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### **MONETARY POLICY TRANSMISSION MECHANISM IN NAMIBIA**

by

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## ABSTRACT

This paper presents results on the transmission mechanism in Namibia. The results are deduced from two methods applied in the paper the Cumulative Forecast Error and Vector Autoregressive (Impulse Response Analysis). The study examined the two main channels through which monetary policy is transmitted into the domestic economy — namely the interest rates and credit channels. The results from the study reveals that a tightening of monetary policy as evidenced by an increase in the repo or bank rate causes lending rates to increase in the domestic economy and is reflected in the shrinkage of private investment with its attendant negative impacts on output and employment in the short run. The results also confirm the operation of the bank lending channel, a version of the credit channel in the Namibian economy.

This channel requires that some firms cannot costlessly replace losses of bank credit with other types of finance, but must rather curtail investment spending, in the face of increased lending rates or shrinkage of bank reserves during a tight money regime. Thus, we are likely to observe a deviation of investment behaviour from its optimal level. The low response of domestic lending rates to domestic money supply shocks did not come as a surprise since in a Currency Board arrangement the domestic economy losses control over interest rates. As domestic interest rates follow anchor currency rates in normal times. The results from our investigation show that both the channels are effective in the case of Namibia. However, the intensity of both channels is difficult to gauge from the results.

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## 1 INTRODUCTION

Recent years have witnessed a revival of interest in the monetary transmission mechanism. This renewed interest reflects both analytical and methodological considerations. From an analytical point of view, it is widely acknowledged that significant gaps remain with regard to the precise nature of the channels monetary impulses are transmitted through economies (Levy, et.al 1997). Economists have been trying to come to grasps with the concept, and nearly every attempt at understanding the process has seen the debate resurface in one form or another. Areas of contention have shifted at one time or the other from the relative importance of interest rates versus credit in the transmission process to the exact methodology for coming out with appropriate measures of the impact of policy. There have also been debates on the appropriate channel of affectation relevant to the financial structure and stage of development of the economy as well as the speed with which impulses are transmitted via a chosen channel. It is no wonder then that this old debate which dates back to the 1960s is still of much relevance particularly to central bankers today.

Monetary and fiscal policies are accorded prominent roles in the pursuit of macroeconomic stabilisation in developing countries. Understanding the monetary transmission mechanism in every economy is essential to ensuring a stable macroeconomic environment. The monetary authorities using tools that will affect the cost and availability of credit in the economy initiate monetary policy actions. However, the ultimate objective of monetary policy is not only to influence the cost and availability of credit but the economy as a whole.

Thus although monetary policy actions originate from the central bank, the variables they are meant to influence like employment, output, and prices lie in the real sector. The transmission mechanism is the term used to describe the various routes through which changes in the monetary policies of the monetary authority in a country affect output and prices in the economy. However, Namibia is a member of the CMA, an arrangement that implies that the central bank cannot undertake discretionary monetary policy to influence money supply with the objective of affecting major macroeconomic aggregates like prices, employment and output. This being the case, the question naturally arises as to why we should be interested in the study of the transmission mechanism. For a number of reasons, we should be interested in how monetary policy actions are transmitted to the real sector of the economy. First, the CMA arrangement confers the status of a quasi-currency board on BON. Central to the adequate functioning of the money supply process in this arrangement is the role of interest rate and credit as appropriate price/quantity channels for the transmission of exogenous shocks within the economy (see below for a discussion of the money supply process in a currency board arrangement). It is instructive to test these channels and ascertain their relative effectiveness in the domestic economy.

Second, it is often assumed that the Namibian financial sector is highly integrated with its South African counterpart. This is based on the fact that the holding and trading of assets issued by residents of each member country of the CMA are unrestricted within the currency areas and this may tend to leave the relative price of these assets constant.

Foreign exchange and payments on capital transactions within the monetary area are generally unrestricted and existing regulations are fairly uniform across members and transactions. If this is so, we should be able to test the impact of monetary policy actions by the South African Reserve Bank (SARB) on the Namibian economy. Specifically, the question we will seek to answer here is how responsive are lending rates and domestic credit to changes in the repo rate by the SARB.

Third, it will be helpful for financial sector development purposes to be able to assess the impact of credit vis- -vis interest rates on the important macro-variables like private investment and consumer prices (or vice versa) and possibly ascertain the length of time it takes for these policy tools to begin to impact on real variables. Where these channels do not operate adequately, the automatic adjustment mechanism for restoring the economic to equilibrium that is suggested by the monetary mechanism in a currency board arrangement may be called into question and interventions may be an optimal policy option. Following from this it may be possible to investigate the possibility of using an active liquidity management tool to correct domestic liquidity imbalances.

The focus of this paper is to empirically investigate the monetary transmission mechanism that is prevalent in the Namibian economy. Specifically, the paper will examine the process through which a change in monetary policy stance by the Reserve bank of South Africa is transmitted to the Namibian economy through changes in money supply, lending rates of interest, credit, prices and private investment.

In addition, the paper will also investigate the transmission channel suggested by a currency board arrangement i.e. how changes in the money supply is routed through interest rates, credit and subsequently aggregate demand in the economy .An attempt will be made to harmonise these routes and examine the deviations of current practices from the framework implied in the transmission process enunciated above. In essence, the paper will attempt to produce some empirical results and policy outcomes that would guide a Monetary Policy framework for Namibia.

