FINANCIAL MARKETS SHOCKS AND MONETARY POLICY IN SOUTH AFRICA: A BAYESIAN VAR APPROACH

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Abstract: *This paper evaluates the dynamic interaction between monetary policy and financial markets. A Bayesian VAR modelling technique was employed on quarterly time-series data for the period 2003:Q2 to 2020:Q4. The findings revealed that interest rates and the inflation rate have a positive effect on stock market capitalisation as a proxy for financial markets, while on the contrary, the real effective exchange rate was found to have a negative effect on stock market capitalisation.*
Keywords: *Bayesian VAR, Monetary policy, Financial Markets*

Introduction

In recent years the subject of monetary policy and financial market nexus has been revived following the recent global financial crises. Foreign investments result in a country's economic growth and development wherein financial markets have a favourable impact on a country's economic growth and development, as well as a positive impact on the Balance of Payments (Tchereni & Mpini, 2020). Thus, when the stock market is performing well, it usually signifies that the good performance of businesses contributes to the economy thriving. As a result, foreign investors are attracted to the security provided by well performing economies because they know that their funds are secure. The financial system in Africa has developed and evolved over the years to withstand and survive a series of banking crises. However, most central banks' monetary policies are primarily focused on ensuring the financial system's existence and development. In their study, Ma & Lin (2016) suggest that any policy that affects the financial market development will ultimately have a concurrent effect on the transmission mechanism of the monetary policy. Some studies have shown that the strength of the monetary policy lies mainly on the stage and structure of financial system development (Krause & Rioja, 2006). The effects of the global financial crisis and more recently Covid-19 pandemic have resulted in many economies having to adopt an expansionary monetary policy of low interest rates and because a bank cannot adopt low inflation rates; Banks can only achieve low interest rates and inflation rates given the responsiveness of the monetary policy instrument, in this case the interest rate, but these policies have not induced the aggregate demand.

In the context of South Africa, the manner in which the country executes its monetary policy has not changed as a result of recent financial market developments. In

the years prior when the government implemented an inflation targeting regime as a response to deal with the global financial crisis such as the Asians 97/98, certain substantial changes happened in terms of the operational aim and monetary policy instruments (Bank of England, (2020). In August 1999, South Africa declared its intention to adopt an inflation targeting framework, and formally introduced inflation targeting in February 2000. Since then, inflation has been managed within a range of 3% to 6%. At present, the SARB is currently revising its monetary policy implementation mechanism in order to improve its efficacy and suitability.

The monetary policy implementation framework that gives effect to the SARB's inflation mandate has changed from variations of a discount facility to a repurchase rate repo-based financing system (BIS, 2020). The SARB follows a cash reserve system, wherein it creates a money market that reserves a certain percentage of the cash for emergency situations. This system requires banks to influence the credit channel of monetary policy transmission (BIS, 2019). The propensity of the financial market to monetary policy implementation is a key concern for the performance of real economic activity. According to Ruth (2017), monetary policy affects macroeconomic and financial variables constantly and the effect is more robust in the presence of high financial frictions. As stated by Chirila, et, al (2015), financial markets in the developing market economies such as Brazil, India, South Africa, and Indonesia amongst others, have realised capital inflows in 2013 owing to the narrowing of the US quantitative easing measures i.e., reversal of unconventional monetary policy aimed at injecting liquidity in the financial markets. Moreover, the US financial markets experienced fluctuation and an exchange rate depreciation, because of the policy measures implemented prior.

The depth of global financial crises prompted various central banks such as European Central Bank, Federal Reserve and Bank of England in the world to make their credit allocation system more robust, and to foster effective and smooth monetary policy transmission (Suurlaht, 2021). As a result of these policy initiatives the elasticity of financial markets to the monetary policy in international community as a whole becomes a problem in the background. It proves to be more difficult when the financial market responds less to predictable monetary policy actions, since the information would have already been taken into consideration prior to the implementation of monetary policy (Ozdagli, 2018). Nevertheless, unexpected component of changes in monetary policy can be computed to address the complexity thereof. Horvath (2018) provides in his discussion, that financial market fragmentation has had an impact on the monetary transmission mechanism in the European context, Horvath (2018) pointed out the conduciveness of unconventional monetary policies in reducing fragmentation, albeit such policies are only a provisional solution to reducing fragmentation.

Therefore, the assessment of the nexus between the financial market development and monetary policy becomes important to make harmonised policies for many countries including but not limited to South Africa. The issue of monetary policy and financial market development has received very little attention both empirically and theoretically. These theoretical and empirical formulations of monetary policy need to consider the quantitative relevance of uncertainty because it is a constant feature of monetary policy practice (Naraidoo & Raputsoane, 2015). Against this background, this study aims to examine the dynamic interactions between financial market and monetary policy.

