Acta Universitatis Danubius
ŒCONOMICA

Analysing Interest Rate and Exchange Rate Volatility on South African Banks' Stock Returns Considering the COVID-19 Pandemic

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Abstract: This paper analysed the impact of interest rate and exchange rate volatility on banking sector stock returns in South Africa considering the Covid-19 pandemic. This paper employed daily secondary data for the period 01 January 2011 - 19 August 2021. The OLS and GARCH approaches were utilized to analyse the relationship between the variables. The results indicate that the interest rates have a positive and significant relationship with bank stock returns as four out of five banks showed positive coefficients in the OLS estimator. Moreover, a high foreign exchange rate leads to a negative bank stock returns as the coefficients from the OLS estimator were negative. The ARCH and GARCH models' results indicate that bank stock returns are determined by their past volatility. The study has managerial implications for the banking sector because interest rate and exchange rate volatility increase the risks associated with the returns, implying that banks should consider various hedging strategies in mitigating these risks. Therefore, banks should consider various hedging strategies while the investors could attentively consider monetary policies during the investment decision process.

Keywords: Interest Rate; Exchange Rate; Volatility; Covid-19; South Africa

JEL Classification: C32; G01; G21

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1. Introduction

The performance of the financial sector is strongly linked to the nature of the economy, hence economic stability is very important as it gears the performance of the banking sector (Ali & Shahid, 2017). When discussing the financial sector's performance, the stock market cannot be excluded as the performance of the stock market is linked to the banking sector, which contributes to economic growth (Paun *et. al*., 2019). According to Steytler and Powell (2010), the global financial crisis had a negative impact on the South African economy, which experienced a recession for the first time in 17 years in 2008/09, harming the banking sector's performance. During the crisis, stock returns became more sensitive to changes in interest rates and currency exchange rates (Mouna & Anis, 2016:8). According to Kasman *et al*. (2011), the bank's common stock interest rate sensitivity relies on the total assets held by the bank, and the return is affected by the effects of wealth distribution resulting from unexpected inflation. Because bank cash flows rely on nominal assets that are fixed in nominal terms, such as account receivables, stock prices fluctuate with cash flows generated from assets as compared to other firms whose cash flow is dependent on real assets, cash and debt making stock prices more sensitive to interest rates (Saunders & Yourougou, 1990). Foreign exchange rate fluctuations have an impact on bank stock returns and performance due to increased exposure to international banking, making it one of the risk factors (Viale *et. al*., 2009).

Interest rates refer to the cost of borrowing or the reward of saving and can also be used to discount future cash flows (Amadeo, 2020). Interest rates and stock returns have an inverse relationship, as interest rates rise stock prices fall as the required rate on stocks rises, resulting in a drop in stock prices (Khan & Rukh, 2012). Furthermore, exchange rates and stock prices can have a positive or negative relationship. Depreciation of a currency leads to increased competitiveness of firms causing exports to increase, which increases stock prices thus exhibiting a positive relationship. Moreover, in the event of production relying on imported inputs, production will rise resulting in currency depreciation, and the stock price will decrease therefore reducing profitability (Jawaid & Haq, 2012).

Since the coronavirus outbreak, governments have implemented a lockdown of household and non-essential producers to mitigate the effect of Covid-19, which caused a negative shock on economic activity (Arndt *et. al*., 2020). This led to both consumers and businesses losing income, and borrowers being unable to meet debt obligations, causing bank earnings to fall as the stock market was forward-looking, and share prices have more than halved in 2020 (Acker, 2020). Since the beginning of the Covid-19 pandemic on 27 March 2020, interest rates and exchange rates reached their highest level of volatility in the past 100 years, emerging currencies have depreciated against the dollar, and the South African rand has depreciated more than it has from 2016 to 2020, having a negative impact on the stock returns

(Pricewaterhousecoopers, 2020). The decrease in the value of the emerging currencies is caused by the excess demand for the dollar because of the fear of an economic downswing connected to the pandemic, as investors shift their investments to the dollar as it is a strong currency and is considered a safe currency (Economist, 2020).

