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# STOCK MARKET DEVELOPMENT AND ECONOMIC GROWTH: EVIDENCE FROM ZIMBABWE

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***Abstract***

*The study explores the causal linkage between stock market development and economic growth in Zimbabwe for the period 1990:I to 2010:IV. Applying the Augmented Dickey Fuller(ADF) unit root tests and the long-run Grangernon-causality estimation technique proposed by Toda and Yamamoto (1995), we tested the nature and direction of the causality between economic growth proxy by the real GDP growth rate and stock market development proxy by real market capitalization, value traded ratio and stock market volatility; and found that in line with the supply leading hypothesis- a bi-directional causality exists between economic growth and stock market development. The study recommends that both economy planners and stock market managers should ensure that the market and economy should be stimulated to grow at an increasingly consistent rate.*

***Keywords: Stock Market Development, Economic Growth, Causality Tests, Zimbabwe***

# 1. INTRODUCTION

Stock markets have played fundamental and pivotal roles in the growth and development of the economies of both industrialized, developed and developing countries. As a result of this, in the past few decades the emphasis of both empirical and theoretical research has been centered on the impact of stock markets development on economic growth.

Apart from facilitating economic growth, the stock market act as an indispensable fulcrum for the growth of sectors, sub-sectors, industries, firms and commerce which eventually foster the growth of the economy of a country to a reasonable degree. This is why the managers of the economy, technocrats, policy advisers and the central banks of countries monitor and keenly regulate the activities of the stock market. The avenues through which the impacts of the stock market are transmitted to the economy are numerous. These avenues include stock market liquidity, real market capitalization, the value traded, and the turnover of stocks in the market amongst others.

Despite this known and widely accepted fact that the stock market facilitates economic growth; the nature and direction of the relationship between stock market development and economic growth is still poorly investigated in Zimbabwe. The crux of this study is to investigate the nature and direction of the causal linkage between stock market development and economic growth. Despite the establishment of the first stock exchange in Zimbabwe in 1894, the Zimbabwean economy has suffered for several decades especially in the immediate past few *quinnquennia*.

Hence, the present study is set to explore whether it is stock market development that causes economic growth or it is economic growth that causes stock market development in Zimbabwe. Furthermore, which of the factors of stock market development is more potent in terms of stock market contribution to economic growth? The study applies the non-causality tests proposed by Toda and Yamamoto (1995) to examine the relationship between stock market development and economic growth.

The rest of this study is presented as follows. Section two examines stock market evolution and literature review. Section three focuses on methodological issues while section four and five contain the analysis of results and conclusion/policy implications of the study.

# 2. DEVELOPMENT OF THE ZIMBABWE STOCK EXCHANGE AND LITERATURE REVIEW

## 2.1. Developments in the Zimbabwe Stock Market

The first stock Exchange in Zimbabwe like others globally was established in 1894 in Salisbury (currently known as Harare) and Bulawayo to mobilize long-term savings for financing investments; provide equity to entrepreneurs; encourage broader ownership of firms and production outfits( such as the gold mining industry); and improve the intermediation process through competitive pricing mechanism (Popiel, 1990 and Emenuga, 1998). Four years after, two other stock exchanges were established in *Gwelo*(the current *Gweru*) and *Umtali* (now known as *Mutare*). Although, the Act that sought the establishment of the Zimbabwe Stock Exchange was initiated is 1974, the Zimbabwe christened stock exchange did notemergeuntil after independence from Britain in 1980.

The Zimbabwe stock exchange experienced unprecedented growth in the two *quinnquennia*after independence and became the second largest in sub-Saharan Africa after the Johannesburg Stock Exchange (Petros, 2009). During the 1994/1995 era, the market capitalization rose at an annual rate of 36% in US dollar terms.

Table 1a

Market Capitalization for Zimbabwe Stock Market (1995/2010)

| **Year Variable** | **1995** | **2000** | **2003** | **2006** | **2008** | **2010** | **%Δ 00/06** | **%Δ 03/06** | **%Δ 00/08** | **%Δ 08/10** | **%Δ 00/10** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mkt. capitalization ($ millions)** | 2,038 | 2,432 | 4,975 | 26,556 | 5,333 | 11,476 | 992 | 433.8 | 119.3 | 115.2 | 372 |

*Source WDI, 2012*

From table 1a, the market capitalization in US Dollar was $2,432 million in 2000. But as at 2008, the market capitalization has grown to $5,333 million US Dollar showing 119.3 percentage changes between 2000 and 2008. In 2010, the market capitalization rose to $11,476 million representing a 372 % increase between 2000 and 2010; and experienced a 115.2 percent change between 2008 and 2010.

