NOVATEUR PUBLICATIONS
JournalNX- A Multidisciplinary Peer Reviewed Journal
ISSN No: 2581 - 4230
VOLUME 6, ISSUE 9, Sep. -2020

THE IMPACT OF MACROECONOMIC VARIABLES ON STOCK MARKET DEVELOPMENT IN ZIMBABWE (1990-2018)

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ABSTRACT— This paper examines the impact of macroeconomic variables on stock market development in Zimbabwe using Autoregressive Distributed Lag (ARDL) model. The macroeconomic variables used are, exchange rates, interest rates, money supply, gross domestic product (GDP) and inflation rate while stock market capitalization is used as a proxy for stock market development. The diagnostic tests conducted revealed that the model is not suffering from any regression violations and all variables were stationary in levels at first difference. The ARDL bounds test revealed the presence of cointegration between stock market development and macroeconomic variables hence an error correction model was adopted. The ARDL error correction model reveled that in the long run only exchange rate has a significant positive relationship with stock market development and only inflation has a negative insignificant relation with stock market development. GDP, money supply and interest rates have a positive insignificant relationship with stock market development. The Granger causality results show that there is a bidirectional relationship between stock market capitalization and exchange rate in Zimbabwe, no causality between stock market development and real GDP, unidirectional causality between inflation and stock market capitalization, running from stock market capitalization to inflation. Results also show that there is no causality between stock market capitalization and money supply, unidirectional causality between interest rates and stock market capitalization which runs from stock market capitalization to interest rates. It is thus recommended that government should consider policies that can help stabilize the macroeconomic environment in Zimbabwe and also to come up with policies that can regulate the activities of the ZSE, to encourage transparency and accountability. This will help in building investor's confidence and attract domestic and foreign financial inflows. **Keywords— stock market development; stock market capitalsation; macroeconomic variables; stock market**

I. INTRODUCTION

Governments of developing economies have of late turned to stock markets as an avenue for raising capital to finance various projects instead of depending on financial institutions for funds (Molefhi, 2019). Stock markets play a fundamental role in economic prosperity by fostering capital formation and sustaining economic growth (Charles and Adjasi, 2008; Pilinkus, 2015). Its performance influences financial and economic conditions of a country by facilitating capital flow from surplus units to deficit units (Joshi, 2015, Pilinkus, 2015). This process generates savings, which in turn can be used to grow different sectors of the economy (Khalid and Khan, 2017). Hence, factors affecting stock market performance are of key interest to economic players and policy makers. Fama (1981), argues that there is a comprehensive group of macroeconomic variables that influences the stock prices and hence its performance. This view suggests that there is a dynamic linkage between stock markets and the macroeconomic environment. Thus it is believed that, if a country's stock market is performing well and expected to grow at a vigorous pace, the macroeconomic environment is frequently anticipated to reflect the same. In Zimbabwe however, macroeconomic performance seem to be having no bearing on the development of the stock market as observed in the period 2001 to 2008 where Zimbabwe had the worst macroeconomic performance and yet the ZSE recorded one of its best stock market performances in terms of capitalization (Dzikiti, 2017). On the other hand after dollarization in 2009 the macroeconomic environment stabilized and yet the ZSE began to experience volatile performance in the stock market capitalization

(Dzikiti, 2017). In the context of this dichotomy the critical question is on the existence of a causal relationship between the development of the ZSE market and the macroeconomic environment. This study therefore, seeks to investigate the causal linkage between selected macroeconomic variables and stock market development in Zimbabwe for the period 1990 to 2018. This multifactor approach to this relationship is one of the rare studies ever conducted in Zimbabwe, common of which are single factor approaches. The results of the study are envisioned to assist in macroeconomic policy formulations, provide a comparative analytical view, the development of the ZSE and will in turn play a pivotal role in the achievement of the much touted Zimbabwe's Vision 2030 inscribed in the 2018 Transition Stabilization Program (TSP). The rest of the paper is organized as follows: literature review, materials & methods, results and conclusion & policy prescriptions; in chronological order.

II. BACKGROUND OF STUDY

The world financial markets have since the end of fixed exchange rates and the progressive removal of international financial flows in the early 1970s witnessed dramatic changes in financial flows leading to drastic changes in the performance of the stock markets (Joshi, 2015). These changes resulted in a significant upsurge in the volatility of stock prices and trade volumes and also lead to noticeable contradictions between market sentiments and macroeconomic performance, due to irrational behavior of investors (Joshi, 2015). The changes in these world financial markets have led to a number of significant changes in the African stock markets. In Zimbabwe, stock market or the trading of stocks and shares dates back to 1891, when the first stock-broking firm was opened (Kadenge and Tafirei, 2012). Since then the ZSE has been among the most successful stock markets in Africa until 2008 when it was temporarily closed down (Zivengwa and Bokoso, 2011). The analytical view of the performance of the ZSE resemble four basic phases, a steady growth phase from 1988 to 1998 with a stable macroeconomic environment, a highly volatile phase from 1999 to 2008 with a deteriorating macroeconomic environment; a sustained decline phase from 2009 coupled with a stable macroeconomic environment (Dzikiti, 2017), and a highly volatile phase from 2015 onwards which is characterized by an unstable macroeconomic environment.

