AN INVESTIGATION OF THE EFFECT OF MACROECONOMIC VARIABLES ON THE PERFORMANCE OF THE NAMIBIA STOCK MARKET

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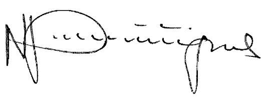

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ABSTRACT

This study investigated the long term as well as short term relationship between macroeconomic variables and the Namibia Stock Market using monthly data from 1996 to 2016. The macroeconomic variables tested are interest rate, inflation, exchange rate, foreign direct investments and GDP. A Vector Error Correction Model (VECM) was employed to determine the long run equilibrium relationship while short term Granger causality test was employed for any short run interactions among the variables. The results indicate that the NSX has insignificant positive long run relationships with interest rate, exchange rate lag two and GDP, and an insignificant negative relationship with the inflation, exchange rate lag one, and foreign direct investments. The results indicate that a multifactor model is appropriate for Namibia Stock Market. Specifically, the study is in support of the multifactor APT as opposed to CAPM, identifying interest rate, exchange rate, FDI and GDP as priced risk factors. However, given the moderate R-squared of the VECM, there may be other macroeconomic variables of statistical significance that still remain unidentified.

1. INTRODUCTION

1.1. Background of the study

The stock market is an important area of economics. Numerous efforts to forecast the stock market performance have attracted the attention of economists and they represent a common area of economic research. In principle, the price of a stock is determined by supply and demand (Al-(Shubiri, 2010). In this setting, buyers and sellers assess information about the firm, industry information, the general economic environment and their own investment goals (Palepu, et al., 2010).

Agents consider the financial health of the company before buying or selling the stocks. Other basics such as strategy analysis, ratio analysis with key profitability ratios and cash flow analysis to examine the company's liquidity are also important tools to assess the financial health of the company as well as the company's past and present performances (Palepu et al., 2010). The strength of the entire industry is also an imperative factor when assessing the firm (Palepu et al., 2010). Therefore, in a deteriorating industry, investors might query the ability of the firm to keep growing, even when it is doing well financially. In addition to the specific firm or industry, investors may carefully follow general trends that signal fluctuations in the general economic and political environment. These signs can indicate whether the economy is healthy or not (NYSE, 2018). The performance of the economic environment is measured through macroeconomic variables.

In the past, many researchers conducted research about the interactions between stock market movements and macroeconomic variables such as gross domestic product, money supply, interest rate, reserve, industrial production index, exchange rate, employment rates, foreign direct investments (FDI) and many others. In theory, these variables should be some of the drivers of corporate profits, which in turn should influence the price of stocks. Thus, it is expected that some relationships between macroeconomic variables and stock prices should exist.

The Namibian government established the NSX with a view to transform the economy from a government controlled economy to a private sector focused economy. The NSX was officially launched in 30th September 1992 as a company and it is the only licensed stock exchange in Namibia in terms of the Stock Exchanges Control Act (No.1 of 1985). The NSX is therefore, a non-profit making body created to facilitate the government's implementation of the economic reforms and in future to encourage the wider share ownership of privatized companies in Namibia and facilitate the raising of medium and long-term capital. The development of the NSX received a major boost after the government imposed regulations on pension funds and life insurance companies requiring them to invest in Namibian assets, which included shares listed on the NSX.

Table 1.1. NSX Trading Statistics

Year	# of deals	Trading value in N$ billions	Year on year % change of Trading Results of NSX	Volume of share in 000s
2007	2,340	10,892	62%	242,597
2008	2,505	9,096	-16%	274,352
2009	3,016	8,728	-4%	342,970
2010	3,071	7,580	-13%	215,598
2011	2,765	3,272	-57%	98,865
2012	2,697	3,648	11%	83,063
2013	2,800	5,507	51%	114,625
2014	4,118	8,332	51%	174,427
2015	4,384	17,196	106%	267,537
2016	5,154	14,411	-16%	219,398
2017	4,412	13,859	-4%	228,607

Source: NSX 2017 annual report

Few past studies have searched for evidence of relationships between macroeconomic factors and the performance of the Namibian Stock Exchange. If macroeconomic variables do provide predictive information regarding future returns, it would be important to take these variables into account when making policy, operational and investment decisions. Hence, this information would be useful to governments, industry bodies, investors and business. If there is any established relationship, it can be used widely as part of investment planning at individual and institutional level, as well as to direct government policy and corporate strategy.

It is therefore essential to investigate the NSX's growth and its determinants in order to enable different parties involved to get relevant information to assist in making financing and investment decisions. Some macroeconomic variables and their impact on the stock market have already been studied in Namibia. Eita (2012) investigated the determinants of stock market prices in Namibia for the period 1998 to 2009. The investigation focused on variables such as interest rates, inflation, money supply and exchange rates.

To ascertain whether relationships do exist between macroeconomic variables and the Namibia Stock Market return, this study investigated the effects of macroeconomic variables on the stock market performance at the Namibia Stock Exchange (NSX). The study was directed by the research objective which was to investigate the overall relationships amongst the exchange rate, interest rates, inflation, economic growth, foreign direct investments, and the stock market performance in Namibia. The study adopted a causal research design and targeted all the companies locally listed and active at the NSX as from January 1996 to December 2016. The

Time Series Regression model was used to examine the effects of macroeconomic variables on the stock market performance at the NSX.

1.2. Statement of the problem

Macroeconomic factors have been playing a significant role in determining the growth of the stock exchange market and economic growth of many countries in the world. Despite such a significant role in terms of stock growth and economic growth, a number of studies have shown different results according to different behaviours of the capital market and different macroeconomic variables (Aurangzeb, 2012).

The NSX is a robust capital market and one of Africa's fastest growing stock exchanges, now ranking as Africa's fourth largest (NSX, 2016). The NSX had a trading decline in 2016 which can be explained by the economic slowdown in the country given fundamental changes in the Namibian economy associated with or preceding this decline.

The correlation between stock market returns and macroeconomic fundamentals is important to Namibia. The stock market and its link to the economic activities is vital to the development of the country and it contributes to the effectiveness, governance, and the appropriate regulatory framework designed by both policy makers and politicians.

Despite the potential importance of the relationship between the returns on the NSX and macroeconomic variables, the mechanism of these relationships has not been completely studied in Namibia. Based on the research gap identified above, the problem statement of this study is that there is limited comprehensive academic knowledge on what the effects of macroeconomic variables are on the NSX returns, notwithstanding the importance of the knowledge.

1.3. Objectives of the study

The objective to this study is derived from the research gap and research problem stated above. The research objective is to investigate the overall relationship between stock market return and each of the macroeconomic variables such as the exchange rate, interest rate, inflation, economic growth and foreign direct investment during the period January 1996 to December 2016. The study focused on the locally listed stocks only.

Accordingly, the specific objectives of the study are:

1. To investigate whether changes in the exchange rate have effects on the stock market returns in Namibia during the period January 1996 to December 2016.
2. To investigate whether changes in the interest rates have effects on stock market returns in Namibia during the period January 1996 to December 2016.
3. To investigate whether changes in the inflation rate as measured by the Consumer Price Index has effects on stock market returns in Namibia during the period January 1996 to December 2016.
4. To investigate whether changes in economic growth rate as measured by percentage growth in GDP have effects on stock market returns in Namibia during the period January 1996 to December 2016.
5. To investigate whether changes in foreign direct investment have effects on stock market returns in Namibia during the period January 1996 to December 2016.

1.4. Hypothesis of the study

To achieve the research outcomes, the researcher conducted data analysis in order to test the following hypothesis:

Hypothesis 1

H_o: Changes in the interest rate have no causal effect on stock market returns in Namibia

H_1: Changes in the interest rate have a causal effect on stock market returns in Namibia

Hypothesis 2

H_o: Changes in the exchange rate have no effect on stock market returns in Namibia

H_1: Changes in the exchange rate have an effect on stock market returns in Namibia

Hypothesis 3

H_o: Changes in inflation rate as measured by the Consumer Price Index have no effect on stock market returns in Namibia

H_1: Changes in inflation rate as measured by the Consumer Price Index have an effect on stock market returns in Namibia.

Hypothesis 4

H_o: Changes in the economic growth rate have no effect on stock market returns in Namibia

H_1: Changes in the economic growth rate have an effect on stock market returns in Namibia

Hypothesis 5

H_o: Changes in the foreign direct investment have no effect on stock market returns in Namibia

H_1: Changes in the foreign direct investment have an effect on stock market returns in Namibia

1.5. Significance of the study

This study is expected to add several contributions to the existing literature on the understanding of stated macroeconomic variables on stock returns in Namibia. This ought to improve the general understanding of all economic agents of the stock market, as well as making it worthwhile to investors for identifying and crafting trading rules based on structural relationships which ought to improve returns in the long term.

1.6. Limitations of the study

The study was limited to the four macroeconomic factors and restricted itself to the secondary data, mainly from Namibia Stock Exchange and from international organisations such as the World Bank, which was compiled over many years and for the period within which such data is available. Consequently, the results of the study may not be generalized to other areas and time periods, therefore further empirical studies and replications across different populations are called for.

1.7. Delimitations of the study

In investigating the relationship between stock market return and macroeconomic variables, the researcher cautions that results and implications that arose from this study should be considered in light of its limitations. The study was purely restricted to companies listed on the NSX. The sample was further restricted to the 20-year period between 1996 and 2016.

2. LITERATURE REVIEW

2.1. Overview

This chapter introduces the definition of key concepts used in the study and presents a critical review of theories that are applicable to the stock exchange market and its macroeconomic determinants. The section draws attention to various approaches and methods used in other studies which focused on interest rate, inflation, exchange rate, economic growth and foreign direct investments that have been covered to identify the research gap from theoretical and empirical literature. The section also presents the conceptual frame work.

2.2. Theoretical literature review

Different theoretical perspectives have been engaged by many researches to connect changes in macroeconomic variables with stock market returns. These include the efficient market hypothesis developed by Fama (1970), and the Arbitrage Pricing Theory (APT). These theories are discussed in this section as they relate the macroeconomic variables to stock market returns.

2.3.1. The Efficient Market Hypothesis (EMH)

Also commonly known as the random walk theory, the efficiency market hypothesis assumes that market prices should incorporate all available information at any point in time. The term was first used by Eugene Fama (1970), who stated that in an efficient market, on the average, completion will cause the full effects of new information on core values to be reflected instantly in actual prices. Fama (1970) defined an efficient market as a market where there are large numbers of sensible profit-maximizers actively competing, of which each attempts to predict future market values of individual securities, and also where current information is almost freely available to all participants.

In an efficient capital market, security prices fully reflect available information in a rapid and unbiased manner and thus provide unbiased estimates for the underlying values. In another words, no investors should be able to utilize readily available information in order to forecast stock price movements quickly enough so as to make a profit through trading shares. Hence, an efficient market is where prices always reflect all available information. Indeed, profiting from predicted price movements is unlikely and very difficult as the efficient market hypothesis suggests that the main factor behind price changes is the arrival of new information. Consequently, the efficient market hypothesis is stated in three variations, namely; the weak form hypothesis, semi strong form hypothesis and the strong form hypothesis.

Fama (1970) furtherer states that EMH and asset pricing models are interrelated topics. These theories are crucial for equilibrium analysis in the financial markets and stock market in particular. Therefore, the evaluation of these theories and the results of the empirical studies and their implications are evaluated to understand and test the efficiency of the Namibian stock market. Moreover, macroeconomic risk factors are integrated into the stock valuation process through the stock valuation models.

The objective of this thesis was to investigate the relationship between macroeconomic variables and the Namibian stock market return. Systematic macroeconomic risk factors are integrated into the investment decision making through the stock valuation models. Major valuation techniques: the NPV, the portfolio theory, the CAPM, and the APT, incorporate the EMH and the rational expectations hypothesis and macroeconomic variables into the stock market valuation process.

The stock market index or portfolio consists of individual stocks and hence any variable affecting individual stocks affects the stock market return as well. Economic variables affect individual stock prices directly or indirectly through the valuation models, and this is examined in this chapter.

Microeconomic variables have an effect on the return of specific firms and they are the sources of unsystematic risk which can be eliminated through diversification. For example, the price of copper only affects firms with exposure to copper prices. However, macroeconomic variables affect all the stock markets and they are the source of systematic risk which cannot be eliminated through diversification. For example, interest rates affect any individual stock through the effect on the cost of the firm and the present value of the stocks because they are a discount factor in the NPV model. Discounted cash flow model is one of the most widely used stock valuation approaches which are based on the concept that the value of a stock is equal to the present value of the cash flows expected to be received from the stock. Clearly, the discount rate that is related to the interest rate in the market is one of the most important parameters of these approaches. When interest rates change, investors will incorporate these changes in their stock price valuation; therefore, a rise in interest rates will reduce the present value of future cash flows, which investors expect to receive in the form of dividends and capital gains.

Some of the studies show that markets are imperfect and inefficient (Grossman & Stiglitz, 1980) from an information aspect and that investors do not behave rationally. Thus, there is a situation where arbitrage profit can be made using certain strategies. To make an arbitrage profit, it is necessary to ascertain the way in which economic variables affect stock returns. Grossman & Stiglitz (1980) further stated the three different approaches to the valuation of stocks.

They are:

- Technical analysis: This is related to the weak form efficiency of the EMH. This analysis concentrates on stock market, price movements and investors' psychology, and uses past price behaviour to predict future prices.

- Fundamental analysis: This is related to the semi strong efficiency microeconomic version of the EMH. This analysis concentrates on the return of individual stock, the industry and firm's profitability, and growth. It uses publicly available firm specific or microeconomic information.

- Macroeconomic analysis: This is related to the semi strong efficiency - macroeconomic version of the EMH. This analysis concentrates on the portfolio returns rather than the returns in individual stocks. It uses publicly available macroeconomic information to predict stock returns. It is also used to test the semi strong efficiency of financial markets.

The model in the present study was based on macroeconomic analysis and it is consistent with the semi strong form of the EMH and the macro variable version.

