THE IMPACT OF SOUTH AFRICA MONETARY POLICY ON OUTPUT AND PRICE STABILITY IN NAMIBIA

by

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This thesis is dedicated to my late grandmother, Kuku Katrina Kamwiitulwa Kalongo. May her soul rest in eternal peace.

DECLARATION

This page declares that the work produced is my own and was conducted whilst completing the degree of Master of Commerce in Financial Markets whilst at Rhodes University. This thesis has not been submitted to other Universities, Technikons or Colleges for degree purposes.

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ABSTRACT

Namibia is a member country of the Common Monetary Area (CMA) with Lesotho, Swaziland and South Africa. South Africa is the anchor country to which the smaller member states have surrendered monetary policy authority. This thesis therefore examines the empirical relationship between the South Africa repo rate (SArepo) on the one hand and Namibia's repo rate (Namrepo), Prime Lending Rate (PLR), Private Sector Credit Extension (PSCE), Consumer Price Index (CPI) and Gross Domestic Product (GDP) on the other hand. The credit channel of the monetary policy transmission mechanism informs the theoretical foundation of the thesis. Vector Autoregression modelling, variance decomposition and impulse response functions were used to explore the nature and strength of the relationship between the SArepo and said variables in Namibia. This thesis used quarterly data for the period 2003 to 2017.

The variation in the Namrepo was predominantly explained by the SArepo, which confirmed that the Namrepo strongly followed the SArepo. The impulse response function results found that the impact of a contractionary monetary policy shock (an increase in the SArepo) lasted for up to six quarters before the effect started to fade. The Namrepo exhibited a positive response to an increase in the SArepo, although the magnitude of the response started to fade after the third quarter. The PLR, as a representative of market rates in Namibia, also exhibited a positive response to an increase in the SArepo. The results were similar for the Namrepo and the PLR because changes to the NamRepo are passed through immediately to the market interest rates.

On the real variables, the study found that a contractionary monetary policy shock initiated in South Africa resulted in an increase in inflation in Namibia of less than 0.4 percent, whereas output declined by less than 1.0 percent. Interestingly, a Namibia (domestic) contractionary monetary policy shock resulted in a decline in prices of less than 0.4 percent. GDP, on the other hand, exhibited a positive response to a contractionary monetary shock, with an increase of less than 2.0 percent in the first four quarters of the period observed. The results reflected that a contractionary monetary policy shock from South Africa was more effective with regard to its impact on GDP; however, a domestic monetary policy shock was more effective at impacting on domestic inflation compared to the impact from South Africa.

Keywords: Monetary Policy, Monetary Policy Transmission Mechanism, Credit Channel, Repurchase Rate, Inflation, Output, South Africa, Namibia

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ABBREVIATIONS

ADF	Augmented Dicky-Fuller
BoN	Bank of Namibia
BVAR	Bayesian Vector Autoregression
CFE	Cumulative Forecast Error
CIRF	Cumulative Impulse Response Function
CMA	Common Monetary Area
CPI	Consumer Price Index
ECB	European Central Bank
EMU	Economic and Monetary Union
EU	European Union
GDP	Gross Domestic Product
IRF	Impulse Response Function
KPSS	Kwiatkowski-Phillips-Schmidt-Shin
LNS	Lesotho Namibia Swaziland
M2	Money Supply
MPC	Monetary Policy Committee
MPTM	Monetary Policy Transmission Mechanism
NAD	Namibia Dollar
Namrepo	Namibia Repurchase Rate
NSA	Namibia Statistics Agency
OCA	Optimum Currency Area
OLS	Ordinary Least Squares
PLR	Prime Lending Rate
PSC	Private Sector Credit
PSCE	Private Sector Credit Extension
PVAR	Panel Vector Autoregression
Repo	Repurchase
RMA	Rand Monetary Area
SARB	South African Reserve Bank
SArepo	South Africa Repurchase Rate
SD	Standard Deviation
SE	Standard Error

SIRF	Structural Impulse Response Function
SVAR	Structural Vector Autoregression
US	United States
VAR	Vector Autoregression
ZAR	South African Rand

CHAPTER 1: INTRODUCTION

1.1 Context of the Research

South Africa, Lesotho and Swaziland[1] signed a Trilateral Monetary Agreement which in 1986 saw the birth of the Common Monetary Area (CMA). This agreement provided the framework for monetary and exchange rate policies in the two smaller countries (Talvas, 2008). Namibia joined the CMA in 1992 after gaining independence in 1990. South Africa is the anchor country to whom monetary policy authority is surrendered to by Lesotho, Namibia and Swaziland (referred to as the LNS countries); and to whom the respective currencies of the LNS countries are pegged. However, the CMA is not a monetary union but somewhat resembles an asymmetric monetary union with the leading economy in charge of setting and implementing monetary policy for all (Seleteng, 2016).

The South African Reserve Bank (SARB) Monetary Policy Committee (MPC) makes monetary policy decisions based on domestic economic developments coupled with the projected needs of the South African economy while also accounting for the forward-looking nature of the inflation-targeting framework. Thus, monetary policy decisions are driven mainly by the economic climate in South Africa, taking into account, to a lesser extent, developments in the CMA. Given the inherent close economic and financial linkages between South Africa and the LNS countries, monetary policy decisions may result in spillover effects onto the LNS economies (Uanguta and Ikhide, 2002; Ikhide and Uanguta, 2010; Sheefeni, 2017). This study, therefore, looked at the impact of South Africa monetary policy on select macroeconomic variables in Namibia.

The mandate of the Bank of Namibia (BoN) as well as the ultimate aim of monetary policy in Namibia is to ensure price stability in the interest of sustainable economic growth while maintaining the exchange rate peg agreement with South Africa (Bank of Namibia, 2008)[2].

[1] The author is aware that the Kingdom of Swaziland is now the Kingdom of Eswatini; however, the thesis will make use of Swaziland as is referred to in the literature.

[2] The Bank of Namibia Monetary Policy Framework was subsequently revised in 2020, however the mandate remained the same. The revised monetary policy framework can be accessed at: https://www.bon.com.na/CMSTemplates/Bon/Files/bon.com.na/12/12253e03-31d8-4a91-882a-35833faec548.pdf

The impossible trinity[3] is a macroeconomic framework which states that a country may simultaneously implement any two of three policy goals. The three policy goals are a fixed exchange rate, monetary policy independence and financial integration (Bank of Namibia, 2008; Aizenman, 2010).

Under the pegged exchange rate regime within the CMA, Namibia effectively enjoys exchange rate stability through a fixed exchange rate and financial integration. However, Namibia does not entirely surrender monetary policy independence to South Africa. Namibia, therefore, has some level of monetary policy discretion (Bank of Namibia, 2008). Ikhide and Uanguta (2010) confirmed that the South Africa Repurchase Rate (SArepo) is the relevant policy instrument for the LNS economies and not their respective central bank rates. The study further concluded that the LNS economies might not be able to undertake independent monetary policy. Therefore, even though the monetary policy discretion confers the liberty on Namibia to maintain its repo rate at a level different from that of the anchor country, if and when needed, the Namibia Repurchase Rate (Namrepo) strongly follows that of the SArepo (Bank of Namibia, 2018). Asonuwa, *et al*. (2012) further confirmed that the BoN, as a result of the CMA agreement, has minimal discretionary powers concerning monetary policy. The peg to the South Africa Rand (ZAR) requires that Namibia currency in circulation be backed by foreign reserves to ensure that Namibia imports price stability from the anchor country (Bank of Namibia, 2008; Wang, *et al*., 2007).

South Africa is Namibia's leading trade partner both within the CMA and globally. In 2017 Namibia imported 64.9 percent of total imports from South Africa while exporting 21.8 percent of total exports to South Africa (Bank of Namibia, 2018). This trade dependence highlights the importance of having the fixed peg in place. According to Alweendo (1999) and Wang, *et al*. (2007) the link of the ZAR to the Namibia Dollar (NAD) ensures that Namibia imports price stability from South Africa. Export prices are also affected by inflation in South Africa, with potential implications for Namibia given the high dependence on South African imports.

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[3] The impossible trinity has been reinvented several times and is sometimes referred to as the "policy trilemma", "holy trinity" or the "uneasy triangle". Advances into this theorem and its practicality in the real-world point toward the possibility of an impossible quadrilemma with financial stability being added to the mix. The extended impossible trinity framework provides useful insights into the trade-offs and challenges facing investors, policy makers and central banks (Aizenman, 2010).

According to Bernanke and Gertler (1995) and Seleteng (2016), the impact of monetary policy on economic activity has been an area of uncertainty with a lack of consensus among economists and researchers alike. A large body of empirical and theoretical literature have therefore emerged on the subject of the monetary policy transmission mechanism (MPTM), including among others, Mishkin (1996), Taylor (1995), Peersman and Smets (2001) and, Smal and de Jager (2001). However, recent studies tend to focus on the United States (US) economy, with a common conclusion that contractionary monetary policy shocks lead to a temporary decline in output while prices are found to decrease gradually (Seleteng, 2016).

The impact of South Africa monetary policy may be observed through the monetary policy transmission mechanism, which is the channels through which monetary policy decisions are transmitted into the real economy, ultimately impacting on inflation and output (Mishkin, 1996). The most important channel in Namibia is the credit channel which is also sometimes referred to as the repo rate channel; alternatively, the bank lending channel (Bank of Namibia, 2008).

The credit channel influences the pricing of retail financial products with an almost immediate change to the commercial bank lending rates. Theoretically, both individuals and firms would change their investment and consumption decisions as a result of new lending rates influenced by the repo rate (Mishkin, 1996). In Namibia, such a change in interest rates is more pronounced in individual investment and consumption decisions relative to that of firms (Bank of Namibia, 2008). Household spending is therefore influenced, with the effect eventually filtering through to output and domestic inflation (Sheefeni and Ocran, 2012). Therefore, monetary policy, in part, works by altering the demand and supply of bank loans vis-a-vis credit flows. Commercial banks, under the credit channel, therefore, play an essential role in the financial system because the nexus of their business is credit provision. Schematically the credit/repo/bank lending channel works as follows:

<u>Expansionary monetary policy:</u>

$$\textit{Repo rate} \downarrow \rightarrow \textit{Bank lending rates} \downarrow \rightarrow \textit{Investment spending} \uparrow (\textit{Consumption spending} \uparrow \rightarrow \textit{Inflation} \uparrow) \rightarrow \textit{Output} \uparrow \quad \textbf{(1)}$$

The credit channel for Namibia taking into account CMA membership is:

SArepo ↓ → Namrepo ↓ → Bank lending rates ↓ → Investment spending ↑ (Consumption spending ↑ → Inflation ↑) → Output ↑ **(2)**

Contractionary monetary policy:

Repo rate ↑ → Bank lending rates ↑ → Investment spending ↓ (Consumption spending ↓ → Inflation ↓) → Output ↓ **(3)**

The credit channel for Namibia taking into account CMA membership is:

SArepo ↑ → Namrepo ↑ → Bank lending rates ↑ → Investment spending ↓ (Consumption spending ↓ → Inflation ↓) → Output **(4)**

The conventional credit channel, as per schematic (1) and (3), does not take into account external policy rates. The anchor country's policy rate is, therefore, also considered in the case of Namibia with her CMA membership. This is presented in schematic (2) and (4).

According to Sander and Kleimeier (2006), the interest rate pass-through between South Africa and the LNS countries is homogeneous and almost immediate, thereby transmitting the SArepo into the LNS countries' respective policy rates. Furthermore, this is in line with Aziakpono's (2008) findings that support the South African dominance hypothesis with regard to policy convergence. Changes in the SArepo, therefore, influence Namibia bank lending rates through the Namrepo set by the BoN, which strongly follows that of the SArepo (Bank of Namibia, 2018). Furthermore, the new policy rate is transmitted into the economy by its impact on private sector credit extension (PSCE), investment spending, consumption and ultimately inflation and output. South Africa monetary policy implementation, therefore, has spillover effects on output and price stability in Namibia through the interest rate pass-through on lending rates via the credit channel of the monetary policy transmission mechanism. This effect is almost immediate, with a varying impact on macroeconomic variables in the Namibian economy.

The empirical literature concerning the impact of one country's monetary policy on macroeconomic activity in another country is very limited in the case of Namibia and more so

the research concerning the CMA and its operations (Sanders and Kleimeier, 2006; Ikhide and Uanguta, 2010; Seleteng, 2016; Sheefeni, 2017). Tjirongo (1995) found that CMA membership produced long-term price stability; thus, macroeconomic stability is achievable, but at a trade-off in the short run. Uanguta and Ikhide (2002) analysed the effectiveness of the interest rate and credit channel in Namibia and found that an increase in the lending rates in the respective domestic economies emanated from a rise in the repo rate, with resultant adverse effects on private investment and consequently impacting on output and employment in the short-run. Given that the Namrepo closely follows the SArepo, a rise in the latter would result in a subsequent rise in the former.

A further study done by Ikhide and Uanguta (2010) examined the effect of a change in the SArepo on credit, money supply and price levels in the LNS countries; the study also assessed the ability of the LNS countries to undertake monetary policy independent from that of the anchor country, South Africa. It was found that a change in the SArepo was met with an instantaneous response in the lending rates, money supply as well as prices levels in the LNS countries (Ikhide and Uanguta, 2010).

Seleteng (2016) investigated the effect of the South Africa monetary policy implementation on regional lending rates, interest rate spread, private sector credit, money supply, inflation and economic growth in the rest of the CMA. The study used an impulse response function analysis derived from the Panel Vector Autoregression (PVAR) methodology. Seleteng (2016) found that a positive shock (increase) to the SArepo significantly affected lending rates, inflation and economic growth in the entire CMA. Furthermore, the SArepo had a high impact on lending rates, followed by the impact on inflation and then economic growth. This was the case for the entire CMA. The literature on analysing the impact of South Africa monetary policy on output and price stability in Namibia is very limited and dated, therefore there was a need for new research on this topic.

1.2 Problem Statement

The context of the research outlined the need for the study. Namibia, as a member of the CMA, inherently has close economic and financial linkages with the anchor country, South Africa. Consequently, monetary policy decisions may result in spillover effects onto the Namibian economy. This thesis, therefore, analysed the impact of South Africa monetary policy on output and price stability in Namibia by determining whether an increase in the SArepo ultimately

results in a decrease in prices and a decrease in output, as outlined by the monetary policy transmission mechanism (MPTM) theory.

The literature concerning the MPTM in the CMA, with specific emphasis on the credit channel, is rather limited, however parallel is drawn with the Euro Area economic and Monetary Union (EMU) when reviewing the literature. The existing empirical findings for the EMU pointed towards a decline in output with a surprising increase in prices as a result of a contractionary monetary policy shock (Barran, *et al*. 1996; Ramaswamy and Slok, 1998; Clements, *et al*. 2002; Binatli and Sohrabji, 2018). This thesis not only extends and updates the literature but also aids in the formulation of monetary policy and allows policymakers in Namibia to understand the impact of South Africa contractionary monetary policy on the Namibian macroeconomy better, while encouraging potential policy solutions in this regard.

1.3 Goals of the Research

The goal of this research was to examine the empirical relationship between the South Africa repo rate on the one hand and Namibia's repo rate, lending rates, private sector credit extension, inflation and output on the other hand.

1.4 Methods, Procedures and Techniques

The thesis took a quantitative research approach informed within a positivist research paradigm. The macroeconomic variables considered were the South Africa repo rate, Namibia repo rate, bank lending rates, private sector credit extension, consumer price index (Inflation), and gross domestic product (Output). The data was sourced from the SARB, BoN and the Namibia Statistics Agency (NSA). The frequency of the data used was quarterly, therefore giving a total of 60 observations for the period 2003Q1 - 2017Q4. Namibia joined the CMA in 1992; however, poor data quality for the earlier period (1992 – 2002) restricted the analysis to the period 2003Q1 – 2017Q4.

The primary methodology used in the empirical literature on transmission mechanism research was the Vector Autoregression (VAR) model. A VAR model is a system of regressions with one equation for each variable in the system. The advantages of using a VAR model is that it has the ability to formulate its own narrative coupled with the richness and unrestricted nature

of the lag structure. This provides a great safeguard against various econometric problems such as cointegration and spurious correlations (Cheng, 2006).

As in Ikhide and Uanguta (2010), the ordering of the variables chosen is based on the empirical observations on the causality and speed with which the variables respond to shocks. The data was first tested for stationarity using the Augmented Dicky-Fuller (ADF) and the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) stationarity tests. This was followed by a VAR model which was estimated in order to determine the impact of the South Africa monetary policy on Namibia through the analysis of the impulse responses as well as the variance decompositions.

1.5 Organisation of the Thesis

The thesis is organised as follows: Chapter 2 briefly discusses the nature and historical developments of the CMA, while Chapter 3 explains how monetary policy operates in Namibia. Chapter 4 gives an overview of the existing empirical literature, and Chapter 5 explains the methodology used. Chapter 6 presents, interprets and discusses the results obtained, with Chapter 7 summarising the findings and concluding the study.

CHAPTER 2: THE NATURE AND HISTORICAL DEVELOPMENTS OF THE COMMON MONETARY AREA (CMA)

2.1 Introduction

This chapter briefly discusses the nature, history and developments of the CMA. The CMA was established in 1986 and is made up of four countries, namely, Lesotho, Namibia and Swaziland, often referred to as the LNS countries, and South Africa, the anchor country. Although the CMA is not an optimum currency area (OCA), it has characteristics in common with a monetary union, currency union and a quasi-currency board. Furthermore, it resembles an asymmetric monetary union with the leading economy (South Africa) in charge of setting and implementing monetary policy for all (Seleteng, 2016).

Membership of the CMA has various advantages and disadvantages to the member countries: these include price stability due to the peg between the ZAR and the member state currencies. The main disadvantages of CMA membership include impediments to trade diversification, fluctuations in nominal and real exchange rates, lack of financial market development as well as a limited role for the BoN as lender of last resort. The theoretical roots of the CMA within the OCA theory as well as the advantages and disadvantages mentioned above also formed part of the discussion in this chapter. It is imperative to have an understanding of the CMA in order to better understand monetary policy in Namibia, which will be expounded on in the next chapter.

2.2 Structure and Historical Background

The SARB was established in 1921, after which the ZAR (formerly the Pound and effectively the ZAR in 1961) became the sole medium of exchange and legal tender in South Africa, Lesotho, Namibia, Swaziland and Botswana. Capital flows were therefore unrestricted within this area (van Zyl, 2003). On 5 December 1974, the arrangement was formalised through the signing of the Rand Monetary Area (RMA) agreement. A year later Botswana left the RMA in pursuit of monetary policy independence (Asonuma, *et al*., 2012). April 1986 saw the restructuring of the RMA into the CMA. The CMA member states were South Africa, Lesotho

and Swaziland. The terms of the CMA allowed Swaziland and Lesotho to issue their own currencies, and Namibia did the same upon gaining independence from South Africa in 1990. The NAD (N$) was launched in 1993, a year after joining the CMA as a sovereign state (Asonuma, *et al*, 2012; van Zyl, 2003).

Lesotho, Namibia and Swaziland are referred to as the LNS countries. The LNS countries pegged their currencies to the ZAR on a 1-to-1 parity. This means that their currencies could be exchanged for the ZAR at the same value, for example, N$1 is equal to R1. As per the bilateral agreements between South Africa and the respective LNS countries, their currencies are legal tender only in their respective jurisdictions whereas the ZAR is legal tender within the entire CMA (Uanguta and Ikhide, 2002). It is worth noting that the 1-to-1 parity with the ZAR is not supported by irreversible commitments such as the promise of mutual assistance in case the peg came under pressure. The SARB at its discretion may, however, make foreign exchange available to the LNS countries. Equally, asymmetric shocks within the CMA are not cushioned by fiscal transfers (Uanguta and Ikhide, 2002).

The impossible trinity is a macroeconomic framework that states that a country may simultaneously implement any two of the following three policy goals: monetary policy independence, a fixed exchange rate and financial integration. Under the pegged exchange rate regime within the CMA, Namibia effectively enjoys financial integration as well as a fixed exchange rate. According to this agreement, monetary policy independence is surrendered to South Africa, although the BoN does have some level of discretion (Bank of Namibia, 2008). The CMA resembles an asymmetric monetary union with the leading economy (South Africa) in charge of setting and implementing monetary policy for all (Seleteng, 2016).

The CMA is different from a monetary union because there is no common central bank conducting monetary policy and pooling external reserves. Furthermore, there is no formal regional surveillance of domestic policies to ensure that domestic policies remain consistent with the objectives of the CMA. According to Asonuma, *et al.* (2012) the exchange rate arrangements of the LNS countries under the CMA have characteristics parallel to that of a currency board because it is required that domestic currency issued be fully backed by foreign

reserves[4]. Sanders and Kleimeier (2006) also do not regard the CMA as a currency union but rather as a quasi-currency board arrangement between the LNS countries and South Africa. This view was also supported by Uanguta and Ikhide (2002). A quasi-currency board or a hard peg is the case where one country's currency is pegged to another country's currency with little to no monetary policy independence in the country that has pegged its currency against another (Artus, 2007). The optimum currency area theory is, therefore, important to further explain the theoretical basis of the CMA.

2.3 Optimum Currency Area (OCA) Theory

An OCA can broadly be defined as a geographical area with a fixed exchange rate against a floating external (world) exchange rate, as is the case for the CMA. Although there is extensive literature on the concept, there seems to be an omission of the exact characteristics that make up an OCA. The highest functionality of a currency is that it be optimum, which is the main objective of the OCA. This means that the currency used by a given economy or a given currency area should put all the member countries as well as the OCA in a favourable position compared to if they were to use their respective currencies. Furthermore, the currency needs to be optimum in order to be used within the currency area (Mundell, 1961). The objectives of the OCA are at the nucleus of what constitutes a single currency area in which monetary policy, fiscal policy and external exchange rates are conducted optimally. The three main objectives are (1) full employment; (2) balance of international payments maintenance; and (3) stable internal average price levels. According to McKinnon (1963), objective (3) is equally important for both monetary policy and international trade. This is very important for Namibia, given that the anchor country (South Africa) is her leading trade partner.

Mundell (1961) focused his main arguments on factor mobility and symmetry in the impact of disturbances on participating countries. Factor mobility can take the form of geographical or industrial mobility. Mundell (1961), however, emphasised geographical mobility within the currency areas, with a focus on labour mobility between the member states. The argument is further expounded on by stating that stabilisation is best achieved when labour is mobile across

[4] This requirement does not apply to Swaziland; however, should Swaziland want to adjust the exchange rate, a six months' notice should be given to the SARB. Unlike Lesotho and Namibia, Swaziland is not required to hold foreign exchange at the SARB for purposes of covering its currency in circulation.

borders, bringing about full employment and labour utilisation to its optimum within the region. Although theoretically plausible, it brought to mind questions on matters concerning labour rigidity, transportation costs and member state legislation and labour laws. There has, however, been a lack of consensus among economists who have critiqued and explored Mundell's (1961) imputes concerning factor mobility. Some argued that optimum factor mobility does not exist, whereas others claim that an improvement in labour mobility within a common currency area provides an environment conducive for capital mobility stimulation (Mundell, 1961).

This study does not aim to determine the optimality of the CMA in an OCA because the CMA does not meet the basic criterion for an OCA, which is symmetry in the impact of shocks in the CMA countries (Uanguta and Ikhide, 2012; Debrun and Masson, 2013). Labour is immobile between countries and shocks asymmetric, further motivating for independent monetary policy in order to allow the LNS countries to effectively deal with idiosyncratic shocks (Uanguta and Ikhide, 2012).

2.4. Advantages and Disadvantages of CMA Membership for Namibia

2.4.1 Advantages

According to Alweendo (1999) the most important benefit of CMA membership is price stability. The pegged currency arrangement helps member states to maintain price stability. This arrangement sends out credibility signals to private agents concerning inflation prospects. On February 2000, the then South African Minister of Finance, Trevor Manuel, announced that South Africa would embark on a new monetary policy framework, that of inflation targeting. He further announced that, as per the government's decision, the inflation target would be in the form of a range of three to six percent (van der Merwe, 2004). This has not changed to date. According to Bernanke and Mishkin (1997) inflation targeting comes with advantages such as coherence of policy and increased transparency. A policy that is considered time consistent is, therefore, easier to sustain as circumstances change over time. According to Tjirongo (1995) and Patroba and Nene (2013) time consistency is crucial for credibility.

South Africa is Namibia's leading trade partner, as such, having the fixed exchange rate arrangement in place eliminates the uncertainty associated with volatile exchange rates. A

stable exchange rate ensures that the prices of traded goods, wages and economic performance remain stable coupled with reduced transaction costs (Tjirongo, 1998). Although significant benefits are derived for Namibia with the fixed exchange rate in place, we cannot ignore the fact that the ZAR has been volatile in international currency markets for quite a number of years, which automatically exposes the LNS countries to this volatility even though a sizable portion of foreign trade is with South Africa (van Zyl, 2003).

A benefit frequently overlooked is that of firms' decisions regarding the geographical concentration of activities. Furthermore, hedging against exchange rate risk is not a concern for the CMA due to the fixed exchange rate arrangement in place. This can be very beneficial in terms of employment creation and direct foreign investment for CMA member countries (Alweendo, 1999). Balanced and sustainable economic growth through the protection of the value of the ZAR would remain the primary objective of monetary policy in South Africa (Smal and de Jager, 2001). The free flow of capital between member countries could be beneficial at times when the country has to finance extraordinary infrastructure projects; access to financial markets is therefore also beneficial in this regard. South Africa compensates Namibia for the ZAR in circulation in Namibia by way of seignorage payments (Tjirongo, 1998; Alweendo, 1999 and van Zyl, 2003).