During the steady growth phase Zimbabwe's macroeconomic performance was characterized by a steady growth in GDP and a general stable stock market performance while the highly volatile phase (1999-2008) saw the economic growth declining by about 40% (Ndlela, 2015). Moreover, due to rapid growth in money supply during this period, inflation reached hyper levels, domestic and foreign currency shortages also reached critical levels. Speculation became a major driving force behind the local bourse's performance as investors desperately looked for ways to hedge (protect) their wealth against hyperinflation (Ben, 2016). Inflation was 231 million percent around 2008 mid-year as demand for shares rose as citizens and the corporates looked for ways to preserve their wealth (Njanike, Katsuro & Mudzura, 2009). Against all the volatility in macroeconomic variables in the period 2001 to 2008 the stock market capitalization of the ZSE continued to grow and the stock market recorded one of its best performances with stock market capitalization reaching $3 310 642 246 in 2007 and $5 033 000 in 2008 (ZSE, 2020, Ndlela, 2015) against GDP of -3.65% in 2007 and -17.67% in 2008 (World Bank, 2020). However, due to high volatile macroeconomic environment the ZSE had to shut down its operations in the late 2008. In February 2009, the ZSE re-opened and resumed trading in United States dollars.

Furthermore, in the sustained decline phase which started in 2009 the ZSE experienced four major losses (0.47% in 2010, 3.58% in 2011, 11.09% in 2013 and 20% in 2014) despite a stable macroeconomic environment (Mudzamba, 2016).The series of losses by the ZSE led to severe contraction of market capitalization reducing savings and eventually investment funds (Tsaurai and Odhiambo, 2012). In each loss, a large number of stock market investors lost significant amounts of their personal wealth (Ben, 2016), and a large majority of them accumulated some degree of financial debt (Ben, 2016). In the midst of all this paradox the question that arises is whether the activities of the ZSE are in any way linked to the macroeconomic environment or vice versa. Particularly why it seems like the macroeconomic performance and the stock market performance are working in opposite directions. This study therefore, seeks to investigate the causal link between stock market performance and macroeconomic variables in Zimbabwe using annual time series data for the period 1990 to 2018.

III. PROBLEM STATEMENT

Fama (1981), argued that there is a comprehensive group of macroeconomic variables that influences the stock prices in the share market of any country. This view suggests that there is a link between stock market development and macroeconomic environment. Numerous empirical and theoretical studies conducted at various levels and broad cross country comparisons, tend to demonstrate a strong positive link between stock market development and macroeconomic activity (Bencivenga et al, 2006 and Kunt and Levine (1996)). Mazur and Alexander (2001) on the other hand disagreed with this view and instead proposed an independent hypothesis to which a number of researchers today agree with (Yue Xu, (2011), Bhattacharya and Mukherjee (2006), Pethe and Karnik (2000)). These proponents argue that there is no relationship between stock market development and the macroeconomic variables. The later suggests that what happens in the stock market does not in any way affect stock market development and vice versa. This leaves this research area void and open for further studies to settle the debate and clearly inform policy formulations and augmentations. There is therefore a need to investigate the causal relationship between stock market development and macroeconomic performance in Zimbabwe. This nexus is little understood in Zimbabwe as research of this nature is still limited. Therefore this study seeks to investigate the nature of the relationship between stock market development and economic growth in Zimbabwe, with the objective of informing policy development.

IV. RESEARCH OBJECTIVES

The primary objective of this research is to investigate the causal link between selected macroeconomic variables and stock market development in Zimbabwe for the peiod 1990 to 2018.

The secondary objectives are as follows;

- ✓ To investigate the short run relationship between macroeconomic variables and the stock market development in Zimbabwe.
- ✓ To investigate the long run relationship between macroeconomic variables and the stock market development in Zimbabwe.
- ✓ To test the causal relationship between macroeconomic variables and stock market development in Zimbabwe.

V. SIGNIFICANCE OF STUDY

Empirical research conclusions on the relationship between stock market development and macroeconomic variables is dichotomous across the world making it difficult to rely on studies performed by other researchers in other countries. In Zimbabwe, Zivengwa et al (2011), Tsaurai and Odhiambo, (2012), Ishioro (2013), Mahonye and Mandishara (2014) are some of the researchers that have investigated this relationship using the single factor approach and have not covered all the major macroeconomic factors. The multifactor approach is still rare and thus undermining the underpinnings of the Arbitrage Pricing model which postulated that there are a number of macroeconomic variables which affect the stock market. Studying the combined effect of macroeconomic variables on the development of the stock markets helps to bring a clear analytical view of their effect on the stock market development. Furthermore, an in-depth study of this nature will help eliminate the trial and error and the one size fits all approach to policy making. This study also helps to bring a much wider perspective into this relationship as it covers the pre and post dollarization periods in Zimbabwe.

VI. THEORETICAL LITERATURE REVIEW

Investigations on the link between stock markets and macroeconomic environment date back to the writings of Schumpeter (1932), and since then several theories have been developed including the well-known Arbitrage Pricing Theory by Ross (1976) and the Efficient Market Hypothesis by Fama (1970). This paper will adopt the Capital Asset Pricing Model (CAPM) by Sharpe (1964) and John Lintner (1965 and Arbitrage Pricing Theory (APT) by Ross (1976) since they are the most popular theories developed over time and appreciated by many empirical researchers in explaining the relationship between the stock price and the macroeconomic environment. These theories are classified as multifactor theories as they identify several key macroeconomic variables such as inflation, interest rates, gross domestic product, trade openness, international financial inflows, crude oil prices, general economic activity, money supply and exchange rates as having an influence on stock market performance (Talla, 2013). These theories further suggest that changes in macroeconomic variables may affect future dividends and cash flows by affecting profitability which ultimately reflects changes in stock prices (Gitman, 2013). These

theories therefore make up the back bone under which this theoretical review is built.

