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DOES STOCK MARKET PERFORMANCE SPUR ECONOMIC GROWTH? EMPIRICAL EVIDENCE FROM GHANA

Bernard Njindan Iyke[1] and Nicholas M. Odhiambo

Abstract

In this paper, we investigate the relationships between stock market performance and economic growth in Ghana over the period 1991Q1 and 2012Q4 using ARDL procedure for testing cointegration and causality. Unlike previous studies, we employed three proxies of stock market performance, namely: market capitalization ratio, turnover ratio, and total value of shares traded ratio. We also introduced inflation as an intervening variable, in order to avoid the problem of omission-of-variable-bias that has featured most studies. We found a causal flow from economic growth to market capitalization and turnover ratio both in the short run and in the long run. However, we only found a causal flow from economic growth to total value of shares traded ratio in the short run. We recommend that, whilst the implementation of effective strategies would be necessary to attract investors into the stock market, policymakers should undertake growth-enhancing policies in order to spur stock market performance.

Keywords: *Economic Growth, Ghana, Inflation, Stock Market Performance*

JEL Classification Code: *N2, E2, C32*

1. Introduction

Although, the finance-growth debate has been widely discussed in economic literature, the main concentration has been on banking sector development and economic growth. The earliest of this discussion dates back to the Smithsonian Era. Adam Smith (1776) asserted that the pace with which the city of Glasgow grew was, perhaps, due to the establishment of the Bank of Scotland

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and the Royal Bank in the 1790's. Similar assertions on the role of banks in economic growth were indicated by Bagehot (1873), and Robinson (1952). The role of stock market performance has not been properly integrated into the finance-growth debate, especially, for studies on developing countries. In the case of African countries, this was quite understandable owing to the nascent nature of the stock markets.

Theory has it that the performance of stock market leads the business cycle (see Levine and Zervos, 1998). In the US, for instance, the economic turmoil started with the stock market boom in 2000 and eventual crash in 2007; the rest they say, is history! With the increase in the importance of stock market activities in real economic activities, one wonders why this issue has not been taken up seriously in previous studies. Whilst it is easy to proclaim that the initial theories (see Patrick, 1966) made attempt to integrate the role of stock markets in financial development for industrialized nations, the same could not be said for developing countries. A pioneering work on the relationship between stock market development and economic growth in emerging countries was first seen in Levine and Zervos (1998). Levine and Zervos were able to argue out that stock market performance has a positive effect on economic growth. Despite this commendable attempt, it must be mentioned that their study employed cross-sectional approach, which may not effectively account for country specific effects. Besides, they used a single composite measure to proxy stock market performance; this approach may lead to loss of vital information.

The stock market and economic growth relationship has gained less attention in Ghana. The few studies were basically cross-sectional or panel approaches, which took into account several countries (see Adjasi and Biekpe, 2006; Akinlo and Akinlo, 2009). A problem with aggregating

countries is the loss of concentration. None of these studies comprehensively examined the impact of stock market performance on economic growth in Ghana. Our study aims to resolve this situation by focusing on only Ghana. The study also includes inflation as an intervening variable as an indicator of macroeconomic stability. Generally, unfavourable macroeconomic climate—in the form of high inflation—has adverse effects on both economic growth and stock market performance, as justified by previous studies (see Beck and Levine, 2004; Bekaert et al., 2005; and Odhiambo, 2014).

The rest of the paper is organized as follows: Section 2 presents the trends in stock market performance, and economic growth in Ghana; Section 3 discusses the literature on stock market performance and economic growth; Section 4 covers the methodology and econometric issues; Section 5 presents the findings; and section 6 draws the conclusions emanating from the findings.

