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FOREWORD

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Monetary Policy Determination Under a Fixed-Exchange Rate Regime in a Common Monetary Area (CMA): The case of Eswatini

By Patrick Ndzinisa[1] and Bongani Dlamini[2]

Abstract

The study investigates how monetary policy is implemented by Eswatini under the fixed exchange rate regime in a CMA. The study found that there is a strong positive relationship between the Eswatini discount rate and the South African repo rate. The study also found that the interest rate differential between the discount rate and repo rate is not important in cushioning capital outflows to South Africa as measured by the purchases of Rands by the commercial banks. However, the study found that capital outflows have a strong negative relation with the call rate, which is the rate at which commercial banks are remunerated for keeping their funds in an overnight call account at the CBE. These results reflect the unique characteristic of the banking sector in Eswatini which is more liquid. Hence, banks do not utilize the discount rate window to borrow funds from the CBE for credit extension and/or Rand transactions. Instead, the banks seek for avenues to invest their liquidity overnight, which happens to be the call account domestically, in order to earn interest. Moreover, the study confirms that domestic macroeconomic conditions as measured by output and inflation matter in the determination of the discount rate and that the discount rate is transmitted to GDP growth but not to inflation. Eswatini inflation is largely

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influenced by the South African inflation due to the high volume of imports originating from South Africa. In view of these results, it is recommendable that the CBE should use the discount rate for financial intermediation to promote economic growth while using the call rate to cushion capital outflows to South Africa. This implies that the CBE may have to pursue a negative interest rate differential between the discount rate and repo rate to make credit relatively cheaper in order to promote economic growth while adjusting the call rate to be above the repo rate to contain capital outflows.

Key words: *Monetary policy, Fixed exchange rate, interest rate differential, financial intermediation*

1. Background

1.1 The History of the Current CMA Arrangement

For a long time, Eswatini has enjoyed a fixed exchange rate currency relationship with South Africa. In 1974, after independence, Eswatini introduced her own currency, which remained at par and fixed to the Rand through the Rand Monetary Area (RMA) agreement, together with Lesotho, South Africa and Botswana (Botswana pulled out in 1976). The agreement provided for free movement of capital between the member states and in this regard, through an agreed formula based on Rands estimate circulating outside SARB, South Africa paid compensation (seigniorage) for the circulation of the Rands in the smaller states. Following a sharp fall of the Rand exchange rate in 1985, the smaller members of the monetary union initiated the modification of the RMA agreement to CMA agreement in 1986 as this development had negative effects on their economies. Namibia, which became independent in 1990, joined the CMA in 1992 and issued its own national currency, the Namibian

dollar, in the following year. Under the CMA agreement, Eswatini had an option to pursue an independent exchange rate policy, should it desire, which led to Eswatini ceasing the legal status of the Rand in the country. Consequently, the obligation of South Africa to make compensatory payments to Eswatini ceased in 1986. Despite that the Rand ceased to be a legal tender in Eswatini, the Central Bank of Eswatini (CBE) maintained the parity peg to the Rand and economic agents continued trading in Rand. However, in 2003 the legal status of the Rand and the payment of seigniorage compensation were reinstated.

Through the CMA arrangement Eswatini's monetary policy is unavoidably and strongly influenced by economic and financial developments prevailing in South Africa. Though the monetary authority has statutory powers to prescribe maximum and minimum rates of interest, it would be unrealistic for the CBE to prescribe rates that differ widely or greatly from those prevailing in the rest of the CMA, particularly South Africa. In this context, the CBE effort has been to protect the economy as far as possible from adverse effects of changes in monetary conditions of the CMA, particularly in South Africa.

1.2 Implementation of Monetary Policy in CMA Smaller Members

1.2.1 Monetary policy implementation in Eswatini

As earlier indicated, Eswatini pursues a fixed exchange rate system in which the Lilangeni is pegged on a one-to-one basis with the South African Rand. To maintain the peg, the CBE must have adequate reserves. By maintaining the peg Eswatini imports low and stable inflation from South Africa. The CBE has a pool of instruments through which it influences domestic monetary conditions, and these include the discount rate, liquidity requirement, reserve requirement and open market operations (OMO). The discount rate is the main instrument used by the CBE to

influence monetary conditions in the country. The discount rate is the interest rate at which commercial banks borrow money from the CBE and in turn, affects other interest rates in the economy. The discount rate moves almost in tandem with the South African Reserve Bank's (SARB) repo rate, albeit with some deviations, to manage capital flows that affect the level of reserves. For example, a wider negative deviation against the SARB repo rate would result in increased capital outflows to South Africa thus depleting the country's level of reserves, hence threatening the peg. Whilst on the other hand maintaining a higher positive interest rate differential will prevent capital outflows it discourages borrowing for economic growth. Hence, to strike a balance between discouraging capital flight and encouraging economic growth, the differential is allowed to fluctuate between ±50 basis points. However, in the event of a negative differential like it is the case currently, the CBE uses its call rate (overnight rate) by keeping it above the South African repo rate and market rates in order to prevent capital flight. The call rate is the rate at which commercial banks are remunerated to keep their funds in a call account at the CBE overnight.

The transmission of the discount rate to the economy is through the market rates among which is the prime lending rates charged by the commercial banks for credit extension to the public. Hence, if the CBE increases the discount rate, market interest rates increase as well, and borrowers will be discouraged to borrow due to the higher interest rates whilst depositors are encouraged to save in order to benefit from the higher interest rates. Currently, the CBE is pursuing a contractionary monetary policy where the discount rate is increasing in line with rising inflation perpetuated by the Russia/Ukraine war. Likewise, the prime lending rates is on an upward trend which does not ague well for economic growth. However, the monetary policy pursued by the Bank is still relatively supportive of economic growth in an effort to strike a

balance between curbing inflation and protecting the peg, and supporting economic growth.

Other monetary policy instruments which the CBE uses are the reserve requirement, liquidity requirement, and open market operations. The reserve requirement stipulates that a certain percentage of the funds commercial banks receive from depositors be kept with the CBE. The CBE periodically decides on the reserve requirement and was last reduced from 6 per cent to 5 per cent during the COVID-19 in order to increase liquidity in the financial system to resuscitates economic growth. Similarly, the CBE lowered the liquidity requirement from the 25 per cent to 20 per cent for commercial banks and from 22 per cent to 18 per cent for development banks in an effort to inject liquidity and cushion the economy from the negative effects of the COVID-19. In an effort to manage excess liquidity in the financial system, the CBE also introduced CBE bills and auctions are held weekly on Thursdays. This is to sterilize excess liquidity which can have an inflationary effect and also curb capital flight, which could lead to higher interest rate and low reserves respectively.

1.2.2 Monetary policy implementation in Lesotho

The primary mandate of the Central Bank of Lesotho (CBL), as indicated in Section 5 of the Central Bank of Lesotho Act of 2000, is to achieve and maintain price stability, by ensuring that the peg between the Loti and the South African Rand (Rand) is maintained. In that regard the CBL pursues an exchange rate targeting monetary policy framework. To maintain the peg the CBL ensures that net foreign reserves (NFR) are at a level that is sufficient to guarantee that for every Loti issued there is a basket of foreign currency equivalent reserves, which is the level that underwrites the peg. The Bank operationalizes the monetary policy decision through conduct of open market operations (OMO), which influences the short-term interest rates with

a view to align them with those in the CMA albeit with an allowable deviation margin. This is to curb, as far as possible, the capital outflows as domestic comparable rates are expected to enhance the attractiveness of the Government of Lesotho securities relative to their counterparts in the CMA sub-region.