A. Capital Asset Pricing Model (CAPM)

This model was founded by William Sharpe (1964) and John Lintner (1965), who built on the earlier work of Harry Markowitz (1959). The CAPM explains how individual securities are valued, or priced, in efficient capital markets (Pike, 2015). Essentially, this involves discounting the future expected returns from holding a security at a rate that adequately reflects the degree of risk incurred in holding that security (Pike, 2015). A major contribution of the CAPM is the determination of the premium for risk demanded by the market from different securities. The general idea behind CAPM is that investors need to be compensated for only the time value of money and risk (Mugambi and Okech, 2016). Time value of money is compensated by the risk free rate, while risk is compensated by the Beta (Mugambi and Oketch, 2016). In line with this theoretical view, risk free rate is the rate of interest or the prime rate and the beta co-efficient measures the risk such as changes in exchange rate and inflation among others (Ogilvie and Parkinson, 2005). Thus this theory predicts that the stock prices are determined by the three macroeconomic variables used in this study. The CAPM model is given as follows:

$$ER_j = R_f + \beta_1 (R_m - R_f) \quad \text{.....1}$$

Where ER_j is the expected return on an asset: R_f = is the risk free rate, R_m= is market rate$(R_m - R_f)$= the risk premium and β_1= average return of securities

From this equation it becomes apparent that there are a number of ways macroeconomic factors can influence stock market returns. Firstly, unanticipated changes in the riskless interest rate will influence pricing, and through their effect on the time value of future cash flows, they will influence returns. Secondly, the discount rate also depends on the risk premium; hence, unanticipated changes in the premium will influence returns. Thirdly, any macroeconomic factor that affect the market risk premium will also change expected returns. The limitation however is that the suggested factors are limited to a number thus not open to many other possible factors

B. Arbitrage Price Theory (APT)

The APT model is considered as a development of the CAPM. Developed by Ross, in 1976, the models attempts to explain the risk–return relationship using several independent factors rather than a single index (Pike, 2015). The model is based on multi-factor modeling in which every investor believes that the stochastic properties of returns of capital assets are consistent with factors structure (Pike, 2015). APT assumes that investors take advantage of arbitrage opportunities in the broader market Omorokunwa and Ikponmwosa, (2014). Thus the model makes the assertion that an asset rate of return is a function of the return on alternative investment and other risk factors. Thus, expected returns of a financial asset can be modelled as a linear function of various macroeconomic variables or theoretical market indices where the sensitivity to change in each factor is represented by a factor-specific beta coefficient (Ogilvie and Parkinson, 2005).

The APT uses the risky asset's expected return and the risk premium of a number of macro-economic factors when calculating the value of an asset while CAPM formula requires the market's expected return. Mathematically APT can be expressed:

$$R_i = a_i + b_{i1}I_1 + b_{i2}I_2 + \cdots + b_{iJ}I_J + e_i \quad \text{..... 2}$$

Where: a_i= the expected level of return for stock i if all indices have a value of zero

I_J= the value of the jth index that impacts the return on stock i

b_{i1}= the sensitivity of stock i´s return to the jth index

e_i= is the random deviation based on unique events impacting on the security's returns.

This model suggests that the stock returns are subject to economic factors such as the unanticipated shifts in risk premium, changes in expected levels of industrial production, inflation and movement in the shape of the term structure of interest rate (Ogilvie and Parkinson, 2005). The theory predicts a linear relationship between the return on any stock to a set of related indexes (Akwasi, 2012). This mean that stock price movements relate to the macroeconomic factors among other factors.

Thus, the APT model is one of the most explicit multifactor model which admits to the fact that stock performance is influenced by various macroeconomic factors. The assertion is that in pricing stocks multiple factors cannot be ignored as they do influence the value of stocks. However, the APT failed to specify the type or the number of macroeconomic factors for researchers to include in their study. For example, although Ross, et al. (1986)

examined the effect of four factors, including inflation, gross national product (GNP), investor confidence, and the shifts in the yield curve, they suggested that the APT should not be limited to these factors. Therefore, more research is needed in order to explore as many factors as possible from different settings.

VII. EMPIRICAL LITERATURE REVIEW

In a Zimbabwean study Ishioro (2013) using the long-run Granger non-causality estimation technique explored the nature and direction of the causal linkage between stock market development and economic growth in Zimbabwe for the period 1990: QI to 2010:Q4. The study used real GDP growth rate as a proxy for economic growth and real market capitalization, value traded ratio and stock market volatility as proxies for stock market development, and found a bi-directional causality between economic growth and stock market development. Magweva and Mashamba, (2016) is another study done in Zimbabwe using annual time series data for the period 1989 to 2014 and found a negative long run relationship and insignificant short run coefficients for the stock market development and economic growth.

Molefhe (2019), using annual data for the period 2010 to 2017 examined the effect of macroeconomic variables on stock market development and bond markets in Botswana. The study used the Autoregressive Distributed Lag (ARDL)-Bounds Test and found that macroeconomic variables have an effect on the growth of the Botswana capital market. Real output, money supply, and inflation had a positive impact on stock market growth in the short run, while real exchange rate retards its development. Real output further supports the long-run development of the stock market. Inflation rate and the interest rate are the only variables which affected the market in the long run. Inflation rate had a positive effect while interest rates had a negative impact on the bond market respectively and none of the variables influenced the bond market in the short run. This study however did not look at the causal link between these variables. If the causal link is not known it will be difficult to craft targeted policies instead policy makers would have to use the blanket approach.

