand for money using the divisia index aggregates, which are indices that are considered to be alternatives to the existing convectional monetary aggregates of M1, M2 and M3. The supporters of this theoretical approach to money demand argued that the simple-sum monetary aggregation (mostly M1, M2 and M3) does not capture the theoretical notion of money adequately (Wesche, 1996: 2). Their argument is that the simple sum aggregates do not take advantage of the results of the possible influences of financial innovation and regulatory changes (Barnett *et al.*, 1992: 2087).

The other weakness of simple sum aggregation is that it has been found not to be consistent with microeconomic theory. This is because the simple addition of components is justified only when all components are perfect substitutes for each other. A typical example of this is that broad money aggregates include components held for saving motives that are only imperfect substitutes

for transactions motives (Wesche, 1996: 1). The simple-sum aggregates assume perfect substitutability of all monetary assets and this makes it possible for the simple sum monetary aggregates to likely give a wrong expression of the stock of money in the economy (Wesche, 1996: 4).

The divisia index for monetary services makes an attempt to separate the transactions role of money from the other functions performed by money. Instead of measuring the stock of money held in the economy like the simple sum aggregate, the index assesses the utility the consumer derives from holding a portfolio of different classes of monetary assets (Barnett *et al.*, 1992: 2087). Therefore, this argument presents money regarded as a consumer durable, yielding a flow of monetary services.6 The use of divisia monetary aggregates rather than simple sum aggregates produces functions that are much more stable than those of simple sum aggregates, but at the cost of greater interest elasticity. Barnett (1990: 246) states that when divisia monetary data are used, the economic variables in the models [illegible] demand for and the supply of monetary services adequately, and tests for structural change reject the hypothesis of shifts in the economy's structure. When the conventional simple-sum monetary data are used, the interest elasticities of the demand and supply functions are usually lower than those found with the divisia data, although the functions estimated with simple sum aggregates experience frequent unexplained structural shifts (Barnett, 1990: 246, Baba *et al.*, 1992: 57).

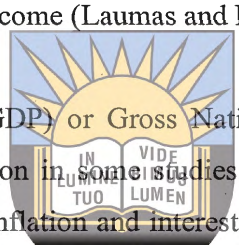
Simple sum aggregations have several advantages over the divisia index number theory. Firstly, simple aggregates are also simple to use (Wesche, 1996:12). The controllability of a divisia index is also impeded as it is influenced by changes in interest rates changes (Stein, 1994, in Wesche, 1996: 12). The divisia measure is also not easier to control as is the case with simple sum aggregate measure (Wesche, 1996: 13). Ericsson (1998: 298) argues that the divisia indexes seem singularly unsuitable to address the ubiquitous phenomena of financial innovation and deregulation. The weakness of a divisia approach is that it implies that liquidity changes suddenly when interest rates move upon deregulation, even when the quantities of aggregate's component and the characteristics of those component remain unchanged (Ericsson, 1998: 298).

6 See Barnett *et a*l., (1992), Barnett (1990) and Wesche (1996) for a detailed argument about monetary aggregation.

The monetary aggregate used, however, varies from study to study and is selected based on the objectives of the study and other variables included in the estimation. The next sub-section therefore looks at scale and opportunity costs variables used in various studies of demand for money.

3.3.2.2 Scale and opportunity cost variables

The choice of scale and opportunity cost variables used in the study of demand for money is generally similar, with some slight differences depending on the chosen monetary aggregation. The scale variable is a measure of transaction relating to the economic activity and this includes using the level of current or permanent income (Laumas and Mehra, 1976: 464).



The use of Gross Domestic Product (GDP) or Gross National Product (GNP) as a variable representing wealth or income is common in some studies. Adam (1991) used income, gross financial wealth, changes in price level/inflation and interest rates13 as variables in the study of demand for money in the United Kingdom fro[illegible]-1986. However, most empirical studies use the level of income to represent the scale variables because it has few measurement problems compared to other representations such as wealth (Sriram, 1999b: 21). The other problem with the use of wealth as a scale variable is that it is difficult to construct a long time series data for most countries.

Although GNP is the most prominently used representation, GDP has also been commonly used as a substitute and this does not show any significant difference in the results obtained (Laidler, 1993: 99). In order to capture the total transactions in an economy dependent on imports some studies used an expenditure based indicator like gross domestic expenditure (GDE) to represent income, that is, a scale variable. Most studies use GNP as the relevant scale variable because of readily available data and as it also satisfies both income and wealth representations, directly and indirectly. The scale variable can, however, be left out in situations where the speed of adjustment of monetary aggregates used is too rapid or when high frequency data is used for which there is no data for the scale variable chosen (Sriram, 1999a: 22-23).

The specification of the opportunity cost variables is however the most important determinant of getting very meaningful results in the estimation of the demand for money function (Ericsson,

1998: 304). As earlier explained in the theoretical literature, the opportunity cost of holding money involves two things, the own-rate of money and the interest rate of return on alternative assets to money. The omission of the variable, own-rate of money can lead to misspecification of the opportunity cost variable. This misspecification often leads to a breakdown of the estimated demand for money function, especially when financial innovation occurs in the economy (Aziakpono, 2000: 131, Baba *et al.*, 1992: 26). In case of a closed economy the rate of return on assets represents yields on domestic financial and real assets, whereas for an open economy, yields on foreign assets are included to capture the effects of currency substitution on domestic money holdings.

There are a number of instruments used to represent yields on domestic financial assets and the use of these instruments as variables largely depend on the state of the domestic financial sector, the extent to which interest rates have been liberalized and the availability of data (Sriram, 1999a: 18). The alternative assets to money include yields on government securities, commercial paper, or savings deposits and return on foreign securities. The general view is that these instruments are very close substitutes for money and their returns are especially relevant among alternatives that are forgone by holding cash (Sriram, 1999a: 23).

The yields on real assets are mostly proxied by the expected inflation, whereas that of foreign assets is proxied by foreign interest rate or some form of exchange rate equivalent variable. The argument for inclusion of expected rate of inflation in the demand for money function is that if money is a way of holding wealth then the demand for money should be viewed as demand for services it provides. That is why the expected rate of change in the price level should be included among the variables in the demand for money function (Sriram, 1999a: 24). In most developing countries, the use of the expected rate of inflation as an opportunity cost variable is common. This is because the financial sector is not well developed and in most cases data on the expected rate of inflation is readily available. The other reasons for this are that there is limited substitution possibility between money and other financial assets due to under-developed markets and interest rates are also regulated, hence there is very little variation in interest rates for long periods of time. Therefore, since the choice of individual wealth holder is limited to holding money and real assets (Fielding, 1994: 18, Simmons, 1992: 29). The individual will thus

look at the possibility of investing in real assets that include land, consumer durables and livestock.

The inclusion of a foreign financial assets variable in the demand for money function depends on the openness of the domestic economy. In an open economy the domestic demand for money can be influenced by external monetary and financial factors such as increases in rates of return in foreign securities and depreciation of domestic currency. The direct currency substitution can happen if the domestic currency is expected to depreciate. In that case domestic portfolio holders will find an incentive to switch to foreign assets. The exchange rate can be used as a variable under this circumstance. Likewise, if there is an increase in rates of return in foreign securities there is a window for alternative investment and foreign interest rate becomes a useful variable (Simmons, 1992: 31-33).

The discussion above shows that there are t[illegible] components acting as the opportunity cost of holding money, namely: the own-rate of money and returns on alternative assets for money. The latter component further comprises return on domestic financial and real assets and return on foreign assets.

The study by Baba *et al.* (1992) also included a risk element/variable in their estimation of demand for M1 in the United States of America from 1960 to 1988. Their variable was represented by a moving average standard deviation of holding period yield of a bond (Baba *et al.*, 1992: 29). The argument presented is that, where the wealth holder has no net position on the Treasury bill or bond market, since bills or bonds are not held or owed, the risk-return trade-off on bonds enters the money holding decision. Therefore, the trade-off is safe money versus risky bonds. This makes the demand for a safe asset, e.g. money; depend on a risk-return trade-off against higher yielding risky assets.

The choice of variables, however, depends much on the financial development of a country, the macroeconomic development, the extent to which interest rates are liberalized, the openness or otherwise of the economy and data availability. For developing countries characterised by underdeveloped financial sectors with limited financial assets and data set, the choice of

variables in the money demand function might be limited. Therefore, the selection of a combination of variables to be used in the estimation of the demand for money function is an empirical issue. It is an empirical issue because the selection of these combinations and measures to represent these variables depends mostly on the macroeconomic development, the status of the domestic financial system, the extent to which interest rates are liberalised, the openness or otherwise of the economy and the availability of data (Sriram, 1999b, 28).

3.3.2.3 Functional forms and framework

In the study of demand for money the functional form and framework chosen should be free from the theoretical and estimation problems, and should be able to work well in an empirical setting (Sriram, 1999b: 37). Presently, economic theory does not state the correct mathematical form of the demand for money function. There are however, generally three functional forms dominating the literature: linear-additive, log-linear and linear-non additive (Feige and Pearce, 1977: 446). The linear-additive functional form assumes that money shifts associated with unit changes in the independent variables are constant over time while elasticities are allowed to change over time. The log-linear demand function imposes constant temporal elasticities while allowing the money shift responses to vary over time. Lastly, the linear-non additive functional form allows both the money shifts and elasticities to vary over time (Feige and Pearce, 1977: 446).

Although there are several functional forms of specifying money demand function, there is general consensus that the log linear version is the most appropriate functional form because it performs better than the other forms (Sriram, 1999a: 28, Laumas and Mehra, 1976: 463 and Cuthbertson and Barr, 1991: 859, Barnett *et al*, 1992: 2086, Bossogo-Egoume, 2000: 10). Bossogo-Egoume (2000: 10) also states that the log linear form allows for interpretation of coefficients of variables in logarithms as elasticities.7

7 This can be interpreted as percentage change leading to a one per cent change in the modelled variables (Bossogo-Egoume, 2000: 10).