2. Trends in Stock Market Performance and Economic Growth in Ghana

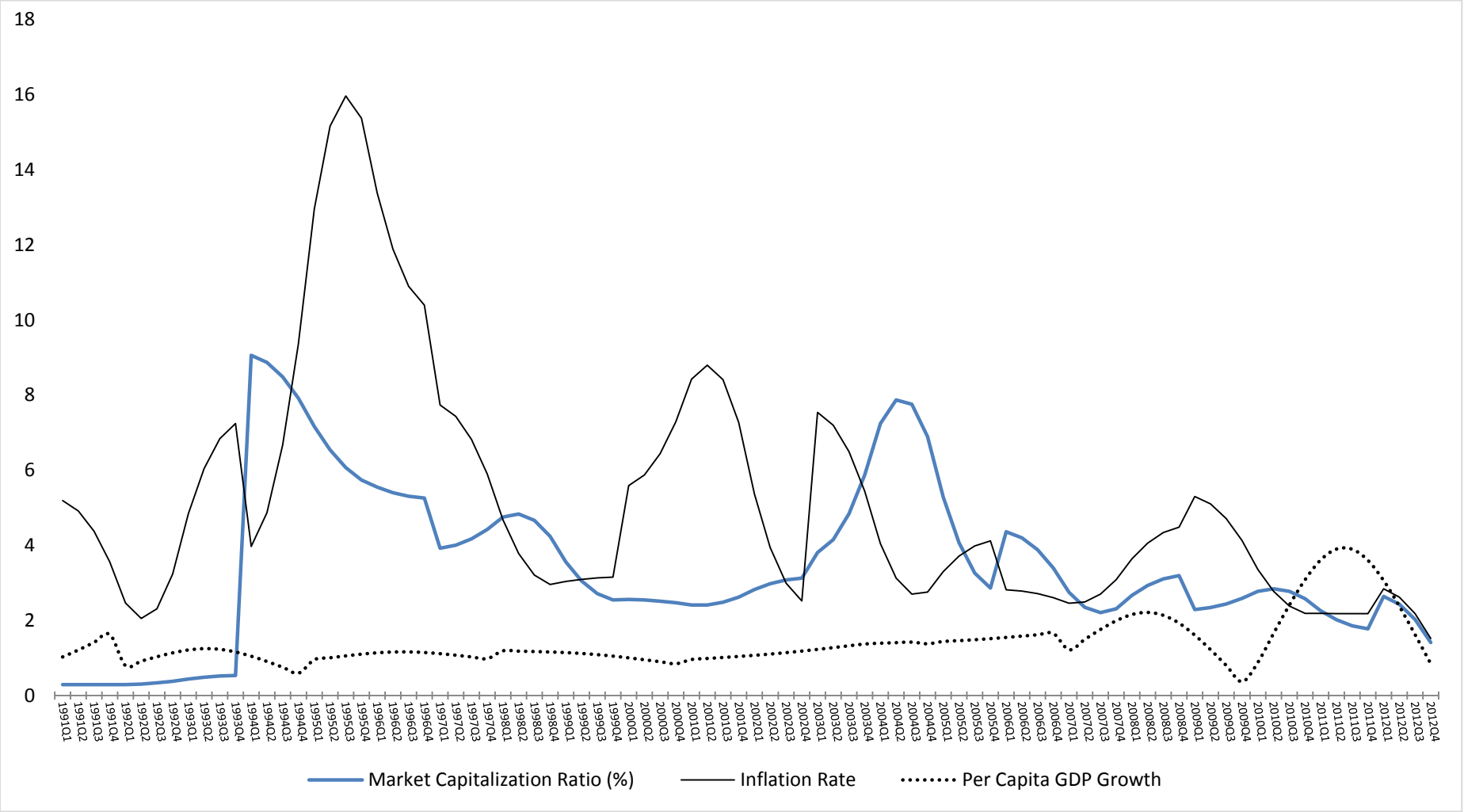
The capital market in Ghana is relatively underdeveloped. As at April 2014, Ghana has one Stock Exchange (the GSE) and one over-the-counter listing institution (the Home Finance Company). The stock prices are regulated. On the Ghana Stock Exchange (GSE), stock prices are only legally allowed to fluctuate by 5% per trading day. This means that on this exchange, stock prices cannot rise or fall by 5% of their previous level; only false trading could lead to prices increasing or falling by 5% overnight.

The GSE is a private sector initiative incorporated in July, 1989 as a private limited liability company by guarantee under the Ghana's Companies Act, 1963 (Act 179) but has enjoyed the support of the Government of Ghana. Currently, there are twenty stock brokerage firms licensed to deal on the exchange. There are also thirty-six listed companies in 2014. The main items traded are the Ordinary shares (Common Stock), Preference Shares and Debt Securities (GSE Homepage, 2014). The GSE currently trade via an automated platform called GATS. The GSE Automated Trading System (GATS) was introduced in November 2008 after a successful installation of systems software and training of user groups. The GATS replaced the GSE Continuous Auction Trading System (CATS) introduced in 2000 to accommodate the needs of investors for a more dynamic trading system. From 1991 to 1999, the GSE employed a Call Over Market Trading System.