Table 1b

Market Capitalization for Zimbabwe Stock Market (1995/2009)

| **Year Variable** | **1995** | **2000** | **2003** | **2005** | **2009** | **%Δ 95/00** | **%Δ 95/03** | **%Δ 95/05** | **%Δ 95/09** |
|---|---|---|---|---|---|---|---|---|---|
| **Mkt.capitalization (% of GDP)** | 28.7 | 32.9 | 67.3 | 70.3 | 161.4 | 15 | 134.5 | 145 | 462.4 |

*Source: WDI, 2012*

Market capitalization as a percentage of GDP was 32.9 percent in 2000; 70.3 percent in 2007 and 161.4% of GDP in 2009. This shows an impressing performance during these periods.

The stock market liquidity in terms of the value of shares traded as percentage of GDP in Zimbabwe performed very well in 2000, 2007 and 2009 with 3.8 percent, 9.7 percent and 16.1 percent respectively. This shows a 155.3 percent increase for 2000/2007 period; 323.7 percent increase for 2000/2009 period and 66 percent increase for 2007/2009 periods respectively. See table 2 below for details.

Table 2a

Selected Stock Market Indicators for Zimbabwe (2000/07 and 2000/2010)

| Year Variable | 2000 | 2005 | 2007 | 2009 | 2010 | %Δ 00/05 | %Δ 00/07 | %Δ 00/09 | %Δ 07/09 | %Δ 00/10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Market liquidity | 30.8 | 5.9 | 9.7 | 16.10 | 15.3 | -80.84 | 155.3 | 323.9 | 66 | -50.32 |

*Source: Author's Compilation from WDI (2012)*

Table 2b

Selected Stock Market Indicators for Zimbabwe (2000/07 and 2000/2008)

| Year Variable | 1990 | 1995 | 2000 | 2002 | 2004 | 2008 | 2011 | %Δ 90/95 | %Δ 00/08 | %Δ 04/08 |
|---|---|---|---|---|---|---|---|---|---|---|
| Stock Traded: Turnover Ratio | 2.9 | 7.6 | 10.8 | 19.2 | 9.2 | 5.1 | NA | 162,07 | -53 | -44.57 |

*Source: Author's Compilation from WDI (2012)*

*Note: Market liquidity is defined as the value of shares traded as % of GDP. Turnover Ratio is the value of shares traded as % of market capitalization.*

Table 3

Listed Domestic Companies (1990/2011)

| Variable | 1990 | 1995 | 2000 | 2002 | 2004 | 2008 | 2011 | %Δ 90/00 | %Δ 00/04 | %Δ 90/08 | %Δ 08/11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| listed companies | 57 | 64 | 69 | 76 | 79 | 81 | 75 | 21.05 | -14.49 | 42.11 | -7.41 |

*Source: WDI (2012).*

*Note: Listed companies are listed domestic companies.*

The Zimbabwe stock exchange had a market liquidity of 3.8 percent in 2000; this increased to 9.7 percent in 2007 and grew to 16.1 percent in 2009. This represents a percentage change of 155.3 for 2000/2007; 323.7 percentage increase was recorded for 2000/2009 but for 2007/2009 period, the percentage change stood at 66 percent. This shows an impressive performance of market liquidity in Zimbabwe within the period under consideration. But the performance of the Zimbabwe stock exchange in terms of the turnover ratio and the number of listed domestic companies was fluctuatingly unimpressive as the number of listed domestic companies increase from 9 listed domestic companies in 2000 to 81 listed domestic companies in 2008 but decreased to 76 listed domestic companies in 2010.According to WDI (2012), the number of listed domestic companies as at 2011 was 75 marking a further decrease in the number of listed domestic companies.

## 2.2 Review of Related Literature

The debates on the impact of stock market development and economic growth is one of the oldest in economics(Ujunwa and Chikeleze,2007).A major contention that is implicit in this debate is the direction of causality between stock market development and economic growth( see Levine and Renelt,1991 for instance).One of the issues in economics and finance that has generated one of the most enduring debates is whether stock market development causes economic growth or it is economic growth that causes stock market development. This debate started from the finance nexus. Early studies such as Schumpeter (1912), Robinson (1952) and Hicks (1969) argued that there is a link between finance sourced from the stock market and economic growth.