The semi strong form hypothesis states that all publicly available information is already incorporated into current prices; that is, the asset prices reflect all available public information. This means that the semi strong hypothesis can be used to explore the positive or negative relationship between stock return and macroeconomic variables since it assumes that economic factors are fully reflected in the price of stocks. Public information can also include data reported in a company’s financial statement and the financial situation of company’s competitors. Therefore, information is public and there is no way to make profit using information that everybody else knows. So the existence of market analysts is required to understand the implications of vast financial information as well as to understand processes in product and input market.

2.3.2. The Arbitrage Pricing Theory

The theory of asset pricing tries to calculate the suitable price of an asset while taking into account systemic risks common across all assets. The Arbitrage Price Theory (APT) that was suggested by Ross (1976) has been an influential form of asset price theory. Established by Ross (1976), the Arbitrage Pricing Theory (ATP) is another way of relating macroeconomic variables to stock market return. It is an expansion of the Capital Asset Pricing Model (CAPM) which is founded on the mean variance framework by the notion of the process generating and security. In other words, CAPM is based on one factor, which means that there is only one independent variable which is the risk premium of the market.

According to Chen (1983), there are two ways to determine the factors of APT. The first is to make assumptions and produce a theory specifying the variables of the equation, and then testing this theory. The second way is to examine assets realized returns and determine empirically which macro variables correspond. The APT is more in the spirit of the second approach, which is the macro variable approach. Chen (1983) states that this is the most important direction for future research on the economic interpretation of the common factors. However, the author did not specify any macroeconomic variables affecting the stock return.

There are two different versions of APT: the factor loading model and the macro variable model. These two empirical models are used to implement and test the APT. The factor loading model uses artificial variables, while the macro variable model avoids artificial factors and uses macroeconomic variables based on the economic transmission mechanism (Groenewold & Fraser, 1997).

The APT does not provide a guideline as to how many pricing factors should be chosen and, more importantly, what those factors are. In application, researchers have relied either on a statistical method, such as factor analysis, and pre-specified macroeconomic variables, or on fundamental variables (Merville *et al*. (2001). In many of the empirical studies, factors are artificially created using principal components analysis (or factor analysis) rather than using an economic transmission mechanism. Naturally they have no real-world explanation (Groenewold & Fraser, 1997).

Ross (1976) recommends a multifactor approach to explaining asset pricing through the arbitrage pricing theory (APT). According to Ross (1976), the primary influences on stock returns are some economic forces such as;

1. unexpected shifts in risk premiums,
2. changes in the expected level of industrial production,
3. unexpected inflation, and
4. unexpected movements of the interest rate.

These factors are denoted with factor specific coefficients that measure the sensitivity of the assets to each factor. APT is a different approach to determining asset prices and it derives its basis from the law of one price. As a matter of fact, in an efficient market, two items that are the same cannot sell at different prices; otherwise an arbitrage opportunity of indexes might happen as shown in the following equation:

$R_1 = \alpha + \beta_1 X_1 + \beta_2 X_2 \ldots \beta_n X_n + \varepsilon$

Whereby

β = Beta

X = Risk factors

R_1 = Expected return

α =If return for stock (return on market portfolios)

ε = Random error

According to Chen *et al*. (1986), individual stock relies on expected and unexpected factors. Chen *et al*. (1986) consider that most of the return realized by investors is the result of unexpected events and these factors are related to the overall economic conditions.

2.3. Review of empirical studies

2.4.1. Studies conducted in Africa

Eita (2012) used variables such as interest rates, inflation, money supply and exchange rates to examine macroeconomic determinants of stock market prices in Namibia. Eita (2012) used time series data for the period 1998 to 2009 and applied the VECM econometric methodology. The result of the study indicated that macroeconomic variables significantly affect the Namibian stock market prices. The study concluded that the rise in economic activity such as the money supply causes an increase in stock market prices, while increases in inflation and interest rates decrease stock prices.

The study done by MacFarlene (2011) sought to answer the question as to whether macroeconomic variables drive future stock market returns in South Africa. MacFarlane (2011) stated that macroeconomic variables constitute useful predictive information for the future FTSE/JSE All Share Index. The data used was for the period from 1965 to 2010, which constitutes the longest study of its nature in South Africa. Through the application of Johansen multivariate cointegration and Granger causality, MacFarlane (2011) found that the selected South African macroeconomic variables did not significantly impact future FTSE/JSE All Share Index returns.

Adarmola (2012) carried a study to examine whether the exchange rate has any long term or short term significant impact on the Nigerian stock market. He used the quarterly data for the period from 1985 to 2009. The techniques used in this study are Johansen's Cointegration Technique and Error correction mechanism. This study found that exchange rate volatility and stock market behaviour in Nigeria had a positive major influence on stock market performance while in the long run, the results show that the relationship is significantly negative. Onasanya and Ayoola (2012) did a similar study using the VECM model and yearly time series data for the period from 1985 to 2008 using various economic variables including exchange rate and interest rate. They found that the macroeconomic variables do not significantly influence the stock return at the stock market. Interest rate in particular was found to be negatively related and insignificant to stock returns in Nigeria.

Coleman and Agyire-Tetty (2008) explored the impact of some macroeconomic variables on the growth of the Ghana Stock exchange using quarterly time series data for the period from 1991 to 2005, running econometric models such as cointegration and error correction model. The findings show that there is a weak effect of Treasury bill rates, and also that the market takes time to react in inflation scenario.

2.4.2. Studies conducted in emerging countries

In India, Pal and Mittal (2011) focused their study on two Indian capital markets whereby they studied the long run relationship between some macroeconomic variables such as the interest rate, inflation, exchange rate, and gross domestic savings. They used quarterly data from January 1995 to December 2008 and applied unit root test, cointegration and error correction mechanism. The study results established that there is a substantial relationship between inflation rates and both capital markets. The study further found that the interest rate and foreign exchange rate have an influence on one capital market.

Ibrahim and Aziz (2003) explored the relationship between four macroeconomic variables which is money supply, inflation rate, exchange rate and interest rate, where they used multiple regression model and Kuala Lampur Composite Index (KLCL) through cointegration and vector error correction model. They took the monthly data of their variables which were real output of inflation rate, money supply, interest rate and exchange rate from 1977 to August 1988 and their model suggests that there is short term relationship as well as long term relationship that exist between the macroeconomic variables and the KLCL. They also concluded that two variables which were exchange rate and money supply are negatively related with the stock prices, while the other two have a positive impact on the index which is inflation rate and interest rate.

Hussainey and Ngoc (2009) explored the effects of domestic and international macroeconomic variables on Vietnamese stock prices. They applied regression model on Vietnam data as well as the US data of some variables which include Vietnam stock prices, industrial production, CPI, Vietnam basic interest rates and government bond rates for Vietnam. The results of the study suggest that industrial production has a positive impact on Vietnamese stock prices, whereas with regards to the short term and long term, both types of interest rates showed an insignificant effect on stock prices. The results also suggested that real production activities of the US have a significant impact on Vietnamese stock prices.

2.4.3. Studies conducted in developed countries

Stavarek (2004) carried a study to explore the causal relationship between stock prices and exchange rate in various European Union countries. Stavarek (2004) focused on four countries which are Austria, France, Germany, the USA and the UK as well as the new comer member countries which are Czech Republic, Hungary, Poland and Slovakia. Each country presented different data as per its availability. The monthly data for the period of December 1969 to December 2003 was used for Austria, France, Germany, UK and USA while for Poland it was from December 1993 to December 2003 and for the Czech Republic it was from December 1994 to December 2003. A number of testing techniques were employed such as cointegration analysis, vector error-correction model and Granger casualty test in order to find out the connection between exchange rate and stock prices. Stavarek's (2004) study came to a conclusion that for the first period of 1970 to 1992, there was no long run relationship. While for the period from 1993 to 2003, a significant casualty was found in old EU members and the USA, and this is believed to be due to their strong stock market and exchange rate development.

Liu and Sheath (2008) investigated the long run relationship between the Chinese stock market and a set of macroeconomic variables which include country's manufacturing or industrial prediction, exchange rate, inflation, money supply and interest rate. Findings of this study suggest that industrial prediction and money supply have a positive relationship with Chinese stock indices, while inflation, interest rate and exchange rate have a negative impact on stock prices. They recommended that the investors who want to invest in the Chinese stock market should invest for a long term horizon because in the start term the Chinese stock market is very volatile and risky.

Merikas and Merika (2006) tried to re-examine a hypothesis which suggests that the stock market has a negative impact on real economic activities in Germany. They collected data of 41 years from 1960 to 2000 and built the VAR model. They used CPI as the measure of inflation while real rate of return of DAX stock index was used as stock market returns. Their findings show that there is an inverse relationship between stock prices and the growth of employment in the country. The GDP growth rates also have a positive relationship with the stock market.

Flannery and Protopapadakis (2002) checked the impact of some macroeconomic factors on aggregate stock returns. They used 7 macroeconomics variable data starting from 1980 to 1996 and applied the GARCH model to find out the impact of these factors on realized returns as well as their volatility. After the analysis they found out that there are six variables in which three nominal variables (CPI, PPI and Monetary Aggregate) and three real variables (Employment

Report, Balance of Trade, and Housing prices), were considered as strong candidates for risk factors. From the three nominal variables, only money supply affects both the level of returns and the volatility; while the other two normal variables only affect the level of returns. On the other hand, all three real macroeconomic variables only affect the volatility of the returns.

Fang and Miller (2002) identified the effects of volatility in the Korean exchange market using the GARCH-M model from the 3rd of January 1997 to the 21st of December 2000 and they found out that the Korean foreign currency market impacts the stock market.

Ahmed and Iman (2007) investigated the relationship between stock market and different macroeconomic variables such as money supply. They analysed the monthly data series for the period from July 1997 to June 2005, of which the results show that there exists no long run relationship between the stock market index and macroeconomic variables, while the interest rate changes or T-bill growth rate may have some effect on the market return.

2.4. Research gap

Several conclusions can be drawn from this literature review. Various studies have shown the use of a wide range of macroeconomic variables to examine their influence on stock prices (returns). Also, given that previous studies have expressively improved our understanding of the relationships between capital markets and real economic activities, the findings from literature are mixed given that they differ with regards to the choice of countries, variable selection, and the time period. It is difficult to generalize the results because each market is unique in terms of its own regulation and type of investors.

The VAR framework VECM method, co-integration tests and Granger causality tests were commonly used to examine the relationship between stock prices and real economic activity. However, there is no definitive guideline for choosing the suitable model. There it is evident that there is a shortage of literature concerning emerging stock markets, but it is particularly lacking with regards to the Namibia Stock Exchange.

To the best of the present researcher's knowledge, few studies have been conducted in Namibia with regards to the relationship between macroeconomic factors and the Namibia Stock Exchange's performance. Therefore, this study, to the best of the researcher's knowledge, is among the first empirical studies which apply the multiple regression model to consider the relationships between the NSX's market growth and a set of macroeconomic variables which include interest rate, inflation rate, exchange rate, economic growth and foreign direct investment.

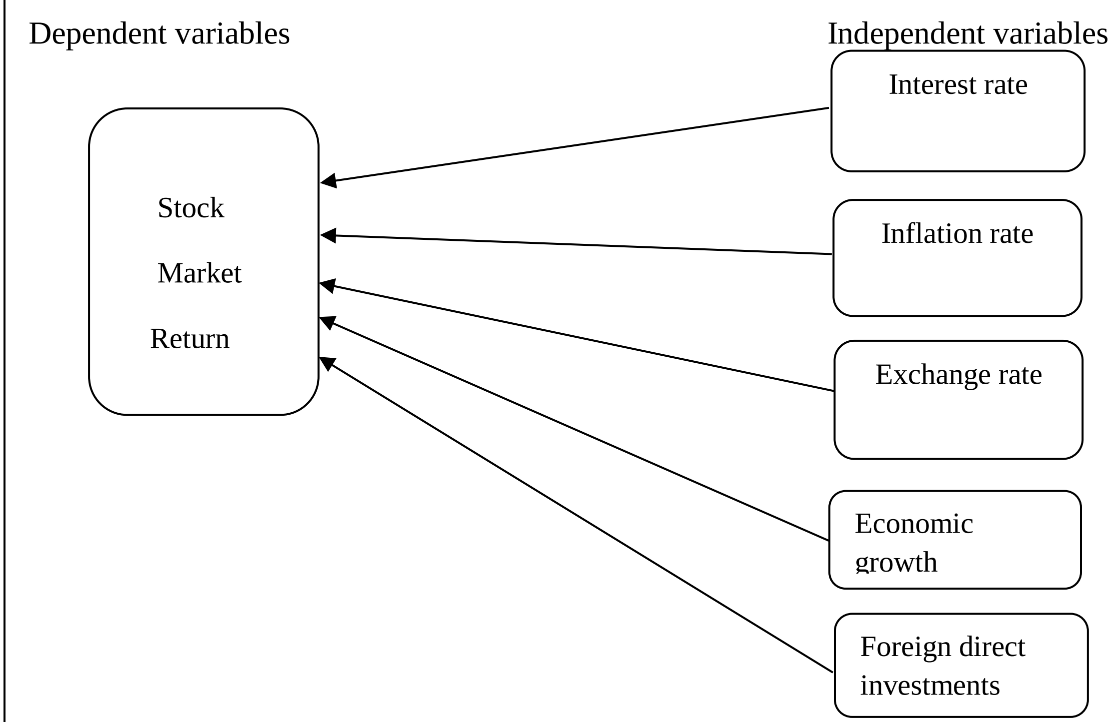
2.5. Conceptual framework

A conceptual framework is a diagrammatic presentation of variables, showing the relationship between the dependent and independent variables. The purpose of a conceptual framework is to help the reader to quickly see the proposed relationship between variables in the study (Mugenda & Mugenda, 2003). This study was based on the framework provided by the efficient market hypothesis as advanced by Fama (1970), and the arbitraged pricing theory suggested by Ross (1976).