The lockdown restrictions led economies into a liquidity crunch which resulted in the central banks reducing interest rates to increase market liquidity, in turn leading to commercial banks reducing the lending rates (Garg & Prabheesh, 2021). In response to the impact of the Covid-19 pandemic on the economy and income, the SARB reduced the repo rate by 300 basis points to reduce the pressure on households and businesses (Khumalo, 2020). The repo rate reduction meant that the reserve bank will lend banks money at a cheaper rate, which might have a positive impact on credit interest charged to banks (Sicetsha, 2020). Furthermore, reductions in the interest rate led to variations between the global and domestic markets in turn causing a decrease in the global investors who invested in currencies (Garg & Prabheesh, 2021).

Interest rate and exchange rate volatility influence bank stock return volatility (Kasman *et. al.*, 2011). The Covid-19 outbreak led the South African economy into a technical recession because of the Covid-19 restrictions (Mathe, 2020). The downswing in the economy affected the financial sector as interest rates were reduced and the rand depreciated, reducing national income. The study will provide insight as to how interest rate and exchange rate volatility affected the stock return of South African banks during the Covid-19 pandemic. A similar study on how interest rate and exchange rate volatility affected bank stock returns was conducted in Turkey and Pakistan, but this study has never been performed in South Africa according to the research knowledge. This study is critical because it will help banks and the economy mitigate the risks associated with interest rate and exchange rate movements to manage bank stock returns, and it may even encourage the development of new risk management techniques based on the knowledge and background gained from the study. The following are the research theoretical questions:

- What is the relationship between interest rates and bank stock returns throughout the Covid-19 period?
- How has the Covid-19 pandemic affected the value of the rand in relation to stock returns?

2. Literature Review

Because interest rates play a significant role in the financial sector, researchers such as Ahmad *et al*. (2010), have examined the impact of interest rates and foreign exchange rates on stock returns. Leon (2008) conducted a previous study that evaluated the relationship between interest rates and stock returns in Korea, and the results revealed that interest rates have a significantly negative relationship with stock returns. Bernie *et al*. (2009) also researched the risks associated with financial markets, interest rates and exchange rates, as well as how they affect stock returns. Furthermore, Bernie *et al*. (2009) examined the effects of interest rates and exchange rates using three different sectors namely the banking, financial, and insurance sector. The findings demonstrate that interest rate and exchange rate risks are most prevalent in the banking sector and financial services, but have a minor impact on the insurance sector, implying that the banking sector absorbs the majority of the interest and exchange rate shocks.

The most recent study is from Malaysia by Isa *et al*. (2021) on the vulnerability of banks' stock returns to the market, interest rate, and exchange rate movements using the ordinary least squares estimator, it is seen that the bank asset allocation and individual banks' stock returns are far more susceptible to fluctuations in the market than to changes in the interest rate and exchange rate volatility. This demonstrates that the market or economic risk factor has a greater impact on stock prices, which in turn affects bank stock returns. According to Ali *et al*. (2018), the responsiveness of stock returns to exchange rate and interest rate movements varies by bank, and the origin and nature of operations play a significant role in the banking sector's stock return sensitivity. Deviations in exchange rates and interest rates, as well as an imbalance in the maturity of the assets and liabilities of banks, increase the banks' exposure to risk (Ali *et. al*.,2018).

According to Yourougou (1990), if the selection between two asset portfolios has the same components consisting of proportionate wealth payments with different interest rate fluctuation responses, the conservative investor will be in favour of the asset or portfolio that is inclusive of risk hedging attributes that hedge against unfavourable changes in interest rates. The findings are supported by a study previously done by Fama and Schwert (1977) on sensitivity, the results prove that single-factor models improved once interest rates were included in the model. Moreover, Bae (1990) also carried out a study and noticed that there is a negative relationship between changes in interest rates and bank stock returns.