Specifically, the study analyses the response of financial market to monetary policy instruments' shocks in South Africa.

Literature review

This section presents theoretical views relating to the topic under investigation. Some of the theories regarding monetary policy and financial market are briefly discoursed in the subsections below. Thus, insights that emerge in this section can be associated with some of the results detailed in the empirical literature studies to explain, validate, and corroborate certain findings, as far as the interaction between financial market and monetary policy is concerned.

Theoretical literature

The Taylor rule is a simple monetary policy rule linking mechanically the level of the policy rate to deviations of inflation from its target and of output from its potential (the output gap). The Taylor rule as genuinely state that:

$$i^* = r^* + \gamma_t + h(\gamma_t - \gamma_\tau^*) + b(\vartheta_t - \vartheta_\tau^*) \quad (1)$$

Where i^* the target is nominal interest rate, r^* is the equilibrium real interest rate, γ_t is the current inflation rate, $(\gamma_t - \gamma_\tau^*)$ is the inflation gap, $(\vartheta_t - \vartheta_\tau^*)$ is the output gap. The interest rate is modified based on the output gap and current inflation rate, according to the interpretation of this form. This allows the policymakers to choose the inflation and output gap coefficients, depending on whether they want to target inflation or output stabilization. In terms of the inflation gap coefficient, Taylor (1998) argued that when the value of the coefficient is considerably over one, inflation can be stabilized. In other words, monetary authorities should raise interest rates by more than the inflation gap when inflation exceeds the target level which is called Taylor principle. Otherwise, if 1 + h is not more than 1, a rise in inflation will decrease the real interest rate $i - \gamma$ and this will boost inflation, stimulating more aggregate demand and leading in further instability.

Following the Taylor principle, in the event of supply or demand shocks that boost inflation, an increase of real interest rates (because nominal rates go up by more than inflation does) thus reduce output, which caused the increase in inflation and keep economy stable. When real output exceeds its long-run potential, an increase in the policy interest rate is required, which is related to the output gap. Its coefficient is not so restrictive, as simply a positive value is desired. According to Garcia-Iglesias (2007), a very high value may have a negative impact on the proportion of inflation and output variability trade-off, causing inflation to rise. The advantage of a basic rule like the Taylor is that it is more robust than more sophisticated rules in terms of limiting swings in inflation output and interest rates, therefore ensuring financial market stability. The proposed form includes variables that are useful to private agents in decision making. However, central banks preferably smooth interest changes, including in Taylor rule a lagged value of the interest rate, resulting in the rule below, known as smoothing interest rate:

$$i_t = \psi i_{t-1} + (1 - \psi) i^* \quad (2)$$

where $\psi \epsilon [0,1]$ is reflecting the degree that the interest rate is smoothed. As an interpretation, when $\psi = 0$, there is an instant adjustment to the targeted interest rate. The higher the value of the interest rate, then the slower the adjustment is. Different scholars pointed to the fact that central banks' decision to smooth interest rates has various advantages, including preventing capital market dysfunction and maintaining credibility.

The second theory is the monetarist theory, this theory explains that financial crises are impacted by bank failures on the economy through the decrease in the supply of money. Contrary to the business cycle, the crises frequently result from monetary authorities' policy errors, which lead to regime transitions that risk-pricing cannot anticipate in advance. Banking panics have reportedly been recognized by monetarists as a sign of a financial crisis. Friedman & Schwartz (1963) opined that, banking panics were a significant factor in the lowering of the money supply, which caused a severe contraction in overall economic activity. Furthermore, they emphasise that inflation is a major contributor to financial instability since it is closely tied to both the interest rate and the money supply, and an increase in inflation triggers an increase in the interest rate. This causes issues for the Central Bank, especially if the bank is involved in fixed rate lending or investment projects. Even this unstable price level may result in bank insolvencies. Monetarists do not exclude the possibility of an asset price bubble and do not perceive an essential connection between the business cycle and crises. In monetarist view, financial crisis` is mainly a shift to money that leads to widespread run-on banks. In particular, banking crises occur when financial systems become illiquid. This type of financial crisis refers to bank runs, closures, mergers, takeovers, or large-scale assistant by the government to a group of banks or to the banking systems, should the crisis turn out to be systemic.

