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# Toda-Yamamoto Granger No-causality Analysis of Stock Market Growth and Economic Growth in Ghana

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**Abstract**

The paper aims at examining the causal nexus between stock market growth and economic growth in the context of Ghana for a sample period covering 1990 to 2016. Toda and Yamamoto (1995) Granger no-causality test which permits Granger causality test irrespective of the order of integration of the variables involved is employed in this study. Data used for the study is annual time series data covering the sample period. The study finds that GDP growth Granger causes stock price index (SPI) and stock value traded (SVT) but does not granger causes market capitalisation (MC). However, none of the stock market growth indicators (MC, STV, and SPI) Granger causes economic growth. Thus the findings of this study support economic growth-driven stock market growth. It is recommended that, in other to enhance the effect of stock market growth on economy, firms in the sectors of the economy that contribute significantly to GDP growth in the stock market should be encouraged, motivated and supported to participate in the stock market by listing on the stock market. Also, government should ensure stable macroeconomic and microeconomic environment for businesses that are listed on the stock market to flourish since stock market growth is found to be economy-driven.

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Stock market growth
Economic growth
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Granger causality.

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## 1. Introduction

It is a general view in the literature that financial system development has a significant relationship with economic development. Financial system development is, thus, theoretically and empirically considered as a key factor in the economic development of a country (Goldsmith, 1959; Levine, 1997; McKinnon, 1973; Patrick, 1966; Schumpeter, 1911). In recent finance and economics literature, this preposition is widely referred to as the finance-growth theory.

The finance-growth theory is traditionally attributed to Schumpeter (1911) who asserted that financial development is associated with economic development. The debate on the finance-growth nexus continued since then and consensus is yet to be reached.

Majority of research findings support the existence of a relationship between finance development and economic growth. In the contrary, some research findings suggest no relationship between finance and economic growth. Proponents of the finance-growth nexus have dichotomous view as to whether the link is positive or negative.

Financial system of a country traditionally consist of market-based finance and bank-based finance. It is theoretically and empirically established that the structure of the finance system, bank-based or market-based, has an implication on the finance-growth nexus.

Thus, according to Nyasha and Odhiambo (2017) studies on finance-growth nexus are further classified into market-based finance-growth nexus and bank-based finance-growth nexus. Hence, the contention on the finance-growth link is not limited to the existence of relationship and the nature of the relationship but also the link between the structure of the financial system and economic growth (Bist, 2017).

The structure of the finance-growth nexus generally vary from one country to the other. Developing countries need to know the implications of their financial structure on economic growth for effective policy decisions on on how to structure their financial system to accelerate economic growth. Policy makers in

developing countries are facing the challenge of identifying the sector of the financial system (bank-based or market-based) that will best spur up rapid economic growth (Osei, 2005). Thus, there is the need to know the relationship between the individual facets of the financial system (bank- based and market-based) and economic growth.

Copious empirical studies have been carried out on both bank-based finance-growth and market-based finance-growth nexus However, it is generally held that the weight of the focus of the studies is on bank-based finance-growth nexus (Adu, Marbuah, & Mensah, 2013; Nyasha & Odhiambo, 2017) for the obvious reasons that in most countries the banking sector usually develop before the market based financial sector. In the case of emerging and developing countries, the market-based finance-growth relationship gained attention in the 1990's. This could be attributed to the late liberalization of financial systems which resulted in late establishment of capital markets.

The findings on both bank-based finance-growth and market-based finance-growth are moot and inconclusive (Bist, 2017). The major and undisputable derivers of the discrepancies in the findings of the finance-growth nexus are research models, estimation method, quality of data, type of data (cross sectional, panel, and time series), context, and variables used as proxies for finance development and economic development (Adu et al., 2013; Nyasha & Odhiambo, 2017).

The Ghana stock market commence trading in January 1990 and has since been operating. Apart from previous cross sectional studies of African stock market, Osei (2005) was the maiden study of market-based finance-growth link in the context of Ghana. Since then quite a number of studies followed suit.

Though these studies all focused on the relationship and link between stock market development and economic growth, they are different in their perspective (impact assessment or causality assessment), in their methodology (models), variables selection, sample period and findings. Their findings are basically inconsistent and moot. This kept the gate for further studies on this issue opened.

Most of the causality studies of market-based finance-growth nexus in the context of Ghana adopted Granger formulation of causality using varied models and econometric procedures.