Interest rates reflect the central banks via the monetary policy announced to the public, the central bank will increase interest rates to control the circulation of money (International Monetary fund, 2021). High-interest rates have a negative impact on stock prices because increased interest rates increase the interest rate required for stock investment (Stoica, 2014). Boedi (1995) executed a study to evaluate the

relationship between interest rates and stock returns, and the study demonstrates that a series of factors including interest rates affect stock price movements. Zhou (1996) investigated the relationship between the interest rate and stock returns, the study's regression analysis disclose that interest rates have a significant impact on stock returns, predominantly over extended time horizons. Wong *et. al*., (2005) examined the long-term relationship between interest rates and stock returns in Singapore and the United States from 1982 to 2002, and the granger causality test results show that stock market performance might affect the adaptation of the monetary policy set by the central bank, which affects commercial banks.

Dornbusch and Fischer (1980) flow-oriented models and Branson and Frankel (1983) stock-oriented models are the two crucial models that show the relationship between exchange rates and stock prices. In flow-oriented models, the country's current account balance is an exchange rate determinant that also influences input and output levels. Furthermore, stock-oriented models evaluate the relationship between stock prices and exchange rates through the use of the capital account (Ndako, 2013). When domestic stock prices rise, the home currency falls in value, making it more expensive to acquire another currency. Furthermore, the models project a negative relationship between stock prices and currency exchange rates (Ndako, 2013). A study by Aggarwal (1981) investigated the impact of exchange rate movements on stock prices, utilizing monthly data from the United States share prices and effective exchange rates from 1974 to 1978, and the results revealed a clear relation, with the relationship being stronger in the shorter term than in the long term. Yu (1997) discovered a strong long-term steady relationship during his research in Hong Kong, Tokyo, and Singapore. Jefferis and Okeahalam (2000) discovered a positive relationship between real stock prices and real exchange rates in South Africa.

A study by Sikhosana and Aye (2018) analysed the volatility spillover effects on stock markets and exchange rates. Mun (2007) carried out a study on the impact of exchange rate movements on the relationship between the United States stock markets and other countries, the study consisted of exchange rate and stock price data from 1990 to 2003 to analyse the effect of exchange rate movements on stock market volatility, and the results from the study state that frequent exchange rate movements lead to a rise in domestic stock returns. Furthermore, exchange rates have a negative effect on the relationship between local markets and United States stock markets. Another study on volatility spillover effects was done by Lee *et al.* (2011), the study investigated the relationship between the Indonesian and Singapore markets. The study used the smooth transition conditional correlation GARCH (STCC-GARCH) to determine the relationship between the two markets as well as the effects of stock market volatility on the markets, and the results show that stock market volatility affects the relationship between the two markets.

The Covid-19 global epidemic has become an ongoing threat to the economy and financial markets (Dunford *et. al*., 2020). According to Goodell (2020), the Covid-19 virus outbreak has done significant damage to the global economy, citing the pandemic's effect on the financial sector as well as the stock market because of the dominance of investor point of view on making decisions. According to behavioural finance, when the market is bearish, investors tend to be pessimistic, resulting in short-term overreaction by investors (Burns *et. al*., 2011). Furthermore, sentiment influences stock market behaviour and volatility, which can have an immediate impact on asset prices and expected returns (Shu, 2010). Investors' reactions have influenced financial market volatility as a result of the uncertainty that originates from the Covid-19 pandemic. As a result of the uncertainty, the stock markets fluctuate in response to the declaration of Covid-19 and potential countermeasures such as interest rates and tax breaks (Baker *et. al*., 2020). A study by Ashraf (2020) states that stock market gains have a negative relation to the number of Covid-19 cases because as the number of Covid-19 cases increases, stock returns decrease. The findings imply that the stock market price in pandemic-related risks reacted more in the beginning stages of an increase in cases and reacts less as the cases decline. Another study by Al-Quduah and Houcine (2021) states that the initial sharp decrease in stock prices occurred on the 26th day of the Covid-19 outbreak, and the pandemic peak occurred between the 30th and 35th day when the second sharp decrease occurred. According to the findings, investor fear caused by the pandemic had an impact on the stock markets.