The rest of the paper is structured as follows. Section II provides a literature review on monetary policy transmission mechanisms. Section III outlines a brief overview of the Currency Board Arrangement. Section IV essentially covers econometric methodology and Data. In Section V we present empirical results. In Section VI, we attempt to make some policy deductions based on our results.

## 2 LITERATURE REVIEW

The literature on the monetary transmission mechanism advocates a transmission process through which monetary policy decisions are converted into changes in real output and inflation. Research has shown that understanding the transmission mechanism of monetary policy is a fairly complex task. Understanding that mechanism in the context of stabilising the economy is an even more daunting challenge. Various channels have been identified in the literature for the transmission of monetary policy to the real sector. The major ones include the interest rate channel, the credit channel, the exchange rate channel, and the broad money channel.

The review undertaken here is rather schematic and the objective is to draw attention to the main differences among the various channels.

### 2.1 The Interest Rate Channel

The interest rate channel of transmission of monetary policy was clearly defined in Keynes's General Theory. The present value of capital and durable consumption goods is negatively related to the real interest rate (the marginal efficiency of capital function). A lower real rate of interest implies a higher present value of existing durable (capital and consumption) goods and an increase in the ratio between the prices of existing stocks and the prices of newly produced goods. Hence a stimulus is given to the current production of durable goods and, through the multiplier, to aggregate demand (Keynes, 1936), when interest rate (the cost of capital) falls. Currently, the main policy instrument used by SARB is the interest rate on repurchase transactions (repo rate). In a bid to regulate liquidity in the economy, banks are given the opportunity to tender on a daily basis for central bank funds through repurchase transactions, and thus enhance their scope to manage their liquidity position efficiently. Repurchase transactions are generally conducted at a variable rate and allotments are made at the individual bidding rates tendered by the banks i.e., a multiple rates auction system. However, there are times when SARB may be more interested in giving interest rate signal in a bid to exercise a stabilising influence on interest rate movements, particularly during periods of uncertainty.

Generally, when the discount rate and the interest rate on monetary loans are increased the commercial banks lending and borrowing rates rise almost immediately, leading to a reduction in the overall liquidity in the system. When there are no price rigidities, which is usually the case in many economies, a restrictive monetary policy translates into an increase in real interest rate. Therefore, the pure interest rate channel works through a reduction in investment, due to an increase in the real cost of borrowing. Thus our analysis on the interest rate channel will focus on how a tight monetary policy symbolised by an increase in the repo or discount rate is transmitted to the lending rate and where possible other longer term rates in the economy such as the bond rate and ultimately to private investment and consumption.

In a high-inflation economy, the interest rate channel loses strength because the relevant concept of the real rate of interest must be modified to take into account the high volatility of inflation. The relevant cost of capital concept must take into account the nominal interest rate less the certainty equivalent of inflation. If inflation is very volatile, its certainty equivalent will exceed its expected value by a volatility premium. Therefore, a high real interest rate is not synonymous with tight monetary policy if the volatility premium is similarly high. A lower inflation strengthened the working of the interest rate channel in the economy, as lower inflation usually implies less volatile inflation. A given real interest rate will produce monetary restraint when inflation is low and less volatile than when inflation is high and more volatile.

## 2.2 The Credit Channel<sup>2</sup>

Two versions of the credit channel are described in the literature. One version is a **bank lending channel**, which relies on the dual nature of banks as holders of reserve-backed deposits and as originators of loans.

The bank-lending channel is based on the view that banks play a special role in the financial system because they are especially well suited to solve asymmetric information problem. Because of banks' role, certain borrowers will not have access to the credit markets unless they borrow from banks. For the bank-lending channel to exist, a reduction in reserves engineered by the monetary authority must cause the volume of bank lending to decline. That is, banks must not insulate their loan supply after a shock to reserves by simply rearranging their portfolio of other assets and liabilities. Furthermore, a bank-lending channel requires that some firms cannot costlessly replace losses of bank credit with other types of finance, but rather must curtail their investment spending.

The central bank can affect the supply of bank loans in two ways. The first is by raising reserve requirements. This has the ultimate effect of reducing not only the total volume of commercial bank assets but also the proportion of commercial bank earning assets to their total assets. The second way is by conducting open market sales. An open market sale of treasury bills, for instance, will reduce commercial bank reserves as purchasers issue checks against their accounts in commercial banks. In a closed economy, where banks cannot easily substitute deposits with other sources of credit, open market sales drain liquidity from the economy. A distinctive feature of the bank-lending channel is the ability of a tight monetary policy to cause a fall in the supply of loans beyond what will ordinarily be predicted by a rising interest rate. A rising interest rate resulting from tight monetary policy will cause a fall in private investment due to (i) a higher cost of capital and (ii) reduction in bank loans supply mostly to small and medium scale entrepreneurs who are rationed out of the credit market as a result.

