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Long Run Relationship between Macroeconomic Indicators and Stock Price: The Case of South Africa

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ABSTRACT

This paper examines the long-term equilibrium between South Africa's stock index and selected macroeconomic variables using vector error-correction models (VECM). Upon testing for co-integration, long run structural equation modelling (LRSM) and VECM, the results indicate that industrial production is the most important determinant of stock market prices. This suggests that South Africa's stock market is highly sensitive to the country's industrial production. Money supply, inflation, and exchange rates are other determinants of South Africa's stock index but to a lesser extent than industrial production. The study found that the macroeconomic variables comprising industrial production, inflation, money supply, and exchange rate are co-integrated on the long run with stock market prices. These findings have implications for policy makers in the sense that any changes in the

macroeconomic policy should take into consideration the impact of such changes on the stock market.

KEYWORDS: Stock price; Macroeconomic; South Africa; Cointegration; VECM

INTRODUCTION

Stock market plays a crucial role in the economic development of countries. It helps in transferring the funds from surplus units to deficit units. As the stock market performs favourably, the economy is expected to grow. Furthermore, both economic and financial theories argue that stock prices are affected by the performance of main macroeconomic variables. Understanding the factors that influence the behaviour of stock markets have long been debated by economists, policy makers, and other interested parties. This is due to the significance of stock market behaviour to the entire economy and economic development of counties. There are extensive studies on the impact of macroeconomic variables on stock markets in developed market with a growing body of literature on emerging and developing countries [1,2].

This study explores the relationship between stock market and macro-economic indicators in the context of South Africa. South Africa's stock market is considered the most active and largest stock market in Africa and among the largest and most important markets in the world. Accordingly, understanding the determinants of its behaviour is important for policy makers, investors, and other stakeholders [3].

A handful of studies have investigated the role of fundamental macroeconomic variables on stock markets in developing and emerging countries such as South Africa [4,5]. As South Africa's stock market continues to undergo technical changes, which likely increases the efficiency of the market thus increasing its response to macroeconomic events, there is a need to investigate the impact of macroeconomic variables on stock prices in view of the on-going changes. The studies that examine the issue in the context of South Africa have been conducted using outdated data and hence may not capture the impact of substantial changes made in South Africa after 1994 [4,5]. Moreover, studies that have been undertaken in South Africa focused on one variable and its co-integration with stock prices, whereas this study will consider numerous variables including inflation, money supply, exchange rate, and industrial production and its impact on South African stock prices.

Our use of the time series technique will add rigor to the results of the study. As such, this study aims to provide new evidence on the relationship between stock prices and economic determinants. The results would have implications for the authoritative bodies and other stakeholders.

LITERATURE REVIEW

A wide range of studies have been undertaken to determine the economic forces that influence stock markets. Although there are growing studies on emerging and

developing markets most have focused on developed countries. The leading study in this regard is Fama which proposed the capital asset pricing model. Following this study, various studies found inconclusive results on the relationship between stock prices and macroeconomic variables.

Maysami et al. (2004) examined the long run relationship between stock prices in Singapore and a set of economic variables including exchange rate, money supply, inflation, and industrial production. They found that the stock market index forms a co-integration relationship with changes in the short and long term interest rate, industrial production, prices levels, exchange rate, and money supply. Other studies in developed counties found a long run relationship between macro-economic variables and stock prices [6,7].

Studies in developing and emerging markets have grown rapidly in the last few years. Kutty [1] examined the relationship between stock prices and exchange rates in Mexico using the Granger causality test. He documented that stock prices lead exchange rates in the short run with no long run relationship between these two variables. Similarly, Ali et al. [2] investigated the relationship between macroeconomic indicators and stock prices in Pakistan. Their results concluded that stock prices co-integrated with industrial production. However, no causal relationship is documented with other macroeconomic variables. Ahmet et al. [8] examined the long relationship between stock prices and inflation, exchange rate, industrial production, and money supply to find that there is long run causality between those determinants and stock prices in Turkey. Gay [9] in Brazil, Eita [10] in Namibia, and Adjasi et al. in Ghana investigated the same issues and found a co-integration relationship among macroeconomic variables and stock prices.