The specification of demand for money function evolved from the partial adjustment models (PAM) to varying regression approach then buffer stock models and most recently to the error correction mechanism approach. Under partial adjustment models, demand for money is assumed to be a function of scale variable and a vector of opportunity cost variables (Sriram, 1999b: 30). These models determine that due to adjustment costs, there is a lag involved for the desired level of holdings to match the actual levels of money.

The partial adjustment models (PAMs) however, have been criticised for being ad hoc in nature because it is a form of log-linear specification. The PAMs framework was also not able to explain the apparent instability in the demand for money function experienced during the post war period. This instability was commonly known as the "missing money" episode and was experienced in the post-war period especially the early 1970s (Mizen, 1997: 1203).17 The instability of the demand for money function under the partial adjustment framework was a result of two factors: the on-going financial innov[illegible] inadequacy of the partial adjustment model framework as an empirical tool to estimate the demand for money (Sriram, 1999a: 3, Mizen, 1997: 1203, Baba *et al.*, 1992: 32).

The PAMs failed on theoretical and empirical grounds. They experienced econometric problems of serial autocorrelation, simultaneity bias, model misspecification such as restrictive dynamic structure, and spurious regressions due to non-stationarity of data (Sriram, 1999a: 32). The empirical estimates of partial adjustment models produced inaccurate predictions of real money balances, they generally showed very low short run elasticities for income (about 0.1) and interest rate elasticities of around -0.05 and a coefficient of the lagged dependent variable was close to unity (Sriram, 1999b:32). Having a small interest elasticity coefficient in the short run and a larger one in the long run meant that, after a change in money stock, interest rate overshooting should occur in the short run. In contrast a larger change in the interest rate is needed in the short run to clear the money market and a small change is necessary in the long run (Sriram, 1999b: 32).

The breakdown of partial adjustment models due to the econometric problems they encountered led to the rise of buffer stock models (BSMs). Buffer stock models explain the demand for

money in the context of individual optimisation and the microeconomics of adjustment in the market for money. They recognise the possibility that current period departures from equilibrium in the money market are based on commonly accepted principles (Mizen, 1997: 1204). A buffer stock model based on Cuthbertson and Taylor (1987, in Mizen, 1997: 1205) incorporates forward looking behaviour allows the individual money balances to be influenced by surprises to current monetary policy and expectations of future monetary policy.

The major drawback of buffer stock models is that the estimates of the coefficient of the long run money demand equation are conditional upon the correct specification of the entire model (Cuthbertson and Barr, 1991: 865). The buffer stock models have also been criticised for their relevance in empirical estimation in that although the short-run dynamics structure is much more advanced than in PAMs, it is still somewhat restrictive. The other weakness with the BSMs is their assumption that money stock is exogenous as some studies have shown that it is a dependent variable (Laidler, 1993: 128).

The downfall of buffer stock models led to the introduction of the error-correction models in estimating demand for money function. Error-correction models (ECMs) are basically a result of improvement in the dynamic structure, the character which was lacking in the PAMs. Studies which used error correction modelling (ECM) in the estimation of demand for money function include among others: Adam (1991), Hafer and Jansen (1991) and Baba *et al.* (1992) in their analysis of the United Kingdom and United States of America, respectively. Others studies are by Wesche (1996) in analysis of five European countries.

Sriram (1999b: 38) summarises the work of several other authors in their review of advantages of ECM as follows: (1) it avoids the possibility of spurious correlation among strongly trended variables; (2) the specification attempts to distinguish between short run (first differences) and long run (lagged-levels) effects and (3) it provides a more general lag structure which does not restrict the model specification. The two most commonly used cointegration estimation procedures in estimating demand for money function are those of Engle-Granger (1987) and Johansen (1988), further developed by Johansen and Juselius (1990, 1995). Cointegration vector

in the error correction model is interpreted as a long run demand for money function since, mathematically, a vector is a linear combination of elements in a set i.e. a set of variables.

The Engle-Granger (1987) relies on convergence to equilibrium and it applies OLS estimation to obtain parameter estimates of the cointegrating vector. In practice this type of OLS estimate will differ with the arbitrary normalization implicit in the selection of the left hand side variables for the regression equation (Hafer and Jansen, 1991: 157). In practice, different arbitrary normalizations can alter the Engle and Granger test results. The drawback of the Engle-Granger method, however, is that if the sample size is small there is a bias in estimated relationships. It has also been criticised for its low power of estimation (Brooks, 2002: 395, Ericsson, 1998: 307). The main advantage of Engle-Granger's procedure is, however, its simplicity. The Johansen and Johansen and Juselius approach is based on maximum likelihood technique used to determine the number of cointegrating vectors and for estimating and conducting inference about the cointegrating vectors. It yields maximum likelihood estimators of the unconstrained cointegrating vectors and also allows the researcher to explicitly test for the number of cointegrating vectors (Hafer and Jansen, 1991: 157). However, this approach is too complex and difficult to carry out although it has high power of estimation which renders it difficult to explain the results to a layman.

3.3.3 Studies conducted in developed countries

The majority of the studies on the demand for money found cointegrating relationships existing between the monetary aggregate and the scale variables used. Wesche (1996) found a single cointegrating relationship existing between vectors in the study of demand for money for five European countries, namely; Germany, France, Netherlands, Belgium and Austria; the study used quarterly data from 1973:1 to 1994:4. The study used vector error correction mechanism and compared the results obtained from a divisia index aggregates to that where real M3 monetary aggregation was used. For divisia index the error correction showed a reasonable speed of adjustment towards equilibrium and was significant. For simple sum M3, the error correction term was much lower and insignificant. The study however did not test the stability using some form of stability test, like the Chow test. Ericsson (1998) found one cointegrating vector in the study of demand for money using M1, total final expenditure (TFE), three month authority

interest rate, retail deposit interest rate and inflation as variables, based on the United Kingdom quarterly data from 1963:1 to 1989:2 and using parsimonious conditional equilibrium model with all variables in logarithms except interest rates (Ericsson, 1998: 307). The income elasticity was found to be unitary in the long run and coefficients of interest rates and inflation were sensibly signed. In the short run, elasticities of money with respect to prices and income were both close to zero.

Haug and Lucas (1996) searched for a long-run cointegrating relationship among real money balances, real income, and interest rates in Canada extending the work of Ambler and Paquet (1990), who explore this issue in the Canadian context employing the methods of Engle and Granger (1987). They used quarterly data for Canada in the period 1953: 1-1990: 4. Firstly, they uncovered parameter estimates of the cointegrated relationships using three different methods of estimation. Secondly, they employed the Hansen (1992) procedure to search for structural instability in cointegrating relationships with unknown break points taking advantage of Hansen's tests which do not require an a priori assumption of a break date in the relationship. They identified the three key issues in an investigation of the demand for money are the choices of the appropriate measure of money, the scale variable (income or wealth), and the opportunity cost variable (short- or long-term interest rates). They found empirical support for a stable cointegrating relationship among real M1, real income, and short-term interest rates in Canada for the period under study. To determine the appropriate lag length for the vector error-correction process in Johansen and Juselius's procedure, they employed the Schwarz criterion and checked all residuals for white noise with the Box-Pierce Q statistic.

3.3.4 Studies in developing countries

There are various studies which have been carried out in the developing countries where the country under study falls in. However, there is a drawback on Swaziland as there are no studies carried out on this topic as to the best of our knowledge, but this cannot deter us from researching on Swaziland since there are other studies from the developing countries which include South Africa, Cameroon, Ghana, Namibia, Mozambique a few to mention.

Pinon-Farah (1998) estimated a co-integrating, error correction model for money demand in Mozambique. The researcher's estimation was based on monthly data for January 1991 to 1997. He found evidence of co-integration for both narrow money (M1) and broad money (M2) with

respect of the level of economic activity and yield of foreign financial instruments. However, the coefficient of economic activity was not in line with the standard quantity theory of money but is consistent with the Baumol-Tobin framework, which predicts an elasticity of 0.5. the researcher concluded that the increase in money demand can be accounted for by the expansion in economic activity and the lower yields of foreign financial instruments (expressed in local currency) resulting from a lower (higher) depreciation (appreciation) of the exchange rate.

The behaviour of M2 broad money demand for Cameroon was analysed by Nachega (2001) where own rate of return, rate of inflation, currency substitution and foreign interest rate were included in the model as variables determining the demand for money. The researcher established that there is a positive sensitivity of broad money to own rate of return and negative sensitivity to all other variables named above, moreover the findings have an evidence of inflation's source being imported since Cameroon is an open economy. Also to note from the findings is that direct currency substitution [illegible] if the domestic currency is expected to depreciate. In that case domestic portfolio holders will find an incentive to switch to foreign assets. The exchange rate can be used as a variable under this circumstance. Similarly, if there is an increase in rates of return in foreign securities there is a window for alternative investment and foreign interest rate becomes a useful variable (Simmons, 1992). Nachega's results closely resemble Civcir (2000), who models the empirical relationship between M2 broad money, real income, interest rates and expected exchange rate in Turkey. He thus examines the constancy of this relationship in the light of financial reforms, deregulation of financial markets and financial crises. The results obtained indicate the existence of a stable real broad money demand relationship with a positive unitary income elasticity confirming the quantity theory of money and negative opportunity cost variables. He expresses that this case might provide justification for the monetary authority to target broad money, together with considering the effect of dollarization.

In contribution to African literature in money demand, Triechel (1997) examines the stability of M2 and M4 broad money functions for Tunisia, with respect to conducting of monetary policy. From his estimations for money demand, he suggests a base regime in which after the prediction of a multiplier the monetary base is manipulated so as to achieve a certain growth of the money

supply with exogenous interest rates for monetary authority, instead of a price regime in which short term interest rates are targeted so as to be consistent with the growth rate of money supply with the endogenous base money supply. The issue of using a proxy for income in modelling has been on debate, researchers either use Gross Domestic Product (GDP) or Gross National Product (GNP), however, Laidler (1993: 99) showed that it does not show any significant difference from the results he obtained.