2.4.2 Disadvantages

Although the Bank of Namibia Act 1 of 2020 gives the Bank of Namibia the right to undertake the lender of last resort function if the need for such action arises, one major criticism against the CMA arrangement is that it limits the role of the Bank of Namibia as the lender of last resort. Surrendering monetary policy autonomy to South Africa meant that the use of nominal exchange rates or interest rate policies for macroeconomic adjustment when necessary had been renounced (Alweendo, 1999). The fixed exchange rate peg, therefore, renders the exchange rate unavailable as an economic tool to influence the economy. Country-specific shocks are adjusted much faster when the exchange rate arrangement of the country is flexible, which helps facilitate changes in the terms of trade. This is not the case for Namibia because her exchange rate is pegged at par with the ZAR. Alweendo (1999) cautioned that, although an exchange rate regime could be a basis for stability and economic growth, economic development does not follow automatically from such a monetary policy arrangement.

The SARB adopted an inflation-targeting approach aimed at keeping inflation within a 3 - 6 percent band; however, direct inflation targeting could lead to fluctuations in short-term and even medium-term nominal and real exchange rates (Alweendo, 1999). Alweendo (1999) stated that empirical evidence appears to not have found a long-run trade-off between price stability and economic growth. However, economic growth is at a slower pace for countries within a CMA like structure compared to those with less extreme forms of exchange rate arrangements.

The CMA arrangement may have impediments to trade diversification. About 73.0 percent of Namibia's total imports and 41.0 percent of total exports are with the CMA member states (Bank of Namibia, 2017). Namibia is therefore not quite diversified in terms of her trade relations which needs improvement as well as improved patterns of trade and commerce. Similarly, risk management and trading skills are negatively affected because of over-dependence on the South Africa money market (Alweendo, 1999; Shangula, 2011). South Africa has the most sophisticated financial markets among the CMA members; however, the LNS countries suffer from a lack of financial market development because capital tends to flow out of the LNS countries to South Africa (Wang, *et al*., 2008). The BoN is of the view that the benefits outweigh the costs of CMA membership and that Namibia will maintain her membership for as long as the arrangement continues to be beneficial (Bank of Namibia, 2018). According to Asonuma, *et al.* (2012), the monetary arrangement in the CMA is beneficial for all CMA members, including South Africa.

2.5 Conclusion

This chapter provided a brief contextual discussion on the nature and historical developments of the CMA. The CMA is an asymmetric monetary union consisting of South Africa (anchor country), Lesotho, Namibia and Swaziland, with monetary policy independence surrendered to the anchor country. Within the context of the OCA theory, the CMA does not meet the basic criterion to be considered an OCA. The CMA, though beneficial, has also been criticised for its drawbacks that largely impact on the speed of economic development in member states. The benefits, however, outweigh the costs, hence the continued membership. Understanding the contextual framework of the thesis with regard to how the CMA operates, lays the foundation for a better understanding of Namibia's monetary policy operations within the CMA, to which we turn next.

CHAPTER 3: MONETARY POLICY IN NAMIBIA

3.1 Introduction

This chapter explains how monetary policy operates in Namibia while also referring to the underlying theory applicable to this study. An understanding of monetary policy theory, the Monetary Policy Transmission Mechanism (MPTM) and related theories within the context of Namibia are crucial when determining the impact of South Africa monetary policy on output and prices in Namibia. This chapter, therefore, examines monetary policy in Namibia with reference to the credit channel of the MPTM by explaining how changes in the SArepo affect the Namrepo, thereby having an impact on output and prices via the credit channel.

As explained in section 2.2, Namibia effectively enjoys exchange rate stability and financial integration, but monetary policy authority has been surrendered to South Africa. The impossible trinity theory allows a country to enjoy two of the three policy goals but not all three; therefore, in the case of Namibia, monetary policy authority has been given up. Monetary policy in Namibia is enforced by the Bank of Namibia (BoN) Monetary Policy Committee (MPC) through the repo rate, therefore transmitting the effect onto the real economy through the MPTM (Bank of Namibia, 2008).

3.2 Monetary Policy and the Transmission Mechanism: An Overview

Monetary policy has three main objectives, often termed the holy trinity. These objectives are full employment, economic growth and price stability (Friedman, 1982). Although these objectives became standard, the role of monetary policy in achieving these objectives was subject to considerable criticism. The appropriate strategy, therefore, was threefold, that monetary policy be explicitly directed at promoting full employment, that economic growth be promoted through maintaining low interest rates and, lastly, that monetary policy should concentrate on price stability (Mishkin, 1996).

Friedman (1982) emphasised, however, that monetary policy might not be the effective instrument through which full employment and economic growth could be achieved. A policy mix, including fiscal policy, is required in order to promote full employment (Parisotto and

Ray, 2017). As a result, present-day consensus among both academic economists and monetary policy practitioners is that price stability is effectively the long-run objective of monetary policy. In other words, the main objective of monetary policy is control over the absolute level of prices through a specified rate or range of inflation or deflation.

Friedman (1982) posits that the role of monetary policy, therefore, depends on the domestic monetary standard and the international monetary arrangement. This dependence on both the domestic and international (South Africa in this case) monetary arrangements is in line with monetary policy arrangements among member states within the CMA. Namibia effectively surrendered monetary policy authority to the anchor country, South Africa, with some level of discretion to maintain the repo rate at a level different from that of the anchor country (Bank of Namibia, 2008).

Mishkin (1996) noted that monetary policy became increasingly important in discussions concerning sustainable growth and low inflation. As a result, the stabilisation of inflation and output became synonymous with monetary policy. According to Fischer (1993) an extensive body of literature suggests that inflation leads to lower economic growth. This implies that it is crucial to manage inflation in order to influence economic growth positively. Unanticipated movements in prices may cause unanticipated fluctuations in output which is an undesirable outcome (Mishkin, 1996). However, there is much less agreement concerning what happens in the interim, essentially how monetary policy exerts its influence from the policy instrument into the real economy. The beginning and end are clear: the process is treated as a "black box", as Bernanke and Gertler (1995) put it. This process is essentially the monetary policy transmission mechanism.

A series of economic events are set in motion once the central bank of a country decides on a route or course of action that would allow for the achievement of its desired objectives (Smal and de Jager, 2001). The initial influence of the sequence of events is on financial markets, followed by an eventual change in the level of current expenditure, more so on investment and private consumption. Moreover, changes in domestic demand have an influence on production levels, wages and employment, with an eventual impact on the rate of inflation (domestic prices) (Loayza and Schmidt-Hebbel, 2002). This chain of events is referred to as the monetary policy transmission mechanism.

The repo rate is the main instrument or monetary policy tool used to effect monetary policy in the real economy. Furthermore, it is also the instrument used by the SARB and the BoN to influence the real economy. The repo rate has a direct effect on variables such as the exchange rate, other interest rates, credit, other asset prices, money as well as on decisions concerning investment and spending. In other words, changes in the repo rate (indirectly) affect the demand for and the supply of goods and services (Smal and de Jager, 2001). Domestic inflationary pressures stem mainly from the pressure of demand relative to the supply capacity of the economy. According to Smal and de Jager (2001) inflation is as a result of pressure that originates in the goods/services and labour markets respectively, coupled with imported inflation which is influenced by exchange rate movements.

The effect of monetary policy on the real economy is experienced as a lag. These lags are not prescribed, they vary from time to time and even from country to country, which is as a result of differences in financial and legal structures among countries (Cecchetti, 1994; Loayza and Schmidt-Hebbel, 2002). The generally accepted lag variation is between 12 and 24 months, bearing in mind that the lags may continue to change as a result of globalisation and rapid financial market innovations (Smal and de Jager, 2001).

According to Loayza and Schmidt-Hebbel (2002), the relevance of the transmission mechanism channels is determined by the structure and depth of the financial system in any given country. Shallow financial systems are characterised by moral hazard and adverse selection problems which in turn create a conducive environment for the credit channel to dominate (Mishkin, 1995). This chapter deals specifically with the credit channel of the MPTM, which is the core focus of this thesis. This channel is also considered the most important channel in Namibia in terms of influencing domestic inflation (Bank of Namibia, 2008).

3.3 Monetary Policy in Namibia[5]

The monetary policy framework in Namibia is underpinned by the fixed exchange rate peg, on par with the ZAR. Price stability in the interest of sustainable growth and development is the ultimate goal of monetary policy in Namibia. Maintenance of the exchange rate peg is the intermediate target, and it ensures the achievement of the ultimate goal of price stability by importing stable inflation from South Africa (Bank of Namibia, 2008). In terms of Article 4 of the Common Monetary Area and the Bilateral Monetary Agreement between Namibia and South Africa, it stipulates that "the Bank of Namibia shall maintain reserves equivalent in the form of Rand assets and freely usable foreign currencies in such proportion as the Bank of Namibia considers appropriate". This means that the fixed currency peg requires Namibia to fully back her currency in circulation with international reserves (the ZAR) in order to import stable prices from South Africa (Bank of Namibia, 2008). [6]

It is the responsibility of the BoN MPC to formulate monetary policy in Namibia. Operational autonomy is enjoyed by the BoN in terms of decision making and matters concerning monetary policy. Individuals, groups or institutions, whether government or otherwise, are not allowed to interfere with monetary policy matters. Although the MPC meets six times a year to discuss and decide on the monetary policy for the next two months until the next meeting, the Governor has the discretion to call for extraordinary MPC meetings (Bank of Namibia, 2008). The monetary policy tool used by the BoN to influence monetary policy is the repurchase (repo) rate, which is kept close to that of the SARB. The repo rate is, therefore, the rate at which commercial banks borrow from the BoN, thereby affecting market interest rates in the economy. The SARB repo rate decision, international and domestic economic developments as well as future prospects are taken into account when monetary policy decisions are made (Bank of Namibia, 2008).

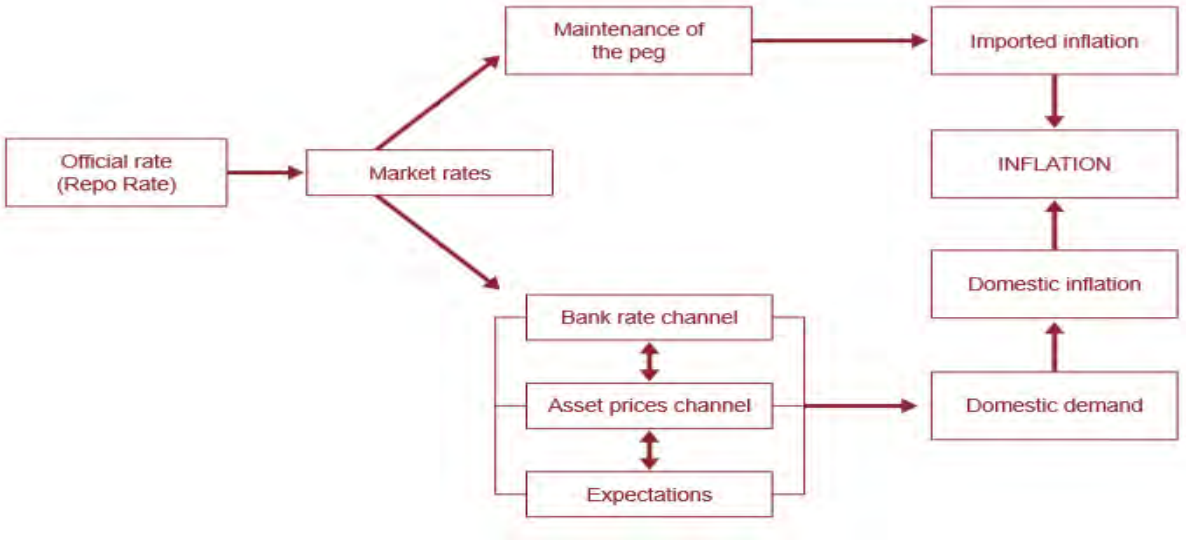
The monetary policy decision-making process involves presentations on recent global and domestic economic developments as well as the inflation outlook. The domestic economic

[5] The Bank of Namibia Monetary Policy Framework was subsequently revised in 2020 and can be accessed at: https://www.bon.com.na/CMSTemplates/Bon/Files/bon.com.na/12/12253e03-31d8-4a91-882a-35833faec548.pdf

[6] Namibia fully backing her currency in circulation with foreign reserves means that for every NAD in circulation there is the equivalent in foreign reserves, primarily ZAR.

developments cover the performance of the real sector, the balance of payments, interest and exchange rate developments as well as fiscal trends. All related MPC decisions are reached by consensus with each MPC member clearly stating his/her decision and reasons behind it. In the event that there is no consensus, the Chairperson, who is the Governor, will exercise the casting vote (Bank of Namibia, 2008). The monetary policy decision, once agreed on, is then communicated to the press.

Figure 3.1: The Monetary Policy Transmission Mechanism for Namibia



(Source: Bank of Namibia, 2008)

Figure 3.1 illustrates the Monetary Policy Transmission Mechanism in Namibia. Once the MPC has made a decision concerning the Namrepo, the decision is communicated and put into operation immediately. The market interest rates such as the prime rate are affected first because the pass-through is immediate from the repo rate to the market interest rates.

The market interest rates are the interest rates at which the commercial banks and other financial institutions do business with the general public (for example the bank lending rates). These rates, if significantly different from the rates in South Africa, would lead to either an inflow or outflow of foreign reserves for Namibia. In the case of an outflow, it negatively affects the reserves against which the Namibia currency in circulation needs to be backed. It is for this reason that the peg needs to be maintained by aligning the monetary policy stance, through the repo rate, between Namibia and South Africa, in order to avoid an outflow of foreign reserves. The maintenance of the peg with South Africa means that Namibia will

continue to trade with South Africa at a 1-to-1 exchange rate parity, especially given that South Africa is Namibia's main trading partner. Furthermore, by virtue of importing more than 50.0 percent of Namibia imports from South Africa, Namibia would be importing inflation from South Africa as well. This means that price developments in South Africa affect price developments in Namibia as well.

The market interest rates also impact on the asset price channel. The asset price channel operates through changes in the market value of corporate and household wealth. Monetary policy shocks therefore impact on equity shares, yields, real estate and other domestic assets (Cevik and Teksoz, 2012). According to Mishkin (1995) changes in policy rates or other short-term interest rates can have the following impact; it can alter a firm's capacity for fixed investment spending through balance sheet effects as well as alter household consumption through wealth effects. The balance sheet effects emanate from a rise in interest rates that reduce the borrowing capacity of businesses (and households) to acquire fixed assets. Wealth effects, on the other hand, experience a decline in the demand for assets such as equities and housing as a result of a contractionary monetary policy shock. The subdued demand for equities and other assets reduces the prices of these assets and therefore reduces the wealth of households and businesses (Mishkin, 1995). The asset price channel (bonds and stocks) is less effective in Namibia because most of the stocks and bonds are held by institutional investors and not by households (Bank of Namibia, 2008). Furthermore, most of the companies listed on the Namibia Stock Exchange (NSX) are listed on other stock exchanges as well. The overall performance of the NSX is therefore largely influenced by external developments and to a lesser extent by domestic developments.

According to the Bank of Namibia (2008) the asset price channel in Namibia is effective through physical assets such as real estate. Accordingly, any changes in the Namrepo leads to changes in the market interest rates which then affects the debt servicing of assets such as real estate. Should the Namrepo increase by 25 basis points[7] then the prime lending rate (PLR) will also increase by 25 basis points since the prime lending rate is used as a starting point when determining the rate of interest to charge a client, as well as their overall risk profile. This

[7] A basis point is a unit of measurement used to describe percentage change. One basis point is equal to 0.01 percent; therefore, 25 basis points are equal to 0.25 percent.

would therefore have a negative impact on disposable income and domestic demand, ceteris paribus (Bank of Namibia, 2008).

The expectations channel deals with the perception of households and firms regarding the impact of monetary policy shocks (Cevik and Teksoz, 2012). In an inflation targeting monetary policy framework such as that adopted by the SARB and followed by the BoN, inflation expectations play an important role by influencing interest rates, disposable income, aggregate demand, domestic prices and ultimately domestic inflation (Taylor, 1995). According to the Bank of Namibia (2020) domestic demand is influenced by changes in consumer behaviour, which in turn is influenced by the expectation of changes in the Namrepo. This then filters through to output and domestic inflation.

An effective part of successful monetary policy is the credibility and transparency of the central bank (Guler, 2016). In the case of Namibia, the SARB takes the lead in terms of monetary policy decisions which eventually gets passed through to Namibia. As a result, it serves as a signal to Namibian households and firms with regard to potential future monetary policy changes, thus expectations are less uncertain (Kamati, 2014). The BoN does not explicitly indicate that the expectations channel is not important when it comes to monetary policy transmission in Namibia, however inferences can be made that transparency coupled with minimal uncertainty (if at all present) renders the expectations channel effective in its own right, though less potent when compared to the credit/repo rate channel, which we turn to next (Bank of Namibia, 2020).

3.4 The Credit Channel of the Monetary Policy Transmission Mechanism (MPTM) in Namibia

The credit channel is concerned with the response of credit aggregates to changes in market interest rates and other policy rates (the repo rate, for example). According to Bernanke and Blinder (1992) and Bernanke and Gertler (1995), the credit channel is an extension, alternatively an enhancement mechanism, of the interest rate channel; however, it amplifies the real effect of monetary policy through changes in the supply of bank credit. The MPTM channels have distinctive effects on the real economy, but there are possible interlinkages between the channels, which may either magnify or counteract the influence of the other channels in the monetary policy transmission process. Furthermore, the necessary condition

for the credit channel to operate is the significant role of banks as a source of capital for the private sector, more so in bank-based emerging market economies (Cevik and Teksoz, 2012).

The credit channel impacts firstly on bank lending and secondly on the balance sheets of both firms and households. The focus of this thesis was on the bank lending channel of the credit channel (hereafter referred to as the credit channel). An expansionary (contractionary) monetary policy stance increases (decreases) both bank deposits and reserves which result in an increase (decrease) in the number of loans available. Furthermore, causing a rise (fall) in investment, consumer spending and ultimately an increase (decrease) in output (Smal and de Jager, 2001). The balance sheet channel postulates that growth in collateral is as a result of a growth in the net worth of firms and households, respectively. This collateral is therefore available for loans with banks, thus reducing potential losses from adverse selection while also reflecting an improvement in cash flows for firms and individuals.

The impact of South Africa monetary policy on output and prices in Namibia may be observed through the credit channel of the MPTM. According to the BoN, the most important channel in Namibia is the credit channel, which is also sometimes referred to as the repo rate channel (Bank of Namibia, 2008). The credit channel influences the pricing of retail financial products with an almost immediate change to the commercial bank lending rates. Theoretically, both individuals and firms would change their investment and consumption decisions as a result of new lending rates influenced by the repo rate (Mishkin, 1996). In Namibia, such a change in market interest rates is more pronounced in individual investment and consumption decisions relative to that of firms (Bank of Namibia, 2008). Household spending is therefore affected; however, the effect eventually filters through to output and domestic inflation (Sheefeni and Ocran, 2012). Commercial banks under the credit channel play an essential role in the financial system because the nexus of their business is credit provision. Schematically presented, the credit channel works as follows:

<u>Expansionary monetary policy:</u>

$$Repo\ rate\ \downarrow \rightarrow Bank\ lending\ rates\ \downarrow \rightarrow Investment\ spending\ \uparrow\ (Consumption\ spending\ \uparrow \rightarrow Inflation\ \uparrow) \rightarrow Output\ \uparrow \quad \textbf{(1)}$$

The credit channel for Namibia taking into account CMA membership:

SArepo ↓ → Namrepo ↓ → Bank lending rates ↓ → Investment spending ↑ (Consumption spending ↑ → Inflation ↑) → Output ↑ **(2)**

Contractionary monetary policy:

Repo rate ↑ → Bank lending rates ↑ → Investment spending ↓ (Consumption spending ↓ → Inflation ↓) → Output ↓ **(3)**

The credit channel for Namibia taking into account CMA membership is:

SArepo ↑ → Namrepo ↑ → Bank lending rates ↑ → Investment spending ↓ (Consumption spending ↓ → Inflation ↓) → Output ↓ **(4)**

The conventional credit channel, as per schematic (1) and (3), does not take into account external policy rates. In the case of Namibia, given the CMA arrangement, the anchor country's policy rate also needs to be considered, which is presented in schematic (2) and (4). The sections that follow will discuss schematic (2) and (4) in more detail as they are the focus of the thesis.

3.4.1 From the SArepo to the Namrepo and to the PLR

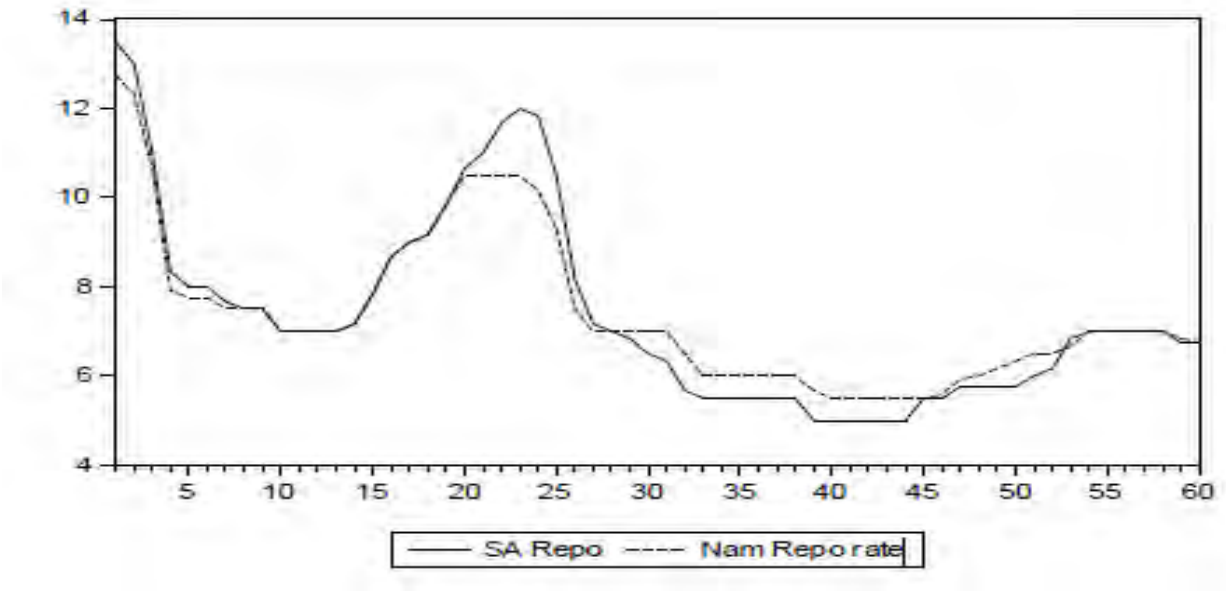
Tai, *et al*. (2012) defines interest rate pass-through as the speed and degree of monetary policy changes through the repo or market interest rates into the retail banking rates. In the case of Namibia, the interest rate pass-through process starts with the SArepo through to Namrepo and PLR. According to Holmes, *et al*. (2015), interest rate pass-through indicates the relationship between changes in the repo rate and changes in the long-term market interest rates, as well as the strength of the said relationship.

The BoN has discretionary powers to maintain the Namrepo at a rate different from the SArepo, if and when necessary. Further, it enables the BoN to control domestically induced inflation. Figure 3.2 below confirms that even though the Namrepo follows the SArepo, there were times

when a level of discretion was used. The Namrepo can, however, not remain much different indefinitely. This is because the difference in the repo rates between South Africa and Namibia affects investment flows and, therefore, foreign reserves as well (Bank of Namibia, 2008).

When the Namrepo is lower than the SArepo, reserves are affected negatively because capital leaves Namibia in search of higher returns in South Africa. The parity is therefore threatened when, amongst others, interest rates move away from each other and/or when there are divergent macroeconomic developments between the two countries. Maintaining the parity between the ZAR and the NAD is, thus, the key objective of the BoN MPC (Bank of Namibia, 2008).

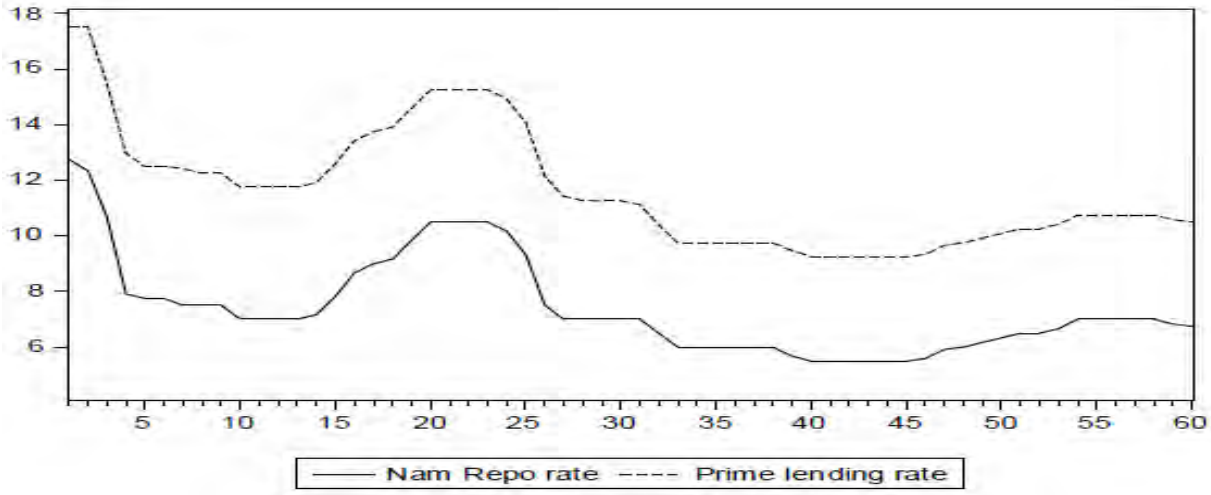
Figure 3.2: South Africa and Namibia Repo Rate (2003Q1-2017Q4)



(Source: Bank of Namibia and South Africa Reserve Bank)

Interest rates are the price of money. The borrower of the money pays the lender interest, usually as a percentage of the money borrowed, in order to make use of the lender's money (Faure, 2015). The repo rate is the rate charged by BoN to commercial banks, with regard to lending from BoN as per the bank's daily liquidity requirements (Uanguta and Ikhide, 2002). The PLR, on the other hand, is the base interest rate on loans to individuals and firms. Figure 3.3 below displays the effectiveness of the Namrepo in determining the PLR.