The OMO is conducted bi-weekly, preceded by forecasts of liquidity conditions in the economy. Conditions of excess liquidity lead to capital outflows which puts pressure on the reserves. The OMO therefore is ultimately aimed at alleviating that pressure which if left unchecked may threaten the level of NFR and by implication the peg between the Loti and the Rand. The other tool of monetary policy is the CBL Rate, which is the reference rate that anchors all other rates in the banking sector. The CBL Rate is also set in alignment with the rates in the CMA, again with some allowable deviation margin. The argument for this broad alignment is still to curb the capital flows to the extent possible.

1.2.3 Monetary policy implementation in Namibia

The main objective of monetary policy in Namibia is to maintain price stability that is in line with sustainable economic growth. Monetary policy is governed by the one-on-one pegging of the Namibian Dollar to the South African Rand. This requires that Namibia's currency in circulation is backed by international reserves to a minimum ratio of one to one, hence importing price stability from South Africa. Hence, the maintenance of the peg is the intermediate target which is achieved by ensuring that the Namibian repo rate do not move away largely from the South African repo rate, which may lead to unintended capital flows, and/or divergent macro-economic developments between the two economies.

The operational target is an economic variable that the central bank wants to influence, largely on a day-to-day basis, through its monetary policy instruments.

Although there is no formal operational target in Namibia, the Bank of Namibia monitors the level of official reserves, as the fixed currency peg requires the country to fully back its currency in circulation with international reserves in order to import stable prices from South Africa.

The Bank endeavors to maintain the foreign reserves at a level which, in the view of the Board, are adequate to cover Namibia's external obligations and retain confidence among its investors and rating agencies (section 62 (1)). In this regard, there is a minimum threshold below which foreign reserves are considered inadequate. The minimum threshold in this case is defined as the currency in circulation plus a buffer of three times the monthly commercial bank net foreign transfers. If international reserves are initially at a level that the Board considers inadequate, it should determine measures to grow the international reserves. The main policy tool that the Bank of Namibia uses to influence monetary conditions in the country is the repo rate, which is aligned to the South African Reserve Bank's repo rate. The Repo rate is the interest rate at which commercial banks borrow money from the Bank of Namibia, and this, in turn, affects other interest rates in the economy. Changes to the repo rate usually consider the SARB's decision, prevailing domestic economic conditions, international economic conditions including foreign reserve adequacy, and future economic prospects.

1.3 Objective and research questions of the study

The objective of the study is to investigate monetary policy implementation in Eswatini under the fixed exchange rate. To achieve this objective, the study intends to answer the following research questions:

1. How does the South African repo rate and capital mobility influence the Eswatini discount rate?

2. Does capital mobility respond to the discount rate and repo rate differential, and/or the call rate?
3. Do domestic macroeconomic conditions as measured by output and inflation matter in the determination of the discount rate?
4. Under the current fixed exchange rate, does the repo rate through the discount rate explains the variations in the domestic output and inflation? This is tantamount to measuring the efficacy of monetary policy in a CMA with a fixed exchange rate.

The study is organized as follows; In section 2, the study outlines the stylized facts on the relation between the interest rates and reserves, capital flows, and selected macroeconomic variables. Section 3 presents literature review. In section 4 we present the methodology used in the study together with data analysis. Section 5 presents the empirical results while section 6 concludes with policy recommendations.

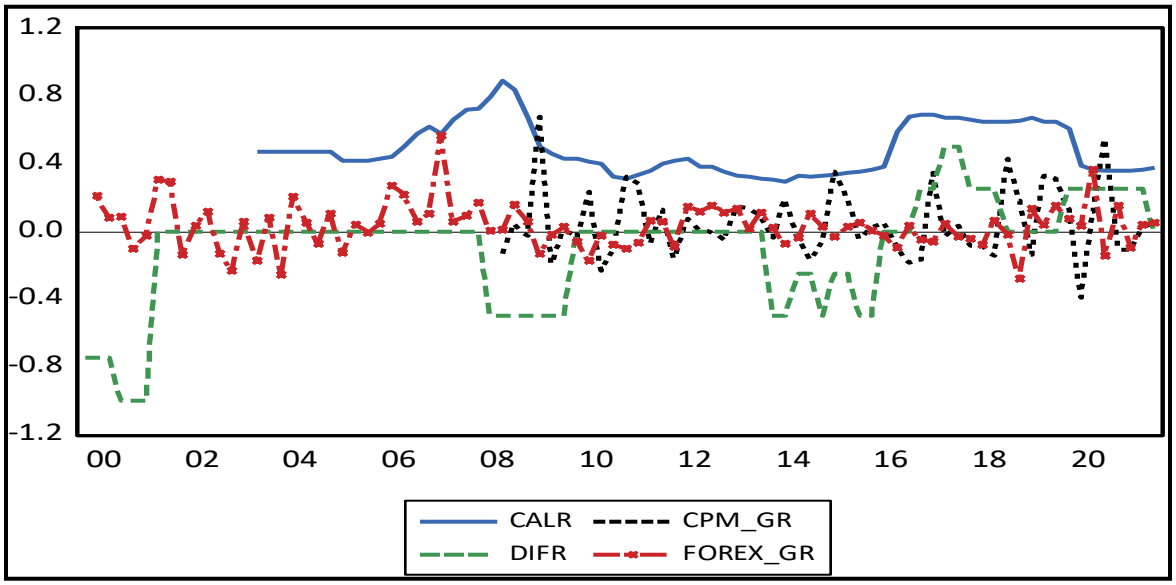
2. Stylized facts

2.1 Interest rate differentials, Reserves, Capital flows and Liquidity Management

Eswatini's foreign exchange reserves are mostly dominated by the South African Rands, hence any movement in both the domestic and South African interest rates is bound to affect the level of reserves through capital flows between the two economies. Capital flows are reflected in the purchasing and selling of Rands by the commercial banks from and to the central bank of Eswatini respectively. Whenever there is a negative differential between the repo rate and the discount rate, that is the discount rate is lower than the repo rate, it is expected that commercial banks will borrow Emalangeni from the CBE at the discount rate to purchase Rands from

the CBE and channeled them to South African markets in pursued of higher returns. This constitute capital outflows and it results in the deterioration of the level of foreign reserves. However, if there is a positive differential, commercial banks are expected to sell Rands to the CBE which discourages capital outflows, hence boosting the level of foreign reserves. Figure 1 depicts the relationship between the interest rate differential (difr), foreign reserves (forex_gr) and capital flows (cpm_gr). There is a clear indication of a negative relationship between the level of reserves and capital mobility as measured by the purchasing of Rands by the commercial banks from the CBE. Increases in the Rands purchasing are associated with a reduction in the level of foreign reserves, while reductions in the Rands purchasing cause the level of reserves to increase.

