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Effect of Monetary Policy Announcements on Stock Prices in South Africa

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ABSTRACT

The purpose of the monetary policy is to attain and sustain price stability in order to achieve balanced and sustainable economic development and growth. The stock market contributes to the growth of vital sectors of the economy and thus ultimately has an impact on the economy of a country. Prior to making investment decisions, investors consider the required rate of return, making stock prices largely sensitive to macroeconomic announcements. The purpose of the study is to define the extent to which the monetary policy rate announcements influence the behaviour of stock prices for firms that are listed on the Johannesburg Stock Exchange (JSE).

A general conclusion from studies done in developed countries is that there is an inverse relationship between monetary policy and stock returns. The existing literature for developing economies, mainly Africa, focuses more on the relationship between long-term interest rates and stock prices and less on the policy rate effects on stock prices which have a number of limitations. According to literature, these limitations can be overcome by utilising the event study methodology. The event study methodology is known for using a short event period around the announcement of the policy rate in order to avoid limitations.

In order to examine the impact of the policy rate announcement on the JSE, the study adopted the event study methodology to analyse data from October 2006 to September 2018. The data was collected from South African Reserve Bank publications and JSE daily trading reports. The results showed that abnormal returns were present for stock prices when there was a policy rate announcement. However, it was found that monetary policy rate announcements had no significant effect on companies listed on the JSE. The study concluded that there is no inverse relationship between the monetary policy announcement and the stock prices in South Africa. Monetary policy rate changes have an immediate effect on commercial banks and because of this, it assumed that the monetary policy rate announcement will have a greater impact on commercial bank stock prices than it would have on non-bank stock prices. The results from this study did not confirm this assumption as the bank stocks were not impacted more by the monetary policy rate announcement than the non-bank stocks were.

This paper further confirms the finding of studies done in developing countries where it is found that policy rate actions do not significantly influence the stock markets in developing countries and more importantly those within Sub-Saharan Africa.

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CHAPTER 1
INTRODUCTION AND BACKROUND OF STUDY

1.1 Background of study

A stock exchange is an organised marketplace, licensed by a relevant regulatory body, where shares in companies are listed and traded (World Federal Exchange (WEF), 2017). The listing of companies is done on the *primary market*, a place where shares in a company are made available to the general public. Listings are used by companies to raise funds in ways other than debt, so instead they will issue stocks. The *secondary market* is the place where investors are able to buy and sell their listed stocks. The listing in the primary market results in an inflow of funds for the listed companies; however, the trading that happens between investors in the secondary market does not. The primary and secondary markets are highly regulated and all activity occurs within a framework of rules and regulations. The objective of these rules and regulations is to protect the assets of the investor, guaranteeing transparent pre and post trade processes and ensuring that listed companies comply with all rules and processes. A securities market regulator supervises exchanges. There are various models applied to decide who is responsible for which element of market regulation in different jurisdictions. Irrespective of the regulatory structure, all exchanges are responsible for ensuring compliance with all market regulations and observing what happens in the market at some level.

At the end of 2016, there were nearly fifty thousand companies listed on 81 exchange groups (this number only represents exchange groups, i.e. Nasdaq Nordic, and not individual groups) around the world (WFE, 2017). The market capitalisation for all companies combined was approximately $70 trillion (WFE, 2017). Companies listed in stock exchanges range in size, from market capitalisation of smaller than $10 million to market capitalisation far greater than $100million and the companies come from all economic sectors such as agriculture, information technology, manufacturing, mining, and services. The stock market contributes to the growth of vital sectors of the economy and thus ultimately has an impact on the economy of a country. The purpose of any stock market is to support the growth of the industry and economy of the country, it is also a measuring tool that gives an indication about the growth of the industry and the stability of the economy regarding their performance (Aurangzeb, 2012). When there is consistent growth in the stock market index, this indicates that the economy is growing and if the index/stock prices are decreasing or the fluctuations experienced are high, this gives an indication of an unstable economy.

Economic growth of any country is directly linked to macroeconomic variables, mainly the Gross Domestic Product (GDP), which consists of variables such as money supply, interest,

exchange rate, Foreign Direct Investment (FDI), inflation and many more. These variables are the pillars of the economy. Stock price movement is affected by variations in the fundamentals of the economy and what the expectations about the future prospects of these fundamentals are. The performance of the market over a period of time is measured by the stock market index. The indices are then used as yardsticks by fund managers or investors to conduct a comparison between their return and the market return. A number of studies conducted in the United Kingdom, United States of America and Japan found that a relationship exists between macroeconomic variables and fluctuations in the price of stocks (Stavarek, 2004; Aurangzeb, 2012). The results from these studies have assisted investors in making market predictions about stock price movements when there is a change in the position of the fundamentals.

There is extensive evidence in support of monetary policy announcements having an influence on stock prices (Minetti, 2008). In South Africa, banks borrow money from the South African Reserve Bank (SARB) at a rate set by the SARB for liquidity needs. The monetary policy rate is therefore expected to have an impact on stock prices due to the fact that it affects the interest rate, inflation, the amount of money in circulation and the expectations of financial market participants regarding the outlook of economic activity. It is often argued that stock prices are forward looking and thus when news is announced, the reaction to this news is the expectation that changes will be made based on what investors expect the central bank reaction will be in light of the news.

There is a general assumption that an inverse relationship exists between interest rate and stock prices. This means that when there is an increase in interest rates, as a consequence of a restrictive monetary policy, it is expected that there will be a decrease in stock prices (vice versa when there is decrease in interest rate). There are a number of stock valuation models (Gordon's Dividend Valuation Model, CAPM and Discounted Cash Flow Model) that support this inverse relationship. These stock valuation models state that the stock prices are affected by interest rates because interest rates shift the discount factor and this makes holding fixed income securities more attractive than holding stocks, and through the interest rate influencing the expectations of economic activity of the market participants.

1.2 Overview of Johannesburg Stock Exchange

The Johannesburg Stock Exchange (JSE) offers safe efficient primary and secondary capital markets through a broad range of securities which are strengthened by the JSE's post-trade and regulatory services. The JSE was established in 1887 during the first gold rush period in South Africa. The JSE combined with the World Federation Exchanges in 1963 as a consequence of the passing of the first legislation covering financial markets in 1947 (JSE, 2013). In the early 1990s, the JSE advanced to an electronic trading system.

An alternative exchange called AltX was launched by the JSE in 2003 for small to medium-sized firm listings (JSE, 2013). After this launch, the JSE launched the Yield X for currency and interest rate instruments. The JSE also did a number of acquisitions – in 2001 it acquired the South African Futures Exchanges (SAFEX) and in 2009 it acquired the Bond Exchange of South Africa (BESA). Currently the JSE has five financial markets on offer: Equities and Bonds, Commodities, Financial and Interest Rate Derivatives. The JSE is the largest stock exchange by capitalisation in the African continent and is ranked 19th in the world (JSE, 2013).

The Market

South Africa has mature capital markets that serve the domestic economy and the wider continent. At the end of 2013, the value of the JSE in terms of market capitalisation value was $1,007bn (JSE, 2013).

The equity market accommodates a diverse range of offerings, with almost 400 firms listed on the JSE (including the Main Board and Alt X). The partnership between the JSE and FTSE Group formed the JSE index series which is known as the FTSE/JSE Africa Index. The JSE has two benchmark indices, namely the FTSE/JSE All Share Index which covers 99% of the market capitalisation and the FTSE/JSE Top 40 Index that is used to track the best performing listings which consist of a spread of sectors. The South African bond market is the largest in Africa (JSE, 2013). The most common bonds on the market are issued by government and owned by state-owned entities; however, the corporate bond market is also growing. The Derivatives market offers a variety of trading products comprising Futures and Options on Bonds, Equities, Indices, Interest Rates, Commodities and Currencies. There is a range of local and international operations which are licensed members on the JSE. They are 62 Equity members, 92 Commodity Derivative members, 102 Currency and Interest Rate Derivatives and 120 Equity Derivatives members (JSE, 2013).

Regulation

The JSE is supervised by the Financial Services Board (FSB) in order to ensure that they are fulfilling their regulatory duties. A twin peaks model of oversight is set to be implemented in the future and this will significantly change South Africa's regulatory landscape. The new system will transfer prudential supervision to the SARB and a strengthened FSB will lead market conduct regulation. The 2013-2014 Global Competitiveness Survey conducted by the World Economic Forum ranked the JSE as the world's leading exchange in terms of regulation of securities.

An important regulatory change to also note is the decision that was taken in 2011 to change the country's inward listing rules by permitting foreign domiciled firms to be treated the same as the domestic listings. Foreign firms had been allowed to list on the JSE since 2004; however, in the past they were subject to foreign exchange rules which as a result limited the amount of stock domestic investors could own. The removal of these restrictions has remained an essential regulatory shift for the JSE, thus making it a more attractive listing destination.

1.2.1 Overview of South African Monetary Policy

The purpose of the monetary policy is to attain and sustain price stability in order to achieve balanced and sustainable economic development and growth. Uncertainty in the economy is reduced by price stability and consequently creates an environment that is constructive for job creation and growth. Furthermore, low inflation rates protect South Africans' purchasing power, predominately the underprivileged who do not have the means to defend themselves against constantly increasing prices.

The SARB has full operational independence and the monetary policy is set by the SARB's Monetary Policy Committee (MPC). During the period 1960-1998, the Banks's Monetary Policy Committee adopted a number of frameworks including discretionary monetary policy, electric approach, exchange-rate targeting and monetary-aggregate approach. In early 2000, the bank formally introduced the inflation-targeting framework. Under the inflation-targeting framework the central bank sets an inflation target (the target can be altered several times) and a policy is implemented to directly achieve this target.

An MPC is appointed by the bank to deal with the monetary policy decision-making process. Decisions regarding the appropriate monetary policy position are made by a consensus or with a majority view without formal votes being taken by the MPC. The MPC comprises seven members and the MPC meetings are chaired by the Governor.

The SARB is committed to having a monetary policy that is transparent. This has resulted in the bank taking numerous initiatives to improve communication to the public regarding their policies. At the end of every MPC meeting, the MPC issues a formal statement through a press conference held by the Governor of the bank explaining the reasons behind the policy stance. This press conference is broadcast on live television and the statement of the Governor is made available on the bank's website. In addition to this, the bank also publishes a Monetary Policy Review bi-annually. The main purpose of this review is to broaden the understanding of the goals and conduct of the monetary policy.

The implementation of the monetary policy is the responsibility of the Financial Markets Department of the bank. The implementation of the monetary policy of the bank follows a framework of a classical cash reserve system. With this framework a cash reserve requirement is levied on banks which is a result of the bank setting an appropriate liquidity requirement or structural money market shortage.

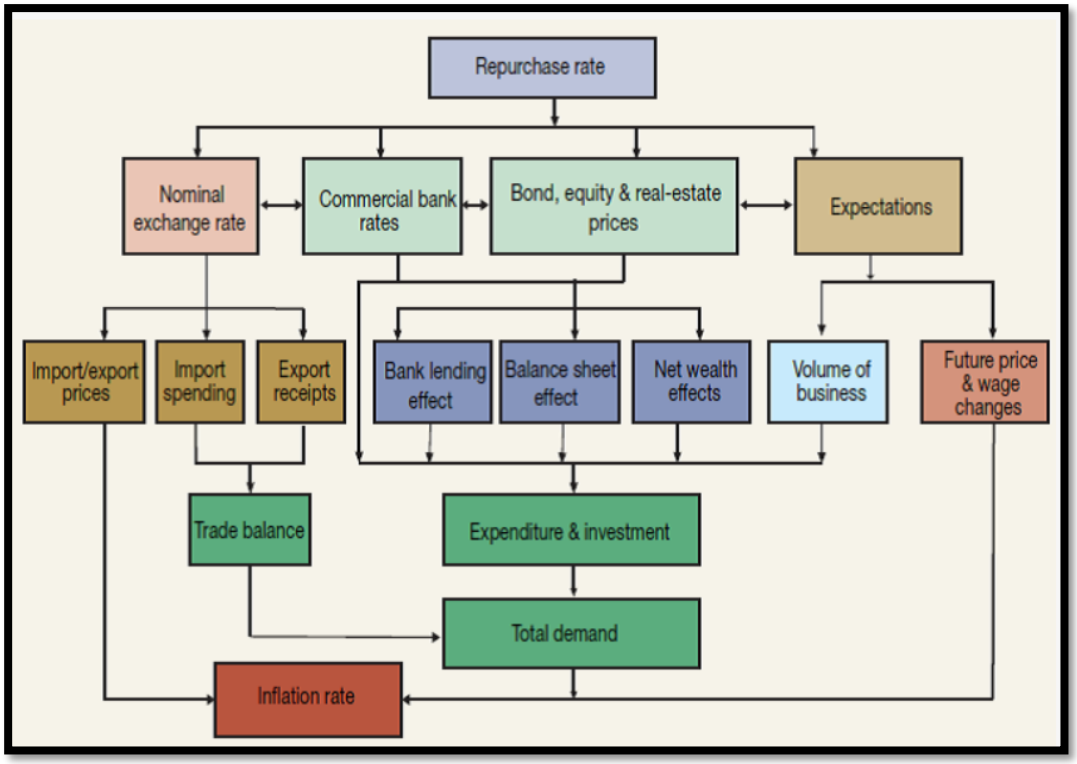


Figure 1.1: Main transmission channels of monetary policy decisions

Source: South African Reserve Bank (SARB), 2004.

The monetary policy transmission mechanism is a process where the policy decisions particularly affect the price level and the economy in general. Predicting the exact effect of the monetary policy actions on price level and economy is complex due to the transmission mechanism being characterised by long, variable and uncertain lags (SARB, 2004). The size of the change in the central bank's policy rate does not provide a good signal of the possible impact the monetary policy will have on that economy. If the exchange rate of the rand, the market interest rates, credit and other asset prices fail to respond in a meaningful way to the changes in the official policy rate, then the monetary policy has minimal effect on the economy (Mollentze, 2001). In order to conduct the monetary policy successfully, the monetary authorities need to conduct all the possible necessary assessments related to the effect and timing of the policy on the economy needs to be assessed. Therefore, this requires authorities to understand the mechanisms through which the monetary policy affects the economy.

1.3 Statement of research problem

The monetary policy is an important economic tool for government because its main objective is to reach financial stability. In order to achieve this, money supply needs to be controlled, which can be done through targeting the inflation and interest rate and being able to use monetary aggregates. The central bank can use the monetary policy rate (can also be called the repo rate or discount rate) to effect the circulation of money supply. This is the rate at which the central bank lends money to financial institutions in the event of any shortfall of funds. In order to expand money supply in the short term, the central bank will lower repo rates as this will result in financial institutions swapping their holdings of government securities in exchange for cash. The opposite is done when the bank wants to contract money supply.

“Stock prices are among the most closely monitored asset prices in the economy and are commonly regarded as being highly sensitive to economic conditions” (Oniore & Oghenebrume, 2017). The sensitivity could result in prices being volatile and cause stock market bubbles, which could be harmful to the economy. When making investment decisions, investors consider the required rate of return, making stock prices largely sensitive to macroeconomic announcements. This is due to the fact that the monetary environment is a key determining factor of an investor’s required rate of return (Hojat, 2015).

The long-term interest rate depends on the current (short-term) interest rate and the market expectations concerning the future interest rate, which is consistent with Efficient Market Hypothesis (EMH). If it is anticipated that there will be changes to the monetary policy rate and there is an announcement of the change of the monetary policy as anticipated, this is unlikely to trigger a stock market reaction and influence stock prices as the policy rate announcement is no different from what was anticipated. Conversely, if the announcement of the rate is different from what was expected this should affect stock market reaction and therefore the behaviour of stock prices. This is evidence that the phenomena of interest rate and stock markets are both psychological. It is key to note that this is the case only when the monetary policy is stable, and not when the monetary policy rate “strikes public opinion as being experimental in character or easily changed” as stated by Keynes (Mullineaux, 1981). A monetary policy that is stable tends to be predictable and in a place where efficiency reigns, this will lead to financial markets being stable and the economy being stable (Mullineaux, 1981).

