Stock Market Returns and Exchange Rates in Botswana

Lesotho O. K[3]; Motlaleng, G.R[4], and Ntsosa M.M[5]

Abstract

This paper investigates the effect of bilateral exchange rates on stock market returns in the Botswana Stock Exchange (BSE) measured by the domestic company index (DCI). To examine whether this effect exists or not, Johansen cointegration test, Vector Error Correction model (VECM), Granger causality test, Impulse Response Function and Variance Decomposition are employed. The paper employs monthly data from 2001:M1-20014:M11. The empirical results indicate that there exists a long run equilibrium relationship between the stock market returns and exchange rates in Botswana. These findings corroborate those found by Mishra (2004), Phylaktis and Ravazzo (2005), Sohail and Hussain (2009) who explored the relationship in developed and emerging markets. In this paper, a negative relationship was found to exist between the stock market returns and the US dollar, British Pound and South African Rand. The Euro and the Japanese Yen showed a positive relationship. The findings of the paper also revealed that the speed of adjustment in the VECM is significant and relatively slow. The causality test indicated a unidirectional causality running from exchange rates to the stock market returns. The significant causality relationship was established between the British Pound, US Dollar, Japanese Yen and the Domestic Company Index. The causality results are consistent with those found by Alagidede et.al (2010) and Granger et.al (1998). Therefore, the evidence from this study implies that bilateral exchange rates have a significant effect on the performance of stock prices.

Keywords: Stock market returns, Exchange rates, Botswana.

[3] Department of Economics University of Botswana, Postal address **:** Private Bag UB 0022 Gaborone, Botswana
[4] Department of Economics University of Botswana: motlaleg@mopipi.ub.bw
[5] Department of Economics University of Botswana: ntsosamm@mopipi.ub.bw

1 Introduction

This paper examines the relationship between exchange rates and stock market returns in Botswana. The study uses the monthly stock price index as a measure of the stock returns for a period of 2001 to 2014. A well-functioning stock market is a good indicator of a healthy economy. The stock market serves as an avenue on which the government and the private sector can raise debt and equity capital. Theory suggests that the stock market returns are influenced by many factors that include dividends, gross domestic product, exchange rates, interest rates, and money supply. The effect of these factors is reflected in the magnitude and movements of stock prices, market index and liquidity of the market (Osianwo and Atanda , 2012).

The relationship between exchange rates and stock market returns has recently received attention from various economists (Amarasinghe and Dharmante , 2014; Raza and Aravanan 2014 Stavarek, 2005). This is attributed to the view that both variables play an important role in influencing the development of a country's economy. In addition, the attention is also driven by an increasing Global Economic Integration (GEI). GEI has led to the global integration of financial markets, the rise of capital flows and world trade. As such, this has made exchange rates to be one of the main determinants of business profitability and equity prices (Kim, 2003). Exchange rates directly influence the international competitiveness of firms (both multi-national and domestic firms) due to their impact on input and output prices. When the domestic currency appreciates, exports lose their competitiveness in international markets. As a result, sales and profits of exporters shrink and stock prices also decline. On the other hand, importers increase their competitiveness in domestic markets, resulting in increased profits and stock prices. Exchange rate movements therefore, affect the value of the firm since future cash flows of the firm change with fluctuations in exchange rates (Joseph, 2002).

To advance the capital markets, Botswana Stock Exchange (BSE) is at the fore front to ensure that the markets are well regulated and coordinated. However, the stock market has been faced with low levels of liquidity. To increase liquidity in the bourse, the Automated Trading System (ATS) was implemented in August 2012. As a result of this venture, the average daily turnover increased from P2.9 million (pre-ATS: 4 Jan 2012 – 22 Aug 2012) to P4.9 million following the implementation of the ATS in 24 Aug 2012 to 31 Dec 2012 (BSE, 2013). In the year 2013, BSE also embarked on a strategy to develop Global Depository Receipts (GDRs) to facilitate equities of foreign companies to be listed and traded on the BSE (Botswana Stock Exchange, 2013). This is expected to assist local investors to diversify and benefit from exposure to international stocks through GDRs. GDRs allow investors to invest in foreign companies without being concerned about foreign trading practices, different laws, accounting rules and cross –border transactions. However, GDRs have foreign exchange risk as the currency of the issuer (foreign company) is often different from the currency of the GDR. It is therefore important for investors to understand the relationship between exchange rates and stock market returns in order to hedge the exchange rate risk.

The paper proceeds as follows. Section II gives an overview of the Botswana Stock Market and exchange rate policy. Review of previous studies is presented in Section III. The methodology employed in the paper is outlined in Section IV. Empirical findings are presented in Section V, while Section VI concludes the paper.

2 Botswana's Exchange Rate Policy and Stock Market

2.1. The Pula Exchange rate

An important goal of an exchange rate policy is stabilisation of the Real Effective Exchange Rate (REER) of the Pula in relation to the currencies of the country's main trading partners. In May 2005, the country adopted a crawling peg exchange rate regime which pegs the Pula to a trade-weighted basket of currencies of major trading partners. The exchange rate regime was introduced at the time of a 12 percent devaluation of the Pula as indicated in Figure 1 below. The 12 percent devaluation was the second devaluation mainly to reverse the effect of the appreciation of the Pula and high inflation in the early 2000s and to maintain REER stability (Bank of Botswana, 2013). Prior to the second devaluation in 2005, Figure 1 further shows that the 7.5 percent devaluation in 2004 did not have much impact on the appreciation of the pula as it continued to appreciate despite the devaluation. As a result, there was need for a second devaluation and adoption of a crawling peg exchange regime to effectively stabilise the pula currency.

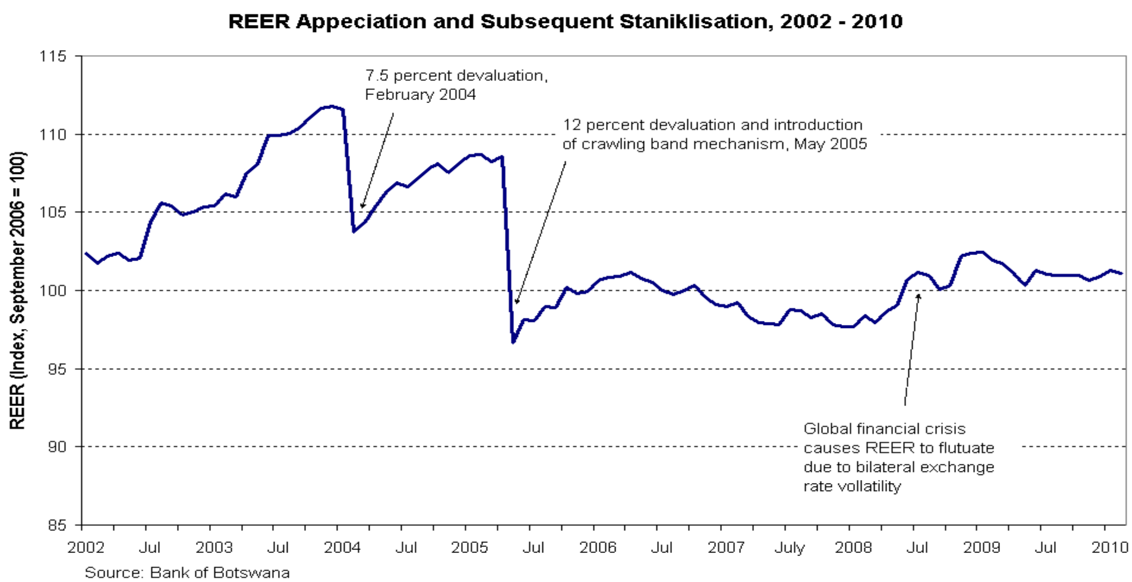

Figure 1: Shows the REER performance for the period of 2002 -2010

The crawling peg exchange rate system allowed the Pula to be continuously adjusted in discrete steps for the REER stability. Figure 1 shows that following the introduction of the crawling peg exchange rate regime, the REER was stable except during the 2008 financial crisis. During the crisis, the Pula exchange rate was volatile relative to its trading currencies but recovered in 2010. In 2013, the government took a critical step in the 2013/14 budget to disclose both the rate of crawl of the Pula and the weight of the currencies in the basket after about eight years of non-disclosure. The move was welcomed by stakeholders as critical in fostering transparency of Botswana's exchange rate mechanism (UNDP, 2014). The choice of which currencies to peg the Pula was guided by trade patterns and the major currencies used in international trade and payments (Masalila and Motshidisi, 2003; Motlaleng, 2009). The Pula exchange rate was fixed to a basket of currencies comprising of the South African Rand and the International Monetary Fund (IMF)'s Special Drawing Rights (SDR). The SDR currencies comprise of the US Dollar, the Euro, the British Pound and the Japanese Yen. The weights of the basket have been 55 percent South African Rand and 45 percent SDR. However, in 2014 the Pula continued to crawl downward at the rate of 0.16 percent per annum (Bank of Botswana, 2015). To maintain the stability of the REER, through the guidance of the Bank of Botswana, the weights were adjusted to 50 percent South African Rand and 50 percent SDR. A zero rate of crawl of the Pula was also adopted for the year 2015.