Figure 3.3: Namibia Repo Rate and Prime Lending Rate (2003Q1 – 2017Q4)



(Source: Bank of Namibia)

A change to the repo rate is followed by an immediate change to the prime lending rate (Mishkin and Serletis, 2011). Figure 3.3 highlights the importance of monetary policy in determining market interest rates, especially in the short run. The BoN controls the short-term interest rates in Namibia through the interbank market, where a liquidity shortage is created (Uanguta and Ikhide, 2002). All other market interest rates and future expectations with regard to interest rate movements are determined by the short-term interest rates (Faure, 2015).

3.4.2 From the PLR to GDP

The impact of a change in the interest rate on investment spending and hence consumer demand, with an ultimate effect on inflation and output, will be discussed in this section. An expansionary (contractionary) monetary policy stance comes with a fall (rise) in the SArepo, which is passed through to Namibia, also as a fall (rise) in the Namrepo. This is as a result of the CMA arrangement. The Namrepo feeds into the bank lending rates by way of a decrease (increase) in the wholesale and retail banking rates after first impacting on the PLR and interbank rates, respectively. This is followed by a decrease (increase) in market interest rates, which influences investment spending positively (negatively) with a resultant similar impact on consumption spending. This means that a lower interest rate would encourage investment spending and consumption because the cost of capital has gone down. As consumption spending increases (decreases) inflationary pressures (relieve) are experienced in the economy, leading to an increase (decrease) in inflation.

The decrease (increase) in the repo rate and ultimately interest rates are intended to stimulate the economy. Output is therefore affected positively (negatively). In sum, a decrease (increase) in the repo rate leads to an increase (decrease) in both inflation and output. There is an inverse relationship between the repo rate on the one hand, and inflation and output on the other hand (Mishkin, 1996, Mishkin and Serletis, 2011).

Not all borrowers have access to the credit market (Uanguta and Ikhide, 2002). Therefore, they depend on the credit facilities made available by the banks to them. An expansionary (contractionary) monetary policy leads to an increase (decrease) in bank reserves as well as bank deposits, thus increasing (decreasing) the quality of loans available. Furthermore, the increase (decrease) in loans would cause a rise (fall) in investment spending and consumer spending as well (Mishkin, 1996). This leads to a rise in aggregate output. It is schematically presented as follows:

$$M \downarrow \rightarrow \textit{bank deposits} \uparrow \rightarrow \textit{bank loans} \uparrow \rightarrow I \uparrow \rightarrow Y \uparrow \qquad \textbf{(5)}$$

where M is the monetary policy stance taken. An expansionary (contractionary) monetary policy stance taken means that the repo rate would go down (go up) thereby increasing (decreasing) bank deposits, bank loans, investments pending and output, respectively. This is essentially the bank lending channel of the credit channel. The demand for credit is higher from small businesses (and households) compared to large companies that have access to the credit market through stocks and bonds. The bank lending channel is rendered less potent because of access to the stock and bond market by companies who make use of bank credit to a lesser extent (Mishkin, 1996).

The monetary policy transmission mechanism highlights important lessons to remember when using monetary policy to impact on the economy. Firstly, it is not advisable to always associate a monetary policy strategy with a rise or fall in short-term nominal interest rates because movements in nominal interest rates do not always correspond with that of real interest rates. It is usually real interest rates that are an element in the monetary policy transmission mechanism. Secondly, besides short-term interest rates, other asset prices contain important information concerning the monetary policy stance because they too are important channels of

the MPTM (Meltzer, 1995). Finally, an important objective of monetary policy is avoiding unanticipated price fluctuations. This highlights the growing interest of central banks to implement price stability as their mandate as well as move toward an inflation-targeting framework (van der Merwe, 2004). The discussion of the MPTM brings about an understanding as to why price stability is important. The goal of price stability is desirable because it lowers uncertainty concerning future price levels (Mishkin, 1996). According to the European Central Bank (2020), price stability is effective in achieving high levels of economic activity and employment by improving the transparency of the price mechanism and reducing inflation risk premiums in interest rates.

3.5 Conclusion

This chapter explored monetary policy and the MPTM theory with a focus on the credit channel. Furthermore, the chapter discussed the conduct of monetary policy and the MPTM in Namibia. In summary, the monetary policy stance in Namibia is influenced by that of South Africa as a result of the CMA arrangement. As noted earlier, the BoN still enjoys some level of discretion with regard to monetary policy. Monetary policy in Namibia is made effective by the repo rate through the BoN establishing a liquidity shortage in the market, thereby influencing the interbank rate and ultimately bank lending rates. The resultant change in market interest rates is accompanied by a change in investment decisions and consumption spending in the short run. This, therefore, has an impact on inflation and output in Namibia. The function of monetary policy transmission channels varies from country to country due to differences in the extent of financial intermediation, the level of development in domestic capital markets, the degree of central bank autonomy, as well as structural and economic conditions in the country of interest.

The next chapter will discuss the existing empirical findings on the impact of South Africa monetary policy on output and prices in Namibia as well as comparable empirical research done in the euro area Economic and Monetary Union.

CHAPTER 4: LITERATURE REVIEW AND EXISTING EMPIRICAL FINDINGS

4.1 Introduction

This chapter looks at the underlying literature concerning the impact of monetary policy decisions, through the credit channel of the MPTM, on output and prices (price stability). The literature specific to Namibia is very limited, which further necessitated research in this area (Seleteng, 2016). This chapter will, therefore, provide a concise review of existing empirical findings in the CMA, which is an asymmetric monetary union and the euro area Economic and Monetary Union (EMU) for comparability. Furthermore, to gain full understanding of the results from the literature, the key methodologies and the results of existing research on this topic will be reviewed. Although a monetary union and a common monetary area are not necessarily the same thing, they do have similar facets that allow us to make critical analysis about the workings of these arrangements (Sheefeni, 2016). Furthermore, reviewing literature on the euro area EMU allowed for comparability with regard to empirical evidence on the impact of monetary policy in the context of a monetary union.

4.2 Euro Area: Economic and Monetary Union (EMU)

Barran, *et al*. (1996) aimed to econometrically verify whether the economic responses to a monetary policy shock in the euro area was significantly different from country to country. Due to data availability, only the following countries were included in the study: The United Kingdom, Austria, Spain, Denmark, Germany, Finland, Italy, France and the Netherlands. Quarterly national accounts data, with a sample period from 1976 to 1994, was used to estimate identified Vector Autoregressions (VARs) in order to determine the effect of monetary policy on the macroeconomy (Barran, *et al*., 1996). The following variables were used: the consumer price index (CPI) (the variable used to observe changes in price levels), gross domestic product (GDP) in constant prices, money market interest rate (the assumed monetary policy instrument), the exchange rate and the world export index as a proxy for world price movements.

Barran, *et al*. (1996) found that in the case of a restrictive monetary policy shock, all the countries experienced a decline in output after the first quarter, ranging from 0.2 percent to 0.7

percent. The magnitude of the shock was more pronounced in Germany at -0.7 percent, following a 0.4 percent interest rate shock (Barran, *et al*., 1996). The Scandinavian countries, on the other hand, experienced a rather small impact, with an insignificant decline in GDP in Denmark and an impact of less than 0.3 percent in Finland, compared to initial interest rate shocks of 1.3 percent and 0.8 percent, respectively. The maximum impact in most countries was reached between four and ten quarters. The decrease in GDP bottomed out after ten quarters in Austria and Germany (Barran, *et al*., 1996).

Prices, on the other hand, experienced a price puzzle. This is essentially because there was a continued increase in prices for more than a year post a monetary policy (contractionary) shock (Barran, *et al*., 1996). According to Sims (1992), central banks may have information concerning expected inflation and therefore raise their interest rates. However, if not raised sufficiently in order to counter future inflation, it is possible to observe interest rate shocks followed by continued price increases. The increases in prices among the countries observed were generally small and not significant, except for the United Kingdom (Barran, *et al*., 1996). In most countries, private consumption experienced a similar effect as output (Barran, *et al*., 1996). Overall, the study found standard effects in most countries observed in terms of similar responses as well as the lags at which these responses were experienced, with the exception that the magnitude of the impact of monetary policy shocks on economic activity differed (Barran, *et al*., 1996).

A study done by Ramaswamy and Slok (1998) focused on understanding the possible differences in the effects of changes in monetary policy on activity among European Union (EU) countries. Their focus was motivated by the importance of understanding and appreciating the difficulties that may arise from the implementation of a unified monetary policy throughout the EU. Ramaswamy and Slok (1998) estimated a VAR with three variables for all EU countries. These variables were, the level of output, the level of prices and a short-term interest rate. The study made use of quarterly data over the period 1971 to 1995.

The response of output to a monetary policy shock fell into two broad groups. In the first group[8] output typically bottomed out about 11 to 12 quarters after a contractionary monetary policy

[8] The first group consisted of the following countries: Austria, Belgium, Finland, Germany, the Netherlands and the United Kingdom.

shock. All the countries in this group experienced a decline in output of about 0.7 to 0.8 percent from baseline following a monetary policy shock, with the exception of Belgium and Finland who experienced a slightly deeper decline in output of about 0.9 percent from baseline; however, the impact tends to dissipate about 12 quarters later (Ramaswamy and Slok, 1998). In the second group[9], output tends to bottom out at about five to six quarters after a contractionary monetary policy shock. Denmark, France and Spain experienced a decline in output of about 0.3 to 0.4 percent from the baseline while Italy, Portugal and Sweden experienced a decline in output of roughly 0.5 to 0.6 percent from baseline (Ramaswamy and Slok, 1998).

Clements, *et al*. (2002) examined the strength of the exchange rate, interest rate and credit channels, respectively, while also determining the effect of monetary policy on prices and output across the EMU countries. A simple model was estimated for each country, using the variables - GDP (output), the short-term interest rate, private sector credit extension, effective exchange rate and consumer price index (CPI) (prices) - over the period 1983Q1 to 1998Q4. Clements, *et al*. (2002) found that the effect on economic activity as a result of a monetary policy shock differed among member countries. Furthermore, the response per country was sufficient to determine an overall EU average response of output and prices given a universal monetary policy change. Therefore, should the EU either increase or decrease the repo rate, the country specific responses could be averaged to give an overall EU response of output and prices to said policy changes.

According to Clements, *et al*. (2002) a monetary policy shock appeared to have had the most substantial impact on output in Germany, the Netherlands and Austria while having only a moderate effect in France, Portugal, Belgium and Italy, whereas Spain and Finland had an extremely weak impact on output. The countries with the strongest effect from a monetary policy shock on output also experienced the most prolonged persistence in the effect, whereas those with the weakest impact died out quickly (Clements, *et al*., 2002).

Clements, *et al*. (2002) assumed a common monetary policy reaction function and fixed intra euro area exchange rates in order to determine the impact on inflation from monetary policy innovations. A one-unit increase in the euro-area interest rate under the EMU led to an increase

[9]The second group consisted of the following countries: Denmark, France, Italy, Portugal, Spain and Sweden.

in inflation; however, declining very slowly after seven to eight quarters. GDP, on the other hand, declined significantly. A one-unit increase in euro area interest rates resulted in a 1 percent decline in GDP as early as the 7th quarter after the initial monetary policy shock (Clements, *et al*., 2002).

Monetary policy could, according to Clements, *et al*. (2002) affect output through its effects on credit. The importance of the credit channel is also dependent on the extent to which a decline in credit could affect GDP growth. The availability of other means of financing is therefore essential. The growth of the financial system and the ability of firms and households to raise capital has a bearing on the effectiveness of monetary policy. The study found that the credit channel is present in all the countries except Italy, Finland and Ireland (Clements, *et al*., 2002).

Of the three monetary policy transmission channels observed, the credit channel accounts for a modest share of the total response of output to monetary policy changes, most notably in the short run. In the long run, however, the effect is more pronounced but more so in extending the impact as opposed to deepening the effect (Clements, *et al*., 2002). This was because the reaction of credit to a change in interest rates was slow and not because output responded at a lag to changes in credit. The study also found that monetary policy has a significant impact on restricting credit in the euro area. A one-unit increase in the euro area interest rate resulted in a 1.3 percent decline in credit whereas an exogenous decline in credit had a relatively small impact on GDP (Clements, *et al*., 2002).

Binatli and Sohrabji (2018) analysed the relationship between, short-term interest rates and long-term interest rates, bank loans, inflation and output in the Eurozone via the bank lending channel of the MPTM[10]. The study used quarterly data from 2002 to 2016, estimated a Panel Vector Autoregressive (PVAR) model and examined the impulse response functions as well as the variance decompositions. Binatli and Sohrabji (2018) found that monetary policy tightening resulted in a decline in output, yet prices surprisingly increased.

[10] The study concentrated on the initial 12 members of the EU, namely: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain.

Binatli and Sohrabji's (2018) expectations were that a positive shock (an increase) to short-term interest rates would reduce both output and inflation; though output did decline after the first quarter, inflation increased. The authors further suggest that a loose (a decrease in interest rates) monetary policy stance promotes growth as a result of its ability to stimulate consumer and investment spending and therefore impacting positively on economic growth. Binatli and Sohrabji (2018) further found that a variation in short-term interest rates led to an increasing variation in output (by 1 percent) and inflation (doubled from 5 to 10 percent).

Overall, Binatli and Sohrabji (2018) found the bank lending channel to be an appropriate yet weak mechanism for monetary policy transmission in the EU. This could be attributed to the period observed, which included a global financial crisis. However, the expected quantitative easing programme by the European Central Bank (ECB) may improve the effectiveness of the bank lending channel in the EU in the future.

The existing empirical findings for the EMU were mostly consistent. Barran, *et al*. (1996), Ramaswamy and Slok (1998), Clements, *et al*. (2002) and Binatli and Sohrabji (2018) all concluded that a contractionary monetary policy shock in the EMU resulted in a decline in output with a surprising increase in price. The magnitude of the impact of a monetary policy shock on output and prices varied from country to country. However, the presence of the credit channel was confirmed in the EMU, though weak in some countries.

4.3 Southern Africa Common Monetary Area (CMA)

This section discusses the existing empirical findings concerning the effect of a South Africa Monetary Policy shock on output and prices in Namibia and the rest of the CMA. According to Sander and Kleimeier (2006) the interest rate pass-through between South Africa and the LNS countries is homogeneous and almost immediate, thereby transmitting the SARB repo rate into the LNS countries' respective policy rates. This is in line with Aziakpono's (2005) findings that support the South African dominance hypothesis concerning policy convergence. Changes in the SArepo, therefore, influence the Namrepo. According to the Bank of Namibia (2018) the Namrepo strongly follows the SArepo.

Uanguta and Ikhide (2002) studied the MPTM in Namibia by way of the Cumulative Forecast Error (CFE) and the Vector Autoregressive (VAR) (impulse response analysis) methods using

monthly data over the period 1990 to 1999. The following variables were used: private investment, credit, lending rates, repo rate, broad money and consumer prices (Uanguta and Ikhide, 2002). The study sought to determine how a change in monetary policy by the SARB was transmitted into the Namibian economy. Further, it also sought to understand the operations of the transmission process in a currency board arrangement, like that of the CMA.

The CFE method found a constant decline in private investment throughout 1997 as a result of a tightening monetary policy stance taken in 1997 and 1998. Furthermore, the exogenous shock stemming from the Asian financial crisis of 1997 and the SARB's immediate response by tightened monetary policy, also influenced the decline in private investment in 1997 (Uanguta and Ikhide, 2002). Domestic lending rates rose to a peak of 20.93 percent in 1997 with a continued increase well into 1998. This resultant increase in lending rates in Namibia was consistent with interest rate pass-through theory because any changes in the SArepo was fully transmitted into lending rates in Namibia (Uanguta and Ikhide, 2002; Sander and Kleimeier, 2006).Uanguta and Ikhide (2002) found a significant effect on private investment and therefore on output too as a result of an interest rate shock. Another significant effect on output was derived from domestic credit to the private sector. Overall, a significant decline in private investment was experienced in the event of an unexpected rise in short-term interest rates (Uanguta and Ikhide, 2002).

The study further found that the decline in private investment began to ease only after the fifth month, as a result of a one standard deviation (SD) innovation of bank credit on private investment (Uanguta and Ikhide, 2002). An immediate and very noticeable decline in private investment was experienced because of an innovation in the repo rate. A money supply shock, however, showed an initial increase in private investment which eventually bottomed out after the sixth month (Uanguta and Ikhide, 2002). In contrast, consumer prices produced exciting results. A one SD innovation in lending rates led to a decline in consumer prices. This confirms the motivation for inflation targeting by the SARB because of the immediate response of prices, influenced by domestic lending rates and ultimately by the repo rate (Uanguta and Ikhide, 2002). A one SD innovation (increase) caused a fall in bank credit to the private sector. Domestic credit fell, given the same shock on the lending rate, but the effect wore off, followed by a stabilisation of domestic credit (Uanguta and Ikhide, 2002).

Overall, Uanguta and Ikhide (2002) found that an increase in the repo rate (contractionary monetary policy) in the domestic economy caused an increase in lending rates, evidenced in the shrinkage of private investment which had a resultant negative impact on output and employment in the short run. The findings of the study also confirmed the operation of the credit channel in Namibia, specifically the bank lending channel (Uanguta and Ikhide, 2002).

Another study done by Ikhide and Uanguta (2010) undertook a three-stage empirical analysis in order to determine the impact of South Africa's monetary policy on the LNS economies. The first stage was a qualitative analysis of the flow of capital within the CMA. The second stage employed a narrative approach by obtaining the Cumulative Forecast Errors (CFE) from a univariate forecasting equation for each principal variable in each country after a significant monetary shock initiated by the SARB. This stage also tried to assess the time it took the impact of a monetary policy shock to wear off. In the third stage, a VAR model was estimated for each country to determine the direction and impact of monetary policy undertaken by the SARB on key economic variables in the LNS countries and Botswana (Ikhide and Uanguta, 2010).

Ikhide and Uanguta (2010) found that, in the first stage, financial flows into and out of the CMA were dominated by flows from and out of South Africa. Almost all portfolio investments in the region were directed to South Africa. The study further found that, except to South Africa, the flows between the LNS countries were very negligible (Ikhide and Uanguta, 2010). The narrative approach in the second stage aimed to identify the disinflation episodes or restrictive monetary policy in which the monetary authority (SARB) appeared to have been willing to accept some output sacrifices by tightening monetary policy (Ikhide and Uanguta, 2010).

In Swaziland, a consistent decline was evident in the consumer price index (CPI), money supply (M2) and private sector credit (PSC), following contractionary monetary policy (increase in the repo rate) episodes. The CPI was found to be impacted to a higher degree, whereas PSC was the least affected. Similarly, in Namibia a contractionary monetary policy episode led to a decline in the variables observed, the results for Namibia were similar to that of Swaziland, but the intensity in the decline was deeper in Namibia (Ikhide and Uanguta, 2010). Ikhide and Uanguta (2001) focused on the 1994 and 1998 contractionary monetary policy episodes and it was found that PSC declined more intensely in 1998 compared to 1994; however, CPI showed the least effect.

Compared to other countries in the CMA, the cumulative forecast error showed that Namibia was more intensely affected by a tightening monetary policy stance taken by the SARB. All the variables declined with a relatively longer lag. On the contrary, South Africa, the country where the monetary policy decisions were initiated, was the least affected by the tightening episodes (Ikhide and Uanguta, 2010). The results for Botswana were instructive. Botswana was included in the study because she was once part of the RMA and presently still trades with the CMA. Unlike the 1994 episode of tightening, the 1998 episode only had moderate effects on money supply (M2) and PSC and was relatively neutral to CPI. No results were produced for Lesotho due to the lack of monthly data for most of the variables analysed (Ikhide and Uanguta, 2010). In stage three, the impulse response function showed a significant effect of the repo rate changes on the lending rates in all countries (Ikhide and Uanguta, 2010). It was useful to note that the effect of changes in the SArepo on lending rates of the LNS countries were by far more significant than the effect of the reference LNS central bank rates. In essence, the relevant policy rate was the SArepo and not the LNS countries' central bank rates (Ikhide and Uanguta, 2010).

In Swaziland, a one-time SD shock of the SArepo caused an initial increase in the lending rate. In Namibia, it caused a very sharp increase in lending rates, more pronounced than what was observed for Swaziland where it took longer to wear off compared to the rest of the CMA (Ikhide and Uanguta, 2010). Lesotho experienced the same result although it initially dipped before rising. It was evident that bank lending rates in the LNS countries respond very strongly to changes in the SArepo, as confirmed by Sander and Kleimeier (2006). Changes in the SArepo were transmitted through the lending rates, money supply and private sector credit to prices in the CMA. Although the exact channel may not be fully established, repo rate changes made an impact on price level changes in these economies. This explained the convergence of inflation between South Africa and the LNS economies.

In response to a one SD innovation (shock) in the SArepo, money supply declined in Namibia and then remained consistent, while in Swaziland and South Africa the decline in money supply wore off in the sixth month. Lesotho also experienced a decline in the money supply (Ikhide and Uanguta, 2010). All the countries experienced an initial rise in prices due to a one-time shock in the SArepo, followed by a decline. The response of credit to the private sector to a shock in the SArepo was quite instantaneous for Namibia, whereas in Swaziland and Lesotho

there was no discernible trend while in South Africa it initially took a deep plunge and then recovered after the third month (Ikhide and Uanguta, 2010).

Kamati (2014) studied the MPTM, interest rate spreads and the spread adjusted monetary policy rule; however, we are only interested in the MPTM findings for Namibia. The study used a Structural Vector Autoregression (SVAR) model to derive structural and cumulative impulse response functions (CIRF) in order to show how output, bank credit and inflation responded to monetary policy and credit shocks in both the short and long run. The study used quarterly data for the period 1991 to 2012 (Kamati, 2014).

Kamati (2014) found that quarterly real GDP, inflation and private credit all declined significantly in the short run as a result of a monetary policy shock in Namibia. Real GDP experienced a sharp decline for more than three quarters after the initial impact. A one SD shock in the private credit under the structural impulse response function (SIRF) led to an increase in both inflation and GDP. Furthermore, the CIRF produced a contrary outcome for inflation compared to the SIRF, which recorded a decline in the long run and remained below the initial level, whereas the other variables recorded statistically insignificant results (Kamati, 2014). The South Africa monetary policy shock led to a significant negative response in private credit in the short run, though the quarterly GDP responses observed were barely significant (Kamati, 2014).

Kamati (2014) further found that changing the repo rate was effective in stabilising GDP, private credit and inflation in the short-run with similar stabilising effects on inflation in the long-run. Furthermore, the interest rate channel performed better than the credit channel in Namibia. This was because repo rate shocks account for a larger variation in output compared to the variation attributed to private credit stock. Although domestic monetary policy, through the Namrepo, was effective, the effects from the SArepo were not convincing in Namibia (Kamati, 2014).

Seleteng (2016) investigated the effects and responsiveness of the South Africa monetary policy implementation on select macroeconomic variables among the CMA member countries. The macroeconomic variables are, namely, macro-regional lending rates, private sector credit, inflation, money supply, interest rate spread and economic growth. The study made use of annual 1980 to 2012 data to estimate a PVAR model and assess the impulse response functions

derived (Seleteng, 2016). Seleteng (2016) found that the SArepo had a significant impact on lending rates in the entire CMA, with 63.8 percent and 63.0 percent of its variance in the short and long run, respectively. The impact on private sector credit and inflation followed at about 18.0 percent and 24.0 percent respectively in both the short and long run. However, the SArepo had quite a marginal impact on economic growth (7.6 percent), interest rate spread (0.6 percent) and broad money supply (10.0 percent) in the CMA region in terms of both its short and long run variance (Seleteng, 2016).

Seleteng (2016) further found that a 10.0 percent increase in the SArepo would lead to a 0.6 percent increase in lending rates in the CMA region for up to five periods, after which it would become statistically insignificant. The response of inflation in the CMA to a SArepo shock (increase) remained positive and statistically significant for up to roughly four periods. This means that an increase in the SArepo led to a rise in inflation for up to four periods (quarters) after which it became negative. The impact of the increase in the repo rate is therefore not felt immediately but rather at a lag of roughly four periods. Smal and de Jager (2001) noted that there are long lags in the transmission mechanism between the change in the monetary policy stance and inflation. Furthermore, it is imperative to note that the lags differ from country-to-country and within the same country from time-to-time.

Economic growth responded positively to a favourable monetary policy shock from South Africa. This response was statistically significant but for one year only, after which it became insignificant. However, a SArepo shock did not illicit a response from broad money supply, interest rate spread and private sector credit extension in all the countries in the CMA (Seleteng, 2016). Seleteng's (2016) findings were in line with those of Ikhide and Uanguta (2010) who also found an instantaneous response from lending rates and price levels among the LNS countries, as a result of a change in the SArepo. However, money supply was found to not respond to the SArepo, which is contrary to Ikhide and Uanguta's (2010) findings.

Sheefeni (2017) analysed the channels of the MPTM in Namibia, utilising the Bayesian Vector Autoregression (BVAR) modelling approach and further deriving the impulse response functions and the forecast error variance decomposition. The study used quarterly data covering the period 2000 to 2016. The variables used included, the real house price index, repo rate, total credit extended to the private sector, the inflation rate, the real effective exchange rate and real gross domestic product. Sheefeni (2017) found that a monetary policy shock via

the credit channel was short-lived. The effects of the monetary policy shock remained persistent for about 12 quarters. The credit channel results showed that a positive shock to credit resulted in a decline in both output and inflation. However, the effect tended to wear off after four quarters in both cases. The study also found that the interest rate and credit channels are the most effective in Namibia (Sheefeni, 2017).

The empirical evidence on the impact of South Africa monetary policy on Namibia, with specific emphasis on output and prices, were – for the most part - consistent across the board; however, contrary results were also apparent. All the studies observed, except for Seleteng (2016), found that a South Africa monetary policy shock led to a decrease in output, the magnitude and significance of which varied from study to study. In terms of the impact of a South Africa monetary policy shock on prices, again the majority of the empirical findings concluded that prices declined whereas Ikhide and Uanguta (2010) experienced an initial increase followed by a decline. The credit channel was also found to be present and effective in Namibia, but Kamati (2014) drew a contrary conclusion.