Gurley and Shaw (1955) were the first to study the relationship between financial markets and real economic activities. The study assessed the nature of the development of the financial systems of both developed and less developed countries(LDCs), and concluded that the financial system of the developed countries is more advanced and can facilitate more economic growth. This conclusion was predicated on the theoretical premise that more developed financial markets could extend more credit/loans to investors for growth-enhancing projects.

But the research on the relationship between financial market development and economic growth suffered a lack of attention until the 1970s and 1990s when studies by Goldsmith (1969), Shaw (1973), McKinnon (1973),King and Levine (1993), Odedokun (1996), Oyejide(1994), Levine and Zervos (1996), Demirguc-Kunt and Levine(1996), Nyong (1997), Obadan (1998) and recently Petros(2009) found that financial market development was significantly related to the level of economic growth. Specifically, Petros (2009) studied the effect of the Zimbabwe stock exchange on economic growth using time series data from 1991 to 2007.The study employed the Autoregressive Distributed Lag(ARDL) bounds test.

Also, Rousseau and Wachtel (2000) and Beck and Levine (2003) found that stock market development is strongly correlated with the growth rate of real GDP per capita. These studies also found that stock market liquidity is a major stock market development variable that explains economic growth. However, most of these studies suffer from various statistical/ econometric weaknesses.

# 3. METHODOLOGICAL ISSUES

## 3.1 Source of Data and Description of Variables

The variables and symbols used in this study are explained below. Three variables of stock market development are used in this study: MKTC, RVTD and SVLT. See table 4 below for details.

Table 4

Variables/Symbols and Descriptions used in this Study

| Variable/Symbol | Description |
|---|---|
| MKTC | Stock Market Capitalization Ratio |
| RVTD | Real Value Traded Ratio |
| SVLT | Stock Market Volatility |
| RGDPR | Economic Growth |

*Source: Author's Computation*

**MKTC** is stock market capitalization ratio (also known as market value). It is one of the proxies for stock market development used in this study. MKTC measures the size of the stock market and equals the value of listed domestic shares on the Zimbabwe stock exchange as a quotient of GDP i.e. the amount of capital as share of real GDP. It is the size proxy for stock market development.

**$RVTD_t$** represents a real value traded ratio and equals the value of the trades of domestic shares on the Zimbabwe stock exchanges divided by real GDP hence it is defined as a ratio of stock trading volume to real GDP. $RVTD_t$ measures the trading volume as a share of national output; thus it ought to positively reflect the impact of liquidity on economic growth. This is the activity proxy for stock market development.

**$SVLT_t$** is stock market volatility which represents the volatility of stock market returns. It is the standard deviation of stock market returns. It is hypothesized that stock market volatility leads to instability that leads to a decline in investment activities either directly or indirectly and it has the tendencies to deter economic growth. Also SVLT is used as a measure of efficient allocation of investment resources (see Arestis *et al*., 2001). This variable is included due to the interests of academics, Practitioners and policy makers on the impact of this stock market variable on economic growth. The adoption of these three definitions for stock market development is one of the hallmarks of this study and a major advancement over previous studies on the Zimbabwe stock market.

**RGDPR** is defined as economic growth measured by the growth rate of real GDP at constant prices.

Data on the above variables were sourced from the World Bank (World Development Indicators, CD Rom for 2012) and were compared with data from the International Financial Statistics (IFS 2012). The study covers the period 1990:I to 2011:IV.

## 3.2 Estimation Technique

To resolve the problem of the statistical weaknesses of most of the previous studies reviewed above, we have adopted a multivariate estimation technique in the analysis of our models. Starting from the traditional Granger causality test á lá Granger (1969), we proceeded to the extension of the Granger non- causality test, namely, Toda and Yamamoto (1995) and as adopted by Omotor (2011) with a recourse to the associated techniques (unit root test).