Monetary policy rate changes have an immediate effect on commercial banks. Empirical evidence suggests that this is caused by the fact that policy rate has an influence on financial institutions’ lending activities. This makes it obvious that a policy rate announcement will have more impact on commercial bank stock prices than it would have on non-bank stock prices. In

theory it is hypothesised that there is an inverse relationship between the policy rate and stock market prices. Therefore, if there is an increase in the interest rate, the market will anticipate this and it will have a negative influence on stock prices, resulting in stock prices declining. A lower policy rate is expected to have a positive influence on stock prices and if the rate remains the same, the stock market is expected to remain unchanged.

Sourial (2002) stated that the degree of development of the financial system and the equity culture will determine the response of the stock market to monetary policy changes. There has been a substantial amount of growth in the capitalisation ratio in stock markets of developing economies as of the early 1990s. However, the majority of the stock markets in emerging countries especially in Sub-Saharan Africa have low levels of financial intermediary development, relatively small stock markets with a small number of listed firms, low liquidity and very few trades taking place, thus showing that their stock markets are at their early stages of development (Yartey & Adjasi, 2007). Therefore, this means that the monetary policy rate changes will have a different impact on emerging countries' (particularly those counties within Sub-Saharan Africa) stock markets than on those of developed countries.

The purpose of this research paper is to define the extent to which the monetary policy rate announcements influence the behaviour of stock prices for firms that are listed on the JSE.

1.4 Research objectives

The main objective of the monetary policy is to achieve financial stability; this makes the monetary policy an important economic tool for government. Finding the correlation between the monetary policy and asset prices is vital to gaining a better understanding of the transmission mechanism of the monetary policy, since fluctuations in asset prices affect various channels. Therefore, it is critical to determine how the monetary policy influences stock market performance in South Africa and to find out whether there is best practice in implementing the monetary policy in order to achieve a better performing stock market. The purpose of this research was to determine if the monetary policy rate announcement has an impact on the behaviour of stock prices for firms that are listed on the JSE.

Stock valuation models (such as CAPM) and existing research studies argue that there is an inverse relationship between monetary policy and stock returns, while this study sought to determine if this is the case for stocks listed on the JSE.

It is assumed that the monetary policy rate has a stronger impact on commercial bank stock prices than non-bank stock prices because of its effect on the bank operations: commercial banks borrow money from their reserve banks at a rate set by the reserve bank for liquidity

needs. This study aimed to determine if this is true for stocks in South Africa, by testing if commercial bank stocks are impacted more by monetary policy announcements than non-bank stocks listed on the JSE.

Based on the background of the study and the problem statement, this study aimed to attain the following objectives:

1. To find out if the monetary policy rate announcements have an impact on JSE stock prices.
2. To find out if there is inverse relationship between the monetary rate and the JSE stock prices.
3. To find out if the monetary policy rate announcement has a greater impact on commercial bank stock prices than on non- bank stock prices.

1.5 Research questions

Stock valuation models (such as CAPM) state that the stock prices are affected by interest rates in two ways: firstly, through interest rates shifting the discount factor, and secondly, through the interest rate influencing the expectations of economic activity of the market participants. Thus, the effect that the interest rate has on stock prices causes the monetary rate to have an impact on stock prices. This study examined the effects that the monetary policy rate, if any, has on stock prices in South Africa.

In view of the presented background to the research and in an attempt to seek answers to the problem statement, the study sought to answer the following research questions:

1. Does the announcement of monetary policy rate have an impact on JSE stock prices?
2. What type of impact does the monetary policy rate have on JSE stock prices?
3. Does the policy rate announcement have a stronger impact on commercial bank stocks than on non-bank stocks?

1.6 Hypotheses

Most of studies conducted in developing economies, especially in Africa, focus on the long-term interest rate. Not many studies have been conducted to determine the effects the monetary policy rate announcement has on stock returns. In order to close this knowledge gap, this study adopted the event study methodology using a short event window which looked at the effects of policy rate announcements on stock returns and systematically tested three hypotheses:

Hypothesis 1

H_0: The announcement of the monetary policy rate does not have a significant impact on the JSE stock prices.

H_1: The announcement of the monetary rate has a significant impact on the JSE stock prices.

Hypothesis 2

H_0: The policy rate does not have a significant inverse relationship with the JSE stock prices

H_1: The policy rate has a significant inverse relationship with JSE stock prices.

Hypothesis 3

H_0: The policy rate announcement does not have a stronger impact on commercial bank stocks than on non-bank stock prices

H_1: The policy rate has a stronger impact on commercial bank stock prices than on non-bank stock prices.

1.7 Justification of study

A number of studies have been conducted worldwide to establish the effect that the monetary policy rate has on stock market prices and many of these studies have had various results depending on the stock exchange chosen. No study has been conducted in recent times using event study methodology with South African data. This research will contribute to the existing body of knowledge by giving insight to the relationship that the monetary rate announcements has on South African stock market prices. Understanding the extent to which the stock market reacts to monetary policy rate announcements is vital to the policy makers and the participants of the financial markets. Policy makers will be able to use the results of this study as an indicator of how stock prices will react and how stock markets will perform to policy rate announcements in the future. This study will also be of value to financial market participants through providing insight and awareness of the effects that the monetary rate announcement will have on the stock prices, which will assist with their investment and risk management strategies.

1.8 Organisation of study

The study consists of five chapters. The first chapter introduces the background of the study and provides an overview of the JSE and the South African Monetary Policy. The second

chapter discusses existing literature on the effects of monetary policy rates on stock markets and also provides an analysis of the knowledge gap this study wants to contribute to the existing literature. The third chapter looks at the methodology used to try answer the research questions and presents the tests of the hypotheses of the study. This chapter also provides an explanation to how the data was analysed in order to answer the research questions. The fourth chapter presents the discussion of findings. The last chapter, Chapter 5, provides recommendations and conclusions which are based on the finding of the study.

CHAPTER 2:
LITERATURE REVIEW

2.1 Introduction

The purpose of this chapter is to define key concepts, conceptual frameworks and models, highlight existing theories as well as provide empirical evidence that is related to the link between the policy rate and stock prices.

2.2 Concept of the monetary policy

According to economic theory, monetary policy is a macroeconomic policy which is put in place by the central bank. It includes managing money supply and interest rate; it is a demand side economic policy utilised by the central bank of a country to attain macroeconomic objectives such as the desired level of growth in real activity, inflation, liquidity, real output and employment.

In order to keep the economy close to its equilibrium level of output, it has to remain within its inflation target. Central banks will use the monetary policy through adjusting the interest rate to stay within the inflation target. The objective of the central bank is to reduce the effects of a shock to the economy by preventing the shock from causing high inflation, because high inflation requires higher unemployment levels to reduce it. During periods of high inflation, the central bank will change the interest rate in a way that it will affect aggregate demand and lead the economy back towards its target inflation and equilibrium unemployment (Norfeldt, 2014). This is a reaction function that the central bank utilises to respond to shocks to the economy and direct it back toward its inflation target. The reaction function has two tasks, the first task is to be a nominal anchor of the inflation target and secondly to guide the interest rate on how it should adjust in order to respond to shocks in the economy to meet the inflation target (Carlin & Soskice, 2006).

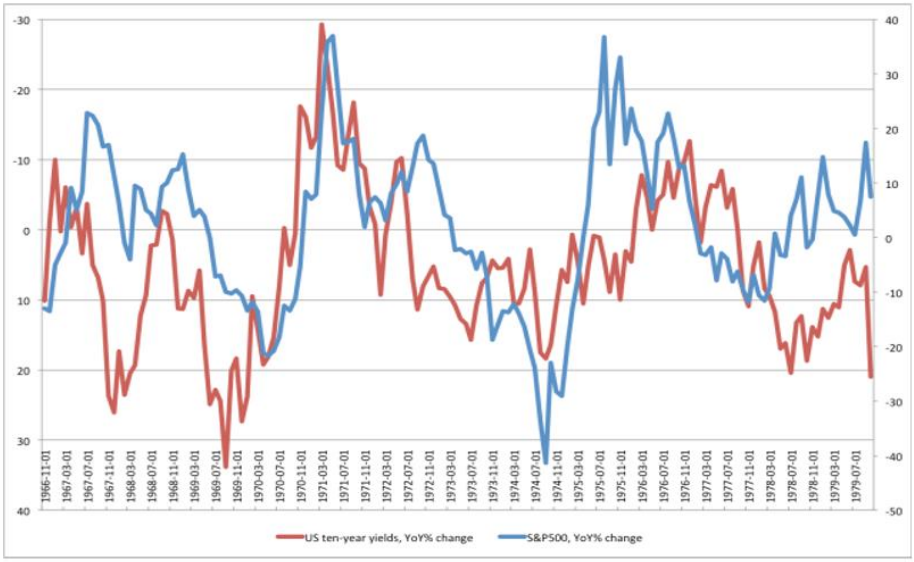
Traditional economic theory states that there is an inverse relationship between interest rates and the demand for money. What this then translates to is that when interest rates increase there will be a decrease in the demand for money. Maintaining equilibrium in the money market requires the central bank to use a set of tools such as adjusting the interest rate and money supply. When interest rates are increased by the central bank, they will have to decrease money supply to maintain money market equilibrium (Carlin & Soskice, 2006). The supply of money can be controlled by the central bank through them increasing or decreasing the monetary base. The monetary base is the total money circulating within the public and the share of the commercial banks' reserves which are preserved with their central banks.

Fluctuations in asset prices affect various channels and therefore finding the correlation between the monetary policy and asset prices is vital to gaining a better understanding of the transmission mechanism of the monetary policy Therefore, it is critical to determine how expansionary or contractionary and neutral monetary policy influences asset prices in different countries and whether there is best practice in implementing the monetary policy in order to positively influence asset prices all around the world. This study used the stock market as a proxy for asset prices because the stock market reacts quickly to changing macro and microeconomic conditions.

2.3 The correlation between monetary policy rate and asset prices

The interest rate forms a central part of economic theory. It could possibly be the most essential macroeconomic variable during the valuation of an asset and when investment decisions are made because it is a measure of the discount rate. In pricing financial assets, the interest rate has an important role. The value of an asset is calculated through discounting future cash flows with a required rate of return. The required return, which is usually calculated using CAPM, includes the risk-free rate, and a higher risk-risk free rate denotes a higher required rate of return (Norfeldt, 2014). The risk-free rate is determined by the type of monetary policy that the central bank implements. The future interest rates are needed when discounting future cash flows; however, because we do not know the future interest rate we will act on expected future interest rates. Monetary policy can only have a significant influence on the incentive to invest in long-term assets on the condition that it disturbs expectations regarding the future short-term interest rates (Sörensen & Whitta-Jacobsen, 2010).

The price of a stock is the function of both microeconomic and macroeconomic variables (including interest rates). The interest rate is an exogenous function, and affects the price directly and indirectly. It does so directly through altering the required rate of return and indirectly through influencing expectations and other macroeconomic variables. Private investment is often the most volatile component of aggregate demand and is linked significantly to total output. Fluctuations in asset prices are closely correlated to output fluctuations and stock price movements have a tendency to lead to movements in output (Norfeldt, 2014). Observing data from the Organisation for Economic Co-operation and Development (OECD) countries shows that higher economic activity causes stock prices to increase, while a substantial decline in stock prices could possibly give an indication of an economic downturn in the future (Sörensen & Whitta-Jacobsen, 2010).



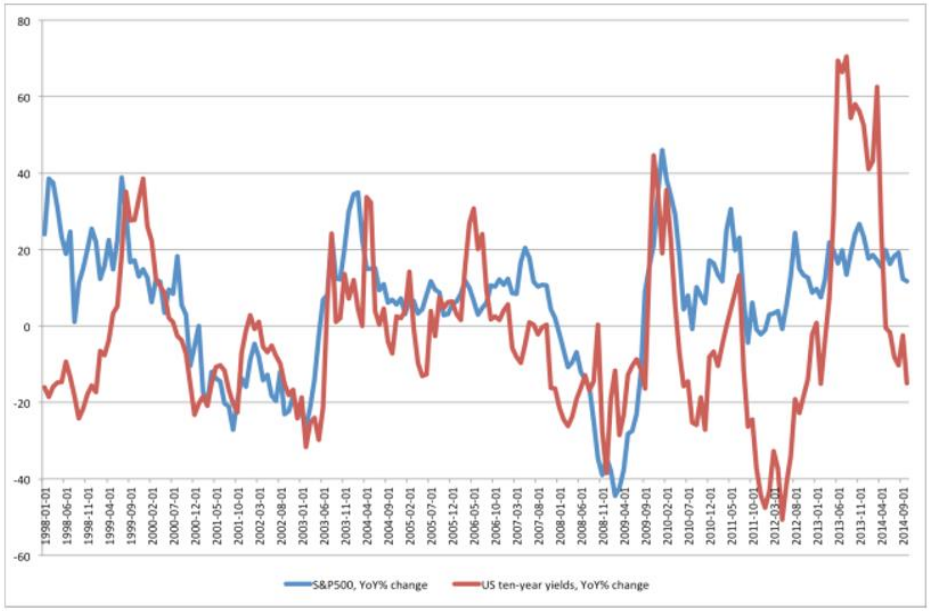


Figure 2.1: A & B - S&P 500 - Relationship between stock markets and interest rates

Source: Norfeldt, 2014.

Figure 2.1 above illustrates Part A (above) and Part B (above, below Part A) . The graphs in the figures above depict the correlation between the stock market and interest rates. The blue lines represent the S&P 500 index and the red lines represent the United States (US) year yields. *Refer to Part A:* During the inflationary period of 1966-1978, there is a negative correlation (-0.34) between the equities and bonds and hence they move in opposite directions. *Refer to Part B:* Contrary to this, during the deflationary periods of 1998-2014, a positive relationship (0.46) is depicted and thus bonds and equities move in the same direction. According to these graphs, the American stock market and interest rate have a positive

relationship through inflationary periods and during deflationary periods have a negative correlation.

2.4 Theoretical foundation

To support and justify the research, existing theories are described in a theoretical framework in this section. The theories discussed were considered important for the research that was conducted.

Efficient Market Hypothesis

The Efficient Market Hypothesis (EMH) is one of the most mentioned theories in modern financial economics. The term "efficient market" is explained by security prices which reflect in full in all available information (Fama, 1970). A market is said to be efficient if its market prices react to new information instantaneously and in an unbiased manner. EMH is the idea that all available information regarding asset prices will be incorporated quickly and efficiently such that available information cannot be used to predict the behaviour of future stock prices.

Depending on the type of information available that affects stock prices, there are three forms of EMH proposed, namely the weak, semi-strong and strong forms. The weak form states that all old information is reflected in the price of securities. An analysis of the fundamental information can assist an investor to make returns which are above the market average in the short term; however, there are no "patterns" that exist. This therefore means that fundamental analysis cannot provide an investor with a long-term advantage and technical analysis won't work. The semi-strong form of EMH suggests that neither technical or fundamental analysis will provide an investor with an advantage and new information is instantaneously priced into the price of securities; however, the investor can use private information to earn returns above the market average. The strong form of EMH suggests that all past, public and private information is reflected in security prices. Therefore, in this form, superior market analysis, fundamental and technical analysis are not adequate to allow an investor to outperform the market because as all the past, private and public information is reflected in the price of securities (Latif, Arshad, Fatima, & Farooq, 2012). This study focused on the strong form of EMH since the monetary policy rate is information that is available to the public, and it is predicated that this information is reflected in full in stock prices. According to EMH, it is therefore impossible to outperform the market using information that everyone knows.

Dividend Valuation Model

The moment an investor purchases a stock it is rational to assume that the price the investor is paying for stock reflects what the investor expects he will receive from the stock. The investor

expects to receive future cash flows in the form of dividends and the value of the stock when it is sold (Patterson, 2015).

In a rational market, the basic premise of stock valuation is that the price of the stock today is the current value of all the future cash flows that will accumulate to the investor when invested in the stock. The price of the stock today can be determined by using the time value of money, therefore discounting the value of future cash flows. This price is called the intrinsic value of the stock because it is the perceived value of the stock based on all available information. The intrinsic value is not always on target but it is usually close to the target.