The framework for this study is made up of selected macroeconomic variables namely; interest rate, inflation, exchange rate, GDP growth and foreign direct investments as independent variables, and the stock market return as the dependent variable. The conceptual framework below presents the relationship.

The research objective was to investigate the overall relationship between stock market return and each of the macroeconomic variables such as exchange rate, interest rate, inflation, economic growth and foreign direct investment during the period January 1997 to December 2016. The study focused on the locally listed stocks only.

Figure 2.1: Conceptual framework



Source: Talla, 2013, derived from literature review

The above conceptual framework shows the relationship between the dependent variables and independent variables. For each of the variables, the study proposes the following.

2.7.1. Relationship between interest rate and Stock Market Return

Interest rate volatility is of importance in asset pricing because of its influence to the discount rate. A negative relationship is generally expected between interest rates and stock prices. The higher the interest rate implies a higher discount factor and this inversely influences stock prices. On the other hand, the interest rate also affects stock prices through the effects on equity demand and corporate profitability. From the perspective of asset allocation, a high interest rate, representing the opportunity cost may influence investors to substitute equities in their portfolio with other financial assets, thereby decreasing the demand for stocks. In addition, rising interest rates impose greater financing costs on corporates, resulting in decreased profitability and depressed stock prices. Chen *et al.* (1986) provide empirical support for this hypothesized negative relationship.

In some of the stock markets, stocks are sensitive to interest rates. On the other hand, Titman and Warga (1989) reported that some studies have a direct relationship between stock returns and interest rates. The influence of interest rates on the bond market is direct; however, interest rates' level of response when it comes to stock returns have been varying and not direct (Park & Choi, 2011).

2.7.2. Relationship between inflation rate and Stock Market Return

It is generally observed that inflation and the performance of stocks have an inverse relationship (Fama, 1981; Chen *et al*., 1986). An increase in the expected inflation influences stock returns via its positive effects on interest rates. Moreover, in a competitive economy, inflation increases the production costs of a company, thereby decreasing its future cash flows and its share price (DeFina, 1991). The rate of inflation in an economy has a great impact on investors when they are faced with making decisions as to whether to make investments or not. The higher the level of inflation, the higher the cost of living, and it results in a shift of resources from investments to consumption.

Talla (2013) explains that the increase in inflation causes a fall in the demand for market instruments and consequently causes a decrease in the volume of stock traded. A negative relationship is thus anticipated between inflation and stock returns.

2.7.3. Relationship between exchange rate and Stock Market Return

A positive relationship between the exchange rate and NSX stock return is postulated in the present study. The appreciation of the Namibia Dollar results in a relative increase in the price of Namibian products in the world market. This decreases the demand for Namibian exports hence decreasing cash inflows into the country. Return of earnings will also be relatively uninviting to foreign portfolio investors who play a major role on the Namibia Stock Exchange, postulating a negative impact on the growth of the Namibia Stock Exchange. Conversely, the depreciation of the Namibia Dollar makes local goods cheaper for foreigners, leading to an increase in domestic exports, and larger capital inflows.

2.7.4. Relationship between GDP growth and Stock Market Return

GDP measures the total value of all goods and services produced by a country in a given year. Therefore, GDP growth represents an important indicator of economic performance. A positive relationship is assumed between GDP and stock return in that a higher level of output implies an increase in cash flows and corporate profitability, hence resulting in the appreciation of the overall stock market.

GDP is regarded as one of the significant determinants of stock market performance and it has often been used to measure the growth of real economic activity. Real per capita GDP is often used as a way of communicating average income, though it can also be used as a measure of the wealth of the population of a nation, particularly in comparison to other nations. Per capita income is often used to measure a country's standard of living.

2.7.5. Relationship between FDI and Stock Market Return

Foreign Direct Investment (FDI) is the investment from one country into another and this is in most cases done between companies rather than governments. The investments normally involve establishing operations or acquiring tangible assets. FDI has become a major source of capital in most nations' economies, especially developing countries where it bridges the gap of capital, technology, managerial skills and human capital formation, and it increases a competitive business environment. Errunza (1983) established the long-term influence of FDI inflows on the development of the domestic capital market and on the increase of investors' participation in the stock exchange market. Similarly, Yartey (2008) indicated that FDI promotes institutional and regulatory transformations which reassure greater confidence in the domestic capital market, which further increases the variety of investors and trading volume.

3. RESEARCH METHODS

3.1. Research design

This study employed the causal research design. Causal research is basically concerned with assessing cause and effect relationships among variables. It is based on the premise that if a statistically significant relationship exists between two variables, then it is possible to predict the dependent variable using the information available on the independent variables. The relationship or effect could be negative or positive. According to Kothari (2004), a causal research is used to explore the effect of one variable on another and this is consistent with the present study which sought to establish the effects of macroeconomic factors and stock market performance.

Moreover, this study is quantitative and its major purpose is to investigate the relationship between Namibia Stock Market returns and the five macroeconomic variables. The study applied the statistical technique of correlation to establish the relationship between the dependent and independent variables and cointegration in conjunction with Granger causality. Online data storage research was used since this data was gathered over a period of 20 years on an annual basis from the year 1996 to 2016.

The study investigated the relationship between macroeconomic variables and stock market returns using the NSX locally registered share index as a proxy to stock returns during the period from January 1996 to December 2016. The exchange rate was measured by the monthly changes in the weighted average of the domestic currency (the Namibian Dollar) per United States dollar

(US$). The Consumer Price Index (CPI) was applied as a proxy of inflation rate, and measured over time in the general price level of goods and services that households acquire for the purpose of consumption. The 91 day Treasury bill rate in Namibia was averaged to obtain the monthly changes in the 91 day treasury rate. The calculated monthly changes were obtained to represent changes in the interest rate. GDP growth represents an increase in the inflation adjusted market value of the goods and services produced by an economy and this is normally measured over a period of 12 months. It is usually measured as the percent rate of increase in real GDP. Foreign Direct Investment (FDI) is the investment between two countries flowing from one country into another that comprises launching operations or acquiring tangible assets, including stakes in other businesses. Specific macroeconomic variables were selected based on the international literature as well as their bearing towards economic fluctuation, thereby impacting the country's stock market performance.

3.2. Procedures and data analysis

The quantitative data collected was analysed using a number of statistical tests and procedures. The tests included stationarity test, Cointegration tests, Causality test and Vector error correction model (VECM). Data was presented by the use of descriptive statistics using tables as appropriately summarized. The data was processed using E-views for windows econometric package.

3.2.1. Multiple regression model

Multiple regression is a method of data analysis that is used to examine the significance relationship of a dependent variable to any other factors as independent variables (Berger, 2003).

3.2.2. Data, data sources and data measurements

To find the long run relationship between the variables, the researcher used multiple regression analysis. In this research, the researcher focused on secondary data. The dataset included observations on monthly intervals from 1996 to 2016 for a total of 249 observations.

Table 3.1: List of variables

Name of the variable	**Explanation**
NSX	NSX local index proxy for Namibia Stock Market Return
IR	Interest Rate
CPI	Consumer Price Index proxy for inflation
ER	Foreign Exchange Rate of Namibia Dollar per US$
FDI	Foreign Direct Investment
GDP	Gross Domestic Product

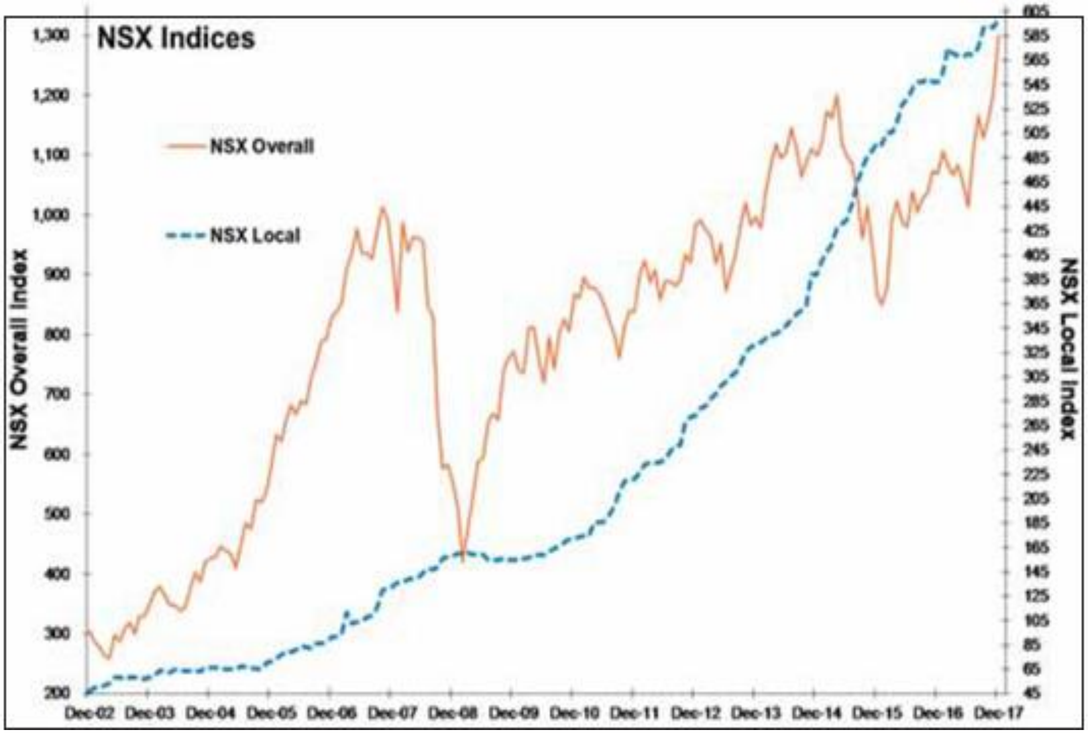
Data for the stock returns was collected on a monthly basis from the Namibia Stock Exchange (NSX) for the period of 20 years from 1996 to 2016. The data on macroeconomic factors was collected from the official database of the Namibia Statistical Agencies (NSA) and from the Bank of Namibia (BoN). In this study, six variables were used, namely; stock market return, interest rate, inflation, exchange rate and foreign direct investment, and GDP growth rate. The data for the NSX, interest rate, inflation and exchange rate were initially obtained from the source as originally compiled on a monthly frequency basis. FDI and GDP data were initially compiled and accessed on a quarterly frequency basis. E-views frequency conversion was used to convert FDI and GDP data from one frequency to another, which is moving from low to high frequencies (quarterly to monthly).

The following paragraphs discuss the definitions and the measurement units for the NSX returns and the macroeconomic variables.

Stock Market Exchange

There are two stock market indices under the Namibia Stock Exchange; the index for the locally registered companies and the overall index for the dually listed companies of which most companies are listed Johannesburg Stock Exchange (JSE). The local stock market is made up of an index of 42 companies listed on the NSX. The NSX local index is chosen by the researcher to represent an entire stock market and thus track the market changes over time. Therefore, in this study, the researcher took the NSX local index only to track the changes in the market over time (with respect to other macroeconomic variables). The local index was chosen due to its stability and the improbability of influences from outside forces. As depicted by figure 3.1, the NSX local has been steadily rising with little or no volatility throughout the years. On the other hand, the average correlation of the NSX overall indices was in most cases higher than the local indices. The NSX overall indices further show a greater increase in return as well as volatility when compared to the NSX local. This could be interpreted as evidence of global shocks and financial turmoil, especially for the years from 2007 to 2012.

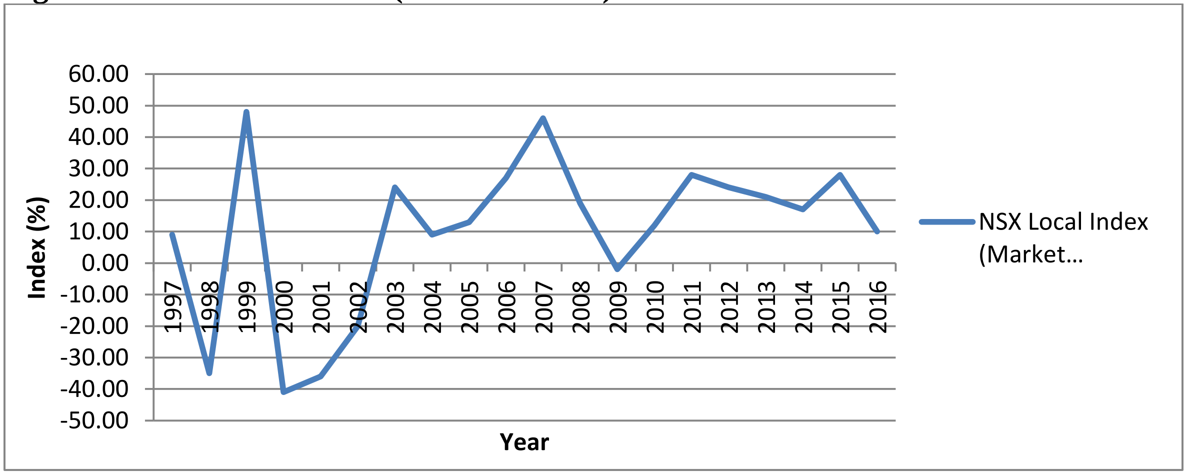
Figure 3.1.: Summary of trading results of the NSX local and NSX overall



Source: NSX 2017 annual report

The data for the NSX is available both in annual and monthly frequency but for this study monthly data was used and the data was taken from the official website of the Namibia Stock Exchange.

Figure 3.2: NSX local Index (Market return)



Interest rate

The interest rate is typically determined by the supply and demand money. It is also determined by the monetary policy of a country on the country's economic situation. The money market rate is considered as a proxy for interest rate. The money market is used by participants as a means of borrowing and lending in the short term, from several days to just under a year. When the interest rate increases, stock prices decrease, which results in the rising of the opportunity cost of holding money, affecting the substitution of stocks for interest bearing securities. The interest rate is one of the important macroeconomic variables and it is directly correlated to economic growth. From the point of view of the borrower, the interest rate is the cost of borrowing money while from a lender's point of view; interest rate is the gain from lending money (Talla, 2013).