The second version of the credit channel<sup>3</sup>, **balance—sheet channel** focuses on the supply of funds from all financial intermediaries and markets and has no special role for banks. The channel arises from the presence of asymmetric information problems in credit markets. A tight monetary policy directly increases lower net worth of business firms and the more severe the adverse selection and moral hazard problems are in lending to these firms. Lower net worth means that lenders in effect have less collateral for their loans, and so losses from adverse selection are higher. A decline in net worth, which raises the adverse selection problem, thus leads to decreased lending to finance investment spending. The lower net worth of business firms also increases the moral hazard problem because it means that owners have a lower equity stake in their firms, giving them more incentive to engage in risky investment projects. Since taking on riskier investment projects makes it more likely that lenders will not be paid back, a decrease in business firms' net worth leads to a decrease in lending and hence in investment spending (Mishkin, 1996).

Bernanke and Blinder (1990) and Romer and Romer (1990) have produced landmark studies on the credit channel in which they assessed the impact of a restrictive monetary policy on money, credit and economic activity using VAR models. According to these authors, a tightening of monetary policy causes an immediate contraction in deposits with no short-term effect on lending. Lending only begins to slow some six to nine months later when the economy itself is slowing. Bernanke and Blinder conclude that the results support the credit view, and they attribute the delayed response of loans to their contractual nature. Romer and Romer, on the other hand, conclude that the credit channel is ineffective.

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<sup>2</sup> Note that the credit channel is supportive of the asymmetric effect of monetary policy: the substantial disadvantages facing small and medium-sized firms in financing and investment behaviours compared to a large one arise mainly in tight-money periods and in recessions.

<sup>3</sup> See, Gupta et.al for interesting discussion on the credit channel

Oliner and Rudebusch (1994) found that short-term credit to small firms generally contracts after monetary policy is tightened, while it expands for large firms, a phenomena they attribute to divergent credit demands reflecting differences in the behaviour of inventories.

As emphasised by Bernanke and Gertler (1995), the credit channel is not really an independent alternative to the traditional interest rate mechanism but rather an amplifying mechanism. A study by Mishkin (1996) cited three reasons to believe that credit channels are an important part of monetary transmission mechanism. First, it finds that there is a large body of cross-section evidence which supports the view that credit market imperfections of the type crucial to credit channels do indeed affect firms' employment and spending decisions. Second there is evidence found in Gertler and Gilchrist (1994), showing that small firms, which are more likely to be credit constrained, are hurt more by tight monetary policy than are large firms which are unlikely to be credit constrained. Third, and perhaps most compelling, the asymmetric information view of credit market imperfections at the core of the credit channel analysis is a theoretical construct that has proved to be highly useful in explaining many other important phenomena.

### 2.3 Exchange Rate Channel

In a country with fixed exchange rate or crawling peg arrangement, the exchange rate channel is not active, because domestic interest rates adjust in such a way as to leave the exchange rate unchanged. In other words, there is self-imposed restriction on the use of monetary policy: the domestic interest rates are determined by the interest rates in the currency of the country to which the domestic currency is pegged. The exchange rate channel is clearly shut off.

In a country with fully flexible rates, the transmission of interest movements to the exchange rate and to activity in the tradable goods sector is the highest (Artis and Lewis, 1991). Although in the end the exchange rate is determined by factors such as purchasing power parity, its short run behaviour is the result of the asset equilibrium. When domestic real interest rates rise after a monetary contraction, deposits in domestic currency and credit in foreign currency become more attractive, inducing an appreciation of the exchange rate, reducing net export, and lowering domestic output (De Fiore, 1998).

The presence of an independent exchange rate channel is controversial. Friedman (1980) denies a role of the exchange rate in the transmission of monetary policy, arguing that monetary policy affects output and prices through changes in asset portfolios and in investment decisions. The movements in the exchange rate are only a consequence of these on output and prices, either domestically or abroad. Even if one is ready to accept the existence of an exchange rate channel, as described by the asset theory of the exchange rate, the issue arises whether this latter is independent from the interest rate channel. In fact, it could be argued that the capital inflows that generate a worsening of the terms of trade and a reduction of net exports are induced by the same increased differential in domestic and foreign interest rates that generates lower investment.

When real interest rates rise after a restrictive monetary action, foreign capital starts flowing into the country. Moreover, the inflation targeting requires that the increased quantity of money be sterilised. The resulting lower share of credit in domestic currency reduces the domestic component of the total average cost of credit, increasing the size of interest rate change necessary to attain a certain inflation target. This effect occurs independently from the effects described by the interest rate channel (De Fiore, 1998).



In what follows, we focus our attention on the asset theory view of exchange rate channel. Sometimes, it is worth to note that both policies of inflation targeting and exchange rate band might affect traditional exchange rate channel in two ways. On one hand, inflation targeting may amplify the effects of the exchange rate channel. If a monetary tightening induces an inflow of foreign capital through higher interest rates, the central bank must sterilise the excess liquidity in order to attain the announced inflation target. To the extent that sterilisation feeds back into higher domestic interest rates and in higher capital inflows, the effects described by the exchange rate channel are amplified.