This model was derived by Gordon (1962) to determine the value of a firm by stipulating that the market value of a firm is equal to the present value of future dividends. This model was criticised; however, it was later explained by Brealey, Myers and Marcus (1995) who proposed that the current value of a stock can be calculated by the equation below:

$$\boldsymbol{Po = \frac{Div1}{r - g}}$$

Where:

P_0 = the current fair value of a stock;

Div_1 = the dividend payment in one period from now;

r = the estimated cost of equity capital (usually calculated using CAPM);

g = the constant growth rate of the company's dividends for an infinite time

The value of a stock is derived by using three factors in this model: the expected "future dividends, the expected rate of return used to discount the expected future dividends and the time pattern of the occurrence of the dividend" (Brealey et al., 1995). Asset prices are affected by the policy rate through the influence that it has on the expected future dividends and the expected rate of return. A limitation of this model is the fact that the equity premium is not taken into account explicitly, but Bernanke and Kuttner (2005) stated that the policy rate integrates this part.

Capital Asset Pricing Model

The Capital Asset Pricing Model (CAPM) was presented by Sharpe (1964) and Lintner (1965) which subsequently resulted in Sharpe winning a Nobel Prize in 1990. The model was built on work done earlier by Markowitz (1959) who developed the "mean-variance model". The

assumption of the Markowitz model is that investors are efficient, risk averse and utility maximising investors that choose points that are on a minimum variance frontier (the points selected are positioned on the efficient frontier) and hence, the portfolio chosen is dependent on the investors' risk return utility function (Elbannan, 2015). The model depends on the trade-off between risk and return.

Sharpe and Lintner developed the Markowitz model by introducing two additional key assumptions. Firstly, the assumption that one can borrow and lend at a risk-free rate which means that an investor is able to borrow or lend money at a risk-free rate of return and this is the same for all investors regardless of the amount borrowed or lent. Secondly, the assumption that all investors' expectations are homogenous which consequently results in estimating identical probability distributions for future return (Elbannan, 2015). The model in its simplest form is represented by the below equation:

$$\boldsymbol{CAPM = Rf - Bi(Rm - Rf)}$$

Where:

Ri = expected return on asset i

(Rm- Rf) = market premium

Bi = risk of the asset

Rf = risk-free rate

Rm = market return

In practice, the policy rate on government traded bonds is utilised as a proxy for the risk-free rate. CAPM explicitly considers the excess return that the stock market provides in addition to the risk-free rate and this is known as the equity premium. The equity premium varies in size due to the risks linked to the stock or the stock market as whole. The elements of risk and required rate of return involved in investing in a specific stock are generally taken into consideration by the investor. The investor faces risks from two perspectives, firstly the company specific risks and secondly risks related to macroeconomic conditions, for example the monetary policy.

2.5 Empirical issues

Patelis (1997) studied whether the changes in monetary policy could explain the observed predictability in excess stock returns. The study used short-horizon vector regressions and long-horizon regressions and it was found that monetary policy variables can predict stock

returns significantly, while they are unable to fully account for the stock return predictability observed.

Thorbecke (1997) investigated the relationship between monetary policy and asset prices in the US using standard Vector autoregression Model (VAR). The study found that expansionary monetary policy causes ex- post stock returns to increase. Explicitly, he concluded that a positive standard deviation of one in the federal funds rate results in stock returns being depressed by an average of -0.8% per month and that a positive standard deviation of one in reserves that are non-borrowed would result in 1.79% per month increase for stock returns.

The relationship between stock market capitalisation rate and interest rate was examined by Ologunde, Elumilade and Asaolu (2006). The result of the study was that the prevailing interest rate impacts the stock market capitalisation rate positively. Another finding of the study was that the government development stock rate impacts the stock market capitalisation rate negatively and the prevailing interest rate influences the government development stock rate negatively.

Ioannidis and Kontonikas (2008) investigated the impact of monetary policy on stock prices over the period 1972-2002 in 13 OECD countries. The stock market variable was regressed on the monetary policy variable and the results found that the returns on stocks decrease when there is a decrease in money supply. These results indicate that shifts in the monetary policy have a major negative effect on inflation-adjusted and nominal stock returns. The strength of these links were different in each, country probably due to the fact that they had intrinsic structural differences.

During the three distinct monetary regimes of Burns, Greenspan and Volcker dating back to the 1970s, Laopodis (2013) studied the relationship between monetary policy and the stock market. There were three major findings from the study. Firstly, Federal Reserve actions (through the federal fund rate) and the stock market reactions were disconnected in the 1990s. Secondly, the latter parts of the 1980s' and 1990s' inflation had no significant impact on the stock market. Lastly, monetary policy had significant asymmetric impacts on the stock market throughout the different monetary regimes; however, this was more distinct during bear markets than bull markets. The proposal from these results is that there is no constant dynamic link between the monetary policy and the stock market and that all three monetary regimes had a different nature of dynamics.

Galí and Gambetti (2015) used time-varying coefficients VAR to investigate the reaction of stock prices to monetary policy shocks. The evidence indicated that there were extended periods in which stock prices persistently increased in reaction to an exogenous contractionary

monetary policy. This evidence is in contradiction with the conventional view on the impact monetary policy has on bubbles. The study further claimed the evidence is unlikely to be justified by an endogenous reaction of the equity premium to the monetary policy shock.

The effects of the monetary policy on stock returns for the period 2003-2014 was investigated by Onyeke (2016). A six variable standard VAR model was used to conduct the empirical investigation; the variables included the all share index, consumer price index, exchange rate, interbank rate, Treasury bill rate and open buy-back. The vigorous interactions between the variables are created by impulse response functions and variance decompositions generated from VAR. The results found that monetary policy variables have no significant effect on stock prices in Nigeria, which is a different result from what was found by the study of Osisanwo and Atanda (2012). Osisanwo and Atanda (2012) examined the determinants of stock market returns in Nigeria for periods 1984-2010 using Ordinary Least Squares between 1984-2010 and found that monetary policy variables (interest rate and money supply), previous stock return and exchange rate are the key determinants of stock returns in Nigeria. The implication of Onyeke's (2016) results is that the stock market in Nigeria does not absorb shifts in monetary policy variables significantly, therefore monetary policy variables are not a key determinant of stock market returns in Nigeria.

2.6 Evidence from developed economies

One of the biggest challenges of academic and financial sector economists is understanding how monetary policy influences economic activity. The stock market is an important financial market that has been unnoticed as a channel for a monetary transmission mechanism. Many economists have agreed that returns of the stock market are linked to real economic activity, while a few economists have argued against this stating that stock returns' sole role is to measure the anticipated future corporate profits. Nonetheless, most economists are of the belief that an important transmission path for monetary policy is the stock market. Empirical evidence from the past generally states that restrictive monetary policy declines simultaneously with stock returns and expected stock returns and vice versa when it comes to expansive monetary policy. The paper further argues that generally in the long and short run, monetary policy tightening results in increased stock market prices, and monetary policy easing results in lower stock market prices (Bernanke, 2003).

Smirlock and Yawitz (1985) found that changes in interest rate impact equity prices through two channels. This takes place firstly, through affecting the rate at which the firm's expected cash flows will be capitalised, and secondly, through changing expectations regarding future cash flows. The paper's argument is that should interest rates increase, this will cause stock prices to decrease and should there be a decrease in interest rate, this will cause stock prices

to increase. It is further argued that should interest rates influence both the expectations about future cash flows and the capitalization rates, these influences would impact stock prices.

Hardouvelis (1987) stated that stock prices and interest rate have an inverse relationship and this could be rationalised through surprises in money supply. Money supply affects stock prices through its effect on interest rates and inflation which can be explained by two hypotheses. First, the expected inflation hypothesis states that decreases in stock prices are caused by the inflation premium in nominal interest rates, which will result in after tax real dividends decreasing. Second, the expected real interest rate hypothesis states that decreases in stock prices are caused by the fact that it is anticipated that the real component of nominal interest rates will increase and in doing so, it increases the discount rate at which future cash flows are capitalised and also for the reason that when interest rates are higher it has an adverse effect on real output, therefore decreasing operating cash flows in the future.

Banerjee and Adhikary (2009) theorised that the justification for the link between monetary policy rate and stock market return is that they have a negative correlation. A contractionary monetary policy results in higher interest rates and usually affects stock market return negatively. The reasons for this are as follows: Firstly, the dividend discount model which stipulates that higher interest rates decrease the value of equity, which therefore results in holding stocks being a less attractive alternative to holding fixed income securities; secondly, the propensity of investors to invest in stocks reduces; and lastly, the costs of running a business increases which therefore decreases profit margins. Conflicting to this, when interest rates are lower due to an expansionary monetary policy this leads to a boost in the stock market.

Ioannidis and Kontonikas (2008) did a study on 13 OECD countries to investigate the relationship between the monetary policy and the stock market. The study found that shifts in the monetary policy affect stock returns significantly. The results show that for most of the countries under study the monetary environment is a vital contributing factor of an investor's required returns. The leading result is that expansionary monetary policy improves the stock market – this remained robust in the majority of the countries observed. The study shows that monetary policy changes affect stock returns in two ways. By changing the discount rate the market participants use, this directly affects stock returns. A tight monetary policy will result in a rise in the rate at which a company's future cash flows are capitalised which brings about a decline in stock prices. There are two fundamental assumptions, market participants use discount factors that are generally related to market rates of interest and market interest rates can be influenced by the central bank. Changes in the monetary policy have an indirect impact on the company's stock value through changing the anticipated future cash flows. Easing of

the monetary policy is projected to result in a rise of the general level of economy activity and stock prices react positively because it is expected that cash flows in the future will be higher.

Ehrmann and Fratzscher (2004) conducted a study on how stock returns reacted to different monetary policy news using an unbalanced panel of S&P 500 individual companies. Sectoral and firm level differences were reported; the sectoral differences were understood to be evidence of the traditional interest rate channel and the firm level differences were taken as evidence of the credit channel. This study showed that the way that stock returns respond to monetary policy news is sensitive to the firm's financial characteristics.

In an analysis of the European region, Bjørnland and Leitemo (2009) found excessive dependence between the setting of the interest rate and stock prices to each other. A monetary policy shock that increases the federal funds rate by ten basis points results in stock prices immediately decreasing by 1.5%. A shock in the stock price which increases stock prices by 1% results in the interest rate increasing by five basis points. Therefore, it is stated that there could possibly be a robust interdependence between monetary policy making and stock prices. Furthermore, contractionary monetary policy shocks decrease the real stock prices. Results of the study show that tightening monetary policy shocks lead to stock returns responding. An increase in the interest rate caused by monetary policy shock will have an immediate and major negative effect on stock prices. The outcome of a decline in stock prices is constant with the discount rate of dividends increasing (the discount rate is linked to a rise in the federal funds rates), but also with the decline in output temporarily and the incline of the cost of borrowing which is probably going to decrease expected future dividends. For a lengthy period post the monetary policy shock the real stock prices stay depressed. In order to explain the variances in stock prices, monetary shocks are important and the stock market delivers evidence that is critical in explaining federal fund rate variations.

2.7 Evidence from emerging economies

As specified by Sourial (2002), the way that the stock market responds to monetary policy changes is not only dependent on the efficiency of a stock market but also the degree of development of the stock market. Many researchers have argued the fact that the response of stock markets in developing countries and developed countries to changes in monetary policy are different because developing countries' stock markets are in their early stages of development which is shown by their thin trading, small number of listed companies, turnover ratio and low capitalisation ratio (Aziza, 2010). Irrespective of this, it is still expected that monetary policy actions will affect the stock market through their effect on the interest rate, inflation, money supply levels, and the expectations of market participants regarding the economic activity in the future. Literature and empirical evidence regarding the relationship

between stock markets and monetary policy are lacking in many developing countries, predominantly in Sub-Saharan Africa.

The nature of the link between macroeconomic variables and the stock market in Tunisia and Egypt was explored recently by Barakat, Elgazzar and Hanafy (2016). In terms of Egypt, their findings were consistent with existing literature, that there is a negative relationship between interest rate and stock market index in the long run. Nonetheless, the findings in Tunisia were different as macroeconomic variables had an insignificant impact on the stock market. It was argued that this finding in Tunisia was caused by the lack of development of stock markets in the country. Earlier findings are in contrast with these findings, in particular with the variation which could be accredited to the variables that were used to measure monetary policy. Bernnaceur, Boughrara and Ghazouani (2009) examined the relationship between MENA (Middle-East and North Africa region) stock markets and the monetary policy. An observation made was that Egypt and Tunisia stock prices do not respond to the interest rate; however, it was found that there was a positive relationship between money supply and stock prices. Sourial (2002) had similar findings to this when he examined the impact that the monetary policy had on the Egyptian stock market and he concluded that the discount rate had an insignificant influence on stock market performance.

The impact the monetary policy had on the performance of the stock market and how monetary policy shocks are transferred to the stock market for developed and developing economies was studied by Aziza (2010). Another matter this study tried to investigate was if the reaction of stock market to lending rates, money supply and inflation in developed countries is different to that of developing countries. In the developing countries of Chile, Indonesia, India, Nigeria and South Africa it was observed that growth in money exerts negative blows on stock market capitalisation. In Nigeria and New Zealand, it was found that there was no stable link between the lending and inflation rate. The arguments of Stone (1974) are consistent with these findings, that risky equity securities, risk-less assets and the portfolio switching behaviour of market participants are less attractive alternatives compared to debt securities.

The models adopted by these researchers to measure the response of the stock markets to monetary policy have their limitations. One of the limitations is from endogeneity which comes up when there are joint effects of an independent variable on both the stock price and monetary policy variables so that it is hard to distinguish if the effect on stock prices is caused by the monetary policy or that of the independent variable. Another cause could be due to the joint causality between stock prices and monetary policy. Correspondingly, policy rate changes can overlap with variations in business cycle conditions and other significant macroeconomic variables. According to literature, these problems can be overcome by utilising the event study

methodology, which is known for using a short event period around the announcement of the interest rate in order to avoid the limitations mentioned. This event study determines the response of stock prices to changes in monetary policy over a short event window.

Samate (2017) conducted a study to determine if monetary policy actions have an effect on stock returns in Zambia. The methodology used was the event study by using the constant mean return model to estimate the expected returns. It was found that the monetary policy rate announcements had no do significant impact on the stock prices of companies listed on the Lusaka Stock Exchange. It was observed that the market tends to react negatively to policy rate announcements; however, the results were not statistically significant. It was also observed that the market tends to react positively when the policy rate remains unchanged.

A study was conducted by Vithessonthi and Techarongrojwong (2013) to determine if monetary policy rate impacted stock markets through observing the effect that monetary a policy rate announcement had on Thailand's stock market. This study implemented the event study model in order to separate expected and unexpected monetary policy actions from one another. The study found that expected monetary policy actions alone did not have a significant impact on the stock exchange, which is in direct contrast with existing theory and the conclusions of Bernanke and Kuttner (2005).

2.8 Conclusion of the literature reviewed

The findings presented in the empirical evidence varied, which shows that there is no consensus on the research conducted on the relationship between monetary policy rate and stock market prices. Studies on the effects of monetary policy have developed over the years through evaluating different monetary policy variables, and through the adoption of different methodologies. Research findings show that the policy rate affects stock prices through its impact on inflation, interest rates, money supply and the expectations of financial market participants regarding the future economic activity.

A study conducted by Tobin (1969) concluded that there is a positive relationship between money supply and stock prices. Most researchers such as Smirlock and Yawitz (1985), Hardouvelis (1987), Jensen and Johnson (1995), Iaonnidis and Kontonikas (2008) and recently Hojat (2015) starting adopting the interest rate variable as a measure of monetary policy. The findings of these researchers generally was that there is an inverse relationship between interest rate and stock prices. However, Durham (2003) found an insignificant weak relationship between stock prices and interest rates. Brown and Reily (2014) also found that there is no strong relationship between the interest rate and stock returns. The existing literature in developing economies, especially in Africa, focuses more on the relationship

between long-term interest rates and stock prices and less on the policy rate effects on stock prices.