### 3.2.1 Granger Causality Test

The Granger causality test has been applied by Bahadur and Neupane (2006); Corporale, Howells and Soliman (2004); Comincioli (1996); Osei (2005); and Spears (1991) in the study of stock market development and economic growth. The Granger causality test often adopted in both statistical and econometric researches to test for the causal linkage between two variables such as stock market development (X) and economic growth (Y), according to Maddala (2001) states that if the past values of variable Y significantly contribute to the forecast of the subsequent value of variable X, then variable Y is said to Granger cause variable X.

Conversely if the past values of variable X statistically contribute to the forecasting of variable Y, then variable X is also said to Granger cause variable Y. On the other hand, Stock and Watson (2007) observed that the Granger causality statistic is the *F*-statistic testing the hypothesis that the coefficients on all the values of X as expressed in equation (2) below (such as stock market capitalization ( $X_{1t}$ ), real value traded ( $X_{2t}$ ) and stock market volatility ( $X_{3t}$ )) arezero. Hence the null hypothesis implies that the regressors (relating to stock market development) have no predictive impacts on economic growth(Y). The Granger causality test takes two major forms: uni-directional and bi-directional causal linkages. The test is traditionally stated as:

$$\mathrm{Y_t} = \beta_{\mathrm{O}} + \sum_{\mathrm{k=1}}^{\mathrm{M}} \beta_{\mathrm{K}} \mathrm{Y_{t\text{-}k}} + \sum_{\mathrm{i=1}}^{\mathrm{N}} \alpha_{\mathrm{i}} \mathrm{Y_{t\text{-}1}} + \mathrm{E_t} \qquad (1)$$

$$\mathrm{X_t} = \theta_{\mathrm{O}} + \sum_{\mathrm{k=1}}^{\mathrm{M}} \alpha_{\mathrm{K}} \mathrm{Y_{t\text{-}k}} + \sum_{\mathrm{i=1}}^{\mathrm{N}} \theta_{\mathrm{i}} \mathrm{X_{t\text{-}1}} + \mathrm{V_t} \qquad (2)$$

Where $Y_t$ and $X_t$ in the context of our study represent economic growth and stock market development. $E_t$ and $V_t$ are mutually uncorrelated stochastic terms. t denotes the time period considered and ‘k’ and ‘l’ are the number of lags.

This linkage emanates from the fact that a viable stock market acts as a dependable fulcrum upon which changes in economic activities can be measured using stock market indices such as the market capitalization (see Obadan, 1998 and Petros, 2009). The stock market may be linked to economic growth through its effects on the general economic activities via the creation of liquidity (see Bencivenga, Smith and Starr, 1996). The degree of economic significance in terms of the causal relationship between stock market development and economic growth may vary mainly according to the country's level of development. Two main causal linkages are found in the economic literature: positive and negative linkages.

The positive linkage between stock markets and economic growth is predicated on the fact that stock markets facilitate economic growth through the mobilization and allocation of funds for the purpose of gainful investment activities (Filter, Hanousek and Campos, 1999; Nyong, 1997 and Petros, 2009).

The negative linkage between stock market development and economic growth is based on the fact that it might reduce the savings rate. This is often experienced when there is increasing returns to investment through income and substitution effects (Petros, 2009).

Two hypotheses are stated as follows:

The null hypothesis:

$$\alpha_t = 0 \forall \text{ l's}$$

$$\theta_t = 0 \forall \text{ k's}$$

The alternative hypothesis:

$\alpha_t \neq 0$ for at least some l's and $\theta_t \neq 0$ for at least some k's. It should be noted that if the coefficient $\alpha_t$'s are statistically significant, but $\theta_t$'s are not, then X Granger causes Y or Y Granger causes X. But if both $\alpha_t$ and $\theta_t$ are statistically significant, then causality runs both ways.

The major weakness associated with the Granger causality test is its sensitivity to the lagged terms included in the model. Sim (1972) argued that Granger causality in a two-variable relationship could be due to the problem of omitted variable (see Corporale, Howells and Soliman, 2004). Also, if the lagged terms included in the regression model are more than required, it may cause the estimates to be inefficient. To solve this problem an appropriate lags selection method must be adopted. To ensure that the appropriate lags are selected, the Akaike and Schwarz information criteria in the selection of suitable lag lengths are adopted.

Furthermore, the efficiency of the Granger causality test depends on the assumption that the variables are either stationary or non-stationary (in which case they must have the same order of integration). Toda and Phillips (1993) observed that any causal inference in Granger causality result is questionable where there are stochastic trends and the F-test is not valid unless the variables in level are cointegrated. These weaknesses associated with the Granger causality test can be overcome by adopting the Toda and Yamamoto (1995) test.