Lastly is the Minsky's financial instability hypothesis which contends that financial crises occur as a result of a credit cycle, with an initial positive shock worsening growing debt, mispricing of risk by lenders, and the bursting of an asset bubble. The theoretical argument of the financial instability hypothesis starts from the characterization of the economy as a capitalist economy with expensive capital assets and a complex, sophisticated financial system (Minsky, 1995). The financial system has been made unstable by the increases of innovation, the complexity of the financial system, the involvement of the government as refinancing agent of financial institutions and businesses. Minsky (1995) identifies the economic problem following Keynes as the capital development of the economy. The author further explains that the occurrence of instability in the financial sector is an increased result of inflation and an extreme use of debt deflation which goes out of control time to time. The instability in the financial sector begins in the banking sector that is involved in a profit seeking activity.

Empirical literature

Domestic and international financial markets have increasingly become integrated, albeit the transmission mechanisms through which financial markets shocks effects remain an area of examination among scholars (Ehrmann, Fratzscher & Rigobon, 2005); (Eyuboglu & Eyuboglu, 2017). According to Onur & Ibrahim (2019) who studied the transmission mechanism of financial stress into economic activity in Turkey, real economic activity is adversely and significantly prone to worsening of financial conditions. As the background to this study stipulated, the variables under investigation in this study are financial market and monetary policy. Hence, this section intends to scrutinize the empirical studies on the same/similar topic to discuss the findings and ultimately the potential gaps.

Using the Dynamic Stochastic General Equilibrium (DGSE) model, Efrem & Salvatore (2010) fitted the post-World War II data into the model to investigate the interactions between stock market fluctuations and monetary policy for the economy of

United States. The study reported a couple of considerable findings signifying that, stock prices have meaningfully affected the business cycle and real economic activity. Furthermore, the estimates also found that the Federal Reserve have a counteractive and significant response to oscillations in stock price.

Having mentioned that stock prices have meaningfully affected the business cycle and real economic activity, the findings of Suurlaht (2021) suggests that during low sentiments concerning the economic stance coupled with periods of recession, unforeseen foreign contraction in monetary policy is allied with negative stock market returns and elevated risk in the financial market. These results have been abridged from the study that analysed the impact of unanticipated changes in domestic and foreign monetary policy on aggregate stock market performance and risk, investigated in five countries (UK, Spain, Italy, France, and Germany) using an event study method, for the period spanning from 1999 to 2018.

In his study, Koivu (2010) examined the impact of monetary policy on the household consumption via stock housing prices in China using the structural vector auto regression model. The study concluded that a loosening of China's monetary policy leads to higher asset prices, which in turn are linked to the household consumption. The study showed that there is positive relationship between asset prices and household consumption in China. The study also revealed that the possibilities of influencing house behaviour in China via monetary policy are limited due the fact that people have limited access to external finance. In a related matter Bonga-Bonga (2010) examines how short-term and long-term interest rates react to supply, demand and monetary policy shocks in South Africa. He uses the impulse response functions obtained from the SVAR model with long-term restrictions. The study found a positive correlation between the two interest rates after a monetary and demand shock and a negative correlation after a supply shock. He concluded by pointing out that, operation of the monetary transmission mechanism should be effective in South Africa. Mbarek et al. (2019) investigated how the nexus amid monetary policy and the treasury yield curve evolves overtime. The study employed a time-varying parameter model estimation with the data spanning from 2006 to 2016, which suggested that the impact of monetary policy is more pronounced at the short end of the yield curve relative to the end, though such impact drops significantly across the maturities post revolution and illustrates wide time variation. Thus, highlighting the appeal of more vibrant monetary policy, notably in a blustery environment. Noumbissie & Mongale (2014) use the vector autoregressive (VAR) model to evaluate the impact of monetary policy on financial market in South Africa with quarterly data spanning from 2000Q1 to 2013Q1. The model consists of five policy instruments as variables; namely: money supply (M3), real exchange rate, discount Rate, consumer price index, gross domestic product and the two market related variables: market turnover and Bond market turnover. Using impulse response function (IRF), the study found that, stock market turnover reacts positively to money supply; discount rate; real exchange and GDP shocks. On the other hand, stock market turnover reacts negatively to CPI economic shocks. They have concluded by suggesting that policymakers must envisage a contractionary monetary policy translated by a proportional cut in money supply through the sales of government securities.