The Figure 1 below shows the patterns of market capitalization ratio, inflation rate, and real GDP per capita growth over our study period. From the figure, quarterly market capitalization ratio and quarterly inflation rate seem to move together, with inflation often leading the movement. From quarter one of 1991 to quarter one of 1992, increment in market capitalization ratio was moderate; however, inflation was on a free fall, declining by about 0.15%. A distinct pattern occurred between quarter two of 1992 and quarter four of 1993 when inflation increased alongside market capitalization ratio; this movement goes against the normal intuition that increasing inflation dampens stock market performance. Beyond quarter four of 1993, increases in inflation were often associated with declining market capitalization ratio and vice versa. The relationship between market capitalization ratio and real GDP per capita growth, on the other hand, is not very clear from Figure 1, although a pattern began to appear at the tail end of the study period. The same could be said of the dynamic movement between inflation rate and real

GDP per capita growth. Figure 1 has not been able to clearly depict the relationships between market capitalization ratio, inflation rate, and real GDP per capita growth over time. Thus, quantitative evidence was required. The remaining part of the paper was dedicated to providing quantitative evidence on the relationships between these variables.

Figure 1: Market Capitalization Ratio (%), Inflation Rate, and Real GDP per Capita Growth Trends (1991Q1-2012Q4)



Source: Constructed using data from GSE, Bank of Ghana, and Ghana Statistical Service.

3. Literature Review

Theoretically and empirically, the role of stock markets in economic growth has not been well documented at least, not until the seminal paper by Levine and Zervos (1998). Until Levine and Zervos (1998), emphasis was on how crucial the banking sector development aids economic growth and vice versa (see Adam Smith, 1776; Bagehot, 1873; Robinson, 1952; Patrick, 1966 among others). Considering how crucial the stock market is, especially in mobilizing funds for listed firms, and providing an avenue for risks diversification for economic agents, it remains esoteric how it was relegated in the literature.

Contributing to this issue, Levine and Zervos (1998) found that stock market performance enhances economic growth. They argued that the stock market offer alternative financial services to the banking sector. However, the procedure used by Levine and Zervos (1998) put their conclusions in doubt (see Beck and Levine, 2004). First, Levine and Zervos employed the method of ordinary least squares (OLS) which does not take into consideration simultaneity bias. The OLS procedure also failed to employ lagged dependent variables as is always the case in growth regressions; besides, the procedure failed to control for country effects (see Demetriadis and Luintel, 2001; Beck and Levine, 2004 among others). In addition to these, Beck and Levine (2004) argued that Levine and Zervos (1998) could not account for the potential relationship between economic growth and the contemporaneous level of financial development, by using initial values of stock market and bank development.

These obvious statistical limitations in Levine and Zervos (1998) were taken up in some studies in the past. Demetriades and Luintel (2001) attempted to resolve these limitations using quarterly data and time series methodology in a study involving five developed economies. The study

found stock market performance to have mild positive impact on economic growth when compared to the impact of banking sector on economic growth. The findings of Demetriades and Luintel (2001) was limited due to the small sample size employed (Beck and Levine, 2004).

Further, Rousseau and Wachtel (2000) attempted to resolve the glaring statistical limitations in Levine and Zervos (1998), and Demetriades and Luintel (2001) by employing series of panel data methods to examine the links between stock markets, banks, and economic growth. The study used the *difference panel estimator*, which differenced the growth regression to filter any bias resulting from unobserved country-specific effects and lagged values of the regressors to filter potential sources of parametric inconsistency resulting from simultaneity bias. Rousseau and Wachtel (2000) found stock market performance to positively affect economic growth.

Zhu et al. (2004) found stock market performance not to be significant in the growth process of economies, especially when outliers are controlled for in the Levine and Zervos (1998) empirical specifications. Beck and Levine (2004) rebuffed this conclusion by examining the relationship between stock market development, banking sector development, and economic growth in a panel setting. They found stock market performance to be essential in enhancing economic growth. The main argument advanced by Beck and Levine (2004) is that when stock market is omitted in the relationship involving banking sector development and economic growth, the result becomes difficult or almost impossible to interpret.

Recent studies have shifted the argument towards causality. The aim of these studies was to establish the direction of the causal linkage between stock market performance and economic growth. For instance, Dritsaki and Dritsaki-Bargiota (2005) found a unidirectional causality running from economic growth to stock market performance for Greece, using time series data.

Hondoyiannis et al. (2005) found a unidirectional causality flowing from stock market performance to economic growth for Greece, using time series data. Other studies found stock market performance to Granger cause economic growth too; the most recent ones include Shen and Lee (2006), Ben Naceur (2007), and Cooray (2010).

4. Methodology

4.1 Bounds Testing Procedure of Pesaran et al. (2001)

In order to see whether stock market performance spurs economic growth in the short and long run, the study examines the cointegrating properties of the underlying variables. If the variables are cointegrated, it means that they move together in the long run when they deviate from each other in the short run. This is done by employing the bounds testing procedure due to Pesaran et al. (2001). The bounds testing procedure is preferred to the Engle-Granger and Johansen procedures due to its desirable small sample properties—it does well in small samples (Pesaran and Shin, 1999). This method is also preferable because it does not take into account the stationary properties of variables under study. That is, it can be employed regardless of whether the variables are I(0) or I(1) processes or a mixture of the two (Pesaran and Shin, 1999). Another desirable property of the bounds testing approach is that we can decide which variables should be the dependent variable and which ones should be independent variables.