On the other hand, a policy of intra-marginal intervention may neutralise the effects that monetary policy exerts on real activity through the exchange rate. If the central bank's intra-marginal intervention is able to reduce the effects of higher interest rates on the nominal and the real exchange rate, then the real effects transmitted through the exchange rate channel are smaller (Mishkin, 1996). This line of causation is not pursued further in this study because of the structure of our exchange rate arrangement, which may preclude the operation of an exchange rate channel for the transmission of monetary changes

## 2.4 The Broad Money channel

The theoretical underpinning of this channel relies on the hypothesis that money is not just a close substitute for a small class of financial assets (e.g. bonds) but also rather a substitute for a large spectrum of financial and real assets. An easy monetary policy, which results from a central bank open market purchase of government securities, for instance will lead to sellers wanting to rid themselves of their excess money balances. If the seller is an individual, he will probably deposit the proceeds in a commercial bank. This will increase bank reserves and their ability to create credit. On the other hand, if the seller is a commercial bank, its reserves will increase and, with it, its loan and credit creating ability. In either case, there is need for a re-adjustment of portfolios; each will want to buy assets that are similar to the ones they have sold. In the process, they bid up the prices of these securities relative to the prices of real assets, and this creates a further desire on the part of wealth-holders to try to adjust their portfolios by acquiring real assets. This consequently makes existing real assets expensive relative to new ones. The rise in the price level of real assets increases wealth relative to the purchase of sources of services. All these combine to raise the demand for current productive services both for producing new capital goods and for purchasing current services. Thus the monetary impulse spreads from the financial markets to the markets for good and services, thereby increasing aggregate output and spending.

One way of testing this channel in empirical analysis is to find out whether monetary shocks reduce deposits and the overall liquidity of the system, in real terms, through increases in the discount rate or an expansion of the money supply due to external factors. The monetary aggregate that has been established to exhibit greater stability in the Namibian economy is M2<sup>4</sup>. The dynamic responses of real money balances defined as the ratio of M2 to the consumer price index is computed and studied after the shocks. It is to be understood that within this context the broadmoney channel can work through or bypass interest rates.

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<sup>4</sup> See Ikhide and Katjumuise (1999): The Demand for Money in Namibia. Occasional Paper Series, no 2.

### **3 BRIEF OVERVIEW OF A CURRENCY BOARD**

#### **3.1 A Currency Board Framework of Monetary Transmission**

The Bank of Namibia in its operation could be described as a quasi — Currency Board. In other words, the bank has currency-board-like characteristics, including a peg to the rand and tight limitations on monetary finance of government. That is why this paper sees it necessary to make a brief overview of the transmission mechanism in a Currency Board Framework.

##### **3.1.1 Monetary rule**

Essential to the currency Board system is a monetary rule that requires any change in the monetary base to be brought about only by corresponding change in the foreign reserves in a specified foreign currency at a fixed exchange rate. Operationally, this monetary rule often takes the form of a convertibility undertaking for the currency board to convert domestic currency into foreign reserves at a fixed exchange rate.

Domestic currency covered by convertibility undertaking may just be the monetary base, or it may be some other definition of domestic money, whether or not including the monetary base. However, it is essential that the settlement of transactions arising from the convertibility undertaking be effected through the monetary base in order that the automatic adjustment mechanism under a currency board system can function to ensure exchange rate stability.

##### **3.1.2 Foreign Reserves**

Theoretically, all that is required for the currency board to hold is the amount of foreign reserves adequate to meet comfortably the anticipated reduction in the monetary base in stress conditions. The monetary rule focuses on the flow rather than the stock of the monetary base, although obviously if it were extended to the stock of the monetary base the Currency Board would have greater credibility. It would therefore be desirable, if only psychologically, for the foreign reserves held by the Currency Board to be larger than the Monetary base and perhaps even larger than the amount of domestic currency covered by the Convertibility undertaking.

#### **3.2 Overview of the Money Supply Process in the Arrangement.**

The ultimate objective of monetary policy in the arrangement is to maintain the fixed exchange rate peg to the South African rand in support of a stable financial environment, which will aid economic growth in the medium to long term. Although financial stability alone does not guarantee that the real economy will perform at maximum capacity, it is believed that it is an important precondition for the attainment of the economic growth potential.

In the end, many other economic as well as non-economic factors will of course determine the actual economic growth performance. However, instability in the financial sector will be detrimental to economic growth. Germane to the stability of the fixed exchange rate arrangement is the unencumbered functioning of the transmission mechanism inherent in the money supply process in the arrangement.

The notes and coins issued by the Currency board together with the deposits held by commercial banks at the currency board constitute the Monetary Base. Strictly, a currency board cannot determine the monetary base given a fixed exchange rate with the reserve currency and a fixed reserve ratio of 100 per cent foreign reserves. This

precludes the possibility of the currency board increasing the monetary base at its own discretion<sup>5</sup>. Money supply is defined as the total of notes and coins issued by the monetary authorities and deposits of the public at commercial banks. A typical central bank can increase the monetary base at its discretion by lending to commercial banks, thus creating reserves for them even if its foreign reserves fall in the process. The reserves thus created for commercial banks enable them to make more loans, which they do by creating deposits for borrowers. In the process, the money supply increases. On the contrary, a currency board cannot influence the relationship between the monetary base and the money supply by creating reserves for commercial banks at its own discretion. The rule governing a currency board makes it impossible for the currency board to create reserves for commercial banks in an inflationary manner as is done by a conventional central bank.

The money supply in a currency board system, is therefore, determined entirely by the balance of payments (BoP). It is quite elastic (responsive) to changes in demand. The currency board acquiring foreign reserves can expand it. Other sources of expansion in the money supply include, changes in commercial banks deposit—to-reserve ratio, the pooling of reserves among branches of commercial banks in the currency board country and the reserve country, inter-bank lending, and variability in the public's deposit—to-cash ratio (Hanke et al, 1993). The other sources of elasticity in the money supply process do not change from time to time. This leaves us with the acquisition of foreign reserves as the major source of changes in money supply.