Since the spread of Covid-19, banks have been hit harder than most sectors in the economy as the financial markets were negatively affected, and bank stock prices declined in conjunction with the overall market, leading to banks being the worst performers as banks experienced more damage not only relative to other sectors but also in comparison with the financial crisis (Aldasoro *et. al*., 2020). In several countries, bank stock underperforms with the companies that are publicly traded in the home country as well as relative to non-financial institutions (Demirguc-Kunt *et. al*., 2020). The banking sector is expected to have an important role in absorbing the shocks by contributing the funds required. A study conducted by Demirguc-Kunt *et al*. (2020) emphasizes the nature of the Covid-19 shock and the anticipations that banks will suffer greater profit losses than other firms and the financial sector. According to the study's findings, by February 2020, bank and non-bank performance had begun to deteriorate due to the Covid-19 outbreak, and by the end of March, 2020 firm stock prices had declined by less than 60 percent.

Borio (2020) states that banks came into the pandemic with more capital than they did during the global financial crisis. The new rules enacted preceding the 2008 global financial crisis compelled banks to increase their capital position, because banks would have a tough time enhancing capital levels, such as issuing new shares if their capital position is low and stock prices are volatile and returns will be low

(Mirzae *et. a*l., 2021). According to Demirguc-Kunt *et al*. (2020), the interest rate cuts by the central bank resulted in a decline in the liquidity risk premium, as interest rates decline banks with lower liquidity realised an abnormal increase in returns as compared to liquid banks. Furthermore, the rise in returns of less liquid banks reflected market expectations that rising interest rates might increase the financial sector's liquidity, leading to banks with higher funding risks benefiting. The findings also show that interest rates remained an important tool during the pandemic because markets are accustomed to conventional monetary policy.

The bank performance metric based on the concept of stocks reflects the company's performance (Ross *et. al*., 2016). According to Wardhani *et al*. (2021), the banking sector is a driving force in the economy, accounting for 33 percent of the stock exchange. During the announcement of the Covid-19 pandemic, stock prices in the banking sector declined (Putri, 2020). Wardhani *et al*. (2021) conducted research in Indonesia using the Du-Pont analysis and found no difference in banking sector performance before and during Covid-19, supporting government policies used in credit restructuring relaxation as a countercyclical policy to resolve the effects of Covid-19 spread.

From the previous studies conducted, it is seen that the performance of the banking sector is crucial as the performance ensures that the banks realise increasing returns and it becomes attractive to investors. Interest rate and exchange rate volatility are important factors in determining bank stock returns and performance. Because of the Covid-19 pandemic, interest rates and exchange rates became even more volatile, and thus the rand depreciated affecting stock prices. To alleviate the effects of high volatility, the repo rate was reduced, to limit the Covid-19 shocks while maintaining some level of spending and consumption. In South Africa, the top five best-performing banks are Capitec, Standard Bank, Nedbank, Amalgamated Banks of South Africa (ABSA), and FirstRand Bank, which have higher capital levels as compared to other banks and are prone to experience higher loss in returns. Furthermore, the study's goal is to use the GARCH model to determine the impact of exchange rate and interest rate volatility on bank stock returns in South Africa in light of the pandemic.

3. Research Methodology

The sections of the methodology that follow represent the research approach and method used, model specification, data description, the formulated hypothesis, and the statistical analysis.

3.1. Research Method

This study was based on the quantitative method of research that is centred on quantifying the collection and analysis of data and can be used to make predictions and test for relationships (Bhandari, 2021). Moreover, the method was utilized in this study to test for the relationship between the dependent and independent variables which are South African top five banks' stock return and interest rates and exchange rates, respectively. According to the SARB, as of 31 March 2021 the top five banks namely the First Rand Bank, Standard Bank, Nedbank, ABSA Bank, and Capitec Bank dominated the banking sector as they accounted for 90.1 percent of the banking sector assets (South African Reserve Bank, 2021).