Balcilar et al. (2020) examined how the US financial markets is impacted by the Fed's unconventional monetary policy using yearly data spanning from 1996 to 2018. They used the smooth transition vector autoregressive (STVAR) model which suggested robust

evidence that the risk structure of the US financial market adjusts post the global financial crises of 2008 and announcement of quantitative easing measures via the portfolio balance channel. Eyuboglu & Eyuboglu (2017) examined the interaction amid government bond markets of 3 developed and 5 emerging countries (i.e., Germany, Japan, US and Turkey, Russia, Brazil, China, India respectively). The period covered 2006 to 2015, with the application of A VAR analysis carried out to a monthly data to determine the link among government bond yield of 10 years. The findings indicated non-dominant impact of US bond market, and an influential Japanese market. Moreover, less integration has been revealed between Chinese and Japanese bond markets. Gumata, Kabundi, & Ndou (2013) study the various channels of monetary policy shock transmission in South Africa. From 1990Q1 to 2012Q2, the study looked at 165 quarterly variables. A Large Bayesian Vector Autoregressive model was utilized. Credit, interest rate, asset prices, exchange rate, and expectations are the five transmission channels in their model. The findings demonstrate that while all channels appear to be powerful, their magnitudes and relevance vary. The interest rate channel, followed by the exchange rate, expectation, and credit channels, is the most important shock transmitter, according to their findings. The asset price channel is somewhat weak, since households are directly affected through the interest rate channel and the amplification of the shock through their balance sheets is rather weak. Tchereni & Mpini (2020) examines the effect of monetary policy decisions on stock markets in emerging economies particularly South Africa for the period 2000Q1 to 2016Q4. The study utilised a two-stage approach to test the hypothesis that stock markets do not respond to monetary policy decisions. The first test is the vector error correction model, which is used to identify the long-run relationship between variables, and the second is the GARCH model, which is used to determine the volatility. The results suggest that about 5.2% variations in the Johannesburg Stock Exchange (JSE) volatility are due to monetary policy shocks. Furthermore, the findings reveal that there is a positive relationship between repo rate and JSE volatility, which is not economically desirable because repo rate fluctuations affect aggregate demand for investment securities. Their study recommends that the Monetary Policy Committee an expansionary monetary policy of keeping the repo rate lower must be pursued in order to increase borrowing that makes the public to have money to make transactions in securities on the financial market.

Despite the fact that several researchers established a link between monetary policy and stock market shocks, others came to the opposite conclusion. This includes Neri (2004), who used structural VAR to test the link on G-7 countries and discovered that it was weak and negative on average. In their study, Li, Iscan, & Xu (2010) analyse whether trade and financial market openness matter for the impact on the transmission of monetary policy shocks to stock prices using SVAR models with short-run restrictions appropriate for Canada and the United States. They discovered that the immediate response of stock prices to a domestic contractionary monetary policy shock in Canada is small and the dynamic response is brief, whereas the immediate response of stock prices to a similar shock in the United States is relatively large and the dynamic response is relatively prolonged. They came to the conclusion that the disparities are mostly due to differences in financial market openness, which result in different dynamic reactions to monetary policy shocks across. Hsing (2013) found a negative and positive relationship between the Polish stock market index and money supply using GARCH models. The study found that when the M3 to GDP ratio is less than 46.03 percent, the correlation is positive, and when

it is greater than 46.03 percent, the link is negative. On the other hand, Atis & Erer (2017) evaluated the association between monetary policy and the stock market using the Markov switching dynamic approach and the criteria of low and high volatility periods. During the low volatility mechanism, the data demonstrated that monetary policy had a negative significant impact on stock returns.

Literature gap

An important observation from the discussion of various findings above is that the relationship between financial market and monetary policy has been investigated dominantly in the developed countries. There are few studies that incorporated emerging countries in their analysis. Most concerning, South Africa rarely appeared among the reviewed literature. For instance, Naraidoo & Raputsoane (2015) applied an extended monetary policy rule that allows scrutiny of the effect of uncertainty about the financial market conditions on the interest rate setting behaviour that describes decisions made by the South African Reserve Bank. This serves as a basis to further examine the variables under investigation. This suggests a need to expand research on this topic with incorporation of more emerging market countries (in particular, South Africa).