### 3.2.2 Toda and Yamamoto Test

Toda and Yamamoto (1995) proposed an alternative but more reliable causality test involving the application of VAR (see Corporale, Howells and Soliman, 2004) in which the appropriate order, K, of the VAR using the maximum order of integration ( $d_{max}$)is augmented. The augmented (K + $d_{max}$) VAR is estimated using stages and steps identified below. The application of this alternative test according to theorem one of Toda and Yamamoto (1995) depends regardless of "*whether the VAR may be stationary,(I(0)-around a deterministic trend), integrated of an arbitrary order or cointegrated of arbitrary order*" (Toda and Yamamoto, 1995:235).The test is explained below using several simplified steps:

**First Step**: **Determine the unit root and order of integration.** As suggested by Toda and Yamamoto (1995) and; Corporale, Howells and Soliman (2004) the first step is to carefully identify the maximal order of integration ($d_{max}$) or to determine the order of the VAR.Hence, westarted by testing for the stationarity or order of integration of the series. The Augmented Dickey Fuller (ADF) test of (Dickey and Fuller 1979) is adopted. The test is stated as:

$$\Delta Y_t = (\varphi - 1) Y_{t-1} + \sum_{j=1}^{K} \theta_j \Delta Y_{t-j} + E_t \qquad (3)$$

Where $E_t \sim WN\ (0,\sigma^2)$

The null hypothesis $H_O$: $(\varphi - 1)$ = 0 is required in testing for the unit root and the alternative hypothesis is stated as: $H_I$:|$\varphi$ |<1. Both hypotheses are tested under the assumption that $E_t$ is a white noise that relates the usual t-ratio of the estimate of $(\varphi - 1)$ to its standard error (as in Deb and Mukherjee, 2008).

But this statistic according to Deb and Mukherjee (2008) has no student's t-distribution under the null hypothesis which implies that when the series is non-stationary the student's t-distribution is absent. The critical values for this test are usually computed on the basis of Monte Carlo simulations after the pragmatic practice of Dickey and Fuller (1979).

However, an extension of the above technique is required because while the null hypothesis of a drift less random walk may be suitable for some series, other series often contain a drift parameter and a linear trend. In which case, we test for the significance of the coefficient $(\varphi - 1)$ associated with $Y_{t-1}$ in the following regression.

$$\Delta Y_t = \varpi_0 + \varpi_1 t + (\varphi - 1)Y_{t-1} + \sum_{j=1}^{K} \theta_j \Delta Y_{t-j} + E_t \tag{4}$$

Where $\varpi_0$ represents a drift parameter.

**Second Step**: **Choose an appropriate lag selection technique**.

The selection of the appropriate lag length is fundamental to the efficiency and reliability of the results of a VAR. Choosing the order *p* of an auto regression almost always requires that the marginal benefit of including more lags be balanced against the marginal cost of additional estimation uncertainty. Stock and Watson (2007) observed that if the order of an estimated auto regression is too low, essentially valuable information contained in the distant lagged values are forfeited. Also, if the order of an estimated auto regression is too high, more coefficients that are not necessary will be estimated thereby introducing more error into the outcome of the model. To solve this problem, *p* is estimated by minimizing an 'information criteria'. Both the Akaike Information Criteria (AIC) and the Bayesian Information Criteria (BIC) also known as Schwartz information criteria (SIC) are used. As in the case of auto regression above, the SIC and AIC are also used in the selection of the appropriate lag length. If the regression model has *K* number of coefficients then the SIC and AIC are stated as:

$$SIC(K) = \ln\left(\frac{SSR(K)}{T}\right) + K\frac{\ln T}{T} \tag{5}$$

$$AIC(K) = \ln\left(\frac{SSR(K)}{T}\right) + K\frac{2}{T} \tag{6}$$

In equation (5) and (6), SSR is the sum of squared residuals of the estimated number of coefficients K. In each model, based on information criteria, the SIC or AIC with the lowest value is selected as the preferred model. Two important points are to be noted: first, the models must be estimated over the same sample, that is, T must be the same for all models. Second, both require many and different models with many combination of the lag parameters. But to avoid this cumbersome computation, all the regressors are required to have the number of lags; with $p = q_1 = ... = q_k$ so that only $p_{\max} + 1$ models are selected for comparison with $p = 0.1, ..., p_{\max}$.

