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-RESEARCH ARTICLE-

ANALYSIS OF THE IMPACT OF EXCHANGE RATE VOLATILITY ON THE SOUTH AFRICAN GOVERNMENT BOND MARKET

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─Abstract ─

Although government bond markets in Africa have been growing steadily, one of the factors inhibiting the growth of these markets is that only a few African economies have clear access to global financial markets. This factor has been worsened by the volatility of exchange rates of these countries, which could potentially affect bonds' yields adversely. This paper empirically investigated the impact of exchange rate volatility on the South African bond market and the economy as a whole. A quantitative technique was utilised with a Johansen cointegration estimation technique to determine whether the variables were cointegrated and to determine the effect of exchange rate volatility on the bond market and the economy. GARCH was used to generate exchange rate volatility from rand/US dollar exchange rate series, which was then used with other variables in a VECM for the main estimation. Monthly datasets from January 2000 to December 2018 were analysed with variables such as exchange rate, bond yields, real GDP and CPI included. The results from the Johansen cointegration test indicated that the variables have a long-run relationship. Furthermore, results from the VECM estimation indicates that volatility with regard to the external

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value of interest payment on government bonds discourages investment in the South African bond market. Inflation and economic growth are also found to have positive and negative effects on bond yield, respectively. The overall results from the study suggest that exchange rate volatility is one of the factors limiting the potential of the economy's bond market by discouraging foreign investment in the market. To this end, both the monetary and fiscal authorities in the country need to work together to formulate and implement policies that would reduce the volatility in the South African currency.

Key Words: bond market, exchange rate, GARCH, VECM, volatility

JEL Classification: G03, C03

1. INTRODUCTION

The African bond market, and specifically the government bond market, has been growing over the last decade, due to the need for finance and increased government expenditure (Reinhart & Rogoff, 2010). The government bond market has as its main purpose the sourcing of funding and finance for infrastructural development projects and in some cases to re-pay public debt (Hellowell, Vecchi & Caselli, 2015). A few factors inhibit the growth of these markets, such as access to global financial markets and the level of risk accompanied with African governments. Also of importance is the continued volatility of exchange rates of African countries' currencies, which could potentially affect bonds' yields adversely (Kumar & Baldacci, 2010). From a general point of view, the stability or volatility of the exchange rate is a reflection of how the global economy views the local economy and governance. If the global view is positive, the local currency could appreciate, but a negative view leads to volatility and depreciation of the currency (Wade, 2004). South Africa has been selected as the study area due to its global standing as a proxy for developing countries and the size and extent of the bond market. South Africa has over the last decade experienced high levels of currency volatility and this has affected government bond yields. Table 1 is a summary of some of the government bond yields throughout the world. South Africa compares well with the BRICS countries with yield rates between 3.2% (China) and the South African rate of 8.03%. From the table, its evident that stable, developed countries and regions have much lower bond rates if compared to African countries or other more relatively unstable countries such as Turkey. When looking at the net yield rates, Argentina and the Euro zone have negative net yield rates, while the rest of the selected countries have positive net yields with Zambia having the highest net yield followed by Kenya.

Table 1: Global government 10-year bond yields and inflation rates

Country	% yield	Inflation rate %	Net yield	Country	% yield	Inflation rate %	Net yield
Argentina	6.22	55.8	-49.6	Russia	7.37	4.7	+2.67
Brazil	7.31	3.4	+3.91	**South Africa**	**8.03**	**4.5**	**+3.53**
China	3.20	2.7	+0.50	Turkey	16.34	15.7	+0.64
Euro Zone	0.58	1.6	-1.02	US	2.05	1.6	+0.45
India	6.38	3.2	+3.18	Zambia	28.50	8.6	+19.9
Kenya	11.65	5.7	+5.95	Mexico	7.77	3.9	+3.87
Nigeria	14.01	11.2	+2.81	Spain	0.43	0.4	+0.03

Source: TradingEconomics, 2019

This paper has the aim to empirically investigate the impact of exchange rate volatility on the South African government bond market and the economy as a whole. The specific research question is: How is the volatile exchange rate in South Africa affecting the government bond yields as well as the impacts on the economic output? This study is important, as results could assist policy development and to again focus on the achievement of stability for economic growth. Economic, governance and political stabilities are required for a stable exchange rate and possibly the bond market. Throughout the literature review process, it was evident that limited studies have been conducted in this field of economics. Limited empirical studies are available, especially for developing countries, including African countries and even South Africa. A gap therefore exists in this field of economic research.