Samantaraya & Patra (2014) highlighted the importance of country-specific research because of the awed assumption of homogeneity in countries combined in cross country research. This research will add to the already existing scanty body of country-specific research on the dynamic interaction between financial markets and monetary policy. The research focuses on South Africa and consider institutional and structural factors that are peculiar to the country. In addition, the literature revealed a research gap in terms of time frame. Firstly, country specific research on South Africa has focused on the use of yearly data. Secondly, the research also considered a shorter time with the longest being 17 years. However, this study intends to fill in this gap by using quarterly data from 2003Q2 to 2020Q4. This will provide more observations as well as more information for analysis. Moreover, when using yearly data, a lot of actualisations during the year are lost in yearly averages; however, the use of quarterly data provides for within year analysis as well as more information for trend analysis. Furthermore, the study employs a Bayesian Vector Autoregressive (BVAR) model to estimate the dynamic interaction between financial markets and monetary policy in South Africa. The BVAR model eliminates the problem of over-parameterisation that is faced with an unrestricted VAR. This is because the BVAR model makes use of restrictions based on prior knowledge of the parameters. Also, the BVAR model has been shown to produce more accurate results and forecasts in comparison.

Methodological Framework

The estimated model was informed by earlier studies including Efrem and Salvatore (2010), Mbarek et al., (2019) and Balcilar et al., (2020). The estimated model, with a few modifications, can be expressed mathematically as:

$$FM = \alpha_0 + \beta_1 cpi_{t-1} + \beta_2 int_{t-1} + \beta_3 exr_{t-1} + \beta_4 dum1_{t-1} + \beta_5 dum2_{t-1} + \varepsilon_t \quad (3)$$

Where

FM is financial markets proxied by the domestic stock market capitalisation,

CPI is the consumer price index capturing the effects of inflation in the financial sector,

INT is the market prevailing interest rate,
EXR is the real effective exchange rate measuring changes in the foreign exchange market
$DUM1$ is a dummy variable to capture the shock of the 2008 financial crisis,
$DUM2$ is a dummy variable to capture the effects of the 2016 sovereign debt crisis and,
ε_t is the error term.
Equation 3 can be expressed in VAR form as follows. Consider the n variable vector autoregression of order p, VAR(p), given by (3.7) below,

$$Z_t = \Psi_1 Z_{t-1} + \cdots + \Psi_p Z_{t-p} + \delta + \varepsilon_t \quad (4)$$

Where Z_t is an *(n x 1)* vector of non-stationary time series, δ is an *(n x 1)* vector of constants coefficients and ε_t is an *n x 1* vector of error terms. Ψ_1 through Ψ_p represent *(n x n)* matrices of parameters to be estimated. The VAR(p) is therefore simply a set of equations in which each variable depends on a constant and lags 1 through p of all n variables in the system.
The study followed the below estimation approach in relation to achieving the primary objectives of the study. First the study conducts the unit root test using the Phillips-Perron unit root test in order to determine the order of integration. This is followed by the determination of the optimal lag length in order to avoid under or over estimation of the lags.

The next step would be to estimate a Bayesian Vector Autoregression Model (BVAR). In their study, Kenny, Meyker & Quinn (1998) postulate that, when it comes to forecasting economic time series, the Bayesian technique is most commonly used with multivariate vector autoregression rather than univariate models like the AR(p) model. A Bayesian approach to vector autoregression has in particular been put forward by Doan, Litterman and Sims (1984) where they proposed priors for an n-dimensional VAR of non-stationary variables. A variety of Bayesian priors have been developed for use in vector autoregressive models. The study chooses Litterman/Minnesota and Sims-Zha Normal Wishat method to see if there is notable difference. This approach is suitable for emerging markets with open borders, such as South Africa, where monetary policy has come under fire for irregularities like liquidity as well as price or exchange rate conundrums (Rosoiu & Rosoiu, 2013). The second issue is over-parameterization, which Sheefeni (2017) identified as being particularly problematic when there are many parameters that need to be estimated but insufficient observations are available. Thus, the Bayesian VAR model was created as a solution to this issue (Rosoiu & Rosoiu, 2013; Mabulango & Boboy, 2016). The choice of this methodology as opposed to the standard vector autoregression utilized in most empirical studies is justified in light of the aforementioned inferences. A good set of priors, on the other hand, should impose some structure on the VAR that represents the nature and process of data generation.

To ensure that the estimated model does not suffer from spurious regression, several residual diagnostic tests were performed including the autocorrelation test and heteroskedasticity test. The last point of analysis involved performing the impulse response and variance decomposition tests. This was done to identify the response of financial markets to innovations in monetary policy aggregates. An impulse response, in general, denotes the response of any dynamic system to some external perturbations. Impulse reactions in VAR, in particular, focus on how the dependent variables respond to shocks from each independent variable by properly summing the coefficients of the impulse response functions, the cumulative effects of unit impulses are calculated (Lin 2006). This

study used the generalized impulse response functions as developed by Pesaran and Shin (1998) to address the issue of the impact of ordering of the variables on the outcomes like the classic impulse response analysis would. In addition, the variance decompositions analysis would be used to demonstrate how the percentage of changes in the dependent variables are caused by their own shocks as opposed to shocks to other variables (Brooks 2008).