In general terms, the real value of the Pula against major foreign currencies has remained stable and competitive over the years. Trends in bilateral nominal exchange rates indicate that from the end of December 2012 to December 2013, the Botswana pula depreciated against the euro (16.1%), the British pound (13.7%), the US dollar (12.2%), although it appreciated against the South African rand by 9.3% (Bank of Botswana, 2014). According to Edwards (1998), exchange rate movements can be explained by net cross-border equity flows. Capital inflows (particularly portfolio investments) are found to result in appreciation of the currency, the reverse is true. In Botswana, the financial account is made up of direct investment, portfolio investment and other investments. The account registered P7.7 billion of net outflows in 2013 compared to P667 million in 2012. The larger outflows were a result of an increase in offshore investment (mainly pension funds). Therefore, a link can be presumed to exist between exchange rate movements and the capital markets.

2.2. Botswana Stock Exchange

Capital market operations in Botswana are largely conducted through Botswana Stock Exchange (BSE). The BSE plays the role of operating and regulating equities and fixed interest securities markets. It is a small but thriving stock exchange. In 2013, the BSE domestic market capitalisation[6] grew more than five-fold between 2000 and 2012 (BSE, 2013). In Figure 2 below, market capitalisation of the bourse plummeted from 2008, and this can attributed to the global financial crunch in 2008. The stock exchange began its recovery in 2009. Since then it has seen tremendous improvements. In 2013 market capitalisation was at its highest peak at P40 801 million. This was also accompanied by a record turnover of P9.3 million per day the same year. The BSE overall performance was aided by the implementation of the Automated Trading System (ATS) in 2012. The system facilitates automated trading and has replaced the manual trading which required brokers to meet on a daily basis at the exchange house in order to execute trades for clients. The growth of the stock exchange was also reflected by a rise in the number of Central Securities Depository (CSD) accounts by 13.5 percent from 17 638 in 2012 to 20 027 in 2013.

[6] Market capitalisation is the market value of a company's outstanding shares. This figure is found by multiplying the stock price by the total number of shares outstanding.

Figure 2: The BSE Market capitalisation from 2004 to 2013
Source: Botswana Stock Exchange

In addition to the overall performance, the Domestic Company Index (DCI) as a measure of market returns also indicated record high results in 2013 as shown by Figure 3 below. The DCI closed the year 2013 at 9,053.4 points, an increase of 20.5 percent. This was its highest level since 21 November 2007 (BSE, 2014). The performance of the DCI also signalled a recovery from the effects of the financial meltdown in 2008. The financial crisis had a negative impact on the performance of the DCI as it declined by more than 30 percent.

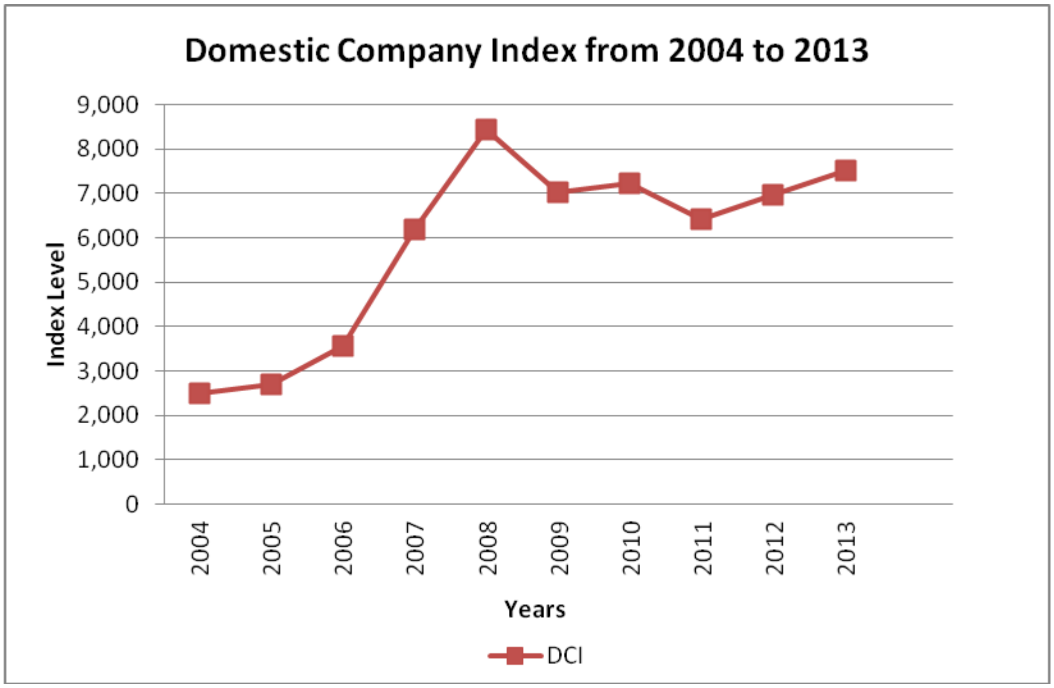

Figure 3: The Domestic Company Index level from 2004 to 2013

Moreover, the domestic capitalisation as a percentage of GDP in 2012 was 31.55 percent and appreciated to 37.14 percent in 2013. This indicates a growth in the stock exchange and its significant role in the economy of Botswana. Financial services, retail and wholesaling and the banking sector accounted for over 90 percent of the growth in the domestic capitalisation (BSE, 2014). However, the stock exchange remains to be characterised by low liquidity which poses challenges to the efficient signalling of prices to investors. Liquidity is the ease at which securities can be bought and sold in the market. It is one of the most important characteristics of a good market. However, a strong and stable currency serves as an advantage in promoting financial markets in Botswana, but this requires continuous monetary policy and exchange rate management.

3 Review of Previous Studies

3.1 Flow Oriented Models

According to flow oriented models (Dornbusch and Fischer, 1980), a country's current account and trade balance performance are the two important factors of exchange rate determination. The models further suggest that domestic currency depreciation improves the competitiveness of local firms. This in turn leads to increased exports and future cash flows. Hence, stock prices will move up in response to the increase in the firm's expected cash flows. The models therefore, suggest a positive relationship to exist between exchange rates and stock prices. However, Pilbean (1998) states that the model does not consider international capital movements, but these capital movements dominate the foreign currency market.

3.1.2 Stock-Oriented Models

The short fall of Flow-oriented models led to the development of stock oriented models (Branson, 1983). The models emphasize the role of capital account in the exchange rate determination. Stock-oriented models can be divided into two: monetary models and portfolio balance models. According to the portfolio balance model, movements in exchange rates are postulated to be driven by changes in stock prices (Chkili and Nguyen, 2014). Exchange rates adjust in response to the changes in supply and demand of foreign and domestic assets. Therefore, an inverse relationship is suggested to exist between exchange rates and stock prices. Contrary to portfolio balance models, monetary models (Gavin, 1989) conclude that there is no linkage between exchange rates and stock prices.

3.1.3 Empirical Literature

With globalization and financial liberalisation, international investment and portfolio diversification is enhanced at the same time as an increase in volatility of exchange rates. Therefore, the empirical evidence on the relationship between exchange rates and stock prices has been actively debated. Early studies such as Aggrawal (1981) provided evidence in support of the flow oriented model. The study established a positive correlation between trade-weighted exchange rate and US stock market indices for the period from 1974 to 1978. The study concluded that movements in the exchange rate could directly affect the stock prices[7] of multinational firms by influencing international business operations. This could indirectly affect domestic firms through influencing prices of exports and imported inputs. On the other hand, Soenen and Henningar (1988) found a negative correlation between changes in US stock prices and the effective value of the US dollar for the period from 1980 to 1986. In contrary, Jorion (1990) found modest relations between stock returns of US multinational companies and the effective US dollar exchange rate for the period from1971 to 1987. These early studies provided useful evidence in establishing a foundation for further studies on the interaction between exchange rates and stock prices. However, the studies were limited in that they only employed simple regression analysis to establish the correlation between the variables. Such a limitation was due to econometric assumptions about stationarity of financial data series. The use of cointegration technique overcomes the problem of non-stationarity and allows an investigation of both the levels and differences of exchange rates and stock prices (Phylaktis and Ravazzolo, 2005).