4.4 Conclusion

Chapter 4 observed the empirical findings of the impact of a monetary policy shock on economic activity in member countries of both the EMU and the CMA. The empirical findings observed revealed that the impact of a monetary policy shock on the macroeconomy attracted different macroeconomic consequences from one country to the next as well as from period to period in the same country, potentially owing to the difference in the financial structures of the respective countries (Barran, *et al*., 1996; Ramaswamy and Slok, 1998; Seleteng, 2016). The different countries within the EMU and the CMA with their respective economic structures and needs responded differently to monetary policy shocks. However, the overall existing empirical research was broadly consistent with regard to the relationship between the monetary policy shocks and the response of output and prices.

The time it took for the impact of a monetary policy shock to bottom out varied from paper to paper, which is understandable given that the researchers did not use the same methodologies, the same sample periods nor the same assumptions. On balance, although the results tended to have mostly similar conclusions with pockets of variation, a few, albeit qualified, conclusions can be drawn. Firstly, within the EMU, the impact of a contractionary monetary policy shock

on member countries led to a decline in output and a surprising increase in prices. On the other hand, the impact of a South Africa contractionary monetary policy shock on the rest of the CMA resulted in a decline in both output and prices.

The discussion in this chapter highlighted the impact of monetary policy decision on the macroeconomy with specific emphasis on output and prices. However, the issue of the impact of South Africa monetary policy on the CMA, particularly Namibia, remains under explored. On this issue specifically, researchers have overlooked 1) how long the impact lasts, 2) the role played by expectations created by South Africa repo rate changes for Namibian households and firms, and how this feeds into the impact of a domestic monetary policy shock on the Namibian economy and finally, 3) the possibility of a price puzzle. This study therefore aims to close some of these gaps by firstly updating the literature with more recent data analysis spanning from 2003 to 2017 and determining how long after the initial monetary policy shock, the intended impact is felt on the real economy through variables such as GDP (output) and CPI (inflation). Following this chapter, Chapter 5 will discuss the methodology used in this study.

CHAPTER 5: METHODOLOGY

5.1 Introduction

Achieving the objectives of this study entails examining the empirical relationship between the South Africa repo rate on the one hand and Namibia's repo rate, prime lending rate, private sector credit extension, inflation and output, on the other hand. This chapter, therefore, explains the methods and procedures used to achieve this objective. The study takes a quantitative research approach informed within a positivist research paradigm. The methods used, which are discussed below, include stationarity tests, a Vector Autoregression (VAR) model, as well as impulse response functions and variance decompositions.

This study utilised quarterly time series data spanning from 2003 to 2017. The data was first tested for stationarity with the use of the Augmented Dickey-Fuller (ADF) and the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) stationarity tests. Vector Autoregression (VAR) modelling was used for this study because most of the empirical research observed in Chapter 4 used the VAR model to determine the relationship between the repo rate and selected macroeconomic variables. The VAR model allowed for an analysis of the variance decomposition as well as the impulse response functions of the variables which explained the dynamic short-term relationships among the variables. The chapter is organised as follows; section 5.2 discusses the data and stationarity testing while section 5.3 outlines the VAR model and section 5.4 concludes the chapter.

5.2 Data and Stationarity Testing

5.2.1 Data

The macroeconomic variables considered in this model were selected based on the empirical evidence on the MPTM as outlined in Chapter 4. The variables used are the South Africa repo rate, and the following Namibia variables: repo rate, prime lending rate, private sector credit extension, inflation, and gross domestic product. Table 1 below lists the variables as well as the expected relationship between the said variables and output and inflation (prices), respectively, as informed by theory and empirical findings in Chapter 4.

Table 5.1: Data Specification

Variable	**Abbreviation**	**Expected relationship with**		**Data Source**
		Output	**Prices**	
South Africa Repo Rate	SArepo	Negative	Negative	SARB
Namibia Repo Rate	NamRepo	Negative	Negative	BoN
Prime Lending Rate	PLR	Negative	Negative	BoN
Private Sector Credit Extension	PSCE	Positive	Positive	BoN
Inflation (Prices)	CPI	Positive	N/A	BoN
Gross Domestic Product	GDP	N/A	Positive	NSA

(Source: Author's compilation)

In order to fully appreciate the empirical results outlined in the next chapter, it is important to understand the expected relationship between the variables, as determined by theory as well as empirical literature. The credit channel prescribes these relationships indirectly by identifying the potential pass-through as well as the variables' respective responses, given either a contractionary or expansionary monetary policy shock. The SArepo, Namrepo as well as the PLR all have an inverse relationship with both output and prices. This means that an increase (contractionary monetary policy) in the SArepo, which is passed through, also leads to an increase in the Namrepo. The Namrepo filters through to the Namibia PLR which, in turn, also increases, resulting in a decrease in investment spending and consumption spending alike, with an ultimate negative impact on both inflation and output.

On the contrary, PSCE has a positive relationship with both output and inflation, that is, an increase in interest rates leads to a decline in the credit appetite which, in turn, impacts on both investment and consumption spending and therefore on output and inflation as well. A decline in PSCE leads to a slowdown in inflation and output. Inflation and output both have a positive relationship with each other. This is because, as investment and consumption spending grow, the quantity demanded, and the quantity supplied of goods and services have an impact on prices; it also stimulates the economy thereby producing growth. Empirical evidence observed in the previous chapter confirmed that often theory might be contradicted. For example, in the

price puzzle context prices continued to increase during a contractionary (increase in repo rate) monetary policy period even though monetary policy theory suggested otherwise. This is, therefore, indicative of a potential positive relationship between the repo rate and inflation.

5.2.2 Testing for Stationarity

The analysis began by conducting stationarity tests in order to determine whether each individual time series was either stationary or non-stationary since a stationary time series does not require further transformation. The non-stationary time series is transformed in order to ensure that the mean, variance and covariance are constant thereby avoiding a spurious regression which could result in an inaccurate estimation of the model (Gujarati, 2004 and Enders, 2010).

This study conducted a three-step stationarity test process, starting with a preliminary graphical assessment and an examination of the correlogram. However, incorrect conclusions from this type of analysis are common because the autocorrelation function of a non-stationary series is similar to that of a stationary but highly persistent series. A formal statistical testing procedure was, therefore, be adopted. The second step was to make use of the Augmented Dickey-Fuller (ADF) unit root test, which, when compared to the graphical analysis, provides a more accurate estimation of the time series' stationarity. Lastly, a Kwiatkowski-Phillips-Schmidt-Shin (KPSS) stationarity test was used in order to confirm the results obtained from the ADF unit root test.

The ADF unit root test, as a regression equation, is estimated as follows:

$$\Delta Y_t = \alpha_0 + \delta Y_{t-1} + \sum_{i=2}^{p} \beta_i \Delta Y_{t-i+1} + \varepsilon_t \quad \textbf{(1)}$$

where ε_t is a pure white noise error term. The ADF unit root test, tests for the presence of a unit root, therefore, the coefficient δ is of interest because if $\delta=0$ then the equation is in first difference and hence has a unit root. The time series is therefore stationary if $\delta<0$ (Enders, 2010).

The difference between the ADF and the KPSS unit root tests is that the ADF tests the null hypothesis of non-stationarity, whereas the KPSS tests the null hypothesis of stationarity (Gujarati, 2004 and Enders, 2010). The study, therefore, made use of these unit root tests in order to tests for stationarity. The KPSS unit root test, as a regression equation, is estimated as follows:

$$KPSS = (T^{-2} \sum_{i=0}^{T} \hat{S}_t^2) / \hat{\lambda}^2 \quad \textbf{(2)}$$

where $\hat{S}_t = \sum_{j=1}^{t} \hat{u}_j, \hat{u}_t$ is the residual of the regression and $\hat{\lambda}^2$ is a constant estimate of the long-run variance of u_t using $\hat{u}_t$ (Kwiatkowski, *et al*., 1992). A series, under the KPSS, is stationary when we fail to reject the null hypothesis whereas, under the ADF, the null hypothesis (of a unit root) must be rejected in order for the series to be stationary (Enders, 2010).

The issue of whether variables needed to be stationary for the purposes of the VAR model has been debunked by Sims (1980) as well as by Sims, Stock and Watson (1990) who recommended against differencing even in the case where the variables are not stationary. The supporting argument was that the main purpose of employing a VAR analysis is to determine the interrelationships between the variables and not to determine the parameter estimates (Enders, 2010). Furthermore, the argument against differencing was due to the fact that differencing a series leads to a loss of information with regard to the comovements between the variables (Enders, 2010). The study, nonetheless, performed unit root tests as part of the overall data analysis process.

5.3 Vector Autoregression (VAR) Model

VAR modelling was used for this study because most of the empirical research observed in Chapter 4 used the VAR model to determine the relationship between the repo rate and selected macroeconomic variables. Using the VAR, monetary policy shocks can be analysed within the context of the impulse response and variance decomposition functions. This analysis is instrumental because it shows the impact and importance of shocks originating from South Africa monetary policy on the following Namibia variables: repo rate, prime lending rate, private sector credit extension, consumer price index (prices) and gross domestic product (output).

The VAR model was developed by Sims (1980); it is a system of regressions with one equation for each variable in the system. This means that, unlike a univariate regression that has a single equation where the dependent variable is a function of some unknown variables, the VAR is a multivariate regression. According to Sims (1980), for true simultaneity to be present among the set variables observed in the VAR model, the variables should all be treated the same and, therefore, there should not be any *a priori* distinction between endogenous and exogenous variables. All the variables in a VAR model are therefore assumed to be endogenous (Enders, 2010).

The VAR is an *n*-variable linear model with an *n*-equation in which variables are explained by their own lagged values as well as past and present values of the remaining *n-1* variables (Stock and Watson, 2001). Simply put, an endogenous variable in the model is explained by its own lagged values as well as those of the other endogenous variables in the model, thereby providing a systemic way to capture rich, dynamic relationships among these variables (Stock and Watson, 2001). The term 'vector' refers to a vector of two or more variables whereas the term 'autoregressive' refers to the inclusion of the lagged value of the dependent variable on the right-hand side of the regression (Gujarati, 2004).

The VAR model allows the time path of one variable to be affected by both past and current realisations of another variable and vice versa (Enders, 2010). For example, the past and current realisations of the SArepo can impact on the past and current realizations of the Namibia CPI, and the past and current realisations of the Namibia CPI can impact on the past and current realisations of the SArepo. This is the essence of a multivariate system. Consider the simple two (bivariate) variable (a VAR system can have more than two variables) first order VAR system below:

$$y_t = b_{10} - b_{12}z_t + \gamma_{11}y_{t-1} + \gamma_{12}z_{t-1} + \varepsilon_{yt} \quad \textbf{(3)}$$

$$z_t = b_{20} - b_{21}y_t + \gamma_{21}y_{t-1} + \gamma_{22}z_{t-1} + \varepsilon_{zt} \quad \textbf{(4)}$$

where the time path of y_t (for example, Namibia CPI) can be affected by both past and current realisations of the z_t (for example, SArepo) sequence and the time path of z_t be affected again by both the past and present realisations of the y_t sequence. It is assumed that y_t and z_t are stationary, ε_{yt} and ε_{zt} are white-noise disturbance with σ_y and σ_z standard deviations,

respectively. It is also assumed that ε_{yt} and ε_{zt} are uncorrelated white-noise disturbances (Enders, 2010).

The structure of the system allows the variables to affect each other and there is therefore feedback. For example, $-b_{12}$ is the effect of a one-unit change of z_t on y_t. In other words, the effect on y_t (Namibia CPI) as a result of a one-unit change in z_t (SArepo) is measured by $-b_{12}$. Furthermore, γ_{12} is the effect of a unit change in z_{t-1} (the lag of SArepo) on y_t (Namibia CPI). The VAR system can have more lags as determined by the researcher. In the case of this study, the researcher made use of five lags.

The terms ε_{yt} and ε_{zt} are the shocks introduced into the model and are also referred to as pure innovations in y_t and z_t, respectively. Therefore, if b_{12} (the effect of a one-unit change of the SArepo) is not equal to zero then it means that ε_{zt} (the innovation or shock of the SArepo) has an indirect contemporaneous effect on y_t (Namibia CPI). If b_{21} (the effect of a one unit change of the (Namibia CPI) is not equal to zero, then it means that ε_{yt} (the innovation or shock on Namibia CPI) has an indirect contemporaneous effect on z_t (SArepo). Such a system is therefore used to capture the feedback effect between the variables observed (Enders, 2010).

A VAR may be estimated through a single equation method like the Ordinary Least Squares (OLS) method as it would be efficient and consistent under the assumption of normality of the error. Once the model has been specified, by determining the variables required, the appropriate lag length is determined (Enders, 2010). The statistical inferences used in this study to determine the appropriate lag length were the Akaike, Schwarz and Hannan-Quinn information criterions, respectively. The study made use of 60 quarterly observations. A lag length larger than the number of observations in the model may yield poor and inefficient estimates of the parameters. Too many lag lengths may consume degrees of freedom while also introducing the possibility of multicollinearity. On the other hand, a lag length that is too short is also not preferred, because it may induce spurious significance of the parameters because of unexplained information left in the disturbance term (Gujarati, 2004).

Every model comes with its drawbacks, and the VAR model is no exception. The VAR model has been criticised for its emphasis on forecasting, which is considered less suited for policy analysis. The biggest practical challenge of this model is choosing the appropriate lag length

(Gujarati, 2004). Another challenging feature of the VAR model is that the variables used should be stationary (Sims, 1980, argues against this), while the results of the transformed data may be unsatisfactory. Finally, the individual coefficients in the estimated VAR models are often difficult to interpret, thereby necessitating an estimation of the impulse response function (IRF). The IRF traces out the response of the dependent variable in the VAR system to shocks in the error terms for several periods into the future (Gujarati, 2004). Irrespective of the drawbacks, Sims (1980) concluded that the VAR model is a credible and coherent approach to data description, structural inference, forecasting and policy analysis.

As mentioned earlier the VAR method is simple because the concern as to whether a variable is endogenous or exogenous is eliminated. All the variables in a VAR model are endogenous (Enders, 2010). Estimation of the VAR model is considered simple as well because the usual Ordinary Least Squares (OLS) method can be applied to each equation separately. The forecasts through the VAR method are, in most cases, better compared to those obtained from more complex simultaneous equation models (Gujarati, 2004). The advantages of using a VAR model is that it can formulate its own narrative. The richness and unrestricted nature of the lag structure provides a great safeguard against various econometric problems such as cointegration and spurious correlations (Cheng, 2006).

The impulse response and variance decomposition analysis are derived after estimation of the VAR model. These can be useful tools when examining the relationships among economic variables, as is the case in this study. Impulse response functions and variance decompositions are together referred to as innovation accounting. The variance decomposition provides information about the interrelationship between the variables whereas the impulse response function traces out the time path of the impact of various shocks on the variables contained in the VAR system (Enders, 2010). These tools, therefore, allow the researcher to analyse the short run dynamic relationships between the SArepo and selected Namibia variables, thereby assessing the impact of short run shocks on said Namibia variables as well as the time taken for these shocks to impact the macroeconomy.

The impulse response functions trace out the responses of Namibia's repo rate, prime lending rate, private sector credit extension, consumer price index and gross domestic product, following changes to the SArepo which is a practical way of seeing the response of these variables to South Africa monetary policy shocks. Similar to a moving average representation

of an autoregression, a vector autoregression can also be represented as a moving average. The variables are then expressed in terms of the current and past values of the shocks. This is essentially the impulse response function, which is an essential feature of Sims's (1980) methodology. It therefore allows the researcher to trace out the path of the various shocks on the variables contained in the VAR system. The impulse response function can be represented as a moving-average as follows:

$$\begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} \bar{y} \\ \bar{z} \end{bmatrix} + \sum_{i=0}^{\infty} \begin{bmatrix} \phi_{11}(i) & \phi_{12}(i) \\ \phi_{21}(i) & \phi_{22}(i) \end{bmatrix} \begin{bmatrix} \varepsilon_{yt-i} \\ \varepsilon_{zt-i} \end{bmatrix} \quad \textbf{(5)}$$

The moving-average representation above is a very useful tool because it allows one to examine the interaction between the $\{y_t$ – Namibia CPI$\}$ and $\{z_t$ – SArepo$\}$ sequences. The coefficients of the impact multipliers (the four components,$\phi_{jk}(0)$ at present) can generate the effects of the error terms $\{\varepsilon_{yt}$ - Namibia CPI shock or innovation) and $\{\varepsilon_{zt}$ - SArepo shock or innovation$\}$ shocks on the $\{y_t$- Namibia CPI$\}$ and $\{z_t$ -SArepo$\}$ sequence's time paths. This means that a one-unit change in ε_{zt} (SArepo shock) effect on y_t (Namibia CPI) is equivalent to the coefficient of $\phi_{12}(0)$ (at present). Furthermore, $\phi_{12}(1)$ (future period), shows the effect of a unit change in ε_{zt} (SArepo) on y_{t+1} (Namibia CPI forecasted one period into the future). The four sets of coefficients, $\phi_{11}(i), \phi_{12}(i), \phi_{21}(i) and\ \phi_{12}(i)$ are termed the impulse response functions which is essentially a forecast of the impact of one variable on another into a future determined period, thereby tracing the time path of the shocks (Enders, 2010).

The impulse response function traces the response of the dependent variable in the vector autoregression system to shocks administered to one or more equations in the system for several periods into the future in this case, 12 quarters into the future. Although the utility of the impulse response function analysis has been criticised, it is the nucleus of vector autoregression analysis and has been widely used in the literature concerning monetary policy analysis (Gujarati, 2004). In terms of the impulse response functions, the results are interpreted as a one standard deviation (SD) positive shock or innovation of one variable on the rest of the variables over 12 periods. The impulse response function therefore looked at the evolution of the variable of interest along a 12-period horizon after a contractionary monetary policy shock.

The shock is an increase (positive shock) in the variable of interest, for example, an increase in the SArepo, which is a contractionary monetary policy shock, to impact on inflation at the time when the economy is overheating. This would be in the case where the inflation rate is close to the upper end of the target range of three to six percent, with a projected further increase. The repo rate would then be used to reduce the rate of inflation or bring it closer to the midpoint of the target range.

Variance decompositions help to determine the proportion of the variation in the independent variable determined by shocks to the dependent variables (Enders, 2010). For example, a one standard deviation innovation in the SArepo on the Namibia variables would tell us the proportion of shocks to the Namibia variables explained by shocks to the SArepo. This variation is recorded in the form of percentages, where, for example, the SArepo could explain 13.0 percent of the variation in the Namrepo. The percentage variation may either increase, decrease or remain consistent over the observed period. It is therefore imperative to understand the properties of the forecast errors when uncovering the interrelationships among the variables in the system (Enders, 2010). The focus of the VAR model results in this study was on the variance decomposition and the impulse response functions.

5.4 Conclusion

After explaining the relevant theories (in Chapter 3) and the discussion of the empirical literature (in Chapter 4), this chapter outlined the methods and procedures appropriate to achieve the objectives of this study and produce the results for the next chapter. Section 5.2 discussed the data as well as the ADF and the KPSS tests of stationarity that were used to determine the order of integration of the variables discussed in the previous sub-section. Section 5.3 discussed the VAR model used to determine the nature and magnitude of the effect of South Africa monetary policy actions on economic activity in Namibia as well as the short-term inter-relationships between the variables as estimated by the variance decompositions and impulse response functions. The following chapter, Chapter 6, presents the empirical findings obtained using the above-mentioned methods and procedures.

CHAPTER 6: EMPIRICAL RESULTS

6.1 Introduction

This chapter presents the empirical results and findings of this study. The MPTM theory, under the credit channel, states that a contractionary monetary policy stance (increase in the repo rate) ultimately leads to a decrease in both inflation and output. The empirical literature concerning the impact of South Africa monetary policy on the macroeconomy in Namibia is very limited which therefore necessitated this study and the importance of further research in this area of work.

The results indicated that the Namrepo is predominately explained by the SArepo, which confirmed that the Namrepo strongly follows the SArepo. The impulse response function results found that the impact of a contractionary monetary policy shock (a fall in the SArepo) lasted for up to six quarters before the effect started to fade. The Namrepo exhibited a positive response to an increase in the SArepo, although the magnitude of the response started to fade after the third quarter. With regard to inflation and output, the study found that a contractionary monetary policy shock initiated in South Africa resulted in an increase in inflation and a decline in output in Namibia. A domestic contractionary monetary policy shock resulted in both a decline in inflation and output. The results reflected that a contractionary monetary policy shock from South Africa was more effective with regard to its impact on output (GDP) however; a domestic monetary policy shock was more effective at impacting on domestic inflation compared to the impact from South Africa.

The chapter is organised as follows: Section 6.2 discusses the data and statistical properties of each of the variables while section 6.3 presents the results of the vector autoregression model, and section 6.4 concludes the chapter.

6.2 Descriptive statistics

The data sample of this study comprised quarterly data of the South Africa repo rate (SARepo), Namibia repo rate (NamRepo), prime lending rate (PLR), private sector credit extension (PSCE), consumer price index (CPI - Inflation) and gross domestic product (GDP - output). Although Namibia joined the CMA in 1992, poor data quality as well as changes in compilation

prescriptions for the period 1992 to 2002 restricted the analysis to the period 2003Q1 to 2017Q4.

The repo rate was used to determine the monetary policy stance taken in South Africa. A decline in the repo rate represents an expansionary monetary policy stance whereas an increase in the repo rate represents a contractionary monetary policy stance. This study focused on a contractionary monetary policy shock. The PLR was used as a representation for the commercial banks' lending rates because the PLR is the reference rate that determines the interest rate given to clients while also taking into consideration their respective risk profiles. The PSCE tells us about the credit appetite of consumers and businesses alike and more so when the cost of capital changes. The PSCE has an influence on consumption and investment spending. Inflation tells us about the rate at which the prices of goods and services change and, in this case, as a result of a contractionary monetary policy shock.

Inflation is the variable of influence under the inflation targeting monetary policy framework in South Africa, and therefore by implication in Namibia as well. A stable inflation rate within a three to six percent range is therefore the ultimate goal of the SARB. The GDP variable looked at the performance of the economy at any given quarter and is the variable measuring output in the economy. The data used in this study was sourced from the SARB, BoN and the NSA. Table 6.1 below presents the summary statistics.

Table 6.1: Summary Statistics[11]

	SAREPO	NAMREPO	PLR	PSCE	CPI	GDP
Mean	7.400000	7.412500	11.65594	3.064714	5.845004	4.530700
Median	7.000000	7.000000	11.19000	3.333366	5.877170	5.352219
Maximum	13.50000	12.75000	17.50000	7.939543	11.55973	15.34077
Minimum	5.000000	5.500000	9.250000	-3.229860	1.361226	-6.090229
Std. Dev.	2.160563	1.746427	2.148131	1.823810	2.245812	4.967929
Skewness	1.154808	1.262254	0.962136	-0.670542	0.599846	-0.114121
Kurtosis	3.545198	3.961441	3.150802	4.892398	3.329612	2.545698
Jarque-Bera	14.07891	18.24379	9.313909	13.44919	3.869761	0.646212
Probability	0.000877	0.000109	0.009495	0.001201	0.144442	0.723897
Sum	444.0000	444.7500	699.3567	183.8828	350.7002	271.8420
Sum Sq. Dev.	275.4139	179.9503	272.2536	196.2507	297.5766	1456.139
Observations	60	60	60	60	60	60

(Source: Author's estimates using EViews 10)

A general observation was that most of the series displayed features of non-normality. The Jarque-Bera statistic is highly significant for the SArepo, NamRepo, PLR and PSCE, which

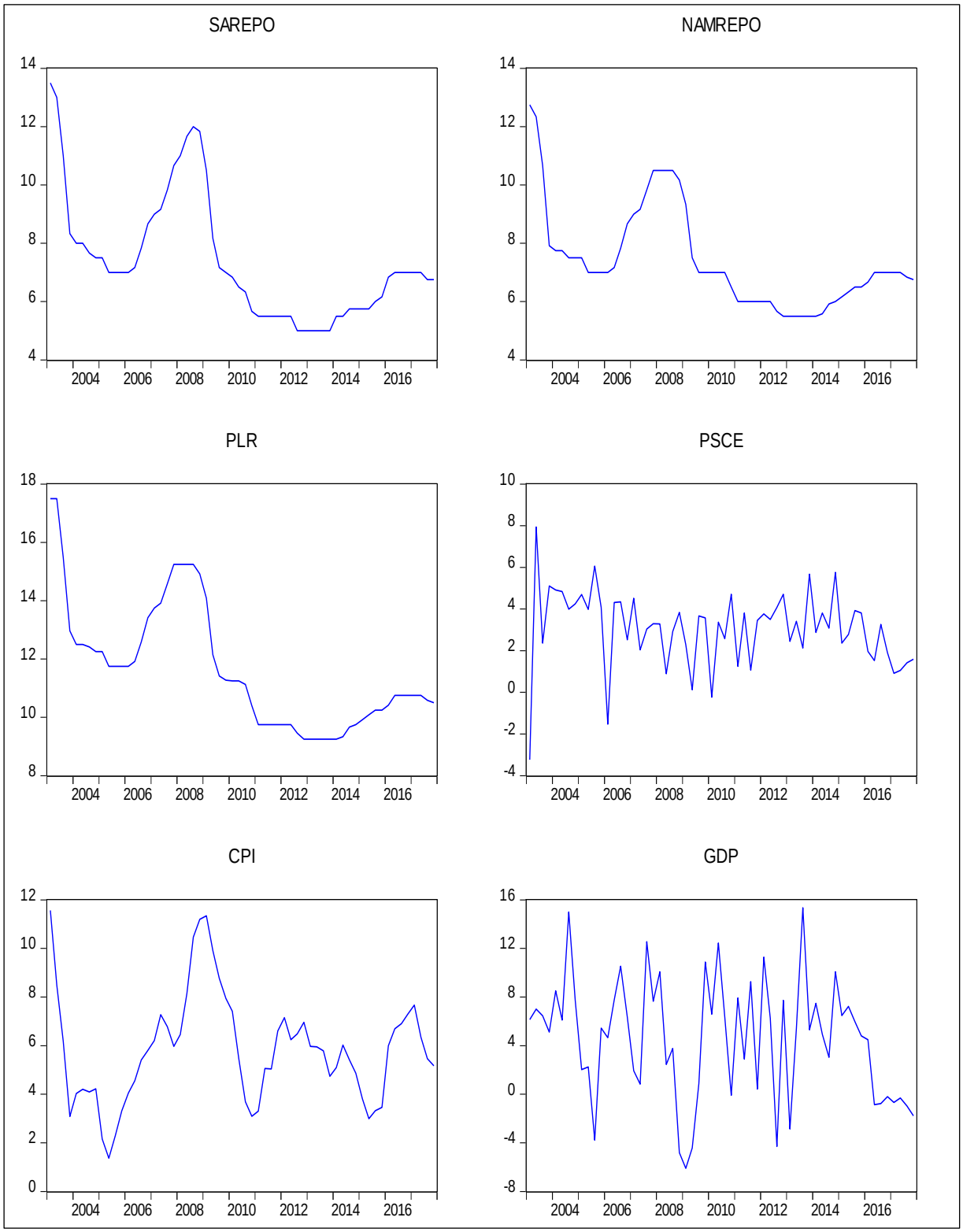
[11] The mean is the average value of the series, which is obtained by adding up the series and dividing it by the number of observations, in this case 60 observations. The median is the middle value of the series when the values are ordered from the smallest to the largest. The median is less sensitive to outliers compared to the mean; this is because the median is a robust measure of the centre of the distribution. The min and max are the minimum and maximum values of the series in the current sample. The standard deviation is a measure of spread in the series. The skewness is essentially a measure of asymmetry of the distribution of the series around the mean. A normal symmetric distribution has a skewness of zero whereas a positive skewness means that the distribution has a long right tail while a negative skewness implies that the distribution has a long-left tail. The peak or flatness of the distribution of a series is measured by kurtosis. A normal distribution has a kurtosis of three whereas a kurtosis that exceeds three represents a peaked distribution relative to the normal, which is also referred to as leptokurtic. On the contrary, a kurtosis of less than three is indicative of a flat distribution relative to normal and is referred to is platykurtic. The Jarque-Bera test is used for testing whether a series is normally distributed or not. This test statistic measures the difference of the skewness and kurtosis of the series with those from the normal distribution. The null hypothesis is a normal distribution (Gujarati, 2004).

means that the null hypothesis of normality for these four series has been rejected. CPI and GDP's Jarque-Bera statistic is not statistically significant which means that we fail to reject the null hypothesis for these two variables and conclude that their series are normally distributed.