3.2. Model Specification

The study made use of two econometrics approaches namely the Ordinary Least Squares (OLS) and the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) models to investigate whether interest rate and exchange rate volatility determine bank stock return. The GARCH model is an addition to the Autoregressive Conditional Heteroscedasticity (ARCH) model which includes the moving average element and autoregressive element and is used to determine volatility between variables. Moreover, the model includes the lag of both the variance variable and residual error from the mean variable (Bollerslev, 1986). The Ordinary Least Squares model assists in analysing the relationship between explanatory variables and assumes a continual variable that reduces the sum square errors (Zdanuik, 2014). To achieve the econometrics models, EViews 11 statistical package was used to perform the analysis.

3.3. Data Description

The sample consists of five commercial banks' stock prices in South Africa listed on the Johannesburg Stock Exchange (JSE) namely the First Rand Bank, Standard Bank, Nedbank, ABSA Bank, and Capitec Bank as well as the foreign exchange rate (rand per dollar), and interest rates (repo rate). The daily closing individual stock price, foreign exchange rates, and interest rates were used for the period beginning on 01 January 2011 and ending on 19 August 2021 as this period consists of dates both before and during the Covid-19 pandemic. The interest rates and foreign exchange data were obtained from the SARB as the bank controls interest rates which affect the value of the rand per dollar, and stock returns data were obtained from Iress BFA.

3.4. Hypothesis

The proposed hypothesis was made based on limited evidence from previous studies, and it was used as the starting point for the study. The null hypothesis(H_0) of the study is that interest rate and foreign exchange volatility do not affect bank stock returns and the alternative null hypothesis (H_1) would be the opposite.

H_0: Interest rate and exchange rate volatility do not affect bank stock returns.

H_1: Interest rate and exchange rate volatility affect bank stock returns.

3.5. Statistical Analysis

The study used the OLS regression and GARCH model to achieve the empirical goals of determining whether interest rates and exchange rate volatility influence bank stock returns, as well as the type of relationship between the dependent and independent variables, demonstrated using the OLS regression. Moreover, the GARCH model was used to determine the volatility of bank stock returns while taking interest rates and exchange rates into account.

3.5.1. OLS Regression

In the OLS regression, the dependent variable is the South African bank's stock returns, and the independent variables are the Repo rate (RP_t) and foreign exchange rates (FX_t), where β_0 is the constant, β_1 and β_2 are the coefficients of the repo rate and foreign exchange rates, respectively.

$$r_t = \beta_0 + \beta_1 RP_t + \beta_2 FX_t + U_t \quad (1)$$

Equation 1 is the OLS method where:

r_t represents the bank stock return.

β_0 represents the intercept.

$\beta_1 RP_t$ represents the interest rate.

$\beta_2 FX_t$ represents the foreign exchange rate.

U_t represents the error term of the model.

3.5.2. GARCH (1,1) Model

Equation 2 is the GARCH model used to determine the determinants and volatility of variables.

$$r_t = \gamma_0 + \gamma_{rt-1} + \gamma_{rt-2} + \alpha_0 RP + \alpha_1 FX \quad (2)$$

r_t represents the bank stock return

γ_0 represents the intercept

γ_{rt-1} represents the first lag of bank stock return

γ_{rt-2} represents the second lag of bank stock return

$\alpha_0 RP$ represents the interest rate

$\alpha_1 FX$ represents the foreign exchange rate

4. Empirical Results and Discussion

4.1. Descriptive Statistics

Table 1 shows negative skewness for Absa bank, FirstRand bank, Nedbank, interest rate, and exchange rate meaning there is a long-left tail and lower values as compared to Capitec Bank and Standard bank which have a positive skewness with higher values. Furthermore, the kurtosis is leptokurtic as the data of all variables show more positive higher values. The Jarque-Bera test which measures the difference between the skewness and kurtosis of the series with normal distribution shows significance at 5% as the probability is less than 0.05, which implies that the series is not normally distributed.