Inflation rate

Consumer Price Index (CPI) is a principle measure of price variations at retail level and it shows the cost of purchasing goods and services consumed by private households. CPI is a proxy of inflation because the annual percentage changes in a CPI act as inflation. Inflation can also be described as a decline in the real value of money, a loss of purchasing power in the medium of exchange, which is also the monetary unit of account. When the general price level rises, each unit of current buys lower goods and services (Talla, 2013).

Exchange rate

The exchange rate is the value of one country's currency in exchange for another country's currency. The exchange rate in this research is expressed as Namibian Dollar per one US dollar (USD). Exchange rate movements frequently focus on changes in credit market conditions, reflected by changes in interest rate differentials across countries and changes in the monetary policies of central banks (Talla, 2013). Chen *et al*. (1986) clarify that economic forces influence discount rates, the ability of firms to generate cash flows, and future dividend payouts, provided the basis for the belief that a long-term equilibrium existed between stock prices and macroeconomic variables.

Economic growth

Gross Domestic Product (GDP) represents economic growth and economic growth is the increase in the inflation-adjusted market value of the goods and services produced by an economy over time. It is usually measured as the percent rate of increase in real GDP. GDP is regarded as one of the important determinants of stock market performance and it has often been used to measure the growth of real economic activity.

Foreign Direct Investment (FDI)

Foreign Direct Investment is the investment from one country into another. Investments are normally transferred between governments and/ or companies that involve establishing operations or acquiring tangible assets, including stakes in other businesses. In the era of globalisation, FDI is a major source of capital in most developing economies where it bridges the gap of capital, technology, managerial skills, human capital formation and a more competitive business environment (World Bank, 2012).

3.2.3. Economic function

After identifying the above variables, we can describe the stock market performance function of Namibia in the following way:

NSX = f (IR, CPI, ER, GDP, FDI)

Where NSX is the return on stock market index, f represents the function of IR, CPI, ER, GDP and FDI. In full, this reads as, interest rate, inflation, exchange rate, GDP growth rate and foreign direct investment.

3.2.4. Economic model

After specifying the return on stock market function in linear form, with an addition of error term, the regression equation is rewritten in the following way:

$$NSX = \alpha + \beta 1\ IR + \beta 2\ CPI + \beta 3\ ER + \beta 4\ GDP + \beta 5\ FDI$$

This study was based on the following hypothesis that clearly defines the study criterion.

H1: Interest rate has no significant impact on Return on Stock Market Performance

H2: Inflation has no significant impact on Return on Stock Market Performance

H3: Exchange Rate has no significant impact on Return on Stock Market Performance

H4: GDP growth rate has no significant impact on Return on Stock Market Performance

H5: Foreign Direct Investment has no significant impact on Return on Stock Market Performance

3.2.5. Unit root test (Stationary test)

Unit root tests are aimed at establishing the order of integration of each variable. For the researcher to investigate the effects of the several macroeconomic factors on NSX stock return, the first step was to analyse the stationary properties of each variable by applying the unit root. Stationarity can be defined as one with a constant mean, constant variance and constant autocovariances for each given lag. The stronger the stationarity was the best for this study because it would not lead to spurious regressions. To check the stationarity of each variable, this study used unit root test by Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test (Gan et el., 2006).

3.2.6. Johansen Cointegration Tests (Bound test)

Once the order of the integration is established for each variable, the study will proceed to evaluate the cointegration properties of the data series. The Johansen and Juselius (1990) cointegration test was used to ascertain whether the linear combination of the series possesses any equilibrium relationship. Moreover, Johansen's co-integration test explained the relationship between dependent variables and independent variables in the short run or long run period (Ali & Rehman, 2010). It can be stated that a set of variables is said to be cointegrated if the variables are individually non-stationary and integrated of the same order, yet their linear combination is stationary (Ibrahim, 2000). In addition, the notion of cointegration means that both dependent and independent variables change strictly in the same direction in the long run (Azizan & Sulong, 2011).

3.2.7. Error Correction Model (ECM)

Once the cointegrating relationship between dependent and independent variables has been defined in the cointegration test, the next step is to proceed with the estimation of the error correction model. Gujarati (2003), states that variables could be cointegrated or have equilibrium in the long run, however, the log run equilibrium does not necessary mean the short run is also in equilibrium. The error correction process allows correction of disequilibrium in one short run period to be corrected in the next period. It also means that the change in dependent variables relates to the past period disequilibria. Thus, a general equation for ECM is expressed as follows:

$$\mathit{\Delta} Y_t = \propto_0 + \propto_1 \Delta X_t - \propto_2 \hat{u}_{t-1} + \varepsilon_t$$

where α_1 denotes short run elasticity on the change in X_t and thus affects Y_t, which is the one-period lagged value of error correction term with its coefficient, α_2 which denotes the speed of adjustment to long run equilibrium and is the random error term (Gujarati, 2003; Frimpong, 2009).

3.2.8. Granger Causality Tests

In 1969, Clive Granger came up with the Granger Causality method so that we can arrive at causality between two time series and also to test whether one time series is useful in predicting another (Harasheh & Abu-Libdeh, 2011). Granger Causality test is used to test the short run relationship between dependent and independent variables. In this method, the methodology is sensitive to lag length used in order to investigate the stationary property of data.

Granger proposed the examination of the relationship that exists between variables, and they can also be used to predict each other (Ali *et al.*, 2010). Granger causality test was also used by Kutty (2010) in the context of the macroeconomic determinants of stock return in Mexico.

3.2.9. Impulse Response Function

The impulse responses are estimated by regressing the series of interest on estimated innovations, which are the residuals gotten from a prior stage 'long auto regression' (Chang & Sakata, 2007). This specific methodology avoids typical orthogonal and ordering problems which would be hardly feasible in the case of highly interrelated financial time series observed at high frequencies (Panapoulou & Pantelidis, 2009).

It acts as an econometric technique which has been employed to investigate the short-run impact caused by the vector auto regression model when it received some impulses. These approaches also provide a system consistent solution for multivariate linear autoregressive models with time varying second moments (Elder, 2003).

3.2.10. Conclusion

In summary, there are five macroeconomic variables that are namely; interest rate, inflation, exchange rate, economic growth, and foreign direct investment, that were used to test the relationship with stock returns of the NSX. All the five variables and stock returns were collected from the official database of the NSX, NSA and the BoN. The five macroeconomic variables were empirically tested to explore the different relationships with stock returns. The following tests were run in this study; Unit Root test, Johansen Cointegration tests, Granger Causality test, Variance Decomposition and Impulse Response Function. Different tests have different purposes in testing the relationship. All these tests investigated the different relationship between the five macroeconomic variables and NSX stock return. The empirical results are discussed in the next chapter.

3.3. Research ethics

The researcher obtained data from secondary sources which are the official websites of the NSX, NSA as well as BoN website. These institutions are mandated to publish these data. As a result, the researcher uses this data only for the purpose of this study.

4. RESULTS

In this chapter, the researcher interprets the analyses the results based on the research methodology as discussed in the previous chapter. In addition, the researcher also explores and explains the relationship between the dependent variable (NSX) and the independent variables (IR, CPI, ER, GDP, FDI). The results are obtained from the research methodology approaches which include; unit root test, cointegration test, error correction model (ECM), Granger Causality Tests and Impulse Response Function. All the stated econometric tests are run and done by the E-views application. The chapter concludes with a summary of the empirical results.

4.1. Unit Root test

Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test are applied to examine the stationarity of each time series data by using E-view software. In this case, both intercept and intercept plus time trend are tested for the level, first and second difference in both ADF and PP tests. The results of ADF and PP test are presented in Table 4.1

Table 4.1.: Unit root tests: ADF and PP in levels, first difference and second difference

Variable	Model Specification	ADF	PP	ADF	PP	ADF	PP	
		Levels	Levels	First Difference		Second Difference		Order of Integration
NSX	Intercept	3.32	0.88	-3.18**	-18.31**	-21.48**	-208.61**	I(1)
	Intercept and Trend	1.85	-1.05	-5.74**	-21.00**	-21.43**	-210.64**	I(1)
IR	Intercept	-2.10	-1.86	-6.30**	-12.94**	-32.07**	-58.88**	I(1)
	Intercept and trend	-2.88	-2.16	-6.33**	-12.95**	-32.01**	-58.76**	I(1)
CPI	Intercept	-2.05	-2.69	-7.22**	-15.76**	-7.52**	-83.58**	I(1)
	Intercept and trend	-2.15	-3.00	-7.21**	-15.74**	-7.51**	-83.63**	I(1)

ER	**Intercept**	-0.95	-0.87	-12.05**	-12.02**	-10.81**	-60.94**	I(1)
	Intercept and Trend	-1.81	-1.71	-12.4**	-11.99**	-10.78**	-60.77**	I(1)
FDI	**Intercept**	-1.78	-6.24**	-10.45**	-70.04**	-9.48**	-91.74**	I(0)
	Intercept and Trend	-2.52	-6.19**	-10.49**	-69.33**	-9.44**	-91.50**	I(0)
GDP	**Intercept**	-0.49	-0.32	-12.89**	-21.27**	-12.69**	-109.39**	I(1)
	Intercept and Trend	-3.88**	-4.81**	-12.86**	-21.20**	-12.67**	-109.21**	I(0)

Source: authors' compilation and estimated values obtained from EViews
*Notes: * and ** indicates the rejection of the null hypothesis at 5% and 10% respectively.*

Analytically, the results obtained from the Table 4.1 show that about half of the series in intercept and intercept and trend at level form appears with the presence of unit root, or the series data are non-stationary data at 5% or 10% significant level but they are stationary after first differencing. Similarly, the other half of the tests indicate that the selected variables are I(0), that is, these variables are stationary in level. Thus, all of the series have to test for the first differencing in order to obtain stationary. Based on the results of the first differencing in ADF and PP test, all series reject the null hypothesis. This concludes that all series, namely, return on stock market (NSX), Interest rate (IR), Inflation (CPI), exchange rate (ER), economic growth (GDP) and foreign direct investment (FDI) are considered integrated of order one, I (1).

4.2. Johansen Cointegration Tests

The Johansen approach to testing for cointegration is highly sensitive to the number of lags in the model. This study determined the appropriate lag length in the systematic manner outlined in the various literatures. The appropriate lag length for the VAR model is that which minimizes the Final prediction error (FPE), Schwarz information criterion (SC), Hannan-Quinn information criterion (HQ), and Akaike information criteria (AIC). The results of the lag order selection criteria are displayed in Appendix D. The appropriate lag length for the cointegration test is 2.

Once the order of the integration is established for each variable, this study proceeded to evaluate the cointegration properties of the data series. Hence, the next step involved estimating and determining the number of long run relationships in the model. The long run relationships among variables are determined by examining the Johansen Cointegration test. The results of the Johansen Cointegration test are shown in Table 4.2 below.

Table 4.2: Johansen Cointegration Test Results (Trace & Maximum Eigen-value)

Trace test				**Maximum Eigenvalue Test**			
Hypothesized No. of CE(s)	**Trace Statistic**	**0.05 Critical Value**	**Prob.****	**Hypothesized No. of CE(s)**	**Max-Eigen Statistic**	**0.05 Critical Value**	**Prob.****
None*	160.3188	95.75366	0.0000	None*	97.64351	40.07757	0.0000
At most 1	62.67533	69.81889	0.1626	At most 1*	35.27107	33.87687	0.0339
At most 2	27.40426	47.85613	0.8385	At most 2	13.45626	27.58434	0.8582
At most 3	13.94800	29.79707	0.8435	At most 3	8.519168	21.13162	0.8692
At most 4	5.428830	15.49471	0.7617	At most 4	5.428070	14.26460	0.6871
At most 5	0.000761	3.841466	0.9788	At most 5	0.000761	3.841466	0.9788

Source: Authors' compilation and estimated values obtained from EViews
** denotes rejection of the null hypothesis (no cointegration) at the 5% level.*

Table 4.2 above shows the results of the cointegration test. Both trace and maximum eigenvalue tests reject null hypothesis of no cointegration at five percent confidence level. This rejection implies that there exists a long run relationship between the macroeconomic variables. Trace test indicates one cointegrating equation at 5% level, while Maximum Eigen-Value test indicates two cointegrating equations at 5% level.

(Gan et el., 2006). The inference is based on the evidence that the calculated value of Trace and maximum Eigenvalue statistics should be larger than their critical value at significant level of 5% (Rahman & Mustafa, 2008). The Trace test proposes two major contentions. Firstly, the selected macroeconomic variables move together in the long run, while short term deviations move towards equilibrium. Secondly cointegration accurately indicates causality in at most two directions.

4.3. Vector Error Correction Model (VECM)

The above unit root tests and the cointegration test results indicate that the dynamic modelling of market stock returns and macroeconomic variables have a valid error correction representation. Given the presence of cointegration or therefore long run relationship between the macroeconomic variables, the Vector Error Correction model (VECM) is to be applied. The VECM estimates provide important information about the short run relationship between stock return and macroeconomic variables, while a negative and significant error correction term signifies the speed of adjustment to the long run equilibrium level.

The long run and short run results of the vector error correction model are presented in Table 4.3 below. The analysis was guided by the regression equation specified below.

$NSX = \alpha + \beta 1\ IR + \beta 2\ CPI + \beta 3\ ER + \beta 4\ GDP + \beta 5\ FDI + \varepsilon\_t$

The principle behind this model is that there often exists a long run equilibrium relationship between two economic variables. In the short run, however, there may be disequilibrium. The error correction process is thus a means to reconcile short run and long run behaviour.