One of the first studies to use cointegration and Granger causality to explain the interaction of exchange rates and stock prices were Bahmani-Oskooee and Sohrabian (1992). The study used monthly data of the US SandP 500 index and the US dollar effective exchange rate for the period of 1973 to 1988 and an autoregressive framework. The results showed bi-directional causalities between exchange rates and stock prices (i.e changes in exchange rate affected stock prices and vice versa). This asserts both the portfolio balance and flow oriented models. Since then many studies investigating these relations in various countries have applied these econometric techniques and have reported mixed and diverse results. Richards, et. al (2009) established a strong evidence of a positive co-integrating relationship between exchange rates and stock prices

[7] Empirical literature reviewed indicates that stock prices and stock market returns are measured by the stock market index; as such the two can be used interchangeably.

in Australia. Granger causality was found to run from stock prices to exchange rates for the period of 2003 and 2006. This is a shift from the traditional view that Australian economy as an export-dependent economy, exchange rate movements should cause movements in stock prices

For decades most empirical literature has been focused on the developed markets. However, most of the recent empirical literature has been focused on Asian emerging markets. For instance, Abidin, et. al (2013) focused on seven Asia Pacific countries for the period of 2006 to 2008 using Engle-Granger two-step methodology. The study established a positive co-integration relationship only in the Japanese market with a 5 percent significance level between exchange rates and stock prices. For the other six countries no co-integration was established. The authors presumed the different findings to be a result of a deeper cause. This difference was attributed to the effects of differences in the country's economic stages, government policy, expectation patterns, industrialisation and liberalisation of capital controls. These were assumed to contribute to the predicting power of stock market prices and exchange rates.

In Pakistan, Jamil and Ullah (2013) found exchange rates to have a significant impact on stock market returns from the cointegration and Vector Error Correction Model (VECM) for the period 1998 to 2009. The results attest to the flow model. These results were in contradiction with Hussain and Bashir (2013), who studied the relationship in Pakistan, India and China. The study found no relationship between exchange rates and stock market returns for the countries analysed. In Sri-Lanka, Amarasinghe and Dharmaratne (2014) found stock returns to influence exchange rate movements using the Granger causality test. This provides evidence in support of portfolio balance models. The study employed All Share Price Index (ASPI) and nominal exchange rates for the period 2003 to 2012. With a different approach, Raza and Aravanan (2014), focused towards two stock indices (BSE Sensex and SandP CNX Nifty) and bilateral nominal exchange rates of United States Dollar (USD), Euro (EUR), Japanese Yen (JPY) and Pound Sterling (GBP) respectively. Indian Rupee was taken as per unit of foreign currency. The study established no cointegrating relationship between exchange rates and stock market returns using daily data. This was attributed to the exchange rate policy adopted in India hence the mutual relations between stock prices and exchange rates could not emerge completely in the long run. However, the study established short-run unidirectional and bi-directional causalities between the variables from the Granger causality test. The study recommended that great caution should be taken when dealing with the relation of stock returns and exchange rates across all currencies as the causalities were found to be highly robust and dynamic.

In Africa, Kuwomu (2012) examined the effect of macroeconomic variables on the Ghanaian Stock Market returns. The study established a long run relationship between exchange rates and stock market returns. The study employed the cointegration and VECM framework. A positive relationship between stock returns and exchange rate was observed. The appreciation of a country's domestic currency is explained to be accompanied by increases in reserves, money supply and a decline in interest rates. As such, the resulting decline in cost of capital and/or imported inputs is expected to lead to increase in economic activities and hence stock returns. Kenani, et.al (2012) investigated short run and long run dynamics of stock prices and exchange rates in Malawi form 1999 to 2010. The study employed the Johansen cointegration approach and Granger causality test. In contrast to Kuwomu (2012), the results showed no evidence of a long run or short run relationship between the variables. These results were attributed to Malawi Stock Exchange (MSE) small capitalization with its limited number and types of securities traded on this market. In South Africa, different methodologies have been used to take into account the relation between exchange rates and stock market returns [Hsing (2011); Chkili and Nguyen (2014)]. In using the exponential GARCH model, Hsing (2011) incorporates the cointegration technique and found a negative association between the share price index and the nominal effective exchange rate. The negative impact on reduced exports was found to dominate the positive impact on reduced import costs, domestic prices and increased capital inflows.

According to Agyapong (2012), lack of consensus on empirical literature can be explained by the extent of the link between the exchange and stock market, depending on the level of openness of the country to the rest of the world. The operating costs of companies in countries that import (inputs) more than exports (output) would be affected (due to exchange rate). This can influence the firm value and stock market activities in that economy. Furthermore, the reason for the disparity of results between the different countries was stated to be the different degree of the capital mobility, trade volume and economic links among them. Another reason could be different methods used in explaining the relationship and omitted variable bias (Dimitrova, 2005).

4 Methodology

4.1 Specification of the model

In investigating the relationship between exchange rates and stock market returns, the paper adopts the model used by Raza and Aravanan (2014) in investigating the dynamics of stock market returns and exchange rates in India. This study employed nominal exchange rates of United States Dollar (USD), Euro (EUR), Japanese Yen (JPY) and Pound Sterling (GBP) respectively and two stock indices. The function under investigation in our study is first stated as follows:

$$DCI_t = \alpha_1 + \alpha_2 EUR_t + \alpha_3 GBP_t + \alpha_4 JPY_t + \alpha_5 USD_t + \alpha_6 ZAR_t + \varepsilon_t \quad (4.1.1)$$

Where DCI_t is the domestic company index. The index serves as a proxy for stock market returns in the model. USD_t is US Dollar, EUR_t is Euro, GBP_t is Pound Sterling, JPY_t is Japanese Yen and ZAR_t is South African Rand all expressed in foreign currency per Pula in nominal terms. ε_t is the stochastic error term and t is time. The coefficients $\alpha_2,\ \alpha_3,\ \alpha_4,\ \alpha_5,$ and α_6 are slope coefficients of the explanatory variables, and α_1 is the intercept term. The variables used in this paper are in logarithm form such that coefficients represent elasticities as follows:

$$lnDCI_t = \beta_1 + \beta_2 lnEUR_t + \beta_3 lnGBP_t + \beta_4 lnJPY_t + \beta_5 lnUSD_t + \beta_6 lnZAR_t + \epsilon_t \quad (4.1.2)$$

The logarithm formulation gives direct estimation of stock market return elasticity and allows stock market returns to react proportionately to rise and fall in exchange rates. The explanatory variables, USD_t , EUR_t , GBP_t , JPY_t and ZAR_t are selected as the Pula is pegged to a basket of currencies comprising of the Special Drawing Rights(SDR) currencies and the South African Rand. The independent variable is DCI_t which is the domestic company index used as a measure of stock market returns. The DCI[8] is the most commonly used to measure the stock price performance in the BSE.