**Third step: Using the appropriate Lag length, construct a general VAR.**

It should be noted that when estimating a VAR with variables that are integrated of order zero, a Wald test usually possesses a restricting Chi-square distribution that follows the nature, presence and location of the unit roots of the VAR that are normally difficult to obtain. To avoid this scenario, a vector autoregressive model (VAR) in levels with a total of ($K+p_{\max}$) lags is constructed.

k denotes the optimal number of lagged terms in the selection of lags using the AIC and SIC criteria in equation(5) and (6) above. Hence, if k = 1 and the two series $Y_t$ and $X_t$ have different orders of integration, vizI(0) and I(1) such that $d_{max}$ = 1; then one extra lag is added to $Y_t$ and $X_t$.Based on this microcosm, a VAR with 2 lags is constructed as follows:

$$\begin{bmatrix} Y_t \\ X_t \end{bmatrix} = \begin{bmatrix} \varpi_{10} \\ \varpi_{20} \end{bmatrix} + \begin{bmatrix} \varpi_{11}^{(1)} & \varpi_{12}^{(1)} \\ \varpi_{21}^{(1)} & \varpi_{22}^{(1)} \end{bmatrix} \begin{bmatrix} Y_{t-1} \\ X_{t-1} \end{bmatrix} + \begin{bmatrix} \varpi_{11}^{(2)} & \varpi_{12}^{(2)} \\ \varpi_{21}^{(2)} & \varpi_{22}^{(2)} \end{bmatrix} \begin{bmatrix} Y_{t-1} \\ X_{t-1} \end{bmatrix} + \begin{bmatrix} E_{1t} \\ E_{2t} \end{bmatrix} \quad (7)$$

**Fourth step: Construct a specific form VAR.**

Next, in order to test the above hypothesis, we construct a VAR (in levels) using three definitions or measures of stock market development, akin to the VAR shown in the third step above, with a total of (K + $d_{max}$) with a maximum of 3 lags i.e. K = 2 and $d_{max}$ = 1.

$$\begin{bmatrix} MKTC_t \\ RVTD_t \\ SVLT_t \\ RGDPR_t \end{bmatrix} = \varpi_0 + \varpi_1 \begin{bmatrix} MKTC_{t-1} \\ RVTD_{t-1} \\ SVLT_{t-1} \\ RGDPR_{t-1} \end{bmatrix} + \varpi_2 \begin{bmatrix} MKTC_{t-2} \\ RVTD_{t-2} \\ SVLT_{t-2} \\ RGDPR_{t-2} \end{bmatrix} + \varpi_3 \begin{bmatrix} MKTC_{t-3} \\ RVTD_{t-3} \\ SVLT_{t-3} \\ RGDPR_{t-3} \end{bmatrix} + E_t \quad (8)$$

Where $\varpi_0$ represents the intercept vector $\varpi_i$ (i = 1, 2, 3) represents the coefficient vector of market capitalization, real value traded ratio and stock market volatility; and $E_t$ is the vector of error terms. The Seemingly Unrelated Regression (SUR) estimation method is used to estimate the system of equations above.

**Fifth step: Estimate the Modified Wald test (MWALD).**

Using the above equation, a Wald test or a modified Wald test (MWALD) is estimated to determine the relationship between economic growth and stock market development. Equation (7) is formulated and designed to test the hypothesis whether stock market development affects economic growth as theoretically proposed by Levine (1991).The hypothesis states that investing in the stock market reduces both the liquidity shock and the productivity shocks that firms would have faced. Firms who are not facing the liquidity shocks are expected to have a higher level of investment which would translate into a higher growth rate. The Wald statistic is based on the asymptotic $X^2$ distribution, and can be applied even if $Y_t$ and $X_t$ are I(0), I(1) or I(2), non-cointegrated and/or the stability and rank criteria are not met, provided "… the order of integration of the process does not exceed the true lag length of the model …" (Toda and Yamamoto, 1995:225).

As a corollary step to the second step above, we determine the number of lagged terms (k) to be included given that the maximum order of integration ($d_{max}$) equals 1 and based on the AIC/SIC rule, the lag length equals 2.