Table 4.3: Error Correction Model for Return on Stock Market

	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.015187	0.062168	-5.888027	0.0000
D(NSX(-1))	-0.058400	0.064983	-0.898701	0.3697
D(NSX(-2))	-0.104507	0.065420	-1.597476	0.1115
D(IR(-1))	2.186283	3.769794	0.579948	0.5625
D(IR(-2))	0.344092	3.688673	0.093283	0.9258
D(CPI(-1))	-1.775672	2.269353	-0.782457	0.4347
D(CPI(-2))	-1.527656	2.256676	-0.676950	0.4991
D(ER(-1))	-2.002666	4.555763	-0.439590	0.6606
D(ER(-2))	0.253674	4.621252	0.054893	0.9563
D(FDI(-1))	-0.002857	0.001359	-2.102152	0.0366
D(FDI(-2))	-0.002965	0.001361	-2.179203	0.0303
D(GDP(-1))	3.88E-05	0.002084	0.018607	0.9852
D(GDP(-2))	0.000113	0.002094	0.054012	0.9570

R-squared	0.076613	**Mean dependent var**	1.379880
Adjusted R-squared	0.025532	**S.D. dependent var**	22.42749
S.E. of regression	22.13933	**Akaike info criterion**	9.087171
Sum squared resid	115185.3	**Schwarz criterion**	9.284939
Log likelihood	-1117.353	**Hannan-Quinn criter.**	9.166776
F-statistic	1.499825	**Durbin-Watson stat**	1.985522
Prob(F-statistic)	0.118100		

Source: authors' compilation and estimated values obtained from EViews
**Denotes significance at the 5 % level*
***Denotes significance at the 10 % level*

The table above reports the results of the VECM. The sign and coefficient of ECM explain the direction and the speed of adjustment in the long run equilibrium (Frimpong, 2009). Based on the results, ECM is negative hence there is long run relationship between the macroeconomic variables and the stock market return. The ECM also shows that it is significant at 5% and 10% level, indicating the importance of a long run relationship between NSX return and the macroeconomic variables. It also implies that the systems have the tendency to come back to their long run relationship. Frimpong (2009) explains that a negative sign means that the deviation of model from long run relation can be corrected by an increase in the dependent variable.

The ECM results show that interest rate, exchange rate lag 2 and GDP have a positive long run result to the NSX return, while the rest of the variables including exchange rate first lag have a negative long run consequence towards the NSX return. Of all listed macroeconomic variables, only FDI significantly affects the NSX in the long run at 5% and 10% level.

Moreover, R^2 means how much independent variables can jointly influence the dependent variable. The R^2 value of 0.34 indicates that about thirty four per cent of the variation in stock market return is explained by interest rate, inflation, exchange rate, foreign direct investments and economic growth. The remaining 66 per cent is explained by other independent factors which are not here. F statistics talks about joint hypothesis of independent variables that means whether independent variables jointly influence dependent variables or not.

The F value of 2.7 and corresponding probability value is statistically significant at 1 per cent level of significance. Here p value is 0.0043 percent which is higher than 5 percent, so interest rate, inflation, exchange rate, foreign direct investments and economic growth jointly do not influence the stock market return. This shows that the developed model is valid and that these five variables have an effect on the performance of the stock market in Namibia.

The Durbin-Watson test for autocorrelation is a statistic that indicates the probability that the deviation (error) values for the regression have a first order autoregression component. The regression models assume that the error deviations are uncorrelated. Durbin Watson statistics show that the model does not have an autocorrelation problem (DW = 2.2).

4.4. Granger Causality Tests

This study applied the Granger causality test which is proposed by C. J. Granger, which states that if the causal relationship exists between variables, they can be used to predict each other (Ali et al., 2010). Thus, the results from the Granger causality tests are given in Table 4.4 as shown below.

Table 4.4: Short- term Granger Causality Tests Results

Dependent Variable: **NSX**		
Independent Variable	**P-Value**	**Result**
IR (Interest rate)	0.8240	Insignificant
CPI (Inflation)	0.5884	Insignificant
ER (Exchange rate)	0.9067	Insignificant
FDI(Foreign direct investments)	0.0252	Significant
GDP (Economic growth)	0.9984	Insignificant

*Note: **Significant at 5% significant level*
**Significant at 10% significant level*

4.4.1. Interest Rate (IR)

Hypothesis:

H_o: Changes in the interest rate have no effect on stock market returns in Namibia

H_1: Changes in the interest rate have an effect on stock market returns in Namibia

From the Table 4.4, the result shows that the NSX is not affected by IR in the short run. This is because the p-value of IR (0.8240) is not significant at both 5% and 10% of significance level, and this means that interest rate does not have any Granger cause impact on the NSX. Thus, this paper tends not to reject H_o and there is no relationship between both the NSX and interest rate for the period under study. These results are supported by previous researchers like Adarmola (2012) and MacFarlane (2011). Even though there is no Granger relationship with the NSX return, the other tests have proven a bilateral relationship. Therefore IR might indirectly cause the NSX return to move.

4.4.2. Inflation/Consumer Price Index (CPI)

Hypothesis:

H_o: Changes in inflation rate as measured by the Consumer Price Index have no effect on stock market returns in Namibia

H_1: Changes in inflation rate as measured by the Consumer Price Index have an effect on stock market returns in Namibia

The results show that a P-value of CPI is 0.5884 which is not significant at 5% and 10% significance level. The Granger causality test with respect to stock return and inflation is presented in Table 4.4. From the results presented, the null hypothesis, which indicates that inflation does not Granger-cause stock return is accepted and concludes that inflation does not Granger-cause stock return. As a result, it can be inferred from the result that the inflation cannot be seen as one of the leading indicators that may influence or help in estimating the stock returns.

4.4.3. Exchange rate (ER)

Hypothesis:

H_o: Changes in the exchange rate have no effect on stock market returns in Namibia

H_1: Changes in the exchange rate have an effect on stock market returns in Namibia

Due to globalisation, capital has greatly moved across the globe as a result of trade hence the exchange rate becomes a key determinant of business profitability and equity prices. Against this backdrop, the study examined how the exchange rate impacts the performance of the stock index. From Table 4.4 above, the p-value for ER is 0.9067 which is larger than 5% and 10% significant level. The table provides the results of the Granger causality test between stock return and exchange rate. It can be inferred from the results that the null hypothesis which indicated no Granger causality between exchange rate and stock return is not rejected. This implies that exchange rate does not Granger cause stock return in Namibia.

4.4.4. Foreign Direct Investment (FDI)

Hypothesis:

H_o: Changes in the foreign direct investment have no effect on stock market returns in Namibia

H_1: Changes in the foreign direct investment have an effect on stock market returns in Namibia

The test shows the P-value for FDI equal to 0.0252 which is significant at 5% and 10% significance level and also shows that FDI affects NSX in the short run. Thus, the finding rejects the H_o and therefore there is a Granger cause relationship between FDI and NSX return in the short run.

4.4.5. Gross Domestic Product (GDP) growth

Hypothesis:

H_o: Changes in the economic growth rate have no effect on stock market returns in Namibia

H_1: Changes in the economic growth rate have an effect on stock market returns in Namibia

Similar to FDI, the test for GDP shows the P-value equal to 0.09984 which is not significant at 5% and 10% significance level. We therefore fail to reject H_o and conclude that there is no Granger cause relationship between GDP and NSX return in the short run. Even though there is no Granger relationship with NSX return, the other tests have proven a bilateral relationship. Therefore GDP might indirectly cause the NSX return to move. But, the results from this paper show that there is no Granger causality relationship between GDP and the NSX return.

After testing five macroeconomic independent variables, namely, IR, CPI, ER, FDI and GDP in this study, only one of the variables (FDI) was found to be of importance in Granger causing the NSX return in the study period.

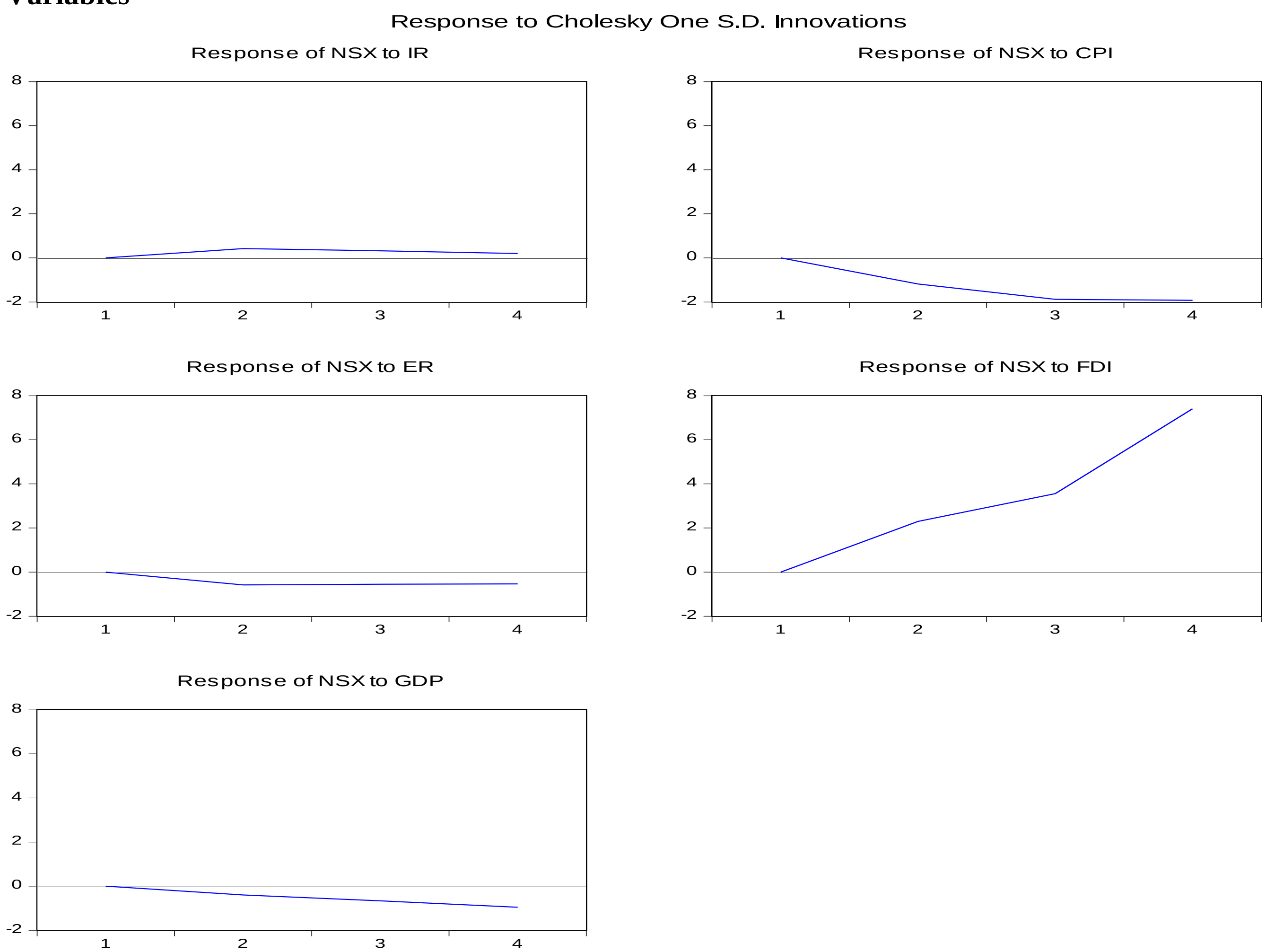
4.5. Impulse Response Function

This section addresses how the variables interact in the short-run (one year) by analysing the impulse response functions of the return on the stock market. An impulse response function (IRF) traces the response of the stock market to a one-time positive standard deviation shock in the economic variables. This provides insights on the sign, speed and persistence of the Namibian stock market's short-run movement to innovations in the variables.

Figure 4.5 below illustrates the responses of the NSX to a one-time standard deviation shock on all economic variables over four quarters. It is evident that the stock market reacts primarily to shocks in all macroeconomic variables, namely; IR, ER, FDI, GDP and CPI.

The IRF indicates that interest rate and FDI have an initial positive shock on the stock market returns. The NSX's reaction to the rest of the macroeconomic variables is completely in the opposite direction with an initial negative shock on the stock market. The response of the NSX to an innovation in foreign direct investment is of a quite bigger magnitude that is dissimilar in comparison to other variables that are of a smaller magnitude.

Figure 4.5.: Impulse Response Function of NSX to Shocks in System Macroeconomic Variables



4.6. Conclusion

In conclusion, this chapter interpreted the outputs from the various econometric techniques such as unit root test, Johansen cointegration test, Error Correction Model (ECM), Granger causality test as well as the impulse response function. The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) test examined the stationary of the series data and resulting from that, all series data is integrated of order one, I(1). The Johansen Cointegration test showed the existence of three cointegrating vectors that describe the relationship between the dependent variable, NSX and the independent variables, namely IR, CPI, ER, FDI and GDP.

In addition, the results of the ECM test which was used to examine the relationship between dependent and independent variables was shown in this chapter. The ECM result indicated the existence of a long run relationship for the equation of market return as the dependent variable and the macroeconomic variables. Only FDI showed significant Granger causality to the NSX return. The results of impulse response function showed that only interest rate and FDI have positive innovative shocks and the other three have negative innovative shocks towards the stock market return. Lastly, a general discussion and conclusion are drawn in the following chapters.

5. DISCUSSIONS

The empirical results of this study indicate that in the long-run, the NSX has a positive relationship with interest rate, exchange rate second lag as well the GDP. The study also revealed a negative long run relationship with inflation, exchange rate first lag and FDI. This result agrees with Adarmola (2012), who found out that inflation and exchange rate relate with the stock return in the long run. This result shows that for the stock index to be improved in the long term, these macroeconomic variables should be stabilized and improved.