It is shown through empirical evidence that event study methodology is possibly the most accurate way to measure the stock market reaction to monetary policy actions. This is because event study methodology makes use of a short event windows. Stock prices are expected to take into account all available information including the actions of the monetary policy variables so that any significant monetary policy actions should be unanticipated. A major challenge with this is the method to separate the expected and unexpected monetary policy actions. Attempting to isolate the expected and unexpected monetary policy actions was only done by researchers who adopted the event study methodology. Another observation of the literature that exists for Africa shows that there is a shortage of studies that used the event study methodology to measure the relationship between monetary policy and stock markets.

The findings from the existing literature show that even though interest rate changes are expected to have an influence on the operations of banks, this impact may possibly not be transmitted to stock prices directly due the maturity composition of commercial banks' balance sheet. The argument is that the effect could be measured by the differential impact and financial market participants' expectations. A statistically negative relationship between bank stock returns and interest rate actions was found by Lynge and Zumwalt (1980). Garg (2008) and Vaz et al. (2008) are examples of other researchers that found that the stock returns of commercial banks are not sensitive to interest rate actions. Another observation made by Garg (2008) was that the sensitivity of the interest rate could be determined by other elements such as average size of the firm, the sector's debt heaviness and age of the firms in the sector.

CHAPTER 3
METHODOLOGY

3.1 Introduction

The purpose of this research study was to define the extent to which the monetary policy rate announcement influences the behaviour of stock prices for firms that are listed on the JSE. This chapter provides an overview of the research approach and design employed to examine the research problem.

3.2 Research approach

A quantitative research approach was used to answer to the research questions. Secondary data was used from the period October 2006 to September 2018 from the South African Reserve Bank for monetary policy rate announcements and the Johannesburg Stock Exchange for stock prices. This period was selected to capture enough data of the different monetary policy regimes (expansionary and contractionary) over the past 12 years.

Instead of using individual stock prices, the researcher chose to use three price indices (discussed below) on the JSE as they are a better representation of average stock price movements. The choice of price indices was to eliminate any potential idiosyncrasies in individual stock price movements and to also keep in line that monetary policy is more concerned about the general economy. Therefore, using price indices would allow the use of a broader representation of asset prices. All price indices are calculated based on price and total return methodologies, both real time and end-of-day.

i. *FTSE/JSE All Share Index (All Shares)*: is a market capitalisation-weighted index. Companies included in this index make up the top 99% of the total pre free-float market capitalisation of all listed companies on the Johannesburg Stock Exchange. In this study, this index represents all the stock prices on the JSE.

ii. *FTSE/JSE Africa All Shares Index (Commercial Bank Stocks)*: represents all the commercial bank stocks listed on the JSE. This study used this index as representation of commercial bank stocks in South Africa.

iii. *Mid Cap Index (Non-Bank Stocks)*: represents all the firms that are not part of the Top 40 companies on the JSE. This index excludes all the commercial bank stocks. Therefore for the purposes of this study, it was used as non-bank stocks.

The event study methodology was used to test the hypotheses. The event study window used was 15 days, looking at stock prices seven days prior to policy rate announcement, the day of

the announcement and seven days after the policy rate announcement. This short 15-day window was used to test Hypotheses 1, 2 and 3 through showing the stock returns before and after the monetary policy rate announcements, thus allowing the researcher to determine if there was any significant impact on stock prices after the monetary policy rate announcement. Stock prices' normal returns were calculated, then based from the normal returns, abnormal returns (returns after the policy rate announcement) were calculated which allowed the researcher to determine if the policy rate announcement had any impact on the stock prices, therefore testing Hypotheses 1. In an attempt to answer Hypothesis 2, separate tests were conducted for when the policy rate was hiked and cut, the results made it possible to determine if there is a positive, inverse or no significant relationship between the policy rate announcement and the stock prices. Further to this, similar tests as discussed above were conducted; however, the researcher only tested for commercial bank stocks and then tested only for non-bank stock prices. From the results, the researcher determined if there was a stronger impact on commercial bank stocks and non-bank stocks when there is a policy rate announcement, allowing her to test Hypothesis 3. Secondly, the results from when there was a policy hike and cut helped to determine if there is a relationship between commercial bank stocks and non-banks with policy rate announcement, assisting the researcher to test Hypothesis 2.

3.3 Selecting the key variables

In order to decide which variables were needed in the study, the problem statement was used. The two main variables selected for the study were independent and dependent. An independent variable is the variable that can be controlled or changed in order to test the effects it will have on the dependent variable. A dependent variable is the variable that is being tested and measured, it responds to the effect of the independent variable (Helmenstine, 2017). For this study it was assumed that the policy rate announcement is the independent variable and the stock prices are the dependent variables. Figure 3.1 below shows the theoretical framework of these variables.

Figure 3.1: Analytical Framework

There were 75 policy rate announcements over the period October 2016 to September 2018. All 75 announcements were used in order to determine the effect that the policy rate announcement (all events, whether hiked, cut and maintained) had on stock prices. The study used the stock prices of three price indices: FTSE/All Share Index which represents all the share prices on the JSE, the FTSE/Africa All Banks which represents commercial bank stocks and Mid-Cap Index which represents non-bank stocks. These price indices were chosen to help answer the research questions and test the hypotheses.

3.4 Data collection, frequency and choice of data

The data collection method used was the positivist method. The study was approached in an objective manner through purely gathering data relevant to the study without influencing it in any way. Secondary data was used from JSE Index stock prices (via Bloomberg) and SARB website to receive information around the monetary policy press releases. The sources used are reliable and are consistent data sources; hence they were chosen to give an example the JSE has an automated trading system that reconciles stock prices at the end of every trading day. The sources used for the literature review are articles from government and organisational reports, reputable professionals and credible academic journals.

The period analysed was from October 2006 to September 2018. This period was chosen in order to collect enough data with monetary policy rate hikes and cuts, as most of the announcements generally tend to keep the policy rate unchanged. There are 75 policy announcements during this period, 50 unchanged, 13 policy rate hikes and 12 policy rate cuts.

3.5 Sampling

A sample of daily JSE index data was collected from 2006 to 2018. The data was collected through the following JSE equity market indices: All Share Data, Africa Banks Stocks Data, and Mid Cap Data. The reason behind choosing these three equity market indices is that they represent almost all the stocks listed in the JSE (All Share Index) and they also allow entire market segments versus stock idiosyncratic data. In addition to this, it allowed the researcher to group stocks based on sector, thereby making it possible to differentiate between non-bank (Mid-Cap Index) and commercial bank stocks (FTSE/JSE Africa Bank Index).

A short-day window was used and therefore daily data was preferred as opposed to weekly and monthly data because weekly/monthly data would not be appropriate for this study. Even though stock returns daily data has a tendency to display some conditions of non-normality, it was deemed that this would have no obvious impact on event study methodologies (Brown & Warner, 1985). All the SARB policy rate announcements from period October 2006 to September 2018 were considered for this study.

3.6 Data analysis methods

The event study methodology was used in order to analyse the data collected to measure the valuation impact of the monetary policy rate announcement. This method was chosen because it is able to observe the reaction of stock prices to monetary policy announcements in the short run by using a short event window of 15 days. The stock market generally reacts very quickly to new information; hence the short window of 15 days. Literature on events studies indicates that the length of the event window is subjective to the researcher. However, it is recommended that the event window is long enough to allow one to accurately estimate the normal returns while it is short enough to remove any unnecessary effects.

This study looked at a 15-day event window, which looks at seven days before the event occurred, day zero which is the day of the policy rate announcement and seven days after it occurred. This allowed the researcher to investigate the short-term effects of monetary policy announcements on stock prices.

3.7 Event study theory and assumptions

It is suggested by finance theory that all available information regarding the prospects of a company are reflected in the stock price. From this foundation, one can examine the way which a certain event changes a company's prospects by computing the effect the event has on the company's stock price. The event study methodology was developed to conduct these types of analysis – it commonly focuses on stock prices.

In theory, the event study analyses the differences between normal returns (the returns that would have been expected had the event not taken place) and the abnormal returns (the returns that are caused by the particular event). There are various analytic techniques for estimating the abnormal returns and the technique that is used will depend on the model being used to predict the normal returns around the event date.

According to Brown and Warner (1985), every event study characterises the particular model of expected returns used, a joint test of the research hypothesis, and theoretical assumptions. These theoretical assumptions have to be met by the particular research framework when applying the event study method. If this is not done, then the results of the analysis could be misleading. The event study methodology has three most fundamental theoretical assumptions which are as follows:

- The capital market – the response of the stocks calculated on this basis are efficient. This means that there is an assumption that over an event window the stock returns of a specific event study reflect the economic effect of the event accurately.

- The stock price has not yet factored in the event and the event is unexpected. Only then, during the event window, the abnormal returns reflect the market's reaction to the event.
- During the event window there are no confounding events, which may be accountable for the change in the stock prices.

The assumptions of the event study are not limited to the ones listed above, and more assumptions may need to be met. The assumptions are dependent on the expected return model used and more assumptions need to be met. The market model is the most common model, an example of which would be testing the relationship between the stock prices and the market. In order to conduct this study, the market needs to be stable during the estimation and event window. Only then can the beta and alpha factors, which need to be established together with the regression analysis during the estimation window, be used in predicting the expected returns reliably during the event window.

Event study is defined by MacKinlay (1997) as "a measure of the impact of a specific event on the value of a firm using financial market data". The way stock prices respond to an announcement of an event is analysed by the event study, and the assumption made is that all available information is taken into account and expectations of market participants are also taken into account. There have been numerous changes to the event study methodology since its inception. The table layout of Fama, Fisher, Jensen and Roll (1969) has been the most profound improvement to the event study methodology and is still being used today. The papers of Brown and Warner focused on modifying the statistical issues. Their 1980 paper emphasised problems from using monthly data and their 1985 paper emphasised the problems from using daily data. Other noteworthy modifications include moving from using monthly data to daily data, eliminating the impact of confounding events, and measuring the significance of the research finding using statistical techniques. These improvements on the event study have assisted in increasing the accuracy of results found in general.

In the context of this study, the announcement of the policy rate by the South African Reserve Bank is the event. Asset prices are expected to be immediately effected by monetary policy actions, which is particularly the case for financial assets because financial markets incorporate all available information quickly and are forward looking. There are a number of monetary policy tools, of which the policy rate is one. The announcement of the monetary policy is a suitable event for the study being conducted because it affects the price of assets through its effect on inflation, the amount of money supply in circulation, short-term and long-term interest rates, as well as exchange rates.

3.8 Event study methodology

Step 1: Define the event

In order to conduct an event study, one needs to firstly define the event. For this study, the event was the day that the SARB makes a policy rate announcement. The study measured the influence that the policy rate announcement, in cases where it was changed and maintained, had on stock prices. To ensure that the measured stock market reaction is valid, it was necessary to check for the impact of other common events which could give an indication of a similar reaction to that of the policy rate announcement. There were no events that could have resulted in an accidental influence on stock prices during the period of the study and therefore all the events were considered. Appendix 1 in the appendices displays the policy rate announcement dates that the event study used.

The impact that the policy rate had on stock prices was measured on all the policy rate announcements, regardless of whether the policy rate remained the same, increased or decreased. To test Hypotheses 1, 2 and 3 of this study, the events were separated into four categories, namely all events (there were 75 policy rate announcements over the period studied), maintained events (there were 50 unchanged policy rate announcements), hiked events (there were 13 policy rate announcements) and cut events (there were 12 cut policy rate announcements).

Step 2: Event and estimation window

An event window needs to be determined according to the event study methodology. The event window constitutes the day of the event, some days prior to the event and days post the event. Before the event, the stock prices have a habit of following a certain trend as the market anticipates the event; after the event has happened, this should change because the trend should have been rectified by the market. When determining the event window, careful consideration must be given because events that are uncertain could result in inaccurate yields (Brown & Warner, 1985).

Gumede (2014) stated that “the estimation window is the period before the event used to estimate normal returns”. Event study literature shows that defining the length of the event and estimation period is subjective because it is done by the researcher. For example, Vaz et al. (2008) used a 15-day event window and 200 days’ estimation period and Ekanayake, Rance and Halkides (2008) used an event window of seven days and an estimation window of 210 days. The general recommendation is that the estimation period should be long enough

to enable one to estimate the normal returns accurately and the event window should be short enough to eliminate effects that are unnecessary.

According to MacKinlay (1997), an assumption of the event study is that the measure for impact is abnormal returns and therefore the event window cannot intersect with the estimation window. This study used an event window of 15 days, which comprises days before the event, the day of the event and seven days after the event. For the purposes of this study, this was considered adequate to measure the short-term effect of the announcement of the policy rate on stock prices. Three separate tests were conducted: the first one was for the all shares (All Share Index), the second one was for commercial bank stocks (FTSE/Africa All Banks), and the third test for was non-bank stocks (Mid-Cap Index). All three tests conducted consisted of four different categories being tested: all policy rate announcements, maintained policy rate announcements, cut policy rate announcements and hiked policy rate announcements. All three tests had a 15-day estimation window. A time line for the event window is shown below in Figure 3.2.

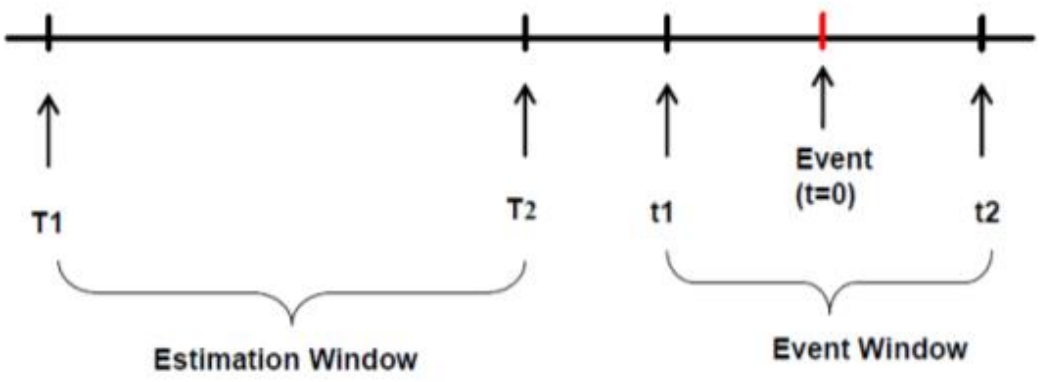


Figure 3.2: Event study timeline

Source: Mackinlay (1997).

The estimation period is T0 to T1, the event date is 0 and the event period is T1 to T2.

Step 3: Calculating the index returns

To calculate the index returns, Fama (1976) recommended that continuous compounding be used. The returns of this study were computed by using the following equation.

$$Rt = Ln\left(\frac{Pt}{Pt-1}\right) \quad (1)$$

This study used price indices and therefore the index returns were given from the data extracted from the JSE and no manual calculation was necessary.

Step 4: Estimating the normal returns

Normal or expected returns need to be observed when no event occurs in order to measure abnormal returns. Data from an estimation window is needed to estimate the normal returns. The normal returns were calculated for all stocks, commercial bank stocks and non-bank stocks.

Two main statistical models were highlighted by MacKinlay (1997) to measure the stock returns' expected performance, which are: the constant mean return model and the standard market model. The market model is able to reduce the variance of abnormal returns through eliminating the returns portion that is correlated to the variation in the market return and because of this, the market model is more improved than the constant mean return model (MacKinlay, 1997). To use the market model one has to use the R-square of the market model regression to be able to estimate the abnormal returns. To estimate the normal returns, the constant mean return instead was adopted. This model is considered limited and simple; however, Brown and Warner (1985) argued that it provides similar results to those that would of been received from more complicated models. From the constant return model, the following equation was used to estimate expected returns:

$$\mathrm{ER}_{it} = \mu_i + \varepsilon_{it} \qquad (2)$$

Where $E(\varepsilon_{it}) = 0$ and var $\varepsilon_{it} = \sigma^2_{\varepsilon i}$

$E(\varepsilon_{it})$is the error term for the stock i.