Table 1. Descriptive Statistics and Augmented Dicky-Fuller

Banks	Mean	Max	Min	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	ADF
Absa Bank	148.4167	207.0000	63.3000	23.6767	-0.7637	4.3096	447.9718*	-53.657**
Capitec Bank	659.0607	1866.3800	142.0000	446.9034	0.5172	2.0448	219.3875*	-38.259**
FirstRand Bank	44.9124	76.0700	17.9000	14.7684	-0.1393	2.0132	116.3414*	-51.611**
Nedbank	200.0587	313.0000	73..2000	49.2907	-0.2612	2.3322	79.5614*	-52.638**
Standard Bank	138.9966	227.4100	84.4100	31.6268	0.6193	2.5205	195.1965*	-53.387**
Interest rate	0.0572	0.0700	0.0350	0.0105	-0.7330	2.7502	244.7597*	-51.507**
Exchange rate	12.2405	19.0768	6.5962	2.9132	-0.2702	2.1318	115.7461*	-52.327**

* Indicates significant at 5% and ** Indicates significant at 5% 1st difference.

The table also includes the Augmented Dicky-Fuller (ADF) unit root test which helps in detecting a unit root problem in the series. The ADF is significant at first difference meaning it shows a probability of less than 0.05 implying stationarity in the series and there is no sign of a unit root problem (Asteriou & Hall, 2016).

4.2. Correlation Analysis

Table 2. Estimates of OLS Regression of Banks

	β_0	β_1	β_2	Adjusted R^2	ARCH (1)
Absa Bank	0.0002 [0.5867] (0.5574)	0.0943 [1.7338] (0.0831)	-0.6049 [-15.7591] (0.0000)	0.0864	318.1826 (0.0000)
Capitec Bank	0.0009 [2.4415] (0.0147)	-0.2466 [-4.3214] (0.0000)	-0.4308 [-10.6968] (0.0000)	0.0463	99.9713 (0.0000)
FirstRand Bank	0.0006 [1.6787] (0.0933)	0.036322 [0.7032] (0.4820)	-0.6238 [-17.1088] (0.0000)	0.0991	135.1624 (0.0000)
Nedbank	0.0003 [0.8934] (0.3717	0.2792 [5.1651] (0.0000)	-0.6241 [-16.3551] (0.0000)	0.1005	243.6346 (0.0000)
Standard Bank	0.0003 [0.7758] (0.4380)	0.0515 [1.0344] (0.3010)	-0.5865 [-16.6834] (0.0000)	0.0949	78.2089 (0.0000)

Values in parentheses [] and () are t-statistic and probability respectively.

Table 2 shows an estimation of the OLS regression of bank stock returns. The interest rate has a positive relationship with four out of five bank stock returns. However, the relationship is positive and insignificant for three out of five banks which are Absa Bank, FirstRand Bank, and Standard Bank as the probability of the estimated returns is greater than the 5% level of significance. Whereas Capitec Bank has a negative significant relationship and Nedbank has a positive significant relationship as the bank's estimated returns have a probability of 0.000 which is less than 5% level of significance. The foreign exchange rate shows a negative and significant relationship for all bank stock returns as the coefficients are negative and the probability is 0.000 which is less than the 5% level of significance, meaning that foreign exchange rates have a negative impact on bank stock returns. Table 2 also shows the ARCH (1) effect on the series. The ARCH effect is frequently termed serial correlation of heteroskedasticity. From the table ARCH (1) is statistically significant at a 5% level of significance for all bank stock returns as the probability is 0.000 which implies that there is evidence of heteroskedasticity. However, heteroskedasticity violates the fifth assumption of the classical linear regression model (CLRM) which states that the disturbances should have constant equal variance, and the existence of heteroskedasticity implies unequal variance (Asteriou & Hall, 2016).