The existence of South Africa as an economic powerhouse and its membership of the Common Monetary Area and Southern African Customs Union make it relevant for us to look at some papers published concerning the topic of money demand. Using both single equation and multivariate models, Nell (2003) estimated the money demand function for South Africa using annual data for the period 1965 to 1997. The study concluded that money demand in South Africa has been stable for the period 1968 to 1997. The study further pointed out that notwithstanding this stability, M3 provides [illegible]tion about future price changes. Wesso (2002) used a single equation error-correction (with fixed or variable coefficients) model using quarterly data for the period 1970 to 1998 and concluded that the demand for money has been stable. Jonsson (2001) used data for the period 1970 to 1996, and found a stable demand for money. These studies produced different estimates of elasticities, a probable indication of the sensitivity of the demand relations in South Africa to the choice of information set, measures of variables as well as estimation technique.

Ghartey (1998) looked at monetary dynamics in Ghana: evidence from cointegration, error correction modelling, and exogeneity. He employed a cointegration and error-correction technique among nominal money stock, price, real income, exchange rate, and exchange risk over the period 1970.4 to 1992.4 for Ghana. The parameter and structural stability are tested by splitting the time span into pre and post-1983.4. The military government of Rawlings relaxed its resistance to the policies of international institutions, namely: the World Bank and IMF. There were also mass inflow of returning residents from neighbouring Nigeria at a time when the country was experiencing acute shortfall in agricultural produce and essential provisions.
Empirical researchers have been fascinated by the estimation of money demand for LDCs, albeit, a stable demand for money in Ghana is very scarce, and often scanty with associated empirical

analysis improperly done. This paper has attempted to provide an in depth study of a stable money demand for Ghana, where cointegration equation is used to measure long-run money demand, with an ECM to explain the short-run dynamics. Shortcomings of previous studies in money demand in general are corrected with exchange rate capturing recent developments in currency substitution. The cointegration results imply that M1 has a long-run relationship with price, real GNP, exchange rate, and exchange risk. The ECM results show that exchange rate, inflation rate, real growth in income, seasonal dummies for the second and fourth quarters are relevant in determining the growth in nominal money demand. Additionally, both long-run unit income elasticity and price homogeneity property hold good, with the ECM results satisfying all desirable statistical tests. Price and income are also both weakly and super exogenous in the demand for money in the country. Finally, M1 provides stable estimates, and serves as a guide for implementing monetary policy in Ghana.

3.4 CONCLUSION

The chapter reviewed literature on money demand starting from the theoretical literature to empirical literature. There is a large body of literature existence but however, we chose to pick a few studies from both the developed countries and developing countries. The researchers seem to follow same line in selecting economic variables used in the estimation of the money demand function. They differed in variable representation and the models used to estimate but however most variables employed lie in the same category especially in choosing the scale variables. Having reviewed literature, we move on to the next chapter which examines the model, the variables and other model specification issues of the demand for money function. This chapter also includes wide-ranging estimation procedures to be employed in the study.

CHAPTER 4

RESEARCH METHODOLODGY

4.0 Introduction

The chapter presents the model as well as the methodology that was used to carry out the empirical analysis of the study. The first section presents the theoretical framework which provides the link between money demand and its determinants as discussed in the previous chapter and the econometric methodology employed in the data analysis. The second section presents the econometric methodology utilised for analysis.

4.1 Model specification

Babatope-Obasa (2004) states that the demand for money is usually expressed for the test of currency substitution. The author shows that in a portfolio approach that emphasise the store of value for money, the demand for money is a function of the return on money itself, rate of returns of alternative assets and income. This can be expressed as:

$(M^d/P) = f(Y, R)$..... (4.1)

where M^d = demand for real money balances

P = Price level

Y = Scale variable (Income, wealth or expenditure, in real terms)

R = Vector of Vector of variables to stand as opportunity cost of money holdings.

Where; m^d/p is real money balances, y is a scale variable and R is the vector of rates of returns on various assets. In this specification, money demand is directly related to the scale variable and elements of R included in m and inversely related to elements of R excluded from m.

Since the portfolio approach include money as part of the portfolio of assets held by economic agents, the return on money is its own rate; and this is inversely related to money. On the other hand, assets alternatives to money include government securities, real assets, foreign currencies, domestic and foreign stocks and bonds. The return on the real assets is the expected rate of inflation; given that while money value depreciates under inflation, the value on real assets remains the same.

Taking into account the model discussed in equation 4.1, and merging the literature on the money demand theories and also empirical literature reviewed in chapter 3, Equation 4.1 can be extended to take into account the variables which affect money holdings, and arrive at the following empirical model:

$$M_2/P_t = \beta_0 + \beta_1 y_t + \beta_2 EX_t + \beta_3 SMMR_t + \beta_4 infl_t + \beta_5 SAr + \varepsilon_t \quad (4.2)$$

where,

$M^d - p$ = Real money supply (M2) in lilangeni

SMMR = Swaziland money market rate proxied by Treasury bill rate as an opportunity for holding money

EX_t = Lilangeni per U.S. dollar exchange

y_t = Real Gross Domestic Product (GDP) at constant prices

$infl_t$ = Headline Consumer price Index

SAr = Is the South African repo rate

ε_t = Error term

The real money supply, GDP, and exchange rate enter into the VAR in natural logarithmic form to normalise the data as well as to interpret the variables as elasticities.

The empirical model thus becomes:

$$LogM_2/P_t = \beta_0 + \beta_1 logy_t + \beta_2 loginfl_t + \beta_3 NSMMR_t + \beta_4 logSAr + \beta_5 logEX + \varepsilon_t \quad (4.3)$$

The variables included in the model will be defined and justified in the next section in detail.

4.2 Definition of Variables and Apriori Expectations

The real money demand is measured as the nominal M2 stock divided by the consumer price index (CPI). The real income variable is proxied by GDP. A positive relationship between money demand and income is expected and this is inversely related to money balances. CPI is a measure of expected inflation. Onafowora and Owoye (2011) argue that the return on the real assets is the expected rate of inflation; given that while money value depreciates under inflation, the value on real assets remains the same. Thus in this study the same approach will be used. This variable is inversely related to money.

SMMR represents the money market interest rate. Onafowora and Owoye (2011) argues that the importance of the interest rate in money demand has been established. However, there is no consensus with regards to the type of interest rate to include, there are studies which argue for the long-term and some for the short-term. In line with the short-term interest rate, Wong (1977) argues that since the majority of people in developing countries are near subsistence level, they only hold money for precautionary purposes over short periods. However in this case it will be short to medium term since money is also regarded as a means of wealth. Therefore this is likely to be the case for Swaziland. Thus the short term interest rate is used in the study. A negative relationship between money demand and the interest rate is expected therefore.

EXt is the exchange rate between the US dollar and the Swaziland currency, a number of studies support the use of the exchange rate and foreign interest to capture the foreign sector. The expected exchange rate captures the substitution between domestic and foreign currencies. However a number of studies argues that its [illegible] ambiguous. Bahmani-Oskooee and Rhee (1994) argues that if residents evaluate their assets in terms of the domestic currency, a depreciation of the currency will increase their foreign holdings and hence increase their wealth. However in a bid to maintain a fixed share of the wealth invested, residents may shift parts of their holdings to domestic currency. This will result in an increase in the demand of the domestic currency. On the other hand, Onafowora and Owoye (2011) argues that if depreciation leads to economic agents anticipating further depreciation, as a hedge against exchange rate risk, they may demand more of foreign currency as opposed to the riskier domestic currency. This will result in a decline in the demand for money.

Rf is the South African interest rate, proxied by the repo rate, representing the foreign interest rate. Studies such as Ibrahim (2001) argue that an increase in interest rate increases the returns on foreign assets relative to the domestic assets. This may result in agents' appetite for domestic assets decreasing and hence a decrease in the domestic money demand. The variables used in the study were chosen taking into account the strong correlation between the South African economy and the Swaziland economy.

4.3 Data Sources

The study employs Swaziland quarterly time series data from 1994:1 to 2013:4 a reasonable large sample that reflect seasonality will be obtained from recognized bodies mostly from the Central Bank of Swaziland (CBS) through their published quarterly reviews and this will be supplemented with data from the International Monetary Fund (IMF) and World Bank (WB) databases. All variables except GDP were obtained from the quarterly reviews of the Swaziland central bank and GDP was obtained from the IMF online resources in an annual series.

4.4 Estimation techniques

An important preliminary step to performing any regression analysis is to reveal the properties and characteristics of the actual data involved. Such an analysis of the individual time series variables is important because the properties of the individual series have to be taken into account in modelling the data generation process of a system of potentially related variables (Lutkepohl and Kratzig, 2004:8). Some of the characteristics may have an impact on the statistical inference used in modelling and analysing the underlying economic system. The first step is the notion of whether a series is stationary or not. Stationarity of the series is a desirable property for an estimated model. A series is considered stationary if it has a constant mean, constant covariance and constant autocovariances for each given lag (Brooks, 2008; Lutkepohl and Kratzig, 2004).

For a long time, econometricians did not realize that some basic assumptions made by the classical estimation theory-about the data generating process (DGP) of the variables-are not satisfied by many macro time series variables like income, consumption, money supply and others (Ojeaga & Folajin, 2009). In the classical econometrics it is assumed that all the variables have constant means and variances. That is, no matter where you start and end your sample selection period, the mean and variance of, for example, GDP remains constant and would be similar and close in different samples. However, if the mean and variance change in samples for different time spans, then those classical assumptions are not satisfied. Variables of this type are known as non-stationary variables.

Regression equations with non-stationary variables have serious limitations. Among other problems, their t-ratios and the adjusted R-squared will be overestimated by a large magnitude. Therefore, all the tests are become invalid. This is known as the spurious regression problem and these are found in many works involving time-series methods. There is a plethora of evidence suggesting a common way of solving the problem of spurious regressions (Dickey and Fuller (1979, (1981) Phillips and Perron (1988). This involves checking the time series properties of the data using formal tests such as the Dickey Fuller, Augmented Dickey Fuller (ADF) and the Phillips-Perron test amongst others. The ADF test is an improvement of the Dickey-Fuller test (DF) which was devised by Dickey and Fuller (1979, 1981). The improved ADF test gives better results than the DF test as it includes extra lagged terms of the dependent variable in order to cater for possible autocorrelation in the residual error term. This section will discuss the methods to be employed in analysing the time series properties of the data in this study. The two methods to be used are the Augmented Dickey Fuller and the Phillips-Perron.