The most commonly used models and procedures, to the best of our knowledge, in assessing the causal link between stock market growth and economic growth in Ghana include traditional Granger causality using F-test following Granger and Sims causality test (see Granger (1969) and Sims (1972)) VECM, and ARDL model procedures. The short falls of these approaches are the following.

For traditional Granger causality, studies have shown that the mainstream F-test of causality may be invalid and unreliable in the case of non-stationary variables (Frimpong & Oteng-Abayie, 2006; Giles, 2011; Gujarati, 1995). Frimpong and Oteng-Abayie (2006) noted that the F-test for causality in Granger causality may be weak and its validity primarily depends on the absence of cointegration between the examined variables. An incorrect identification of order of integration would result in an incorrect inferences of causality among the variables involved (Frimpong & Oteng-Abayie, 2006).

Concerning VECM, Giles (2011) indicated that the requirement for pre-test for the presents of unit root before the application of the VECM is a key short fall of the VECM procedure. He noted that studies by Toda and Phillips (1994), Dolado and Lütkepohl (1996), Zapata and Rambaldi (1997), and Clarke and Mirza (2006) have shown that pre-testing for cointegration before testing for granger causality could lead to severe over rejection of the null hypothesis of no-causality and that alternative methods such (Toda & Yamamoto, 1995) surplus lag approach is preferred to the VECM model unless the sample is extremely small.

The single equation approach of the ARDL frame work is said to be an advancement on the VAR system with a couple of merits, yet it has been noted that using one size fit all critical values of Pesaran, Shin, and Smith (2001) may result in invalid inferences of cointegration (Narayan, 2004) especially, when the sample size is severely small. Narayan (2004) found that critical values for the bounds F-statistic of small sample size differ significantly from the existing critical values for the bounds F-statistic of Peserans and Peseran (1997) which are based on a sample size of 500 and those of Pesaran et al. (2001) which are based on 1000 observations.

In this paper, the Toda and Yamamoto (1995) surplus lag procedure, which has been elaborated and extended by Rambaldi and Doran (1996) as well as Zapata and Rambaldi (1997) is adopted to test for the causal nexus of stock market growth and economic growth. Unlike previous studies, this study examines the causal link between three stock market indicators and economic growth in a bivariate framework to identify the market indicator that best links the stock market and the economy as well as the direction of the link between the stock market and the economy.

The rest of the paper is presented in section 2, section 3, section 4 and section 5. Section 2 is a review of relevant literature on finance-growth nexus in the context of bank-based finance and market-based finance. Section 3 presents a concise description of design, data, models and estimation techniques and procedures employed in the study. Section 4 presents the results and discussion of the results of the study and finally, section 5 deals with the conclusion and implications of the findings of the study.

## 2. Literature Review

The relevance of financial system development to economic growth is widely asserted in economics and finance theory.

Whiles the theory of finance-growth is a well-researched issue in recent times, authors usually trace it back in history to Schumpeter (1911), Solow (1956), Goldsmith (1959) and McKinnon (1973).

Schumpeter (1911) and the subsequent proponents of finance-growth mainly argued that the development of the financial system influence economic growth through savings mobilization and capital accumulation for financing economic activities of both public and corporate entities.

### 2.1. Finance-Growth Nexus

In theory, financial system development promote economic growth in various ways. It is held that financial system growth and development is associated with better financial intermediation, cheap cost of transaction, better opportunity for investment and risk management, efficient resource allocation, good corporate governance, improved savings mobilization, smooth trading of goods and services and, consequently, economic growth (Bencivenga & Smith, 1991; Levine, 1997; Solow, 1956).

Endogenous growth theory and the Neoclassical growth model all assert that developed financial market promote economic growth by facilitating and enhancing savings, investment, technology transfer, efficient resource allocation, access to information and reduce transaction cost.

Empirical studies on the finance-growth nexus, irrespective of the component of the financial system involve (bank-based or market-based), are of two categories, namely, studies that found evidence to support finance-growth nexus and studies that found no nexus between finance growth and economic growth.

The most recent studies with findings that support the finance growth theory are Akinlo and Akinlo (2009), Bernard and Austin (2011), Kagochi (2013) and Ujunwa and Salami (2010). The findings of the other category of studies indicate no relationship between finance development and economic growth (see (Andersen & Tarp, 2003; Osinubi & Amaghionyeodiwe, 2003; Ram, 1999)).