In testing the effect of macroeconomic variables on domestic stock prices in Botswana Lekobane and Lekobane (2014) used Johansen Stock Market Approach. The study used quarterly data for the period 1998 to 2012. The selected macroeconomic variables included long and short-term interest rates, Gross Domestic Product (GDP), US share price index and 10 Year US government bond yield, money supply, foreign reserves, inflation, diamond price index and exchange rate. The study employed the VECM framework following Johansen's cointegration technique. The analysis revealed that macroeconomic variables and the stock market price are cointegrated, hence, a long-run equilibrium relationship existed between them. Furthermore, the results also revealed that in the long run, real GDP, short-term interest rates, inflation and diamond index are positively related with stock market price. However, in the short run, real long-term interest rate, money supply, foreign reserves, exchange rate, US share price index and US government bond yield were negatively linked to stock market price.

In an Asian study Joshi (2015) using annual, quarterly and monthly data for the period 1979 to 2014 examined the relationship between macroeconomic variables and the Indian stock market development. The study utilized as its macroeconomic variables GDP, crude oil prices, inflation (CPI), real effective exchange rate, FDI and real interest rate. The study also adopted the ARDL and Granger Causality as its estimation techniques. The annual data indicated a strong and optimistic impact of economic growth, exchange rate and inflation on stock price movements in India. The VECM-based Granger causality test showed that a short-run, unidirectional causality exists in India, from GDP to BSE. In fact, the results showed the existence of long-term causality as the dependent variable for the equation with the stock price. Quarterly data showed that that economic development, and free trade in India have a positive impact on market capitalization. The ARDL approach error correction model revealed the short-run deviation adjustment process is small. The findings of the causality of VECM based Granger suggested the existence of long-term causality for the equation with Stock Market Capitalization (LMCAP) as the dependent variable, whereas in the short-run the change in trade openness causes a change in Stock market capitalization. The monthly data analysis of the long-run estimates of ARDL test showed a significant and positive influence of economic growth, Exchange Rate and Inflation on stock prices. Further, the study confirmed that there is a negative and significant relationship between gold prices and stock prices in India. The error correction model of ARDL approach revealed that

the adjustment process from the short-run deviation is slow.

Evidence from various studies as provided above indicates that these macroeconomic variables used in this study are key determinants of movements in stock prices and can be used in Zimbabwe and indicate movements in stock prices in Zimbabwe.

VIII. METHODS AND MATERIALS

The study uses annual time series data for the period 1990 - 2018 to test the long run and short run causal relationship between major macroeconomic variables and stock market development in Zimbabwe. Money supply, interest rates, inflation rate, real GDP and exchange rate are independent variables while stock market capitalization is the dependent variable. The description of variables is given as follows:

Table 1: Data Variables description

Variable	Description
logsmcap	Log value of Stock market capitalization of GDP %
logexchr	Log value of Exchange Rate ZWE$ to US$
loggdp	Log value of Real Gross Domestic Product (US$)
loginfl	Log value of Inflation Rate%
logir	Log value of Interest Rate
logm3	Log value of Money Supply (US$)

The model uses log values of variables because of different units of measurement in the variables and because the relationship between stock market development and macroeconomic variables is considered to be linear functional relationship can be written as:

Stock Market Capitalisation = f (gross domestic product, exchange rate, inflation rate, interest rate, and money supply).

This can be explained mathematically as:

$$smcap_t = \alpha + \beta_1 gdp_t + \beta_1 er_t + \beta_2 infl_t + \beta_3 ir_t + \beta_4 ms_t + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3$$

Where: $smcap_t$ = Stock Market Capitalisation (Stock Market Development), er_t = exchange rate at time t; $infl_t$ = Inflation rate at time t; ir_t = Interest rates at time t; ms_t = money supply at time t; ε_t= error term.

The variables in question 3 are then converted into log linear form for easy interpretation since these variables are using different units of measurement. The log-linear form gives more efficient results and avoids nonsensical regression as compared to the original functional specification (Cameron, 1994). Also, such sort of conversion in variables provides elasticity estimates in the form of coefficients which a researcher can directly and easily interpret for policy purposes (Khalid and Khan, 2017). Accordingly, the structural model in the log-linear form of all variables under examination can be stated as follows:

$$\ln smcap_t = \beta + \beta_{gdp} \ln gdp + \beta_{exch} \ln exch_t + \beta_{infl} \ln infl_t + \beta_{ir} \ln ir_t + \beta_{m3} \ln m3_t + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 4$$

Where; $\ln smcap_t$ = log of Stock Market Capitalisation (Stock Market Development); lngdp = log of real gross domestic product at time t;$\ln exch_t$ = log of exchange rate at time t;$\ln infl_t$ = log of Inflation rate at time t; $\ln ir_t$ = log of Interest rates at time t; $\ln m3_t$ = log of money supply at time t; ε_t= error term