Although insignificant, the results indicate the existence of a positive long-run relationship between interest rate and the NSX return. This finding contradicts the commonly hypothesised negative relation postulated by most financial analysts. A negative relationship is expected between interest rates and stock prices. A higher interest rate implies a higher discount factor and this inversely influences stock prices. It is based on the view that a decrease in interest rates will result in higher future profits, and thus higher stock prices as borrowing costs of firms will decrease. Additionally, lower interest rates encourage the transfer of capital from the bond market to the equity market, resulting in an increased demand for stocks and consequently, increased stock prices. These predictions are almost certain when shocks to interest rates are observed in isolation. However, if interest rates decline at a time when there is reduced demand for firms' products, sales may decline and the aggregate effects on stock prices can become more difficult to predict; and depending on the effects of lower borrowing costs and reduced sales, future profits may decrease, thus causing stock prices to decline. Furthermore, lower interest rates do not necessarily result in greater future profits unless total costs decline; and the possibility of a simultaneous increase in other input costs is real and in such a case, total costs may increase.

While the NSX returns and interest rate are positively related in the long-run, it is important to note that in the short-run this Granger causal relation is not displayed. The difference in the effects of interest rate changes in the short-run and long-run represents a possible area for further research.

Empirical analysis depicts that inflation indicates a negative long run relationship. Furthermore, the study carried out Granger causality tests to determine the short run causal relationship between inflation rate and Namibia stock market return. This study established that in the short run, changes in inflation do not influence stock market volatility in Namibia. This implies that inflation does not Granger cause stock market volatility in the short-run in Namibia.

The negative relationship between inflation and the NSX is in line with the theoretical assertion which implies that an investment on the stock market is not an effective hedge against inflation.

The negative relationship between the NSX and inflation is not surprising because inflation reduces the real disposable income of individuals and consequently reducing investors' ability to save and invest. Hence, in theory, inflation and stock returns are expected to have a negative relationship. The finding is also in agreement with the findings of Ray and Vani (2003) who found that stock return and inflation are negatively related in the short run.

Findings from the study established that there is a twofold long run relationship between stock market returns and a change in the exchange rate. The exchange rate in the first lag displays a negative relationship while the second lag displays a positive relationship. In addition, the Granger causality test result settles that exchange rate does not influence stock market volatility. The study established that, in the short run, changes in exchange rate do not explain stock market volatility in Namibia. From this finding, the study concludes that exchange rate does not Granger cause stock market volatility in Namibia and therefore does not improve the forecast of stock market returns. The result of this study is supported by Ayoola (2012), who did a similar study using exchange rate and found that it does not significantly influence the stock return at the stock market. The relationship between exchange rate and stock market volatility was also found to be insignificant. This means that exchange rate appreciation or depreciation does not influence stock market returns in Namibia in the short run.

GDP growth is a popular measure used to gauge the health of an economy. Strong GDP growth therefore encourages investors to commit more of their capital to the stock market in an attempt to realize greater stock returns. Indeed, many investors believe that stock indices move in the same direction as the real economy. While counterclaims to this sentiment exist, the existence of the sentiment itself plays an influential role in the level of money that is invested in the stock market at a given time. The result is supportive of the findings of Eita (2012) whose findings concluded that the rise in economic activities similarly causes an increase in stock market prices.

A causality test indicates that in the short run, the GDP does not explain variations in stock market volatility in Namibia. This means that the GDP does not Granger cause stock market volatility in NSX returns. It also implies that the GDP cannot be used to predict stock market volatility in Namibia. However, the results from the impulse response analysis confirm that the GDP growth does have a negative impact towards the NSX in Namibia in the short run.

A higher level of output implies an increase in cash flows and corporate profitability, hence resulting in the appreciation of the overall stock market. The positive relationship between the NSX returns and GDP growth is consistent with economic theory and most international studies. But the GDP growth in the second lag as well as the direction of causality remains debatable. In either scenario, the linkages are simple and intuitive. It can be argued that the GDP affects the future cash flows of the firm and through this transmission, the GDP leads to stock returns. However, assuming markets are efficient; the stock market should contain information on future economic output, not the other way around.

Errunza (1983) established the long-term influence of FDI inflows on the development of the domestic capital market and on the increase of investors' participation in stock exchange market. Therefore, theoretically, the more FDI flows inwards, the more prospective investment opportunities the host country brings. The empirical results show that there is a negative long term connection between FDI and Namibia stock market return. Findings from the causality test indicate that in the short run, the FDI is significant in explaining variations in stock market volatility in Namibia. This means that the FDI inversely Granger cause volatility in the NSX returns. The results from the impulse response analysis indicate that FDI does have a positive impact towards the NSX in Namibia.

6. CONCLUSIONS

Despite the extensive literature on the relationship between economic factors and stock market returns, few studies have tested this relationship in Namibia. Similar to this study, a research conducted by Heita (2012) utilized the VECM which represents the standard and more appropriate technique for examining cointegration among macroeconomic variables. The VECM enables the analysis of long-run relationships as well as short-run adjustment processes between non-stationary variables. This study too performed an empirical analysis on the long-run and short run equilibrium relationship between economic factors and the NSX using the cointegration procedure outlined by Johansen (1991).

Following the principles of Chen et al. (1986), economic factors were pre-selected. The results of the cointegration analysis and VECM are in conformity with the prevailing literature; using monthly data between 1996 and 2016, it was found that a long-run relationship exists between these variables and the Namibian stock market. The coefficients of the long-run parameter produced by the VECM indicated a long run relationship between the NSX and interest, inflation, exchange rate, foreign direct investment and GDP growth. The relationship between the NSX return and the GDP as well as inflation fits well with existing literature; however, the remaining relationships oppose conventional theories.

The short run dynamic system was analysed by examining the Granger causality of variables and the IRFs of the NSX. One of the independent variables is that FDI Granger causes the NSX. The IRFs results suggest that in the short-run, the NSX responds each quarter to one-time standard deviation innovations in interest rate, inflation, exchange rate, FDI and GDP. The most influential factor in each quarter appears to be FDI. The results of this study can be comparable with the findings of Eita (2012) whose finding concluded a long run relationship of macroeconomic variables towards stock prices, which implies that the changes in economic activity similarly cause changes in stock market performance. The existence of cointegration reported in this study goes along with Fama's (1981) hypothesis that stock returns are grounded in macroeconomic fundamentals. This result has important implications on the applicability of asset pricing models in Namibia. Specifically, the study is in support of the multifactor APT as opposed to CAPM, identifying interest rate, exchange rate, FDI and GDP as priced risk factors. However, given the moderate R-squared of the VECM, there may be other macroeconomic variables of statistical significance that still remain unidentified.

7. RECOMMENDATIONS

In this study, the following independent variables were used; IR, CPI, ER, FDI and GDP. Therefore, it is recommended that future researchers implement other macroeconomic variables in their research in order to investigate the effects of the macroeconomic variables on the variation of stock market returns.

Based on the abovementioned findings, three recommendations are made for further research:

1. The relationship between the NSX and global economic factors should be analysed as markets are becoming more integrated.
2. Researchers may examine the effects of qualitative variables (such as political events, changing legislation and economic agreements) on the NSX as these are likely to affect investors' sentiments.
3. It would be interesting to test for the existence of disproportionateness in the way different stock portfolios react to the same economic variables.
4. The findings of the thesis can be used to predicting the relationship between macroeconomic variables and NSX. It can also be used by investors to craft trading rules based on structural relationships, which should improve profits in the long-term.

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9. APPENDICES

APPENDIX A: TIME SERIES DATA

period	interest rate	exchange rate	NSX	CPI	FDI	GDP
Jan-96	17.50	3.64	150.65	7.21	1086.00	7255.60
Feb-96	17.50	3.74	150.07	7.69	1086.00	7255.60
Mar-96	17.50	3.93	152.29	7.96	1086.00	7255.60
Apr-96	17.50	4.21	154.04	7.86	1419.00	7574.05
May-96	17.50	4.37	155.84	7.84	1419.00	7574.05
Jun-96	17.50	4.35	168.11	8.04	1419.00	7574.05
Jul-96	17.50	4.39	169.81	7.47	1559.00	7560.30
Aug-96	17.50	4.52	164.58	8.12	1559.00	7560.30
Sep-96	17.50	4.50	132.23	8.27	1559.00	7560.30
Oct-96	17.50	4.57	129.09	8.45	1742.00	7647.36
Nov-96	17.75	4.66	124.91	8.64	1742.00	7647.36
Dec-96	17.75	4.68	91.04	8.45	1742.00	7647.36
Jan-97	17.75	4.64	164.21	9.95	2386.00	7729.83
Feb-97	17.75	4.45	163.33	9.51	2386.00	7729.83
Mar-97	17.75	4.44	164.59	9.98	2386.00	7729.83
Apr-97	17.75	4.44	166.88	9.85	1609.00	7624.45
May-97	17.75	4.47	159.38	10.31	1609.00	7624.45
Jun-97	17.75	4.50	165.28	9.49	1609.00	7624.45
Jul-97	17.75	4.56	173.32	9.30	3466.00	7972.68
Aug-97	17.75	4.68	166.88	8.77	3466.00	7972.68
Sep-97	17.75	4.69	165.12	7.86	3466.00	7972.68
Oct-97	16.00	4.71	165.27	7.37	671.00	7977.26
Nov-97	16.00	4.84	155.65	6.97	671.00	7977.26

Dec-97	16.00	4.87	161.52	6.87	671.00	7977.26
Jan-98	16.00	4.94	106.00	5.65	1263.00	8094.10
Feb-98	16.00	4.94	107.00	5.39	1263.00	8094.10
Mar-98	16.00	4.97	135.26	4.51	1263.00	8094.10
Apr-98	16.00	5.05	143.20	4.36	2158.00	8075.78
May-98	18.00	5.09	149.68	4.33	2158.00	8075.78
Jun-98	18.00	5.36	153.56	5.70	2158.00	8075.78
Jul-98	20.75	6.24	152.36	6.56	1047.00	8057.45
Aug-98	21.25	6.32	155.41	6.81	1047.00	8057.45
Sep-98	21.25	6.12	145.84	7.18	1047.00	8057.45
Oct-98	20.25	5.81	145.25	7.49	4837.00	8107.85
Nov-98	19.50	5.66	141.43	7.65	4837.00	8107.85
Dec-98	18.75	5.89	161.63	8.66	4837.00	8107.85
Jan-99	18.25	5.98	157.00	8.86	-50.00	8197.20
Feb-99	17.00	6.11	141.00	8.48	-50.00	8197.20
Mar-99	16.00	6.21	137.00	9.31	-50.00	8197.20
Apr-99	15.25	6.11	143.00	9.33	438.00	8341.53
May-99	15.00	6.18	138.00	8.95	438.00	8341.53
Jun-99	14.50	6.09	130.00	8.19	438.00	8341.53
Jul-99	13.25	6.11	125.00	8.37	94.00	8268.22
Aug-99	13.00	6.13	131.00	8.08	94.00	8268.22
Sep-99	12.00	6.06	125.00	8.02	94.00	8268.22
Oct-99	11.75	6.09	114.00	8.77	-362.00	8634.78
Nov-99	11.50	6.14	113.00	8.78	-362.00	8634.78
Dec-99	11.50	6.15	104.00	7.89	-362.00	8634.78
Jan-00	11.50	6.12	92.00	7.41	236.00	13695.67
Feb-00	11.25	6.32	91.00	8.07	236.00	13695.67

Mar-00	11.25	6.46	96.00	7.84	236.00	13695.67
Apr-00	11.25	6.61	106.00	8.94	293.00	13361.83
May-00	11.25	7.02	107.00	9.10	293.00	13361.83
Jun-00	11.25	6.93	111.00	9.85	293.00	13361.83
Jul-00	11.25	6.08	123.00	9.57	460.00	12368.09
Aug-00	11.25	6.95	122.00	9.74	460.00	12368.09
Sep-00	11.25	7.16	128.00	10.60	460.00	12368.09
Oct-00	11.25	7.47	146.00	9.82	304.00	13907.10
Nov-00	11.25	7.67	162.00	9.26	304.00	13907.10
Dec-00	11.25	7.64	151.00	10.79	304.00	13907.10
Jan-01	11.25	7.77	59.00	10.58	412.00	13645.34
Feb-01	11.25	7.82	60.00	10.59	412.00	13645.34
Mar-01	11.25	7.88	61.00	11.09	412.00	13645.34
Apr-01	11.25	8.08	71.00	10.44	951.00	13985.27
May-01	11.25	7.97	70.00	9.90	951.00	13985.27
Jun-01	10.75	8.06	78.00	9.84	951.00	13985.27
Jul-01	10.75	8.20	80.00	8.46	1099.00	12540.32
Aug-01	10.75	8.31	82.00	8.26	1099.00	12540.32
Sep-01	9.25	8.63	81.00	7.61	1099.00	12540.32
Oct-01	9.25	9.27	80.00	7.93	682.00	14214.67
Nov-01	9.25	9.73	80.00	8.61	682.00	14214.67
Dec-01	9.25	11.55	91.00	8.29	682.00	14214.67
Jan-02	10.00	11.61	47.00	8.68	1105.00	14406.45
Feb-02	10.00	11.48	48.00	9.72	1105.00	14406.45
Mar-02	11.00	11.49	49.00	9.66	1105.00	14406.45
Apr-02	11.00	11.08	53.00	10.42	794.00	14568.29
May-02	11.00	10.15	52.00	11.90	794.00	14568.29