Majority of the studies that found support for the finance-growth theory, especially the recent once, support a positive finance-growth relationship (see (Ahmad & Malik, 2009; Akinlo & Akinlo, 2009; Hassan, Sanchez, & Yu, 2011; Kagochi, 2013; Kargbo & Adamu, 2009; King & Levine, 1993; Levine, Loayza, & Beck, 2000; Roubini & Sala-i-Martin, 1992)).

In contrast, some of the authors who support the finance growth nexus, contend that the relationship could also be negative (see (Adu et al., 2013; Bernard & Austin, 2011; De Gregorio & Guidotti, 1995; Klobodu & Adams, 2016; Obstfeld, 1994; Singh, 1997; Ujunwa & Salami, 2010))

### 2.2. Market-base Finance-Growth

Market based finance-growth nexus which is the thesis of this paper gained scholastic attention in the finance-growth debate in the last two decades.

Like the findings of bank-based finance-growth studies, the findings of market-based finance-growth is inconclusive and reflects two points of views. In consonant with finance-growth theory, one of the arguments is that there is a relationship between capital market development and economic growth (see (Beck & Levine, 2004; El-Wassal, 2005; Enisan & Olufisayo, 2009; Greenwood & Smith, 1997; Levinee & Zervos, 1998; Oskooe, 2010; Saci, Giorgioni, & Holden, 2009; Senbet & Otchere, 2008; Uyanga & Suruga, 2008; Yartey & Adjasi, 2007)).

The other argument is that there is no relationship between market development and economic growth contrary to the finance-growth theory (see (Levine-Ross, 2002; Naceur & Ghazouani, 2007; Zhu, Ash, & Pollin, 2004)).

The findings that suggest the existence of a relationship are not consistent. Whiles most of the studies suggest a positive relationship between market-base finance and economic growth (see (El-Wassal, 2005; Oskooe, 2010; Uyanga & Suruga, 2008)) a couple of them also suggest a negative relationship.

Authors who found negative relationship between market growth and economic growth express reservations about stock market development and warn that it may have damaging effects on economic growth.

They argue that stock markets are prone to failures and besides, stock market growth may result in macro-economic instability, weaken the banking system, encourage non-productive corporate practices, and that (see (Morck, Shleifer, Vishny, Shapiro, & Poterba, 1990; Singh, 1997))

Recent studies on finance-growth nexus try to establish the structure of the relationship between finance and economic growth given that majority of the studies support the finance-growth theory. Most of the current studies therefore focus on finding answers to the question of whether financial development precedes economic growth or vice versa.

The argument on the market-based finance-growth nexus, therefore, have moved from the issue of a relationship to the issue of causal relationship (see (Chang, 2002; Cooray, 2010; Demetriades & Hussein, 1996; Hondroyiannis, Lolos, & Papapetrou, 2005; King & Levine, 1993; Luintel & Khan, 1999; Naceur & Ghazouani,

2007; Nurudeen, 2009; Olweny & Kimani, 2011; Raza, Jawaid, Afshan, & Karim, 2015; Shen & Lee, 2006; Wachtel, 2001)).

The findings of Naceur and Ghazouani (2007), Cooray (2010), Hondroyiannis et al. (2005), King and Levine (1993), (Levine et al., 2000), Nurudeen (2009), Olweny and Kimani (2011), Osei (2005) and Shen and Lee (2006) individually support finance-led economic growth hypothesis and the findings of Demetriades and Hussein (1996) as well as Dritsaki and Dritsaki-Bargiota (2005) individually support growth-led finance hypothesis. In addition, some of the studies also found evidence of bi-directional causality relationship (see (Churchill, Arhenful, & Agbodohu, 2013; Greenwood & Jovanovic, 1990; Luintel & Khan, 1999; Vazakidis & Adamopoulos, 2009)).

### 2.3. Market-Based Finance-Growth in Ghana

The reviewed literature indicates that market-based finance-growth studies in the context of Ghana could be traced back to 2005.

Osei (2005) opened the debate of causal relationship between stock market growth and economic growth in Ghana, in a working paper series of Bank of Ghana, and his findings are in favour of the market-led economic growth proposition.

Since then, a couple of studies have been carried out on the causal nexus of stock market and economic growth in Ghana. A summary of these studies and their findings are presented in Table 1.

Table 1 shows that none of the studies employed the surplus lag procedure of Toda and Yamamoto to test the causal link between stock market growth and economic growth in Ghana. This study examines the causal link between stock market growth and economic growth using the extra lag procedure of Toda and Yamamoto.