IX. ESTIMATION TECHNIQUE

This research adopted the Auto Regressive Distributed Lag (ARDL) model by Pesaran et al (2001). The ARDL method is one of the methods used in the cointegration research family, which includes Engle and Granger (EG) cointegration tests, and Johansen and Juselius (JJ) cointegration tests. However, the ARDL is the latest co-integration technique and offers a certain econometric advantage over co-integration techniques of both EG and JJ. Unlike other integration tests, the ARDL does not require pre-test series to determine their integration order, since the test can be carried out regardless of whether it is strictly I(1), strictly I(0) or fractionally integrated (Nkoro and Uko 2016). The unrestricted ARDL model for this study is given as follows:

$$\Delta \log smcap_t = \alpha_1 + \alpha_{gdp} loggdp_{t-1} + \alpha_{exch} \log exch_{t-1} + \alpha_{infl} \log infl_{t-1} + \beta_{ir} \log ir_{t-1} + \beta_{MS} \log m3_{t-1} + \sum_{i=1}^{p} \alpha_1 \Delta loggdp_{t-1} + \sum_{j=0}^{q} \alpha_j \Delta logexch_{t-J} +$$

$\sum_{k=0}^{h} \delta_k \Delta loginfl_{t-k} + \sum_{i=0}^{n} \alpha_1 \Delta logir_{t-0} + \sum_{i=0}^{m} \alpha_1 \Delta logm3_{t-1} + \varepsilon_t$.. ……....5

Where: Stock market capitalization ($smcap_t$) is the dependent variable and gross domestic product(gdp), exchange rate (Zimbabwe dollar to United States Dollar), inflation rate (infl), interest rate (ir) and money supply (m3) are independent variables. ε_t is error correction term used to capture the deviation of variables from long-run equilibrium.

x. RESULTS AND DISCUSSION

Statistical analysis is one of the preliminary steps before running the ARDL cointegration test. Table 2 below summarizes the descriptive statistics of the data. It presents the descriptive statistics on the selected macroeconomic variables used in this study. Descriptive statistics help describe and understand the features of a specific data set by giving short summaries about the sample and measures of the data.

Table 2: Descriptive Statistics

Standard Dev	.7943594	3.92879	.5320973	3.843819	.6100089	1.939773
Skewnes	.1582592	1.542679	.7528457	2.354144	.718199	-.4100448
Maximum	6.189126	15.40355	24.15729	19.25858	23.02684	7.054476
Minimum	2.230014	0	22.20843	-1.560648	20.83212	-1.07881

Source: Author's computation by Stata 14

The standard deviations above show that interest rate, inflation and exchange rate are more volatile than the stock market capitalisation, GDP and money supply. Furthermore, the standard deviation also indicates that the level of interest is the least volatile compared to other macroeconomic variables. The analysis of skewness shows that the distributions for stock market capitalisation, exchange rate, real gross domestic product, inflation rate and money supply were positively skewed, while the distribution for interest rate is negatively skewed.

A. Unit root test

An important concern in data analysis is to determine whether a series is stationary (does not contain a unit root) or not stationary (contains a unit root). Time series data are often assumed to be non-stationary and thus it was necessary to perform a pretest to ensure that all the variables were stationary in order to avoid the problem of spurious regression (Granger, 2001). The first step in unit root testing is the selection of the optimal lag length. The selection of the optimum lag length was obtained using the Akaike Information Criterion (AIC), Swartz-Bayes Information Criterion (SBIC), Final Prediction Error (FPE), Hanna and Quinn (HQC), and Likelihood Ratio (LR). As it often happens that the tests show different lag orders, the AIC test and the FPE showed a lag of two for money supply compared to other tests which indicate a lag of one (Table 3). These lags refer to the number of lags in the underlying VAR "levels and the optimum lag structure for each variable was obtained as follows:

Table 3: Selection of the optimal lag order

Source: Author's computation by Stata 14

After obtaining the optimal lag order the next step is to conduct a unit root test. The unit root was conducted for each variable and the following results were obtained.

Variable	P	FPE	AIC	HQIC	SBIC
logsmcap	0.003	I(1)	I(1)	I(1)	I(1)
logexchr	0.001	I(1)	I(1)	I(1)	I(1)
loggdp	0.000	I(1)	I(1)	I(1)	I(1)
loginfl	0.006	I(1)	I(1)	I(1)	I(1)
logir	0.000	I(1)	I(1)	I(1)	I(1)
logm3	0.000, 0.128	I(2)	I(2)	I(1)	I(1)

Table 4: Unit root test results (1st Difference)

1st Difference			
Variable	t-stat	p-value	Decision
logsmcap	-7.201	0.0000	Stationary
logexchr	-6.494	0.0000	Stationary
loggdp	-4.269	0.0005	Stationary
loginfl	-6.303	0.0000	Stationary
logir	-4.475	0.0002	Stationary
logm3	-4.669	0.0001	Stationary

In testing for stationarity the variables were stationary in levels at first difference as shown in the Table 4 above hence the next step is to run the diagnostic tests.

B. Diagnostic Tests

Diagnostic tests are often used to detect model misspecification and guide for model improvements. The study undertook several diagnostic tests to check robustness of the results. Following the diagnostic tests carried out, one may conclude that this model is correctly specified. The Durbin-Watson d-statistic (10, 28) = 2.571198 is greater than the R squared statistic of 0.6623 thus the data is stationary. Skewness test for normality showed that residuals are normally distributed and hence the regression model explains all trends in the dataset. The study tested for the presence of serial correlation using Breusch-Godfrey Serial Correlation LM Test and heteroscedasticity using White's Test and both were not detected in the model. The results are presented in Table 5, 6 and 7 below:

Table 5: Skewness/ Kurtosis test for normality

Var	Obs	Pr (Skewness)	Pr (Kurtosis)	Adj Chi2(2)	Prob> Chi2
Resid	28	0.6910	0.950	3.25	0.1971

Source: Author's computation by Stata 14

Table 6: Breusch-Godfrey LM test for autocorrelation.