4.4.1 Augmented Dickey Fuller

The ADF used in testing for the presence of unit roots in a series is given by the following equation:

$$\Delta y_t = a_0 + \gamma y_{t-1} + a_2 t + \sum_{i=1}^{p} \beta_i \Delta y_{t-1} + u_t \quad \text{.....(4.4)}$$

The equation shows that: $\Delta Y_t = Y_t - Y_{t-1}$; $\Delta Y_{t-1} = Y_{t-1} - Y_{t-2}$ etc, and the number of lags to be included is empirically determined using Schwarz information criteria. The same critical values for the DF are calculated by Monte Carlo simulation in MacKinnon-Haug-Michelis (1999) as the distribution is not standard. The test proceeds by testing the significance of the coefficient of Y_{t-1}.The augmenting is done to remove possible autocorrelation among error terms. In the event that the calculated values are greater than the critical values in absolute terms, we reject the null and state that the variable is stationary.

However, Culver and Papell (1997) points out that the ADF as well as the DF tests are unable to discriminate well between non-stationary series with a high degree of autocorrelation. It is also argued that both the DF and ADF tests may also incorrectly indicate that the series contain a unit

root when there is a structural break in the series. It is also widely believed that the ADF test does not consider the cases of heteroscedasticity and non-normality frequently revealed in raw data of economic time series variables. The Phillips Perron test will be carried out to take into account these limitations.

4.4.2 Phillips-Perron test

Due to the limitations of ADF discussed above and to ensure robust results, the Phillips-Perron test developed by Phillips and Perron (PP) (1988) will be undertaken to check if the results are consistent with the ADF test. This test allows for fairly mild assumptions concerning the distribution of errors. The test regression for the Phillips-Perron test is the AR(1) process given as:

$$\Delta y_{t-1} = \alpha_0 + \gamma \; y_{t-1} + e_t \quad \ldots\ldots\ldots\ldots 4.5$$

As there is likely to be serial correlation in some explanatory variables such as inflation, repo rate and, the PP test corrects for higher order serial correlation by adding lagged differenced terms on the right-hand side, this test makes a correction to the t statistic of the coefficient γ from the AR(1) regression to account for the serial correlation in e_t. In addition, the PP test has an advantage over the ADF test when the concerned time series has serial correlation and there is a structural break as in our case. All the variables will be tested for stationarity using the above methods.

4.4.3 Cointegration Test

Having established the order of integration and stationarity of the variables, cointegration tests will be undertaken. Cointegration tests will help establish if there is a long-term relationship between the money demand function and its determinants in Swaziland. In the event that there is evidence of cointegration, that will be an indication that the variables share a certain type of behaviour in terms of their long-term fluctuations.

In testing for cointegration, in the event that the variables of interest are not stationary and not integrated of the same order, the study will try and establish if there exists a linear combination

of the variables using a cointegration technique. There are different methods which can be used to check for cointegration. These tests include the Engle and Granger two stage method and the Johansen and Juselius (1990) multivariate approach.

In this study we will employ the Johansen test as it has several advantages over the simple Engle and Granger approach. Asteriou and Hall (2007) shows that when testing for cointegration using the Engle and Granger (EG) approach one has to place one variable in the left-hand side and use the others as regressors. The test does not clarify which of the two variables can be used as regressors and why.

In addition, the EG approach does not give us the number of cointegrating vectors. In the event that there are more than two variables there may be more than one cointegrating relationships, and the Engle-Granger procedure using residuals from a single relationship cannot test this possibility.

Another shortcoming of the EG approach is that it relies on a two-step estimator. The first step involves generating residuals and the second step involves testing the stationarity of the residuals. This therefore means any error introduced in the first step is carried into the second step.

The Johansen approach is more desirable therefore as it takes into account the above mentioned shortcomings of the EG approach. The Johansen approach is a multivariate equation approach in which one can obtain the estimates for all cointegrating vectors.

The Johansen procedure produces two statistics, the likelihood ratio test based on maximal eigenvalue of the stochastic matrix and the test based on trace of the stochastic matrix. These statistics are then used to determine the number of cointegrating vectors. The test is based around an examination of the π matrix, where π can be interpreted as a long-run coefficient matrix. The test for cointegration between the variables is calculated by looking at the rank of the π matrix via its eigenvalues. π can be defined as the product of two matrices:

$$\pi = \alpha\beta' \quad \text{.....4.6}$$

The matrix β gives the cointegrating vectors, while α gives the amount of each cointegrating vector entering each equation of the VECM, also known as the 'adjustment parameter'

Under the maximum Eigenvalue (denoted by $\lambda_{\max}$) test the null hypothesis that Rank (Π) $=r$ is tested against the hypothesis that the rank is $r+1$. The null hypothesis attests that there is cointegrating vectors and that there are up to r cointegrating relationships, with the alternative suggesting that there is $(r+1)$ vectors.

The test statistics are based on the characteristic roots (eigenvalues) obtained from the estimation procedure. The test consists of ordering the largest eigenvalues in descending order and considering whether they are significantly different from zero. If the variables are not cointegrated, the rank of Π is zero and all the characteristic roots will equal zero. To test how many of the numbers of the characteristic roots are significantly different from zero, the maximum eigenvalue uses the following statistic:

$$\lambda_{\max}(r, r+1) = -T\ln(1-\hat{\lambda}_{r+1}) \quad \ldots\ldots 4.7$$

The second method is based on a likelihood ratio test about the trace of the matrix and it's called the trace statistic. The trace statistic considers whether the trace is increased by adding more eigenvalues beyond the r^{th} eigenvalue. The null hypothesis in this case that the number of cointegrating vectors is less than or equal to r. Just like under the maximum eigenvalue, in the event that $\hat{\lambda}_i = 0$, the trace statistic will be equal to zero as well. On the other hand the closer the characteristic roots are to unity the more negative is the ln $(1-\hat{\lambda}_i)$ term and therefore, the larger the trace statistic. The trace statistic is calculated by:

$$\lambda_{trace}(r) = -T\sum_{i=r+1}^{n}\ln(1-\hat{\lambda}_{r+1}) \quad \ldots\ldots 4.8$$

The procedure to determine the presence of cointegration involves working downwards and stopping at the value of r which is associated with a test statistic that exceeds the displayed critical value. Critical values for both the maximum eigenvalue and trace statistic are provided in Eviews.

Assuming X_t is a set of I (1) variables consisting n stock indexes, the VAR (κ) model is specified below:

$$LogX_t = \mu + \beta_1 LogX_{t-1} + \beta_2 LogX_{t-2} + \cdots \beta_\kappa LogX_{t-\kappa} + \varepsilon_t \quad (4.9)$$

where: β_κ, is an n x n coefficient matrix

$t = 1, 2, 3 \ldots T$

ε_t is an error term.

To estimate the Johansen cointegration test, equation (6), may be transformed into an error correction model as follows:

$$\Delta LogX_t = \mu + \sum_{i=1}^{k=1} \Gamma_i \Delta \text{Log} X_{t-i} + \Pi LogX_{t-\kappa} + \varepsilon_t \quad (4.10)$$

where:

Δ, is the first difference operator as indicated earlier.

Γ_i, is an n x n coefficient matrix defined as $\Gamma_i = -(I - \beta_1 - \cdots \beta_i)$ representing the short run dynamics, Π is an n x n matric defined as $(I - \beta_1 - \cdots \beta_\kappa)$ representing the long run dynamics and I is an identity matrix whose rank determines the number of distinct cointegrating vectors.

ε_t is the diagonal matrix of structural innovations that has zero means, constant variance and are individually serially uncorrelated.

To test the long run restrictions implied by economic theory there is one cointegrating vector $(\beta_{11} lny_{t-1} + \beta_{21} Binfl_{t-1} + \beta_{31} lnM3_{t-1} + \beta_{41} NSMMR_{t-1} + \beta_{51} SAr_{t-1} + \beta_{61} C)$ which feeds into six different equations as follows:

$$\Delta Logy_t = a_{11}[\beta_{11} infl_{t-1} + \beta_{21} M3_{t-1} + \beta_{31} NSMMR_{t-1} + \beta_{41} SAr_{t-1} + \beta_{51} EX_{t-1} + \beta_{61} C]$$

$$\Delta infl_t = a_{21}[\beta_{11} y_{t-1} + \beta_{21} M3_{t-1} + \beta_{31} NSMMR_{t-1} + \beta_{41} SAr_{t-1} + \beta_{51} EX_{t-1} + \beta_{61} C]$$

$$\Delta LogM3_t = a_{21}[\beta_{11} y_{t-1} + \beta_{21} infl_{t-1} + \beta_{31} NSMMR_{t-1} + \beta_{41} SAr_{t-1} + \beta_{51} EX_{t-1} + \beta_{61} C]$$

$$\Delta LogNSMMR_t = a_{21}[\beta_{11} y_{t-1} + \beta_{21} infl_{t-1} + \beta_{31} M3 + \beta_{41} SAr_{t-1} + \beta_{51} EX_{t-1} + \beta_{61} C]$$

$$\Delta LogSAr_t = a_{21}[\beta_{11} y_{t-1} + \beta_{21} infl_{t-1} + \beta_{31} M3_{t-1} + \beta_{41} NSMMR_{t-1} + \beta_{51} EX_{t-1} + \beta_{61} C]$$

$$\Delta LogEX_t = a_{21}[\beta_{11} y_{t-1} + \beta_{21} infl_{t-1} + \beta_{31} M3_{t-1} + \beta_{41} NSMMR_{t-1} + \beta_{51} SAr_{t-1} + \beta_{61} C]$$

Each equation will tests to establish if cointegration exists between the dependent variable and its determinants. In the event that there is cointegration a Vector Error Correction model will be estimated, however, if there is no cointegration a VAR model in first difference will be

estimated. The VAR model will be estimated to analyse the short-term interaction between the money demand function and its determinants.