2. LITERATURE REVIEW

This section contains an explanation of important concepts included in the study, such as government bonds, and also analyses global empirical studies regarding the relationship between government bonds, exchange rates and economic growth. A government bond can be considered as a debt-based investment. Citizens buy bonds as a loan to the government, this is done in exchange for a guaranteed return on investment as a fixed rate, which is the yield rate for the agreement with government. In turn, the specific government can then use the funds raised via the selling of bonds for projects such as hard and soft infrastructure (IG Group, 2019). Investors analyse the risk of their investment in a specific government bond.

Higher risks lead to higher expected returns for the investor (Elton, Gruber, Brown & Goetzmann, 2009). Other factors that can affect the expected yield of the bonds are level of interest rates, inflation rates and economic growth (Cox, Ingersoll & Ross, 2005). Government bonds are backed by a country's treasury and, for most countries, especially developed countries, are generally viewed as safe investments. As is the case in many developing countries, poor governance leads to instability affecting the economy and exchange rates. This also results in lower confidence in the specific government and yield rate can increase (Hemming, Mahfouz & Kell, 2002).

Various factors could affect the yield rate of government bonds. The first factor is supply and demand in the bond market. A government bond is a financial asset, and prices are therefore also affected by supply and demand. Such bonds will only attract investment if it is a low risk with relative high returns (Tobin, 1969; D'Amico & King, 2013). Another factor is the movement and level of interest rates. High interest rates above that of the bond yield rate will result in low demand for bonds and *vice versa*. On the point of interest rates, the period towards maturity and the number of interest rate payments remaining could also affect the price of a bond (Hull, Predescu & White, 2005). A third and important factor is credit ratings. Although government bonds are in most cases seen as relatively low-risk investments, default on payments is possible. In order to determine the risk rating of a country, the risk ratings agencies Standard and Poor's, Moody's and Fitch are the authority (Duffie & Singleton, 2012).

From a theoretical point of view, government bonds can affect national economies as it impacts interest rates. Government bonds impact the economy by providing government with additional income, while also taking money away from consumers (Kenny, 2019). In periods of economic growth, inflation could increase and the Central Bank usually responds by an increase in interest rates. Stronger economic growth usually leads to higher bond yields (Bloom, 2014). In periods of increasing inflation, government bonds are under pressure as the future value of investment is at risk and investors will demand higher yields before they invest (Hakkio & Keeton, 2009).

Regarding empirical results from different countries, the following section provides insights into the relationships between government bonds, exchange rates and economic growth. Akram and Das (2015) analysed the factors that caused changes to government bond yields in India. The most important factor was changes in local interest rates taking into account the effects of economic growth and inflation. An interesting finding from this study was that a seemingly

important factor, such as increasing fiscal deficits, did not significantly raise bond yields. Bailey and Chung (1995) investigated the effect of exchange rate volatility with associated political risk on the bond market in Mexico. The main finding from the study is that volatility has an impact on bond yields and could lead to increased risks for investors and also has an impact on in emerging markets regarding sovereign debt markets and portfolio management. Pradhan, Zaki, Maradana, Dash, Jayakumar and Chatterjee (2015) tested the relationship between the government bond market and economic growth in G-20 countries for the period 1990 to 2011. The results from the study are that bi-directional causality exists between changes in the bond market yields and growth.