All the series exhibit excess kurtosis. The SArepo and the Namrepo are positively skewed with excess positive kurtosis which means that the series is leptokurtic, with a long right tail. The distribution of the PLR shows little positive skewness (below one), however kurtosis is above three which implies that the series is leptokurtic. The PSCE also exhibits excess kurtosis, implying again that the series is leptokurtic; however, there is evidence of negative skewness in the distribution of the series which means that the distribution of the series has a long-left tail. The distribution of CPI shows very little positive skewness (it is almost symmetrical), but there is excess positive kurtosis which implies that the series is leptokurtic. The distribution of GDP shows evidence of negative skewness which means that the distribution of the series has a long-left tail. GDP also exhibits kurtosis below three which implies that the series is platykurtic.

The graphs of each series are presented in Figure 6.1. The SArepo, Namrepo and PLR graphs look similar and follow a downward trend over the observed period. The PSCE graph shows that the series appears to oscillate all through the observed period, but, on balance, it remained positive. The CPI series also tends to oscillate, though less frequently when compared to the PSCE series. GDP, on the other hand, oscillates more frequently, reaching both positive and negative values. The series appears to be characterised by a stochastic trend; while graphical analysis is useful, it is more appropriate to conduct formal unit root tests to assess the time series behaviour of each of the series.

Figure 6.1: Graphical presentation of the variables over the sample period (2003Q1-2017Q4)



(Source: Author's estimates using EViews 10)

6.3 Results

6.3.1 Unit root tests

The Augmented Dicky-Fuller (ADF) stationarity test results are presented in Table 6.2 below. The null hypothesis of the ADF stationarity test assumes that the series is non-stationary, whereas the alternative hypothesis assumes that the series is stationary. A rule of thumb for the ADF unit root test is that, when the absolute value of the t-statistic is greater than the critical values, then the null hypothesis of non-stationarity is rejected. The ADF stationarity test results indicate that all the variables are stationary at level terms. This means that we reject the null hypothesis of a unit root for every variable.

Table 6.2: ADF Stationarity Test

Variables	**Test Statistic**	**Critical Value**	**P-value**	**Order of Integration**
South Africa Repo Rate	-3.407903	-2.912631	0.0146**	I(0)
Namibia Repo Rate	-3.572010	-3.548208	0.0094***	I(0)
Prime Lending Rate	-3.455633	-2.912631	0.0129**	I(0)
Private Sector Credit Extension	-9.818288	-3.546099	0.0000***	I(0)
Inflation (CPI)	-3.312538	-2.912631	0.0188**	I(0)
Output (GDP)	-5.473144	-3.546099	0.0000***	I(0)
Notes: Null Hypothesis: Series is non-stationary Lag length: Automatic selection (Schwarz Info Criterion) MacKinnon (1996) one-sided p-values.				
* Indicates significance at the 10% level ** Indicates significance at the 5% level ***Indicates significance at the 1% level				

(Source: Author's estimates using EViews 10)

The result of the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) stationarity test are presented in Table 6.3 below. The null hypothesis for the KPSS test assumes the opposite to the ADF stationarity test. It assumes that the series is stationary. The alternative hypothesis assumes that

the series is non-stationary. A rule of thumb for the KPSS unit root test is that when the absolute value of the LM-statistic is smaller than the critical value, then we fail to reject the null hypothesis. The results indicate that all the variables are stationary, meaning that we fail to reject the null hypothesis for every variable. The result for both the ADF and KPSS stationarity tests were the same and therefore appropriate to include in the VAR estimations.

Table 6.3: KPSS Stationarity Test

Variables	**LM - Statistic**	**Critical Value**	**Order of Integration**
South Africa Repo Rate	0.548185***	0.739000	I(0)
Namibia Repo Rate	0.583067***	0.739000	I(0)
Prime Lending Rate	0.714760***	0.739000	I(0)
Private Sector Credit Extension	0.267689***	0.739000	I(0)
Inflation	0.081227***	0.739000	I(0)
Output	0.196763***	0.739000	I(0)
Notes: Null Hypothesis: Series is stationary Automatic bandwidth selection: Newey-West Bandwidth			
* Indicates significance at the 10% level ** Indicates significance at the 5% level ***Indicates significance at the 1% level			

(Source: Author's estimates using EViews 10)

6.3.2 Vector Autoregression (VAR) Model Results

This section focuses on the VAR model results of a South Africa contractionary monetary policy shock (increase in the repo rate) on the following Namibia variables: repo rate (NamRepo), prime lending rate (PLR), private sector credit extension (PSCE), consumer price index (CPI) and gross domestic product (GDP). Secondly, the results will also discuss the variance decomposition and impulse responses that will capture the effect of a South Africa monetary policy shock on the said Namibia variables. The results of the VAR model were examined by looking at the nature and significance of the response to a change in the variable of interest on the other variables at the various lags. A lag length of five was determined by the

Akaike, Schwarz and Hannan-Quinn information criterions. The VAR results can be found in Table A7 in the Appendix.

A significant negative response to an increase in the SArepo was observed for the SArepo, Namrepo and PSCE in the 2nd lag. The Namrepo, however, recorded a significant negative relationship with PSCE in the 1st lag, and a positive significant relationship with PSCE in the 5th lag. A significant negative relationship was evident between the Namrepo and GDP in the 3rd lag. The PLR had a significant positive relationship with PSCE in the 1st lag and a significant negative relationship with the SArepo in the 5th lag. PSCE exhibited a significant positive relationship with GDP in the 4th lag. However, PSCE had a significant negative relationship with itself in the 1st and 2nd lags. PSCE experienced another significant negative relationship, however, with the SArepo in the 2nd lag. CPI exhibited five significant relationships, three positive and two negatives. The positive relationships were with itself in the 2nd lag and with PSCE in the 2nd, 3rd, 4th and 5th lags. The negative relationship was with GDP in the 4th lag. The focus of the VAR model results was more on the variance decomposition and the impulse response functions, to which we turn next[12].

6.3.2.1 The South Africa Repurchase Rate (SArepo)

Variance Decomposition

The variance decomposition of the SArepo is presented in Table 6.4 below. The results show that the variation in the SArepo is mainly explained by itself, to an extent of 100.00 percent in the first quarter. Although its ability to explain its own variation diminishes as one goes further along the period observed, it still remained the main variable able to explain its own variation. At the end of the 4th quarter, the results showed that the Namrepo as well as the CPI are able to explain the variation in the SArepo rate at 4.46 percent and 5.32 percent, respectively. The ability of the Namrepo to explain the variation in the SArepo increased to 15.03 percent in the 8th quarter and 14.38 percent in the 12th quarter. The PLR as well as GDP's ability to explain the variation in the SArepo increased to 5.20 percent and 2.90 percent in the last quarter observed. PSCE, however, remained below 1.00 percent over the 12 periods observed.

[12] The results of the variance decomposition and the impulse response functions are rounded off to two decimal places.

Table 6.4 Variance Decomposition of the SArepo

Period	S. E[13]	SArepo	Namrepo	PLR	PSCE	CPI	GDP
1	0.337387	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.606010	97.73242	0.143661	0.036053	0.000206	1.998837	0.088821
3	0.828392	93.21243	0.609735	0.026683	0.264844	5.679618	0.206692
4	0.992887	89.85924	4.461298	0.027326	0.188762	5.319337	0.144035
5	1.181681	84.38170	10.16165	0.369720	0.255159	4.516488	0.315282
6	1.364409	80.11665	13.47915	1.305999	0.450798	3.736822	0.910578
7	1.498106	77.43051	14.81048	1.977963	0.495954	3.201853	2.083244
8	1.564232	76.24485	15.03101	2.475200	0.633655	3.060271	2.555012
9	1.598369	75.63312	14.84497	3.202703	0.765603	3.095029	2.458579
10	1.616031	74.99054	14.70037	3.890887	0.834751	3.124215	2.459230
11	1.628492	74.01382	14.66787	4.523834	0.824212	3.221935	2.748331
12	1.646980	72.36607	14.38215	5.204485	0.850793	4.294265	2.902243

(Source: Author's estimations using EViews10)

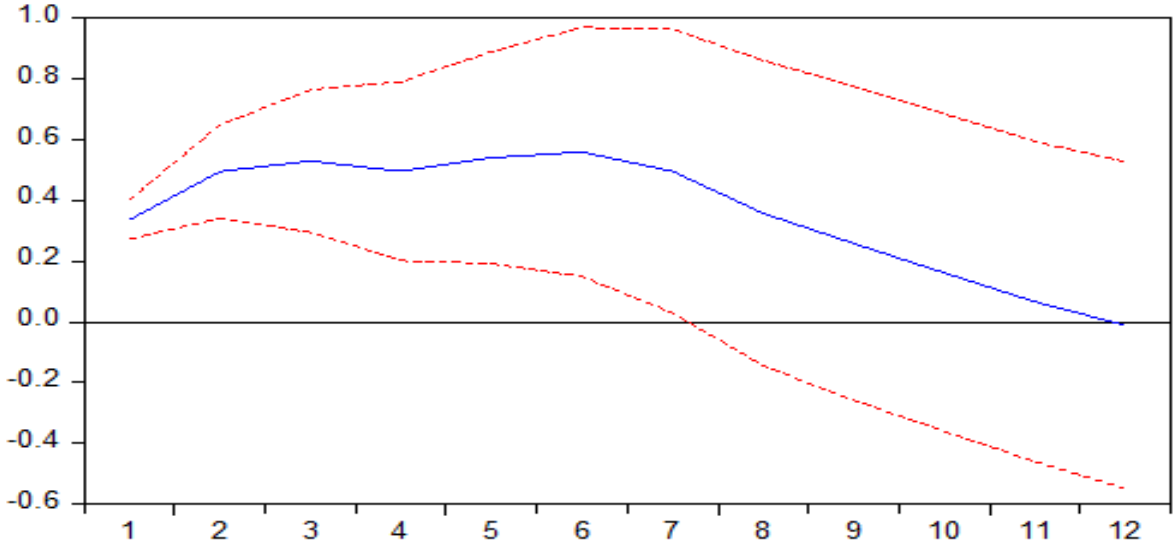
Ultimately, the SArepo tends to explain its own variation. This confirms that the SArepo is determined by the performance of the South Africa economy as well as the performance of the indicators in the economy that contribute toward the SARB MPC decision making. According to the Bank of Namibia (2018), the Namrepo strongly follows the SArepo. Given that Namibia has surrendered monetary policy independence to the anchor country of the CMA, South Africa, monetary policy in Namibia is essentially decided by and influenced by the SARB MPC. Monetary policy decisions taken by the SARB MPC may or may not be what Namibia needs at any given time as outlined by Alweendo (1999) and the Bank of Namibia (2018). The benefits of CMA membership outweigh the costs; therefore, Namibia continues her membership in the CMA, which means limited monetary policy discretion for Namibia.

[13] S.E stands for Standard Error.

Impulse response of the SArepo

The impulse response of the SArepo to a SARB contractionary monetary policy shock, is presented in Figure 6.2 below.

Figure 6.2: Impulse response of SArepo to a South Africa contractionary monetary policy shock.



(Source: Author's estimation using EViews10)

The response of the SArepo as a result of a one standard deviation innovation of the SArepo, is positive up until the 12th quarter, but the magnitude starts to slow toward the end of the 6th quarter. The historical performance of the SArepo showed that a monetary policy shock is usually 25 basis points at a time (be it contractionary or expansionary). The positive response starts to slow after the 6th quarter, falling to a zero response in the 12th quarter. This means that the impact of an increase in the SArepo, on itself, is expected to last for up to six quarters before the effect starts to fade.

6.3.2.2 The Namibia Repurchase Rate (Namrepo)

Variance Decomposition

The variance decomposition of the Namrepo is presented in Table 6.5 below. As per *a priori* expectation, the variation in the Namrepo is predominantly explained by the SArepo, to an extent of 85.32 percent in the first quarter of the 12 quarters observed. The variation in the Namrepo is explained by the SArepo to an extent of 81.63 percent in the 4th quarter, 72.99

percent in the 8th quarter and 67.43 percent in the 12th quarter. During the 1st quarter, the variation in the Namrepo is only explained by the SArepo and the Namrepo, with the rest of the variables coming in from the 2nd quarter onward. The PLR explains the variation in the Namrepo by 5.64 percent in the 12th quarter. PSCE's ability to explain the variation in the Namrepo remained below 1.00 percent during the period observed, with its highest at 0.73 percent in the 12th quarter.

Table 6.5: Variance Decomposition of the Namrepo

Period	S. E	SArepo	Namrepo	PLR	PSCE	CPI	GDP
1	0.284416	85.31980	14.68020	0.000000	0.000000	0.000000	0.000000
2	0.542419	89.26812	7.989702	1.60E-05	0.041174	2.490360	0.210628
3	0.745365	84.92106	7.747327	0.022843	0.094720	7.074043	0.140006
4	0.879060	81.63184	9.667961	0.085368	0.208759	8.200985	0.205089
5	0.996912	78.22085	13.01747	0.143021	0.484339	7.896798	0.237530
6	1.099043	75.59284	15.05440	0.695342	0.552698	7.338797	0.765923
7	1.162298	73.65367	16.20267	1.255884	0.558310	6.595977	1.733497
8	1.193168	72.98937	16.08319	1.836430	0.573326	6.264788	2.252895
9	1.206984	72.58079	15.76136	2.683649	0.593735	6.148406	2.232056
10	1.217260	71.79937	15.54288	3.637309	0.589343	6.197422	2.233679
11	1.232004	70.14311	15.29695	4.563304	0.645945	7.010597	2.340100
12	1.256587	67.42852	14.77389	5.642254	0.734760	9.018818	2.401750

(Source: Author's estimations using EViews10)

CPI and GDP's ability to explain the variation in the Namrepo increased gradually over the 12 quarters observed, with CPI performing a lot better when compared to GDP. This could be attributed to the fact that the South Africa monetary policy framework takes an inflation targeting approach and therefore the same is true for Namibia. Since the aim is to keep inflation within the three to six percent target band, one would expect inflation to contribute more to the variation of the Namrepo when compared to the other variables observed, with the exception of itself and the SArepo. The CPI, for example, was able to explain the variation in the Namrepo to an extent of 9.02 percent during the 12th quarter, from 7.01 percent in the 11th quarter. GDP marginally explained the variation in the NamRepo at 0.21 percent in the 4th quarter, increasing to 2.25 percent in the 8th quarter while further increasing to 2.40 percent in the 12th quarter.

The SArepo explained the variation in the Namrepo the most, ranging from 85.32 percent in the 1st quarter to 67.43 percent in the 12th quarter. This is explained by the interest rate pass-through between South Africa and Namibia. Tai, *et al*. (2012) defined interest rate pass-through as the degree and speed of monetary policy changes through the repurchase or market interest rates into the retail banking rates. However, in this case, it was the degree and speed at which monetary policy changes made in South Africa, through the repo rate, were passed through to the Namrepo and ultimately to the PLR. The interest rate pass-through between South Africa and the rest of the CMA countries (by implication between South Africa and Namibia) is homogeneous and almost immediate (Sander and Kleimeier, 2006). Aziakpono (2005) postulated that this is in line with findings that support the South Africa dominance hypothesis concerning policy convergence. According to the Bank of Namibia (2018) the Namrepo strongly follows the SArepo. Ikhide and Uanguta (2010) found that the SArepo was the relevant policy instrument for the LNS economies as opposed to their respective central bank rates and the findings in this thesis confirm the findings of Ikhide and Uanguta (2010).

Even though the BoN has discretionary powers to maintain the repo rate different from the repo rate in South Africa, if and when needed, it does not do so indefinitely. This is shown in Figure 3.2 in section 3.4.1. The BoN is able to control domestically induced inflation through its monetary policy discretion. However, Namibia also imports inflation from South Africa who is her main trading partner. According to the BoN monetary policy statements, maintaining the exchange rate peg in the interest of economic growth is the main objective of monetary policy in Namibia (Bank of Namibia, 2008 and 2019). This means that domestic economic developments are of lesser importance and therefore do not carry a significant weight in terms of explaining the variation in the Namrepo.

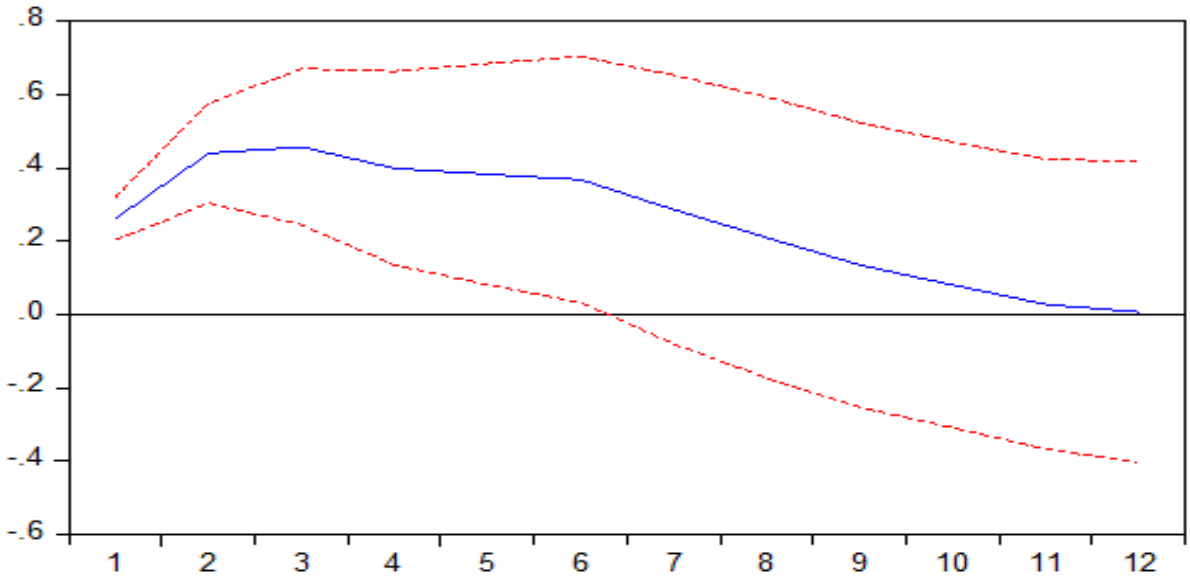
Impulse response of the Namrepo to a South Africa contractionary monetary policy shock

The impulse response of the Namrepo to a South Africa contractionary monetary policy shock is presented in Figure 6.3 below. The response is similar to that of the SArepo to a contractionary monetary policy shock on itself, however the magnitude of the impact starts to fade as from the 3rd quarter, three quarters earlier than in Figure 6.2. An increase in the SArepo which was then passed through to the Namrepo led to an initial steep positive response in the first two quarters, followed by a positive response toward the end of the 2nd and 3rd quarters respectively. The initial positive response was more than 0.20 percent but less than 0.40

percent. Although the positive response improved to more than 0.40 percent but less than 0.60 percent in the 2nd, 3rd and 4th quarters, it reverted back to the 0.20 percent to 0.40 percent range before reaching a zero response in the 12th quarter.

It could be argued that the reason the impulse response of the Namrepo faded out faster compared to the SArepo is that monetary policy decisions at the SARB serve as a signal for Namibia and therefore economic agents already start adjusting their activity in anticipation for a similar monetary policy decision by the BoN (Kamati, 2014). As a result, by the time a similar monetary policy decision is taken in Namibia, businesses and households would have already responded to the SA monetary policy shock, thus it fades out sooner when the shock is domestically administered.

Figure 6.3: Impulse response of Namrepo to a South Africa contractionary monetary policy shock



(Source: Author's estimation using EViews10)

6.3.2.3 The Namibia Prime Lending Rate (PLR)

Variance Decomposition

The variance decomposition of the PLR is presented in Table 6.6 below. The variation in the PLR is predominately explained by the SArepo to the extent of 84.76 percent in the 1st quarter with the Namrepo explaining only 12.99 percent of the variation in the PLR during the same

period. The dominance of the SArepo in explaining the variation in the PLR is expected because any changes to the Namrepo are passed through immediately to the PLR, so if the variation in the Namrepo is predominately explained by the SArepo then the same could possibly hold true for the PLR. Collectively, PSCE, CPI and GDP explain about 10.00 percent of the variation in the PLR in the 12th quarter, with all three variables increasing in magnitude over the observed quarters. Although the ability of the SArepo to explain the PLR diminishes with time, it still remained the dominant variable in terms of explaining the variation in the PLR to the extent of 66.41 percent in the 12th quarter. The Namrepo, on the other hand, explains 13.08 percent of the variation in PLR during the 12th quarter.

Table 6.6: Variance Decomposition of the PLR

Period	S.E.	SArepo	Namrepo	PLR	PSCE	CPI	GDP
1	0.294567	84.76016	12.98545	2.254391	0.000000	0.000000	0.000000
2	0.573359	89.99943	6.796037	1.243026	0.000358	1.867763	0.093384
3	0.794103	87.25515	6.176819	0.782407	0.012689	5.712063	0.060874
4	0.935000	84.75198	7.441831	0.612616	0.228036	6.802562	0.162972
5	1.060459	80.93786	10.77849	0.940394	0.570194	6.555190	0.217875
6	1.176946	77.29742	13.13104	2.124494	0.717882	5.943059	0.786102
7	1.257388	74.59250	14.38638	3.365027	0.773209	5.210504	1.672380
8	1.302437	73.41590	14.27070	4.522175	0.822530	4.871330	2.097358
9	1.325137	72.54747	13.89899	5.908763	0.873290	4.731298	2.040188
10	1.342217	71.29123	13.67696	7.374847	0.854769	4.720485	2.081711
11	1.362187	69.31086	13.50211	8.778922	0.837156	5.287192	2.283753
12	1.391654	66.41404	13.07547	10.28795	0.828483	6.941898	2.452166

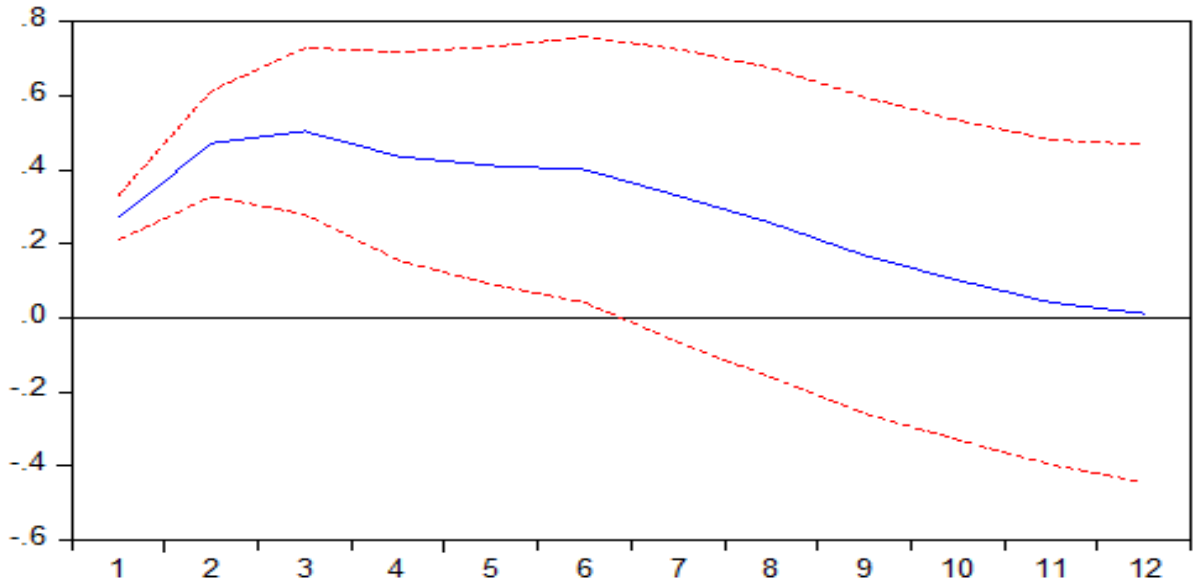
(Source: Author's estimates using EViews 10)

Impulse response of the PLR to a South Africa contractionary monetary policy shock

The impulse response of the PLR to a SArepo contractionary monetary policy shock is presented in Figure 6.4 below. The first two quarters exhibit a positive response before slowing and gradually fading out by the 12th quarter. The positive response of the PLR to an increase in the SArepo starts to fade out at the same time for both the Namrepo and the PLR. Further, this response is a lot sooner than the response of the SArepo to an increase in itself. However, the similarities in the impulse response functions of the Namrepo and PLR were expected

because the PLR follows the performance of the Namrepo as depicted in Figure 3.3 in section 3.4.1 in Chapter 3.