Lags (p)	Chi2	df	Prob > Chi2
1	4.337	1	0.0373

Source: Author's computation by Stata 14

The Breusch Godfrey LM test for auto correlation shows that there is autocorrelation in the model as chi2 = 0.0373 is less than 0.05 or 5% thus the null hypothesis is rejected. Therefore to correct autocorrelation problem, the researcher used the 'prais' and the 'corc' command in Stata 14 instead of regression command and the model was cleared of autocorrelation and a new DW Statistic of 2.169727 was generated then proceeded to test for the presence of heteroscedasticity.

Table 7: White Test for Heteroskedasticity

```
         chi2(27)     =     28.00
         Prob > chi2  =    0.4110

Cameron & Trivedi's decomposition of IM-test
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Source	chi2	df	p
Heteroskedasticity	28.00	27	0.4110
Skewness	6.89	9	0.6488
Kurtosis	3.34	1	0.0674
Total	38.23	37	0.4133

Source: Author's computation by Stata 14

The White's test results show that Prob > Chi2 = 0.4110. The null hypothesis of constant variance can be accepted at 5% level of significance. The implication of the above finding is that the model is homoscedastic in the residuals. Thus the model is cleared of all possible errors and can proceed to estimate the ARDL.

XI. Estimating the ARDL Bounds Test (Cointegration)

In order to test for long run relationship in the model, ARDL Bounds Test was used. ARDL bounds testing approach is a cointegration method developed by Pesaran et al. (2001) to test presence of the long run relationship between the variables. This procedure, is relatively a new method and can be used irrespective of whether the series are I(0) or I(1). Secondly, unrestricted error correction model (UECM) can be derived from the ARDL bounds testing through a simple linear transformation. This model has both short and long run dynamics. Thirdly, the empirical results show that the approach is superior and provides consistent results for small samples. For this study the ARDL bounds test was done and the results are shown in the following Table 8 below:

The ARDL bounds test for this model indicate that there is a long run relationship between the variables since the value of the F-statistic is greater than the upper bound at all levels of significance that is F-statistic (3.927) is higher than the upper-bound critical value (4.19) at the 5% level. This implies that the null hypothesis of no cointegration among

the variables in equation is rejected. Thus we proceeded to the error correction model.

Table 8: ARDL bounds test results (Cointegration Test)

Pesaran/Shin/Smith (2001) ARDL Bounds Test

H0: no levels relationship F = 3.927
t = -3.021

Critical Values (0.1-0.01), **F-statistic**, Case 3

	[I_0] L_1	[I_1] L_1	[I_0] L_05	[I_1] L_05	[I_0] L_025	[I_1] L_025	[I_0] L_01	[I_1] L_01
k_5	2.26	3.35	2.62	3.79	2.96	4.18	3.41	4.68

accept if F < critical value for I(0) regressors
reject if F > critical value for I(1) regressors

Critical Values (0.1-0.01), **t-statistic**, Case 3

	[I_0] L_1	[I_1] L_1	[I_0] L_05	[I_1] L_05	[I_0] L_025	[I_1] L_025	[I_0] L_01	[I_1] L_01
k_5	-2.57	-3.86	-2.86	-4.19	-3.13	-4.46	-3.43	-4.79

accept if t > critical value for I(0) regressors
reject if t < critical value for I(1) regressors

k: # of non-deterministic regressors in long-run relationship
Critical values from Pesaran/Shin/Smith (2001)

Source: Author's computation by Stata 14

XII. ESTIMATING THE ERROR CORRECTION MODEL

To run the ARDL model, the variables in equation 5 are used in an Unrestricted Error Correction Model by Pesaran, Shin and Smith (2001). The following figure presents the results of the estimated ECM corresponding to the long run estimates for the model. The ARDL error correction model results above are divided into three major sections. The first part consists of the estimates of the error correction term (ECT) that measures the speed of adjustment whereby short-run dynamics converge to the long-run equilibrium path in the model. The second part consist of the estimated coefficients of short run dynamics and the third part consists of the estimated coefficients of the long run dynamics. The results of the ARDL error correction model show that the model is significant, 66% of the stock market capitalisation ratio can be explained by real GDP, inflation, exchange rate, interest rate and money supply. The speed of adjustment is significant at 0.007 and the adjustment coefficient is -.5560133 (55.6%) showing that there is long run convergence among the variables and previous error will be corrected in the current period.

In the short run, exchange rate is significantly negatively related to stock market capitalisation, inflation is significantly positively related to stock market capitalisation while interest rate is insignificantly related to stock market capitalisation. These results are consistent with what Molefhe, (2019), Fama and Shwert (1977), Chen et al (1986) and Fishers (1930) found. The results suggest that an increase in exchange rate in the short run will reduce the value of stocks while an increase in inflation in the short run will increase the value of stocks. On the other hand an increase in interest rates in the short run will have a negative effect in the value of stocks. Long run estimates indicate that inflation is the only variable that has a negative relationship with market capitalisation. This shows

that in the long run, an increase in inflation has a negative influence on stock market development.

Table 9: ARDL error correction model results

ARDL(1,1,0,1,0,1) regression

Sample: 1991 - 2018	Number of obs	=	28
	R-squared	=	0.6618
	Adj R-squared	=	0.4927
Log likelihood = -12.317758	Root MSE	=	0.4686

D.logsmcap	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ADJ						
logsmcap						
L1.	-.5539427	.1833405	-3.02	0.007	-.9391268	-.1687587
LR						
logexch	.3109685	.1452983	2.14	0.046	.0057082	.6162288
loggdp	.4901796	.6526205	0.75	0.462	-.8809252	1.861285
loginfl	-.3411787	.1830155	-1.86	0.079	-.7256801	.0433227