Presbitero, Ghura, Adedeji and Njie (2016) reviewed the government bond market from 1995 to 2014 for a total of 105 developing countries. The results from the study include that developing countries could successfully issue bonds in mostly large economies, with relatively high GDP per capita, with lower levels of government debt, where good governance is in existence, and countries with sound and effective fiscal policy. Schnabl (2009) tested the relationship and also the effect of volatility of the exchange rate on economic growth in East Asia. Global debates indicate that instability in the exchange rate could have a negative impact on growth, as international trade transactions costs are kept relatively stable allowing for confidence as well as government bond yields. Miyajima, Mohanty and Chan (2015) analysed the relationship between exchange rates and government bond yields in a number of developing countries from 2000 to 2013. The results indicate that local issues mostly affect the relationship between changes in the exchange rate and government bond yields, potentially leading to an increased diversification benefit. Another interesting finding is that global external shocks do not present significant impacts on the yields.

Mu, Phelps and Stotsky (2013) analysed African bond markets. The government bond market yields are positively correlated with good governance and interest rates, and negatively related to fiscal deficits and exchange rate volatility. Olabisi and Stein (2015) found similar results for African governments on the government bond markets and confirmed that African governments in general have higher yields leading to higher costs on loans due to higher risk ratings. In conclusion, government bonds have a duel effect on the economy, it provides the government with additional income for infrastructure investment, which should be spend effectively, but on the other hand, it takes away consumer spending power. Bonds are negatively affected by volatile exchange rates and economic conditions and rising bond yields affect the ability of government to repay debt.

3. METHODOLOGY

In order to capture the impact of exchange rate volatility on the bond market, the following model is formulated:

$$lgb_{it} = \alpha_0 + \beta_1 lexv_t + \beta_2 lcpi_t + \beta_3 lgdp_t + \epsilon_t \quad (1)$$

In the model, lgb is log of yields on government bonds, $lexv$ is log of exchange rate volatility, $lcpi$ is log of consumer price index, $lgdp$ is log of GDP and ϵ is the error term. From equation (1), the coefficient of exchange rate volatility is expected to be either positive or negative, since uncertainty in exchange rate movements incentivises investors to either hold their funds or invest, depending on their expectations. Furthermore, the coefficient of inflation rate is also expected to be negative or positive depending on whether fewer investors are motivated to invest in bonds, in the face of rising inflation, with a concern on the likely inability of the bond's yield to keep up with the rising costs of inflation or more investors are motivated to invest with the increase in interest payment following adjustment to rising inflation. Lastly, given the fact that the South African economy is an emerging economy, investors are expected to be highly optimistic about its growth prospects, and consequently invest more in it, and consequently, the coefficient of economic growth is expected to be positive.

To determine whether the variables in the model have a long-run relationship, a cointegration technique of Johansen (1988) and Johansen and Juselius (1990) was employed. This technique is applicable only if all the variables in the model are integrated of order one, and therefore, it is preceded by unit root tests. Johansen (1988) postulates that a p-dimensional VAR model, with up to k lags, can be formulated as follows:

$$Z_t = \Pi_1 Z_{t-1} + \Pi_2 Z_{t-2} + \cdots \Pi_k Z_{t-k} + \epsilon_t \quad (2)$$

where Z_t is a $(p \text{ x } 1)$ vector of p endogenous variables, which for this study, comprises log of yields on government bonds, log of exchange rate volatility, log of consumer price index and log of GDP. Π_i is a $(p \text{ x } p)$ matrix of parameters, and ϵ_t is the error term. Equation (4) presents the error correction model (ECM):

$$\Delta Z_t = \Pi_k Z_{t-k} + \sum_{i=1}^{k-1} \phi_i \Delta Z_{t-i} + \epsilon_t \quad (3)$$

where Δ is the difference operator, Π and ϕ are $(p \text{ x } p)$ matrices of unknown parameters, k is lag order and ϵ_t is the error term. The long-run parameters that are represented in the model by vector Π are defined as multiples of two vectors α