Figure 1: Call rate, Interest rate differentials, Reserves and Capital flows



Source: Central Bank of Eswatini
Note that in this graph the call rate was scaled down by dividing its original values by 10

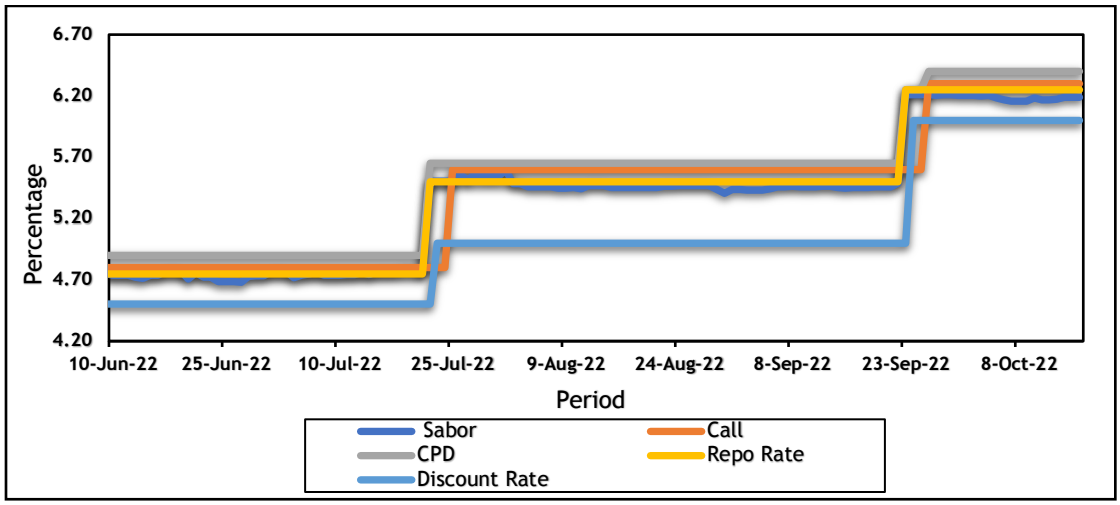
However, there is no clear evidence of a relation between the interest rate differential and capital flows as the country records capital outflows even in periods of positive interest rate differentials. This is attributed to the fact that commercial banks in Eswatini are liquid and hence do not utilize the discount rate window to borrow funds

from the CBE for purchasing of Rands to invest in South Africa in pursuit of the relatively high interest rate. The relationship between the interest rate differential and capital flows is further weakened by the liquidity management and other measures pursued by the CBE to prevent capital outflows during negative interest rate differentials and in the process protecting the level of reserves from dwindling. Previously, the CBE Bank issued the Central Bank Bills to mop up excess liquidity that may results in capital outflows until around 2012 when the issuance was suspended on the reason that it was perceived to be competing with the Government Treasury Bills. However, with the emergence of Covid-19 and the subsequent loan advances to Government, particularly the E2 billion loan from the IMF in 2020, the Central Bank re-introduced the Central Bank Bills to control liquidity which could arise due to these loans. On the other hand, the CBE uses the call rate to encourage commercial banks to keep their excess liquidity in a call account at the CBE, which was re-adjusted in 2016 to be at least above the SARB repo rate, to curb capital flight.

As indicated in Figure 1, relatively higher call rates are associated with declines in the Rands purchasing, while lower call rates result in increases in the Rands purchasing by the commercial banks, hence an increase in capital outflows. In the third quarter of 2008 the country recorded a negative differential of 50 basis points with a corresponding peak of 8.89 percent in the call rate and the Rands purchasing recorded a negative of growth of 14 percent. As the call rate was reduced to 5.02 percent in the second quarter of 2009, the Rands purchasing increased by the highest level of 68 percent. In the period between 2010 and 2016 the call rate was stable around 3 percent and the Rands purchasing remained stable over the same period. In the subsequent periods the call rate shot up and remained stable before falling drastically in the second quarter of 2020. Consequently, negative and positive growths were observed in the Rands purchasing during periods of high and low call

rates respectively. Figure 2 shows the recent relations between the call rate and the South Africa Benchmark Overnight Deposit Rate (SABOR), Corporation for Public Deposit (CPD) rate (the rate at which CBE can place ZAR liquidity overnight), Repo rate and Discount rate.

Figure 2: Call rate versus SABOR, CPD, Repo rate and Discount rate



Source: Central Bank of Eswatini

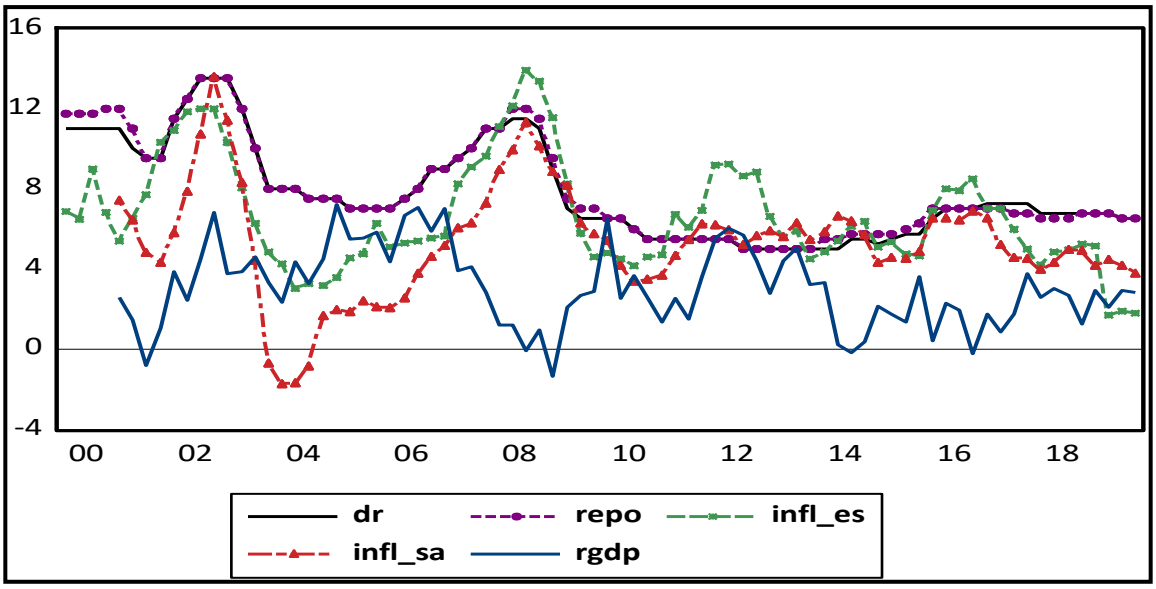
Over the period from June to October 2022, a negative differential between the discount rate and the repo rate has been maintained, which is envisaged to have encouraged capital outflows to South Africa. However, because of the call rate remaining above SABOR and the repo rate, which are the rates at which domestic commercial banks are remunerated for placing overnight funds in the South African markets, capital flight to South Africa has been to a large extent cushioned. On the other hand, for the CBE to pay a competitive call rate, it places ZAR liquidity overnight and get paid the CPD rate which is above the call rate. At the end of the review period, the call rate was 11 and 5 basis points above the SABOR and the repo rate respectively, while it was 10 basis points below the CPD rate. The CBE call rate is adjusted weekly in line with money market developments in the South African markets in an effort to curb Rand outflows to South Africa. As such, the call rate is not a monetary policy rate but an instrument used by the CBE to discourage capital

outflows by commercial banks in order to protect the level of reserves from declining, which poses as a threat to the parity.