$\mu_i$is estimated by the arithmetic mean of the returns in the estimation window using equation 3 below.

$$\mu_i = \frac{1}{\mathrm{M}_i} \sum_{\mathrm{i=t0+1}}^{\mathrm{t1}} \mathrm{R}_{it} \qquad (3)$$

Where M_i is the number of non-missing returns over the estimation window.

Step 5: Measurement of the abnormal eturns (AR)

In order to measure the abnormal returns, the differences between actual and expected returns were calculated for the relevant price indices on the stock exchange. The abnormal returns

were calculated for all stocks, commercial bank stocks and non-bank stocks. The abnormal returns were calculated using the following equation:

$$\mathrm{AR}_{it} = \mathrm{R}_{it} - \mathrm{ER}_{it} \quad (4)$$

Step 6: Measurement of the average abnormal returns

Measuring the average abnormal returns (AAR) defines the shape of the individual securities in the index abnormal returns. Cross-sectional aggregation across events were used to see the effect that policy rate announcements had through all events, maintained events, hiked events and cut events. Separate calculations were done for all stocks, commercial bank stocks and non-bank stocks.

The below equation was used to mathematically determine cross-sectional AAR at each instant t within the event window for a sample of n events:

$$\mathrm{AAR}_{it} = \sum_{i=1}^{n} \frac{\mathrm{AAR}_{it}}{n} \quad (5)$$

Where AAR_{it}= average abnormal returns; i= number of securities in the research; t= days in the event period; and n = total number of events.

Step 7: Measurement of the cumulative average abnormal returns

The cumulative average abnormal returns (CAAR) is the mean value of the cumulative abnormal returns through time (t1-t2). In this study, it measured stock prices' reaction to the monetary policy rate announcement. The CAAR was calculated for all three tests which helped determine the impact of monetary policy announcement on stock prices, commercial bank stocks and non-bank stocks in South Africa, answering the first research question. The CAAR for when there is a maintained, cut and hiked event for three indices was calculated and the results helped to determine if there is a relationship between the policy rate announcement and all the stock prices, commercial bank stock prices and non-bank stock prices JSE, giving an answer to research question 2. The results of the CAAR of commercial bank stocks and non-bank stocks were compared to determine which of the two is impacted more by policy rate announcements, helping to answer research question 3.

CAAR is computed mathematically using the equation below.

$$\mathrm{CAAR}_i(\mathrm{t}_1\mathrm{t}_2) = \sum_{i=1}^{\mathrm{t}_2} = \mathrm{AAR}_t \quad (6)$$

Step 8: Testing for significance

Testing for significance ensures that the research is reliable and examines whether the research outcome is a result of chance or not. In order to measure the probability that the research outcome is not a result of a sampling error, significant levels are used. The researcher decides on the significance level; thus it is usually subjective. For this study, the T-test was used in order to test for the effect of the policy rate at a 5% and 10% significance level. To calculate the T-statistic the formula below was used.

$$\text{T statistic} = \frac{\text{AAR}_t}{\text{S}(\text{AAR}_t))} \quad (7)$$

where $\text{S}(\text{AAR}_t)$ is the standard deviation for the stocks at time *t*

The outcome of the research would be said to be statistically significant if the T value is bigger than 1.96 and 1.645 and statistically insignificant if the T-value is smaller than 1.96 and 1.645.

STEP 9: Hypothesis testing

The null hypothesis tests if the mean abnormal return at a time t is equal to zero. To test the hypothesis, the T-statistic was used. The T-stat was calculated for all three tests in order to determine the impact of monetary policy announcement on stock prices, commercial bank stocks and non-bank stocks in South Africa, therefore allowing the researcher to test Hypothesis 1. The t-test was calculated for when there is a maintained, cut and hiked event for all three indices the results helped to determine if there is a relationship between the policy rate announcement and all the stock prices, commercial bank stock prices and non-bank stock prices, therefore allowing the researcher to test Hypothesis 2. The results of the CAAR and the T-test of commercial bank stocks and non-bank stocks were compared to determine which of the two were impacted more by policy rate announcements, therefore allowing the researcher to test for Hypothesis 3. The T-statistic is calculated using the formula below.

$$\text{T statistic} = \frac{\text{AAR}_t}{\text{S}(\text{AAR}_t)} \quad (8)$$

If the t-value is less than 1.96 and 1.645 the null hypothesis will be rejected and the alternative hypothesis accepted. If it is greater than 1.96 and 1.645, the null hypothesis cannot be rejected and thus it is said that the test was not statistically significant.

3.9 Limitations

A limitation of the event study methodology is that it has perplexing effects such that evaluating the exact effect of an event can be difficult. In order to avoid this, the study used a short event

window to make sure only the effect of the interest rate announcements on stock prices is reflected. The study also checked for any events that could have had similar effects to the monetary policy during the event window.

Another limitation to consider is that certain monetary policy changes might have been anticipated by the market so the market gradually reacted well before the actual announcement. Nonetheless, expectations do not necessarily replace the actual event where the event actually kicks in.

Conditions of non-normality may be exhibited on daily data for stock returns, which can be a limitation. Brown and Warner (1985) noted that this has “no obvious impact on event study methodologies because the mean excess return in a cross section of securities converges to normality as the number of sample securities increases”.

CHAPTER 4
EMPIRICAL ANALYSIS AND DISCUSSION OF FINDINGS

4.1 Introduction

The purpose of this chapter is to report the empirical findings of the study through the use of descriptive statistics to enable answering the research questions, test the hypothesis and give a basis for the research conclusions. The daily index stock prices were collected from the Johannesburg Stock Exchange daily trading reports. Continuous compounding was used to compute the stock returns and for further analysis the event study was used (by using the constant mean model). The event study results were reported in agreement with the way the abnormal returns were analysed and aggregated. The reaction of the stock prices to policy rate announcements was assessed, and a separate examination of the financial stocks and non-financial stocks was done.

4.2 Empirical analysis

In order to observe the overall effect of the 75 policy rate announcements, daily analysis was performed for each of the days in the event window, for all the indices used, namely the All Share Index, Africa Banks Index and Mid Cap Index. The study used a 15-day event window and test for significance, a significance level of 5% to 10% was used to make sure that the study results are reliable. The results of the analysis are presented below.

4.2.1 Results from All Share Index

Table 4.1: FTSE/JSE All-Share Index – All events

Time	AARt	t stat	CAARt	t stat	Result
-7	0.175%	0.145	0.175%	0.145	INSIGNIFICANT
-6	0.043%	0.036	0.218%	0.128	INSIGNIFICANT
-5	0.047%	0.039	0.264%	0.127	INSIGNIFICANT
-4	-0.041%	(0.034)	0.223%	0.093	INSIGNIFICANT
-3	0.007%	0.006	0.230%	0.085	INSIGNIFICANT
-2	0.101%	0.084	0.331%	0.112	INSIGNIFICANT
-1	0.143%	0.119	0.473%	0.149	INSIGNIFICANT
0	-0.011%	(0.009)	0.462%	0.136	INSIGNIFICANT
1	0.126%	0.105	0.588%	0.163	INSIGNIFICANT
2	0.087%	0.072	0.675%	0.178	INSIGNIFICANT
3	0.031%	0.026	0.706%	0.177	INSIGNIFICANT
4	0.109%	0.091	0.815%	0.196	INSIGNIFICANT
5	-0.172%	(0.143)	0.643%	0.148	INSIGNIFICANT
6	-0.190%	(0.158)	0.452%	0.101	INSIGNIFICANT
7	-0.007%	(0.006)	0.445%	0.096	INSIGNIFICANT

The FTSE/JSE All-Share Index was used to analyse the reaction of the stock prices over the 75 events (observation dates). The results show that when there is a policy rate announcement for all events, the All Share Index (refer to Table 4.1) shows a CAAR of 0.445%, an insignificant positive effect on stock prices during the event window when there is a policy rate announcement. The t-stat is equal to 0.096, making the results statistically insignificant. The results show that even though abnormal returns are present, there are no days in the event window that exert a significant impact on stock prices for all the announcements. Therefore, there is no evidence to reject the null hypothesis for Hypothesis 1.

Table 4.2: FTSE/JSE All-Share Index – Policy rate hiked

Time	AARt	t stat	CAARt	t stat	Result
-7	0.530%	0.441	0.530%	0.441	INSIGNIFICANT
-6	0.127%	0.106	0.657%	0.387	INSIGNIFICANT
-5	0.024%	0.020	0.681%	0.327	INSIGNIFICANT
-4	0.024%	0.020	0.704%	0.293	INSIGNIFICANT
-3	0.280%	0.233	0.985%	0.366	INSIGNIFICANT
-2	-0.305%	(0.254)	0.679%	0.231	INSIGNIFICANT
-1	-0.141%	(0.117)	0.538%	0.169	INSIGNIFICANT
0	0.013%	0.011	0.552%	0.162	INSIGNIFICANT
1	-0.219%	(0.183)	0.332%	0.092	INSIGNIFICANT
2	-0.162%	(0.135)	0.170%	0.045	INSIGNIFICANT
3	-0.162%	(0.135)	0.009%	0.002	INSIGNIFICANT
4	0.188%	0.157	0.197%	0.047	INSIGNIFICANT
5	-0.297%	(0.248)	-0.100%	(0.023)	INSIGNIFICANT
6	0.312%	0.260	0.212%	0.047	INSIGNIFICANT
7	0.182%	0.151	0.394%	0.085	INSIGNIFICANT

The abnormal returns were grouped based on the policy rate change whether the policy rate was unchanged, hiked or cut and separate tests were conducted for each. There was a total of 13 monetary policy rate hikes, 12 policy rate cuts and 50 policy rates maintained. The results show that when there is a policy rate hike, the stocks (refer to Table 4.2) have a CAAR of 0.394%, reflecting a positive relationship between monetary policy rate announcement and stock returns during the event window when there is a policy rate hike. The t-stat is equal to 0.085 which is less than 1.96 and 1.64 therefore making the results statistically insignificant.

The results (refer to Table 4.3) show that there is an inverse relationship between stock prices and monetary policy rate when there is monetary policy rate cut. The t-stat is equal is to 0.714 which is less than 1.96 and 1.64, therefore showing that the positive effect the monetary policy cut had on stock prices is insignificant. The positive impact on stock prices from the policy rate

cut is greater (CAAR= 3.324%) than the positive impact from the policy rate hike (CAAR=0.394%). However, the results for both the policy rate hike and cut test were insignificant, therefore showing that there is no relationship between the monetary policy and stock prices. Therefore, the null hypothesis for Hypothesis 2 cannot be rejected.

Table 4.3: FTSE/JSE All-Share Index – Policy rate cut

Time	AARt	t stat	CAARt	t stat	Result
-7	0.033%	0.028	0.033%	0.028	INSIGNIFICANT
-6	0.006%	0.005	0.039%	0.023	INSIGNIFICANT
-5	0.535%	0.445	0.574%	0.276	INSIGNIFICANT
-4	0.202%	0.168	0.775%	0.323	INSIGNIFICANT
-3	0.424%	0.353	1.199%	0.446	INSIGNIFICANT
-2	-0.362%	(0.301)	0.837%	0.284	INSIGNIFICANT
-1	1.166%	0.970	2.003%	0.630	INSIGNIFICANT
0	-0.142%	(0.118)	1.861%	0.548	INSIGNIFICANT
1	0.513%	0.427	2.374%	0.659	INSIGNIFICANT
2	0.397%	0.331	2.771%	0.729	INSIGNIFICANT
3	0.273%	0.227	3.045%	0.764	INSIGNIFICANT
4	0.578%	0.481	3.622%	0.870	INSIGNIFICANT
5	0.004%	0.003	3.626%	0.837	INSIGNIFICANT
6	-0.250%	(0.208)	3.376%	0.751	INSIGNIFICANT
7	-0.053%	(0.044)	3.324%	0.714	INSIGNIFICANT

The results from the maintained monetary policy rate (refer to Table 4.4) show a CAAR of -0.233%, an insignificant negative effect on stock prices during the event window when the policy rate announcement is maintained. The t-stat is -0.038 which is less than 1.96 and 1.64, therefore showing that when the monetary policy rate is maintained there is no significant impact on stock prices.

Table 4.4: FTSE/JSE All-Share Index – Policy rate maintained

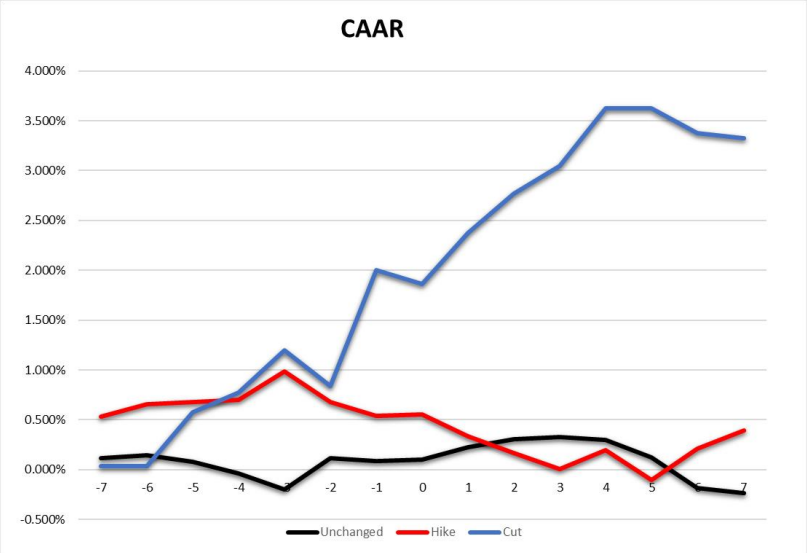
Time	AARt	t stat	CAARt	t stat	Result
-7	0.116%	0.097	0.116%	0.097	INSIGNIFICANT
-6	0.030%	0.025	0.146%	0.086	INSIGNIFICANT
-5	-0.065%	(0.054)	0.082%	0.039	INSIGNIFICANT
-4	-0.117%	(0.097)	-0.035%	(0.015)	INSIGNIFICANT
-3	-0.164%	(0.137)	-0.199%	(0.074)	INSIGNIFICANT
-2	0.317%	0.264	0.118%	0.040	INSIGNIFICANT
-1	-0.029%	(0.024)	0.089%	0.028	INSIGNIFICANT
0	0.014%	0.011	0.103%	0.030	INSIGNIFICANT
1	0.123%	0.102	0.226%	0.063	INSIGNIFICANT
2	0.077%	0.064	0.303%	0.080	INSIGNIFICANT

3	0.023%	0.019	0.326%	0.082	INSIGNIFICANT
4	-0.024%	(0.020)	0.302%	0.073	INSIGNIFICANT
5	-0.182%	(0.152)	0.120%	0.028	INSIGNIFICANT
6	-0.307%	(0.255)	-0.187%	(0.042)	INSIGNIFICANT
7	-0.046%	(0.038)	-0.233%	(0.050)	INSIGNIFICANT

The results show that there is no significant impact on stock prices when there is a monetary policy announcement. Therefore, the null hypothesis in Hypothesis 1 cannot be rejected. The results also show that there is no significant relationship between monetary policy rate and stock prices and therefore, the null hypothesis for Hypothesis 2 cannot be rejected. The results of this study do not confirm the findings of Bernanke and Kuttner (2005) and Bjørnland and Leitemo (2009) who found a statistically significant inverse relationship between the policy rate and the stock prices. However, the maintained policy rate result is in agreement with the findings of Bernanke and Kuttner (2005), which were that there is no significant impact on stock prices when monetary policy rate is maintained.

During the period when a market does not anticipate a policy rate cut/hike, Schweitzer (1989) observed CAAR should have a stabilised trend during the early days of the event window, and when the event day is approaching the CAAR. After the event day, an upward trend should be seen when there is a policy rate cut announcement (vice versa for policy rate hike). If this pattern is followed by the market, this shows that the negative/positive effect from the policy rate announcement was not anticipated by the market but the market reacts during the time of the announcement. Similarly, when the policy rate is maintained, the CAAR should maintain a constant trend prior to the event day and also after the event day. The reaction of the stock prices is measured by CAAR, and the anticipatory facets of the market through the event window are depicted by CAAR. The CAAR Graph shows the cumulative average abnormal returns for the All Share Index share prices graphed during the event time (negative values represent the number of days before event, 0 = day of event, positive values represent the number of days after event). The horizontal axis represents the days relative to the event window and the vertical axis is the abnormal returns.