and β', such that $\Pi = \alpha\beta'$, where α represents the speed of adjustment from disequilibrium, while β' indicates a vector of long-run coefficients such that $\beta' Z_{t-1}$ in equation (5) represents up to $(p-1)$ cointegrating relationships in the model. Johansen and Juselius (1990) developed two likelihood ratio tests, which are based, respectively, on the maximal eigenvalue and the Trace test. The former is based on the null hypothesis of 'r' cointegrating vectors against the alternative of '$r+1$' cointegrating vectors, while the latter is based on the null hypothesis of at most 'r' cointegrating vector(s) against the alternative of more than 'r' cointegrating vectors. This follows from Johansen and Juselius' (1990) postulation that the rank (r) of vector Π in equation (5) is analogous to the number of cointegrating vectors in the model. If it has full rank, that is, $r = p$, then there are p cointegrating relationships; if $r = 0$, then it indicates that the variables are not cointegrated, in which case the appropriate model is VAR in the first differences, provided all the variables are integrated of order one (Enders, 1995; Harris, 1995). However, if the rank is equal to or greater than one, then one or multiple cointegrating vectors are confirmed, in which case, equation (3) becomes a vector error correction model.

The VECM is advantageous for this model, not only for its ability to enable both the long-run and short-run estimations, but also for being able to address the problems of simultaneity and endogeneity in the model.

Furthermore, according to Engle and Granger (1987), there is a likelihood of causality in at least one direction between variables that are both integrated of order one and cointegrated. To this end, the direction(s) of causality among the variables in this study are investigated by means of the pairwise granger causality test, which comes in the form of two tests. Assuming two variables X and Y, the first test investigates the null hypothesis that X does not granger-cause Y, while the second test investigates the null hypothesis that Y does not granger-cause X. If either of the two null hypotheses is rejected, and the other is not rejected, then we have a case of unidirectional causality (Gul & Ekinc, 2006).

In the model, the bond market is represented by the dataset on government bond yields, inflation rate is denoted by the consumer price index, economic growth is measured by GDP at constant prices, and the volatility of exchange rate is measured based on rand/US dollar exchange rate, and all data is sourced from the SARB. The time series included in the study is from 2000 to 2018, with monthly intervals. To obtain the volatility of exchange rate, a GARCH (1, 1) specification with lags of relevant variables was estimated, from which residuals were derived. Consequent to this, exchange rate volatility was captured by the conditional

variance of the residuals. The autoregressive conditional heteroscedasticity (ARCH) models were introduced by Engle (1982). The ARCH is advantageous, as it allows the error term to have a time-varying variance. Put differently, it is conditional on the past behaviour of the series. The model is generalised as GARCH by Bollerslev (1986) who provided a more parsimonious model, thereby lessening the computational burden with the use of fewer parameters (Bollerslev, Engle & Nelson, 1994).

4. ESTIMATION AND RESULTS

The descriptive statistics of the variables in the model are presented in Table 2. The average value of yields on government bond, rand to US dollar exchange rate, consumer price index and GDP for the study period stood at R9.16, R9.17, 69.08 and R880 235.30, respectively. Yields on government bond peaked at R14.79 in May 2000, while it was recorded its lowest value of R6.96 in May 2013. The highest and the lowest values of rand to US dollar exchange rate are R16.38, recorded in January 2016 and R5.73, recorded in December 2004. By and large, the variance is quite large for all the series as shown by the substantial differences between the maximum and the minimum values of the variables. This is further reinforced by the high standard deviation value of all the variables that indicate that the data points are quite spread out around their means.

Table 2: Descriptive statistics

Variable	Mean	Std. dev.	Min.	Max.	Obs.
gb	9.160307	1.568651	6.96	14.79	228
exr	9.169875	2.655628	5.732300	16.3801	228
cpi	69.075	21.07477	38.4	109.6000	228
gdp	880235.3	131403.3	642532.3	1053907.	228

The results of the unit root tests conducted on the variables are reported in Table 3. The tests were conducted based on the automatic lag selection by the Akaike information criterion (AIC). Two sets of tests were conducted, one with the inclusion of only constant in each equation, and the other with the inclusion of both constant and trend in each equation. Both the ADF and PP in the two-unit root tests agree that all the three variables are integrated of order one. In other words, all the variables assume stationarity only at first difference.