## 3. Methodology

This paper employs (Toda & Yamamoto, 1995) extra lag procedure, which has been elaborated and extended by Rambaldi and Doran (1996) as well as Zapata and Rambaldi (1997) to assess the causal Link between stock market growth and economic growth. Giless and Mirza (1999) observed that Toda and Yamamoto (1995) surplus or extra lag procedure of testing for Granger no causality yields an asymptotic chi-square ($\chi^2$) null distribution for the Wald Granger no-causality test statistic in a VAR system irrespective of the integration or cointegration properties of the variables involved. According to Zapata and Rambaldi (1997) the advantage of using the surplus lag procedure of Toda and Yamamoto (1995) in testing for Granger causality in a VAR system is that unless the maximal order of integration of the process exceeds the true lag length of the VAR model, the surplus lag procedure will yield valid results irrespective of the integration and cointegration properties of the variables.

### 3.1. Source of Data

The study used annual time series data of GDP growth rate of Ghana and stock market indicators (SMI) of Ghana Stock Exchange for the sample period covering 1990 to 2016. The GDP growth rates of Ghana are extracted from world bank development indicators and stock market indicators (SMI) which comprises of stock price index (SPI), stock value traded (SVT) and market capitalization (MC) are extracted from Ghana stock exchange monthly reports for 2016 as well as World Bank development indicators.

### 3.2. Model

Toda and Yamamoto Granger no-causality test is conducted by estimating the following VAR(p +n) model using seemingly unrelated regression technique. This same framework has been used by Seabra and Flach (2005) as well as Frimpong and Oteng-Abayie (2006).

$$lnGDP_t = \gamma_{0\ 0} + \sum_{i=1}^{p+n} \alpha_i\ lnGDP_{t-1} + \sum_{i=1}^{p+n} \beta_i\ lnSMI_{t-1} + u_t \quad (1)$$

$$lnSMI_t = \gamma_0 + \sum_{l=1}^{p+n} \varphi_i\ lnSMI_{t-1} + \sum_{i=1}^{p+n} \delta_i\ lnGDP_{t-1} + v_t \quad (2)$$

**Table-1.** Studies on Stock Market Growth and Economic Growth Nexus in the context of Ghana

| Author | Proxies of economic growth and stock market growth | Model | Results | Data | Context |
|---|---|---|---|---|---|
| Osei (2005) | Economic growth:<br>• Real GDP in local currency,<br>Stock market growth:<br>• MC , MCR | Traditional granger causality OLS regression | CM and CMR granger causes real GDP | 1991:Q1-2003:Q4 | Ghana |
| Asante, Agyapong, and Adam (2011) | Economic growth:<br>• Real GDP<br>Stock market growth:<br>• MC | Traditional Granger causality, ARDL/DOLS approach | MC Granger causes real GDP | 1992-2009 | Ghana |
| Nabieu and Barnor (2016) | Economic growth:<br>• Real GDP<br>Stock market growth:<br>• MC , SVT, SVOLT, SPI | VECM, Granger causality | CM and GDP Granger causes each other<br>SPI and GDP Granger causes each other<br>SVT Granger causes GDP<br>SVOLT Granger causes GDP | 2000:Q1-2012:Q4 | Ghana |
| Owusu and Odhiambo (2014) | Economic growth:<br>• Real GDP per capita<br>Stock market growth:<br>• MC , SVT, STOR, SPI | ARDL- Bounds test, ARDL-ECM | VT, STOR, CM, SPI have no significant impact on economic growth | N/A | Ghana |
| Iyke and Odhiambo (2015) | Economic growth:<br>• Real GDP per capita<br>Stock market growth:<br>• SVT, STOR, MCR | ARDL-ECM, Granger causality | GDP Granger causes MCR and STOR | 1991Q1 and 2012Q4 | Ghana |
| Adusei (2014) | Economic growth:<br>• GDP 2006 constant price<br>Stock market growth:<br>• SPI | ARDL-ECM, Granger causality | SPI Granger causes GDP | 2006:Q1-2013:Q2 | Ghana |
| Dzwornu and Awunyo-Vitor (2013) | Economic growth:<br>• GDP growth rate<br>Stock market growth:<br>• SPI | Traditional Granger Causality | SPI Granger causes GDP growth | 1990-2012 | Ghana |
| Osamwonyi and Kasimu (2013) | Economic growth:<br>• Real GDP<br>Stock market growth:<br>• MCR , SVT, STOR, SPI , NSL | Traditional granger causality | No causal link | 1993-2009 | Ghana |