2.2 Interest Rates and Selected Macroeconomic Variables

The main objective of monetary policy in Eswatini is to maintain price stability in order to foster sustainable economic growth. However, in a fixed exchange rate there is always a likelihood that inflation rate in the anchor economy is transmitted to the smaller economies through the high volume of trade between the two countries. The policy rate of the anchor country is also expected to have an impact on macroeconomic variables of the anchoring country. Figure 3 below shows the relations between the Eswatini discount rate (DR), South African repo rate (RR) and selected macroeconomic variables such as Eswatini inflation (INFL_ES), South Africa inflation (INFL_SA and real GDP growth rate (RGDP).

Figure 3: Trends of RGDP growth, Inflations and Interest Rates



Source: Central Bank of Eswatini

The correlation between the Eswatini discount rate and the South African repo rate is almost one with ±50 basis points differentials in some periods. This is expected for Eswatini whose monetary policy is in line with that of South Africa because of its

limited scope to formulate independent monetary policy under the fixed exchange rate. The interest rates are positive correlated with the inflation rates indicating that higher inflation causes the central banks of both countries to hike their monetary policy rates to contain inflation. By virtue of in a fixed exchange rate with South Africa coupled with a large of its imports originating from South Africa, Eswatini inflation is largely driven by South Africa's inflation. This is confirmed in the graph where Eswatini inflation's trend mimics that of South Africa. Regarding the relation between the interest rates and Eswatini real GDP growth rate, high interest rates are associated with low economic growth while low interest rates are in line with high real GDP growth rates.

3. Literature review

Theoretically, the choice of monetary policy a country can pursue is guided by the Mundell-Fleming impossible trinity, which argue that countries cannot simultaneously have a fixed exchange rate, an open capital account and still pursue an independent monetary policy. A country can possibly pursue at a time two of the three objectives and forgo the other. For example, Saxena (2008) argues that in an economy with a closed capital account, domestic interest rates transmit to domestic aggregate demand regardless of the exchange rate regime. On the other hand, for an economy with an open capital account the determination of the domestic monetary policy will depend on the exchange rate regime and the degree of capital mobility between the domestic economy and the foreign economy. The author further states that in a floating exchange rate regime, monetary policy can be transmitted to the economy through the interest rate and liquidity channel or through the exchange rate channel.

Under the exchange rate channel coupled with higher degree of capital mobility, monetary policy largely impacts on domestic aggregate demand through a policy induced changes in interest rates which affect the exchange rate leading to changes in output and inflation. However, in a fixed exchange rate regime the higher degree of capital mobility cushions the impact of monetary policy on domestic aggregate demand through capital flows. Hence, under a fixed exchange regime, monetary authorities can move domestic interest rates independently of foreign rates of the anchor country only if there is a lesser degree of capital mobility. This confirms the assertion by El Hamiani Khatat and Veyrune (2019) that in practice, many central banks with fixed exchange rates determine their domestic monetary policy rates even under capital mobility. Jefferis (2012) also argues that in real life countries do pursue policies that combines elements of open capital account, independent monetary policy and fixed exchange rate.

Figure 4: Monetary Policy Frameworks' Main Components

Source: El Hamiani Khatat et al. (2020)

Notes: OMOs (Open Market Operations), SFs (Standing Facilities) and RRs (Reserve Requirements)

El Hamiani Khatat et al. (2020) outlines the guiding principles for monetary policy design and implementation with an exchange rate anchor as follows:

- The exchange rate should preferably target one main objective, which is inflation. In this framework the exchange rate targeting country imports stable inflation from the anchor country.

- Price stability (inflation) should be the ultimate objective of a country fixing the exchange rate while the exchange rate is the intermediate target and the main monetary policy instrument. The use of the nominal exchange rate as an instrument of monetary policy is to keep it fixed to either one currency or a basket of currencies. Hence, the exchange rate can be used as the main monetary policy instrument while the policy rate can target the exchange rate. Adopting a fixed exchange rate is compatible with stable inflation when the exchange rate, the interest rate, and banking system liquidity are managed coherently.

- There should be a clear distinction between the processes of setting or changing the level of the policy rate and stabilizing money market rate fluctuations. Stabilizing short-term fluctuations of money market rates is an operational process aimed at managing liquidity that may result in capital flight during excess liquidity, which leads to the depletion of the level of foreign reserves and consequently posing as a threat to the peg. Hence, liquidity management has the dual objective of stabilizing the money market rates and protecting the peg. On the other hand, the monetary policy, which is set by the central bank should be managed coherently with the exchange rate. However, El Hamiani Khatat and Veyrune (2019) argue that where the central bank uses the monetary policy rate

to protect the peg like in Denmark, both the monetary policy rate and liquidity management instruments (money market rates) are used to offset shocks. The monetary policy is used to offset shocks to capital flows (exogenous shocks) while money market rates are used to offset short-term autonomous factor's shocks. While liquidity management also protects the peg, it has an added responsibility of preserving financial stability. Liquidity is managed through Open Market Operations (OMOs), Reserves Requirements (RRs), and liquidity management Standing Facilities (SFs) which include the overnight (O/N) credit and deposit facilities.

Several studies have tested the Mundell-Fleming impossible trinity on countries with a fixed/flexible exchange rate coupled with an open capital account. Shambaugh (2004) investigated the effects of a fixed exchange rate on monetary policy by examining if a pegging country's interest rate closely follows the interest rate changes in the base country. Using the Kwiatkowski, Phillips, Schmidt, and Shinn (1992) test for stationarity and cointegration techniques the author finds evidence that countries with a fixed exchange rate regime along with an open capital account follow closely the interest rate of the anchor country compared to floating exchange rate countries. The responsiveness of the interest rate of the pegging country to the interest rate of the anchor country as measured by the coefficient of the interest rate of the anchor country in relation to the pegging country's interest rate is found to be closer to one. The R^2 of the relation between the pegging country's interest rate and the interest rate of the anchor country is found to be higher for pegged countries compare to floating countries. This implies that the variation in the interest rates of pegged countries are largely explained by changes in the interest rate of the anchor country. The relatively low R^2 for floating countries indicates that other factors

besides the foreign interest rate largely influences the variation in the interest rates of non-pegged countries. Estimating an Error Correction Model (ECM) of the relation between domestic interest rate and foreign interest rate, the author finds that the speed of adjustment of the domestic interest rate due to a shock to the foreign interest rate is high for pegged economies than non-pegged economies. The results do confirm that pegged countries have a lesser degree of monetary policy autonomy compares to non-pegged countries.

Saxena (2008), examined the relation between capital flows, exchange rate regime and monetary policy in emerging economies. On the question of whether or not foreign interest rates influence domestic short-term interest rates, the study finds a positive and significant coefficient of the foreign interest rate (US interest rate) in relation to the domestic interest rates of the emerging economies. The results as interpreted by the author are indicating fear of floating for countries with floating exchange rates, interest rate parity condition for countries with fixed exchange rates or due to common shocks. Cpraru and Ihnatov (2012) investigated interest rate transmission and exchange rate arrangements in the Central and Eastern European (CEE) countries and they found that the domestic interest rates of the CEE countries as a panel respond to the European Central Bank (ECB) interest rate with a positive and significant coefficient of 0.638. However, the results on exchange rate regime subsamples are contrary to expectations where it is found that the coefficient of the CBE interest rate is high and significant at 1.173 for flexible exchange rate countries and significantly low at 0.405 for fixed exchange rate countries. For pegged exchange rate regime, the results could be due to lack of capital mobility or that monetary policies in these economies are not set in line with the IMF de jure exchange rate regimes classification. The lack of capital mobility may also explain the high coefficient for the flexible exchange rate regimes countries.