4.4.4 Vector Error Correction Model (VECM)

In this study, the dynamic interactions between the money demand and its determinants in the Swaziland economy are obtained by presenting the estimated reduced-form equation of the VEC model, the analysis of variance decomposition and impulse response functions. Having established the number of cointegrating vectors, the study will proceed with the estimation of the VECM. The VECM applies maximum likelihood estimation to VAR to simultaneously determine the long-run and short-run determinants of the dependent variable in the model.

Brooks (2008) explains that this approach takes into account the short-term adjustments of the variables as well as the speed of adjustment of the coefficients. It, therefore, measures the speed at which the money demand function will revert to its equilibrium following a short term shock to each of the variables. In addition, this approach is appropriate for macroeconomics and financial data as it distinguishes between stationary variables with momentary effects and non-stationary variables with undeviating effects.

The VECM specification has the following form:

$$\Delta y_t = \prod y_{t-1} + \sum_{t=i}^{k} \Gamma_i \Delta y_{t-1} + \varepsilon_{kt} \sum_{t=i}^{k} \quad \text{.....4.11}$$

where,

$y_t = (y_1 + y_{2t} \ldots\ldots)$ is the 6x1 vector, Δy_t are all $I(0)$, Γ_i are the 6×6 coefficient matrices and are normally and ε_{kt} independently distributed error terms.

However, in the event that there is no cointegration, an unrestricted VAR model in first differences will be estimated to examine the short-term interaction between the variables of interest.

4.5 Diagnostic checks

Diagnostic checks will be conducted in order to validate the parameter estimation outcomes achieved by the estimated model. Diagnostic checks test the stochastic properties of the model, such as residual autocorrelation, heteroskedasticity, and normality among the rest. Diagnostic checks are essential in the examination of the determinants of money demand because they confirm that the parameter evaluation outcomes are achieved by the estimated model. The tests to be conducted are discussed in detail in this section.

4.5.1 Heteroscedasticity test

Brooks (2002:148) indicates that a sequence of random variables is heteroscedastic if the random variables have different variances. Conversely a sequence of random variables with a constant variance are said to be homoscedastic. There are a number of formal statistical tests for heteroscedasticity and the most popular one is the White's test for heteroscedasticity. The test is useful because it assumes that the regression model estimated is of the standard linear.

Gujarati (2003) concurs with Brooks (2002) that in a situation where different error terms do not have identical variances, such that the diagonal elements of the covariance matrix are not identical, heteroskedasticity will occur. The error terms are mutually uncorrelated while the variance of μ_i may vary over the observations. Gujarati (2003) suggests that the consequences of using the usual testing procedures despite the heteroskedasticity are that the conclusions we draw may be misleading. After running the regression, residuals are obtained and then test regression is run by regressing each product of the residuals on the cross products of the regressors and testing the joint significance of the regression. The null hypothesis (H_0) for the White test is homoscedasticity and in the event that the null hypothesis is accepted, it implies that there is homoscedasticity. But if the null hypothesis is rejected, then there no is heteroscedasticity.

4.5.2 Normality test

Muchaonyerwa (2011) in his study mentions that the Jarque-Bera (JB) test is one of the most commonly applied tests for normality in time series analysis. Results for asymptotic validity of the JB test in VAR models assume stationarity. The JB uses the property of a normally

distributed random variable that the entire distribution is characterized by the first two moments, that is, the mean and the variance. For stationary VAR models and in VEC models the bootstrap critical values are used and the JB test statistic asymptotically follows a x^2 distribution under the null hypothesis that the distribution of the series is symmetric. In the event that the residuals from the model are either significantly skewed or leptokurtic/platykurtic (or both) the null hypothesis of normality would be rejected (Muchaonyerwa, 2011).

The residual normality test used in this study was the multivariate extension of the Jarque-Bera (1980) normality test which compares the third and fourth moments of the residuals to those from the normal distribution. One way of detecting misspecification problems is through observing the regression residuals. Usually the normality test checks for skewness (third moment) and excess kurtosis (fourth moment). The Jarque-Bera normality test compares the third and fourth moments of the residuals to those from the normal distribution under the null hypothesis that residuals are normally d[illegible]d a significant Jarque-Bera statistic, therefore, points to non-normality in the residuals (Muchaonyerwa, 2011).

4.5.3 Autocorrelation test

Gujarati (2003) defines autocorrelation as the relationship between members of a series of observations ordered in time. It arises in cases where the data has a time dimension and where two or more consecutive error terms are related. In this case, the error term is subject to autocorrelation or serial correlation. Salvatore (2002: 222) clarify that autocorrelation or serial correlation refers to the case in which the error term in one time period is correlated with the error term in any other time period. If the error term in one time period is correlated with the error term in the previous time period, there is first-order autocorrelation. This is common in time-series analysis and leads to downward-biased standard errors (and, thus, to incorrect statistical tests and confidence intervals).

The Breusch–Godfrey serial correlation LM test is a test for autocorrelation in the errors in a regression model. It makes use of the residuals from the model being considered in a regression analysis, and a test statistic is derived from these. The null hypothesis is that there is no serial

correlation of any order up to *p*. The BG test is useful in that it allows for (i) lagged dependent variables, (ii) higher order autoregressive processes, as well as single or higher order moving average processes. The basic idea is to regress the residuals from the OLS regression on all of the independent variables and on the lagged values of the residuals (Regis, 2008).

Regis (2008) explains further that there are a variety of tests for serial correlation. The two most common are (i) Durbin-Watson d-test and (ii) Breusch-Godfrey or Lagrange Multiplier (LM) test. Because of the limitations of the Durbin-Watson test like: 1. The statistic tests only for correlation between the current error and the immediately preceding error; 2. The statistic is biased when lagged values of the dependent variable are used as independent variables; and 3. The test often falls into the "indeterminate" range, i.e. it gives an ambiguous result. Breusch-Godfrey test was favoured also because: 1. Estimates by OLS saves residuals; 2.Conduct another regression (the auxiliary regression): regress the current value of residual on all of the independent variables, and as many lagged re[illegible]

4.5.4 Stability of the Money Demand

Having estimated the VECM for the South African money demand model, the next step will be to investigate the stability of the money demand model. This will be examined through the CUSUM and CUMSUMSQ tests proposed by Brown et al (1975). The CUSUM test is estimated as follows:

$$W_t = \sum_{j=k+1}^{t} \frac{\hat{\epsilon}_j}{\hat{\sigma}_\epsilon} \qquad 4.12$$

Where the $\hat{\epsilon}_j$ is the recursive residual term and the $\hat{\sigma}_\epsilon$ is the standard deviation of the recursive residual term, which is defined as:

$$\hat{\sigma}_\epsilon \sqrt{\left(\frac{1}{T-k}\sum_{t=1}^{T}(\epsilon_t - \bar{\epsilon})^2\right)} \qquad 4.13$$

In order to obtain robust results, the Cumulative Sum of Squares test will also be applied. The test can be estimated as follows:

$$S_t = \left(\sum_{r=k+1}^{t} \omega_r^2 \right. \qquad 4.13$$

Where the ω is the recursive residual which is computed for t=k+1,.....,T. The expected value of S_t under the hypothesis of parameter constancy is given as:

$$E(S_t) = (t-k)/(T-k) \qquad 4.14$$

This ranges from zero at t=k, to unity at t=T. Doguwa et al (2014) states that the significance of the departure of S from its expected value is assessed by looking at a pair of parallel straight lines around the expected value. The test statistic will be plotted alongside the 5% critical lines. In the event that the cumulative sum of squares goes out of the area between the two critical lines, that will be an indication of parameter instability.

4.6 Conclusion

The chapter has presented the empirical methodology which will be used in the analysis of the determinants of money demand function in Swaziland. The first section has presented the model which is based on the Friedman hypothesis. The second section presented the estimation techniques which will be used to carry out the study. The last section discussed the diagnostic tests which will be conducted to establish if the assumptions underlying the classical linear regression model will have been observed.