As far as South Africa is concerned, Jefferis et al. [4] tested the influence of economic fundamental or drivers of stock return in South Africa, Botswana, and Zimbabwe adopting co-integration and error correction techniques and utilising quarterly data throughout the 1985 to 1995 period. The finding of the study revealed that the stock market is influenced by economic growth and other variables such as exchange rate and interest rate. Exchange rate has a positive relationship with stock prices and real GDP and is negatively related to interest rate. Van Rensburg [5] a study to uncover the expected influence on macroeconomic variables on the South African stock exchange in Johannesburg using data from 1980 until 1994. The vector autoregressive (VAR) technique was employed and the result reported that stock returns mainly follow the industrial sectors.

Apart from the above two studies, Moolman [11] investigated whether there is a relationship between stock return and macroeconomic variables using Markov's switching model. The findings documented that stock return is influenced by economic variables. Following these studies, there was scant literature on this issue, especially research that used recent data. Among recent researches is Arjoon et al. [12] in South Africa using the structural bivariate vector autoregressive (VAR) method. They tested the long run association between inflation and stock prices. The results indicated that stock prices are invariant to permanent changes in inflation rate. The impulse responses reveal a positive real stock price response to a permanent inflation shock in the long run which implies that any deviations in short run real stock prices will be corrected towards the long run value. Furthermore,

Ocran [13] found that there is co-integration relationship between South Africa stock prices, US stock prices, and exchange rate.
The data used in literature on South Africa were very old data and therefore, investigating such an issue by using recent data could add new evidence to the relationship between stock market and macroeconomic variables. This is very important since South Africa has undergone many substantial changes in their market following 1994. As the few studies on South Africa used data prior to 2000, this study will fill the gap by examining the impact of macro-economic variables on stock returns using recent data and employing co-integration and the Vector Error Correction Model (VECM). Further, it is evident from the literature review that the issue of causality between stock market performance and economic determinants has remained inconclusive either theoretically or practically and thus, the paper contributes to literature on stock prices and its determinants by providing new evidence to interested parties such as the government and investors.

THEORY AND HYPOTHESES DEVELOPMENT

Inflation Rate

The vast literature on the theoretical relationship between the rate of inflation and stock prices in an economy has shown varied predictions about the long run effects of inflation on real stock prices [12]. A large body of literature provides evidence for the movement of financial asset prices in response to inflation changes, but conclusions have been widely debated. Different explanations and theories have been provided for the relationship between stock prices and inflation such as proxy hypothesis by Fama and nominal contract hypothesis [14]. An increase in an inflation rate is expected to relate negatively with stock prices. This is because rising inflation is more likely to lead policy makers to tighten policies. This has an impact on the nominal risk free rate and hence leads to increases in the discount rate used in valuation [15]. Therefore, the hypothesis is that the higher inflation rate the more likely the stock prices would experience a down trend.

Exchange Rate

There is wide debate among researchers, policy makers, and economists as to whether stock prices influence exchange rates or vice versa. Empirically, the literature is inconclusive and unable to find unique findings due to different country specific institutional and environmental forces. In classical economic theory, the deprecation of a certain currency will lead to increasing the demand for the country's export consequently leading to increases in cash flow and profit of companies, which in turn will drive the stock prices to higher levels [1,15,16]. Conversely, according to traditional approaches, appreciation in the currency is considered bad news for local firms as it will drive the competitive advantages of export to lower rates therefore leading to decline in a firm's profitability and stock prices. According to this view, a negative relationship would exist between stock prices and exchange rate. Others like Maysami et al. [15] suggest an alternative explanation and argue that appreciation in the currency would attract the investment and thus push up stock market prices. Due to conflicting results, in line Phylaktis et al. [16] this paper

hypothesises that there is positive relationship between stock market and exchange rate.