On the relation between the domestic interest rates and capital mobility, the study by Saxena (2008) finds that for countries with high capital mobility the coefficient of capital mobility is positive and significant regardless of the exchange rate regime. This implies that countries with high capital mobility has less ability to change their interest rates independently of the foreign interest rate. In a nutshell, the results indicate that there is a positive and significant relation between the domestic interest rates and foreign interest rate for countries with a fixed exchange rate and high capital mobility. Moreover, the study finds that countries with flexible exchange rate regimes have their domestic interest rate linked to the US interest rate only when capital mobility is high.

Using a structural vector autoregressive (SVAR), Seoela (2022) examined how economic output, inflation, money supply, domestic credit, and lending rate spread for each CMA member country respond to shocks in the South African repo rate. The study finds that there is a negative and significant effect of the South African repo rate on economic output, and a positive and significant effect on inflation at the 10 percent level for all countries in the CMA. Khide and Uanguta (2010) also finds that the prices of CMA member countries respond positively and instantaneously to changes in the South African repo rate. The positive relation between the repo rate and inflation of the CMA members is contrary to theoretical expectations where a contractionary monetary policy expected to reduce inflation. However, Seleteng (2016) found that the repo rate positively and significantly influences economic growth in the CMA region. Giovanni and Shambaugh (2007), find that an increase in the foreign interest rates reduce the real GDP growth in the domestic economy, particularly in countries with a fixed exchange rate. Ghosh et al. (1996), find evidence indicating that a pegged exchange rate leads to low inflation and low economic growth.

4. Methodology and Data Analysis

4.1 Theoretical Models

The intention of this paper is to investigate the degree of dependence of the Eswatini monetary policy and domestic macroeconomic variables to the South African monetary policy under an open capital account and a fixed exchange rate with the South African Rand as guided by the CMA. In a fixed exchange rate coupled with an open capital account, the Eswatini discount rate (dr) can be expressed as a function of the South African monetary policy as measured by the repo rate ($repo$) and a measure of capital mobility (cpm) as follows;

$$dr_t = \beta_0 + \beta_1 repo_t + \beta_2 cpm_t + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

Equation (1) is the long-run relationship between the Eswatini discount rate and the South African repo rate. The coefficient β_1 measures the responsiveness of the domestic discount rate to changes in the repo rate while β_2 is the responsiveness of the discount rate to capital mobility between Eswatini and South Africa. As argued by Saxena (2008), the responsiveness of the discount rate to changes in the repo rate may be attributable to common shocks that require a common interest rate response, high capital mobility that imposes an interest parity condition, or due to attempts to fix the exchange rate. In the case of Eswatini with high degree of capital mobility, the coefficient β_1 depends on the high capital mobility between Eswatini and South Africa. Hence, β_1 can be expressed as a function of a measure of capital mobility (cpm) as follows;

$$\beta_1 = \delta_r + \delta_{cm} cmp_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

Where the parameter δ_{cm} measures the responsiveness of the coefficient β_1 due to high capital mobility that imposes an interest rate parity condition. Substituting equation (2) into equation (1) yields the following equation;

$$dr_t = \beta_0 + \delta_r repo_t + \delta_{cm}(repo_t * cmp_t) + \beta_2 cpm_t + \varepsilon_t \ldots\ldots\ldots\ldots.\ldots(3)$$

Hence, the coefficient δ_{cm} measures the impact of the interaction-term between capital mobility and the repo rate on the discount rate. If higher capital mobility increases the impact of the repo rate on the discount rate, the interaction of the repo rate and capital mobility should be high and significant, thus $(\delta_{cm} > 0)$.

To answer the question of whether or not domestic output and inflation explains the variation in the discount rate, equation (3) is extended to include output gap $(rgdp\_gap)$ and inflation rate (cpi) as explanatory variables to obtain the following equation;

$$dr_t = \beta_0 + \delta_r repo_t + \delta_{cm}(repo_t * cmp_t) + \beta_2 cpm_t + \beta_3 rgdp\_gap_t + \beta_4 cpi_t + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(4)$$

If the coefficients β_3 and β_4 of output gap $(rgdp\_gap)$ and consumer price index (cpi), respectively are positive and statistically significant it can be concluded that output and inflation matter in the determination of the discount rate in Eswatini. Since, in a fixed exchange rate coupled with high capital mobility the discount rate is largely determined by the repo rate and capital mobility, the coefficients β_3 and β_4 are expected to be positive but statistically insignificant for Eswatini.

The study also investigates if the interest rate differential between the repo rate and the discount rate can still be considered as the driver of capital mobility by commercial banks, which are major conduit of capital flows. This arises from the CBE's action to allow commercial banks to deposit funds in a call account in order to prevent capital flight and paying them the call rate. Hence, Capital mobility is

expressed as a function of the interest rate differential ($difr$) and the call rate ($calr$) as follows:

$$cpm_t = \delta_0 + \delta_1 difr_t + \delta_2 calr_t + \epsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (5)$$

The sign of δ_1 is expected to be negative implying that an increase in the interest rate differential due to the discount rate increasing faster than the repo rate reduces the purchasing of Rands by commercial banks, hence reduces capital outflows. Likewise, the coefficient of the call rate is also expected to be negative indicating that an increase in the call rate entices commercial banks to place more funds in the call account and therefore reduces capital flight.

Lastly, the study intends to test the hypothesis that the higher degree of capital mobility offsets the impact of monetary policy on aggregate demand, hence on output and inflation through capital flows in a fixed exchange rate regime (Saxena (2008)). In that regard, the study examines whether or not the repo rate through the discount rate influences domestic output and inflation. Consequently, the study separately expresses output and inflation as a function of the discount rate and other control variables as they are deemed by theory to affect output and inflation as follows;

$$rgdp_t = \alpha_0 + \alpha_1 dr_t + \alpha_2 er_t + \alpha_3 rgdp_t^f + \mu_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (6)$$

$$cpi_t = \theta_0 + \theta_1 dr_t + \theta_2 er_t + \theta_3 oil_t + \theta_4 cpi\_sa_t + \epsilon_t \dots\dots\dots\dots\dots\dots\dots (7)$$

Where cpi and dr are as previously defined, $rgdp$ is Eswatini real GDP, er denotes the exchange rate between the lilangeni/rand and the US dollar, $rgdp^f$ stands for foreign real GDP, cpi_sa is South African consumer price index representing imported inflation from South Africa as Eswatini's imports are largely sourced from the South African markets, and oil represents international crude oil prices. An increase in the

discount rate is expected to reduce inflation and output, hence the coefficients α_1 and θ_1 are expected to be negative. Hence, monetary policy is considered effective to reduce both output and inflation in a contractionary monetary policy and to increase both output and inflation in an expansionary monetary policy. The size of those coefficients indicates the magnitude of the impact of monetary policy to influence output and inflation respectively. If the signs of those coefficients are positive and significant, monetary policy is not effective to reduce both inflation and output during a contractionary monetary policy or to increase them during an expansionary monetary policy. Hence, the sign and size of those coefficients measures the effectiveness and magnitude of the impact of monetary policy to influence output and inflation respectively.