Data and Sources

The data was sourced from several reliable databases including the South African Reserve Bank online statistical query and St Louis Federal Reserve database. The frequency of the data was quarterly, spanning from 2003:Q2 to 2020:Q4. This brought the total number of observations to 71. The variables are domestic stock market capitalisation, the consumer price index, the market prevailing interest rate and the real effective exchange rate.

Empirical Results and Discussion

Stationarity Analysis

Table 1 below shows that the order of integration of the variables is a mixture of I(0) and I(1). The unit root analysis indicated that the consumer price index and real effective exchange rate are stationary at level. On the contrary, the study found that stock market capitalization and interest rates are stationary after first differencing.

Table 1: Stationarity results

Variable	Model Specification	PP		Order of Integration
		Level	First Difference	
MKP	Intercept	-0.96	-7.21**	I(1)
	Trend & Intercept	-1.47	-7.19**	
CPI	Intercept	-9.05**	-29.57**	I(0)
	Trend & Intercept	-8.90**	-30.20**	
EXR	Intercept	-7.98**	-31.31**	I(0)
	Trend & Intercept	-7.91**	-35.46**	
INT	Intercept	-2.33	-8.13**	I(1)
	Trend & Intercept	-2.53	-13.08**	

Source: Author's computations, (2022)*, Note: asterisk ** indicate rejection of the null hypothesis at 5% level of significance.*

Lag order

One of the common problems in the estimation of an unrestricted vector autoregression is the over-parameterization of the VAR model. Thus, to overcome this challenge, determining the appropriate optimal lag length was crucial to the analysis. The results are provided in table 2 below.

Table 2: Optimal lag length selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-567.52	NA	1.85	17.64	17.85	17.73

1	-173.67	702.86	3.09e-05	6.64	8.04*	7.19*
2	-133.82	63.75*	2.82e-05*	6.52*	9.13	7.55
3	-105.05	40.72	3.79e-05	6.74	10.55	8.24
4	-68.05	45.54	4.24e-05	6.71	11.73	8.68
5	-39.02	30.36	6.78e-05	6.92	13.15	9.38
6	-10.37	24.68	0.00e-30	7.15	14.57	10.08

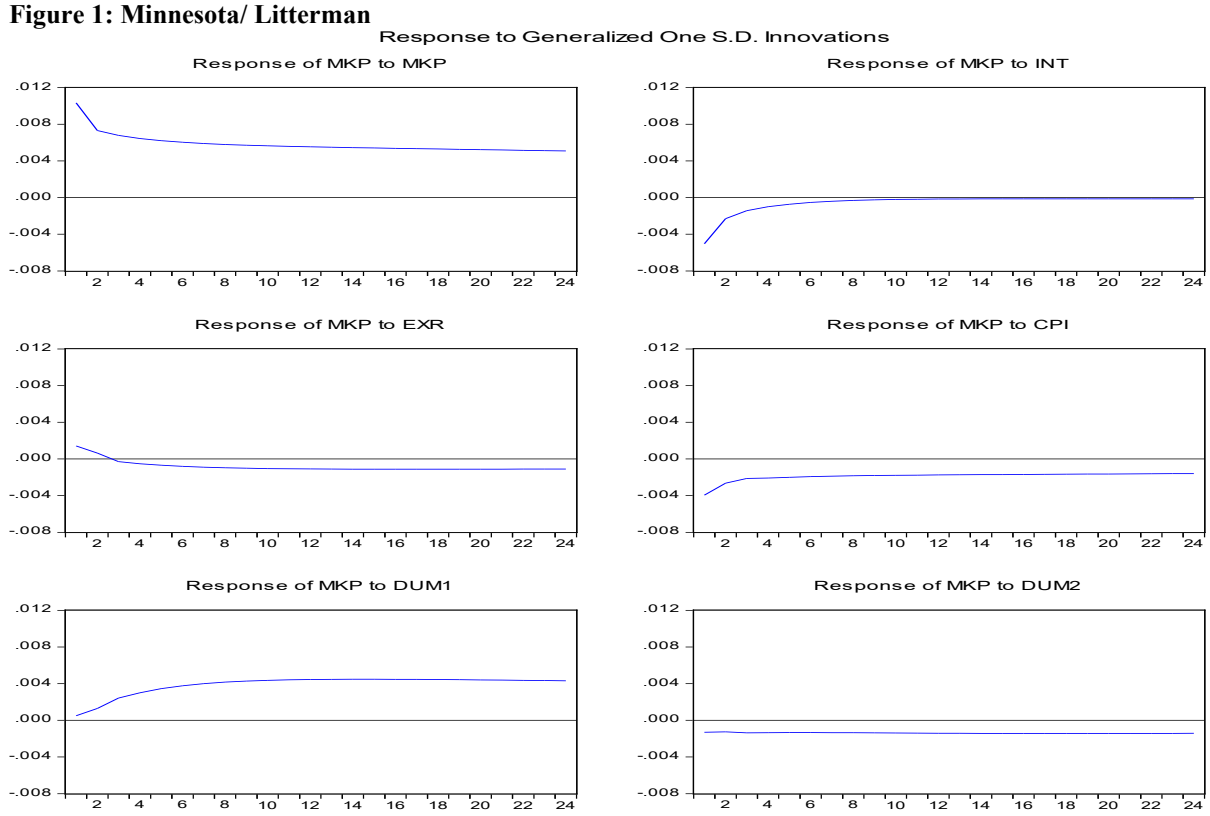
Source: Author's computations, (2022)