**Note:** SPI is stock price index, SVT is stock value traded, STOR is stock turnover ratio, MC is market capitalization, MCR is market capitalization ratio, GDP is gross domestic product, NLS is number of listed stock

ln*GDP* and lnSMI are the natural logarithm of GDP (proxy for economic growth) and stock market Indicators (SMI) (proxy of stock market growth) respectively. SMI represent, individually, the three stock market indicators (stock price index (SPI), stock value traded (SVT) and market capitalization (MC)) selected for this study. Also, p is the optimal lag order, **n** is the maximum order of integration of the variables in the VAR model and $u_t$ & $v_t$ are white noise error terms.

After estimating the bivariate VAR (p + **n**), the restriction that the coefficients $\beta_i$ and $\delta_i$ for lag variable of i =1, 2,…….p are equal to zero is tested. This implies that when testing for the significance of the coefficients $\beta_i$ and $\delta_i$, the coefficients $\beta_i$ and $\delta_i$ of the extra **n** lag variables are not included. This procedure enhances the applicability of the asymptotic critical values where the variables are integrated (Toda & Yamamoto, 1995).

## 4. Results of Model Estimation

Toda and Yamamoto no-causality test, a modified Granger causality test, requires and involves the estimation of order of integration of the variables, maximum lag length of the variables in the VAR, long run relationship between the variables in the VAR (not required) and finally the implementation of the Toda and Yamamoto procedure to test the hypothesis of Granger no- causality.

Thus, in this paper, the results of the study as estimated using the Toda and Yamamoto procedure are presented under the following headings, namely, Order of Integration of Stock Market Indicators (SMI) (SPI, MC and SVT) and GDP, Optimal Lag Order p of VAR (p), Long-run Relationship between SMI and GDP, and Toda and Yamamoto Granger No-causality Test.

### 4.1. Estimation Order of Integration of SMI (SPI, MC and SVT) and GDPG

In Toda and Yamamoto Granger no-causality test, VAR (p+ **n),** an augmented VAR(p) is estimated and the relevant coefficients are subjected to Wald test of zero restrictions.

The maximum order of integration (**n)** is required for the purpose of augmenting VAR(p) to derive the augmented VAR(p+ **n).** Save this, order of integration is not an issue in Toda and Yamamoto no-causality test. The order of integration of SMI (SPI, SVT, MC) and GDP are estimated by conducting a Kwiatkowski, Phillips, Schmidt, and Shin (1992) KPSS test for level stationarity on the level and 1st difference form of LNSPI, LNCM, LNSVT and LNGDP series. The results of the KPSS stationarity test are presented in Table 2.

**Table-2.** Summary of KPSS test that SMI (SPI, MC, SVT) and GDP are level stationary

| Variables | KPSS level stationarity test | | | Order of integration I(n) |
|---|---|---|---|---|
| | Truncation Lags | Levels of series | 1st difference of series | |
| LNSPI | 1 | 1.0094(0.01)** | 0.27035(0.1) | I(1) |
| LNMC | 1 | 0.1538(0.1) | 0.039685(0.1) | I(0) |
| LNSVT | 1 | 1.1582(0.01)** | 0.35019(0.0986) | I(1) |
| LNGDP | 1 | 0.5068(0.04013)** | 0.14797(0.1) | I(1) |

**Note:** the figures in the parentheses are the p-values of KPSS level stationarity test
** denotes significant 5% significance level

The results presented in Table 2 show that with the exception of LNMC which is I(0) the rest of the variables (LNSPI, LNSVT and LNGDP) are I(1) series. Thus the maximum order of integration is one (1) and this implies n = 1

### 4.2. Estimation of Optimal Lag Order p of VAR (p)

To estimate the optimal lag order (p) of VAR (p), AIC and SBC information criteria are employed. A lag length of three (3) is selected as the optimal lag length for VAR(p) irrespective of the SMI (SPI, SVT, MC) involved in VAR(p).

Though AIC and SBC criteria suggested higher lag length of four (4) or five (5) in the case of VAR(p) involving SVT and MC, three (3) lag order (p=3) is selected for the estimation of VAR(p) because the sample size of the series available for the study is small (27 annual series) and there is the need to spare an optimal degree of freedom for the estimation. The details of the results of AIC and SBC estimations are available and will be provided on request.