Kandil and Mirzaie (2003) and the Svensson (2000) model support that an exchange rate depreciation lead to an increase in output by increasing exports competitiveness in international markets leading to an increase in aggregate demand, hence a rise in economic growth. However, this hinges on whether the Marshall-Lerner condition holds and on the ability of the domestic economy to meet the additional demand created by the depreciation. Hence, the relation between the real exchange rate and output is expected to be positive. As supported by the findings of Rasaki and Malikane (2015), the relation between the foreign real GDP and domestic output is expected to be positive since an increase in foreign GDP causes demand for home country exports to increase leading to an increase in aggregate demand, hence output. With regard to the relation between the nominal exchange rate and inflation, Tejvan (2019) argues that an increase in the exchange rate (a depreciation) will lead to cost-push and demand-pull inflationary pressures through increases in the cost of imports and domestic aggregate demand, respectively. Hence, a positive relation is expected between the nominal exchange rate and inflation. Oil prices which

constitute a cost-push inflation in an economy because of its usage as a major input in the economy has a positive relation with inflation as confirmed by the findings of Choi et al (2017).

In the equations to be estimated there are evidences of potential endogeneity and of having a mix of stationary and non-stationary variables. The reason that the discount rate is influenced by domestic output and inflation in Eq. (4) and that the discount rate also influences output and inflation in Eqs. (6) and (7) makes these explanatory variables correlated with the error terms, hence the problem of endogeneity. In this regard, the study uses the Autoregressive Distributed Lag (ARDL) bound cointegration testing technique as proposed by Pesaran and Shin (1999) to estimate the equations. The ARDL overcomes the problem of endogeneity by lagging the potential endogenous variables in the equations. Also Nkoro and Uko (2016) note that the ARDL is applicable for variables that are I(0), I(1) or a combination of both.

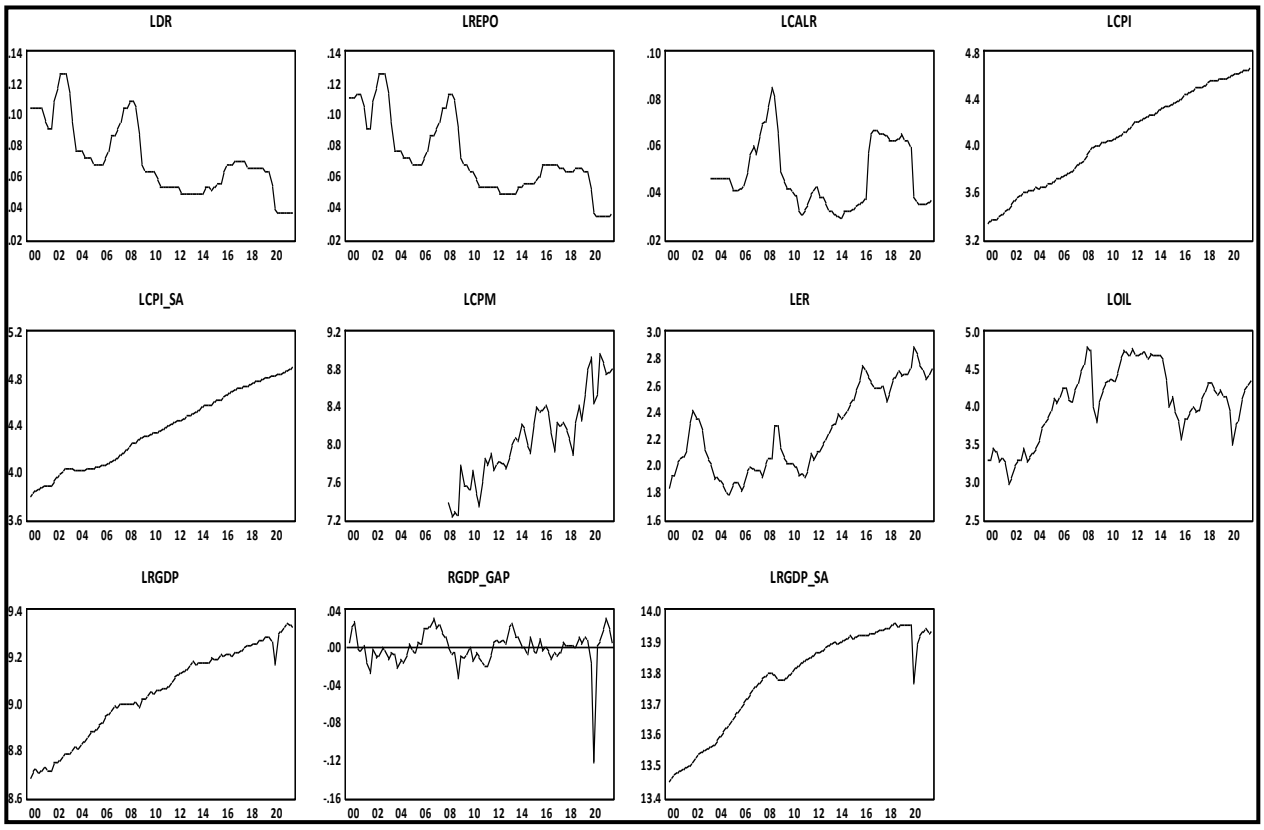
4.2 Data Analysis

Due to limitation on capital mobility data, the study uses quarterly data spanning from the year 2008 to 2021. The variables used in the study, which are in logarithm form are as follows: The monetary policy rates which are the repo rate ($lrepo$), call rate ($lcalr$) and discount rate (ldr)[3], Eswatini Consumer Price Index ($lcpi$), a measure of capital mobility ($lcpm$), Bilateral exchange rate of the lilangeni/rand to the US dollar (ler), world Brent crude oil prices ($loil$), Eswatini real GDP ($lrgdp$), Eswatini output gap ($rgdp\_gap$), (the South African real GDP ($lrgdp\_sa$) and consumer price index ($lcpi\_sa$). The data has been sourced from the Central Bank of Eswatini (CBE), South African Reserve Bank (SARB) and the Federal Reserve Economic Data (FRED). The discount rate and the repo rate are mimicking each other indicating a strong

[3] In line with Frankel et al (2004) and Shambaugh (2004), lrepo = log (1 + repo), lcalr = log (1 + calr) and ldr = log (1 + dr), where repo and dr of 10% is represented as 0.10

positive correlation while on average are showing a downward trend over the sample period, implying an accommodative monetary policy stance by Eswatini and South Africa.

Figure 5. Variable Trends



In the study, capital mobility is measured by the ZAR sales to commercial banks by the Central Bank of Eswatini. ZAR sales, which also forms part of the country's foreign reserves increase in tandem with the widening of the differential between the discount rate and the repo leading to the depletion of the level of reserves, hence posing a threat to the peg. That is, if the repo rate increases faster than the discount rate, economic agents including commercial banks will move funds in the form of ZAR from Eswatini to South Africa in pursuit of higher returns. Over the period 2008 to 2021, the ZAR sales are showing volatility but on average trending upward. The

exchange rate is defined in such a way that an increase is a depreciation and a reduction represent an appreciation. Although showing volatility over the sample period, both the nominal and real exchange are on average trending upwards, indicating a depreciation. The domestic CPI and South African CPI are on an upward trend implying that on average inflations in these countries have been trending up. The South African and Eswatini real GDPs are showing upward trends but with some downturns around 2007 to 2009 reflecting the effects of the global financial crisis and in 2020 indicating the impacts of the Covid-19 pandemic in these two economies.