The findings from the estimated VAR model recommended the use of two lags. This was informed by the Akaike Information Criterion. Following the pre-estimation analysis, the proceeding step was to perform a Bayesian VAR model.

Bayesian VAR, impulse response functions and variance decomposition

Bayesian VAR estimates based on the prior of KoKo Minnesota/Litterman (2010) and Sims & Zha (1998) prior were conducted from which the generalised impulse response functions and forecast error variance decomposition were derived. Figure 1 shows the results of the responses of financial market to monetary policy and other variables in the model. The findings indicates that stock market capitalisation (MKP) responded positively to its own shocks during the short run and long run. The effect of shocks appears to be permanent for stock market capitalisation since the blue line does not go back to its initial equilibrium which is the zero line for the steady state. Meaning the new equilibrium has been formed.

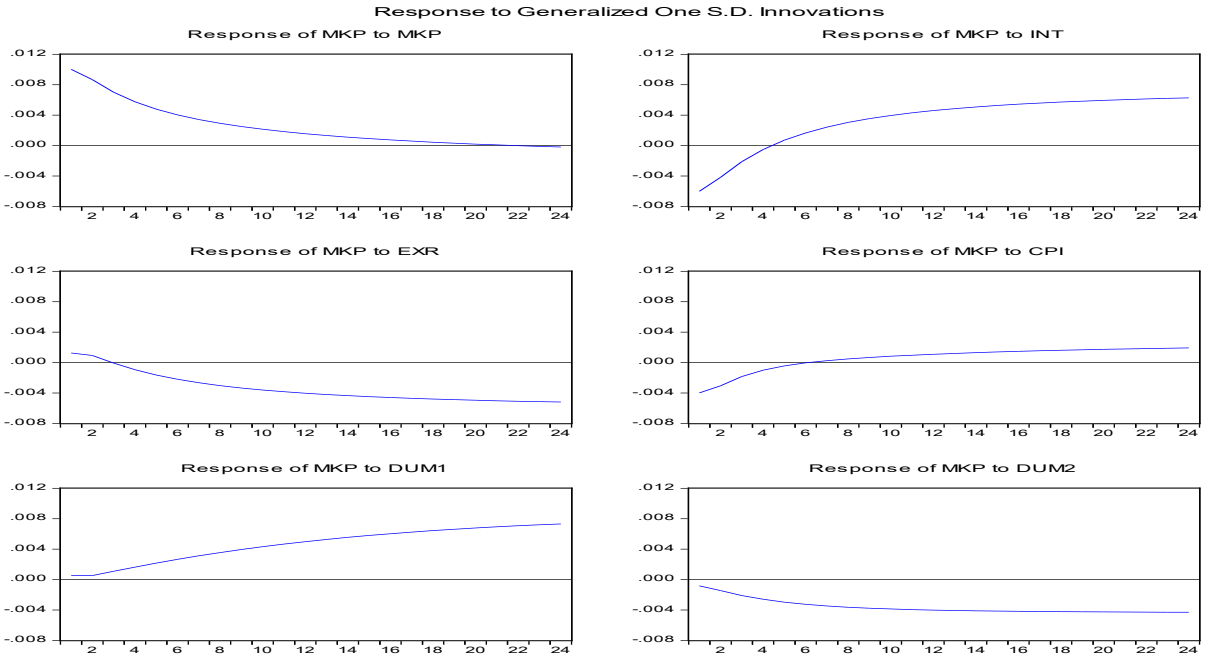
Figure 1: Minnesota/ Litterman



Source: Author's computations, (2022)