4.2 Vector Autoregressive (VAR)

In recent times, studies about the relationship between the stock and foreign exchange markets have used the VAR methodology (Agyapong, 2012; Kenani, et. al, 2012; Jamil and Ullah (2013). The VAR by Sims (1980) was estimated to find short-run causality between macro-economic variables and stock prices. The VAR facilitates to capture both the dynamic and interdependent relationships of the exchange rates and stock market returns. In the VAR methodology, lagged values of exchange rates and stock market returns are used to forecast future values of those variables. Sims (1980) suggests the use of VAR models as a theory-free method to estimate economic relationships and as an alternative to structural econometric models. A reduced-form VAR, as proposed by Sims (1980) is a system of equations that can be written in matrix form as:

$$Y_t = \alpha + A_1 Y_{t-1} + \cdots + A_p Y_{t-p} + U_t \qquad (4.1.3)$$

Where α is a (k *1) vector of intercepts, $A_1,\ldots,A_p$ are (k*k) matrices of coefficients, U_t is a (k*1) vector of random innovations or shocks, that is, serially uncorrelated disturbances that have zero mean and a variance with covariance matrix $E(u_t u'_t) = \sum_u$.This model is referred to as VAR (p) process because the number of lags is p. In formulating the VAR matrix, equation (4.1.1) can be expressed as:

$$\begin{pmatrix} DCI_t \\ EUR_t \\ GBP_t \\ JPY_t \\ USD_t \\ ZAR_t \end{pmatrix} = \begin{pmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \\ \alpha_4 \\ \alpha_5 \\ \alpha_6 \end{pmatrix} + \begin{pmatrix} A_{11}^1 & \cdots & A_{16}^1 \\ \vdots & \ddots & \vdots \\ A_{61}^1 & \cdots & A_{66}^1 \end{pmatrix} \begin{pmatrix} DCI_{t-1} \\ EUR_{t-1} \\ GBP_{t-1} \\ JPY_{t-1} \\ USD_{t-1} \\ ZAR_{t-1} \end{pmatrix} + \cdots + \begin{pmatrix} A_{11}^p & \cdots & A_{16}^p \\ \vdots & \ddots & \vdots \\ A_{61}^p & \cdots & A_{66}^p \end{pmatrix} \begin{pmatrix} DCI_{t-p} \\ EUR_{t-p} \\ GBP_{t-p} \\ JPY_{t-p} \\ USD_{t-p} \\ ZAR_{t-p} \end{pmatrix} + \begin{pmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \\ \varepsilon_{6t} \end{pmatrix} \qquad (4.1.4)$$

[8] The BSE's main indices are the Domestic Company Index (DCI) and Foreign Company Index (FCI). However, the FCI is inefficient in measuring the performance of the returns of dual listed companies on the foreign company board. The inefficiency of the FCI is to a larger extent a function of low liquidity in the foreign equity board and the computation methodology employed for the Index (Botswana Stock Exchange, 2014). As a result, this study is restricted to the DCI as a measure of stock returns for efficiency of results.

Where A_i is a (k*k) matrix of coefficients, p is the lag length of the VAR and ε_t is a (k*1) column vector of random stochastic terms.

4.3 Vector Error Correction Model (VECM)

Once the variables included in the VAR model are found to be cointegrated, we estimated the Vector Error Correction Model (VECM), not the VAR model. If the series are not cointegrated the model is restricted to the VAR model. The VECM is a first-differenced vector autoregressive (VAR) model incorporating co-integration. As such, it also accounts for interdependences between exchange rates and stock market returns. The model is employed to analyse the long run relationship and establish short run properties of the cointegrated series. The VECM is also introduced to correct a disequilibrium that may shock the whole system. The model is obtained by subtracting $Y_{t-1}$from both sides of equation (4.1.3) and rearranging the terms as follows:

$$\Delta Y_t = \Pi Y_{t-1} + \Gamma_1 \Delta Y_{t-1} + \Gamma_2 \Delta Y_{t-2} + \cdots + \Gamma_{k-1} \Delta Y_{t-(p-1)} + \varepsilon_t \qquad (4.1.7)$$

There always exists an error correction representation of the form:$(i.e\ Y_t = Y_{t-1} + \Delta Y_t)$:

$$\Delta Y_t = \Pi Y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-i} + \varepsilon_t \qquad (4.1.8)$$

In matrix format, it can be stated as:

$$\begin{pmatrix} \Delta DCI_t \\ \Delta EUR_t \\ \Delta GBP_t \\ \Delta JPY_t \\ \Delta USD_t \\ \Delta ZAR_t \end{pmatrix} = \Pi \begin{pmatrix} DCI_{t-1} \\ EUR_{t-1} \\ GBP_{t-1} \\ JPY_{t-1} \\ USD_{t-1} \\ ZAR_{t-1} \end{pmatrix} + \Gamma_1 \begin{pmatrix} \Delta DCI_{t-1} \\ \Delta EUR_{t-1} \\ \Delta GBP_{t-1} \\ \Delta JPY_{t-1} \\ \Delta USD_{t-1} \\ \Delta ZAR_{t-1} \end{pmatrix} + \Gamma_2 \begin{pmatrix} \Delta DCI_{t-2} \\ \Delta EUR_{t-2} \\ \Delta GBP_{t-2} \\ \Delta JPY_{t-2} \\ \Delta USD_{t-2} \\ \Delta ZAR_{t-2} \end{pmatrix} + \cdots + \Gamma_{p-1} \begin{pmatrix} \Delta DCI_{t-(p-1)} \\ \Delta EUR_{t-(p-1)} \\ \Delta GBP_{t-(p-1)} \\ \Delta JPY_{t-(p-1)} \\ \Delta USD_{t-(p-1)} \\ \Delta ZAR_{t-(p-1)} \end{pmatrix} + \begin{pmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \\ \varepsilon_{6t} \end{pmatrix} \quad (4.1.9)$$

Where: Δ is the difference operator, $\Pi = -(I - A_i \ldots - A_p)$ and $\Gamma_j = (A_{i+1} + \cdots + A_p), for\ i = 1, \ldots, p-1$. Π and Γ are (k*k) coefficient matrices. Π gives information about the long run relationship between Y_t variables. The rank of Π is indicated by the number of linearly independent combinations of the variables. In VECM, the rank shows the number of cointegrating vectors (Gunes, 2006). The short run function is represented by the following ECM:

$$\Delta lnDCI_t = \alpha_0 + \alpha_1 EC_{t-1} + \sum_{i=1}^{n} \beta_i \Delta lnEUR_{t-i} + \sum_{i=1}^{n} \beta_i \Delta lnBGP_{t-i} + \sum_{i=1}^{n} \beta_i \Delta lnJPY_{t-i} + \sum_{i=1}^{n} \beta_i \Delta lnUSD_{t-i} + \sum_{i=1}^{n} \beta_i \Delta lnZAR_{t-i} + \varepsilon_t$$

Where EC_{t-1} is the lagged error correction term derived from the residuals of the cointegrating equation and the aforementioned variables. The coefficient of each individual equation measures the speed of adjustment of the variable towards its long run equilibrium value.

5 Empirical Results

5.1 Preliminary Tests

This section presents the preliminary tests conducted on the data to specify the VAR model. The conditions required to specify the VAR model include the lag length selection, the Normality test and the Unit root test.

5.1.1 The Normality Test

The Jarque-Bera Test is a goodness of fit test of whether the sample has Skewness and Kurtosis matching a normal distribution. A normal distribution has a Skew = 0, which is a measure of symmetry. Kurtosis is a measure of peakedness and a normal distribution has a kurtosis of 3. According to Jarque and Bera (1987), the null hypothesis is a joint hypothesis of the skewness being zero and the excess kurtosis being zero. A sample from a normal distribution have an expected skew = 0 and an expected kurtosis = 0 (which is equal a kurtosis = 3).

The variables tested for normality are the Domestic Company Index (DCI), Euro exchange rate (EUR), British Pound exchange rate (GBP), US Dollar exchange rate (USD), South African rand exchange rate (ZAR) and the Japanese yen exchange rate (JPY). The summary of the results is as shown in Table 5.1 below.

Table 5.1 Descriptive statistics of the data for the period of 2001 to 2014

	DCI	EUR	JPY	GBP	USD	ZAR
Mean	5684.776	0.130	16.776	0.095	0.159	1.250
Median	6831.480	0.116	17.715	0.0927	0.156	1.182
Maximum	9860.370	0.195	25.060	0.133	0.233	1.719
Minimum	1451.910	0.0812	10.030	0.0666	0.108	1.0265
Std. Dev.	2601.070	0.0364	4.721	0.0174	0.0309	0.183
Skewness	-0.175	0.490	0.0780	0.365	0.486	1.0196
Kurtosis	1.492	1.804	1.473	2.111	2.605	2.893
Jarque-Bera	16.574	16.535	16.305	9.151	7.616	28.842
Probability	0.000252	0.000257	0.000288	0.0103	0.0222	0.000001
Sum	943672.9	21.558	2784.840	15.80370	26.396	207.512
Sum Sq. Dev.	1.12E+09	0.217521	3678.152	0.0500	0.158	5.513
Observations	166	166	166	166	166	166

The Jarque-Bera results indicate that the P-vale all the variables employed in the study are significant at 10 percent. The implication is that we reject the null hypothesis that skewness is zero and excess kurtosis is zero for the variables. The Jarque-Bera statistics therefore indicates a non-normality of the distributions. This can be partly attributed to the direct method of interpolation in transforming the data from daily to monthly. This may have been a contributing factor to the lack of normality in the variables.