CHAPTER 5

EMPIRICAL ANALYSIS AND DISCUSSION

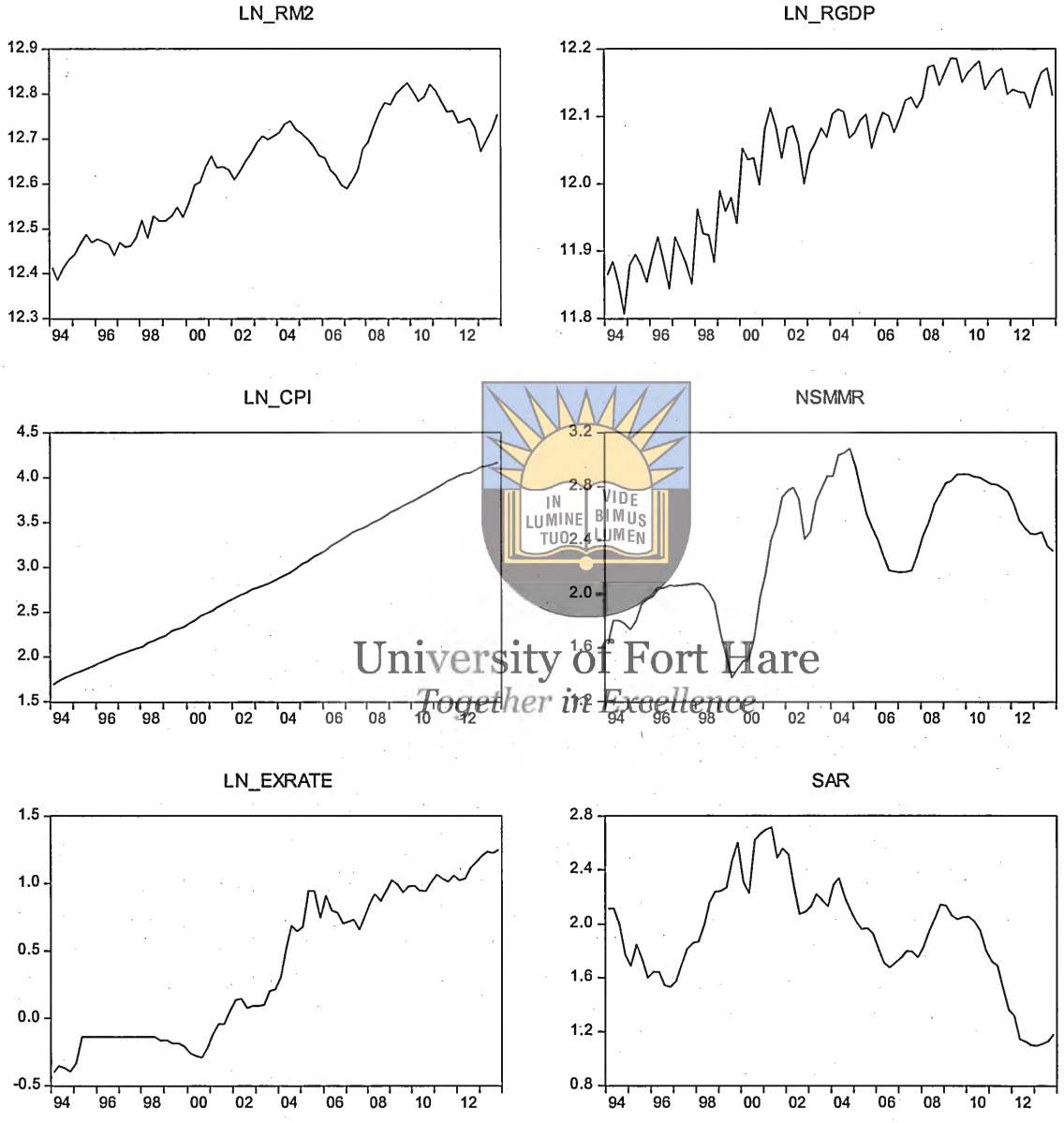
5.1 INTRODUCTION

This chapter presents the results of the models estimated in Chapter 4. The chapter is made up of seven subsections. Following the introduction, section 5.2 presents the analysis of the time series properties of the data through the informal tests and the formal unit root tests. Section 5.3 presents the lag length selection criteria to choose the appropriate lag to be used in the estimation. Section 5.4 discusses the model selection and the Johansen cointegration technique. Sections 5.5 and 5.6 discuss the Vector Error Correction Model and the diagnostic tests. Section 5.7 provides the conclusion to the chapter.

5.2 Graphical Analysis of the variables

The graphical plots of the data shows that the key variables to be used in the study exhibit some evidence of non-stationarity as indicated in the trend in the data. This is illustrated in figure 5.1.

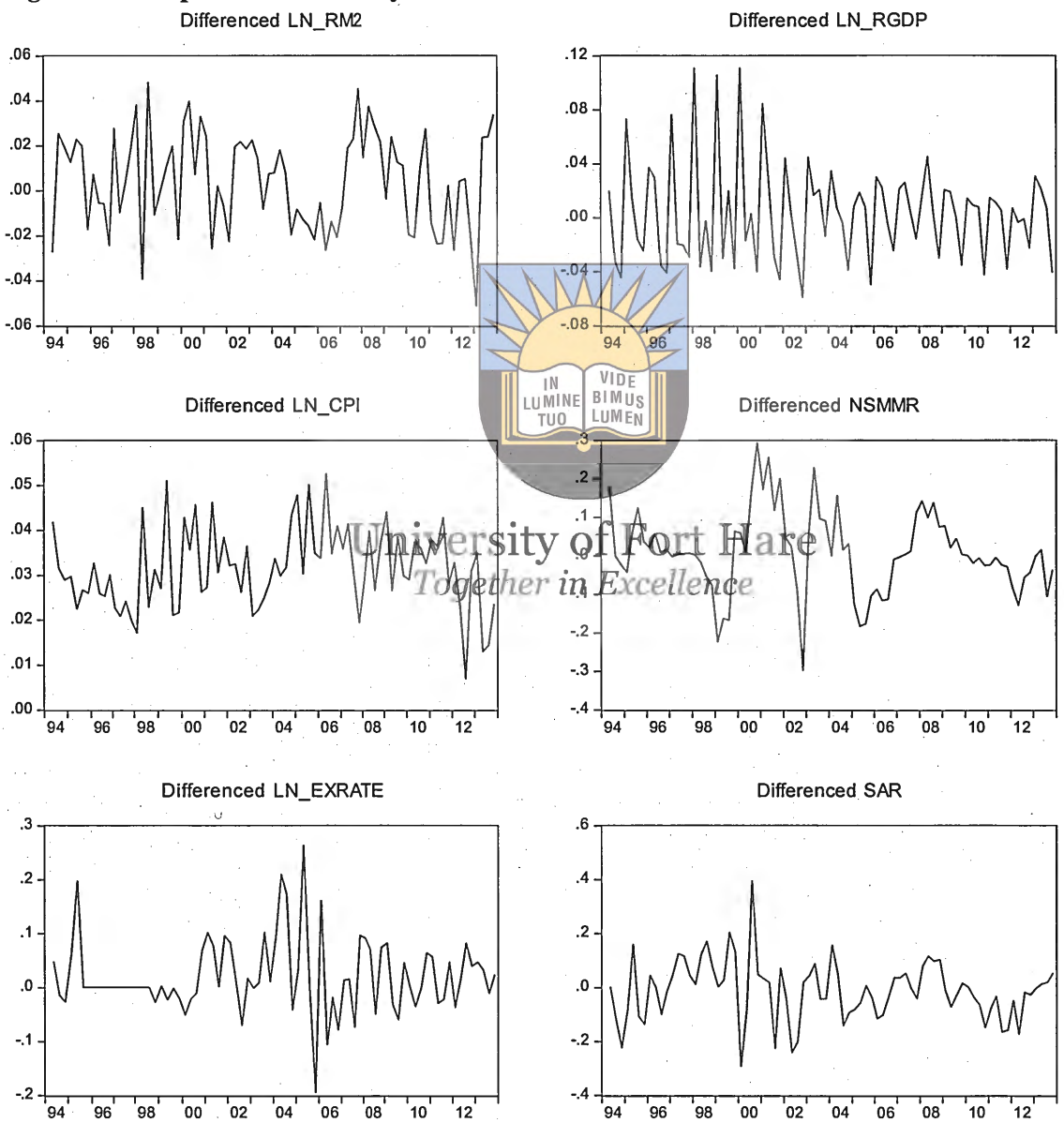
Figure 5.1: Graphical Plots of Key Variables at Level Series



Source: Author's Computation Using Eviews 8

Figure 5.1 shows that all the variables plotted are non-stationary. The same variables were examined in first difference and the results are reported in figure 2.2.

Figure 5.2 Graphical Plots of Key Variables at First Difference Series



Source: Author's Computation with Eviews 8

The variables plotted in figure 5.2 illustrate that all variables revolve around their mean at first difference. This further implies that the variables are stationary in their first differences. The graphical plots are, however, regarded as informal tests, and formal tests are used to analyse the time series properties of the data in detail. This is discussed in section 5.3.

5.3 Unit Root Test Results

The variables used in the study were examined for the presence of unit root using the ADF and the PP tests. The results are reported in Table 5.3, which shows that both the ADF and the PP report for all the variables to be used in the study are non-stationary. This suggests that the mean, variance and covariance of the series are not constant. The variables were examined for stationarity in first difference and the results are reported in Table 5.4.

Table 5.1: Unit root Tests (Level Series)

	Augmented Dickey Fuller (ADF)			Phillips-Perron (PP)		
Variables	Constant	Constant and Trend	None	Constant	Constant and Trend	None
LRGDP	-1.917	-1.028	-0.891	-0.287	-1.714	-1.674
INFL	-0.650	-0.723	-0.783	-0.340	-0.309	-1.241
LM2	-1.749	-1.133	-1.005	-1.353	-1.137	-1.505
SNMMR	-1.070	-0.927	-1.310	-0.253	-3.102	-1.715
EX	-0.831	-1.117	-0.869	-1.712	-0.638	-0.624
SAR	-3.253	-3.234	2.818	-2.764	-2.688	1.091

Note: ***, * and * indicates significance at 1%, 5% and 10% significance level

Table 5.2 Unit Root Test (First Difference Series)

	Augmented Dickey Fuller (ADF)			Phillips-Perron (PP)		
Variables	Constant	Constant and Trend	None	Constant	Constant and Trend	None
ΔLRGDP	-4.476**	-4.929***	-4.532***	-19.221***	-21.61***	-19.29***
ΔINFL	-6.789***	-6.874***	-6.848***	-5.357***	-5.308***	-5.400***
ΔLM2	-8.682***	-8.575***	-8.756***	-10.043***	-9.842***	-10.13***
ΔSNMMR	-4.967***	-5.081***	-4.919***	-8.307***	-8.385***	-7.300***
ΔEX	-3.464**	-3.612**	-3.480***	-4.080**	-2.138**	-2.694***
ΔSAR	-3.687***	-5.480***	-3.672***	-4.459***	-4.441***	-8.703***

5.4 Lag Length Selection criteria

Table 5.3 shows the results of the lag length selection test. The study uses a lag of 1 as chosen by the Schwarz Information Criterion (SIC), and Hannan-Quinn criterion (HQIC) the LR test The SIC has a characteristic of underestimating the lag order whilst the HQIC is somewhere in between. However, adding more lags increases the penalty for the loss of degrees of freedom (Brooks, 2008b). The above mentioned criterions concur that the maximum lag length for the six endogenous variables is one (1). This implies the VAR for this study is estimated using the lag length of one (1) for each endogenous variable.