The response of financial market to low interest rates is that the domestic financial market suffers due to capital outflows as investors seek higher returns in other countries. The opposite holds when interest rates are increased domestically. These results are similar to those of Sheefeni (2017). Changes in interest rates (INT) largely influence the decision to borrow and invest. In the same vein, the reaction to interest rate suggests that the effect of the shocks is transitory because no new equilibrium has emerged since the blue line returned to the initial equilibrium. With regard to real effective exchange rate (EXR), financial market responded negatively, and the effects wear out after two quarters. It is worth noting that when the domestic currency weakens, the stock market appreciates given that domestic stocks become relatively cheaper. As shown above, the response to exchange rate shows that the effect of shocks is permanent. In contrast, the consumer price index (CPI) was found to have a positive impact on stock market capitalisation. This is because, a stable and sustained inflation rate is necessary for preserving the value of stocks. During periods of hyperinflation, the value of domestic stocks decreases while during periods of deflation, the value of domestic stocks appreciates thus making them attractive. In this case, the effect to shocks is also permanent. The dummy (DUM1) for the 2008 financial crisis was found to have a positive effect on stock market capitalisation. It can be assumed that the 2008 financial crisis affected advanced market economies adversely, especially in relation to emerging market economies and as a result, emerging market economies were regarded as safe havens for investment. The dummy (DUM2) for the 2016 sovereign debt crisis was found to have a negative impact on stock market capitalisation as well with permanent effect of shocks. The exercise was repeated with additional prior of Sim's-Zha to compare whether or not the results differ. Similarly, the response of stock market capitalisation to shocks in interest rates was likewise found to be positive during the entire quarters. This is based on the assumption that higher interest rates are linked to higher returns. As a result, potential investors seek returns in countries with higher prevailing market interest rates

Figure 2: Sim's-Zha (WishartNormal)



Source: Author's computations, (2022)

The same is true for the exchange rate. A weak exchange rate attracts capital inflows and thus driving liquidity into the domestic financial market. This can be observed in figure 2. Stock market capitalisation responds negatively to shocks in the exchange rate. The response of stock market capitalisation to shocks in inflation is positive in the short run but muted in the long run. This is because, the effects of inflation on domestic stocks are only temporary and thus muted in the long run which one can conclude that monetary policy does have effect on inflation rate in the long run. The effect of shocks in all cases are permanent.

Similar to impulse responses, the variance decomposition is used to illustrate the forecast error discrepancy of each variable in relation to its own fluctuations. The findings are provided in table 3.

Table 3: Variance decomposition

Period	S.E	MKP	CPI	INT	EXR	DUM1	DUM2
1	0.01	100.00	0.00	0.00	0.00	0.00	0.00
6	0.02	70.72	2.08	18.75	0.83	5.50	2.12
12	0.03	35.16	3.02	37.29	3.12	17.72	3.69
18	0.04	20.01	3.01	42.08	4.44	26.62	3.84
24	0.05	13.11	2.90	42.70	5.14	32.46	3.69

Source: Author's computations, (2022)

The variance decomposition results show that in the short run, variations in stock market capitalisation are explained by changes in its shock. For example, in the first period, 100% of the variations in stock market capitalisation are explained by its own shock although this share declines to 87% in period 4 and 62% in period 7. Over the long run, variations in stock market capitalisation are largely explained by shocks in interest rates,

DUM1 and to a small extent by shocks in the real effective exchange rate and inflation rate. This is indicative of the significant role played by various monetary policy tools to maintain price stability, exchange rate stability and overall financial stability.

Conclusion

The primary goal of the study was to examine the dynamic interaction between monetary policy and financial markets. This was achieved by means of economic analysis. The study employed quarterly time-series data spanning from 2003:Q2 to 2020:Q4. Various econometric techniques were utilised including the Philips Perron unit root tests to examine the order of integration of the variables. The lag length criteria was conducted in order to determine the optimal lag length. Further to this, a Bayesian VAR model was estimated from which the generalised impulse response function and forecast error variance decomposition were derived, to analyse the dynamic interaction between monetary policy and financial markets. The findings revealed that interest rates and the inflation rate have a positive effect on stock market capitalisation as a proxy for financial markets, while on the contrary, the real effective exchange rate was found to have a negative effect on stock market capitalisation. Also, findings for the variance decomposition indicated that in the long run, fluctuations in stock market capitalisation are largely explained by itself, interest rate and by DUM1.

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