INDUSTRIAL PRODUCTION

This factor usually used to measure the real economic activity [15]. In the theory, the productive capacity of an economy indeed depends directly on the accumulation of real assets, which in turn contributes to the ability of firms to generate cash flow. As results of this argument the stock prices will exhibit a growth trend. This is because the industrial production index is an indicator of real output. In line with studies conducted by Humpe et al. [7] on stock prices and industrial production, the positive relationship between stock price and industrial production is hypothesised.

Money Supply

An increase in money supply growth would indicate excess liquidity available for buying securities, resulting in higher security prices. The modern quantity theory of money developed by Brunner assumes that investors reach an equilibrium position in which they hold a number of assets including money in their portfolio. A monetary disturbance, such as an increase in rate of money supply, causes disequilibrium in portfolios of assets. As a result, asset holders adjust the portion of their portfolio. This adjustment alters the demand for other assets that compete with money balances, including stocks. Due to the increase in the money supply, there would be excess demand from investors for stock and hence the prices of stocks will increase and vice versa. Even though the literature and empirical evidence did not reach the agreement on the effect on money supply on stock a price, the paper hypothesises that increase in money supply will lead to increase in stock prices.

Research Methodology

This study investigates the impact of certain economic variables described in a previous section on the stock market behaviour of South Africa using monthly data for the period between January 1998 and August 2010. To achieve this objective, the study employs time series techniques or vector Auto-regression (VAR) framework.
By adopting such techniques, it is argued that the weakness of traditional regression can be overcome. Using time series method which includes granger co-integration, error correction model, and variance decomposition, researchers would be better able to consider the problems faced in the regression. The main problem of regression centres on the idea that economic variables are non-stationary and hence the results of t-test and f-test could be invalid. Researchers tried to solve such problems by differentiating the variables. However, such an approach has another implication on the data as it will remove the long run relationship or the theoretical part. Apart from the above, the application of this method helps to deal and account for the problems of endogeneity, as it can be dealt with in a suitable manner and as such the variables are considered endogenous and the data will determine whether the variable is endogenous or exogenous [17].

The VAR method comprises several steps including unit root test, co-integration test, Error Correction Model, Impulse Response Function persistence profile. The importance of these tests is briefly described in the next sections.

Unit Root Test

Most of the time series data are non-stationary, meaning that the mean and variance are not constant over time. When the data are nonstationary, it will lead to wrong conclusion in classical regression and hence spurious results will be produced. Therefore, in co-integration analysis we have to test whether the variable is stationary or nonstationary in order to proceed with the next step of co-integration testing. The variable should be I (1) or non-stationary in its level form and stationary in its difference form. Many tests have been suggested to test the non-stationary of the variables such as Augmented Dickey- Fuller (ADF) and Phillip Pirron (PP). For the purpose of the study, ADF is utilised to test each variable in its level and difference form.

Determination of the Order of the VAR

The second step in time series co-integration is that the VAR order should be selected. There are different methods of selection of the VAR or the number of lags to be used when the test of co-integration is conducted. In this study, Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC) are adopted. The rule of thumb in this step is to select the maximum value under each method which gives the order of the lag. Usually, the AIC maximises the lag and SBC minimises the lag.

Testing for Co-Integration and Long Structural Modeling

According to Masih and Masih [18] co-integration plays an essential role in determining the presence or absence of Granger causality. This test is useful for estimating a long-run relationship between time series macroeconomic. If two or more variables are found to be non-stationary, the linear combination of these variables is most likely to occur. Two variables are said to be co-integrated when they experience long run relationship. In relation to this study, the co-integration technique analyses the long-run relationship and stock prices and some fundamental macroeconomic variable. For the purpose of this study, Johansen co-integration technique is applied based on its Eigen value and trace statistics. Once the estimated co-integration vector is determined, it is subjected to exact identification and over identification restrictions based on theoretical expectations and prior information of the market [19]. The test of co-integration as mentioned by Masih et al. [19] tests the long run theoretical relationship and rules out any spurious relationship.