Table 3: Unit root tests

Variable	ADF (with constant only)		P-P (with constant only)		ADF (with constant and trend)		P-P (with constant and trend)	
	Level	1st diff.	Level	1st diff.	Level	1st diff.	Level	1st diff.
Lgb	-1.89	12.09*	-1.72	-11.93*	-1.59	-12.19*	-1.30	11.96*
Lexv	-0.98	15.43*	-1.02	-15.43*	-1.80	-15.40*	-1.88	15.39*
Lcpi	-0.98	10.69*	-0.71	-10.82*	-1.99	-10.71*	-1.01	10.84*
Lgdp	-2.24	-4.47	-1.96	-18.29	-0.76	-4.97*	-0.20	18.93*

Note: * indicate 1% significance level

For the optimum lag length of the model, all the lag length criteria unanimously indicate lag 4 as the optimum lag length for our model, and therefore it is adopted for the estimations. The results of the cointegration test conducted on the variables are presented in Table 4. From the results, the Trace statistic suggests that there are three cointegrating equations, while the max-eigen statistic indicates only one cointegrating equation among the variables. These indications are predicated upon the rejection of null hypothesis that no long-run relationship exists among the variables (that is, $r = 0$) at the 5% level of significance. Consequently, it can be concluded that the variables in the model are cointegrated, which allows the application of VECM for our analysis.

Table 4: Johansen cointegration test results

Hypothesised no. of CE(s)	Trace statistic	Critical value (5%)	Max-eigen statistic	Critical value (5%)
None	76.5052*	47.8561	38.1237*	27.5843
At most 1	38.3814*	29.7970	18.0157	21.1316
At most 2	20.3657*	15.4947	16.7296	14.2646
At most 3	3.6361	3.8414	3.6361	3.8414

Note: * indicate 1% significance level

The result of the estimated VECM cointegrating equation with the bond market as the dependent variable is presented in Table 5. The coefficient of log of exchange rate volatility is significant and negative, indicating that, in the long run, exchange rate volatility has a negative impact on the bond market. Specifically, an increase

in exchange rate volatility by 1% depresses the bond market by 0.06%, and *vice versa*. This result further suggests that volatility of yields of government bonds, especially with regard to the external value of domestic interest payments, occasioned by exchange rate volatility discourages investment in the bond market. This finding corroborates that of Mu, Phelps and Stotsky (2013), who posit that African governments' bond market capitalisation is inversely related to exchange rate volatility, smaller fiscal deficits, higher interest rate spreads and current and capital account openness. The coefficient of log of consumer price index is positive and statistically significant, which indicates that, in the long run, inflation rate affects the bond market positively. This result might be borne out of the fact that an increase in inflation rate leads to higher interest payments on investment in bonds, which, in turn, encourages more investment. Specifically, an increase of 1% in inflation is expected to enhance the bond market by about 1.81% and *vice versa*. Furthermore, the coefficient of GDP is negative and statistically significant, indicating that economic growth has a negative relationship with the bond market.

Table 5 also contains results of the short-run dynamics, where it is evident that the coefficients of all the lags of exchange rate volatility are positive, but statistically insignificant. This indicates that exchange rate volatility has no impact on the bond market in the short run. The coefficients of both consumer price index and GDP are equally insignificant, indicating that both inflation and economic growth also have no impact on the bond market in the short run. The third important result in Table 5 is that of the error correction term (ECT), which is expected to be negative, less than one and statistically significant if previous errors are to be corrected in the current period and also if long-run relationships exist among the variables. From the result, it evident that this condition is satisfied by the ECT in the model, which implies that any deviation from long-run equilibrium in the previous period would be corrected, however, at a rather slow speed of adjustment of approximately 8.6%.