The easiest way to acquire foreign reserves and thus expand the money supply is for a currency board to run a current account surplus. Within our context in Namibia, this will mean two things. For example, an excess of exports over imports and second, an increase in SACU revenue payments. We start by assuming that a currency board country is initially at equilibrium in its current account (exports equal imports). As a result of a decline in the domestic demand for imported goods or increase in foreign demand for the country's goods, exports become greater than imports and the country thus runs a current account surplus. The surplus will work its way through a sequence as follows. The reserves of commercial banks will increase. This will compel commercial banks to increase their loans and there will thus be a tendency for interest rates to fall. Other things equal, incomes will increase and the demand for goods in general, including currency notes and coins, increases. The prices of domestic goods will increase. The demand for goods increases or foreign demand for currency board's country's goods decreases.

This will restore equilibrium as imports outstrip exports and current account balance returns to zero. In the case of a current account deficit, the reverse process takes place—the reserves of commercial banks decrease, interest rates increase, income decreases, demand for goods in general, including currency board notes and coins, decreases, prices of domestic goods decrease, domestic demand for foreign goods decreases or foreign demand for currency board country's goods increase and finally current account balance returns to zero to restore equilibrium. The monetary process in this system is automatic, as it is self-adjusting provided the various actors in the system do not tamper with the transmission process.

Arbitrage plays an important part in this process. Arbitrage occurs through changes in the money supply, interest rate and credit supply, rather than through the exchange rate. Although the currency board maintains a fixed exchange rate with the reserve currency, it does not control other nominal or real prices in the economy. These other prices are determined by arbitrage. For our purpose, our goal here is to test empirically whether this process, which is so vital for the efficient operation of the monetary mechanism of a currency board system, actually exists in the Namibian economy.

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<sup>5</sup> Many central banks operating as currency boards have in recent times circumvented this requirement by holding more than the 100 percent mandatory reserves.

**4. METHOD OF ANALYSIS AND DATA DEFINITION**

Two distinctive though interrelated issues are addressed in this analysis. The first is to find out how a change in monetary policy stance (e.g. a tightening of monetary policy) by the SARB is transmitted to the Namibian economy. The second issue relates to the operations of the transmission process in a currency board arrangement.

Here we assume that the payment of SACU receipts or in the alternative, an increase in exports results in the growth of money supply and we trace out the impact of this on interest rates, credit and income. To address these issues, two methods i.e. the Narrative approach and the Vector autoregressive analysis are used.

**4.1 The Narrative Approach**

The use of this approach is fairly well documented in De Fiore (1998) and Morsink and Bayoumi (1999). First, we identify **focal episodes** of restrictive monetary policy in which the SARB appeared to have deliberately been willing to accept some output sacrifices<sup>6</sup>. It was particularly difficult to elicit such focal episodes from the set of monetary and credit policy guidelines available to us. As a result of this, we resorted to the use of historical data from major financial variables, in this case the discount rate, bank rate and short-term interest rates to identify periods of monetary tightening. The thinking here is that if monetary policy is indeed a major source of output changes in the focal episode, the expected impact of changes in the chosen policy instrument on money supply, lending rates, bank credit, private investment, and consumer prices should be discernible.

It was much easier to determine focal episodes for the currency board analysis. The identified period should coincide with periods of relative expansion in money supply heralded by SACU revenue payments or export boosts. Since a calendar of such payments is easily available, this did not constitute a problem. We simply verified that such payment periods coincided with major boosts in money supply growth.

In order to select the date of the shock in the first case, we focus on the Reserve Bank's main instrument, the repo rate and its corresponding Bank of Namibia's bank rate<sup>7</sup>. The focal episodes selected are the twelve months beginning January 1997 and 1998. These years are characterised by a tight monetary policy i.e. both the repo rate and bank rate are on a rise. Thereafter, a dynamic forecasting analysis is used to see how changes in the policy instrument—repo rate/bank rate translate into deviations of key variables from the normal behaviour, after each tightening episode.

A cumulative forecast error (CFE) is derived for each variable. Our evidence of tightening is estimated after each major hike in repo rate for the years 1997 and 1998. The variables considered by this paper are private investment, credit to the private sector, money supply, consumer price index and lending rates.

$$\ln X_t = \alpha + \beta_t + \sum_{i=1}^{12} \gamma_i \ln X_{t-i} + E_t \tag{1}$$

The normal path is estimated based on a simple univariate forecasting equation, where t is a trend, and X<sub>t</sub> denotes the variable in the equation, i.e. credit to the private sector, money supply, CPI, and private investment respectively.

<sup>6</sup> Our decision to jettison the BoN bank rate results from the close correlation between the SARB repo rate and the BoN bank rate. This is to be expected given the degree of co-movement in the two rates. In addition we argued earlier that the financial markets in both countries are highly integrated.

<sup>7</sup> Although the goal of monetary policy by SARB has changed in recent times to inflation targeting, operationally monetary policy has continued to focus on the control of short-term rates principally the repo rate. Other short-term rates closely monitor this rate.