5.1.2 Lag length Selection Criteria

In specifying any VAR model, an appropriate lag length has to be selected. In order to select the appropriate lag length we use the standard selection criteria, IC(p). The model estimation following the standard selection criteria IC(p) was first popularised by Valid and Engle (1993). The standard selection criterion entails first estimating p (optimal lag length) using the Akaike

Information Criteria (AIC), Standard Information Criteria (SC) and Hanna-Quinn (HQ). In addition to the standard selection criteria (AIC, SC and HQ), we apply three more criteria (Log L, LR and FPE) to select the optimal lag length. The results are reported in Table 5.2. On the basis of the HQ criteria, the lag of 1 was selected as the optimal lag length. The HQ criterion is more efficient when observations are above 120. However, for the VECM model we adopted a standard lag length of 2. This is to ensure that the model is not underestimated.

Table 5.2 Lag Selection Criteria for optimal lag length

Lag	LogL	LR	FPE	AIC	SC	HQ
0	783.580	NA	1.27e-12	-10.368	-10.247	-10.319
1	2041.997	2399.381	1.06e-19*	-26.667*	-25.824*	-26.324*
2	2068.744	48.859	1.20e-19	-26.543	-24.978	-25.907
3	2100.763	55.926	1.27e-19	-26.490	-24.202	-25.561
4	2131.478	51.192*	1.38e-19	-26.420	-23.409	-25.197
5	2156.508	39.714	1.62e-19	-26.273	-22.540	-24.757
6	2169.219	19.151	2.27e-19	-25.963	-21.507	-24.153
7	2203.482	48.882	2.41e-19	-25.939	-20.761	-23.836
8	2233.520	40.451	2.75e-19	-25.860	-19.959	-23.463

* indicates lag order selected by the criterion, LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion.

5.1.3 The Unit Root Test for Stationarity

The next fundamental step is to uncover the stochastic properties of the data employed. This involves the investigation of the order of integration of the variables. Augmented Dickey-Fuller (1979) test is implemented to investigate whether the time series of exchange rates and stock market price are stationary or not to avoid the problem of spurious results.

Table 5.3 below indicates that the null hypothesis of non stationarity cannot be rejected for all variables in levels. This is with both the intercept and with trend and intercept. This indicates that there is a presence of a unit root. The appropriate step taken was to first difference the variables. All the variables, the Domestic Company Index, Euro, British pound, US dollar, South African rand and Japanese yen became stationary after first differencing. This means they were all integrated of order one. The next step is to determine whether the non-stationary variables are cointegrated having established their order of integration

Table 5.3 Results of the Unit root test for stationarity

Variables	Augmented Dickey Fuller (ADF) test: With Intercept: Levels	With Intercept: First Difference	Trend and Intercept: Levels	Trend and Intercept: First Difference	Order of integration
DCI	-1.069	-8.312*	-2.043	-8.288*	I(1)
EUR	-1.551	-15.888*	-1.871	-15.909*	I(1)
JPY	-1.015	-13.391*	-2.117	-13.350*	I(1)
GBP	-1.450	-14.240*	-2.390	-14.200*	I(1)
USD	-1.146	-13.201*	-2.327	-13.048*	I(1)
ZAR	-1.223	-13.201*	-1.284	-13.182*	I(1)

*indicates statistically significant at 1%

5.1.4 Cointegration Test

To test for cointegration, we employ the Johansen and Juselius (1990) cointegration test to estimate the long run equilibrium relationship between the exchange rates and the domestic company index. To explore the number of cointegrating vectors, Maximum Eigenvalue and Trace statistics are both used**.** The trace test is performed to obtain the number of the most likely cointegrating equations and the Maximum Eigenvalue test is performed to determine the number of cointegrating equations. Table 5.4 and 5.5 presents the results for the cointegration test.

Table 5.4 Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.223	112.957	95.754	0.002
At most 1 *	0.157	73.619	69.819	0.024
At most 2	0.134	47.033	47.856	0.059
At most 3	0.094	24.523	29.797	0.179
At most 4	0.038	9.192	15.495	0.348
At most 5	0.020	3.095	3.841	0.079

Trace 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

Table 5.5 Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.222	39.338	40.077	0.060
At most 1	0.157	26.586	33.877	0.286
At most 2	0.134	22.510	27.584	0.195
At most 3	0.094	15.331	21.132	0.266
At most 4	0.038	6.0972	14.265	0.601
At most 5	0.020	3.0946	3.841	0.079

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

The trace test presented in Table 5.4 rejects the null hypothesis of zero cointegrating equations at the 95 percent critical values. The trace test indicates two cointegrating equations at the 0.05 level. In contrary, the maximum eigenvalue tests in Table 5.5 indicate no cointegration equation at the 0.05 level. The maximum eigenvalue statistic is 39.33841 which is less than the critical value; as such we fail to reject the null hypothesis of no cointegration. In analysing the sample performance of likelihood ratio tests for cointegration Toda (1995), finds that neither the trace test nor the maximum eigenvalue test is uniformly superior to the other. However, the trace test was found to perform better in some situations where the Power is low. From our results, the trace test results indicate the presence of a long run relationship between the domestic company index and the exchange rates (Euro, British Pound, US dollar, South African rand and Japanese Yen). We can therefore conclude that there exists a long run equilibrium relationship between the domestic company index and the exchange rates. The results are consistent with the findings established in Pakistan and Ghana using the cointegration technique by Jamil andUllah (2013) and Kuwomu (2012), respectively. However, other studies such as Raza and Aravanan (2014); Hussain and Bashir (2013); Amarasinghe and Dhamaratne (2014) and Kenani et. al (2012) found no long run relationship between the variables.

However, Agyapong (2012) explained that the level of openness of a country can determine the extent of the relationship between the stock and exchange markets. A highly open economy is likely to reveal a stronger relationship between the two markets. The long run equilibrium established from the cointegration test above can be attributed to the view that Botswana is a highly open economy with a strong trade liberalisation policy. Imports of goods and services accounted for approximately 49.8 percent and exports for about 47 percent as a percentage of GDP (Bank of Botswana, 2013). This indicates that domestic firms are exposed to the foreign exchange rate risk. As a result, this would affect the firm’s operating costs, hence the value of the firm (stock price). To build a comprehensive analysis on the nature of the long run relationship between the exchange rates and the stock market price, we examine the the cointegrating vector.

5.1.5 Cointegrating Vector

The cointegrating vector is obtained by normalising the domestic company index, where the estimated coefficient of the domestic company index is set to -1. The cointegrating vector is then divided by the negative of this coefficient. The cointegrating vector is shown in Table 5.6 below.

Table 5.6 Cointegrating vector for the DCI

1 Cointegrating Equation(s):	Log likelihood 2205.887				
Normalized cointegrating coefficients (standard error in parentheses)					
LNDCI	LNEUR	LNGBP	LNUSD	LNZAR	LNJPY
1.000	-15.279	1.827	24.756	16.509	-5.105
	(4.641)	(5.611)	(5.716)	(3.861)	(3.539)
	[-3.292]	[0.326]	[4.331]	[4.275]	[-1.443]

The cointegrating vector in Table 5.6 can be written as a long run function as follows:

$$\underset{}{lnDCI_t} = \underset{[3.292]}{15.279\, lnEUR_t} - \underset{[-0.326]}{1.827\, lnGBP_t} \underset{[-4.331]}{-24.756\, lnUSD_t} \underset{[-4.275]}{-16.509\, lnZAR_t} + \underset{[1.443]}{5.105\, lnJPY_t} \qquad (5.1)$$

From the function above, it is evident that the Euro and the Japanese yen per pula have a positive long run relationship with the Domestic Company Index. This implies that when the bilateral exchange rates depreciate against the pula, the Domestic Company Index will in turn rise. On the other hand, the US dollar, the British pound and the South African rand per pula depict an expected inverse long run relationship with the Domestic Company Index. The implication is that as the US dollar, British pound and the South African rand appreciate against the pula, the Domestic Company Index will in turn rise. This could be attributed to the consecutive domestic currency devaluation by 7.5 and 12 percent in 2004 and 2005, respectively. The crawling peg exchange rate regime was introduced at the time of a 12 percent devaluation of the Pula to enhance competitiveness of domestic firms.