Figure 6.4: Impulse response of PLR to a South Africa contractionary monetary policy shock



(Source: Author's estimation using EViews10)

The PLR and the NamRepo appear to have the same response to a contractionary monetary policy shock from South Africa. This is because any changes to the Namrepo are immediately passed through to the market interest rates in Namibia. The market interest rates are the interest rates at which the commercial banks and other financial institutions do business with the public. The PLR is therefore used to determine the rate of interest charged for households and businesses while also taking into consideration their respective risk profiles. The PLR through the market interest rates therefore has an impact on asset prices, domestic economic expectations and ultimately on domestic demand and inflation, as outlined in section 3.3 of Chapter 3.

The market interest rates are vital in maintaining the exchange rate peg with South Africa because any significant differences in interest rates between the two countries would lead to either an inflow or an outflow of foreign reserves for Namibia. It is therefore important that Namibia maintains an interest rate environment in line with the main objective of monetary policy in Namibia and the requirements of the CMA arrangement. Namibia is required to fully back her currency in circulation with foreign reserves therefore an outflow of foreign reserves could negatively affect the stock of foreign reserves in Namibia and ultimately threaten the

peg. As a result, it is not advisable indefinitely to maintain the NamRepo much different from the SArepo (Bank of Namibia, 2018).

6.3.2.4 The Namibia Private Sector Credit Extension (PSCE)

Variance Decomposition

The variance decomposition of the PSCE is presented in Table 6.7 below.

Table 6.7: Variance Decomposition of PSCE

Period	S.E.	SArepo	Namrepo	PLR	PSCE	CPI	GDP
1	0.989038	0.940607	2.761117	13.69034	82.60794	0.000000	0.000000
2	1.299891	4.471352	1.600236	8.303066	83.58290	0.821122	1.221327
3	1.500689	13.00991	9.902232	6.247565	62.73959	0.812811	7.287897
4	1.614548	12.19365	12.20473	5.414784	60.76815	3.018278	6.400401
5	1.738786	10.60934	11.52969	4.860540	55.36263	5.692218	11.94558
6	1.786345	10.06490	12.11672	4.702152	54.46997	6.840509	11.80575
7	1.916092	18.68114	10.53392	4.635988	49.15007	6.049832	10.94905
8	1.940376	19.28255	10.51427	4.730360	48.02024	5.922314	11.53027
9	2.024783	18.53768	11.46801	5.058859	47.02429	7.274158	10.63701
10	2.034305	18.99800	11.39536	5.012442	46.65863	7.302938	10.63264
11	2.067543	20.44851	11.03856	4.915677	45.17064	7.570834	10.85578
12	2.100067	21.83992	10.96464	4.835405	43.86624	7.928343	10.56545

(Source: Author's estimates using EViews 10)

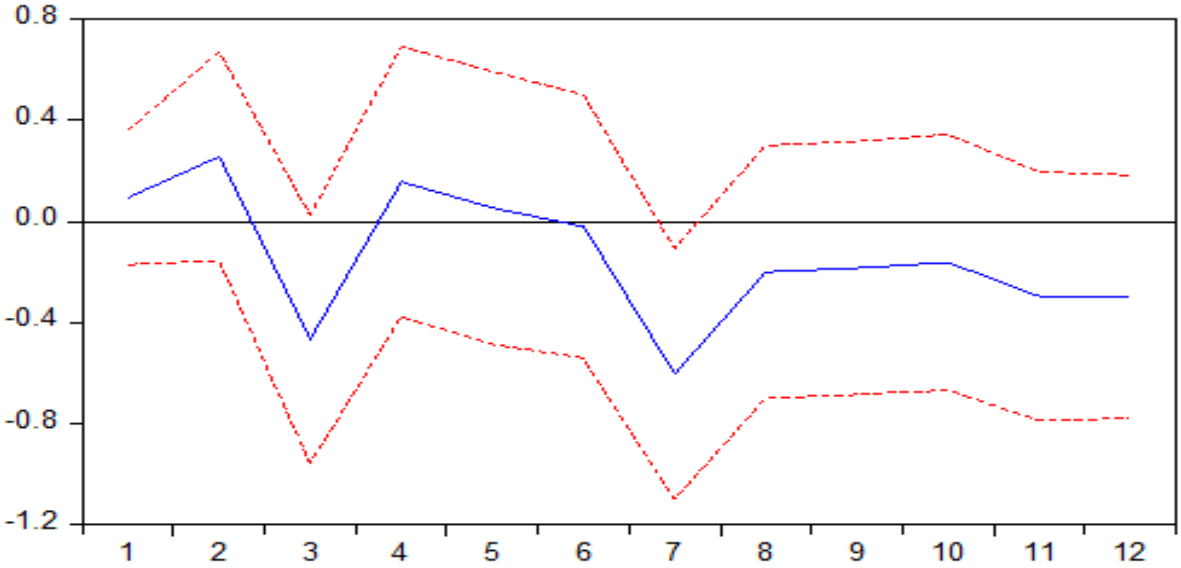
The variation in PSCE in the 1st quarter is primarily explained by itself followed by the PLR and the Namrepo at 82.61 percent, 13.69 percent and 2.76 percent respectively. The ability of PSCE to explain its own variation diminishes significantly to 43.87 percent in the 12th quarter, however that of the Namrepo improves significantly to 10.96 percent during the same quarter. It is interesting to note that the PSCE variation is explained better by the SArepo compared to the Namrepo over the observed period, with a significant improvement in the SArepo's ability to explain the PSCE from 0.94 percent in the 1st quarter to 13.01 percent in the 3rd quarter, rising further to 21. 84 percent in the 12th quarter. This is confirmation that the SArepo is more influential compared to the Namrepo in terms of effecting a change in the PSCE in Namibia, even though the effect is transmitted via the Namrepo. The effect is not transmitted

immediately, therefore giving businesses and households time to adjust their activity. CPI and GDP did not explain much of the variation in the PSCE in the 1st quarter, but CPI and GDP proceeded to improve to 7.93 percent and 10.57 percent respectively in the 12th quarter.

Impulse response of the PSCE to a South Africa contractionary monetary policy shock

The impulse response of the PSCE to a SArepo contractionary monetary policy shock is presented in Figure 6.5 below.

Figure 6.5: Impulse response of PSCE to a South Africa contractionary monetary policy shock



(Source: Author's estimation using EViews10)

PSCE in Namibia appears to be highly responsive to a monetary policy shock from South Africa. There is a steep positive response in the first two quarters following the SArepo shock. This means that an increase in the SArepo led to an initial increase in PSCE. Since the impact on PSCE is lagged, initially PSCE is still positive. Generally, PSCE is assumed to have an inverse relationship with interest rates which means that an increase in interest rates (increase in the cost of credit) is expected to lead to a decrease in PSCE. On the contrary, a decrease in interest rates (decrease in the cost of credit) is expected to lead to an increase in the credit appetite of households and businesses and thus increase spending in the economy.

This increase (positive response) in the PSCE is only evident in the first two quarters following the South Africa contractionary monetary policy shock, at a less than 0.40 percent increase, in

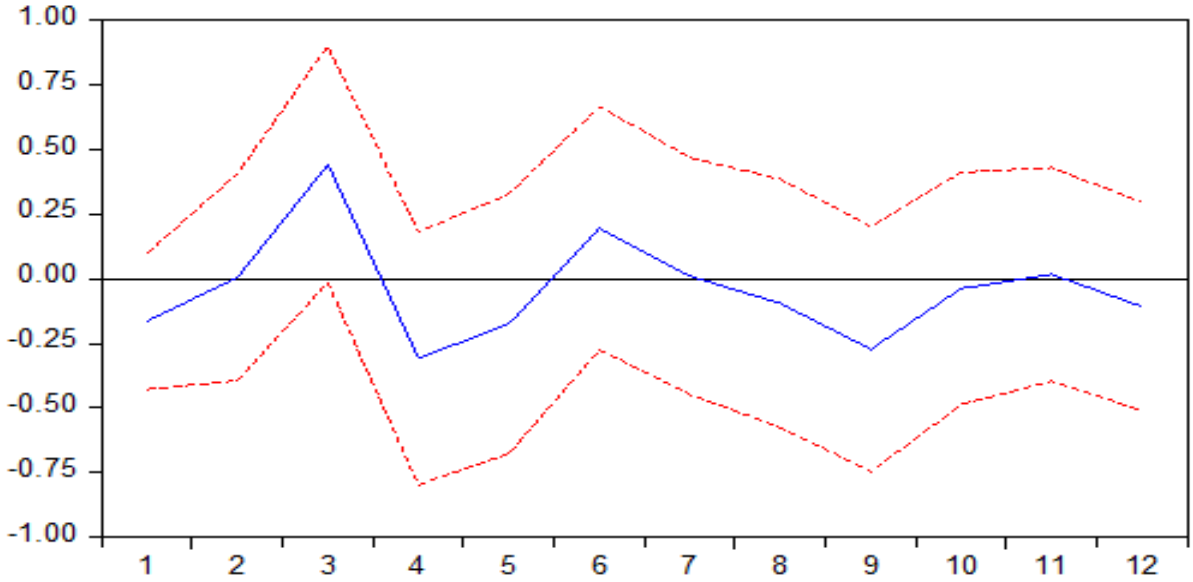
PSCE. However, this sharp positive response is followed by an even sharper negative response during the 3rd quarter with a significant negative response of less than 0.40 percent in the demand for credit in Namibia. PSCE's response to a contractionary monetary policy shock is lagged, therefore, *a priori* expectation of a fall in PSCE as a result of an increase in the SArepo is evident in the 3rd quarter. The 4th quarter has a positive response with a credit growth of less than 0.40 percent before normalizing and bottoming out in the 6th quarter. Quarters six to 12 experience a negative response which is in line with *a priori* expectation in the case of an increase in market interest rates.

The response of PSCE to a South Africa contractionary monetary policy shock was similar to Kamati's (2014) findings with an initial positive response, followed by a significant negative response and an overall significant negative response in the short run. The results were further supported by Uanguta and Ikhide's (2002) findings that a contractionary monetary policy shock in South Africa led to an overall decline in private credit (now called PSCE). A further study done by Ikhide and Uanguta (2010) also confirms the response of domestic PSCE to a South Africa contractionary monetary policy shock. Even though monetary policy in Namibia strongly follows that of South Africa, the BoN does have discretion to keep the repo rate different from that of South Africa, if and when needed. The response of PSCE to a domestic contractionary monetary policy shock is what we turn to next.

Impulse response of the PSCE to a domestic (Namibia) contractionary monetary policy shock

The impulse response of PSCE to a domestic contractionary monetary policy shock is presented in Figure 6.6 below.

Figure 6.6: Impulse response of PSCE to a domestic contractionary monetary policy shock



(Source: Author's estimations using EViews 10)

The initial response of PSCE to a Namrepo shock is negative and in line with *a priori* expectation. It is initially negative followed by a positive response in the 3rd quarter before falling sharply in the 4th and 5th quarters respectively. Another positive response is evident in the 6th quarter before PSCE normalises and bottoms out. The response of PSCE normalises and starts to fade from the 10th quarter. A one SD innovation in the Namrepo results in a less than 0.25 percent decrease in PSCE in the 4th quarter.

Although the initial negative response of PSCE to a domestic contractionary monetary policy shock was in line with *a priori* expectation, it could also be assumed that because the Namrepo follows the SArepo, the monetary policy shock was anticipated and therefore expected. Households and businesses are then assumed to align their activity in anticipation of the domestic monetary policy shock. Kamati (2014) noted that this could be explained by the link between financial institutions in South Africa and Namibia. However, this change in economic behaviour would only be the case for economic agents who are privy to what the monetary policy shock means and its potential impact on their economic activity.

When comparing the impact of a South Africa monetary policy shock on PSCE with a domestic monetary policy shock on PSCE, it can be concluded that the SArepo is more effective than the Namrepo in slowing PSCE during a time of a restrictive monetary policy approach.

However, one cannot completely ignore the signalling power of the SArepo in Namibia for potential monetary policy decisions to come.

6.3.2.5 Consumer Price Index (CPI)

Variance Decomposition

The variance decomposition of CPI is presented in Table 6.8 below. The variation in CPI is mainly explained by itself to an extent of 65.00 percent during the 1st quarter, with the SArepo contributing 15.17 percent to the variation in CPI and PSCE contributing 9.38 percent. GDP, on the other hand, did not contribute to the variation in CPI in the 1st quarter; however, GDP explains 7.27 percent of the variation in CPI in the 8th quarter and 8.58 percent in the 12th quarter. The variation in CPI is explained more by both the SArepo and Namrepo over time, with the Namrepo reaching 31.45 percent in the 12th quarter compared to 23.02 percent of the variation explained by the SArepo during the same period. The PLR's ability to explain the variation in CPI remained below 6.00 percent during the period observed.

Table 6.8: Variance Decomposition of CPI

Period	S.E.	SArepo	Namrepo	PLR	PSCE	CPI	GDP
1	0.855036	15.16193	6.219314	4.240888	9.382826	64.99504	0.000000
2	1.321090	10.37055	20.98342	3.156656	9.522895	54.78201	1.184477
3	1.512757	8.185834	24.67546	4.107356	9.912366	51.89392	1.225066
4	1.572053	7.787409	24.61086	5.373142	9.185501	51.90851	1.134587
5	1.588242	8.024802	24.24133	5.533326	9.254406	51.22491	1.721228
6	1.662273	10.34513	25.25372	5.139620	8.739789	46.83023	3.691505
7	1.794077	16.10558	26.25646	4.412193	7.542322	40.32696	5.356473
8	1.938554	20.57512	27.16331	3.781244	6.668342	34.54190	7.270091
9	2.052490	21.69841	29.93161	3.443386	6.061485	30.85858	8.006529
10	2.127145	22.47633	31.38950	3.253805	5.658412	28.87909	8.342862
11	2.156453	22.96897	31.58707	3.216579	5.505684	28.17859	8.543112
12	2.165633	23.02444	31.44740	3.279911	5.641593	28.02438	8.582280

(Source: Author's estimates using EViews 10)

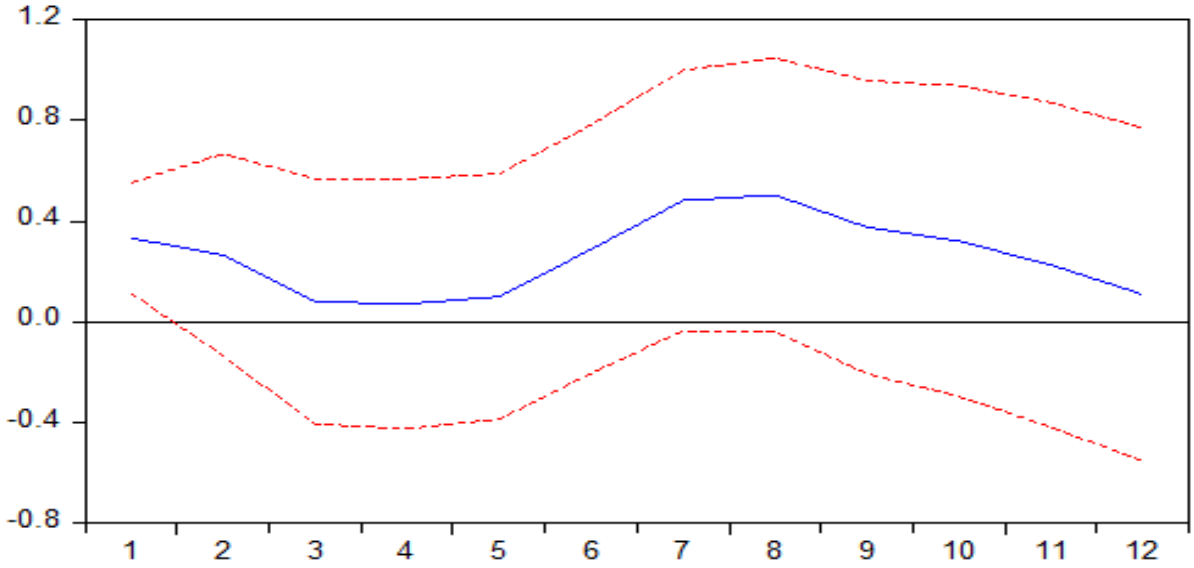
The anchor country in the CMA is South Africa and they have adopted an inflation targeting framework with a range between three to six percent. Namibia, by virtue of her CMA

membership, has therefore also adopted an inflation targeting framework by implication. The repo rate is the monetary policy tool used to influence the inflation rate and therefore impact on the economy. The magnitude by which the SArepo (23.02 percent in the 12th quarter) and Namrepo (31.45 percent in the 12th quarter) are able to explain the variation in the CPI is as expected given *a priori* expectation. Furthermore, it confirms the effectiveness of the repo rate to impact on the CPI. The effect of monetary policy on the real economy is experienced at a lag. These lags vary from country to country, which is as a result of differences in financial and legal structures among countries (Cecchetti, 1994; Loayza and Schmidt-Hebbel, 2002). The generally observed variation is between 12 and 24 months (Smal and de Jager, 2001). This lag variation translates into 4 to 8 quarters. In the above illustration, however, we observe that the ability of SArepo and NamRepo to explain the variation in CPI is still significant beyond the 4/8 quarters.

Impulse response of the CPI to a South Africa contractionary monetary policy shock

The impulse response of the CPI to a South Africa contractionary monetary policy shock, is presented in Figure 6.7 below. The response remained positive throughout the 12 quarters. Inflation initially responded positively but then declined significantly from the 2nd quarter and rose in the 5th quarter before it began a more sustained decline in the 8th quarter. The response in the first two quarters, though less than 0.40 percent, decreased in magnitude before maintaining a persistent near zero response in the 3rd, 4th and 5th quarters respectively. The positive response increased in the 6th quarter, but it remained less than 0.40 percent. The 7th and 8th quarters were characterized by a positive response of more than 0.40 percent but less than 0.80 percent.

Figure 6.7: Impulse response of CPI to a South Africa contractionary monetary policy shock



(Source: Author's estimation using EViews10)

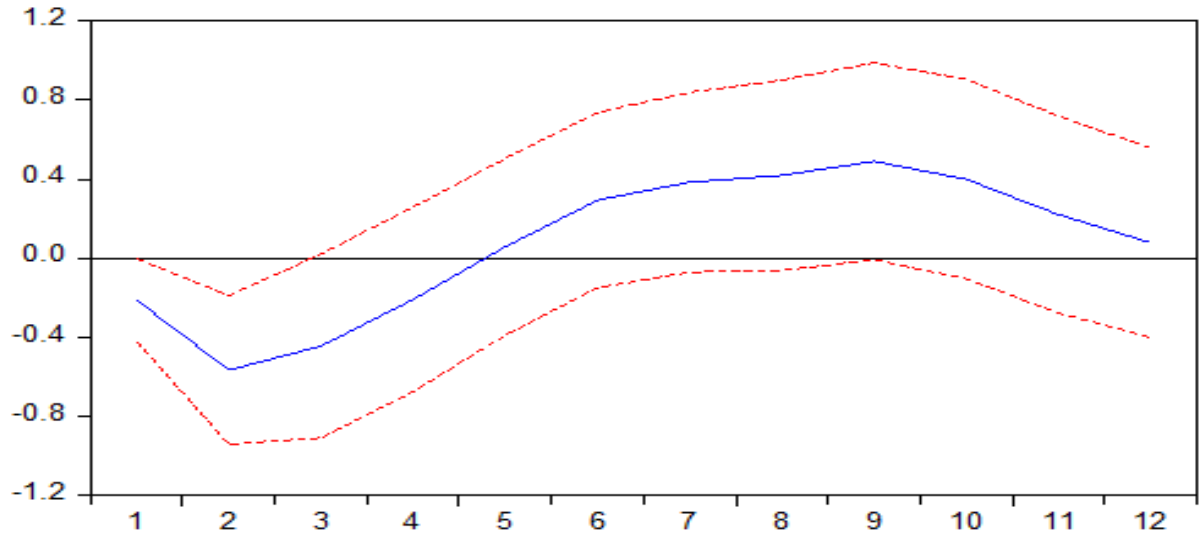
A contractionary monetary shock (a one SD innovation of SArepo, essentially an increase in the SArepo) initiated by the SARB has, for the most part, generated a less than 0.40 percent positive response in inflation in Namibia. The increase in the SArepo led to a positive response of inflation in Namibia, which means that inflation increased as a result of a contractionary monetary policy shock. However, the rate at which inflation rises is also of importance. The impulse response function shows that inflation, although initially positive, declined at a more sustained pace in the 8th quarter. This means that the rate at which prices grew, slowed. Inflation remained positive; however, the growth rate slowed which may imply a decline in inflation.

A positive response from CPI to a contractionary monetary policy shock could mean that the impact of the increased repo rate has not yet been felt in the real economy and therefore has not influenced spending patterns. This means that the impact on CPI is experienced at a lag of two quarters. Seleteng (2016) found that the impact of the repo rate increase was not felt immediately but rather at a lag. Smal and de Jager (2001) further noted that there are long lags between the change in the monetary policy stance and inflation and that lags do not only differ from country to country but that lags also differ from period to period in the same country. This may explain the more sustained decline in CPI from the 8th quarter as firms adjust their prices.

Impulse response of the CPI to a domestic contractionary monetary policy shock

The impulse response of CPI to a domestic contractionary monetary policy shock is presented in Figure 6.8 below. The initial response of CPI to a domestic contractionary monetary policy shock was negative and less than 0.80 percent. This means that a one SD innovation of Namrepo resulted in a less than 0.80 percent decline in inflation. The response remained negative up until the 4th quarter, followed by a positive response that was mostly less than 0.40 percent for the rest of the period observed. The lowest negative response was in the 2nd quarter at less than 0.80 percent whereas the highest positive response was in the 9th quarter at less than 0.80 percent. Uanguta and Ikhide (2002) and Kamati (2014) found similar results, i.e. CPI declined immediately after an unexpected contractionary monetary policy shock, which further confirmed the effectiveness of inflation targeting through its nearly immediate response from prices. A study done by Ikhide and Uanguta (2010) found that a monetary policy tightening episode led to an overall decline in CPI after an initial increase in prices which is similar to the results of a one SD innovation of the SArepo on CPI in this thesis.

Figure 6.8: Impulse response of CPI to a domestic contractionary monetary policy shock



(Source: Author's estimation using EViews10)

The positive response of domestic prices to an increase in the SArepo rate coupled with an increase in domestic CPI in the 5th to 8th quarters could be as a result of imported inflation from South Africa. South Africa is Namibia's main trading partner so price changes in South Africa also affect prices in Namibia through the fixed peg. The time period it takes South Africa exporters to increase their prices during a contractionary monetary policy environment is

essentially the lag Smal and de Jager (2001) and Seleteng (2016) referred to. Once price changes have taken effect in South Africa, they are passed through to Namibia through imports from South Africa and in turn import prices put pressure on domestic prices (Kamati, 2014).

A contractionary monetary policy shock could lead to an increase in prices as the cost of money increases and is passed on to the consumer. The increase in prices is intended to discourage spending and, in so doing, curb the rate at which prices grow by influencing the quantity demanded in the economy. The quantity supplied in the economy has to adjust to ensure market equilibrium and, as a result, slow down the rate at which prices are growing. The impulse response results indicated that the domestic contractionary monetary policy shock was more effective at meeting *a priori* expectation when compared to the contractionary monetary policy shock from South Africa.

These results were in line with Kamati's (2014) findings of an initial negative response as a result of a domestic contractionary monetary policy shock. It could be argued that, by the time prices in Namibia respond to a contractionary monetary policy shock, the exporters in South Africa have already transferred the cost of the increased repo rate to prices. Namibia does not always immediately change her repo rate to align with South Africa, as can be seen in Figure 3.2 in Chapter 3. In terms of the impact of South Africa monetary policy on prices in Namibia, all the relevant studies observed in Chapter 4 found that prices declined as a result of a South Africa contractionary monetary policy shock, with the exception of Ikhide and Uanguta (2010) who found an initial increase in prices (price puzzle) followed by a decline, as was the case for a contractionary monetary policy shock from South Africa in this thesis.

6.3.2.6 Gross Domestic Product (Output)

Variance Decomposition

The variance decomposition of GDP is presented in Table 6.9 below. The variation in GDP is primarily explained by itself to an extent of 72.14 percent in the 1st quarter, followed by the SArepo and the Namrepo at 13.78 percent and 11.96 percent respectively. There is a noticeable deterioration in GDP's ability to explain its own variation from 72.14 percent in the 1st quarter to 46.47 percent in the 2nd quarter, while CPI improved significantly from 0.01 percent in the 1st quarter to 23.07 percent in the 2nd quarter. Both the SArepo and the Namrepo continued to

improve in their ability to explain the variation in GDP, reaching 24.32 percent and 18.28 percent respectively in the 12th quarter. The PLR remained below 4.00 percent for the period observed, improving marginally over the 12 quarters to 3.11 percent in the 12th quarter.