Forecast errors at each period are given by the difference between the actual and the forecasted difference of the log variable. At each period t, the overall effect of monetary tightening on X is obtained by cumulating the forecast errors from the date of the monetary shock up to t,

$$CFE_t^{X*} = \sum_{i=1}^t (\ln X_t - \ln^f X_t) \text{-----} \quad (2)$$

Since we cumulate the first difference in log values, CFE gives the percentage deviation of the variable X from its usual behaviour, t periods after the beginning of the shock.

For lending rates the same procedure is followed except for the fact that, data are used in percentage change, so that cumulative errors are built in a similar way as for the growth of production, etc. The normal behaviour is estimated using the following autoregressive specification

$$\tilde{E}_t = \alpha + \sum_{i=1}^t \tilde{y}_i e_{ei} + E_t \text{-----} \quad (3)$$

Where e is alternatively the percentage change in nominal lending rate and the repo rate where applicable. The same procedure as above is applied to derive the cumulative forecast errors. Our results are summarised in 5.1 below.

**4.2 Vector Auto regression and Impulse Response Analysis.**

The second approach consists of the use of the vector auto-regression (VAR) analysis. It involves the formulation of a general (unrestricted) vector autoregressive (VAR) model.

This approach consists in regressing each current (non-lagged) variable in the model on all the variables in the model lagged a certain number of times. Since this model involves only lagged variables on the RHS and since these variables by definition are not supposed to be correlated with the error term, it can be consistently estimated equation by equation by ordinary least squares (Charemza and Deadman). Its relative simplicity, attractiveness stems from a number of econometric advantages. First, compared to reduced-form simultaneous equation models, VAR models impose few a priori restrictions, such as exclusion of potential explanatory variables or restrictions on the lag structure, to achieve identification.

Since economic theory is rarely so well defined as to suggest strong exogeneity assumption, the rather atheoretical approach of VAR models has the advantage of allowing the historical data to tell their own story. Second, the richness and unrestricted nature of the lag structure in VAR models provide a good safeguard against a host of econometric problems, notably spurious correlation and cointegration problems. This study would not deviate from this standard methodology, although it has its own limitations.

The main results drawn from VAR are through the **impulse response analysis (IRA)**. IRA seeks to answer the question, how do the modelled variables respond to any innovations or shock in the economy? In order to show the dynamic effects of the impact of unitary shocks on private investment, consumer prices, lending rates, repo rate and money supply, we formulated a VAR model using Choleski decomposition in that order<sup>8</sup>.

The ordering determines the level of exogeneity of the variables, so current shocks to private investment are assumed independent of current shocks to all the other variables in the system, while current shocks to money

<sup>8</sup> Put simply, using a Choleski decomposition implies putting the variables in an order which assumes that the innovation of the first high most of the time is a policy variable is not affected contemporaneously by the innovation to any of the other variables, the innovation the second assumed affected contemporaneously only by the innovation to the first and so on by the innovation.

supply are assumed to be affected by current shocks to all other variables. For our purpose, the advantage in this approach is that we are able to capture the exogenous shocks of money on all the other variables in the system while at the same time capturing the effect of short-term rates on the other variables. The idea here is that money may also affect short-term rates. This allows us to use money and short-term rates as policy variables. Later in the analysis we are able to disentangle this relationship.

The overriding advantage in this approach is that while we can later discontinue the investigation on intermediate transmission variables of the impact of SARB repo rate, our analysis can focus more on the impact of monetary changes on our variables of interest which we are interested in for the Currency board investigation. The ordering was done based on the speed with which these variables respond to shocks with Private Investment assumed to be the least responsive, followed by prices, credit, lending rates, repo rate and finally broad money. It will be observed that our model captures the main elements of a transmission process with a monetary policy instrument (repo rate/ bank rate), two intermediate transmission variables (lending rates and bank credit) and two target variables (consumer prices and private investment). This study uses monthly data for the period 1990 to 1999, obtained from the BoN and the SARB quarterly bulletins.

Data on Private investment were interpolated from their annual series using the Friedman linear interpolation method. Nevertheless, for the Impulse response analysis the sample used is from 1997—1999 since we assume that the response of variables in the model is with reference to the focal episode identified in January 1997. The result credibility may come under scrutiny because the period of focal episodes coincides with Asian crisis. To allay any fear of that nature the study also uses 1995 a normal year but with tightening of monetary policy. Moreover, the result replicated the previous ones.

## 5. EMPIRICAL RESULTS

### 5.1 Cumulative Forecasting Error (CFE).

The results from the CFE analysis are presented in Table 1 below. The table reports cumulative forecast errors for the percentage change of the above variables, calculated according to equation 1-3. The variables taken into account are private investment, broad money, credit to the private sector, and lending rates.