Jun-02	12.00	10.14	55.00	11.33	794.00	14568.29
Jul-02	12.00	10.11	56.00	11.96	-187.00	12925.00
Aug-02	12.00	10.59	56.00	12.52	-187.00	12925.00
Sep-02	12.75	10.60	56.00	13.07	-187.00	12925.00
Oct-02	12.75	10.33	57.00	13.75	200.00	14837.80
Nov-02	12.75	9.65	58.00	14.14	200.00	14837.80
Dec-02	12.75	8.96	58.00	12.88	200.00	14837.80
Jan-03	12.75	8.68	58.24	12.92	416.00	15290.54
Feb-03	12.75	8.30	56.92	11.18	416.00	15290.54
Mar-03	12.75	8.04	58.13	10.48	416.00	15290.54
Apr-03	12.75	7.71	58.30	9.60	513.00	15589.25
May-03	12.75	7.67	57.99	8.16	513.00	15589.25
Jun-03	11.50	7.90	57.31	7.92	513.00	15589.25
Jul-03	11.50	7.54	58.00	6.93	-74.00	13760.06
Aug-03	10.75	7.39	58.00	6.34	-74.00	13760.06
Sep-03	9.75	7.32	54.00	5.37	-74.00	13760.06
Oct-03	8.25	6.96	52.00	3.71	270.00	15597.45
Nov-03	7.75	6.73	50.00	2.80	270.00	15597.45
Dec-03	7.75	6.53	50.00	2.63	270.00	15597.45
Jan-04	7.75	6.92	66.54	3.97	306.00	16591.73
Feb-04	7.75	6.77	66.99	4.10	306.00	16591.73
Mar-04	7.75	6.66	63.25	4.00	306.00	16591.73
Apr-04	7.75	6.55	64.02	4.32	463.00	16540.13
May-04	7.75	6.78	63.60	4.48	463.00	16540.13
Jun-04	7.75	6.44	63.86	3.80	463.00	16540.13
Jul-04	7.50	6.13	64.31	4.28	666.00	15823.29
Aug-04	7.50	6.46	64.98	4.22	666.00	15823.29

Sep-04	7.50	6.55	62.17	3.79	666.00	15823.29
Oct-04	7.50	6.39	62.17	4.38	24.00	16802.72
Nov-04	7.50	6.06	64.20	4.05	24.00	16802.72
Dec-04	7.50	5.73	59.51	4.23	24.00	16802.72
Jan-05	7.50	5.97	71.74	2.53	1107.00	16926.37
Feb-05	7.50	6.02	69.98	2.16	1107.00	16926.37
Mar-05	7.50	6.01	65.04	1.79	1107.00	16926.37
Apr-05	7.00	6.15	65.64	1.72	-119.00	16910.79
May-05	7.00	6.33	66.30	0.94	-119.00	16910.79
Jun-05	7.00	6.75	66.62	1.42	-119.00	16910.79
Jul-05	7.00	6.70	67.42	1.84	641.00	15225.67
Aug-05	7.00	6.47	64.83	2.11	641.00	15225.67
Sep-05	7.00	6.36	65.11	2.93	641.00	15225.67
Oct-05	7.00	6.58	65.11	2.88	821.00	17717.90
Nov-05	7.00	6.66	65.92	3.46	821.00	17717.90
Dec-05	7.00	6.36	66.54	3.59	821.00	17717.90
Jan-06	7.00	6.09	91.13	4.06	675.00	17715.38
Feb-06	7.00	6.12	88.12	3.89	675.00	17715.38
Mar-06	7.00	6.25	86.01	4.20	675.00	17715.38
Apr-06	7.00	6.07	86.16	3.84	710.00	18221.36
May-06	7.00	6.32	82.05	4.56	710.00	18221.36
Jun-06	7.50	6.95	83.50	5.26	710.00	18221.36
Jul-06	7.50	7.08	83.73	5.19	923.00	16828.03
Aug-06	8.00	6.96	80.95	5.55	923.00	16828.03
Sep-06	8.00	7.41	79.60	5.47	923.00	16828.03
Oct-06	8.50	7.65	79.09	5.55	310.00	18846.06
Nov-06	8.50	7.26	77.02	5.82	310.00	18846.06

Dec-06	9.00	7.04	74.44	6.03	310.00	18846.06
Jan-07	9.00	7.18	133.06	5.64	3072.00	18042.67
Feb-07	9.00	7.17	131.76	6.45	3072.00	18042.67
Mar-07	9.00	7.35	129.33	6.53	3072.00	18042.67
Apr-07	9.00	7.12	116.02	7.30	960.00	18363.10
May-07	9.00	7.02	108.88	7.62	960.00	18363.10
Jun-07	9.50	7.17	107.88	6.89	960.00	18363.10
Jul-07	9.50	6.97	105.11	6.98	910.00	18942.53
Aug-07	10.00	7.23	103.69	6.70	910.00	18942.53
Sep-07	10.00	7.13	102.62	6.64	910.00	18942.53
Oct-07	10.50	6.77	111.61	7.17	222.00	20312.51
Nov-07	10.50	6.70	94.25	5.20	222.00	20312.51
Dec-07	10.50	6.83	92.20	5.52	222.00	20312.51
Jan-08	10.50	6.99	157.95	6.28	2141.00	19877.96
Feb-08	10.50	7.64	157.55	6.20	2141.00	19877.96
Mar-08	10.50	7.98	155.80	6.87	2141.00	19877.96
Apr-08	10.50	7.79	148.94	7.67	1762.00	18822.42
May-08	10.50	7.62	146.49	8.04	1762.00	18822.42
June-08	10.50	7.92	147.90	8.72	1762.00	18822.42
Jul-08	10.50	7.64	143.91	10.35	1170.00	19654.74
Aug-08	10.50	7.66	140.29	10.45	1170.00	19654.74
Sep-08	10.50	8.05	139.78	10.59	1170.00	19654.74
Oct-08	10.50	9.67	138.95	10.18	878.00	19309.84
Nov-08	10.50	10.12	137.07	12.25	878.00	19309.84
Dec-08	10.00	9.95	136.23	11.16	878.00	19309.84
Jan-09	10.00	9.90	154.77	11.57	1286.00	18667.35
Feb-09	9.00	10.01	154.47	11.45	1286.00	18667.35

Mar-09	9.00	9.99	155.96	11.02	1286.00	18667.35
Apr-09	8.00	9.02	154.63	9.84	1033.00	17990.22
May-09	7.50	8.37	154.88	9.28	1033.00	17990.22
Jun-09	7.00	8.05	154.42	10.63	1033.00	17990.22
Jul-09	7.00	7.95	159.52	8.87	955.00	19824.96
Aug-09	7.00	7.94	159.16	9.07	955.00	19824.96
Sep-09	7.00	7.52	159.37	8.39	955.00	19824.96
Oct-09	7.00	7.48	160.27	8.19	1014.00	21412.30
Nov-09	7.00	7.52	160.02	7.72	1014.00	21412.30
Dec-09	7.00	7.49	159.63	7.93	1014.00	21412.30
Jan-10	7.00	7.45	172.72	7.44	1086.00	19895.13
Feb-10	7.00	7.76	171.58	7.73	1086.00	19895.13
Mar-10	7.00	7.43	168.94	7.05	1086.00	19895.13
Apr-10	7.00	7.34	166.23	6.37	1419.00	20229.22
May-10	7.00	7.63	163.55	6.12	1419.00	20229.22
Jun-10	7.00	7.65	161.60	3.92	1419.00	20229.22
Jul-10	7.00	7.55	158.45	4.32	1559.00	21081.54
Aug-10	7.00	7.30	159.13	3.28	1559.00	21081.54
Sep-10	7.00	7.14	158.18	3.47	1559.00	21081.54
Oct-10	6.75	6.92	156.90	3.02	1742.00	21393.21
Nov-10	6.75	6.97	156.18	3.21	1742.00	21393.21
Dec-10	6.00	6.83	155.41	3.06	1742.00	21393.21
Jan-11	6.00	6.90	221.19	3.27	2386.00	21472.92
Feb-11	6.00	7.19	220.73	3.00	2386.00	21472.92
Mar-11	6.00	6.91	219.37	3.63	2386.00	21472.92
Apr-11	6.00	6.73	210.55	4.75	1609.00	20811.94
May-11	6.00	6.86	198.58	5.10	1609.00	20811.94

Jun-11	6.00	6.79	191.40	5.31	1609.00	20811.94
Jul-11	6.00	6.79	186.39	4.74	3466.00	23035.38
Aug-11	6.00	7.06	185.47	5.28	3466.00	23035.38
Sep-11	6.00	7.52	185.70	5.11	3466.00	23035.38
Oct-11	6.00	7.95	174.54	6.16	671.00	21484.25
Nov-11	6.00	8.16	174.43	6.25	671.00	21484.25
Dec-11	6.00	8.17	173.76	7.40	671.00	21484.25
Jan-12	6.00	8.01	273.56	6.79	1263.00	23894.68
Feb-12	6.00	7.66	272.03	7.45	1263.00	23894.68
Mar-12	6.00	7.60	269.10	7.22	1263.00	23894.68
Apr-12	6.00	7.83	249.00	6.57	2158.00	22114.33
May-12	6.00	8.15	248.38	6.32	2158.00	22114.33
Jun-12	6.00	8.40	243.67	5.83	2158.00	22114.33
Jul-12	6.00	8.25	237.38	6.27	1047.00	22044.64
Aug-12	5.50	8.28	235.13	6.14	1047.00	22044.64
Sep-12	5.50	8.28	234.39	7.02	1047.00	22044.64
Oct-12	5.50	8.64	234.28	7.14	4837.00	23144.44
Nov-12	5.50	8.79	233.05	7.53	4837.00	23144.44
Dec-12	5.50	8.64	226.78	6.38	4837.00	23144.44
Jan-13	5.50	8.79	331.72	6.20	2345.00	23216.64
Feb-13	5.50	8.88	329.37	5.82	2345.00	23216.64
Mar-13	5.50	9.17	325.77	5.88	2345.00	23216.64
Apr-13	5.50	9.11	315.57	5.86	2961.00	23315.38
May-13	5.50	9.36	308.51	5.75	2961.00	23315.38
Jun-13	5.50	10.03	305.61	6.24	2961.00	23315.38
Jul-13	5.50	9.91	301.40	5.89	1695.00	25425.74
Aug-13	5.50	10.08	297.67	6.03	1695.00	25425.74

Sep-13	5.50	9.98	291.21	5.44	1695.00	25425.74
Oct-13	5.50	9.92	286.99	4.87	729.00	24361.04
Nov-13	5.50	10.20	281.40	4.44	729.00	24361.04
Dec-13	5.50	10.37	279.43	4.89	729.00	24361.04
Jan-14	5.50	10.87	389.02	4.89	29.00	24949.56
Feb-14	5.50	10.98	389.57	5.17	29.00	24949.56
Mar-14	5.50	10.75	364.22	5.24	29.00	24949.56
Apr-14	5.50	10.55	360.11	5.90	1964.00	24457.89
May-14	5.50	10.40	356.34	6.06	1964.00	24457.89
Jun-14	5.75	10.68	351.92	6.12	1964.00	24457.89
Jul-14	5.75	10.66	347.18	5.56	2231.00	26199.88
Aug-14	6.00	10.67	343.57	5.41	2231.00	26199.88
Sep-14	6.00	10.95	340.48	5.28	2231.00	26199.88
Oct-14	6.00	11.07	339.52	4.99	462.00	26829.32
Nov-14	6.00	11.10	336.82	4.96	462.00	26829.32
Dec-14	6.00	11.46	333.40	4.63	462.00	26829.32
Jan-15	6.00	11.57	497.91	4.46	980.00	26571.03
Feb-15	6.25	11.58	491.09	3.56	980.00	26571.03
Mar-15	6.25	12.06	486.15	3.40	980.00	26571.03
Apr-15	6.25	12.01	476.73	2.93	795.00	26232.81
May-15	6.25	11.97	464.27	3.01	795.00	26232.81
Jun-15	6.50	12.30	447.53	3.05	795.00	26232.81
Jul-15	6.50	12.45	434.57	3.28	-150.00	27769.44
Aug-15	6.50	12.91	430.24	3.35	-150.00	27769.44
Sep-15	6.50	13.61	427.38	3.32	-150.00	27769.44
Oct-15	6.50	13.50	413.98	3.37	12346.00	28118.90
Nov-15	6.50	14.12	407.42	3.31	12346.00	28118.90

Dec-15	6.50	14.93	400.03	3.70	12346.00	28118.90
Jan-16	6.50	16.38	547.45	5.34	2135.00	27757.48
Feb-16	6.75	15.77	547.04	6.14	2135.00	27757.48
Mar-16	6.75	15.42	549.64	6.49	2135.00	27757.48
Apr-16	6.75	14.63	547.12	6.61	256.00	26008.02
May-16	7.00	15.36	547.17	6.75	256.00	26008.02
Jun-16	7.00	15.06	542.11	6.73	256.00	26008.02
Jul-16	7.00	14.42	532.38	6.99	448.00	27571.94
Aug-16	7.00	13.73	529.17	6.82	448.00	27571.94
Sep-16	7.00	14.04	515.03	6.90	448.00	27571.94
Oct-16	7.00	13.94	505.91	7.26	1204.00	28115.55
Nov-16	7.00	13.91	505.44	7.34	1204.00	28115.55
Dec-16	7.00	13.84	495.88	7.30	1204.00	28115.55

APPENDIX B: ADF TEST RESULTS

B1: ADF test on NSX (level)

Null Hypothesis: NSX has a unit root
Exogenous: Constant
Lag Length: 12 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		3.318244	1.0000
Test critical values:	1% level	-3.457630	
	5% level	-2.873440	
	10% level	-2.573187	

*MacKinnon (1996) one-sided p-values.

B2: ADF test on NSX (first difference)

Null Hypothesis: D(NSX) has a unit root
Exogenous: Constant
Lag Length: 11 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.179855	0.0224
Test critical values:	1% level	-3.457630	
	5% level	-2.873440	
	10% level	-2.573187	

*MacKinnon (1996) one-sided p-values.

B3: ADF test on NSX (second difference)

Null Hypothesis: D(NSX,2) has a unit root
Exogenous: Constant
Lag Length: 10 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-21.48022	0.0000
Test critical values:	1% level	-3.457630	
	5% level	-2.873440	
	10% level	-2.573187	

*MacKinnon (1996) one-sided p-values.

B4: ADF test on IR (level)

Null Hypothesis: IR has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.105531	0.2428
Test critical values:	1% level	-3.456514	
	5% level	-2.872950	
	10% level	-2.572925	

*MacKinnon (1996) one-sided p-values.

B5: ADF test on IR (first difference)

Null Hypothesis: D(IR) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.296012	0.0000
Test critical values:	1% level	-3.456514	
	5% level	-2.872950	
	10% level	-2.572925	

*MacKinnon (1996) one-sided p-values.