The results are also in support of Dornbusch and Fisher (1980)'s flow-oriented model which suggests that foreign currency appreciation against the domestic currency (depreciation of the domestic currency) improves the competitiveness of local firms. This in turn leads to the increase in the firm's expected cash flows hence the rise in stock prices. Sikalalo-Lekobane and Lekobane (2014) also found the devaluation or depreciation of the REER of the pula to result in a rise of stock prices using the DCI as a measure of stock prices. The negative long run relationship between the stock price and the British pound, South African rand and the US dollar can further be attributed to the trade relations. The United Kingdom was the most important destination for exports, accounting for 60% of the total in 2012, followed by South Africa with 13%. The

European Union and United States accounted for 5% and 1% respectively. This trade relation implies that domestic firms are exposed to foreign currency risk associated with exporting to the UK, South Africa and the USA (UNDP, 2014). As such, an appreciation of the foreign currency against the pula will boost the competitiveness of domestic firms, hence a rise in stock prices. A significant negative long run relationship between exchange rates and stock returns was also established by Mishra (2004), Phylaktis and Ravazzo (2005), Sohail and Hussain (2009) who explored the relationship in developed and emerging markets. The findings established in this section therefore conform to the empirical literature. Having established the nature of the long run relationship, we then examine whether the exchange rates have short term impact on stock market returns. To achieve this, we apply the Vector Error Correction Model.

5.1.6 Vector Error Correction Model (VECM)

According to Engle and Granger (1987), it is crucial to include the error correction terms (ECT) in the vector autoregressions of co-integrated variables. Thus, failing to do so would lead to misspecified models and inefficient forecasts. The error correction model (ECM) therefore describes the short-run dynamics or adjustments of the cointegrated variables towards their equilibrium values. The analysis in this section therefore seeks to uncover the short run effects of the exchange rates (Euro, British Pound, US dollar, SA rand and Japanese Yen) on the Domestic Company Index (DCI).

The ECM is employed to correct the fragment of the disequilibrium error from one period to the next. This is achieved by regressing ΔlnDCI on the explanatory variables and the stationary lagged error terms (Gujarati, 2003). The important parameter in the estimation of the short run dynamic model is the coefficient of the error correction term (ECT). It measures the speed of adjustment of the domestic company index to its equilibrium level. A lag length of 2 is adopted in the VECM as indicated in Section 5.1.2.

The statistically significant results of the error correction model for the domestic company index are presented in Table 5.7 below. The Table indicates that the error correction term for the domestic company index, the South African rand and Japanese yen bilateral exchange rates have the correct negative sign and are statistically significant. A coefficient of -0.023 on the domestic company index implies that in each period, the level of the domestic company index adjust by about 2 percent of the gap between the current level and the long run equilibrium. This further implies that, on monthly basis, 2 percent of the adjustments of the domestic company index in Botswana towards the long run equilibrium occur. For the South African rand and the Japanese Yen about 1.6 percent and 3 percent of adjustments occur towards long run equilibrium on monthly basis, respectively.

Table 5.7: ECM Results

Error Correction:	Equation 1 Δ(LNDCI)	Equation 2 Δ(LNEUR)	Equation 3 Δ(LNGBP)	Equation 4 Δ(LNUSD)	Equation 4 Δ(LNZAR)	Equation 5 Δ(LNJPY)
Δ(LNDCI(-1))	**0.281** **[3.687]***	-0.045 [-0.581]	-0.090 [-1.087]	-0.104 [-1.201]	0.026 [0.494]	-0.091 [-0.922]
Δ(LNGBP(-1))	**-0.487** **[-3.50]***	0.099 [0.704]	0.053 [0.353]	0.081 [0.511]	0.139 [1.469]	0.131 [0.724]
Δ(LNUSD(-1))	0.187 [1.290]	**-0.297** **[-2.034]***	-0.264 [-1.671]	-0.117 [-0.709]	0.048 [0.491]	-0.218 [-1.159]
Δ(LNUSD(-2))	-0.272 [-1.857]	0.009 [0.063]	0.053 [0.332]	0.321 [1.925]	-0.012 [-0.117]	**0.394** **[2.076]***
Δ(LNJPY(-2))	**0.252** **[2.432]***	0.117 [1.112]	-0.143 [-1.262]	-0.187 [-1.582]	-0.013 [-0.183]	-0.099 [-0.737]
C	0.006 [2.131]	-0.005 [-1.840]	-0.003 [-1.040]	-0.001 [-0.369]	-0.0007 [-0.369]	-0.001 [-0.337]
ECT	**-0.023** **[-2.139]***	0.007 [0.608]	0.004 [0.305]	-0.012 [-0.951]	**-0.016** **[-2.223]***	**-0.029** **[-2.127]***
R-squared	0.344	0.085	0.068	0.049	0.059	0.083

The results further indicate that the rate of change of the domestic company index Δ(LNDCI) is explained by its past values Δ(LNDCI(-1)). Its parameter coefficient is statistically significant at 0.05 level. The implication is that the domestic company index depends on its past values. An appreciation in the British pound against the pula leads to a rise in the domestic company index where the coefficient depicts a negative relationship. As such, 1 perecnt appreciation in the British pound per pula results in a 49 percent rise of the domestic company index in the short run. On the other hand, a 1 percent depreciation in the Japanese yen against the pula results in a 25 percent rise in the domestic company index. In overall, the domestic company index depends on its past values and those of the British pound and Japanese yen exchange rates in the short term.

The VECM also indicates that the Euro per pula and the Japanese yen are explained by the past values of the US dollar per pula Δ(LNUSD(-1)) and . Δ(LNUSD(-2)), respectively. This suggests that 1 percent depreciation in the US dollar per pula results in about 30 percent appreciation of the Euro per pula. On the other hand, 1 percent depreciation in the US dollar per pula in the past month leads to about 39 percent depreciation of the Japanese yen in the current month. The results indicate that, the US dollar per pula does not only have a significant impact on the domestic company index, but it also depicts a significant effect on the Euro and the Japanese yen per pula.

5.1.7 Granger Causality Test

Cointegration between two variables does not specify the direction of a causal relation, if any, between variables. As such, Granger causality technique is applied to back up the VECM estimates on the relationships established between the domestic company index and the exchange rates. Economic theory guarantees that there is always Granger Causality in at least one direction (Order and Fisher, 1993). F- statistics and probability values constructed under the null hypothesis of non-causality show that there is a causal relationship between the stock price index and exchange rates as indicated by Table 5.8 below.

Table 5.8: Results for the Granger Causality Test

Null Hypothesis	F-statistic	Prob.
D(lnGBP) does not granger cause D(lnDCI)	8.980	0.0002*
D(lnJPY) does not granger cause D(lnDCI)	4.162	0.0173**
D(lnUSD) does not granger cause D(lnDCI)	2.778	0.0653***

Note: *, **, and *** represent statistically significant at 1%, 5% and 10%, respectively

Significant probability values above denote rejection of the null hypothesis. The results indicate that the British pound, the US dollar and the Japanese yen Granger cause the domestic company index. The implication is that the past values of the exchange rates have a predictive ability in determining the present values of the domestic stock index. The Granger causality estimates are in support of the VECM estimates which indicate that the domestic company index depends on the past values of the British pound and the Japanese yen in the short run. Furthermore, the results are in line with previous studies which indicate a unidirectional causality running from exchange rates to the stock price index. The findings conform to those found by Alagidede, Panagiotidis and Zhang (2010) in investigating the nature of causal linkage between stock markets and foreign exchange rates in Canada, Switzerland and the United Kingdom. Granger, Huang and Yand (1998) reported similar results for Japan in examining the causality for nine Asian countries. Therefore, it can be stated that the findings of the study conform to the economic theory that exchange rates affect input and output price of domestic firms, hence the competitiveness of the firm. As such, currency appreciation has both negative and positive effect on the domestic stock market for an export dominated and import dominated country, respectively.

5.1.8 Impulse Response Analysis

The impulse response measures the time profile of the effect of a shock or impulse on the expected values of a variable (Mitchell, 2000). The impulse response analysis shows how modelled variables respond to any innovations or shocks in the economy. Figure 4 below indicates that a shock to the domestic company index on itself has a positive effect lasting the entire horizon. A shock to the Euro, British pound and the South African rand has a negative effect on the domestic company index, which is witnessed the entire horizon. However, a shock to the US dollar has a very minimal effect on the domestic company index. A one standard deviation impulse response to the Japanese Yen on the domestic company index is negative on the second month. It becomes positive in the third month lasting the entire horizon.