With the selected lag length of the VAR(p) (p=3) and the estimated maximum order of integration (n=1) the augmented VAR(p + n) is specified as VAR(4). Hence, the following VAR(4) model is estimated for the purpose of implementing Toda and Yamamoto Granger no-causality test.

$$lnGDP_t = \gamma_{0\ 0} + \sum_{i=1}^{4} \alpha_i\ lnGDP_{t-1} + \sum_{i=1}^{4} \beta_i\ lnSMI_{t-1} + u_t \quad \ldots\ldots\ldots \quad (3)$$

$$lnSMI_t = \gamma_0 + \sum_{i=1}^{4} \varphi_i\ lnSMI_{t-1} + \sum_{i=1}^{4} \delta_i\ lnGDP_{t-1} v_t \quad \ldots\ldots\ldots\ldots \quad (4)$$

### 4.3. Estimation of Long-run Relationship between SMI and GDP

Establishing the long-run relationship between the variables in a VAR (p) is not required for the purpose of carrying out Toda and Yamamoto no-causality test. However, Toda and Yamamoto no-causality test is not a substitute to co-integration test, but a complement. Hence, Johansen maximum likelihood co-integration test is adopted for establishing the existence of long-run relationship between SMIs and GDPG. The results of the test is shown in Table 4.

**Table-3.** Summary of Results of Johansen Cointegration Test for SMIs and GDPG.

| Test type | Null | Test statistic | 95% critical values | 90% critical values |
|---|---|---|---|---|
| **LNGDPG & LNSVT** | | | | |
| Eigen | r = 0 | 25.7158** | 15.8700 | 13.8100 |
| | r ≤ 1 | 5.0142 | 9.1600 | 7.5300 |
| Trace | r = 0 | 30.7300** | 20.1800 | 17.8800 |
| | r ≤ 1 | 5.0142 | 9.1600 | 7.5300 |
| **LNGDPG & LNSPI** | | | | |
| Eigen | r = 0 | 15.6926 | 15.8700 | 13.8100* |
| | r ≤ 1 | 6.3534 | 9.1600 | 7.5300 |
| Trace | r = 0 | 22.0462** | 20.1800 | 17.8800 |
| | r ≤ 1 | 6.3534 | 9.1600 | 7.5300 |

**Note:** Cointegration type-cointegration with restricted intercepts and no trends.
** indicates that the null hypothesis is rejected at 5% level of significance.
* indicates that the null hypothesis is rejected at 10% level of significance.

It is observed from Table 3 that at 5% significance level there is cointegration between GDP and SMI (SPI and SVT). Cointegration test is not carried out for GDP and MC because MC and GDP are not of the same order of integration (MC is I(0) and GDP is I(1))

### 4.4. Toda and Yamamoto Granger No-Causality Test

As already explained in the previous section, to test for Granger no-causality using Toda and Yamamoto extra lag procedure, VAR(p + n) is estimated. The coefficients of the causal variable for p lags are restricted to zero for Wald test of linear restrictions.

This procedure was carried out for the two equations Equation 3 and Equation 4 for each of the three (3) stock market indicators (SPI, CM and SVT). Table 4 shows a summary of the results of Toda and Yamamoto Granger no-causality test.

**Table-4.**Toda and Yamamoto Granger No-causality Test Results.

| Null Hypotheses ($H_0$) | LNMC | LNSPI | LNSVT |
|---|---|---|---|
| SMIs does no Granger cause GDPG | 2.2987(0.5131) | 2.0185(.569) | 2.2057(.531) |
| GDPG does not Granger cause SMIs | 2.4764(0.480) | 9.7260(.021)** | 7.4050(060)* |

**Note:** the figures in the parentheses are the asymptotic p-values .
** denotes rejection of null hypothesis at 5% significance level .
* denotes rejection of null hypothesis at 10% significance level.

The results presented in Table 4 indicate that the null hypothesis that "SMI does not Granger cause GDP" is not rejected at 5% or 10% significance levels for all the SMIs (MC, SPI, SVT) and hence this evidence does not support market-led economic growth irrespective of the SMI involve. For the null hypothesis that "GDP does not Granger cause SMI", the results are mixed. "GDP does not Granger cause SMIs" hypothesis is rejected at 5% significance level for SPI and at 10% significance level for SVT.