4.3. Regression Analysis

Table 3. Estimation of Returns with GARCH (1,1)

	γ_0	γ_{1rt-1}	γ_{2rt-2}	α_0Int	α_1FX	ARCH	GARCH
Absa Bank	0.0004 [1.1968] (0.2314)	-0.1060 [-5.6322] (0.0000)	-0.0461 [-2.3692] (0.0178)	0.0976 [1.3069] (0.1913)	-0.5122 [-16.9517] (0.0000)	0.0802 [10.7874] (0.0000)	0.8795 [71.5468] (0.0000)
Capitec Bank	0.0013 [4.5088] (0.0000)	0.0111 [0.5811] (0.5612)	0.0083 [0.4204] (0.6742)	-0.0139 [-0.2168] (0.8284)	-0.2800 [-10.4159] (0.0000)	0.1294 [26.1182] (0.0000)	0.8447 [106.7855] (0.0000)
FirstRand Bank	0.0009 [2.6487] (0.0028)	-0.0547 [-2.9849] (0.0028)	-0.0428 [-2.3325] (0.0197)	0.0439 [0.6328] (0.5268)	-0.5252 [-16.5841] (0.000)	0.0567 [10.0769] (0.0000)	0.9204 [104.7472] (0.0000)
Nedbank	0.0005 [1.6602] (0.0969)	-0.0742 [-3.9582] (0.0001)	-0.0397 [-3.9382] (0.0001)	0.0491 [0.6323] (0.5271)	-0.4850 [-17.3969] (0.0000)	0.0645 [10.2339] (0.0000)	0.9140 [106.5800] (0.0000)
Standard Bank	0.0005 [1.7517] (0.0798)	-0.0929 [-4.914] (0.0000)	-0.0506 [-2.8261] (0.0047)	0.0365 [0.4311] (0.6664)	-0.4870 [-16.1181] (0.0000)	0.0569 [0.5389] (0.0000)	0.9287 [114.2144] (0.0000)

Values in parentheses [] and () are z-statistic and probability, respectively.

The estimated GARCH (1, 1) parameters of the conditional mean return model are shown in Table 3. The coefficients of the interest rate show a positive and insignificant relationship with estimated returns for all banks as the probability is more than 0.05 at a 5% level of significance. The foreign exchange rate shows a negative significant relationship with the estimated returns of all the banks. The major reason for the negative relationship with the exchange rate can be described by the sharp depreciation of the exchange rate, which will have a negative economic impact on the deterioration of net assets (liabilities denominated in foreign currency exceed assets denominated in foreign currency) in banks and corporations (Mouna & Anis, 2016).

Furthermore, the ARCH term represents the square of the past residual whereas the GARCH represents the past volatility. Looking at the parameters of the Absa Bank, ARCH shows a coefficient of 0.0802 and GARCH of 0.8795 meaning the stock returns of Absa Bank are significantly affected by the past volatility component which amounts to 0.8795. secondly, Capitec Bank has an ARCH coefficient of 0.1294 and GARCH of 0.8447 which shows that the bank is significantly affected by past volatility of 0.8447.

Thirdly, FirstRand Bank ARCH shows a coefficient of 0.0567 and GARCH of 0.9204 meaning the stock returns of Absa Bank are significantly affected by the past volatility component which amounts to 0.9204. The fourth bank which is Nedbank shows an ARCH coefficient of 0.0645 and GARCH of 0.9140 meaning the stock returns of Absa Bank are significantly affected by the past volatility component which amounts to 0.9140. Lastly, Standard Bank shows an ARCH coefficient of 0.0569 and GARCH of 0.9287 meaning the stock returns of Absa Bank are significantly affected by the past volatility component which amounts to 0.9287. These findings are supported by research done by Ali *et al.* (2018) as the results indicate that banks' stock returns are significantly affected by their past volatility and the results are significant meaning stock returns volatility is continuous. Also comparable to a study by Priti (2016) as the findings show that interest rates and exchange rates have a lead-lag relationship meaning the leading variable is affected by the lagged variable. These findings are also supported by a study done by Isa *et al*. (2021), the GARCH and ARCH results demonstrate that the volatility of bank stock returns is more responsive to the lagged values, meaning that the variance on stock returns is continuous.