Vector Error Correction Model (VECM)

Once we confirm that there is a long run relationship between the variables as indicated from the previous step, VECM comes to play another role in determining

the exogeneity and endogeneity of the variables under investigation. This method is another approach to investigate the relationship among variables and determine the direction of Granger causality in the short and long run [19]. For example, ECM combines the short and long run relationships of the variables in one equation [20].

Variance Decomposition

While in the VECM, we can determine which variable is exogenous and which endogenous. However, it is through VDCs that we know the relative endogeneity and exogeneity of the variables [19]. This can be done by portioning the variance of forecast error of a variable into proportions attributable to shock in each variable in the system including its own. The variable that explains its own shock more than others is considered a leading variable and the variable that explains less of its own shock is considered a lagging variable.

Impulse Response Functions (IRFs)

The IRFs present the same information contained in VDCs, however, the IRFs map out the results in graphical form for the dynamic respond path of the variable to one period standard deviation in another variable [18].

Persistence Profile

Finally, this step is designed to estimate how long the variables take to return to equilibrium when there is a wide system shock.

Data, Empirical Results and Discussions

As mentioned previously, the objective of this study is to determine whether the economic variables under investigation influence the behaviour of South Africa's stock market. The data for this study runs over the period beginning from January 1998 until August 2010. The variables of the study include the stock market index of South Africa (SA), money supply (M2), inflation (INFL), exchange rate (EX), and industrial production (IP).

Result of Testing For the Unit Root

Performing stationary/non-stationary test requires that the variables are transformed to log for the level and then to take the difference of log form.

Log of level form variables are:

LSA= log(SA); LM2 = log(M2); LINFl = log(INF); LIP = log(IP); LEX = log(EX);

Then we have to difference as follows

DLSA = LSA - LSA(-1); DLM2 = LM2 – LM2 (-1); DINLF = LINLF - LINFL (-1); DLIP = LIP - LIP (-1); DLEX = LEX - LEX (-1);

The summary of the variables and the results of ADF are shown in Table 1:

Table 1: Stationary and non-stationary results

Variable	**Abbreviation for level form**	**Stationary of the variables**	
		Level form	**Difference form**
South Africa stock index	LSA	Non-stationary	Stationary
Money Supply	LM2	Non-stationary	Stationary
Inflation	LINF	Non-stationary	Stationary
Exchange Rate	LEX	Non-stationary	Stationary
Industrial Production	LIP	Non-stationary	Stationary

Based on ADF, for the level form and difference for shown in Table 1, all variables are I (1), which suggests that the null hypothesis of non-stationary (i.e. the variables are stationary) is supported for all variables.

Selection the Order of VAR

This step determines the optimal order for the VAR. At this stage, according to Pesaran, it is important to select a high enough order in the sense that with confidence the optimal order will not exceed it. Hence, Lag 6 was entered into the VAR order. Therefore, the results of the test select VAR order of 2 has been selected as the lag order for the VAR.

Co-Integration Test

Co-integration is conducted following the determination of VAR. This determines whether there is co-integration among the variables. Based on evidence from different markets, there is at least one co-integration equation. Multivariate with VAR order 2 is used to obtain the results based on ‘eigenvalues’ and the ‘trace’ statistics to determine the value of r (co-integrating relationship). If r = 0 is accepted, there is no co-integration among the variables. If r = 0 is rejected, there is co-integration among the variables.

As shown in Table 2 Panel A and Table 2 Panel B, the test statistics based on calculated maximal eigenvalue of the stochastic shows a value of 42.6030 which is greater than the critical value at 95% level of significance 37.8600, suggesting the null hypothesis of no co-integration or zero co-integration is rejected, and therefore, the alternative hypothesis of one (1) co-integration is accepted. Furthermore, the null

hypothesis of r ≤ 1 co-integration cannot be rejected whereas the alternative hypothesis of r ≥ 2 is rejected. This is because the maximal eigenvalue (23.1095) in this case is less than critical value (31.7900) at 95% level of significance. Similarly, the results of the trace test shown in Table 2 indicate the same conclusion as those drawn from the maximal eigenvalue. Based on the above results and discussion, there is co-integration between the variables hence rejecting the noncointegration.