Figure 5.3: Lag Length Selection Criteria

VAR Lag Order Selection Criteria						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-13.25714	NA	6.37e-08	0.458503	0.632133	0.528301
1	696.2016	1300.674	6.94e-15*	-15.57623*	-14.36082*	-15.08765*
2	745.2028	82.83533	5.16e-15	-15.88578	-13.62859	-14.97841
3	761.3349	24.96639	8.56e-15	-15.41274	-12.11377	-14.08658
4	835.5832	104.3011	3.67e-15	-16.32341	-11.98267	-14.57847

5	881.6806	58.17047	3.21e-15	-16.56382	-11.18130	-14.40009
6	919.2916	42.08853	3.66e-15	-16.60218	-10.17788	-14.01967
7	989.5608	68.59619*	2.08e-15	-17.41812	-9.952035	-14.41681
8	1031.716	35.12941	2.60e-15	-17.56467	-9.056811	-14.14458
* indicates lag order selected by the criterion						
LR: sequential modified LR test statistic (each test at 5% level)						
FPE: Final prediction error						
AIC: Akaike information criterion						
SC: Schwarz information criterion						
HQ: Hannan-Quinn information criterion						

In empirical analysis, the choice of optimal lag length to be used in the estimation is imperative, especially in a VAR model. This is important to avoid spurious rejection or acceptance of estimated results. In addition, the lag length also influences the power of rejecting the null hypothesis. As reported in Table 5.3, the information criterion are the Akaike Information Criteria (AIC), Schwarz Information Criterion (SIC), Hannan-Quinn Information Criterion (HQI), Final prediction error (FPE) and the Likelihood Ratio test (LR). Of the available information criteria, the LR test is regarded as the best approach in determining the lag length. Unlike the other information criteria, the LR is a formal test, whilst the others operate like the adjusted R^2 measuring the goodness of fit of the model. However, the LR performs best given a bigger sample size. This applies to the study given the longer sample used in the study.

5.5 Choosing the Appropriate Model

In carrying out the Johansen cointegration test, it is important to note that the variables may have non-zero means and deterministic and/or stochastic trends. Similarly, the cointegrating equations may have intercepts and deterministic trends. Since the asymptotic distribution of the LR test statistic for cointegration does not have the usual χ^2 distribution and depends on the assumptions made with respect to deterministic trends, it is necessary to make assumptions regarding the trends underlying the data to be used in empirical analysis. This is illustrated in Table 5.8.

Table 5.4 Choosing the Appropriate Model

Series: LN_RM2 LN_RGDP LN_CPI NSMMR LN_SAR LN_EXRATE					
Selected (0.05 level*) Number of Cointegrating Relations by Model					
Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept	Intercept	Intercept	Intercept	Intercept
	No Trend	No Trend	No Trend	Trend	Trend
Trace	0	1	2	1	1
Max-Eig	1	1	1	2	2
*Critical values based on MacKinnon-Haug-Michelis (1999)					

As reported in Table 5.4, there is contradiction between trace statistic and the maximum eigenvalue, except for all other models except the second model of intercept and no trend. The model of intercept and no trend is therefore chosen in checking if there is a long-term relationship between the variables using the Johansen cointegration test. Table 5.6 illustrates a model in which a lag length of 1 is used.

Having determined the order of integration, of the variables and the appropriate model to be used in the study, the Johansen cointegration test was estimated and the results are reported in table 5.6.

5.6 The Johansen Cointegration Test

Table 5.5: Johansen maximum likelihood Cointegration

Panel A: Johansen maximum Likelihood Cointegration Test results				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.600	160.2	103.8	0.000
At most 1 *	0.437	89.51	76.97	0.004
At most 2	0.250	45.22	54.07	0.241
At most 3	0.185	23.07	35.19	0.523
At most 4	0.054	7.276	20.26	0.878
At most 5	0.037	2.979	9.164	0.584

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.600	70.69	40.95	0.000
At most 1 *	0.437	44.28	34.80	0.002
At most 2	0.250	22.15	28.58	0.2659
At most 3	0.185	15.79	22.29	0.312
At most 4	0.054	4.296	15.89	0.940
At most 5	0.037	2.979	9.164	0.584
Max-eigenvalue and Trace test indicates 2 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level; **MacKinnon-Haug-Michelis (1999) p-values				
Panel B				
Normalised cointegrating coefficients of the real M3 demand equation:				
$Ln(M2/P)_t$ = -70.420 + 5.013$lrgdp_t$ + 0.073$nsmmr_t$ – 0.395lcp_t + 0.$rate_t$ - 0.276Sar_t				
	(1.090)	(0.024)	(0.160)	(0.144) (0.120)
	[4.600]	[3.040]	[-2.470]	[-6.560] [-2.300]
NOTES:				
Standard errors in ( ) & t-statistics in [ ]				

Source: Computation Employing Eviews 8

The results of the Johansen cointegration test are reported in table 4 Panel A. based on both the Trace statistic and the Maximum eigenvalue, the null hypothesis of no-cointegration is rejected. The results suggest that there exists a long-term relationship linking real M2 and its macroeconomic determinants as specified in the model in Swaziland. In other words the results indicate that there exist a unique long-run relationship between *M2/P, rgdp*, nsmmr, *lcpi, lexrate* and *SAr.* The existence of the long run cointegrating vector implies that an economic interpretation of the long-run broad money demand function can be made by normalising the estimates on M2/P. The parameter estimates which represents the long run elasticities of the cointegrating vector are reported in Panel B of table 5.5.

The results in panel B indicates that there is a positive relationship between income and the demand for real money for the period examined in the study in Swaziland. The coefficient is also statistically significant. This is consistent with the apriori expectation and theory. It asserts that

as income increases, people will hold more money. The coefficient of 5.013 indicates that the long run income elasticity for real broad money is significantly greater than unity. This is consistent with Moll (2000). This again corroborate Laidler (1993) who argues that broader money produce higher estimates of income or wealth elasticity of the demand for money as compared to the narrow ones.

The empirical results also shows that the interest rate coefficient is positive and statistically significant. This again correspond to the apriori expectation. This implies that the higher the own rate of return, the higher the demand for money in Swaziland. The coefficient of cpi is negative and statistically significant suggesting that the higher the return on alternative assets, the less the demand of money in Swaziland. This is also consistent with the apriori expectation. The measures of the foreign sector in the study are all negatively related to the demand for money. This result supports the portfolio balance hypothesis of capital mobility as far as the interest rate variable is concerned, on the other hand the s[illegible]xchange rate indicates the existence of currency substitution in Swaziland in the event that the currency is depreciating. Both the two measures of the foreign sector are also consistent with the apriori expectation.

Table 5 reports on the Vector Error Correction model. The results indicates that the coefficient of the error correction term is negative (-0.51) and highly significant. This implies that 51 per cent of the disequilibrium error is corrected within a quarter. About 17% will be corrected in the next quarter.

5.7 The Vector Error Correction Model

Table 5.6: The Vector Error Correction Model

Error Correction:	D(LN_RM2)	D(LN_RGDP)	D(SMMR)	D(CPI)	D(LEXRATE)	D(LSAR)
CointEq1	-0.510164	-0.121820	0.224500	-0.037338	0.135260	0.252828
	(0.02490)	(0.03381)	(0.08494)	(0.00934)	(0.08044)	(0.10941)
	[-0.40826]	[-3.60285]	[2.64298]	[-3.99931]	[1.68144]	[2.31092]
D(LN_RM2(-1))	-0.171658	-0.109962	0.413717	-0.016058	-0.054163	1.450820
	(0.13803)	(0.18747)	(0.47096)	(0.05176)	(0.44601)	(0.60659)
	[-1.24363]	[-0.58656]	[0.87846]	[-0.31022]	[-0.12144]	[2.39175]
D(LN_RM2(-2))	-0.049021	0.081486	1.058735	0.062478	0.581501	1.121846
	(0.14542)	(0.19750)	(0.49616)	(0.05453)	(0.46989)	(0.63906)
	[-0.33711]	[0.41258]	[2.13385]	[1.14567]	[1.23754]	[1.75546]

Source: Author's Computation Using Eviews 8

5.8 Diagnostic Tests

Table 5.7 reports the diagnostic tests. The results suggest that the model does not suffer from normality, heteroscedasticity and autocorrelation. This suggest that the results are robust.

Table 5.6: Diagnostic tests

Test	Test Statistic	Probability	Conclusion
Normality Test (JB)	7.539165	0.8200	Residuals are normally distributed
VECM ARCH LM Tests(2)	26.441	0.8779	Residuals are not serially correlated
Heteroscedasticity Test	1301.372	0.4997	Residuals are homoscedastic

5.9 Stability of the Money Demand (The CUSUM and CUSUMSQ Tests)

The CUSUM and CUSUMSQ tests were applied to determine if the money demand function is stable over the study period. Brown et al (1975) points out that whenever the recursive residual of the estimated money demand function crosses outside the boundary of the critical lines, that will be an indication that the money demand function is unstable. The results are reported in figure 5.1 and figure 5.2.