B6: ADF test on IR (second difference)

Null Hypothesis: D(IR,2) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-32.07888	0.0000
Test critical values:	1% level	-3.456514	
	5% level	-2.872950	
	10% level	-2.572925	

*MacKinnon (1996) one-sided p-values.

B7: ADF test on CPI (level)

Null Hypothesis: CPI has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.678657	0.0062
Test critical values:	1% level	-3.512290	
	5% level	-2.897223	
	10% level	-2.585861	

*MacKinnon (1996) one-sided p-values.

B8: ADF test on CPI (first difference)

Null Hypothesis: D(CPI) has a unit root
Exogenous: Constant
Lag Length: 11 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.221908	0.0000
Test critical values:	1% level	-3.457630	
	5% level	-2.873440	
	10% level	-2.573187	

*MacKinnon (1996) one-sided p-values.

B9: ADF test on CPI (second difference)

Null Hypothesis: D(CPI,2) has a unit root
Exogenous: Constant
Lag Length: 13 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.523308	0.0000
Test critical values:	1% level	-3.457984	
	5% level	-2.873596	
	10% level	-2.573270	

*MacKinnon (1996) one-sided p-values.

B10: ADF test on ER (level)

Null Hypothesis: ER has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.953496	0.7698
Test critical values:	1% level	-3.456408	
	5% level	-2.872904	
	10% level	-2.572900	

*MacKinnon (1996) one-sided p-values.

B11: ADF test on ER (first difference)

Null Hypothesis: D(ER) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-12.05103	0.0000
Test critical values:	1% level	-3.456408	
	5% level	-2.872904	
	10% level	-2.572900	

*MacKinnon (1996) one-sided p-values.

B12: ADF test on ER (second difference)

Null Hypothesis: D(ER,2) has a unit root
Exogenous: Constant
Lag Length: 6 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.80676	0.0000
Test critical values:	1% level	-3.457173	
	5% level	-2.873240	
	10% level	-2.573080	

*MacKinnon (1996) one-sided p-values.

B13: ADF test on FDI (level)

Null Hypothesis: FDI has a unit root
Exogenous: Constant
Lag Length: 12 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.778492	0.3906
Test critical values:	1% level	-3.457630	
	5% level	-2.873440	
	10% level	-2.573187	

*MacKinnon (1996) one-sided p-values.

B14: ADF test on FDI (first difference)

Null Hypothesis: D(FDI) has a unit root
Exogenous: Constant
Lag Length: 11 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.44765	0.0000
Test critical values:	1% level	-3.457630	
	5% level	-2.873440	
	10% level	-2.573187	

*MacKinnon (1996) one-sided p-values.

B15: ADF test on FDI (second difference)

Null Hypothesis: D(FDI,2) has a unit root
Exogenous: Constant
Lag Length: 12 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.476722	0.0000
Test critical values:	1% level	-3.457865	
	5% level	-2.873543	
	10% level	-2.573242	

*MacKinnon (1996) one-sided p-values.

B16: ADF test on GDP (level)

Null Hypothesis: GDP has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.498432	0.8879
Test critical values:	1% level	-3.456622	
	5% level	-2.872998	
	10% level	-2.572951	

*MacKinnon (1996) one-sided p-values.

B17: ADF test on GDP (first difference)

Null Hypothesis: D(GDP) has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-12.88520	0.0000
Test critical values:	1% level	-3.456622	
	5% level	-2.872998	
	10% level	-2.572951	

*MacKinnon (1996) one-sided p-values.

B18: ADF test on GDP (second difference)

Null Hypothesis: D(GDP,2) has a unit root
Exogenous: Constant
Lag Length: 10 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-12.69857	0.0000
Test critical values:	1% level	-3.457630	
	5% level	-2.873440	
	10% level	-2.573187	

*MacKinnon (1996) one-sided p-values.

APPENDIX C: PP TEST RESULTS

C1: PP test on NSX (level)

Null Hypothesis: NSX has a unit root
Exogenous: Constant
Bandwidth: 14 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		0.884324	0.9952
Test critical values:	1% level	-3.456302	
	5% level	-2.872857	
	10% level	-2.572875	

*MacKinnon (1996) one-sided p-values.

C2: PP test on NSX (first difference)

Null Hypothesis: D(NSX) has a unit root
Exogenous: Constant
Bandwidth: 15 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-18.31023	0.0000
Test critical values:	1% level	-3.456408	
	5% level	-2.872904	
	10% level	-2.572900	

*MacKinnon (1996) one-sided p-values.

C3: PP test on NSX (second difference)

Null Hypothesis: D(NSX,2) has a unit root
Exogenous: Constant
Bandwidth: 190 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-208.6127	0.0001
Test critical values:	1% level	-3.456514	
	5% level	-2.872950	
	10% level	-2.572925	

*MacKinnon (1996) one-sided p-values.

C4: PP test on IR (level)

Null Hypothesis: IR has a unit root
Exogenous: Constant
Bandwidth: 9 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.860129	0.3509
Test critical values:	1% level	-3.456302	
	5% level	-2.872857	
	10% level	-2.572875	

*MacKinnon (1996) one-sided p-values.

C5: PP test on IR (first difference)

Null Hypothesis: D(IR) has a unit root
Exogenous: Constant
Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-12.93596	0.0000
Test critical values:	1% level	-3.456408	
	5% level	-2.872904	
	10% level	-2.572900	

*MacKinnon (1996) one-sided p-values.

C6: PP test on IR (second difference)

Null Hypothesis: D(IR,2) has a unit root
Exogenous: Constant
Bandwidth: 17 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-58.87653	0.0001
Test critical values:	1% level	-3.456514	
	5% level	-2.872950	
	10% level	-2.572925	

*MacKinnon (1996) one-sided p-values.

C7: PP test on CPI (level)

Null Hypothesis: CPI has a unit root
Exogenous: Constant
Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.755483	0.0663
Test critical values:	1% level	-3.456302	
	5% level	-2.872857	
	10% level	-2.572875	

*MacKinnon (1996) one-sided p-values.

C8: PP test on CPI (first difference)

Null Hypothesis: D(CPI) has a unit root
Exogenous: Constant
Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-15.76491	0.0000
Test critical values:	1% level	-3.456408	
	5% level	-2.872904	
	10% level	-2.572900	

*MacKinnon (1996) one-sided p-values.

C9: PP test on CPI (second difference)

Null Hypothesis: D(CPI,2) has a unit root
Exogenous: Constant
Bandwidth: 22 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-83.58398	0.0001
Test critical values:	1% level	-3.456514	
	5% level	-2.872950	
	10% level	-2.572925	

*MacKinnon (1996) one-sided p-values.

C10: PP test on ER (level)

Null Hypothesis: ER has a unit root
Exogenous: Constant
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.868166	0.7971
Test critical values:	1% level	-3.456302	
	5% level	-2.872857	
	10% level	-2.572875	

*MacKinnon (1996) one-sided p-values.

C11: PP test on ER (first difference)

Null Hypothesis: D(ER) has a unit root
Exogenous: Constant
Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-12.01684	0.0000
Test critical values:	1% level	-3.456408	
	5% level	-2.872904	
	10% level	-2.572900	

*MacKinnon (1996) one-sided p-values.

C12: PP test on ER (second difference)

Null Hypothesis: D(ER,2) has a unit root
Exogenous: Constant
Bandwidth: 31 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-60.93909	0.0001
Test critical values:	1% level	-3.456514	
	5% level	-2.872950	
	10% level	-2.572925	

*MacKinnon (1996) one-sided p-values.

C13: PP test on FDI (level)

Null Hypothesis: FDI has a unit root
Exogenous: Constant
Bandwidth: 14 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.239007	0.0000
Test critical values:	1% level	-3.456302	
	5% level	-2.872857	
	10% level	-2.572875	

*MacKinnon (1996) one-sided p-values.

C14: PP test on FDI (first difference)

Null Hypothesis: D(FDI) has a unit root
Exogenous: Constant
Bandwidth: 249 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-70.04102	0.0001
Test critical values:	1% level	-3.456408	
	5% level	-2.872904	
	10% level	-2.572900	

*MacKinnon (1996) one-sided p-values.

C15: PP test on FDI (second difference)

Null Hypothesis: D(FDI,2) has a unit root
Exogenous: Constant
Bandwidth: 33 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-91.73998	0.0001
Test critical values:	1% level	-3.456514	
	5% level	-2.872950	
	10% level	-2.572925	

*MacKinnon (1996) one-sided p-values.

C16: PP test on GDP (level)

Null Hypothesis: GDP has a unit root
Exogenous: Constant

Bandwidth: 27 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.319585	0.9187
Test critical values:	1% level	-3.456302	
	5% level	-2.872857	
	10% level	-2.572875	

*MacKinnon (1996) one-sided p-values.

C17: PP test on GDP (first difference)

Null Hypothesis: D(GDP) has a unit root
Exogenous: Constant
Bandwidth: 29 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-21.27184	0.0000
Test critical values:	1% level	-3.456408	
	5% level	-2.872904	
	10% level	-2.572900	

*MacKinnon (1996) one-sided p-values.

C18: PP test on GDP (second difference)

Null Hypothesis: D(GDP,2) has a unit root
Exogenous: Constant
Bandwidth: 43 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-109.3990	0.0001
Test critical values:	1% level	-3.456514	
	5% level	-2.872950	
	10% level	-2.572925	

*MacKinnon (1996) one-sided p-values.

APPENDIX D: LAG LENGTH CRITERIA TESTS

D1: Testing the lag length

VAR Lag Order Selection Criteria

Endogenous variables: NSX IR CPI ER FDI GDP
Exogenous variables: C
Date: 06/13/18 Time: 21:02
Sample: 1997Q1 2016Q4
Included observations: 76

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1350.280	NA	1.28e+08	35.69158	35.87558	35.76512
1	-720.8307	1142.947	21.12320	20.07449	21.36253	20.58925
2	-620.8186	165.8095*	3.987163*	18.38996*	20.78203*	19.34595*
3	-602.2614	27.83578	6.597408	18.84899	22.34509	20.24620
4	-591.0567	15.03801	13.82709	19.50149	24.10162	21.33993

* indicates lag order selected by the criterion

APPENDIX E: COINTEGRATION TEST RESULTS

Date: 08/25/18 Time: 23:49
Sample (adjusted): 1996M04 2016M12
Included observations: 249 after adjustments
Trend assumption: Linear deterministic trend
Series: CPI ER FDI GDP IR NSX
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.324392	160.3188	95.75366	0.0000
At most 1	0.132076	62.67533	69.81889	0.1626
At most 2	0.052607	27.40426	47.85613	0.8385
At most 3	0.033635	13.94800	29.79707	0.8435
At most 4	0.021564	5.428830	15.49471	0.7617
At most 5	3.05E-06	0.000761	3.841466	0.9788

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.324392	97.64351	40.07757	0.0000
At most 1 *	0.132076	35.27107	33.87687	0.0339
At most 2	0.052607	13.45626	27.58434	0.8582
At most 3	0.033635	8.519168	21.13162	0.8692
At most 4	0.021564	5.428070	14.26460	0.6871
At most 5	3.05E-06	0.000761	3.841466	0.9788

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

APPENDIX F: VECM

Dependent Variable: D(NSX)
Method: Least Squares
Date: 08/26/18 Time: 02:10
Sample (adjusted): 1996Q4 2016Q4
Included observations: 81 after adjustments
D(NSX) = C(1)*(NSX(-1) - 4.3169426028*IR(-1) + 12.0655232477*CPI(-1) - 37.5245021495*ER(-1) - 0.125133744832*FDI(-1) + 0.00201707651252*GDP(-1) + 208.917085373) + C(2)*D(NSX(-1)) + C(3)*D(NSX(-2)) + C(4)*D(IR(-1)) + C(5)*D(IR(-2)) + C(6)*D(CPI(-1)) + C(7)*D(CPI(-2)) + C(8)*D(ER(-1)) + C(9)*D(ER(-2)) + C(10)*D(FDI(-1)) + C(11)*D(FDI(-2)) + C(12)*D(GDP(-1)) + C(13)*D(GDP(-2)) + C(14)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.091889	0.038663	-2.376641	0.0203
C(2)	-0.286508	0.108995	-2.628634	0.0106
C(3)	-0.279691	0.115424	-2.423172	0.0181
C(4)	4.107991	5.323910	0.771612	0.4431
C(5)	-0.057408	5.501427	-0.010435	0.9917
C(6)	-0.902661	4.169833	-0.216474	0.8293
C(7)	-1.801140	3.952725	-0.455671	0.6501
C(8)	-4.095762	7.075569	-0.578860	0.5646
C(9)	4.828803	7.310146	0.660562	0.5112
C(10)	-0.005056	0.003979	-1.270634	0.2083
C(11)	-0.002566	0.002817	-0.911144	0.3655
C(12)	0.001124	0.003775	0.297746	0.7668
C(13)	0.008310	0.003588	2.315976	0.0236
C(14)	4.967283	4.328014	1.147705	0.2552

R-squared	0.342661	Mean dependent var	4.282346
Adjusted R-squared	0.215117	S.D. dependent var	36.99488
S.E. of regression	32.77510	Akaike info criterion	9.973138
Sum squared resid	71971.88	Schwarz criterion	10.38699
Log likelihood	-389.9121	Hannan-Quinn criter.	10.13918
F-statistic	2.686620	Durbin-Watson stat	2.248436
Prob(F-statistic)	0.004266		

APPENDIX G: GRANGER CAUSALITY TEST

VEC Granger Causality/Block Exogeneity Wald Tests
Date: 08/25/18 Time: 23:57
Sample: 1996M01 2016M12
Included observations: 249

Dependent variable: D(NSX)

Excluded	Chi-sq	df	Prob.
D(IR)	0.387052	2	0.8240
D(CPI)	1.060537	2	0.5884
D(ER)	0.195785	2	0.9067
D(FDI)	7.360244	2	0.0252
D(GDP)	0.003231	2	0.9984
All	8.139162	10	0.6152