Table 2: Results of co-integration

Panel A eigenvalue				
H0	H1	Statistics	95% Critical value	90% Critical value
r = 0	r = 1	42.6030	37.8600	35.0400
R ≤ 1	r = 2	23.1095	31.7900	29.1300
Panel B Trace statistic				
r = 0	R ≥ 1	95.8365	87.1700	82.8800
R ≤ 1	R ≥ 2	53.2335	63.0000	59.1600

Long Run Structural Equation Modeling (LRSM)

LRSM is an important analytical step in the sense that we can compare the theoretical expectation with the generated statistics. In other words, LRSM allows estimating the long rum model based on theory by imposing identifying and over identifying the parameters [21]. Since the main purpose of the article is to ascertain the influence of economic variables on the South African stock index, we impose restrictions on the LSA or South African stock index. This means that we have to normalise the dependent variable to reveal the significance of the variables as determined by its T-ration statistics. The summary of the results of exact identification is depicted in Table 3.

LSAt =– 0.1277 LM2t + 2.3328 LEXt - 17.5841 INFLt -+ 7.9777 LIPt ~ I(0)
(0.279) (1.01) (10.97) (5.3386)

Table 3: Results of exact identification

Vector 1	**T-Ratio**
LSA	1.0000 (*NONE*)
LM2	-.12773 Insignificant (0.457) T-ratio less than 2 (.27905)
LEX	2.3328 significant (2.130) T-ratio more than 2 (1.0195)
LINFL	-17.5841 Insignificant (1.602) T-ratio less than 2 (10.9759)
LIP	7.9777 (5.3386) Insignificant (1.494) T-ratio less than 2

Trend	.053349 (.041690)

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LL subject to exactly identifying restrictions= 2269.8

Value in parentheses are standard errors

Based on the results of Table 3, only foreign exchange rate (LEX) is significant and the other variables are insignificant as indicated by the T-ratio. Following the exact identification restriction, we applied one restriction on money supply (LM2), inflation (LINFL), and industrial production (LIP) variables at once. To check the robustness of such restriction, one restriction was applied on each variable. The results of restriction on all variables are shown in Table 4.

Table 4: The results of over identification restriction

	Vector 2
LSA	1.000 (*NONE*)
M2	.0000 (*NONE*)
LEX	1.2423 (19937)
LINFL	.0000 (*NONE*)
LIP	-.0000 (*NONE*)
Trend	-.011134 (.9885E-3)

LR Test of Restrictions CHSQ(3)= 20.2314[.000]
DF=Total no of restrictions (4) - no of just-identifying restrictions (1)
LL subject to exactly identifying restrictions= 2269.8
LL subject to over-identifying restrictions= 2259.7

Table 4 shows that the restrictions imposed on the variables are rejected by Chi Square of 0.000 and hence we proceed Vector 1 for the reminder of the paper. The rejection of the restrictions means that the variables entered the co-integration relationship significantly. To check the robustness of restrictions, the researchers imposed restrictions for each variable separately. To summarise the results of those additional restrictions, the restriction is only valid for LINF (inflation) and LIP (industrial production) while the separate restriction on M2 (money supply) is not valid. The restrictions on LINF (inflation) and LIP (industrial production) are rejected with Chi Square of 0.000 and therefore, the two variables enter the co-integration relationship significantly. With regards to M2 or money supply restrictions, they cannot be rejected with Chi Square of 0.672 and therefore we have to drop that variable. However, based on the theoretical underpinnings, the impact of money supply on the stock market behaviour and empirical evidence reported by literature, the researcher prefers to proceed with vector 1 for the reminder of the paper.