logm3	.5153388	.4059002	1.27	0.220	-.3374258	1.368103
logir	.3011317	.1502793	2.00	0.060	-.0145935	.6168569
SR						
logexch						
D1.	-.2626486	.0680408	-3.86	0.001	-.4055971	-.1197001
loginfl						
D1.	.2568244	.0666563	3.85	0.001	.1167848	.396864
logir						
D1.	-.135443	.0763885	-1.77	0.093	-.2959292	.0250432
_cons	-10.66126	9.3786	-1.14	0.271	-30.36497	9.042446

Source: Author's computation by Stata 14

The long run results show that the coefficient for GDP is positively related to market capitalisation although not significant. It suggest that a healthy and stable economic situation has a positive influence on stock market development. The results are consistent with Aron and Muelbauer (2002), who also found a positive, but insignificant relationship. The results are also partly consistent with Lekobane and Lekobane (2014) and Jefferis and Okeahalam (2000) who found a positive and significant relationship between stock market capitalisation and GDP. In addition, a positive relationship between GDP and stock market was found by Moolman and du Toit (2005), whilst Hsing (2011) found a positive influence of GDP on stock market development in the Johannesburg Stock Exchange using a GARCH model.

Money supply has a positive and insignificant effect on market capitalisation in the long run. Arguments by Gupta and Modise (2011) posits that the increase in money supply creates an excess supply of money and this results in excess demand for equity through portfolio allocation and thereby increase the stock prices. In addition, Mukherjee and Naka (1995) confirm that the injections of money supply have an expansionary effect that boosts corporate earnings, which then gets reflected in the share price and hence leading to a positive relationship between the two variables.

Exchange rate is positively and significantly related to stock market capitalisation in the long run. This result is consistant with Griffin, Nardari and Stulz (2004), Katechos (2011) and Vejzagic and Zarafat (2013). However, Dimitrova (2005) recognized that the linkage between exchange rate and stock market depends on the appreciation and depreciation on domestic currency. Exchange rate is viewed as a macroeconomic variable because it contributes to the growth of the economy and is used by policymakers to formulate new strategies.

The positive and insignificant relationship which money supply and interest rates have a with stock market capitalisation reflected on the results is consistent with that of Bulmash and Trivoli (1991) who developed a model to describe the relation between stock price and economic variables. They found that stock prices are predicted by various lagged economic variables such as money supply and interest rate. Dhakal et al (1993) analysed the relationship between the money supply and share prices for the United States and found a direct causal impact of changes in the money supply on share prices. Cheng (1995) examined the relationships between security returns and economic indicators and finds a positive relationship between stock price and money supply, government securities price index and unemployment.

XIII. CAUSALITY TESTS

Granger Causality test is an investigation which looks at the short run causality impact between the variables (Keat et al, 2017). An independent variable is said to granger cause the dependent variable through a series of t-test and F-test on lagged values of the independent variable (Khalid and Khan, 2016). Consequently, this test is suitable is able to condust and individual test for each variable. (Gujarati & Porter, 2009). This test is also able to get rid of the limitation of co-integration test that is, it does not indicate any related information on the direction of causality, it only estimate or measure the variables whether are correlated or not (Guisan, 2001). The tests the hypothesis that Variable X does not granger causes the variable Y (H0). The decision is to reject H0 if the value of test statistic is exceed the critical value or the p-value is smaller than the significance level of 5%, $\alpha = 0.05$. Otherwise, do not reject H0.

The granger causality test results are displayed in Table 10 below. The results show that that there is a bidirectional relationship between stock market capitalization and exchange rate in Zimbabwe. It also shows that there is no causality between stock market development and real GDP and that there is a unidirectional causality between inflation and stock market capitalization running from stock market capitalization to inflation. Furthermore results are also showing that there is no causality between stock market capitalization and money. There is a unidirectional causality between interest rates and stock market capitalization which runs from stock market capitalization to interet rates.. These results are consistent with the annual analysis by Pooja, Keat et al, (2017) and Mbulawa (2015).

Table 10: Granger causality Wald test results

Equation	Excluded	Chi2	df	Prob>Chi2
logsmcap	logexch	18.25	1	0.000
logsmcap	loggdp	3.1467	1	0.076
logsmcap	loginfl	16.366	1	0.0000
logsmcap	Logm3	.36842	1	0.544
logsmcap	logir	5.5132	1	0.091
logsmcap	All	26.018	5	0.000
logexch	logsmcap	3.9349	1	0.047
loggdp	logsmcap	.0704	1	0.971
loginfl	logsmcap	1.9278	1	0.165
Logm3	logsmcap	2.3451	1	0.126
logir	logsmcap	.06257	1	0.802

Source: Author's compilation by Stata 14

XIV. TESTING THE MODEL STABILITY

To test this model for stability we used the CUSUM test suggested by Brown, Durbin, and Evans, 1975).

CUSUM test is based on the cumulative sum of the recursive residuals. This option plots the cumulative sum together with the 5% critical lines. The test finds parameter instability if the cumulative sum goes outside the area between the two critical lines (Pooja, 2015). The results of the CUSUM graph show that the model is stable as it fall within the critical lines.

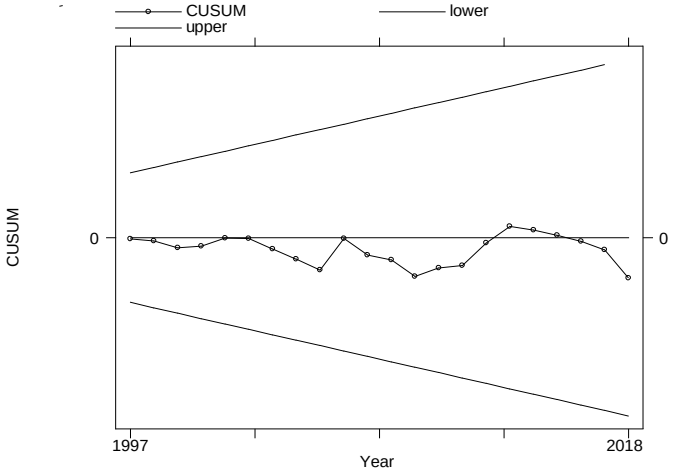

Figure 1: CUSUM6 plot

XV. CONCLUSIONS AND RECOMMENDATIONS