5.1.9 Variance decomposition

The variance decomposition reflects on how much information each variable contributes to the other variables in a VAR model. It is often conducted to examine the extent to which the forecast error variance of each of the variables can be explained by exogenous shocks to other variables. Table 5.9 gives a summary of how the variables in the model explain fluctuations in the domestic company index. The results indicate that fluctuation in the DCI is explained mostly by itself in the long run, at about 69%. The British Pound explains about 17% of the variation in the DCI. The South African rand accounts for about 7%, while the remaining variables account for less than 5% of the fluctuations in the DCI. The results indicate that there exist other macroeconomic variables that account for the variation in the domestic company index.

Figure 4: Impulse responses to the DCI

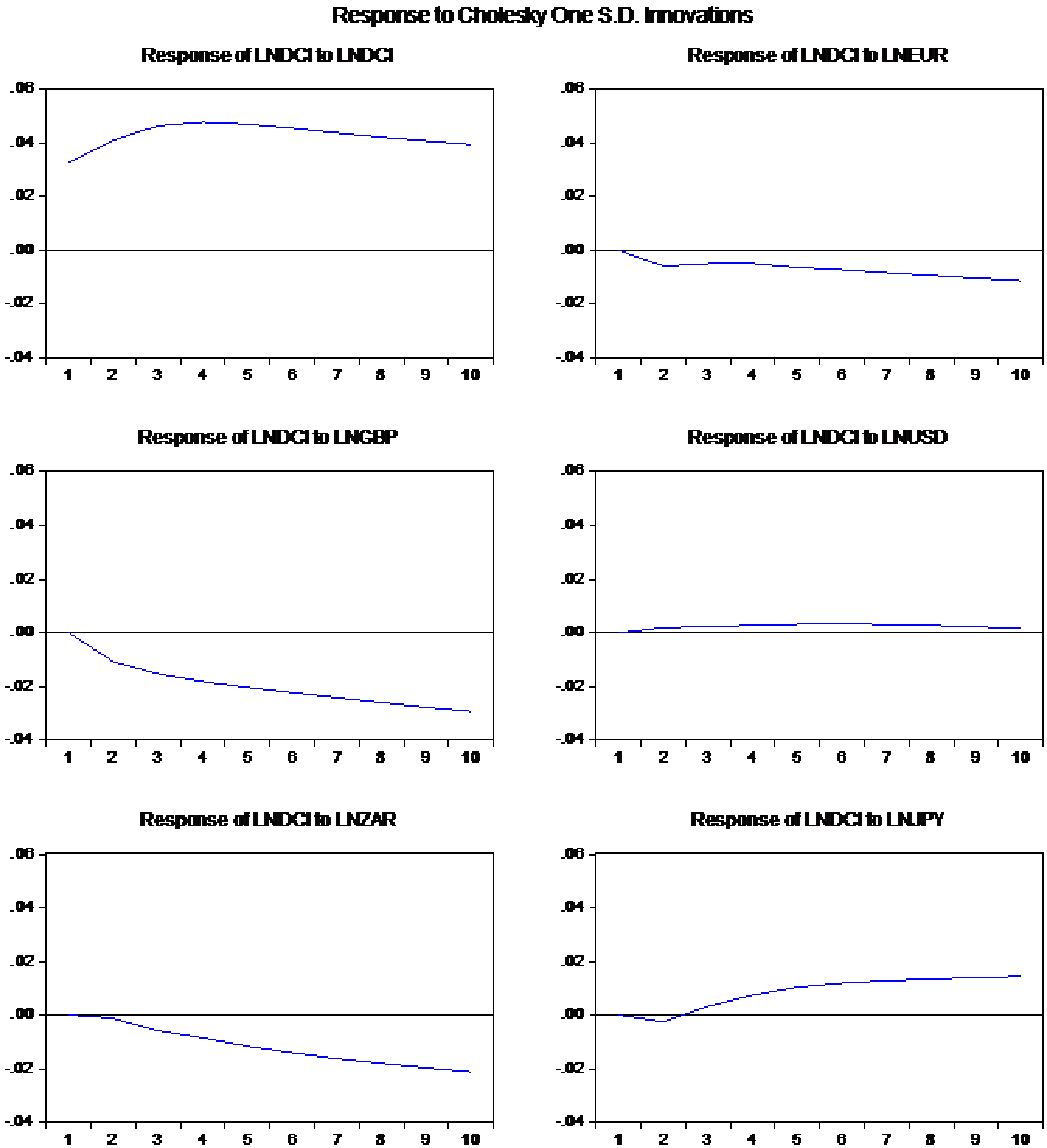

Table 5.9 Variance decomposition of the DCI

Period	S.E.	LNDCI	LNEUR	LNGBP	LNUSD	LNZAR	LNJPY
1	0.0326	100.000	0.000	0.000	0.000	0.000	0.000
2	0.0539	94.536	1.167	3.941	0.109	0.046	0.201
3	0.0732	91.261	1.0962	6.503	0.166	0.667	0.307
4	0.0902	88.228	1.0208	8.347	0.199	1.341	0.863
5	0.105	84.886	1.115	9.924	0.241	2.218	1.615
6	0.118	81.585	1.255	11.411	0.270	3.181	2.299
7	0.130	78.376	1.451	12.853	0.280	4.178	2.861
8	0.142	75.281	1.674	14.271	0.275	5.175	3.324
9	0.152	72.297	1.917	15.665	0.259	6.153	3.708
10	0.163	69.427	2.173	17.020	0.238	7.105	4.037

6 Conclusion

This paper examined the relationship between the stock market returns and the exchange rates in Botswana for the period 2001 to 2014. In contrast to the majority of studies whose focus are on the effective exchange rate, this study investigates the relationship using the bilateral exchange rates. The Domestic Company Index (DCI) is employed as a measure of stock market returns. The Johansen’s cointegration approach and the VECM framework are used to estimate the long run equilibrium relationship between stock market returns and exchange rates.

Empirical results indicate that there exists a long run relationship between stock market returns and the bilateral exchange rates. An inverse relationship between the US dollar, South African rand, British pound per pula and the Domestic Company Index (DCI) was established. This indicates that as the foreign currencies appreciate against the Pula, the DCI will in turn rise. This is consistent with economic theory which states that a long run depreciation of a local currency results in a positive effect on profitability of export-oriented domestic firms ultimately leading to an increase in stock prices. The significant negative long run relationship also corroborates the results found by Soenen and Henningar (1988); Mishra (2004), Phylaktis and Ravazzo (2005), Sohail and Hussain (2009) and Hsing (2011) who explored the relationship in developed and emerging markets.

The VECM results indicate that in the short run, the market (through the DCI) correct itself to the changes in exchange rate to be in equilibrium. The VECM also revealed the British pound to exhibit short run effects on the DCI. The variance decomposition further revealed that the British pound explains 17 percent of the variance in the DCI. This signifies the significant effect exerted by the British pound to the domestic stocks in both the long run and short run terms. The implication is that domestic firms are exposed to the foreign currency risk associated with the

British pound. On the other hand, a shock to the US dollar per pula was found to have a minimal effect on the DCI as shown by the impulse response analysis.

In examining the direction of the short run relationship presented by the VECM, the Granger causality technique found a unidirectional causality running from exchange rates to stock market returns. The findings corroborate those found by Alagidede et.al (2010) in investigating the nature of causal linkage between stock markets and foreign exchange rates in Canada, Switzerland and the United Kingdom. Granger et.al (1998) also reported similar results for Japan in examining the causality for nine Asian countries. Therefore, exchange rates can be helpful in projecting forecasts of stock market returns. This also conforms to the economic theory that exchange rates have an impact on the performance of the stock market. Therefore, it is critical for policy makers to use an appropriate monetary policy approach to facilitate the development of the stock market. This is because the stock market plays a pivotal role in the functioning of the financial system.

References

Abidin, S., Walters, C., Lim, K., and Banchit, A. (2013). "Cointegration Between Stock Prices And Exchange Rates In Asia-Pacific Countries," *Investment Management and Financial innovations*. 10 (2). Pp. 142-146.

Aggrawal. G. B,. and Srivastava, A. (2010). "A Study of Exchange Rates Movement and Stock Market Volatility," *International Journal of Business and Management*. 5(12). Pp. 62-73.

Aggrawal, R. (1981). "Exchange Rates And Stock Prices: A Story of the Us Capital Markets under Floating Exchange Rates," *Akron Business and Economic Review*. 12. Pp. 7 - 12

Agyapong, D. (2012) "The Foreign Exchange Rate-Capital Market Returns Nexus: A Synthesis of Related Literature," *Asian Journal of Business and Management Sciences*. 2(1). Pp. 7-19.