Vector Error Correction Model (VECM)

VECM shows further information on the relationship between variables. Co-integration does not tell the direction of Granger causality as to which variable is endogenous and which is exogenous. Thus, VECM is used to reveal which variable is dependent and which is independent. Table 5 summarises the results of VECM. Determining which variable is endogenous and which exogenous can be inferred from the table. Policy makers and related parties are in a position to better identify the areas meriting greater focus. Table 5 shows that LSA or stock market behaviour is a dependent variable according to T-ratio of more than 2, as expected. Money supply (LM2), and industrial production (LIP) are independent variables. Lastly, exchange rate (LEX) and inflation (LINF) are dependent variables.

Table 5: results of VECM

Variable	ECM(-1) t-ratio p-value	Implication
LSA	-3.27 [.001]	Variable is endogenous
LM2	-.95779[.339]	Variable is exogenous
LINFL	3.0483[.003]	Variable is endogenous
LEX	2.1513[.033]	Variable is endogenous
LIP	1.2559[.211]	Variable is exogenous

Variance Decompositions (VDCs)

The results of the previous step cannot explain the relative endogeneity and endogeneity of the variables. Therefore, the VDCs are designed to draw conclusion on such a matter. There are two types of VDCs tests. The first is the orthogonalized forecast error variance decomposition and the second is generalised forecast error variance decomposition. Table 6 shows a summary of the results from orthogonalized forecast error variance decomposition. The most leading variable is the industrial production which confirms the results of VECM in which industrial production (IP) is an exogenous variable explaining about 97% of its own shocks. This is consistent with the theory and previous empirical evidence from other countries [22]. South Africa as an industrial country is growing fast in this field and this could be due to the changes made in the political atmosphere as well as the country's reputation in the gold industry. Thus, the implications are that the market reacts to industrial events very sensitively.

Table 6 also shows that money supply follows industrial production in its effect on stock markets. This results show that M2 (explains 97% of its own shock) is the

second leading variable in line the VECM results whereby the money supply was an exogenous variable. This also accords to the theory of money supply as access liquidity leads to high demand for stock shares which pushes the prices upward due to high demand. However, the surprising results here are that the South African stock market is the third leader variable explaining 91% of its own shock. The least leading variable or the dependent variable is exchange rate, which is contradictory to the theory. However, the results of orthogonalized forecast error variance decomposition is sometimes misleading as it is assumes that when one variable is shocked the other variables are switched off.

Table 6: Orthogonalized forecast error variance decomposition

	LSA	**M2**	**LEX**	**LINFL**	**LIP**	**Total**
LSA	91.6%	0.02%	7.7%	0.05%	.00%	100%
M2	0.03%	97%	2.5%	.002%	.03%	100%
LEX	32.1%	0.04%	65.8%	1%	0.02%	100%
LINFL	1.8%	1.6%	12.8%	83.7%	0.01%	100%
LIP	0.8%	0.4%	0.1%	1.3%	97.2%	100%

Relative exogeneity and endogeneity according to orthogonalized VDCs

LIP	M2	LSA	LINFL	LEX
Industrial production	Money supply	Stock market south Africa	Inflation	Exchange rate

Furthermore, it is affected by the ordering of the variable and may produce different results if the order of the variables is changed. For these reasons, the paper proceeds to analyse the generalised forecast error variance decomposition as it may reflect better results.

Table 7 shows the results of the generalised forecast error variance decomposition. This may reflect the true picture than the orthogonalized forecast error variance decomposition. It does not consider the issue of ordering of the variable. As reported in Table 7, the South African stock market is the least leading variable which confirms our expectation. The VECM results show that the South African stock market was an endogenous variable in the sense that its performance is dependent on different economic determinants. Again, industrial production is the most leading variable. Similarly, money supply has a leading role in guiding the market behaviour.
Relative exogeneity and endogeneity according to orthogonalized VDC.