The macroeconomic variables used for this analysis are in relation to the ratio of stock market capitalization and these are inflation rate, exchange rate, money supply, interest rate and real GDP. The results show that exchange rate inflation and interest rates have a short run relationship with stock market capitalization. However the relationship is only significant for exchange rate and inflation and insignificant for interest rate. In the long run only exchange rate has a significant relationship with stock market capitalization. In conclusion therefore exchange rate is significantly negatively related to stock market capitalization, inflation is significantly positively related to stock market capitalization in the short run while interest rate is insignificantly related to stock market capitalization. In the long run exchange rate is positive and significantly related to the stock market capitalization, GDP, money supply and interest rate are insignificantly related to stock market capitalization and inflation is negatively and insignificantly related to the stock market capitalization.

The results of the granger causality test show that there is a bidirectional relationship between stock market capitalization and exchange rate in Zimbabwe. It also shows that there is no relationship between real GDP and stock market capitalization and there is a unidirectional causality between inflation and stock market running from stock market capitalization to inflation. This results is assumed to have been caused by the fact due to confidence crisis in Zimbabwe stock market players tend to exchange their currencies in the black market especially in the period 1998 to 2008 when the bourse was still trading using in the Zimbabwe dollar. Furthermore the causality results showed that there no causality between money supply and stock market capitalization. Finally there is a unidirectional causality between interest rate and stock market capitalization which runs from stock market capitalization to interest rates.

A. POLICY RECOMMENDATIONS

This portion of the study seeks to bring forth some policy proposals stock market regulators, policy makers and stock market analysts. The study suggests that the relevant authorities should take effective policy steps to monitor inflation, which inevitably leads to monitoring stock market volatility. By introducing appropriate monetary policies and by creating appropriate fiscal controls, the Government of Zimbabwe would be in a position to monitor and regulate the inflation rate and the money supply rate to promote a healthy growth of the stock markets in Zimbabwe. Therefore, the study suggests that the financial regulators and policymakers should consider the effect of these fundamental macroeconomic variables while formulating fiscal and economic policies.

Furthermore, policymakers should also develop policies to achieve optimal rates of broad money expansion, because an increase in money supply contributes to an increase in the development of stock markets. The study found money supply to be one of the macroeconomic factors supporting stock-market growth. Expansionary monetary policy is good for the advancement of the stock market, but growth in the supply of money should not be so inflationary. Too much supply of money is one of the reasons why Zimbabwe faced hyperinflation which led to the temporary closure of the ZSE in 2008. Although GDP seems not to be having a significant impact on the stock market, both in the short run and in the long run. GDP is the economic measure that informs the economy's health most crucially. It may possible that

the stock market in Zimbabwe is dominated by foreign companies hence the economic activity does not seem to influence stock market performance. Because of this, the stock markets will survive and thrive with the nation's economic growth and policymakers will aim to boost growth to increase the stock market. Moreover there is also a need for the government of Zimbabwe to improve its financial inclusion strategies so as to involve a large number of economic players in economic activities.

There is need for government to increase its saving mobilization by improving its financial inclusion strategy this will "mop" funds lying idle in the accounts of ordinary people and small businesses and create small branches of the ZSE that allows small businesss and ordinary citizens to take part in the activities of the ZSE. Involving these players will improve economic activity hence growing the economy and improving stock market performance. Moreover there is also a need to reengineer the financial system in the country so as to encourage bank deposits and improve the savings. This could be done by stabilizing both the economic and political activity to boost confidence. The government and commercial banks at large are recommended to increase their financial support for small firms which cannot raise money from the bourse (but they are currently the major employers and economic engines of the nation). The government can also consider fragmenting the ZSE to have various levels to serve different levels of income.

B. SUGGESTIONS FOR FUTURE RESEARCH

The study suggests further scope for the research to increase the understanding about the relationship between the macroeconomic variables and stock prices in Zimbabwe. Further research may either eliminate some of the limitations or expand the scope of relationship already done in this research. It is thus recommended that further research be done with the consideration of a relatively more comprehensive and probably a combination of different series of data sets. Furthermore, it is also recommended that further macroeconomic study be done with the inclusion of other important variables like FDI, domestic and foreign savings and so on. Specifically the researcher suggests studying for the impact of foreign equity flow on the individual stock market development.

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