Alagidede, P., Panagiotidis, T., and Zhang, X. (2010). "Causal Relationship between Stock Prices and Exchange Rates," *Stirling Economics Discussion Paper* 2010-05

Amarasinghe, A. A. M. D., and Dharmaratne, D. G. (2014). "Dynamic relationship between exchange rate and stock returns: Empirical evidence from Colombo Stock Exchange," *International Journal of Liberal Arts and Social Science*. 2(5). Pp. 129-137.

Bahmani-Oskooe, M., and Sohrabian, A. (1992). "Stock prices and the effective exchange rate of the dollar," *Applied Economics*. 24(4). Pp. 459 - 465

Bank of Botswana Annual Report (2013, 2014). Available at www.bankofbotswana.co.bw [Accessed on 17th September 2014].

Botswana Stock Exchange Annual Report. (2013, 2014). Available at www.bse.co.bw [Accessed on 23th October 2014]

Branson, W. H. (1983). Macroeconomic determinants of real exchange rates. In Herring, R. J. (eds.), *Managing Foreign Exchange Risk*. Cambridge University Press.

Campbell, J. Y. (1990). A variance decomposition for stock returns. *NBER Working Paper No.* 3246. Available at http://www.nber.org/papers/w3246 [Accessed on 7th November]

Chkili, W., and Nguyen, D. K. (2014). Exchange rate movements and stock market returns in a regime – switching environment: Evidence for BRICS countries. *IPAG Business School Working Paper 2014-388*. Available at http://www.ipag.fr/fr/accueil/la-recherche/publications-WP.html [Accessed on 7th September]

Dickey, D. and W. Fuller. (1979). Distribution of the estimates of autoregressive time series with a unit root. *Journal of the American Statistical Association.* (74). Pp. 427 – 431

Dimitrova, D. (2005). The relationship between exchange rates and stock prices: Studied in a Multivariate Model. *Issues in Political Economy*. Vol. 14.

Dornbusch, R., and Fisher, S. (1980). Exchange rates and the current account. *American Economic Review*. 70(5). Pp. 1960 – 1971.

Engle, R. F. and Granger, C. W. (1988): Co-integration and Error Correction: Representation, Estimation, and Testing. *Econometrica*, 55, Pp. 251–276.

Gavin, M. (1989). The stock market and exchange rate dynamics. *Journal of international Monetary and Finance.* 8. Pp. 181 – 200

Gunes, S. (2006). Functional Income distribution in Turkey: A cointegration and VECM analysis. *Journal of Economic and Social Research*. 9(2). Pp. 23 – 36.

Granger, C. W. J. (1988). Causality, cointegration and control. Journal of Economic Dynamics and Control. (12). Pp. 551 -559

Gujarati, D. N. (2003). *Basic Econometrics. Fourth* Edition. New York. United Sates. McGraw Hill.

Hodrick, R. J. (1990). Volatility in the foreign exchange and stock markets: Is it excessive? *The American Economic Review*. 80(20). Pp. 251 – 267.

Hsing, Y. (2011). The stock market and macroeconomic variables in a BRICS country and policy implications. *International Journal of Economics and Financial Issues.* 1(1) Pp. 12 - 18

Hussain, M., and Bashir, U. (2013). Dynamic linkages of exchange rate and stock market return volatility: Evidence from Pakistan, India and China (PIC). *International Review of Management and Business Research*. 2(2). Pp. 345-354.

Iimi, A. (2006). Exchange rate misalignment : An application of the behavioural equilibrium exchange rate (BEER) to Botswana. *IMF Working paper WP/06/140*. International Monetary Fund

Jamil, M., and Ullah, N. (2013). Impact of foreign exchange rate on stock prices. *Journal of Business and Management*. 7(3). Pp. 45-51

Johansen, S. and Juselius, k. (1990). Maximum Likelihood Estimation and Inference on Cointegration with Applications to the Demand for Money. *Oxford Bulletin of Economics and Statistics*. (52)2. Pp. 169 - 210

Johansen, S. (1988). Statistical analysis of cointegration vectors. *Journal of Economic Dynamics and Control*. (12). Pp. 231 -254

Jorion, P. (1990). The exchange rate exposure of US multinationals. *Journal of Business*.63. Pp. 331 – 345.

Joseph, N. (2002). Modelling the impacts of interest rate and exchange rate changes in the UK stock returns. *Derivatives Use, Trading and Regulation*. 7(4). Pp. 306 – 323

Khalid, A. M. and Kawai, M. (2003). Was financial market contagion the source of economic crisis in Asia? Evidence using a multivariate VAR model. *Journal of Asian economics*, 14(1), 131-156.

Kenani, J. M., Maoni, F., Kaunda, S., and Nyirenda, D. (2012). Short-run and long-run dynamics of stock prices and exchange rates in developing economies: Evidence from Malawi. *European Journal of Business and Management.* 4(18). Pp. 174-184.

Kim, K. (2003). Dollar exchange rate and stock price: Evidence from multivariate co-inegration and Error Correction Model. *Review of Financial Economics*. 12. Pp. 301 – 313

Kuwomu, J. K. M. (2012). Effect of macroeconomic variables on the Ghananian stock market returns: A cointegration analysis. *Agris online papers in Economics and Informatics*. 4(2)

Lutkepol, H. (2007). Econometric analysis with vector autoregressive models. *European University Institute WP Eco 2007/11*. Available at http://cadmus.iue.it/dspace/bitstream/1814/6918/1/Eco -2007-11.pdf [Accessed on 5th November 2014]

Masalila, K., and Motshidisi, O. (2003). Botswana's exchange rate policy. *BIS Paper No. 17*. Pp. 122-127. Available at http://www.bis.org/publ/bppdf/bispap17m.pdf [Accessed on 25th October 2014]

Mitchell, J. (2000). The importance of long run structure for impulse response analysis in VAR models. *NIESR Discussion paper No. 72. National Institute of Economic and Social Research.*

Motlaleng, G. R. (2009). Botswana's crawling-peg exchange rate system: Trends and variations in the pula exchange rate. *Botswana Notes and Records*. Vol. 14. Pp. 104-111.

Osianwo, B. G,. and Atanda, A. A. (2012). Determinants of stock market returns in Nigeria: A time series analysis. *African Journal of Scientific Research*. 9(1). Pp. 478-496.

Pilbean, K. (1998). *International Finance*. 2nd ed. Basingstroke: Mac.

Phillips, P. C. B. and P. Perron. (1988). Testing for unit roots in time series regression. *Biometrika*. (75) Pp. 335 -346

Phylaktis, K., and Ravazzolo, F. (2005). Stock prices and exchange rate dynamics. *Journal of International Money and Finance*. 22. Pp. 267 - 283

Raza, M. T., and Aravanan, S. (2014). Dynamics of stock returns and exchange rates: Evidence from India. *Asia Pacific Journal of Applied Finance*. 3(3). Pp. 1-17.

Richards, N. D., Simpson, J., and Evans, J. (2009). Interaction between exchange rates and stock prices: An Australian context. *International Journal of Economics and Finance*. 1(1). Pp.3 – 23

Roll, R. (1992). A mean/variance analysis of tracking error. *The Journal f Portfolio Management.* 18 (4). Pp. 13 -22

Saleh, G. (2009). The dynamic relation between stock prices and exchange rates in Egypt, Saudi Arabia and UAE. United States. UMI

Sikalalo-Lekobane, O. L., and Lekobane, K. R. (2014). Do macroeconomic variables influence domestic stock market price behaviour in emerging markets? A Johansen cointegration approach to the Botswana stock market. *Journal of Economics and Behavioural studies*. 6(5). Pp. 363 – 372.

Sims, C. (1980). Macroeconomics and Reality. *Econometrica*. 48. Pp. 1-48

Soemen, L. A., and Hennigar, E. (1988). An analysis of exchange rates and stock prices: The US experience between 1980 and 1986. *Akron Business and Economic Review*. 19(4). Pp. 71-76.

Stavarek, D. (2005). Stock Prices and Exchange Rates in the EU and the United States: Evidence on their Mutual Interactions. *Czech Journal of Economics and Finance*. 55 (3-4). Pp. 141- 161.

UNDP (2014). African Economic Outlook. Available at www.africaneconomicoutlook.com [Accessed on the 15th April 2015]