Impulse Response Function (IRF)

The results of VDCs are similar to the results of impulse response function. However, in the IRF, the results are depicted in graphical form. The drawn conclusion from all graphical representation of the shock in any variable is that industrial production (LIP) is the only variable that does not react to other shocks in variables. However, when it is shocked, all other variables react positively and negatively indicating its exogeneity. The reaction for stock prices to the shock on other variables varies according to the nature of the variable.

Table 7: Generalised forecast error variance decomposition

	LSA	M2	LEX	LINFL	LIP	Total
LSA	58%	0.09%	40.2%	0.07%	0.03%	100%
M2	0.33%	95%	2.2 %	0.0189%	2.19%	100%
LEX	24.55%	0.03%	73.44%	1.53%	0.44%	100%
LINFL	1.8%	1.7%	12.9%	83.6%	0.000	100%
LIP	0.88%	0.53%	0.09%	0.02%	98.46%	100%

Relative exogeneity and endogeneity according to orthogonalized VDC

LIP	M2	LEX	LINFL	LSA
Industrial production	Money supply	Inflation	Exchange rate	Stock market south Africa

For example, LSA or South African stock prices react positively to shocks in M2 indicating the positive relationship between both variables as indicated by theory which states that access liquidity will lead to increasing the demand for stock prices in the long run. Inflation and stock prices proved to have a negative relationship in the long run. Overall, all variables are co-integrated in the long run and not in the short run as indicated by VECM and thus, the shock of one variable has a different impact on the co-integration relationship as some of the variables react sensitively while others do not.

Persistence Profile

This test is designed to show how long the entire co-integration equation takes to return to equilibrium when the system is shocked. Figure 1 shows the system wide shock result and it is graphically shown that it takes about two and half years or 30 periods (months) to return to equilibrium.

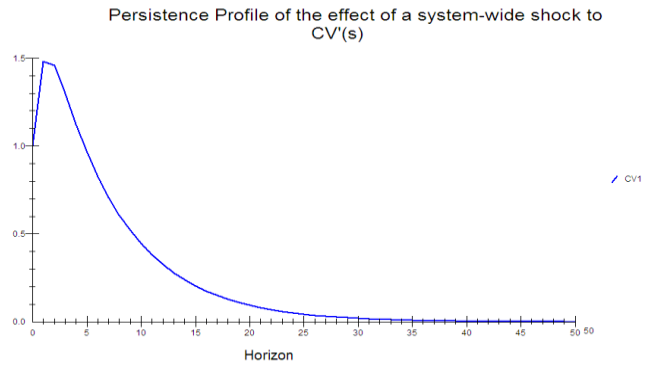

Figure 1: Persistence Profile

CONCLUSION

This study employs a time series technique comprised of cointegration, error correction modelling, and variance decomposition to reach empirical evidence of the nature of relations between stock prices and macroeconomic variables. The findings revealed that the South African market formed significant relationships with all macroeconomic variables included in this study. Precisely, the South African stock market is more sensitive to industrial production than other variables thereby highlighting its importance. The results are consistent with previous studies [4,5].

Prior studies have [15] argued that the economy of a country relies directly on the accumulation of real assets, which in turn contributes to the ability of firms to generate cash flows and hence affecting the price of stocks. Money supply shows its significant in affecting the stock market, which can be related the increasing in the liquidity and hence availability of cash to buy securities, which pushes stock prices to rise up. As evident from the study, such a relationship is considered a long run relationship. The presence of co-integration supports the opponents of efficient market hypothesis in which they argue that the market reflects the available information. This study would guide South African policy makers toward reassessing their policies regarding those macroeconomic variables and their influence on the stock market. The policy makers should think wisely when deciding to alter or change their policies regarding the macroeconomic variables. They should be aware that any changes in their policies would have affected the stock market. Finally, it is worthwhile to note that the study has some limitations due to the problems encountered in time series such as the order of lag selection and its impact on other results. Other avenues of research could be in developing a model to predict the above relationship using non-linear techniques.

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