**Sixth step: Formulate and test the null hypothesis.**

In order to ascertain the causal relationship between economic growth and stock market development, a null hypothesis is formulated as follows:

$H_0$: $\varpi_{14}^{(1)} = \varpi_{14}^{(2)} = 0$

Where $\varpi_{14}^{(i)}$, i = 1, 2 is the coefficient vector appearing in the equation above.

The general null hypothesis is that there is no causality between the variables.

The specific null hypotheses are:

a) There is no causality between economic growth and market capitalization;

b) There is no causality between economic growth and real value traded; and

c) There is no causality between economic growth and stock market volatility.

**Final step: Investigate the nature of the relationship between the variables.**

The relationship between the variables is investigated using the results of the MWALD statistic and p-values estimated in the fifth step above. It is based on these results that the null (alternative) hypothesis is rejected (not rejected).

# 4. EMPIRICAL RESULTS

## 4.1 Results of Unit Root Test

The results of the unit root test (the Augmented Dickey Fuller) are presented in table 5

Table 5

Results of the Augmented Dickey Fuller (ADF)

| Variable | ADF | | | |
|---|---|---|---|---|
| | Levels | | 1st Differences | |
| | Constant (without trend) | Constant (with trend) | Constant (without trend) | Constant (with trend) |
| MKTC | 0.643 | -0.269 | -4.164* | -6.221* |
| RVTD | -2.275 | -2.030 | -6.024** | -7.113* |
| SVLT | -3074 | -3.621*** | -5.790** | -6.182** |
| RGDPR | -0.370 | -2.150 | -5.232* | -5.466* |

*Note: * denotes statistically significant at 1% level, ** denotes statistically significance at 5% level, and *** denotes statistically significance at 10% level.*

The results presented in table above suggest that all the variables (MKTC, RVTD, RGDPR and SVLT) are not stationary at levels which mean they are not integrated of order zero. But the variables were stationary at first difference suggesting that they have a random walk trend (integrated of order one(I (1)). Only SVLT was stationary at level at a conservative 10% significance using the constant with trend. The econometric intuition drawn from our results is that, the variables (MKTC, RVTD, SVLT and RGDPR) are not co integrated. This renders the application of the traditional Granger causality test inappropriate because the *F*-statistic in Granger causality may give misleading inference in terms of the determination of leads and lags among these variables (Toda and Phillips, 1993).

## 4.2 Results of the Long-Run Causality (Toda and Yamamoto) Version

The results of the Toda-Yamamoto tests of Granger non-causality are presented in table 6 below:

Table 6

Long-Run causality: Toda – Yamamoto Version

| Null Hypothesis | MWALD Statistics | P-values | Decision |
|---|---|---|---|
| **Real DGP Growth Rate (RGDPR) versus Market Capitalization (MKTC)** | | | |
| RGDPR does not Granger cause MKTC | 19.433* | 0.0003 | RGDPR→ MKTC |
| MKTC does not Granger cause RGDPR | 28.767* | 0.0001 | MKTC→RGDPR |
| **Real GDP Growth Rate (RGDPR) versus Value Traded Ratio (RVTD)** | | | |
| RGDPR does not Granger cause RVTD | 0.8421 | 0.738 | |
| RVTD does not Granger cause RGDPR | 9.687** | 0.0486 | RVTD→RGDPR |
| **Real GDP Growth Rate (RGDPR) versus Stock Market Volatility (SVLT)** | | | |
| RGDPR does not Granger cause SVLT | 7.002*** | 0.0723 | RGDPR→SVLT |
| SVLT does not Granger cause RGDPR | 14.218** | 0.0531 | SVLT→RGDPR |

As expected, the three stock market development variables yielded surprisingly consistent and significant MWALD results. This shows the robustness of our results.

For instance, our results for the real GDP growth rate (RGDPR) versus market capitalization in Zimbabwe suggest that a two-way causality exist between real GDP growth rate and real market capitalization. Our finding is in line with Petros (2009) and, Deb and Mukherjee (2008). Our results imply that in Zimbabwe, economic growth is positively and statistically significant (very significant at 1%) in the explanation and determination of the stock market development. As the Zimbabwean economy grows, the stock market grows and increases in terms of its tempo of performance.