The variables are tested for stationarity using the Augmented Dickey Fuller test and their results are tabulated in Table 2. All the variables have a unit root implying that they are non-stationary and integrated of order one i.e. I(1) except for the discount rate and repo rate which are stationary and integrated of order zero i.e. I(0).

Table 2: ADF Test Results

Variable	Levels	1st Difference	Decision
lrepo	-3.66**	_____	I(0)
ldr	-3.59**	_____	I(0)
lcalr	-0.81	-5.10***	I(1)
lcpi	-1.86	-3.05**	I(1)
lcpi_sa	-0.36	-5.33***	I(1)
lcpm	-1.10	-7.91***	I(1)
lner	-1.02	-7.06***	I(1)
loil	-1.87	-7.65***	I(1)
ler	-2.27	-7.18***	I(1)
lrgdp	-1.13	-12.62***	1(1)
rgdp_gap	-6.10	_____	I(0)
lrgdp_sa	-2.13	-12.96***	1(1)

Note: *, ** and *** represent stationarity at 10%, 5% and 1%, respectively and otherwise non-stationary

5. Empirical results

5.1 The Repo Rate, Capital Mobility and the Discount Rate

5.1.1 Analysis of the Long-run Relationship

The general ARDL formula used to determine the relationship between the variables (cointegration) is as follows:

$$\Delta Y_t = \delta_0 + \delta_1 X_{1t-1} + \delta_2 X_{2t-1} + \cdots + \delta_\rho X_{\rho t-1} + \sum_{i=1}^{k} \beta_i \, \Delta Y_{t-i} + \sum_{i=0}^{k} \beta_{1i} \, \Delta X_{1t-i} + \sum_{i=0}^{k} \beta_{2i} \, \Delta X_{2t-i} + \cdots + \sum_{i=0}^{k} \beta_{\rho i} \, \Delta X_{\rho t-i} \ldots \ldots \ldots \ldots \ldots (8)$$

Where Y is the dependent variable, $X_1, X_2, \ldots., X_\rho$ are explanatory variables, $\delta_1, \delta_2, \ldots., \delta_\rho$ are long-run coefficients, $\beta, \beta_1, \beta_2 \ldots., \beta_\rho$ are short-run coefficients, k is the ARDL model maximum lag order and in this study it is chosen based on the Akaike information. An F-statistic test is carried out on the joint null hypothesis that the coefficients $\delta_1, \delta_2, \ldots., \delta_\rho = 0$, in which case we conclude that there is no cointegration and if not zero then a long-run relationship exists. Specifically, if the F-statistic falls above the upper bound of the critical values, then the null hypothesis of no-cointegration is rejected. On the other hand, if the F-statistic falls below the lower bound, then the null hypothesis cannot be rejected. However, if the F-statistic value falls inside the critical value band, the result is inconclusive. Below show the cointegration test results of Eqs. (4), (5), (6) and (7).

Table 3: bounds cointegration test results

Equations	Lower **(0)** and upper bounds **(1)**			F-Statistics
		I(0)	**I(1)**	
	10%	2.08	3.00	
Eq. (4)	5%	2.39	3.38	3.41
	2.5%	2.70	3.73	
	1%	3.06	4.15	

		I(0)	**I(1)**	
	10%	2.17	3.19	
Eq. (5)	5%	2.72	3.83	7.55
	2.5%	3.22	4.50	
	1%	3.88	5.30	
		I(0)	**I(1)**	
	10%	2.37	3.20	
Eq. (6)	5%	2.79	3.67	5.62
	2.5%	3.15	4.08	
	1%	3.65	4.66	
		I(0)	**I(1)**	
	10%	2.45	3.52	
Eq. (7)	5%	2.86	4.01	6.76
	2.5%	3.25	4.49	
	1%	3.74	5.06	

The cointegration results indicate that in equation (4) the F-statistic of 3.41 is above the upper values of the bands at 10 percent and 5 percent implying the existence of a long-run relationship between the discount rate and the explanatory variables. In equation (5), the F-statistic at 7.55 is above the upper values of all the bands, which also confirms that the variables in that equation are cointegrated. For equation (6), the F-statistic is 5.62 and above the upper values of all bands thus indicating the existence of a long-run relationship in that equation. Similarly, equation (7) has an F-statistic value of 6.76 and above the upper values of all bands, which is showing that the explanatory variables included in that equation have a true relation with the domestic inflation. Hence, the long-run of Eqs. (4), (5), (6) and (7) are estimated in the following format:

$$Y_t = \delta_0 + \sum_{i=1}^{k} \alpha_1 X_{1t-i} + \sum_{i=1}^{k} \alpha_2 X_{2t-i} + \cdots + \sum_{i=1}^{k} \alpha_\rho X_{\rho t-i} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (9)$$

The long-run estimation results of all the equations based on equation (9) are tabulated in Table 4.

Table 4. Long-run Estimation Results

	Eq.(4)	Eq.(5)		Eq.(6)	Eq.(7)
c	1.032***	_____	**c**	-1.930	-1.041***
	(0.363)			(1.864)	(0.401)
lcalr	_____	-0.970***	**ldr**	-2.223***	-1.509
		(0.245)		(0.831)	(1.281)
difr	_____	-0.065	**ler**	0.146***	0.284**
		(0.048)		(0.045)	(0.101)
lrepo	0.995***	_____	**lrgdp_sa**	0.787***	_____
	(0.056)			(0.135)	
lcpm	-0.041	_____	**lcpi_sa**	_____	0.845***
	(0.042)				(0.255)
lrepo*lcpm	0.617	_____	**loil**	_____	0.205**
	(0.708)				(0.101)
lcpi	0.055*	_____	**F-stat.**	5.62	6.76
	(0.029)				
rgdp_gap	0.145*	_____			
	(0.087)				
F-stat.	3.41	7.55			

Notes: The asterisks (*), (**), and (***) denote the statistically significant at 10%, 5% and 1% levels; the standard errors are in ( ).

The results of equation 4 show that the discount rate is largely influenced by the South African repo rate. A one percent increase in the repo rate causes the discount

rate to increase on average by 0.995 percent, which is not significantly different from 1. This is in line with expectations for Eswatini which has a fixed exchange rate with South Africa coupled with free movement of capital between the two economies. However, the results find that capital mobility and the interaction term between the repo rate and capital mobility do not influence the discount rate. This implies that movements in capital flows between the two countries do not determine the movement of the discount rate. This is confirmed by the results of equation 5, where positive interest rate differentials between the discount rate and repo rate are insignificant to reduce capital outflows to South Africa. These outcomes can be explained by the strong relation between capital mobility and the call rate as indicated by the results of equation 5. According to the results, a one percent increase in the call rate significantly reduces capital outflows to South Africa by 0.97 percent.

The results of equation 4 further provide evidence that domestic macroeconomic conditions as measured by output and inflation matter in the determination of the discount rate in Eswatini. The results show that a one percent increase in inflation rate causes the discount rate to increase by a 0.06 percentage point. This conforms to theoretical expectation where central banks are expected to raise monetary policy rates due to hikes in the inflation rate, hence suggesting a positive relation between the interest rate and inflation rate. The results also reveal that a positive percentage deviation of output from its steady state as measured by the output gap will cause the discount rate to increase by a 0.15 percent. This is also in line with theoretical expectation where a positive output gap signals an overheating economy, which requires an increase in the discount rate to cool it off. Hence, there is a positive relation between the output gap and the discount rate.