Graph 1: FTSE/JSE All-Share Index – CAAR



The policy rate announcement has anticipatory effects on the stock prices in the FTSE/JSE All-Share Index when there is a policy rate hike and when there is a policy rate cut. However, when the policy rate announcement is unchanged there are non-anticipatory effects on the stock prices in the FTSE/JSE All-Share Index as depicted by the graph above. When there was a hike and cut in the policy rate, one can see that there is no stability in the trend of the stock returns prior to policy rate announcement. In the case where there is a policy rate hike, the stock returns start to depict a downward trend three days prior the announcement which continues after the announcement. In the case where there is a policy rate cut, the stock returns start to experience an upward trend from six days prior to the event day which continues till four days after announcement and thereafter stock returns start to increase. This could indicate that the market anticipated the policy rate change prior to the announcement, for both the policy rate hike and cut. Therefore, the trend of the stock returns when there is a policy rate hike and cut is not consistent with Schweitzer (1989). However, when the policy rate is maintained the stock returns are fairly stable prior and after the policy rate announcement. This trend is the consistent with Schweitzer's (1989) observations.

4.2.2 Results from FTSE/JSE Africa Banks Index

It is suggested in existing theory that monetary policy actions could have a greater effect on commercial bank stock returns due to the fact that commercial banks operations are directly impacted by the policy rate through its effects on interest rates (both short term and long term). This study sought to determine the degree of difference of response by commercial bank stock returns and non-bank stock returns to the announcement of the policy rate.

Table 4.5: FTSE/JSE Africa Banks Index Results – All events

Time	AARt	t stat	CAARt	t stat	Result
-7	-0.025%	(0.01)	-0.025%	(0.01)	INSIGNIFICANT
-6	-0.188%	(0.11)	-0.212%	(0.09)	INSIGNIFICANT
-5	-0.237%	(0.14)	-0.450%	(0.15)	INSIGNIFICANT
-4	-0.410%	(0.24)	-0.860%	(0.25)	INSIGNIFICANT
-3	-0.391%	(0.23)	-1.251%	(0.33)	INSIGNIFICANT
-2	0.284%	0.17	-0.967%	(0.23)	INSIGNIFICANT
-1	0.334%	0.20	-0.633%	(0.14)	INSIGNIFICANT
0	-0.065%	(0.04)	-0.698%	(0.14)	INSIGNIFICANT
1	0.103%	0.06	-0.596%	(0.12)	INSIGNIFICANT
2	0.010%	0.01	-0.586%	(0.11)	INSIGNIFICANT
3	0.022%	0.01	-0.563%	(0.10)	INSIGNIFICANT
4	0.211%	0.12	-0.352%	(0.06)	INSIGNIFICANT
5	-0.209%	(0.12)	-0.561%	(0.09)	INSIGNIFICANT
6	-0.232%	(0.14)	-0.793%	(0.12)	INSIGNIFICANT
7	-0.080%	(0.05)	-0.873%	(0.13)	INSIGNIFICANT

There are five commercial banks included in the FTSE/JSE Africa Banks Index and the index was analysed over the 75 policy rate announcements. The results (refer to Table 4.5) found a CAAR of -0.873%, showing that policy rate announcements have a negative effect on commercial bank stock prices. The t-stat is equal to -0.13, therefore making this finding statistically insignificant at significance level of 5% and 10%. The results received for commercial bank stocks differ from those found for all stocks; it was found that the policy rate announcements had a positive impact on all stock returns as opposed to the negative effect finding in the commercial bank stocks.

Table 4.6: FTSE/JSE Africa Banks Index Results – Policy rate hike

Time	AARt	t stat	CAARt	t stat	Result
-7	0.098%	0.06	0.098%	0.06	INSIGNIFICANT
-6	-0.319%	(0.19)	-0.221%	(0.09)	INSIGNIFICANT
-5	-0.499%	(0.29)	-0.720%	(0.24)	INSIGNIFICANT
-4	-0.499%	(0.29)	-1.219%	(0.36)	INSIGNIFICANT
-3	-0.506%	(0.30)	-1.726%	(0.45)	INSIGNIFICANT
-2	-0.573%	(0.33)	-2.298%	(0.55)	INSIGNIFICANT
-1	-0.020%	(0.01)	-2.318%	(0.51)	INSIGNIFICANT
0	0.477%	0.28	-1.841%	(0.38)	INSIGNIFICANT
1	-0.314%	(0.18)	-2.154%	(0.42)	INSIGNIFICANT
2	-0.014%	(0.01)	-2.169%	(0.40)	INSIGNIFICANT
3	-0.014%	(0.01)	-2.183%	(0.38)	INSIGNIFICANT
4	0.048%	0.03	-2.135%	(0.36)	INSIGNIFICANT
5	-0.759%	(0.44)	-2.895%	(0.47)	INSIGNIFICANT
6	0.291%	0.17	-2.603%	(0.41)	INSIGNIFICANT
7	0.018%	0.01	-2.586%	(0.39)	INSIGNIFICANT

FTSE/JSE Africa Banks Index returns were analysed to measure their reaction to policy rate hikes, cuts and when policy rate is maintained. The results for when there is a policy rate hike (refer to Table 4.6) show a CAAR of -2.586%, indicating a negative effect on commercial bank stock prices when there is a hike in the policy rate. The t-stat is equal to -0.39, therefore making this negative effect statistically insignificant. The results from the policy rate cut (refer to Table 4.7) show a CAAR of 0.740%, which shows that there is a positive effect on commercial bank stock prices when there is a policy rate cut. The abnormal returns of the commercial bank stocks when there is a policy rate hike and cut in this study are consistent with the existing literature; there is an inverse relationship between policy rate announcements and commercial bank stock returns.

Table 4.7: FTSE/JSE Africa Banks Index Results – Policy rate cut

Time	AARt	t stat	CAARt	t stat	Result
-7	-0.172%	(0.10)	-0.172%	(0.10)	INSIGNIFICANT
-6	0.237%	0.14	0.066%	0.03	INSIGNIFICANT
-5	0.621%	0.36	0.687%	0.23	INSIGNIFICANT
-4	0.083%	0.05	0.770%	0.22	INSIGNIFICANT
-3	-0.570%	(0.33)	0.200%	0.05	INSIGNIFICANT
-2	-0.045%	(0.03)	0.154%	0.04	INSIGNIFICANT
-1	1.279%	0.75	1.434%	0.32	INSIGNIFICANT
0	-0.669%	(0.39)	0.764%	0.16	INSIGNIFICANT
1	0.367%	0.21	1.132%	0.22	INSIGNIFICANT
2	-0.459%	(0.27)	0.673%	0.12	INSIGNIFICANT
3	-0.215%	(0.13)	0.458%	0.08	INSIGNIFICANT
4	0.599%	0.35	1.056%	0.18	INSIGNIFICANT
5	-0.205%	(0.12)	0.851%	0.14	INSIGNIFICANT
6	-0.107%	(0.06)	0.744%	0.12	INSIGNIFICANT
7	-0.004%	(0.00)	0.740%	0.11	INSIGNIFICANT

The results from the maintained monetary policy announcement (refer Table 4.8) show a CAAR of -0.815% showing that there is negative impact on commercial bank stocks when the policy rate is maintained. The t-stat is equal to -0.12 and therefore these results are statistically insignificant at a significance level of 5% and 10%.

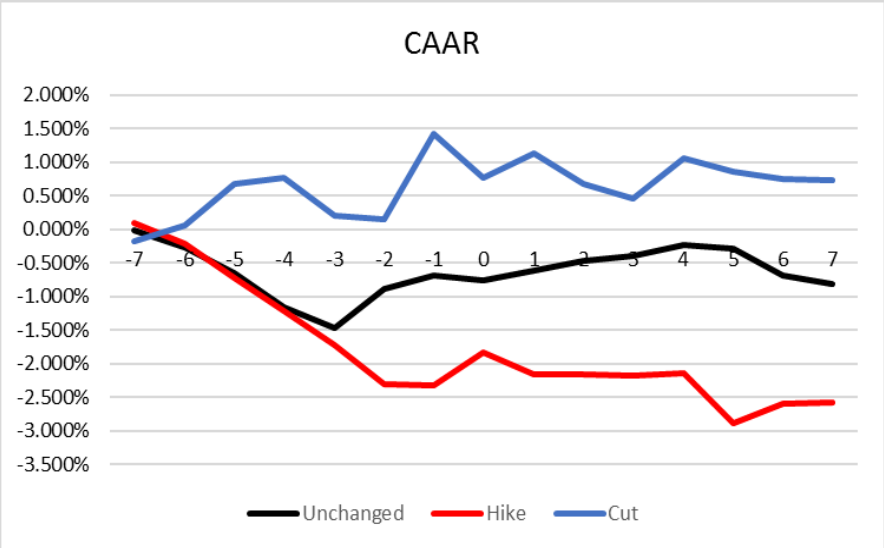
Table 4.8: FTSE/JSE Africa Banks Index Results – Policy rate maintained

Time	AARt	t stat	CAARt	t stat	Result
-7	-0.022%	(0.01)	-0.022%	(0.01)	INSIGNIFICANT
-6	-0.256%	(0.15)	-0.277%	(0.11)	INSIGNIFICANT
-5	-0.375%	(0.22)	-0.652%	(0.22)	INSIGNIFICANT
-4	-0.505%	(0.29)	-1.157%	(0.34)	INSIGNIFICANT
-3	-0.318%	(0.19)	-1.475%	(0.39)	INSIGNIFICANT
-2	0.585%	0.34	-0.890%	(0.21)	INSIGNIFICANT
-1	0.199%	0.12	-0.691%	(0.15)	INSIGNIFICANT
0	-0.061%	(0.04)	-0.752%	(0.16)	INSIGNIFICANT
1	0.147%	0.09	-0.605%	(0.12)	INSIGNIFICANT
2	0.128%	0.08	-0.476%	(0.09)	INSIGNIFICANT
3	0.089%	0.05	-0.387%	(0.07)	INSIGNIFICANT
4	0.161%	0.09	-0.226%	(0.04)	INSIGNIFICANT
5	-0.068%	(0.04)	-0.294%	(0.05)	INSIGNIFICANT
6	-0.398%	(0.23)	-0.692%	(0.11)	INSIGNIFICANT
7	-0.123%	(0.07)	-0.815%	(0.12)	INSIGNIFICANT

The results from the commercial bank stocks show that monetary policy announcements have no impact on commercial bank stocks. Therefore, the null hypothesis for Hypothesis 1 cannot be rejected. The results also show that there is an inverse relationship between the monetary policy and commercial bank stocks, however based on the t-value the relationship is insignificant therefore no evidence exists to reject the null hypothesis for Hypothesis 2.

Graph 2 below shows the CAARS of commercial bank stocks (FTSE/JSE Africa Banks Index) grouped by policy rate hike, cut and when the policy rate is unchanged. The CAARS are plotted on a 15-day event window (7 days prior to the event, 0= day of event and, 7 days after event).

Graph 2: FTSE/JSE Africa Banks Index – CAAR



The policy rate announcement has anticipatory effects on the commercial bank stock prices in the FTSE/JSE Africa Bank Index when there is policy rate announcement, as depicted in Graph 2. In the case where there is policy rate hike, the stock returns experience a downward trend from seven days prior to the announcement which stabilises two days prior to announcement and continues to stabilise after announcement. When there is a policy rate cut, the stock prices tend to have an inconsistent trend before and after the policy rate announcement. In the case where the policy rate is maintained, the stock returns show an increasing trend seven days prior to announcement, then a decreasing trend three days prior to the announcement and thereafter the stock returns increase slowly and start to stabilise. The trend that is portrayed on this graph is not consistent with Schweitzer's (1989) observations as the stock returns trend (see in Graph 2) were not stable prior to policy rate announcements.

4.2.3 Results from Mid Cap Index

The Mid Cap index (does not include any bank stocks) was analysed to see if policy rate announcements have any effects on the Mid Cap Index stock prices. The results from the non-bank stocks were similar to those for all stocks and commercial bank stocks during all events, due to the fact that the results found were statistically insignificant for all events.

The results from all events (refer to Table 4.9) show that the policy rate has a negative impact on non-bank stocks when there is policy rate announcement for all events. The t-stat is equal to -0.04, therefore showing that this negative impact is insignificant. The commercial bank stocks experienced a stronger negative effect (CAAR = -0.873%) when there is policy rate announcement for all events compared to the negative effect (CAAR= -0.138%) experienced by non-bank stocks for all events. However, both the results for monetary policy having a negative impact on non-bank and commercial bank stocks were statistically insignificant.

Table 4.9: Mid-Cap Index results – All events

Time	AARt	t stat	CAARt	t stat	Result
-7	0.084%	0.10	0.084%	0.10	INSIGNIFICANT
-6	0.045%	0.05	0.130%	0.11	INSIGNIFICANT
-5	-0.011%	(0.01)	0.119%	0.08	INSIGNIFICANT
-4	-0.061%	(0.07)	0.058%	0.03	INSIGNIFICANT
-3	-0.128%	(0.15)	-0.070%	(0.04)	INSIGNIFICANT
-2	0.136%	0.16	0.066%	0.03	INSIGNIFICANT
-1	-0.028%	(0.03)	0.038%	0.02	INSIGNIFICANT
0	0.037%	0.04	0.075%	0.03	INSIGNIFICANT
1	-0.019%	(0.02)	0.056%	0.02	INSIGNIFICANT
2	0.003%	0.00	0.059%	0.02	INSIGNIFICANT

3	-0.029%	(0.03)	0.030%	0.01	INSIGNIFICANT
4	0.131%	0.15	0.161%	0.05	INSIGNIFICANT
5	-0.141%	(0.16)	0.020%	0.01	INSIGNIFICANT
6	-0.194%	(0.23)	-0.174%	(0.05)	INSIGNIFICANT
7	0.036%	0.04	-0.138%	(0.04)	INSIGNIFICANT

A further examination was done on the non-bank stocks in order to group the monetary policy rate announcement based on the changes (hiked and cut) and maintained policy rate announcements. The results from the monetary policy hike announcements (refer to Table 4.10) show a CAAR = -0.237%, showing that there is a negative effect on non-bank stock prices when there is a hike in the policy rate. The t-stat is -0.07 showing that this negative impact is statistically insignificant. The negative effect of the policy rate hike was higher for commercial bank stocks (CAAR = -2.586%) than for non-bank stocks (CAAR = -0.237%). This is consistent with existing literature for developing countries in which it is stated that commercial bank stocks tend to be affected more by policy rate changes than non-bank stocks.

Table 4.10: Mid-Cap Index results – Policy rate hike

Time	AARt	t stat	CAARt	t stat	Result
-7	0.084%	0.10	0.084%	0.10	INSIGNIFICANT
-6	0.045%	0.05	0.130%	0.11	INSIGNIFICANT
-5	-0.011%	(0.01)	0.119%	0.08	INSIGNIFICANT
-4	-0.061%	(0.07)	0.058%	0.03	INSIGNIFICANT
-3	-0.128%	(0.15)	-0.070%	(0.04)	INSIGNIFICANT
-2	0.136%	0.16	0.066%	0.03	INSIGNIFICANT
-1	-0.028%	(0.03)	0.038%	0.02	INSIGNIFICANT
0	0.037%	0.04	0.075%	0.03	INSIGNIFICANT
1	-0.019%	(0.02)	0.056%	0.02	INSIGNIFICANT
2	0.003%	0.00	0.059%	0.02	INSIGNIFICANT
3	-0.029%	(0.03)	0.030%	0.01	INSIGNIFICANT
4	0.131%	0.15	0.161%	0.05	INSIGNIFICANT
5	-0.141%	(0.16)	0.020%	0.01	INSIGNIFICANT
6	-0.194%	(0.23)	-0.174%	(0.05)	INSIGNIFICANT
7	0.036%	0.04	-0.138%	(0.04)	INSIGNIFICANT

The results from the monetary policy cut announcement (refer to Table 4.11) show that there is a positive effect on non-bank stock prices when the policy rate is cut. This shows that there is an inverse relationship between non-bank stocks and monetary policy cut announcement; however, the relationship is insignificant because the t-value is equal to 0.59. The positive effect of the policy rate cut is weaker for commercial bank stocks (CAAR= 0.740%) than for non-bank stocks (CAAR =1.967%), which is inconsistent with existing literature for developing

countries where it is stated that commercial bank stocks tend to be affected more by policy rate changes than non-bank stocks.