Table 6.9: Variance Decomposition of GDP

Period	S.E.	SArepo	Namrepo	PLR	PSCE	CPI	GDP
1	3.858780	13.77817	11.96117	0.866828	1.242422	0.007624	72.14378
2	4.808944	17.92220	10.04684	1.428446	1.053839	23.07464	46.47404
3	5.038098	18.03264	12.94204	3.276149	1.057372	21.10096	43.59084
4	5.127090	17.41354	14.67747	3.295048	2.057829	20.45215	42.10396
5	5.604687	17.72486	16.58319	2.796813	3.956953	17.94149	40.99670
6	5.771956	19.93050	15.69491	3.685991	3.780508	17.57924	39.32886
7	6.006932	19.92112	18.85530	3.473134	3.626960	17.49835	36.62513
8	6.328270	21.61872	19.52721	3.159512	3.505844	16.20604	35.98267
9	6.447882	21.17834	19.58517	3.044051	3.382465	16.99897	35.81101
10	6.576328	23.73579	18.99653	3.226038	3.269080	16.34547	34.42709
11	6.683391	24.37969	18.88604	3.130396	3.425017	16.84587	33.33298
12	6.804497	24.32083	18.28220	3.114172	3.348850	16.83971	34.09424

(Source: Author's estimates using EViews 10)

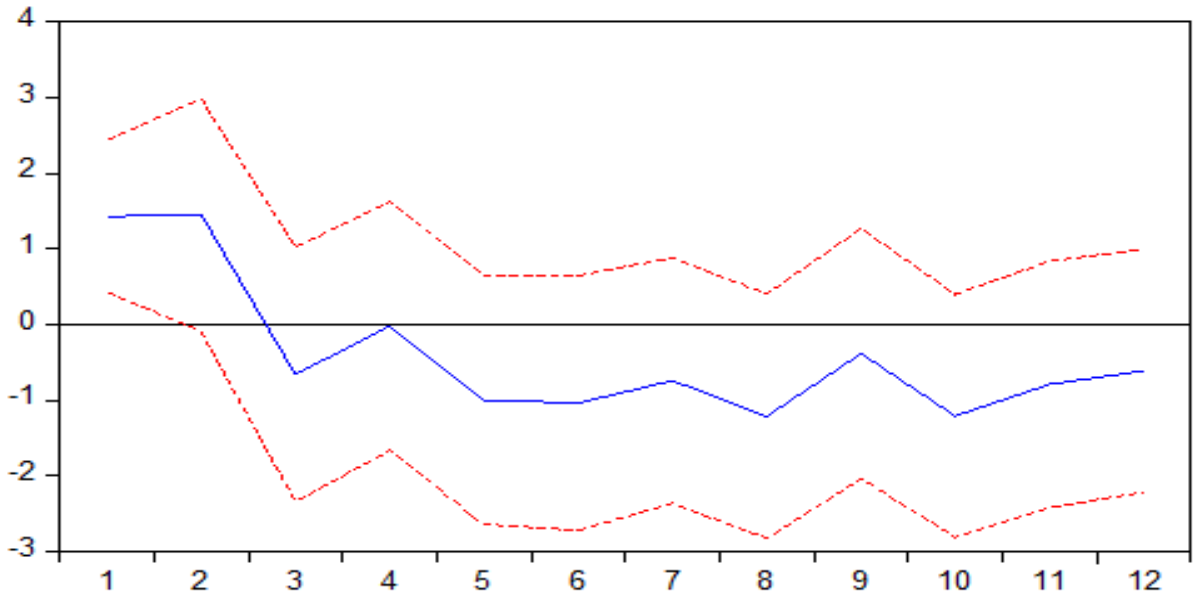
The PSCE also remained below 4.00 percent with marginal improvements in its ability to explain the variation in GDP over the 12 quarters observed. Similar to GDP, CPI also slowed in its ability to explain the variation in GDP over the 12 quarters, but the slowdown is only noticeable after the 3rd quarter. It is interesting to note that as the GDP's ability to explain its own variation diminishes over time so does that of the CPI, which implies that as output falls so does the growth rate of prices. The increased repo rate would increase cost of capital and therefore have a negative impact on the credit appetite of households and businesses, negatively affecting the aggregate supply and aggregate demand. As a result, inflation slows and output contracts.

Impulse response of the GDP to a South Africa contractionary monetary policy shock

The impulse response of GDP in Namibia to an increase in the SArepo is presented in Figure 6.9 below. The results show an initial positive response of less than 2.00 percent in the first two quarters followed by a negative response of less than 1.00 percent in in the 3rd and 4th

quarters. The response of GDP to a South Africa contractionary monetary policy shock is noticeably negative and the shock remained negative for the rest of the period observed. The results are in line with *a priori* expectation that a decline in GDP follows a contractionary monetary policy shock. Although the negative response was not immediate, the decline was evident from the 2nd quarter and most importantly this remained negative for the rest of the period.

Figure 6.9: Impulse response of GDP to a South Africa contractionary monetary policy shock



(Source: Author's estimation using EViews10)

Barran, *et al*. (1996) found similar results where GDP declined; however, the response was evident in the 1st quarter already, a quarter earlier than the response in Figure 6.9. Barran, *et al*. (1996) further noted that the maximum impact was reached between the 4th and 10th quarters for the majority of the countries observed in their study. The results in Figure 6.9 exhibited a maximum impact between the 8th and 10th quarters. In this case, the response was effective a quarter earlier and persisted for two quarters longer than what was observed by Baran, *et al*. (1996). Ramaswamy and Slok (1998), Clements, *et al.* (2002) and Binatli and Sohrabji (2018), all found that a restrictive monetary policy shock resulted in a decline in output in the euro area EMU. The empirical evidence on the impact of South Africa monetary policy on Namibia observed in this thesis shows that a South Africa contractionary monetary policy shock led to a decline in GDP (output). This was also supported by the empirical evidence in Chapter 4 with the exception of Seleteng's (2016) findings.

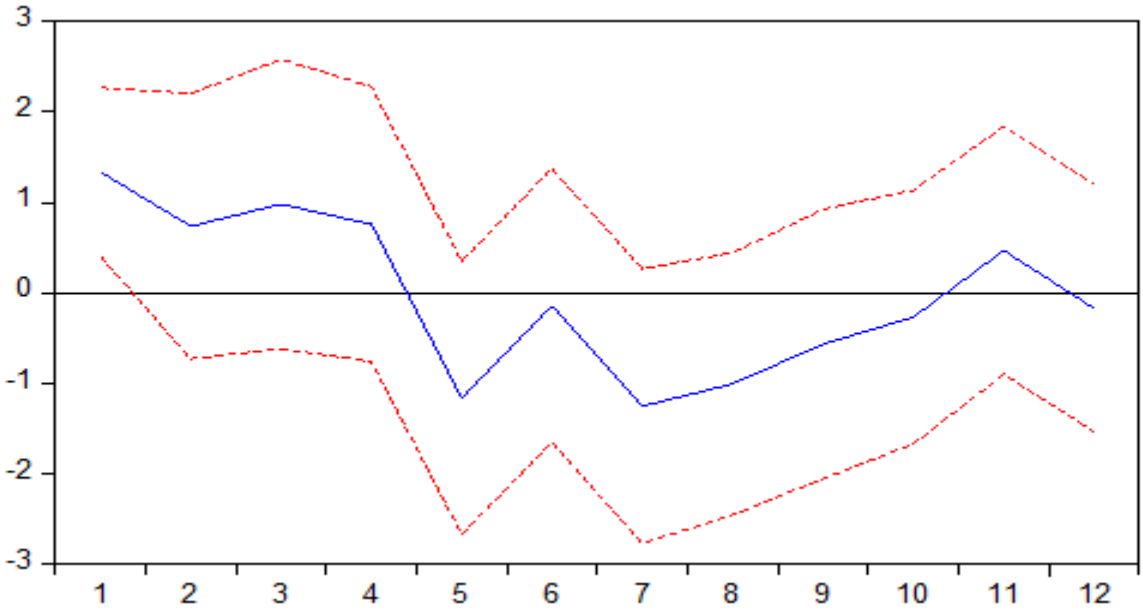
Impulse response of the GDP to a domestic contractionary monetary policy shock

The impulse response of GDP to a domestic contractionary monetary policy shock is presented in Figure 6.10. The initial response of GDP to a domestic contractionary monetary policy shock is positive during the first four quarters post shock; however, the positive response declined marginally during this period. Furthermore, this positive response was less than 2.00 percent in the 1st quarter and less than 1.00 percent in the 2nd, 3rd and 4th quarters, respectively. GDP declined drastically from the 4th quarter and the response remained negative until the 10th quarter.

A priori expectation was that an increase in the Namrepo would result in a decline in GDP (output).[14] Overall, the response of GDP to a domestic contractionary monetary policy shock only became aligned with *a priori* expectation about four quarters after the shock. The impact of monetary policy decisions on output in Namibia is therefore experienced at a lag of four quarters. The transmission of monetary policy from the repo rate to the macro economy is not instantaneous, but the lags are also not prescribed. Smal and de Jager (2001) noted that it took about 12 to 24 months for monetary policy decisions to be effective in the South Africa economy. The same might not apply to Namibia but in this case the lag did fall within that lag range.

[14] See section 3.4.2 for an outline of the transmission from market interest rates to the real economy in terms of GDP (output).

Figure 6.10: Impulse response of GDP to a domestic contractionary monetary policy shock



(Source: Author's estimation using EViews10)

The slowdown in GDP during the first four quarters (although positive and above zero), as a result of a domestic contractionary monetary policy shock, compared to a consistent positive (growth) response in the first two quarters in response to a South Africa contractionary monetary policy, suggests that economic agents in Namibia respond rapidly to changes to the South Africa monetary policy. This gradual domestic adjustment could be due to domestic expectations brought about by monetary policy changes made by the SARB, suggesting that the BoN will respond by adjusting its repo rate accordingly (Kamati, 2014). Monetary policy changes in South Africa therefore serve as an indicator to Namibian businesses and households that a similar monetary policy decision may be taken in future in Namibia. As a result, businesses and households adjust their economic activity in anticipation of higher borrowing costs, which ultimately impacts on output. However, the negative impact of a South Africa contractionary monetary policy shock on GDP, starts to take effect from the 3rd quarter up to the end of the observed period. The domestic contractionary monetary policy shock's negative impact on GDP starts to kick in from the 5th quarter until the 11th quarter. The negative impact on GDP is in line with *a prior* expectation. Again, the lagged response to the monetary policy shock is indicative of the fact that the impact of monetary policy decisions is not felt immediately in the real economy.

6.4 Conclusion

This chapter presented the empirical results and findings of this study as guided by the methods and procedures in Chapter 5. Section 6.2 discussed the descriptive statistics and observed that most of the series displayed features of non-normality and that all the series exhibited excess kurtosis. Graphical presentation of the variables was also analysed but, though useful, more appropriate formal unit root tests were done to determine the behaviour of each of the series. Section 6.3.1 looked at the unit root test results of the variables. The ADF and the KPSS stationarity test were used to determine the order of integration of the time series used in the model. All the time series were stationary in level terms and did not require any differencing. Section 6.3.2 focused on the VAR model results of a South Africa contractionary monetary policy shock on the following Namibia variables: the repo rate, prime lending rate, private sector credit extension, consumer price index and gross domestic product. The variance decomposition as well as the impulse response functions results were also discussed in this section.

The variation in the Namrepo was predominantly explained by the SArepo which means that the SArepo has a significant influence on the Namrepo. The Namrepo and the PLR had a positive response to a contractionary monetary policy shock from South Africa in the form of an increase in the SArepo, as per *a prior* expectation. PSCE had an overall negative response which was also in line with *a prior* expectation. CPI had an initial positive response, but the response's magnitude slowed over time, eventually coming in line with *a prior* expectation of a negative response. Further, GDP exhibited an overall negative response which was also in line with *a prior* expectation. Overall, the results were mostly in line with *a priori* expectation and most of the empirical literature concerning the CMA. Chapter 7, to which we turn next, concludes the study by providing an overview of the study, summary of the main results and findings as well as recommendations for future research.

CHAPTER 7: CONCLUSION

7.1 Overview

The CMA was established in 1986 when the Trilateral Monetary Agreement was signed by South Africa, Lesotho and Swaziland. Namibia joined the CMA in 1992 after gaining independence in 1990. The CMA is an asymmetric monetary union of which the LNS countries have effectively surrendered monetary policy independence to the anchor country, South Africa. The CMA has various advantages and disadvantages; the main advantage includes price stability due to the peg between the ZAR and the member state currencies. The main disadvantages include impediments to trade diversification, fluctuations in nominal and real exchange rates, lack of financial market development as well as a limited role for the BoN as the lender of last resort. The CMA, though beneficial, has also been criticized for its drawbacks that largely impact on the speed of economic development in member countries. The benefits outweigh the costs, however, the LNS countries have continued membership in the CMA. The impossible trinity theory allows a country that is part of a monetary union to enjoy two of three policy goals but not all three. These policy goals are a fixed exchange rate, monetary policy independence and financial integration (Bank of Namibia, 2008; Aizenman, 2010). Namibia therefore enjoys a fixed exchange rate and financial integration; however monetary policy independence has been surrendered to South Africa.

Monetary policy in Namibia is enforced by the BoN MPC through the repo rate. The repo rate is used to transmit monetary policy decisions onto the real economy through the MPTM (Bank of Namibia, 2008). The most important channel in Namibia is the credit channel, which influences the pricing of retail financial products with an almost immediate change to the commercial bank lending rates. The resultant change in market interest rates is accompanied by a change in investment decisions and consumption spending in the short run. This, therefore, has an impact on inflation (CPI) and output (GDP) in Namibia. However, the monetary policy stance in Namibia is influenced by the South Africa monetary policy stance as a result of the CMA arrangement.

The aim of monetary policy in Namibia is in line with the mandate of the BoN which is to ensure price stability in the interest of sustainable economic growth whilst maintaining the exchange rate peg agreement with South Africa (Bank of Namibia, 2008). The goal of this

thesis was, therefore, to examine the empirical relationship between the SArepo on the one hand and Namrepo, PLR, PSCE, CPI (inflation) and GDP (output) on the other hand.

The literature specific to Namibia is very limited and therefore necessitated the need for further research in this area. This thesis looked at empirical literature for the CMA as well as the euro area EMU since they do have similar facets that allowed for comparisons. The empirical findings observed revealed that, even though the same monetary policy stance was taken in the union or area, the impact on the macroeconomy differed from country to country as well as from period to period in the same country. Having differing results, in the magnitude of the impact, is indicative of the different financial structures in the countries observed (Barran, *et al*., 1996; Ramaswamy and Slok, 1998; Seleteng, 2016). This also highlighted that the countries may have different monetary policy needs that may not always be in line with the common monetary policy stance taken.

Overall, the empirical studies were broadly consistent with regard to the relationship between the monetary policy shock, on the one hand, and the responses of output and prices, on the other hand. The time it took for the impact to die out varied from paper to paper. The impact of a contractionary monetary policy shock on member countries in the euro area EMU led to a decline in output and a surprising increase in prices, while the impact of a South Africa contractionary (increase in SArepo) monetary policy shock on the rest of the CMA resulted in a decline in both output and prices.

This study, as with many of the empirical literature studies, used a VAR model. Quarterly time series data was used over the period 2003Q1 to 2017Q4. The data was first tested for stationarity using the ADF and KPSS stationarity test. A VAR model was used to determine the relationship between the SArepo and the Namrepo, PLR, PSCE, CPI and GDP. The VAR model allowed for an analysis of the variance decomposition as well as the impulse response functions of the model which explained the dynamic short-term relationships among the variables. The main findings of the thesis are presented in the next section.

7.2 Summary of Findings

The study aimed to determine the impact of South Africa's monetary policy on output and prices in Namibia. The monetary policy tool used by the SARB is the repo rate. The variation

in the Namrepo was predominately explained by the SArepo, but not completely. The SArepo is determined as per the needs of the South Africa economy while taking into consideration its inflation targeting monetary policy framework. Overall, the results indicated that a contractionary monetary policy shock initiated by the SARB did have some effect on output and prices in Namibia.

Kamati (2014) argued that the South Africa monetary policy serves as an indicator to Namibia of potential future monetary policy decisions that could come into effect. Expectations of businesses and households in Namibia are therefore heightened in anticipation of a similar monetary policy decision as that of South Africa. As a result, spending patterns and overall activity are adjusted in anticipation of future monetary policy changes, in this case, in anticipation of an increase in the repo rate. Therefore, by the time the restrictive monetary policy decision is taken in Namibia, the effect is less pronounced because the gradual changes in the activities of businesses and households have already started taking place. Sanders and Kleimeier (2006) noted that the interest rate pass-through between South Africa and the rest of the CMA is homogeneous and almost immediate. Note that it is not immediate but rather 'almost immediate' which allows for an adjustment in spending patterns from economic agents in anticipation of the eventual interest rate pass through (Kleimeier, 2006; Kamati, 2014). The BoN confirmed that the Namrepo strongly follows the SArepo (Bank of Namibia, 2018).

The impulse response results found that the impact of a contractionary monetary policy shock of the SArepo lasted for up to six quarters before the effect on itself starts to fade. The Namrepo exhibited a positive response as a result of an increase in the SArepo; however, the magnitude of the response started to fade after the 3rd quarter. The PLR, as a representative of market interest rates in Namibia, exhibited a positive response to an increase in the SArepo and, like the Namrepo, the effect started to fade after the 3rd quarter. The results are similar for the Namrepo and the PLR because changes to the repo rate are passed through immediately to the market interest rates. The market interest rates are vital in terms of maintaining the exchange rate peg between Namibia and South Africa because a significant difference in market interest rates in the two countries could lead to either an inflow or an outflow of reserves in Namibia. Further, this could have an impact on Namibia's stock of foreign reserves.

An increase in PSCE is experienced in the first two quarters after the SArepo increase, but this is followed by a decrease in the 3rd quarter after which the response starts to normalise back to

an increase. The initial response of PSCE to an increase in the Namrepo was a decline in the first two quarters, followed by an increase in the 3rd quarter before returning negative and normalising. *A priori* expectation was that an increase in the SArepo would result in a decline in PSCE as businesses and households' credit appetite slows due to higher costs of borrowing. This in turn would negatively impact on economic activity, leading to a decline in inflation and ultimately a decline in output as well. The response of PSCE to a contractionary monetary policy shock is more in line with *a priori* expectation when the monetary policy shock is from South Africa as opposed to when the shock is domestically initiated.

Prices (CPI) in Namibia responded positively to an increase in the SArepo, but only for the first two quarters. The response started to decline in the 3rd and 4th quarters though still remaining positive before returning to its initial level, followed by an even deeper increase in inflation during the 7th and 8th quarters. Therefore, a contractionary monetary policy shock in South Africa, for the most part of the period observed, resulted in an increase in inflation. This means that inflation responded positively (increased) when the repo rate increased. This is contrary to monetary policy theory; however, it is not peculiar to Namibia. A continuous increase in prices after a contractionary monetary policy shock is referred to as a price puzzle. The price puzzle was common in the empirical literature observed for the euro area EMU in Chapter 4. Ikhide and Uanguta (2010) also had similar results in the CMA. The rest of the studies observed with regard to the CMA all found that prices decreased as a result of a contractionary monetary policy shock from South Africa. This study therefore found that a contractionary monetary policy shock resulted in a positive response in inflation. However, inflation slowed and did not continue to increase post the shock even though it remained within positive estimates. This is in line with the findings of Ikhide and Uanguta (2010).

On the contrary, the response of inflation to a domestic increase in the repo rate was negative in the first two quarters after the shock and remained negative for two more quarters. These results are in line with *a priori* expectation. It can be concluded that the response of inflation to a domestic contractionary monetary policy shock is more effective compared to that of a South Africa contractionary monetary policy shock, even though the shock is transmitted from South Africa to Namibia through the Namrepo. As Kleimeier (2006) stated, though, the transmission is almost immediate but not immediate. One cannot eliminate the signalling power of the SArepo for potential repo rate performance in Namibia. It could be argued that price adjustments in South Africa (Namibia's main trade partner) contribute to imported

inflation. Price adjustments might not be immediate, thus imported inflation affects the Namibian economy at a lag. The rate at which exporters in South Africa adjust their prices in line with increased borrowing costs may take time and therefore the effect on the real economy might not be immediate. Kamati (2014) also found that inflation had a more pronounced response to domestic rather than South Africa contractionary monetary policy shocks.

The results for GDP showed an initial positive response in the first two quarters as a result of an increase in the SArepo. A significant negative response was experienced in the 3rd quarter which persisted for the rest of the period observed. This result is in line with *a priori* expectation. The empirical literature discussed in this study on the impact of South Africa monetary policy on Namibia all concluded that a contractionary monetary policy shock from South Africa resulted in a decline in output in Namibia, with the exception of Seleteng's (2016) findings. The response of GDP to a domestic contractionary monetary policy shock started off positive, but the response declined gradually over the observed period, eventually reaching negative responses. Overall, GDP declined as a result of a restrictive monetary policy shock be it from South Africa or Namibia.

In summary, the study found that a contractionary monetary policy shock from South Africa, through an increase in the repo rate, led to an initial increase in prices, which was followed by a decline in prices. Overall, an increase in the South Africa repo rate resulted in an increase in inflation. Output (GDP) declined as a result of a contractionary monetary policy shock to the South Africa repo rate. The impact of a contractionary monetary policy shock on prices and output in Namibia is an increase in prices and a decline in output.

It was interesting to note that a Namibia (domestic) contractionary monetary policy shock produced a negative response for prices while GDP exhibited a positive response in the first four quarters of the period observed. It appears that a domestic contractionary monetary policy shock is more effective in terms of the results for inflation whereas GDP had a more effective response when the shock was from South Africa.

7.3 Limitations, Recommendations and Future Research Areas

7.3.1 Limitations

Namibia joined the CMA in 1992, as such a data period starting 1992 would have been ideal, however, poor data quality led to the sample period starting 2003. Although the data was available, the frequency was annual and not quarterly. Converting the data from a lower (annual) frequency to a higher (quarterly) frequency would have distorted the data, the results and the overall findings of the study and further taking away from the accuracy for the study. South Africa formally adopted the inflation targeting framework on 23 February 2000. It would have been interesting to determining whether there is a difference between pre and post inflation targeting monetary policy shocks from South Africa on the macroeconomy in Namibia, however the data limitations hampered such an analysis.

7.3.2 Recommendations

The study recommends that the central banks of the smaller CMA countries improve on their data quality and availability in order to encourage more detailed research on the impact of the South Africa monetary policy on their respective macroeconomic environments. The results from these studies will give policy makers a better understanding regarding the magnitude of the impact while also identifying potential policy needs.

Monetary policy within the CMA is determined by the anchor country, South Africa, while the member countries enjoy a fixed exchange rate regime as well as a free flow of capital, as per the impossible trinity. Although the member countries enjoy a fixed exchange rate, it does not enjoy exchange rate stability because the ZAR is subject to volatility. It is therefore recommended that the member countries factor in exchange rate volatility because it has an impact on international trade, debt acquisition and repayment as well as foreign direct investment from outside the CMA. These disturbances could have a much stronger impact on the performance of the macroeconomy of the respective CMA countries.

In addition, it is further recommended that the expectations channel of monetary policy transmission be emphasized more because it plays an important role given the almost immediate transmission of monetary policy shocks from South Africa to the rest of the CMA. The period between the South Africa monetary policy shock and its transmission to the member

countries is where expectations are formed by both households and firms, thus influencing their economic activity prior to the realisation of the monetary policy shock domestically.

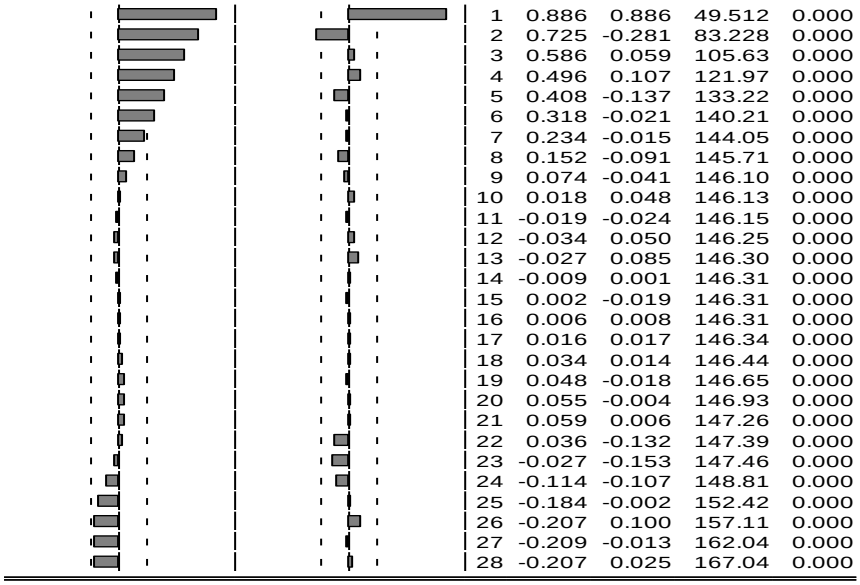
7.3.3 Future Research Areas

It may also be insightful to analyse the asset price and interest rate monetary policy transmission mechanism channels for Namibia, to further determine the nature and strength of the relationships between the variables and the impact on output and price stability. This research would therefore allow for a comparison of the results as well as the effectiveness of the various channels in Namibia.