**Table 1: Cumulative Forecast error**

Months after the shock	Credit private sector		Lending rates		Real Broadmoney		Private Investment		Consumer Price Index	
	1997	1998	1997	1998	1997	1998	1997	1998	1997	1998
1	0.0096	0.0024	0.0114	0.0233	-0.0279	-0.0316	-0.4180	-0.0453	0.0159	0.0057
2	0.0099	0.0012	0.0255	0.02459	-0.0767	-0.0255	-0.4232	-0.0455	0.0168	0.0084
3	0.0024	0.0007	0.0337	0.0322	-0.0350	-0.0089	-0.4277	-0.0455	-0.0046	0.0009
4	-0.0018	0.0041	0.0365	0.0319	0.0395	0.0099	-0.4331	-0.0452	0.0089	0.0023
5	-0.0134	-0.002	0.0591	-0.0449	0.0278	-0.0285	-0.4377	-0.0439	-0.0074	-0.0088
6	-0.0247	0.009	0.0842	0.0335	0.0323	-0.0338	-0.4393	-0.0426	0.0085	-0.0044
7	-0.0288	0.002	0.0473	0.0345	0.0222	-0.04120	-0.4471	-0.0407	-0.0091	-0.0043
8	-0.0143	0.0039	0.0516	0.01092	-0.0127	0.0204	-0.4518	-0.0399	0.0061	0.0119
9	-0.0151	0.0044	0.0709	0.2012	-0.0512	-0.0167	-0.4563	-0.0385	-0.0003	-0.0013
10	-0.0138	0.00966	0.0475	0.1317	-0.0435	-0.0127	-0.4609	-0.0376	0.0022	0.0028
11	-0.0006	0.0183	0.0308	0.2003	0.0158	-0.0088	-0.4653	-0.0367	-0.0016	-0.0003
12	-0.0005	0.0176	0.0105	0.1597	-0.0224	-0.0247	-0.4671	-0.0744	0.0036	-0.0044

Cumulative percentage deviation of actual from forecasted differences in log values

In the two episodes, the private investment which is the main target variable declined as a result of the tightened monetary policy in 1997 and 1998. The coefficients of private investment declined consistently throughout 1997 becoming larger in absolute terms as we approached the twelfth month.

This decline is attributed to the two scenarios involved in the exogenous shock captured by our focal episode- the Asian financial crisis of early to middle 1997, and the internal shock following from a reaction of the South African Reserve bank which immediately tightened monetary policy consequent on the crisis. The domestic lending rates, after a tightening of the monetary policy (shock), rose substantially with a peak of 20.93 per cent in 1997 and continued rising into 1998. Clearly the rise in lending rate is consistent with the theoretical expectations; any increase in the repo rate by SARB is fully transmitted into an increase in lending rate in Namibia.

Our analysis in the following section enables us to investigate further the existence of this transmission channel.

### 5.2 Impulse Response Functions

The basic model, which includes private investment, consumer prices, credit to the private sector, lending rates, repo rate and money supply, provides some important and useful results relevant to the transmission mechanism: (i) interest rate shocks have significant effects on private investment and hence on output, consistent with an

important role for monetary policy; (ii) domestic credit to the private sector also have a significant effect on output, even when interest rates are included in the model, consistent with the idea that non-policy monetary shocks are also important in determining economic activity.

The results from the basic model summarised through the model's impulse response functions reported in figure 1A to figure 2D. An unexpected rise in short-term interest rates causes statistically significant decline in private investment (see fig 1a).

A one standard deviation (SD) innovation of bank credit on private investment leads to a decline in private investment, which only begins to ease after the fifth month (see figure 1 e). The effect of an innovation on repo rate on private investment is also very noticeable as private investment declines immediately. Two results however stand out. The impact of a one S.D. innovation on lending rates on private investment is not well articulated in our model. A discernible pattern does not begin to emerge until about the ninth month after the innovation.

The effect of an innovation on money supply on private investment initially indicates an increase, which eventually falls off after the sixth month. The results of the impact of our innovations on consumer prices are also very interesting. Of particular interest, here is the response of consumer prices to a one S.D. innovation in the lending rate. It shows that consumer prices will decline in response to shock from this variable. This may be one of the factors influencing the use by SARB of the interest rate (repo) for the control of inflation. As the response of the domestic lending rates which affect prices on repo rate is immediate.

Similarly, an unanticipated shock in most of the innovations causes statistically significant decline in the credit to the private sector. A one S.D. innovation in the repo rate causes bank credit to the private sector to fall (Fig 1C). The same magnitude of shock on the lending rate will cause domestic credit to initially fall although this effect initially wears out, and domestic credit stabilises thereafter. The initial fall is reinforced by the response of credit to business to lending rate innovations, which further causes domestic credit to plummet. We reproduce in Fig 1C, the responses of credit to business and credit to individuals to innovations to lending rates.

The overall impact of innovations to lending rate on domestic credit is minimised by the lack of response of credit to individuals to the shock caused by lending rate. Given the rather low response of private investment to innovations on bank credit, this study assumes that the major channel through which private investment is influenced by credit is through the effect of lending rates on credit to business.

The response of lending rates to repo rate is as should be expected fast and deep. A one SD innovation of repo on lending rates shoots up the latter and does not begin to wear out until the sixth month. The effect of the same shock on money supply is indeterminate, as money supply appears not to change by much around its median. The reverse is also true. A shock to money supply does not affect the lending rate. The effect of a one SD innovation to money supply on credit is positive. This confirms that though shocks to money supply may not affect lending rates, they do impact significantly on bank credit. Both credit to individuals and credit to business respond very sharply to a one SD innovation on money supply. Our results also attest to the fact that monetary shocks are crucial determinants of the behaviour of private investment in the economy. A one SD innovation to money supply shoots up private investment substantially. The fact that private investment responds positively to money supply shocks instantaneously may tend to support the assertion we made earlier of the existence of an additional channel of transmission of monetary shocks to economic activity outside interest rates. In other words, the impact of money supply changes on domestic credit may be crucial for the transmission of monetary policy to economic activity even where such shocks do not impact on lending rates.