Table 4.11: Mid-Cap Index results – Policy rate cut

Time	AARt	t stat	CAARt	t stat	Result
-7	-0.023%	(0.03)	-0.023%	(0.03)	INSIGNIFICANT
-6	0.235%	0.27	0.212%	0.17	INSIGNIFICANT
-5	0.228%	0.26	0.440%	0.29	INSIGNIFICANT
-4	0.143%	0.17	0.584%	0.34	INSIGNIFICANT
-3	0.226%	0.26	0.810%	0.42	INSIGNIFICANT
-2	0.016%	0.02	0.826%	0.39	INSIGNIFICANT
-1	0.230%	0.27	1.057%	0.46	INSIGNIFICANT
0	0.476%	0.55	1.532%	0.63	INSIGNIFICANT
1	0.161%	0.19	1.693%	0.65	INSIGNIFICANT
2	0.068%	0.08	1.761%	0.65	INSIGNIFICANT
3	0.014%	0.02	1.775%	0.62	INSIGNIFICANT
4	0.196%	0.23	1.971%	0.66	INSIGNIFICANT
5	0.051%	0.06	2.022%	0.65	INSIGNIFICANT
6	-0.192%	(0.22)	1.830%	0.57	INSIGNIFICANT
7	0.138%	0.16	1.967%	0.59	INSIGNIFICANT

The results from the maintained monetary policy announcements (refer to Table 4.12) find a CAAR of -0.618%, showing that there is a negative effect on non-bank stock prices when the policy rate is maintained. The t-value found is equal to -0.19, meaning that the negative effect found is statistically insignificant. The negative effect of a maintained policy rate is stronger for commercial bank stocks (CAAR=-0.815%) than for non-bank stocks (CAAR= -0.618%). However, the negative effect was statistically insignificant for both the bank and non-bank stocks, therefore indicating that there is no impact on non-bank and commercial bank stocks when there is a maintained policy rate announcement.

Table 4.12: Mid-Cap Index results – Policy rate maintained

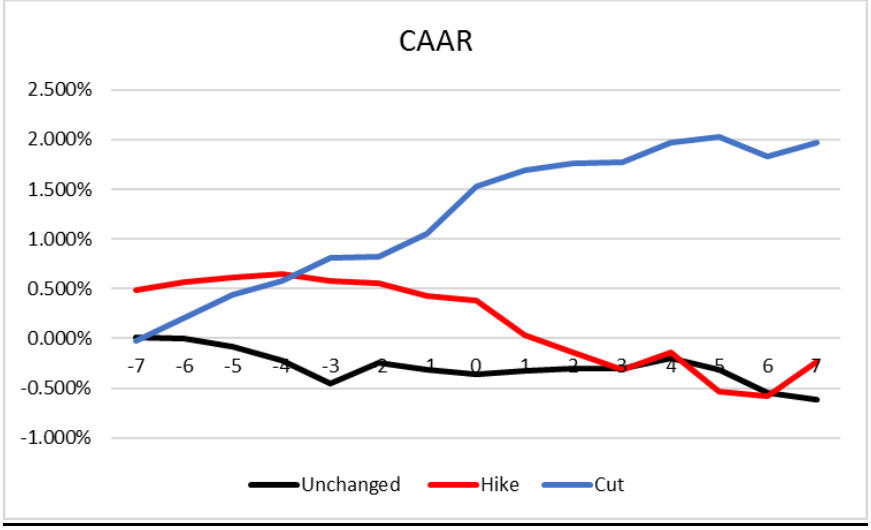
Time	AARt	t stat	CAARt	t stat	Result
-7	0.006%	0.01	0.006%	0.01	INSIGNIFICANT
-6	-0.011%	(0.01)	-0.005%	(0.00)	INSIGNIFICANT
-5	-0.082%	(0.09)	-0.087%	(0.06)	INSIGNIFICANT
-4	-0.136%	(0.16)	-0.222%	(0.13)	INSIGNIFICANT
-3	-0.226%	(0.26)	-0.449%	(0.23)	INSIGNIFICANT
-2	0.205%	0.24	-0.244%	(0.12)	INSIGNIFICANT
-1	-0.065%	(0.07)	-0.309%	(0.14)	INSIGNIFICANT
0	-0.047%	(0.05)	-0.356%	(0.15)	INSIGNIFICANT
1	0.026%	0.03	-0.330%	(0.13)	INSIGNIFICANT
2	0.033%	0.04	-0.297%	(0.11)	INSIGNIFICANT
3	-0.003%	(0.00)	-0.300%	(0.10)	INSIGNIFICANT

4	0.105%	0.12	-0.194%	(0.07)	INSIGNIFICANT
5	-0.122%	(0.14)	-0.317%	(0.10)	INSIGNIFICANT
6	-0.234%	(0.27)	-0.550%	(0.17)	INSIGNIFICANT
7	-0.068%	(0.08)	-0.618%	(0.19)	INSIGNIFICANT

Firstly, the results from the non-bank stocks show that there is no significant impact on stock prices when there is a monetary policy announcement. Therefore, the null hypothesis for Hypothesis 1 cannot be rejected. Secondly, the results also show that there is an inverse relationship between monetary policy announcements and non-bank stocks; however, the t-stat makes the relationship insignificant at the 5% and 10% significance level. Thus, the null hypothesis for Hypothesis 2 cannot be rejected. Lastly, the results show that when there is monetary policy hike, the negative effect on commercial bank stocks is greater than for non-bank stocks which confirms with existing literature. Conversely, when there was a policy rate cut the positive effects on commercial bank stocks were less than on non-bank stocks. The t-value for the tests conducted for the commercial bank stocks and non-bank show that the results found are statistically insignificant. Thus the commercial bank stocks were not impacted more by monetary policy announcements than non-bank stocks. Therefore the null hypothesis for Hypothesis 3 cannot be rejected.

Graph 3 below depicts the CAARS for Mid Cap Index stocks grouped by the policy rate change (hike, cut, and when the policy rate is maintained) and then are plotted in the event window of -seven days prior to announcement, the day of event = 0, and +seven days after the announcement. In the case where there is a policy rate hike, the CAAR starts to show a downward trend from four days prior announcement and continues with this downward trend after the announcement. During the policy rate cuts, the graph shows an upward trend from seven days prior to the policy rate announcement and continues with this upward trend after the announcement. This could indicate that policy rate change was anticipated by the market and therefore this graph is not consistent with Schweitzer's (1989) observations when there is policy rate hike and cut. Conversely, when the policy rate is maintained, the CAAR shows a stabilised trend prior to announcement and continues to be stabilised after the announcement which is consistent with Schweitzer's (1989) findings regarding a maintained policy rate.

Graph 3: Mid Cap Index – CAAR



4.3 Testing the hypotheses

The hypotheses of this study were developed in order to try and find answers to the research questions. The hypotheses were established to firstly determine if stock prices are significantly impacted by policy rate announcements, secondly to examine the effects on stock prices when the policy rate is hiked, policy rate is cut and policy rate remains unchanged, and finally to also determine if the policy rate announcement has a stronger impact on commercial bank stocks than on non-bank stock prices. The results of the three hypotheses are summarised below:

Hypothesis 1

H_0: The announcement of the monetary policy rate does not have a significant impact on the JSE stock prices.

H_1: The announcement of the monetary rate has a significant impact on the JSE stock prices.

The results found for all *monetary policy rate announcements (all events):* show that there is a positive effect on all stock returns when there is monetary policy announcement and negative effect on commercial bank and non-bank stocks when there is monetary policy announcement. The results from the *monetary policy rate hike*: show that there is positive effect on all stocks when the policy rate is hiked; however, there is a negative effect on commercial bank and non-bank stocks when the monetary policy rate is hiked. The results from a *monetary policy rate cut:* show a positive effect on all stocks, commercial bank stocks and non-bank stocks when there is a policy rate cut. The results from when the *monetary policy rate* was maintained: show

a negative effect on all stocks, commercial bank stocks and non-banks when the policy rate is maintained.

The t-values for all the tests conducted for all stocks, commercial bank stocks and non-bank stocks were insignificant. This indicates that monetary policy announcements for all events, hike event, cut event or maintained event have no effect on stock returns for all stock, commercial bank stocks and non-bank stocks. Thus the null hypothesis, stating that the announcement of the monetary policy has no impact on the JSE stock prices, cannot be rejected.

Hypothesis 2

H_0: The policy rate does not have a significant inverse relationship with the JSE stock prices

H_1: The policy rate has a significant inverse relationship with JSE stock prices.

The results from the *monetary policy rate hike*: show that there is a positive relationship between on all stocks and monetary policy when the policy rate is hiked. However, there is an inverse relationship between commercial bank stocks/non-bank stocks and the monetary policy rate when the policy rate is hiked. The results from a *monetary policy rate cut:* show that there is an inverse relationship between all stocks/ commercial bank stocks/ non-bank stocks and the monetary policy rate when there is a policy rate cut.

The t-values for all the tests conducted (all stocks, commercial bank stocks and non-bank stocks) were insignificant. Therefore, the null hypothesis, stating that there is no significant inverse relationship between the policy rate and the JSE stock prices, is accepted.

Hypothesis 3

H_0: The policy rate announcement does not have a stronger impact on commercial bank stocks than on non-bank stock prices

H_1: The policy rate has a stronger impact on commercial bank stock prices than on non-bank stock prices.

The results from the *monetary policy announcement (all events):* show that the impact of monetary policy announcement has a stronger negative effect on commercial bank stocks than non-bank stocks. The results from the *monetary policy announcement (hike events):* show that the negative impact of a monetary policy rate hike is stronger for commercial bank stocks than non-bank stocks. The results from *the monetary policy announcement (cut events):* show that

the positive impact of a monetary cut is weaker for commercial bank stocks than non-bank stocks. The results from the *monetary policy announcement (maintained events):* show that the negative impact of a monetary cut is stronger for commercial bank stocks than non-bank stocks.

The t-values for all the tests conducted for both the commercial bank stocks and non-bank stocks were insignificant. Therefore, the null hypothesis, stating that the policy rate announcement does not have a stronger impact on commercial bank stocks than non-bank stocks, cannot be rejected.

4.4 Discussion of results

It is expected that if the policy rate affects portfolio allocation and the required rate of return, then the policy rate would direct future stock returns because the policy rate has an impact on future company profits and the subsequent stock returns, ceteris paribus. The Capital Asset Pricing Model, Discount Cash Flow Model and the Gordon's Dividend Valuation Model are stock valuation models which support the argument of the policy rate having an inverse relationship with stock prices. According to these stock valuation models, the policy rate has an effect on stock prices through changing the discount factor, influencing the perception of investors and altering future cash flows.

The negative relationship between policy rate and stock prices suggests that should there be a policy rate hike as it is expected that stock prices will be affected negatively, thus causing them to decrease. A decline in the policy rate should have a positive impact on stock prices, causing them to rise and when the policy rate remains unchanged this should have no significant impact on stock returns. The policy rate has been reduced 12 times during the period under study. Looking at the All Share Index results, a decrease in the policy rate yielded a CAAR of 0.03324 at the end of the event window for all 12 announcements, meaning that actual daily returns were 3.324% higher than normal returns and thus showing an inverse relationship between a monetary policy rate cut and JSE stock returns. Increasing the policy rate yielded a CAAR of 0.0394 at the end of the even window for all 13 announcements, meaning that actual returns were higher than normal by 0.394%. When the policy rate was maintained, a CAAR of -0.0233 was obtained at the end of the event window for all 50 announcements, meaning that actual returns decreased by -0.233% from normal returns. Despite the abnormal returns in all three instances, the results were statistically insignificant at the 5% and 10% significance level.

Financial sector stocks are also suggested to be connected to the monetary policy transmission mechanism. The reason for this is that the policy rate is a basis for short-term

and long-term interest rates and commercial banks alter their lending and deposit rates with every policy rate change. As a consequence, the policy rate may affect the balance sheet of institutions in the financial sector like commercial banks. Lynge and Zumwalt (1980) found a statistically negative relationship between bank stock returns and interest rate. However, there are other findings from the existing literature that show that even though interest rate changes are expected to have an influence on the operations of banks, this impact may possibly not be transmitted to stock prices directly due the maturity composition of commercial banks' balance sheet. Garg (2008) and Vaz et al. (2008) are examples of researchers that found that the stock returns of commercial banks are not sensitive to interest rate actions.

This study found that commercial bank stocks were not significantly impacted by policy rate announcements and it also found that commercial bank stocks are not more impacted by policy rate announcements than non-bank stocks. Abnormal returns were present when the policy rate was hiked and cut, possibly indicating an inverse relationship between policy rate and commercial bank stock returns. However, the abnormal returns were statistically insignificant at the 5% and 10% significance level. On the other hand, when the policy rate was maintained there was an insignificant impact to the commercial bank stocks, which is in line with the findings of Lynge and Zumwalt (1980). The results of this paper regarding there being no significant relationship between commercial bank stocks and policy rate announcements is consistent with Garg (2008) and Vaz et al. (2008).

The Efficient Market Hypothesis (EMH) is one of the most widely debated theories; however, it is still one of the most applied in financial economics. EMH states that stock markets are forward looking, and it is unlikely to respond to policy actions that they already anticipated because they usually include all available information. The CAAR graphs for all indices used, All Share Index, Africa Bank Stocks and Mid-Cap Stocks, show that there was some level of anticipatory effects to the news of either hiking, cutting and maintaining the policy rate.

There are a number of reasons for the insignificant results of this study, a few important ones that are significant to this study are discussed below.

Firstly, the nature of shares listed on the JSE. The equity market in South Africa has changed over the past 130 years from a narrow, however growing market to a concentrated, open and cyclical market. Thus it is important to understand the nature of the shares of a different perspective, namely:

- *Offshore-focussed rand hedges companies:* companies that are rand hedged tend to benefit when the rand exchange rate weakens. This is either due to the fact that the company's income is mainly derived from their operations offshore or the company is

a major exporter of goods and services with their prices being set internationally in solid currencies such as the US Dollar.

- *Domestic 'SA Inc.' companies:* these companies earn their revenue in South African Rands and their income is mainly from local activities.
- *Defensive Companies:* these companies are expected or have a constant dividend and their earnings are stable no matter the state of the business cycle.
- *Cyclical Companies:* these companies' profits are highly connected to the state of the economy where they operate.

Figure 4.1 below summaries the listed companies on the JSE based on the nature of the company. The figure shows that there are 131 companies of 165 companies that are more cyclical than defensive, which shows that the JSE market has a cyclical nature. The spilt between offshore and domestic is 57%:43%; however, less than half the number of companies are mainly rand hedges (www.investec.co.za). This shows that domestic factors are important but global factors are more crucial when investing in the JSE. Therefore, because of the nature of shares listed on the JSE, there is no causal relationship between the SARB policy rate announcement and stock prices, and there are other global and company specific factors that play a greater role to price of the stocks.