APPENDIX

Table A1: Correlogram of South Africa Repo Rate

Sample: 1 60
Included observations: 60

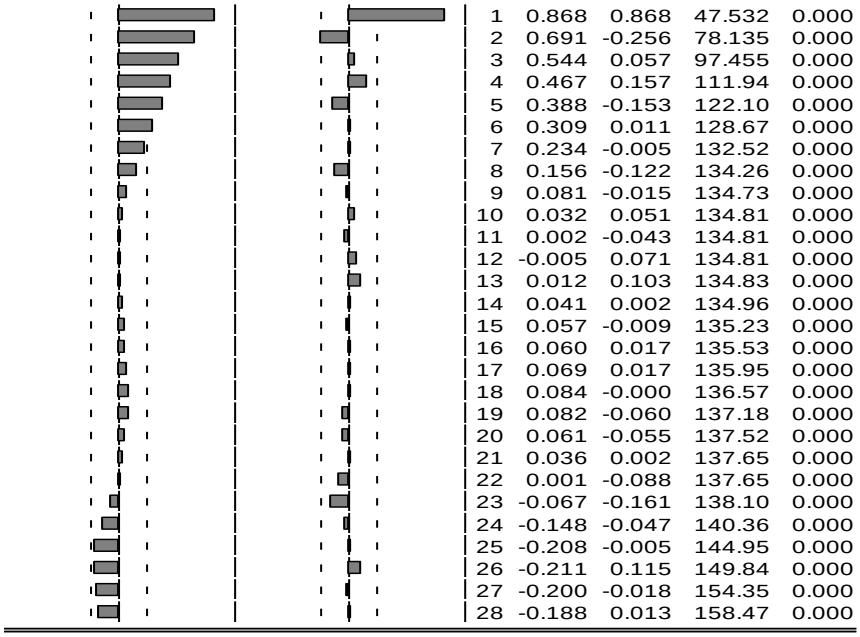


Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.886	0.886	49.512	0.000
		2	0.725	-0.281	83.228	0.000
		3	0.586	0.059	105.63	0.000
		4	0.496	0.107	121.97	0.000
		5	0.408	-0.137	133.22	0.000
		6	0.318	-0.021	140.21	0.000
		7	0.234	-0.015	144.05	0.000
		8	0.152	-0.091	145.71	0.000
		9	0.074	-0.041	146.10	0.000
		10	0.018	0.048	146.13	0.000
		11	-0.019	-0.024	146.15	0.000
		12	-0.034	0.050	146.25	0.000
		13	-0.027	0.085	146.30	0.000
		14	-0.009	0.001	146.31	0.000
		15	0.002	-0.019	146.31	0.000
		16	0.006	0.008	146.31	0.000
		17	0.016	0.017	146.34	0.000
		18	0.034	0.014	146.44	0.000
		19	0.048	-0.018	146.65	0.000
		20	0.055	-0.004	146.93	0.000
		21	0.059	0.006	147.26	0.000
		22	0.036	-0.132	147.39	0.000
		23	-0.027	-0.153	147.46	0.000
		24	-0.114	-0.107	148.81	0.000
		25	-0.184	-0.002	152.42	0.000
		26	-0.207	0.100	157.11	0.000
		27	-0.209	-0.013	162.04	0.000
		28	-0.207	0.025	167.04	0.000

(Source: Author's estimation using EViews10)

Table A2: Correlogram of Namibia Repo Rate

Sample: 1 60
Included observations: 60



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.868	0.868	47.532	0.000
		2	0.691	-0.256	78.135	0.000
		3	0.544	0.057	97.455	0.000
		4	0.467	0.157	111.94	0.000
		5	0.388	-0.153	122.10	0.000
		6	0.309	0.011	128.67	0.000
		7	0.234	-0.005	132.52	0.000
		8	0.156	-0.122	134.26	0.000
		9	0.081	-0.015	134.73	0.000
		10	0.032	0.051	134.81	0.000
		11	0.002	-0.043	134.81	0.000
		12	-0.005	0.071	134.81	0.000
		13	0.012	0.103	134.83	0.000
		14	0.041	0.002	134.96	0.000
		15	0.057	-0.009	135.23	0.000
		16	0.060	0.017	135.53	0.000
		17	0.069	0.017	135.95	0.000
		18	0.084	-0.000	136.57	0.000
		19	0.082	-0.060	137.18	0.000
		20	0.061	-0.055	137.52	0.000
		21	0.036	0.002	137.65	0.000
		22	0.001	-0.088	137.65	0.000
		23	-0.067	-0.161	138.10	0.000
		24	-0.148	-0.047	140.36	0.000
		25	-0.208	-0.005	144.95	0.000
		26	-0.211	0.115	149.84	0.000
		27	-0.200	-0.018	154.35	0.000
		28	-0.188	0.013	158.47	0.000

(Source: Author's estimation using EViews10)

Table A3: Correlogram of Namibia Prime Lending Rate

Sample: 1 60
Included observations: 60

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.899	0.899	50.920	0.000
		2	0.753	-0.282	87.330	0.000
		3	0.639	0.136	113.96	0.000
		4	0.571	0.110	135.63	0.000
		5	0.507	-0.101	153.03	0.000
		6	0.440	0.007	166.37	0.000
		7	0.370	-0.036	175.98	0.000
		8	0.299	-0.068	182.36	0.000
		9	0.230	-0.026	186.21	0.000
		10	0.180	0.044	188.62	0.000
		11	0.143	-0.022	190.18	0.000
		12	0.123	0.064	191.34	0.000
		13	0.121	0.079	192.50	0.000
		14	0.127	0.010	193.80	0.000
		15	0.123	-0.027	195.05	0.000
		16	0.110	-0.003	196.08	0.000
		17	0.101	0.014	196.97	0.000
		18	0.097	-0.025	197.80	0.000
		19	0.079	-0.082	198.37	0.000
		20	0.047	-0.051	198.57	0.000
		21	0.014	-0.018	198.59	0.000
		22	-0.028	-0.101	198.67	0.000
		23	-0.091	-0.139	199.50	0.000
		24	-0.166	-0.075	202.36	0.000
		25	-0.227	-0.010	207.84	0.000
		26	-0.246	0.114	214.45	0.000
		27	-0.248	-0.035	221.40	0.000
		28	-0.249	0.018	228.63	0.000

(Source: Author's estimation using EViews10)

Table A4: Correlogram of Namibia Private Sector Credit Extension

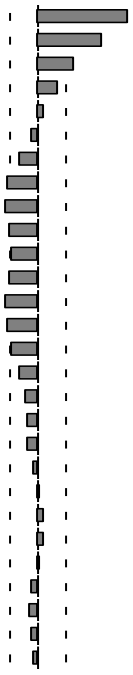
Sample: 1 60
Included observations: 60

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.147	-0.147	1.3640	0.243
		2	0.122	0.103	2.3244	0.313
		3	0.103	0.139	3.0186	0.389
		4	0.168	0.198	4.8831	0.300
		5	-0.040	-0.014	4.9934	0.417
		6	0.062	-0.006	5.2566	0.511
		7	0.038	0.005	5.3578	0.616
		8	-0.042	-0.071	5.4850	0.705
		9	-0.003	-0.028	5.4857	0.790
		10	-0.065	-0.084	5.7960	0.832
		11	-0.259	-0.302	10.872	0.454
		12	0.147	0.107	12.541	0.403
		13	0.012	0.167	12.553	0.483
		14	-0.178	-0.093	15.128	0.369
		15	-0.088	-0.110	15.763	0.398
		16	-0.034	-0.126	15.859	0.463
		17	-0.040	0.009	15.994	0.524
		18	-0.153	-0.056	18.061	0.452
		19	-0.116	-0.204	19.285	0.439
		20	-0.081	-0.133	19.902	0.464
		21	0.009	0.046	19.910	0.527
		22	-0.067	0.026	20.345	0.561
		23	-0.026	0.138	20.415	0.617
		24	-0.075	-0.084	20.995	0.639
		25	0.113	-0.049	22.344	0.616
		26	-0.085	-0.061	23.132	0.625
		27	-0.068	-0.130	23.652	0.650
		28	0.202	0.228	28.387	0.444

(Source: Author's estimation using EViews10)

Table A5: Correlogram of Namibia Consumer Price Index

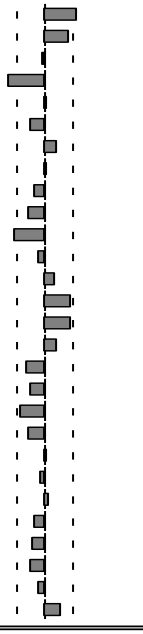
Sample: 1 60
Included observations: 60

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.811	0.811	41.505	0.000
		2	0.566	-0.270	62.058	0.000
		3	0.331	-0.106	69.194	0.000
		4	0.178	0.077	71.307	0.000
		5	0.055	-0.112	71.512	0.000
		6	-0.053	-0.097	71.706	0.000
		7	-0.161	-0.103	73.525	0.000
		8	-0.264	-0.125	78.502	0.000
		9	-0.288	0.103	84.534	0.000
		10	-0.252	0.021	89.247	0.000
		11	-0.230	-0.168	93.278	0.000
		12	-0.253	-0.128	98.227	0.000
		13	-0.279	-0.033	104.39	0.000
		14	-0.277	-0.027	110.60	0.000
		15	-0.242	-0.034	115.46	0.000
		16	-0.171	0.021	117.94	0.000
		17	-0.099	-0.010	118.79	0.000
		18	-0.089	-0.160	119.48	0.000
		19	-0.083	0.012	120.11	0.000
		20	-0.042	0.041	120.27	0.000
		21	0.022	-0.031	120.32	0.000
		22	0.063	-0.046	120.70	0.000
		23	0.046	-0.137	120.91	0.000
		24	0.000	-0.058	120.91	0.000
		25	-0.063	-0.084	121.33	0.000
		26	-0.081	-0.026	122.06	0.000
		27	-0.060	-0.019	122.47	0.000
		28	-0.027	-0.005	122.55	0.000

(Source: Author's estimation using EViews10)

Table A6: Correlogram of Namibia Gross Domestic Product

Sample: 1 60
Included observations: 60

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.289	0.289	5.2820	0.022
		2	0.214	0.142	8.2212	0.016
		3	-0.019	-0.126	8.2452	0.041
		4	-0.321	-0.358	15.081	0.005
		5	-0.005	0.234	15.083	0.010
		6	-0.121	-0.031	16.086	0.013
		7	0.100	0.082	16.791	0.019
		8	0.011	-0.180	16.799	0.032
		9	-0.096	-0.047	17.474	0.042
		10	-0.155	-0.191	19.253	0.037
		11	-0.273	-0.057	24.895	0.009
		12	-0.056	0.059	25.137	0.014
		13	0.091	0.206	25.786	0.018
		14	0.245	0.072	30.626	0.006
		15	0.243	-0.013	35.510	0.002
		16	0.101	-0.047	36.365	0.003
		17	-0.160	-0.233	38.577	0.002
		18	-0.127	0.116	40.012	0.002
		19	-0.213	-0.117	44.119	0.001
		20	-0.156	-0.103	46.374	0.001
		21	0.020	-0.089	46.413	0.001
		22	-0.035	0.060	46.533	0.002
		23	0.036	-0.055	46.664	0.002
		24	-0.086	0.009	47.428	0.003
		25	-0.112	-0.027	48.771	0.003
		26	-0.130	-0.115	50.625	0.003
		27	-0.058	-0.054	51.007	0.003
		28	0.138	0.042	53.215	0.003

(Source: Author's estimation using EViews10)

Table A7: VAR Results

	SAREPO	NAMREPO	PLR	PSCE	CPI	GDP
SAREPO(-1)	1.376792	0.290281	0.356451	2.205376	2.004348	-8.654739
	(0.47422)	(0.39977)	(0.41404)	(1.39017)	(1.20182)	(5.42381)
	[2.90326]	[0.72612]	[0.86092]	[1.58641]	[1.66776]	[-1.59569]
SAREPO(-2)	-1.396354	-1.059177	-1.068619	-4.768003	-2.965249	-5.246194
	(0.69081)	(0.58235)	(0.60314)	(2.02509)	(1.75072)	(7.90100)
	[-2.02132]	[-1.81879]	[-1.77177]	[-2.35446]	[-1.69373]	[-0.66399]
SAREPO(-3)	0.312274	0.510733	0.530009	4.092577	0.708365	11.82351
	(0.64442)	(0.54325)	(0.56263)	(1.88910)	(1.63315)	(7.37042)
	[0.48458]	[0.94015]	[0.94201]	[2.16642]	[0.43374]	[1.60418]
SAREPO(-4)	-0.027207	-0.143175	-0.275443	-0.969982	0.448495	0.977869
	(0.66441)	(0.56010)	(0.58009)	(1.94769)	(1.68381)	(7.59903)
	[-0.04095]	[-0.25563]	[-0.47483]	[-0.49802]	[0.26636]	[0.12868]
SAREPO(-5)	0.266833	0.368909	0.413073	-1.297979	-0.975265	-7.194046
	(0.45914)	(0.38705)	(0.40087)	(1.34595)	(1.16359)	(5.25128)
	[0.58116]	[0.95313]	[1.03045]	[-0.96436]	[-0.83815]	[-1.36996]
NAMREPO(-1)	-0.551820	0.292701	-0.597565	-9.176917	-3.191663	3.439672
	(1.40713)	(1.18621)	(1.22855)	(4.12497)	(3.56608)	(16.0938)
	[-0.39216]	[0.24675]	[-0.48640]	[-2.22473]	[-0.89500]	[0.21373]
NAMREPO(-2)	0.310649	0.607340	0.716978	3.749470	5.633602	29.00343
	(1.52597)	(1.28639)	(1.33230)	(4.47334)	(3.86726)	(17.4530)
	[0.20357]	[0.47213]	[0.53815]	[0.83818]	[1.45674]	[1.66180]
NAMREPO(-3)	1.128491	0.551084	0.415979	-1.538944	-0.498050	-36.00235
	(1.41349)	(1.19157)	(1.23409)	(4.14359)	(3.58219)	(16.1664)
	[0.79837]	[0.46249]	[0.33707]	[-0.37140]	[-0.13904]	[-2.22698]
NAMREPO(-4)	-1.943531	-1.494010	-1.406534	-2.195926	-3.484045	-8.933447
	(1.39189)	(1.17336)	(1.21524)	(4.08028)	(3.52745)	(15.9194)
	[-1.39633]	[-1.27327]	[-1.15742]	[-0.53818]	[-0.98769]	[-0.56117]

NAMREPO(-5)	1.313407	0.635361	0.608327	5.028150	2.464282	14.97431
	(0.77385)	(0.65235)	(0.67563)	(2.26851)	(1.96115)	(8.85069)
	[1.69725]	[0.97396]	[0.90038]	[2.21650]	[1.25655]	[1.69188]
PLR(-1)	0.477454	0.800747	1.717208	7.352775	0.562088	8.784818
	(1.31914)	(1.11204)	(1.15172)	(3.86703)	(3.34310)	(15.0874)
	[0.36194]	[0.72007]	[1.49099]	[1.90140]	[0.16813]	[0.58226]
PLR(-2)	0.862695	-0.011104	-0.206011	-1.298661	-1.752646	-28.83659
	(1.59666)	(1.34598)	(1.39402)	(4.68056)	(4.04641)	(18.2615)
	[0.54031]	[-0.00825]	[-0.14778]	[-0.27746]	[-0.43314]	[-1.57910]
PLR(-3)	-1.462922	-1.089319	-0.982600	-2.710038	-0.463988	27.14992
	(1.55182)	(1.30819)	(1.35487)	(4.54912)	(3.93277)	(17.7486)
	[-0.94271]	[-0.83269]	[-0.72523]	[-0.59573]	[-0.11798]	[1.52969]
PLR(-4)	2.005850	1.682439	1.779337	3.151764	3.568201	4.397912
	(1.32610)	(1.11790)	(1.15779)	(3.88741)	(3.36071)	(15.1669)
	[1.51260]	[1.50500]	[1.53683]	[0.81076]	[1.06174]	[0.28997]
PLR(-5)	-1.666316	-1.080111	-1.104407	-2.868303	-1.782105	-6.186575
	(0.70703)	(0.59603)	(0.61730)	(2.07265)	(1.79183)	(8.08654)
	[-2.35677]	[-1.81218]	[-1.78909]	[-1.38388]	[-0.99457]	[-0.76505]
PSCE(-1)	-0.034624	-0.044898	-0.031844	-0.794601	0.034061	-0.696501
	(0.05421)	(0.04570)	(0.04733)	(0.15892)	(0.13738)	(0.62002)
	[-0.63869]	[-0.98247]	[-0.67282]	[-5.00016]	[0.24793]	[-1.12336]
PSCE(-2)	-0.107730	-0.082125	-0.066964	-0.643330	-0.035254	-0.322595
	(0.05234)	(0.04412)	(0.04569)	(0.15342)	(0.13264)	(0.59859)
	[-2.05838]	[-1.86138]	[-1.46545]	[-4.19313]	[-0.26579]	[-0.53892]
PSCE(-3)	0.016634	0.017706	0.037049	-0.067693	-0.104232	0.690976
	(0.04855)	(0.04093)	(0.04239)	(0.14233)	(0.12304)	(0.55530)
	[0.34260]	[0.43260]	[0.87402]	[-0.47561]	[-0.84710]	[1.24433]
PSCE(-4)	0.042405	0.033272	0.037302	0.126602	-0.066071	1.298408
	(0.04738)	(0.03994)	(0.04137)	(0.13890)	(0.12008)	(0.54194)
	[0.89491]	[0.83295]	[0.90166]	[0.91143]	[-0.55021]	[2.39584]

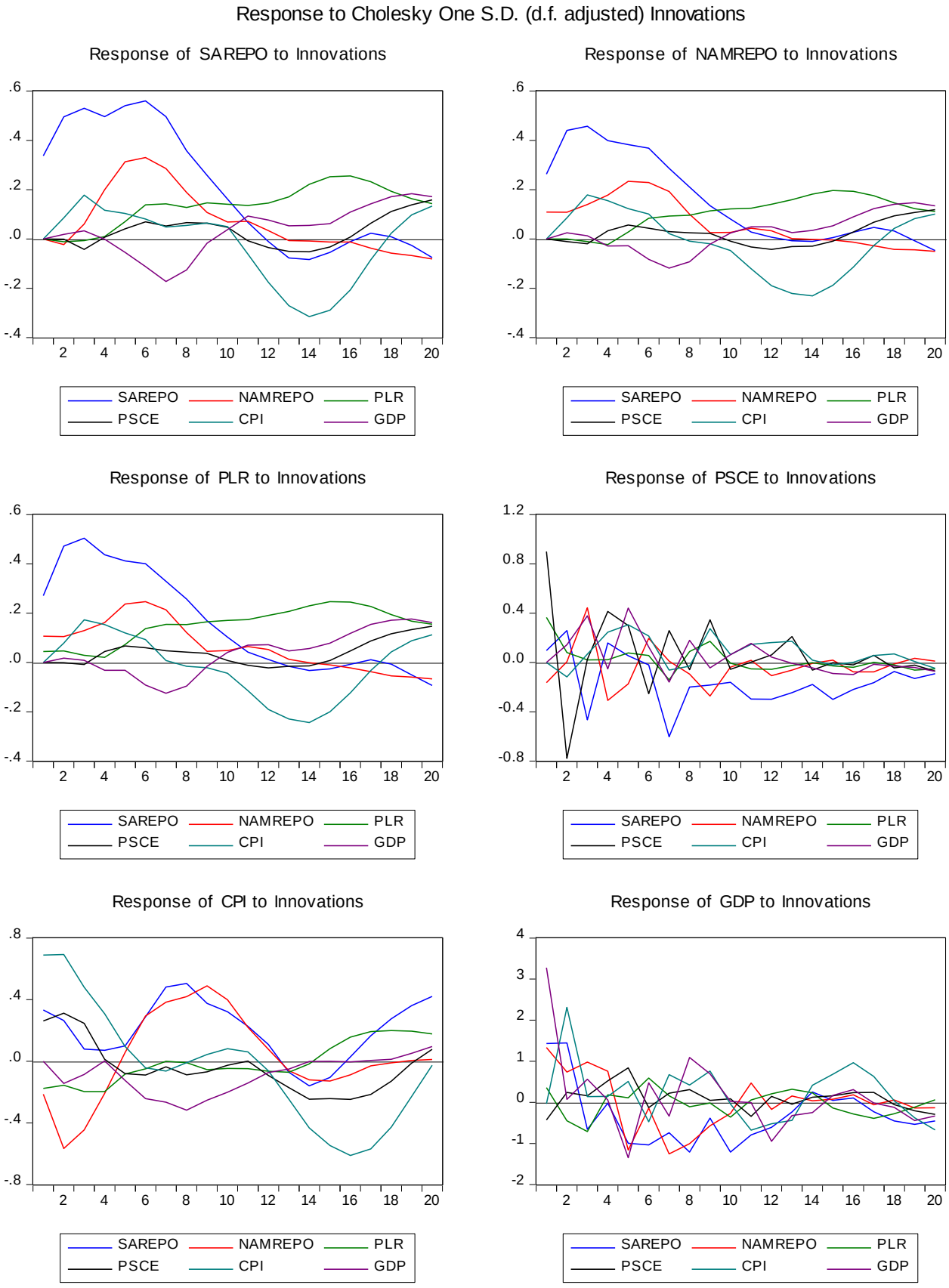
PSCE(-5)	0.083724	0.040705	0.043508	0.056915	-0.015041	0.797505
	(0.04523)	(0.03813)	(0.03949)	(0.13260)	(0.11464)	(0.51736)
	[1.85088]	[1.06746]	[1.10164]	[0.42921]	[-0.13120]	[1.54149]
CPI(-1)	0.124562	0.124548	0.113936	-0.168736	1.003899	3.351863
	(0.08911)	(0.07512)	(0.07780)	(0.26123)	(0.22583)	(1.01918)
	[1.39783]	[1.65799]	[1.46445]	[-0.64594]	[4.44533]	[3.28877]
CPI(-2)	-0.048011	-0.062325	-0.052402	0.021133	-0.074567	-3.695521
	(0.13083)	(0.11029)	(0.11423)	(0.38353)	(0.33156)	(1.49635)
	[-0.36697]	[-0.56510]	[-0.45876]	[0.05510]	[-0.22489]	[-2.46968]
CPI(-3)	-0.218448	-0.114846	-0.122725	0.120373	-0.232327	-0.022356
	(0.14063)	(0.11855)	(0.12278)	(0.41225)	(0.35640)	(1.60842)
	[-1.55336]	[-0.96875]	[-0.99954]	[0.29199]	[-0.65188]	[-0.01390]
CPI(-4)	0.219318	0.143532	0.160095	1.026452	-0.029084	1.719448
	(0.12652)	(0.10666)	(0.11046)	(0.37090)	(0.32064)	(1.44707)
	[1.73343]	[1.34572]	[1.44928]	[2.76749]	[-0.09071]	[1.18823]
CPI(-5)	-0.066513	-0.072197	-0.094585	-0.617776	0.043416	0.438722
	(0.07598)	(0.06405)	(0.06634)	(0.22274)	(0.19256)	(0.86904)
	[-0.87537]	[-1.12713]	[-1.42578]	[-2.77351]	[0.22546]	[0.50484]
GDP(-1)	0.005510	0.007595	0.005346	0.043830	-0.043868	0.022035
	(0.01691)	(0.01425)	(0.01476)	(0.04956)	(0.04284)	(0.19335)
	[0.32595]	[0.53295]	[0.36218]	[0.88442]	[-1.02390]	[0.11396]
GDP(-2)	0.010996	0.002997	0.002346	0.160276	0.027525	0.323430
	(0.01454)	(0.01226)	(0.01269)	(0.04262)	(0.03685)	(0.16629)
	[0.75626]	[0.24455]	[0.18479]	[3.76040]	[0.74700]	[1.94494]
GDP(-3)	-0.004009	-0.005632	-0.007865	0.087624	0.001669	0.040689
	(0.01468)	(0.01237)	(0.01282)	(0.04303)	(0.03720)	(0.16789)
	[-0.27310]	[-0.45512]	[-0.61369]	[2.03633]	[0.04486]	[0.24236]
GDP(-4)	-0.009766	0.009955	0.008289	0.209347	-0.051481	-0.376462
	(0.01430)	(0.01206)	(0.01249)	(0.04193)	(0.03625)	(0.16358)

	[-0.68284]	[0.82562]	[0.66375]	[4.99300]	[-1.42027]	[-2.30133]
GDP(-5)	0.010795	0.006450	0.000547	0.199777	-0.007883	0.226644
	(0.01993)	(0.01680)	(0.01740)	(0.05842)	(0.05050)	(0.22792)
	[0.54171]	[0.38397]	[0.03145]	[3.41977]	[-0.15609]	[0.99439]
C	-1.074846	-0.375508	-0.251995	-4.676747	0.053247	-32.29290
	(1.03847)	(0.87542)	(0.90667)	(3.04423)	(2.63177)	(11.8772)
	[-1.03503]	[-0.42894]	[-0.27794]	[-1.53627]	[0.02023]	[-2.71890]
R-squared	0.985430	0.982749	0.988507	0.811723	0.928823	0.749302
Adj. R-squared	0.967217	0.961186	0.974140	0.576377	0.839851	0.435931
Sum sq. resids	2.731912	1.941425	2.082472	23.47670	17.54606	357.3645
S.E. equation	0.337387	0.284416	0.294567	0.989038	0.855036	3.858780
F-statistic	54.10682	45.57539	68.80623	3.449058	10.43951	2.391097
Log likelihood	4.522492	13.91593	11.98726	-54.63019	-46.62276	-129.5058
Akaike AIC	0.962818	0.621239	0.691372	3.113825	2.822646	5.836573
Schwarz SC	2.094224	1.752645	1.822778	4.245231	3.954052	6.967979
Mean dependent	7.093939	7.151515	11.33467	3.032472	5.770205	4.338306
S.D. dependent	1.863394	1.443651	1.831773	1.519578	2.136592	5.137878
Determinant resid covariance (dof adj.)	1.09E-05					
Determinant resid covariance	7.53E-08					
Log likelihood	-17.19969					
Akaike information criterion	7.389080					
Schwarz criterion	14.17752					
Number of coefficients	186					

*Notes: Standard errors in ( ) & t-statistics in [ ]

(Source: Author's estimation using EViews10)

Figure A1: Combined response of variables to a one standard deviation innovation



(Source: Author's estimation using EViews10)

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