Table 5: VECM results

Variable	Coefficient	Std. error	t-Statistic
	Cointegrating results		
Lexv	-0.0612	0.0228	-2.6826
Lcpi	1.8053	0.2942	6.1354
Lgdp	-3.8448	0.4865	-7.9028
	Short-run dynamics		
ect_{t-1}	-0.0857	0.0294	-2.9158
D(lexv(−1))	0.0086	0.0123	0.6944
D(lexv(−2))	0.0227	0.0121	1.8748
D(lexv(−3))	0.0048	0.0119	0.4042
D(lexv(−4))	0.0045	0.0104	0.4356
D(lcpi(−1))	0.7237	0.5982	1.2098
D(lcpi(−2))	0.2855	0.6307	0.4527
D(lcpi(−3))	0.1563	0.6211	0.2516
D(lcpi(−4))	0.3079	0.5849	0.5264
D(lgdp(−1))	0.1708	0.6864	0.2488
D(lgdp(−2))	1.0337	0.5163	2.0022
D(lgdp(−3))	-0.7365	0.5140	-1.4328
D(lgdp(−4))	-0.8006	0.7030	-1.1388

Turning to the impact of exchange rate volatility on the economy, results of the VECM estimations with economic growth (measured by GDP) as the dependent variable are presented in Table 6. The cointegrating equation results show that the coefficient of log of exchange rate volatility is significant and negative, which suggests that, in the long run, exchange rate volatility has a negative impact on the economy. Specifically, a 1% increase in exchange rate volatility is associated with an approximately 0.02% contraction of the economy. This result is in line with findings by Schnabl (2007), who provided evidence for both Emerging Europe and East Asia. The coefficient of log of consumer price index is reported to be positive and highly significant, which indicates that inflation affects growth

positively. Furthermore, the coefficient of yield on government bond is negative and statistically significant, implying a negative impact of the bond market on the economy. In the case of the short-run dynamics, results from the table show that the coefficient of the lags of exchange rate volatility are mixed and insignificant, which indicates that, in the short run, exchange rate volatility has no impact on the economy. The short-run results of both inflation and bond market also indicate no effect on economic growth, given the statistical insignificance of their coefficients. As for the ECT in the model, the result shows that the ECT is negative, less than one and significant, further confirming the long-run relationship of the variables in the model. It also indicates that previous deviation from equilibrium will be corrected at the speed of 3.5%.

Table 6: VECM results (dependent variable: economic growth)

Variable	Coefficient	Std. error	t-Statistic
	Cointegrating results		
lexv	-0.0159	0.0049	-3.2232
lcpi	0.4695	0.0232	-20.1653
lgb	-0.2600	0.0331	-7.8490
	Short-run dynamics		
ect_{t-1}	-0.0354	0.0111	-3.1701
D(lexv(−1))	0.0004	0.0012	0.3262
D(lexv(−2))	-0.0002	0.0012	-0.1489
D(lexv(−3))	-0.0006	0.0011	-0.5402
D(lexv(−4))	0.0001	0.0010	0.1208
D(lcpi(−1))	0.0663	0.0591	1.1204
D(lcpi(−2))	0.0212	0.0624	0.3403
D(lcpi(−3))	0.0763	0.0614	1.2416
D(lcpi(−3))	-0.0345	0.0578	-0.5973
D(lgb(−1))	0.0122	0.0069	1.7662
D(lgb(−2))	0.0003	0.0083	0.0344
D(lgb(−3))	0.0088	0.0085	1.0327
D(lgb(−4))	0.0110	0.0082	1.3318

The result of the granger-causality test conducted to ascertain the direction of causality among the variables is presented in Table 7. As shown in the table, there exists a bidirectional causality between the bond market and exchange rate volatility, while unidirectional causality exists between bond market and inflation, with causality coming from the bond market. Another case of bidirectional causality is found between economic growth and the bond market. Furthermore, the results suggest that there is no causality between log of consumer price index and log of exchange rate volatility, as we cannot reject the null hypotheses of no granger causality in both directions. Causality between economic growth and

exchange rate volatility is also found to be unidirectional, with causality coming from the latter. Lastly, a case of bidirectional causality is established for economic growth and inflation, as we cannot reject the null hypothesis of no granger causality in both directions at the 1% level.