To confirm that such shocks are not necessarily passed through the lending rates we ran a smaller VAR consisting of private investment, prices, and the money supply with lending rate exogenized. Such a VAR will block off any responses within the VAR, which passes through the lending rate variable. The results of the innovations are shown in Fig 1 E. As reported earlier, a one SD innovation to broad money causes both private investment and prices to rise substantially.

## 6. POLICY IMPLICATIONS

A few policy issues stem from the analysis above. Given the high degree of integration between the Namibian and South African financial markets and the current exchange rate arrangement it appears monetary policy decisions taken by the South African monetary authority is transmitted through the interest rates and credit channels. The intensity of both channels is difficult to gauge from the set of results we have. The cost of capital effect is severe on private investment. The fact that a change in interest rate is transmitted to private investment has some policy ramifications. The demand for goods and services is not related to the market or nominal interest rate but rather to the real rate of interest (nominal rate minus the rate of inflation). A change in the real rate of interest affects the public's demand for goods and services, the availability of bank loans, the portfolio of households and the exchange rate. This study has established that the interest rate channel is effective in the economy. Given the importance of the inflation rate in determining real interest rate, it is important that efforts should continue to be made to avoid actions that may trigger or escalate domestic inflation. In this wise, the insistence on making the budget deficit manageable is in the right direction. More important, however, is the impact of domestic lending rates on the demand for credit, in particular credit to the business sector.

A change in the repo rate in South Africa is transmitted to lending rates in Namibia. It is transmitted eventually to credit to the private sector. Our analysis show that credit to individuals may not respond to such interest rate shocks but credit to business does. This is also transmitted to private investment. This channel clearly establishes that one possible means of influencing private investment in Namibia (in the short run) is by stimulating domestic credit to the business sector through lower lending rates. However, BoN does not possess the capability for enforcing lower lending rates in the economy even when policy so dictates, as we will argue below.

One principal objective of this study was to examine the money supply process in Namibia and articulate its implications for the transmission of monetary policy. For a quasi-currency board arrangement, a major avenue for the initiation of policy changes in the economy is through actions brought about by changes in the current account of the balance of payments. In the case of Namibia, a source of such change could be increases in exports or more noticeably, changes in SACU receipts by government. One important implication of our study is that such payments, which increase the money supply impacts on bank credit and stimulates private investment in the domestic economy. However, our studies discovered that they do not impact on domestic lending rates. This has two important implications. The first is that domestic lending rates are unresponsive to domestic monetary developments. The second, which is more overwhelming, is the fact that the automatic adjustment mechanism, which is the core of the transmission process in a quasi-currency board arrangement, may be impaired. Both developments could have adverse implications for the growth of output and employment in the economy.

There are two reasons why this situation could have survived this far. The first is the practice by commercial banks to build up their foreign reserves at periods following such expansion in money supply rather than lowering domestic lending rates. The second is the argument that such practice by banks could be defended by the fact that lowering lending rates in response to major money supply shocks could put pressure on the fixed exchange rate arrangement (this is in spite of the fact that other rates respond to increased liquidity in the economy). It might be necessary to further investigate this argument. The third argument is the much orchestrated one. Commercial Banks build up their foreign assets because there are no viable lending opportunities in the domestic economy. However valid these arguments are, this co-existence of excess liquidity and high lending rates in the economy warrants further investigation.

## 7. CONCLUSION

This study examined the two main channels through which monetary policy gets transmitted into the economy - namely the interest rates and credit channel. The results from our investigation reveal that both channels are effective in the case of Namibia.

### THE RESULTS INDICATES THAT:

A tightening of monetary policy as evidenced by an increase in the repo or bank rate causes lending rates to increase in the domestic economy and is reflected in the shrinkage of private investment with its attendant negative impacts on output and employment in the short-run. The result also confirms the operation of the bank-lending channel, a version of the credit channel in Namibia. As this channel requires that some firms cannot costlessly replace losses of bank credit with other types of finance, but must rather curtail their investment spending, in the face of increased lending rate or shrinkage of bank reserves during a tight money regime, we are likely to observe a deviation of investment behaviour from its optimal level.

The low response of domestic lending rate to domestic money supply shocks did not come as a surprise since in a Currency Board arrangement the domestic economy loses control over interest rates. Domestic interest rates follow anchor currency rates in normal times. The situation becomes worrisome at moments when external shocks cause fluctuations in domestic liquidity. At such times policy dictates that the central bank be able to manage its liquidity position to enable her smooth out any fluctuations in interest rates and keep this in line with anchor currency interest rates. This again underlines the urgent need for a liquidity management and monetary policy framework.

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**APPENDDICES**

DSAREPO

DLINVP

DLCPI

DLPRSCREDIT

DLRM2

DNAMLR

**ANNEX I**

SOUTH AFRICA REPO RATE

PRIVATE INVESTMENT IN NAMIBIA

CONSUMER PRICE INDEX IN NAMIBIA

PRIVATE SECTOR CREDIT IN NAMIBIA

REAL BROADMONEY IN NAMIBIA

PRIME LENDING RATE IN NAMIBIA