Figure 5.1: CUSUM Stability Tests

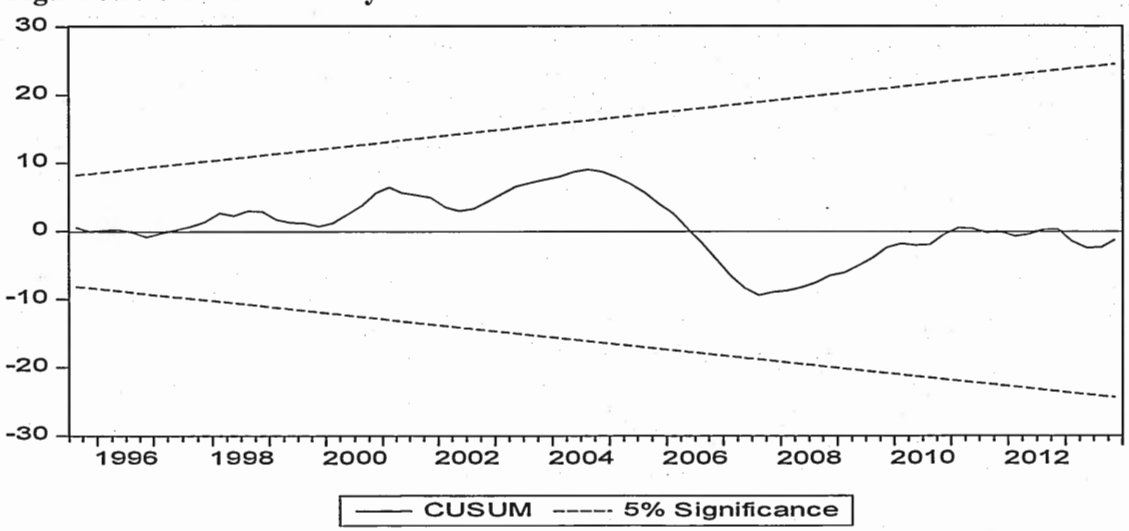
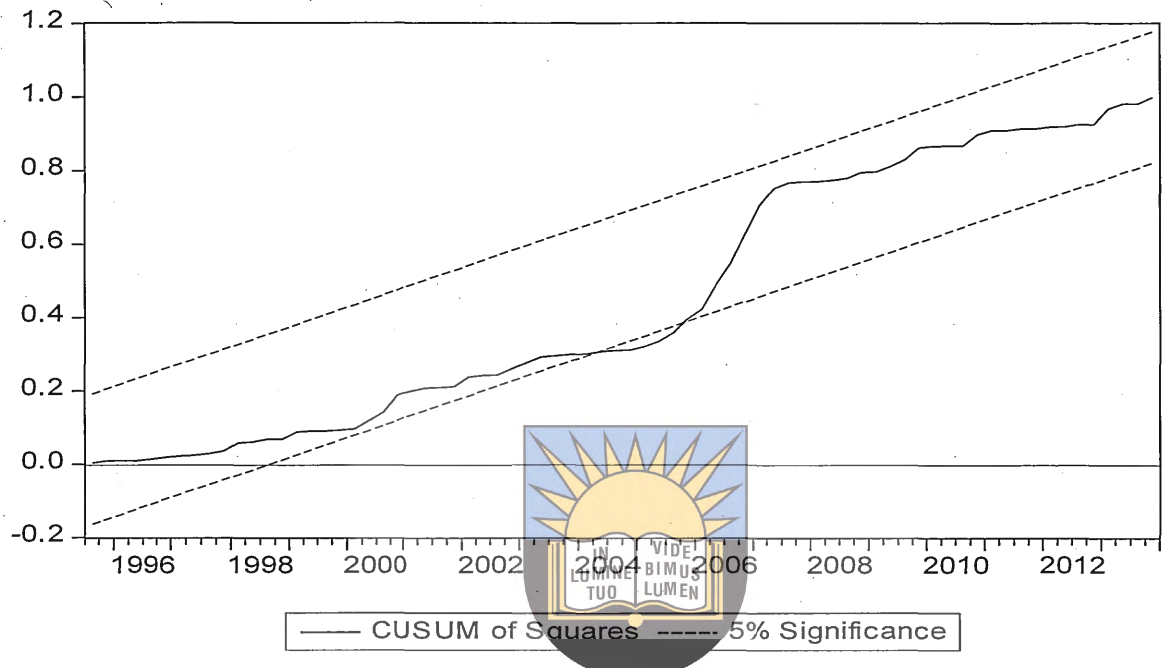


Figure 5.2: CUSUSMSQ Stability Test



Analysing Figure 1, the CUSUM indicates that the money demand function in Swaziland is stable, however the CUSUMSQ provides evidence of instability between 2003 and 2007. This suggest that the money demand function in Swaziland is unstable in some periods. Dritsaki and Dritsaki (2012) argue that in the event that the money demand function is not stable, the central bank should use the interest rate in the conduct of monetary policy. Thus based on these results there maybe need to review the use of monetary aggregates as a means to conduct monetary policy in Swaziland.

5.10 Conclusion

The chapter has focused on interpreting the model estimated in chapter 4. The chapter begun with the analysis of the time series of the data. Both the informal and formal tests confirmed that the data used in the study is integrated of order 1, providing the justification of the Johansen cointegration test. The appropriate lag length to be used in the study was empirically determined. The Johansen cointegration test proved that there was cointegration. In other words the results confirmed that there exists a long-term relationship between the variables of interest. Having established cointegration, the VECM was estimated to analyse the short-term interaction between the variables. The long-term cointegrating vector, normalised on rela M2 indicated that all variables were significant and correctly signed. The VECM also proved that in case of

disequilibrium, there is evidence of convergence towards the long-run equilibrium, with more than 51% being achieved within a quarter. The robustness of the results were examined by means of the Normality test, the heteroscedasticity and autocorrelation. The results proved that all the three assumptions were upheld by the model. Also the stability of the money demand was analysed by means of the CUSUM and the CUSUMSQ test, the results proved that the money demand function in Swaziland is not stable in some periods.

CHAPTER 6

CONCLUSION, POLICY RECOMMENDATIONS AND LIMITATIONS

6.1 SUMMARY OF THE STUDY AND CONCLUSION

The study analysed the money demand function in Swaziland employing the Johansen cointegration tests as well as the Vector error Correction model. The importance of the money demand function cannot be underestimated given its importance to the determination of the effectiveness of monetary policy in a country. The study provided a review of the financial sector developments and recent reviews of economic growth in Swaziland. The review showed that there is a significant development within the financial sector in Swaziland, which is likely to have had an impact on money demand in Swaziland.

The importance of establishing the money demand function was reviewed in the study and it is well documented in the literature. The study reviewed a number of theories which explains the money demand function. These theories include the QTM, the Cambridge approach, the Liquidity Preference theory. All these theories shows that there is no consensus regarding what explains the money demand function. The earlier theories, especially the QTM was criticised in that it only focuses on the money supply, and not the money demand function. In addition to the theoretical literature review, there was an extensive review of empirical literature explaining the money demand function.

Based on theory, review of literature on the link between financial sector development and savings, background to money demand function and the availability of data in Swaziland, an empirical model linking the money demand function and its determinants was specified. The variables utilised in the study as potential determinants of the money demand function in Swaziland include income (real GDP), domestic interest rate, inflation rate, foreign interest rate and the exchange rate between the Swaziland currency and the US dollar.

In examining if there exists a long-term relationship between the money demand function and its determinants, the Johansen cointegration test and the Vector Error Correction Model was preferred against other approaches to cointegration because of its advantages. Before estimating the Johansen cointegration tests, the time series properties of the data was examined using both

the formal and the informal tests. The results indicated that the variables are integrated of order one *I(1)*.

In determining the optimal lag length to be used in the study, the multivariate lag length selection approach was employed in the study. The approach chose different lag lengths, 1 chosen by the AIC, SC, and HQ, whilst the LR chose a lag of 7. Based on the support from literature and the need to obtain robust results, the LR lag length chosen by the LR model was chosen. The Johansen cointegration test was therefore estimated and the null hypothesis of no cointegration was rejected at the 5% level. Thus suggesting that there exists a long-term relationship between the money demand function and its determinants as specified in the model for Swaziland.

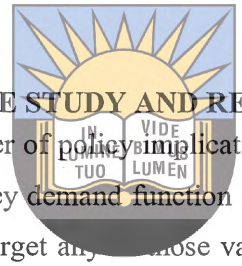
Evidence of cointegration allowed the estimation of the VECM which provided the parameter estimates of both the long-run and the short run estimates of the variables. The results indicates that there is a positive relationship between in[illegible]e demand for real money for the period examined in the study. The empirical results also shows that the interest rate coefficient is positive and statistically significant. The coefficient of GPI was found to be negative and statistically significant suggesting that the higher the return on alternative assets, the less the demand of money in Swaziland.

The measures of the foreign sector in the study were all found to be negatively related to the demand for money. This result supports the portfolio balance hypothesis of capital mobility as far as the interest rate variable is concerned, on the other hand the sign on the exchange rate indicates the existence of currency substitution in Swaziland in the event that the currency is depreciating. Both the two measures of the foreign sector are also consistent with the apriori expectation.

Within the VECM, the speed of adjustment is an interesting parameter which measures the speed of adjustment in the dependent variable which is the Money demand measure. The estimate found in the study indicates that in the event that there is disequilibrium, about 51% of the variation in money demand is corrected within a quarter. This is inconsonance with a number of empirical studies.

The models employed in the study were subjected to a number of diagnostic tests for robust check and the results indicated that the residuals are normality distributed, they are homoscedastic and there is no autocorrelation.

The stability of the VECM was also examined by means of the CUSUM and CUSUMSQ tests. The results indicates that the residual plots of the money demand function under the CUSUMSQ crosses the 5% critical line. This shows that the money demand function was not stable for the period from 2003 to 2007. This therefore suggest that there are some period in which the money demand function is not stable.



6.2 POLICY IMPLICATIONS OF THE STUDY AND RECOMMENDATIONS

The results from the study have a number of policy implications. Firstly, the establishment of a long-term relationship between the money demand function and its determinants as specified in the model implies that authorities can target any of those variables in influencing the long-run behaviour of the money demand function in Swaziland.

Specifically, the results suggest that there are periods in which the money demand function is not stable in Swaziland as measured by the CUSUM and the CUSUMSQ. There are a number of studies which suggest that in this event it is justifiable to use the repo rate as an instrument of monetary policy since the broad money exhibits some element on instability.

In addition, the results from the long run cointegrating equation indicates that there exists currency substitution in Swaziland. Thus, foreign currencies are part of the domestic components of money supply in Swaziland and using monetary aggregates as an instrument of monetary policy may expose the country to external and internal shocks.

However these recommendations should be taken on a broader scale, taking into account other factors within the financial sector of the Swaziland economy.

6.3 LIMITATIONS OF THE STUDY AND AREAS OF FURTHER RESEARCH

The study focused on establishing the money demand function in Swaziland. An important feature which has confronted previous researchers is the availability of data. In this case it means some variables could have been left from the estimation because of lack of data.

Also, it is important to note that there are other qualitative features which could have played a part in determining the money demand function in Swaziland but which are not included in the model. However these problems seem not to be affecting the findings of the study in any meaningful way given that the findings presented from the study corroborate both theory and empirical findings on the relationship between financial development and savings.

The areas of further research that emerge from this study include undertaking an in-depth micro level study which can supplement the findings of this study since it was carried at a macro level. Examining the money demand function in Swaziland taking into account the developments in South Africa in general maybe be more informative given that Swaziland is affected to a greater extend by developments in South Africa due to the link between the two countries as far as formulation of monetary policy is concerned.

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