Regarding the research question on whether or not the discount rate explains the variations in output and inflation, the results show that the discount rate has a significant negative relation with output but has an insignificant negative relation with inflation. A one percent increase in the discount rate reduces output by 2.22 percent. The results also indicate that output is positively impacted by the depreciation of the exchange rate and the South African real GDP growth, which measure competitiveness and external demand of Eswatini exports respectively. The results show that an exchange rate depreciation of one percent raises output by 0.15 percent, while a one percent growth in the South African real GDP increases Eswatini output by 0.79 percent. Because of the large volume of imports originating from South Africa, Eswatini inflation rate is largely influenced by the South African inflation. According to the results, a one percent increase in the South African inflation causes Eswatini inflation to rise by 0.85 percent. Other variables exerting inflationary pressures on Eswatini inflation are the exchange rate depreciation and rising world oil prices. The results show that a one percent depreciation of the Lilangeni against the US Dollar pushes inflation upwards by 0.28 percent. Meanwhile, a one percent increase in oil prices causes Eswatini inflation to upsurge by 0.21 percent.

5.1.2 Residual Diagnostic and Stability Test Results

To confirm the robustness of the results, the estimated equations are subjected to diagnostic tests including stability test to verify if the relationship is stable. The residuals of the equations were tested against null hypotheses of normality, no heteroscedasticity and no serial correlation of the error terms. If the p-values are greater than 5 percent do not reject the null hypotheses. The analysis of the residuals plays an important role in validating the results of the regression. Hence, if the residuals of the equations satisfy the assumptions of normal distribution,

homoscedasticity and no serial correlation then the results of the equations are considered valid. Since the p-values as indicated in Table 5 are greater than 5 percent, the null hypotheses are not rejected and conclude that the residuals are homoscedastic, normally distributed and not serial correlated.

Table 5: Residual Diagnostic Tests Results

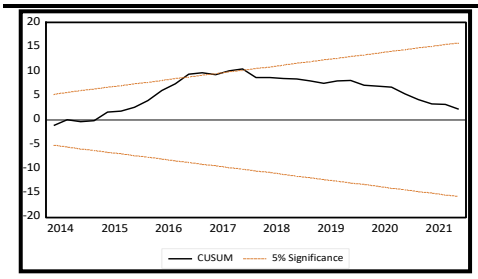
Tests	Eq.(4)	Eq.(5)	Eq.(6)	Eq.(7)
Normality (Jarque-Bera)	0.100	0.241	0.373	0.499
Heteroscedasticity (Breusch-Pagan-Godfrey)	0.878	0.506	0.065	0.505
Serial Correlation (Breusch-Godfrey)	0.459	0.534	0.384	0.827

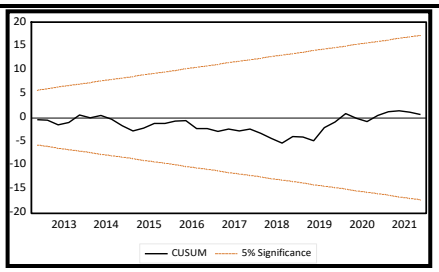
The figures in this table represent P-Values

The equations were also tested for stability using the CUSUM test and the result are shown in Figure 5. Although in equation 4 there are few years in which there are some instabilities as shown by the black line falling outside the red boundaries, there is stability for the better part of the sample period. Hence overall all equations fall within the red boundaries confirming stability of the equations thus the equations are considered stable, reliable and that their results are robust.

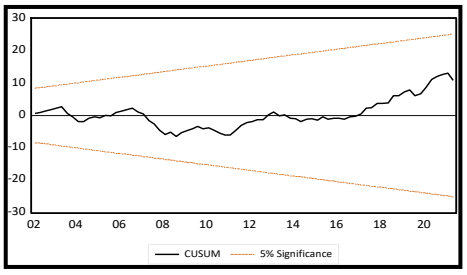
Figure 6: Stability Test Results

Eq. (4)	Eq. (5)

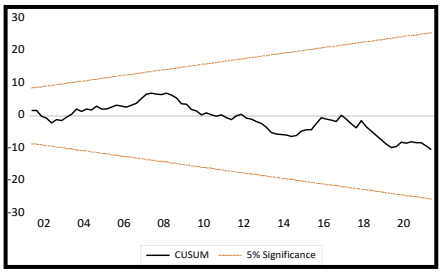




Eq. (6)



Eq. (7)



6. Conclusions and Policy Implications

The study investigates monetary policy implementation in Eswatini under the fixed exchange rate. This is achieved by answering the following research questions: How does the South African repo rate and capital mobility influence the Eswatini discount rate. Does capital mobility respond to the discount rate and repo rate differential, and/or the call rate. Do domestic macroeconomic conditions as measured by output and inflation matter in the determination of the discount rate. Under the current fixed exchange rate, does the repo rate through the discount rate explains the variations in the domestic output and inflation. This is tantamount to measuring the efficacy of monetary policy in a CMA with a fixed exchange rate.

The results confirm that there is a strong positive relationship between the discount rate and the repo rate with a coefficient of 0.99, which is closer to one implying that Eswatini monetary policy as measured by the discount rate is largely influenced by the South African repo rate. Shambaugh (2004) also find a strong relation between

the interest rate of the anchor country and the pegging country's interest rate with a coefficient of closer to one. Although the policy stance by Eswatini not to deviate much from the repo is meant to cushion capital flows, the study found that there is no relation between the interest rate differential between the discount rate and repo rate, and capital mobility. This is contrary to Saxena (2008) who finds that for countries with high capital mobility the coefficient of capital mobility is positive and significant regardless of the exchange rate regime. For Eswatini the results imply that even if the discount rate is higher than the repo, the country still experiences capital outflows to South Africa as measured by the purchasing of Rands by the commercial banks. However, the study found that capital outflows has a strong negative relation with the call rate, where if the call rate increases Rand purchases by the commercial banks reduces and vice versa. In the case of Eswatini, the weak relation between the interest rate differential and capital flows can be explained by the fact that commercial banks are more liquid. Hence, they do not make use of the discount rate window to borrow funds from the CBE for the purchasing of Rands to invest in South Africa where interest rates are relatively high. On the other hand, the strong relationship between capital flows and the call rate is explained by that banks which are more liquid seek high returns by investing their liquidity in an overnight call account at the CBE, which has to be more competitive to similar investment avenues in South Africa.

With regard to whether domestic macroeconomic conditions as measured by output and inflation matter in the determination of the discount rate, the study found that these variables do influence the discount rate. Hence, while the discount rate is largely influenced by the repo rate, domestic macroeconomic conditions are very important in the determination of the discount rate in Eswatini. Lastly, the study found that monetary policy is transmitted to economic growth but not to inflation.

Eswatini inflation is largely influenced by the South African inflation because of the large volume of imports from South Africa.

Given these results, it is recommendable that the CBE should use the discount rate for financial intermediation aimed at promoting economic growth while using the call rate to cushion capital outflows. This means that the CBE may have to pursue a negative interest rate differential to promote economic growth while the call rate is adjusted to be above the repo rate to contain capital outflows.

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