Table 7: Granger causality test

Null hypothesis	F-stat	Probability	Decision
lexv does not granger cause lgb	3.20**	0.0395	Reject
lgb does not granger cause lexv	25.65***	0.0000	Reject
lcpi does not granger cause lgb	0.58	0.6285	Do not reject
lgb does not granger cause lcpi	7.48***	0.0000	Reject
lgdp does not granger cause lgb	2.28*	0.0800	Reject
lgb does not granger cause lgdp	6.97***	0.0002	Reject
lcpi does not granger cause lexv	1.81	0.1464	Do not reject
lexv does not granger cause lcpi	0.88	0.4542	Do not reject
lgdp does not granger cause lexv	1.55	0.2028	Do not reject
lexv does not granger cause lgdp	6.55***	0.0003	Reject
lgdp does not granger cause lcpi	10.73***	0.0000	Reject
lcpi does not granger cause lgdp	4.73***	0.0032	Reject

Note: ***, ** and * indicate significance at 1%, 5% and 10%, respectively

For diagnostic checks on the estimation results, the Lagrange multiplier (LM) test of residual serial correlation, Jaque-Bera normality test and the heteroscedasticity test were utilised, which are all presented in Table 8. The statistical significance of any of the respective three diagnostic tests indicates the presence of the respective biasedness in the estimated results. As shown in the table, none of the tests are significant, which implies that the model is free from both serial correlation and heteroscedasticity, while also exhibiting normal distribution.

Table 8: Diagnostic tests

Type of test	Prob.
Serial correlation LM test	0.5297
Normality test	0.3105
Residual heteroskedasticity test	0.3111

5. CONCLUSIONS

Developing countries, which, in many cases are characterised by unstable political and economic environments, are also affected by high levels of exchange rate volatility. This adversely affects the marketability of their government bonds, and ultimately, the applicable yields. This paper empirically investigated the impact of exchange rate volatility on the government bond market and the economy as a whole in a developing country, namely South Africa. A quantitative technique was utilised to achieve the objective using the Johansen cointegration estimation technique to determine whether the variables were cointegrated and to determine the effect of exchange rate volatility on bond market and the economy. The main results indicated that, in the long run, exchange rate volatility has a negative impact on the government bond market. Specifically, an increase in exchange rate volatility by 1% depresses the bond market by 0.06%. This result further suggests that volatility of yields of government bonds, especially with regard to the external value of domestic interest payments, occasioned by exchange rate volatility, discourages investment in the bond market. Furthermore, results indicate that the coefficients of both consumer price index and GDP are equally significant, indicating that both inflation and economic growth also have positive and negative impacts, respectively, on the bond market in the long run. Moreover, exchange rate volatility is found to have a negative impact on the economy. Also in the short run, exchange rate volatility has no significant impact on the economy. The short-run results of both inflation and bond market also indicate no effect on economic growth, given the statistical insignificance of their coefficients. Regarding causality, a bidirectional causality between the bond market and exchange rate volatility exists, while unidirectional causality exists between bond market and inflation, with causality coming from bond market. Another case of bidirectional causality is found between economic growth and the bond market.

The study limitations relate to a restricted dataset with only four variables. Future research could include other financial market variables and comparative studies between other African countries to test the strength of such bond markets and

relationships to other economic variables. Government bond market analysis is a relatively less researched field, especially within the African context, and results and methodologies used in the paper could contribute to the discourse in this study field. Effective management of government bonds forms an integral part of good governance and successful economic development strategies should be included in economic strategies. On the other hand, policy uncertainty and government instability will have a negative effect on the bond market, thereby making it difficult for the government to achieve its developmental objectives. Both the monetary and fiscal authorities in the country need to work together to formulate and implement policies that would reduce the volatility in the South African currency.

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