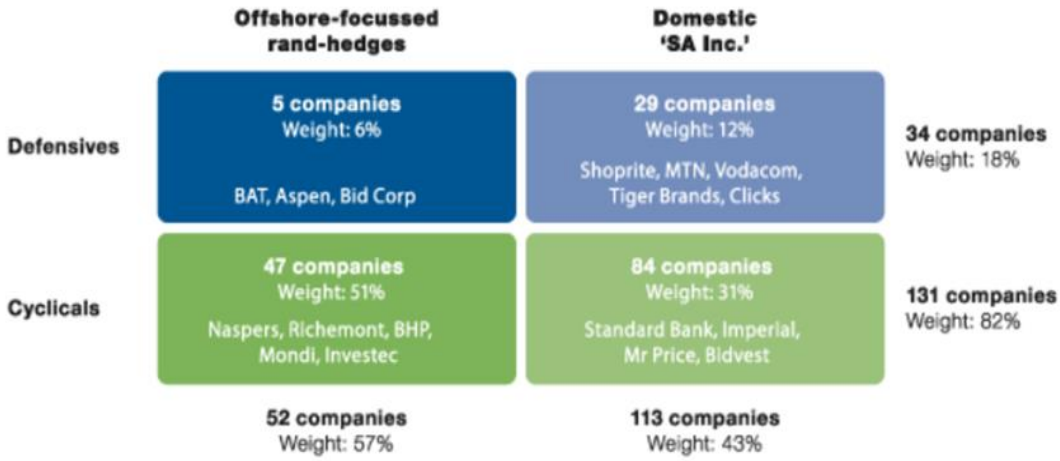


Figure 4.1: Nature of FTSE/JSE All Share Index

Source: Bloomberg, Investec Asset Management; FTSE/JSE All share Index has been used as a base index as at 30.04.18.

Secondly, Alatiqi and Fazel (2008) stated that for bond prices the policy rate is the most important determinant, and a multitude of factors influence the stock price. For example, an increase in the policy rate may take place at the same time as a decrease in cost of major

inputs (such as commodities) for some companies or the possible positive or negative effects of policy rate may be negated by changes in labour costs. Both of these examples are just illustrative examples of the fact that despite the policy rate being an important factor in stock prices, other factors also need to be taken into consideration as they may influence company revenue or costs which subsequently affects stock prices.

Thirdly, a study by Bernanke and Blinder (1992) observed that increasing or decreasing the policy rate will only affect companies that are highly leveraged through debt significantly. Companies that use gearing aggressively may be constrained or liberated by this. MacFarlane (2011) conducted an analysis of the JSE listed companies and found that the companies listed on JSE are inclined to have a conservative approach to using leverage, therefore the invigorating or direct restraining influence of an increase or decrease in the policy rate may be somewhat muted.

Fourthly, a study conducted by Alatiqi and Fazel (2008) suggested that an increase or decrease in the policy rate will bring about further expectations regarding the future rates movement. The study prescribes that when the policy rate increases or decreases, the reaction of the stock market might not be inverse to this and uncertainty affects the negative causality from the policy rate to stock prices.

Lastly, Ehrmann and Fratzcher (2004) studied that policy rate changes generally coincide with business cycle changes and other applicable economic variables. Hence what contributes to the change in the policy rate and what contributes to other economic factors is not always clear. Patelis (1997) and Thorbecke (1997) both found that the stock returns in the United States vary significantly with policy rates.

Given the above the information from the different studies, there is plenty of supportive empirical evidence showing the lack of causality between the monetary policy rate announcement and stock prices – thus increasing the credibility of the results of this study.

CHAPTER 5
CONCLUSIONS AND RECCOMENDATIONS

5.1 Introduction

The purpose of this chapter is to discuss the major findings from this study and to provide recommendations for future studies.

5.2 Major findings

This paper's objective was to investigate whether monetary policy actions through the policy rate affect the stock market in South Africa. The data analysed was from October 2006 to September 2018. The FTSE/JSE All Share Index represented the stock market of South Africa, the All Africa Bank Share Index represented the commercial bank stocks of South Africa and the Mid Cap Index represented the non-bank stocks of South Africa. During this period, a total number of 75 policy rate announcements were made of which the policy rate remained unchanged 50 times, increased 13 times and was decreased 12 times. The event study methodology was used; the event study requires the constant mean model to be used to estimate expected returns. To test the null hypothesis, the cumulative abnormal returns were used to calculate the t-statistic. In order to test the abnormal returns, the t-statistic at a significance level of 5% and 10% was used.

The study had three research objectives that were linked with three hypotheses to help find answers to the objectives. The first objective was to find out if the monetary policy rate announcement has an impact on the JSE stock prices. This objective is linked to Hypothesis 1. The results for all the shares listed in on JSE found that a policy rate announcement has a positive effect on stock prices and the stock returns increased by an average of 0.445%. The results of the commercial bank stocks found that when there is a monetary policy announcement, commercial bank stocks are affected negatively, the stock returns decrease by an average of -0.873%. The results for the non-bank stocks showed that when there is a monetary policy announcement, non-bank stocks are also affected negatively, the stock returns decrease by an average of -0.138%. From the results of the abnormal returns it is clear that there is a movement in the price of stocks; however, based on the t-values received these results were all statistically insignificant. Therefore, the null hypothesis for Hypothesis 1 cannot be rejected. The announcement of the monetary policy rate has no impact on the JSE stock prices. The results found contrasting research findings presented in the literature review as empirical evidence for this study, particularly with regards to evidence from developed countries. For example, the studies found that policy rate actions had a significant effect on the stock markets within the United States of America and Europe. On the other hand, the

results of this study were consistent with empirical evidence from developing countries. For example, Bernnaceur et al. (2009), and Barakat et al. (2016) who observed Middle East and African regions found that these countries' stock exchange did not react to changes in the monetary policy rate. An argument made by Aziza (2010) was that emerging markets consist of stock markets that are in their early stages of development and hence the inconsistencies in the findings of the effect of the policy rate on stock markets when examining developing and developed countries.

The second objective of this study was to find out if existing literature and valuation models' assumption of an inverse relationship between monetary policy rate and stock prices is also true for JSE stocks. This objective was linked to Hypothesis 2. The results from all the stocks showed that when there is a monetary policy rate announcement of an increase, the stock prices are affected positively, the returns increase by an average of 0.394%. The results from the commercial bank stocks show that when there is policy rate announcement of an increase, the stock prices are affected negatively and their returns decrease by an average of -2.586%. The results from the non-bank stocks show that when there is policy rate announcement of an increase, the stock prices are affected negatively and their returns decrease by an average of -0.237%. The results for when there is a monetary policy announcement of a decrease, the stock prices of all stocks, the non-bank stocks and the commercial bank stocks are impacted positively and there is a positive return to their stock prices. From these results it is evident that the all stocks on JSE have a positive relationship with monetary policy announcement when there is policy rate hike and an inverse relationship with the policy rate when there is monetary policy rate announcement of a cut. The commercial bank stocks and the non-bank stocks have an inverse relationship with the monetary policy announcement; when there is policy rate hike, the average stock returns decrease and when there is a policy rate cut, there is an increase in the average stock returns. This result is consistent with the findings of Bjørnland and Leitemo (2009) that stock returns have an inverse relationship with monetary policy rate. A t-value was calculated for all the abnormal returns, and the values found were all statistically insignificant. Therefore, the null hypothesis for Hypothesis 2 cannot be rejected. The policy rate has no significant inverse relationship with the JSE stock prices.

The third objective of the study was to determine if monetary policy announcement had a stronger impact on commercial bank stocks than non-bank stocks. The results of the study show that when there is a monetary policy announcement (all events) commercial bank stock returns decrease by an average of -0.873%, and non-bank stock returns decrease by -0.138%. Therefore, when there is a policy rate announcement, commercial bank stocks are impacted more negatively than non-bank stocks. The results of the study when there is a policy rate

announcement of an increase found that commercial bank stock returns decrease by -2.586% and non-bank stock returns decrease by an average of -0.237%. Thus, the negative impact on commercial bank stocks is stronger than on non-bank stocks when there is an increase in the monetary policy rate. Financial theory assumes that the policy rate should have a stronger impact on commercial bank stock returns than non-bank returns because it impacts the banks' short-term and long-term interest. The results of the study, discussed above, agree with this assumption. However, when there is policy rate announcement of a cut, the commercial bank stock returns increase by an average of 0.740% and non-bank stocks increase by 1.967%. This contradicts the financial theory assumption, because the positive impact on stock returns is not stronger for commercial bank stocks than for non-bank stocks. A t-value was calculated for all the abnormal returns, and the values found were all statistically insignificant. Therefore, the null hypothesis for Hypothesis 3 cannot be rejected. The policy rate announcement does not have a stronger impact on commercial bank stocks than non-bank stocks. In contrast to the financial theory assumption there is an argument that policy rate may not have an effect on the operations of commercial banks because commercial banks mainly manage their risks, such as the interest rate risk through matching the maturity of their assets and liabilities.

Bernanke and Kuttner (2005) and Bjørnland and Leitemo (2009) argued that when there is monetary policy announcement of a maintained policy rate there should not be an impact or there should be an insignificant impact on the returns of stock prices. The result of the study regarding the announcement of a maintained policy rate was that the impact on stock returns for all stocks, commercial bank stock and non-bank stocks was insignificant.

In conclusion, this study agrees with studies done in developing countries where the findings state that policy rate actions do not significantly impact the stock markets in developing countries and more importantly those within Sub-Saharan Africa as they are in their early stages of development and most of the companies listed in these stock exchanges are highly influenced by global factors and company specific factors. Conversely, the findings of this study provide weak support for the findings of researchers who conducted research in developed countries where it is found that the policy rate has a statistically significant impact on stock returns. An inverse relationship between stock prices and monetary policy rate was revealed by empirical evidence in developed countries. This study's results mostly agreed with this but the results were not statistically significant. The study also found that the impact of the monetary policy rate was not significantly stronger for commercial bank stocks than for non-banks. There are other factors that can determine the interest rate sensitivity of sector profits such as those stated by Garg (2008), namely the average size of the firm, the sector's debt heaviness and the age of the firm. It is revealed by the previous studies that the sensitivity of

the interest rates differs across the various economic sectors. The findings in the different empirical studies show that there is still no clear distinction of the impact the policy rate has on commercial bank stock returns for both developed and developed countries.

5.3 Research limitations

A limitation of this research was the fact that the policy rate during the period of study was mostly maintained for 50 out of the 75 announcements, resulting in the data examined for policy rate increases and decreases not being as much the maintained data information.

In South Africa there are set dates for monetary policy rate announcements and there is much speculation in the media and the news pertaining to what the decision surrounding the policy rate will be. This is another limitation to consider as certain monetary policy changes might have been anticipated by the market so the market gradually reacted well before the actual announcement. Nonetheless, expectations do not necessarily replace the actual event and when it actually kicks in.

Another limitation of this study which is similar to the normal limitations specifically for the South African stock market, is the asset pricing models used when estimating stock returns. The South African stock markets are concentrated with firms who receive the majority of their profits from global operations as opposed to local operations. The three largest shares in the All Share Index are Naspers, Richmond and BHP Billiton which together make up one-third of the South African Stock market. The Top 40 listed companies on the JSE generate more than 70% of their revenue from foreign operations. Therefore, due to the concentration of the JSE market, this could imply that the results of this study may be biased towards some of the companies.

5.4 Recommendations and areas for future research

This study investigated the impact that monetary policy rate actions had on the stock prices in South Africa, using daily data from October 2006 to September 2018. An understanding of the South African stock market as a monetary policy transmission mechanism was provided using the event study method. The observation of the study was that policy rate announcements by the South African Reserve Bank do not have a significant effect on the stock returns for companies listed on the JSE. The results of the study provide weak support for the developed countries' empirical evidence adopted by this study, but strongly support empirical evidence of developing countries particularly those within Sub-Saharan Africa.

The study also found that there is lack of empirical evidence on the relationship between the policy rate and stock returns in South Africa. This increases the need to conduct further

research to be able to advance the knowledge of the relationship between monetary policy actions and stock returns in South Africa. The paper also observed the influence of policy rate actions not having a significant influence on stock returns, sparking interest that if this macroeconomic variable does not have influence on stock returns what other factors may have an influence on stock returns? This too is an area that could be researched and looked into.

The South African economy tends to have a dependency on precious metals based on historic information and a number of dominating firms on JSE rely on precious metals. Thus it would be a good area to conduct research to determine whether precious metals have a significant influence on the JSE stock returns. To add to this, markets have become more related with each other and understanding to what extent an influential index such as the MSCI World Index and S&P 500 would impact the local markets and indices would be interesting, if there would be any influence at all.

Do stock market returns lead the direction of macroeconomic variables in the long term? This would be a very interesting research question and it would enable us to know if the JSE stock returns would be a beneficial predictive tool to assess the future of macroeconomic variables. This would look at all or any macroeconomic variables, such as the interest rate, inflation, or GDP.

The monetary policy transmission mechanism is usually a multifaceted and difficult process which at times may not achieve its objectives. Therefore, it would be valuable to add to the existing body of knowledge by investigating the monetary policy transmission of South Africa. This will enable researchers to understand the level at which the policy rate affects other macroeconomic variables such as inflation, short-term and long-term interest rate, exchange rates and money supply.

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APPENDIX 1:

SARB Monetary Policy Announcements

	Dates	Policy Rate	Remark
0	12-Oct-06	8.5	Start Date
1	07-Dec-06	9	Increased
2	15-Feb-07	9	Maintained
3	12-Apr-07	9	Maintained
4	07-Jun-07	9.5	Increased
5	16-Aug-07	10	Increased
6	11-Oct-07	10.5	Increased
7	06-Dec-07	11	Increased
8	31-Jan-08	11	Maintained
9	10-Apr-08	11.5	Increased
10	12-Jun-08	12	Increased
11	14-Aug-08	12	Maintained
12	09-Oct-08	12	Maintained
13	11-Dec-08	11.5	Decreased
14	05-Feb-09	10.5	Decreased
15	24-Mar-09	9.5	Decreased
16	30-Apr-09	8.5	Decreased
17	28-May-09	7.5	Decreased
18	25-Jun-09	7.5	Maintained
19	13-Aug-09	7	Decreased
20	22-Sep-09	7	Maintained
21	22-Oct-09	7	Maintained
22	17-Nov-09	7	Maintained
23	26-Jan-10	7	Maintained
24	25-Mar-10	6.5	Decreased
25	13-May-10	6.5	Maintained
26	22-Jul-10	6.5	Maintained
27	09-Sep-10	6	Decreased
28	18-Nov-10	5.5	Decreased
29	20-Jan-11	5.5	Maintained
30	24-Mar-11	5.5	Maintained
31	12-May-11	5.5	Maintained
32	21-Jul-11	5.5	Maintained
33	22-Sep-11	5.5	Maintained
34	10-Nov-11	5.5	Maintained
35	19-Jan-12	5.5	Maintained
36	29-Mar-12	5.5	Maintained
37	24-May-12	5.5	Maintained
38	19-Jul-12	5	Decreased
39	20-Sep-12	5	Maintained
40	22-Nov-12	5	Maintained
41	24-Jan-13	5	Maintained
42	20-Mar-13	5	Maintained
43	23-May-13	5	Maintained
44	18-Jul-13	5	Maintained
45	19-Sep-13	5	Maintained
46	21-Nov-13	5	Maintained
47	29-Jan-14	5.5	Increased
48	27-Mar-14	5.5	Maintained
49	22-May-14	5.5	Maintained
50	17-Jul-14	5.75	Increased
51	18-Sep-14	5.75	Maintained
52	20-Nov-14	5.75	Maintained
53	29-Jan-15	5.75	Maintained
54	26-Mar-15	5.75	Maintained
55	21-May-15	5.75	Maintained
56	23-Jul-15	6	Increased
57	23-Sep-15	6	Maintained
58	19-Nov-15	6.25	Increased
59	28-Jan-16	6.75	Increased
60	17-Mar-16	7	Increased
61	19-May-16	7	Maintained
62	21-Jul-16	7	Maintained
63	22-Sep-16	7	Maintained
64	24-Nov-16	7	Maintained
65	24-Jan-17	7	Maintained
66	30-Mar-17	7	Maintained
67	25-May-17	7	Maintained
68	20-Jul-17	6.75	Decreased
69	21-Sep-17	6.75	Maintained
70	23-Nov-17	6.75	Maintained
71	18-Jan-18	6.75	Maintained
72	28-Mar-18	6.5	Decreased
73	24-May-18	6.5	Maintained
74	19-Jul-18	6.5	Maintained
75	20-Sep-18	6.5	Maintained