However it is not rejected in the case of MC. The acceptance of "GDP does not Granger cause SMI" hypothesis in the case of MC is in consonance with the cointegration test result which indicated that MC and GDPG do not have long-run relationship.

According to Engle and Granger (1987) and Giles (2011) if two variables are cointegrated there is a one-way or bidirectional causal link between the variables. For variables that are not cointegrated, a causal link between them, one-way or bi-directional, is a probability.

The results implies that there is possibly a one-way causal link between stock market indicators (SMI) and GDP growth and this causal link runs from economic growth to stock market growth. The results specifically show that SPI and STV are the stock market indicators that has a one-way causal link with GDP growth. Market capitalization has no causal link with GDP growth. It is also evident that stock market indicators (SMI) do not derive GDP growth.

## 5. Conclusion, Implications and Recommendation

### 5.1. Conclusion

It was generally expected that the findings of this study will lend support to one of the four computing findings in the literature of market growth and economic growth relationship, namely market lead economic growth, economic led market growth, bi-directional causality between market growth and economic growth, and no causal link between market growth and economic growth.

The findings of this study support growth-led finance proposition for two market indicators (SPI, SVT) of the three stock market indicators (SPI, MC, STV). However the study did not find any evidence to support market-led economic growth for any of the three (3) stock market indicators used. Thus, the study could not confirm the finance-led economic growth proposition.

The findings could not support economic growth-led stock market growth in the case of market capitalisation because the market capitalisation of the Ghana stock exchange is dominated by a single firm, AngloGold Ashanti Limited, with over 70% of total market capitalisation over the years. As at July, 2016, AngloGold Ashanti Limited and Tullow Oil Plc. accounted for about 74% of total market capitalisation. Thus, probably, it is the activities of these two firms that drive market capitalisation of the stock market instead of the economy.

The stock market is yet to make a significant contribution to economic growth in Ghana. A plausible explanation for this, despite the remarkable transformation of the stock market, is that there are impediments and bottle necks that hinder the intended and expected impact of stock market on the economy such as market inefficiency, small market size relative to the economy, low investor confidence due to regulatory and economic limitations, unattractiveness of the market for listing due to laborious listing requirements, and abysmal representation of the sectors of the economy that drive economic growth in the country among others.

Ghana stock market is dominated by the mining sector and the banking sector over the years. The key sectors of economy growth, agriculture (cocoa) and the service and innovative sectors are abysmally less represented in the stock market. Thus, the stock market is not efficient in allocating resources for the financing of these key sectors that drive growth in the economy.

### 5.2. Implications

One possible implication of the economic-driven market growth is, as suggested by the adaptive expectations model, that investors of the GSE do not form their expectations about the future stock market by looking at factors such as institutional quality, shareholder protection and firm specific characteristics but also past economic activities (GDP growth). It may also be suggested from the finding that in recent times investors have developed some level of confidence in the economy hence consider economic indicators such as GDP growth rate in their stock market investment decisions.

The absence of market-driven economic growth implies that market growth may be necessary but not adequate to drive economic growth for the sample period. The results confirm the opinion of the critics of stock price-led economic growth proposition.

The critics reasoned that expectations about future economic activities are subject to human errors, which in many cases cause stock prices to deviate from the real economic activities. Since investors do not always anticipate correctly, stock prices will sometimes increase before the economy enters into recession or decrease before the economy expands.

As a result, the stock market will often mislead the direction of the economy. Even when stock prices do precede economic activities, a question that arises is how much lead or lag time should the market be allowed to have an effect on economic activities?

The results are also inconsistent with the wealth effect. According to this argument, fluctuations in stock prices have a direct effect on the wealth of investors which also has a direct effect on aggregate consumption. As a result, economic activities are influenced by fluctuations in the stock market.

### 5.3. Recommendations

One way to enhance the effect of market growth on the economy is to encourage listing of firms in the sectors of the economy that contribute significantly to GDP growth in the stock market.

This will provide an opportunity for the capital market to allocate resource to these sectors of the economy and hence drive the growth of these sectors and the economy. Here, eliminations of irrelevant listing requirement, and provision of legal and economic incentives for firms in the sectors that drive economic growth for listing in the stock market is key.

With the findings of this study, the growth of the Ghana stock exchange largely depend on the economic climate within which the firms listed in the stock market operates. Thus, government should ensure stable macroeconomic and microeconomic environment for businesses that are listed in the stock market to flourish.

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