Furthermore, all the banks' ARCH coefficients are positive and statistically significant as well as the GARCH coefficients, which signifies that there is a positive relationship between the past variance and current variance. However, the GARCH coefficients are greater than the ARCH coefficients which implies greater volatility in the lagged variables. Meaning that the volatility of the banks' returns from previous the previous period of interest rate and exchange rate shocks is strongly supported by the GARCH whereas the ARCH exhibits weak support of the shocks as the coefficients are lower than of the GARCH (Kasman *et. al*., 2011). Moreover, the model supported the ARCH and GARCH conditions as the coefficients are less than 1. The ARCH and GARCH coefficients have a probability of 0.000 for all banks namely Absa Bank, Capitec Bank, FirstRand Bank, Nedbank, and Standard Bank meaning that we reject the null hypothesis of interest rate and exchange rate volatility not affecting bank stock returns. Alternatively, accepting the null hypothesis of interest rate and exchange rate volatility affecting banks' stock returns means that interest rates and exchange rates have a significant impact on the banks' returns as the probability is less than the 5% level of significance.

5. Conclusion

Earnings in the financial sector are critical for policymakers and investors in South Africa and abroad. The volatility of the banking sector's return influences the decision-making process of investors, hedgers, and policymakers. As a result, this study will benefit all stakeholders who are concerned about fluctuations in financial sector profitability as well as volatility in exchange rates and interest rates. This

study showed a gap in the literature as few to no studies showed the latest literature including the Covid-19 period, hence this study is crucial. Previous studies found that interest rate and exchange rate volatility do determine bank stock returns and that interest rates and exchange rates have a negative significant relationship. This study aimed to analyse the impact of interest rate and exchange rate volatility on banking sector stock returns in South Africa considering the Covid-19 pandemic. Three variables were used for the achievement of the objectives. The interest rate and the exchange rate are independent variables, and the stock return of South Africa's top five banks is the dependent variable. The banking sector's profitability is important to a variety of stakeholders such as investors, hedgers, and policymakers. This study made use of the OLS regression as well as the ARCH and GARCH models to analyse the relationship between the variables. The findings state that interest rates have a positive and significant relationship with bank stock returns as four out of five banks showed positive coefficients in the OLS estimator. Moreover, the foreign exchange rate exhibited a negative relationship with the bank's stock returns as the coefficients from the OLS estimator are negative. The ARCH and GARCH models' findings stated that bank stock returns are determined by their past volatility.

The findings of this paper are explicitly useful for investors reassessing bank stocks, bank managers developing risk management strategies, and policymakers developing monetary policies. As a result, the findings of this study have managerial and policy implications. The study has managerial implications for the banking sector because interest rate and exchange rate volatility increase the risks associated with the variables, implying that banks should consider various hedging strategies in light of the study's findings. Understanding how interest rates and exchange rates affect the stocks returns of banks might dispense information that is useful for portfolio management in the home country and abroad because interest rates and exchange rates can forecast bank stock returns and volatility, the findings suggest that investors must attentively consider monetary policies during the investment decision process. The relationship between the interest rate and the exchange rate with bank stock returns implies that when formulating monetary policies, policymakers should consider the banking sector's recent performance to interest rates and exchange rates, as the success of the banking sector predicts economic performance. When developing risk management strategies, bank managers should adhere to monetary policies as well. This is critical because the banking system has a significant role in the growth of the economy, and monetary policies can aid in the development of a steady banking system. Furthermore, to improve the study, future researchers can make use of larger sample sizes and more banks to analyse the impact interest rate and exchange rates have on bank stock returns.

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