Furthermore, the causal linkage was detected between stock market development variable (MKTC) and economic growth suggesting that the Zimbabwean stock market has very statistically significant impacts on the growth of the economy within the period under consideration. Since MKTC is a size variable of stock market development, the results could be interpreted to mean that as the size of the stock market increases, it would lead to higher investment opportunities for firms, making market capitalization an indispensable channel for economic growth. The channels through which the stock market development can affect economic growth are multiple and are either direct or indirect. For instance, stock market development facilitates the mobilization of funds from the surplus unit of the economy to the deficit units of the economy. This makes funds available to boost economic activities (see Oyejide, 1994; Obadan, 1998; and Nyong, 1997). This is in line with Nyong 1997 who observed that the stock market is a complex institution with potent mechanism through which long-term funds of the productive sectors of the economy consisting of households, firms, including government are mobilized and channeled to various sectors of the economy. This is an indirect way through which stock market development affects economic growth. The policy implication of this finding is that the stock market in Zimbabwe is veritable channel for the mobilization of funds for both industrial development and economic growth that ought to be fully harnessed.

Therefore, we reject the null hypothesis that RGDPR does not Granger cause MKTC and that MKTC does not Granger cause RGDPR at 1% level respectively. Our results corroborate the findings of Shahbaz, Ahmed and Ali (2008).

Also, there is a two-way causal linkage between the real GDP growth rate (RGDPR) and stock market volatility (SVLT). The results suggest that economic growth Granger causes stock market volatility in Zimbabwe. For instance, due to distortion of major macroeconomic determinant of economic growth; financial instability is initiated which triggers the stock market weaknesses resulting into a market *Sinosodal*tendencies. Thus, we reject the null hypothesis that economic growth does not Granger cause stock market volatility. A volatile stock market weakens the growth and finance avenues – this detrimental weakness directly inhibits economic growth.

Finally, a one-way causality runs from stock market activities (value traded Ratio) to economic growth without reverse causality.

## 5. CONCLUSION AND POLICY IMPLICATIONS

This study examines the causal linkage between stock market development and economic growth in Zimbabwe from 1990-2010 using annual time series data. The study adopted the Toda and Yamamoto (1995) non-causality test. The major focus of this study is to examine the nature of the relationship that exists between stock market development and economic growth. Real market capitalization (represents activities), Value traded and stock market volatility are employed as the stock market development indicators while real GDP growth rate is used as the representative indicator for economic growth.

The major findings that emanated from this study are summarized as follows: first, a two-way statistically significant relationship exists between stock market development and economic growth in Zimbabwe. This result is consistent with majority of previous empirical findings. Second, there is bi-directional causality between stock market volatility and economic growth. Finally, the results suggest unidirectional causality from stock market activities to economic growth.

Principally, using the Granger non-causality test proposed by Toda and Yamamoto (1995), the results suggest that stock market development in the Zimbabwean economy encourages economic growth within the period under consideration. This validates the fact that funds raised from Zimbabwe stock market have been used for growth – engendering purposes.

The policy implication of our finding is that both economy planners and stock market managers should ensure that both market and economy grows at an increasingly consistent rate.

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# RAZVOJ TRŽIŠTA DIONICA I GOSPODARSKI RAST: PRIMJER IZ ZIMBABWEA

***Sažetak***

*Studija istražuje uzročno-posljedičnu vezu između razvoja tržiša dionica i gospodarskoga rasta u Zimbabveu u periodu između siječnja 1990. do travnja 2010. Primjenjujući prošireni Dickey Fullerov test jediničnog korijena (ADF test) i dugoročnu Grangerovu tehniku procjene ne-uzročnosti koju predlažu Toda i Yamamoto (1995) ispitali smo prirodu i smjer uzročnosti stvarne stope rasta BDP-a, kao zamjenske varijable (proxy) gospodarskog rasta, i tržišne kapitalizacije, omjera tržišne vrijednosti i volatilnosti tržišta dionica kao zamjenskih varijabli razvoja tržišta dionica; i utvrdili smo da u skladu s hipotezom ponude postoji dvosmjerna uzročnost između gospodarskog rasta i razvoja tržišta dionica. U studiji se predlaže da i projektanti gospodarstva i menadžeri tržišta dionica trebaju osigurati poticaj neprestanog rasta tržišta i gospodarstva.*

***Ključne riječi: razvoj tržišta dionica, gospodarski rast, testovi uzročnosti, Zimbabwe***

***JEL klasifikacija: C1, G15, O16***