The ARDL bounds testing procedure due to Pesaran et al. (2001), in terms of our variables, could be formulated as follows:

Model One: GDP per capita, Inflation, and Market Capitalization Ratio

$$\Delta lnGDP_t = \alpha_{01} + \sum_{i=1}^{n} \psi_{i1} \Delta lnGDP_{t-i} + \sum_{i=0}^{n} \psi_{i2} \Delta lnINF_{t-i} + \sum_{i=0}^{n} \psi_{i3} \Delta lnMCR_{t-i} + \sigma_{11} lnGDP_{t-1} + \sigma_{12} lnINF_{t-1} + \sigma_{13} lnMCR_{t-1} + \varepsilon_{1t} \quad (1)$$

$$\Delta lnINF_t = \alpha_{02} + \sum_{i=1}^{n} \varphi_{i1} \Delta lnINF_{t-i} + \sum_{i=0}^{n} \varphi_{i2} \Delta lnMCR_{t-i} + \sum_{i=0}^{n} \varphi_{i3} \Delta lnGDP_{t-i} + \sigma_{21} lnGDP_{t-1} + \sigma_{22} lnINF_{t-1} + \sigma_{23} lnMCR_{t-1} + \varepsilon_{2t} \quad (2)$$

$$\Delta lnMCR_t = \alpha_{03} + \sum_{i=1}^{n} \gamma_{i1} \Delta lnMCR_{t-i} + \sum_{i=0}^{n} \gamma_{i2} \Delta lnINF_{t-i} + \sum_{i=0}^{n} \gamma_{i3} \Delta lnGDP_{t-i} + \sigma_{31} lnGDP_{t-1} + \sigma_{32} lnINF_{t-1} + \sigma_{33} lnMCR_{t-1} + \varepsilon_{3t} \quad (3)$$

Model Two: Real GDP per Capita, Inflation, and Turnover Ratio

$$\Delta lnGDP_t = \beta_{01} + \sum_{i=1}^{n} \tau_{i1} \Delta lnGDP_{t-i} + \sum_{i=0}^{n} \tau_{i2} \Delta lnINF_{t-i} + \sum_{i=0}^{n} \tau_{i3} \Delta lnTOR_{t-i} + \emptyset_{11} lnGDP_{t-1} + \emptyset_{12} lnINF_{t-1} + \emptyset_{13} lnTOR_{t-1} + \mu_{1t} \quad (4)$$

$$\Delta lnINF_t = \beta_{02} + \sum_{i=1}^{n} \pi_{i1} \Delta lnINF_{t-i} + \sum_{i=0}^{n} \pi_{i2} \Delta lnGDP_{t-i} + \sum_{i=0}^{n} \pi_{i3} \Delta lnTOR_{t-i} + \emptyset_{21} lnGDP_{t-1} + \emptyset_{22} lnINF_{t-1} + \emptyset_{23} lnTOR_{t-1} + \mu_{2t} \quad (5)$$

$$\Delta lnTOR_t = \beta_{03} + \sum_{i=1}^{n} \rho_{i1} \Delta lnTOR_{t-i} + \sum_{i=0}^{n} \rho_{i2} \Delta lnGDP_{t-i} + \sum_{i=0}^{n} \rho_{i3} \Delta lnINF_{t-i} + \emptyset_{31} lnGDP_{t-1} + \emptyset_{32} lnINF_{t-1} + \emptyset_{33} lnTOR_{t-1} + \mu_{3t} \quad (6)$$

Model Three: Real GDP per Capita, Inflation, and Total Value of Shares Traded Ratio

$$\Delta lnGDP_t = \delta_{01} + \sum_{i=1}^{n} \Theta_{i1} \Delta lnGDP_{t-i} + \sum_{i=0}^{n} \Theta_{i2} \Delta lnINF_{t-i} + \sum_{i=0}^{n} \Theta_{i3} \Delta lnTVR_{t-i} + \phi_{11} lnGDP_{t-1} + \phi_{12} lnINF_{t-1} + \phi_{13} lnTVR_{t-1} + \epsilon_{1t} \quad (7)$$

$$\Delta lnINF_t = \delta_{02} + \sum_{i=1}^{n} \Gamma_{i1} \Delta lnINF_{t-i} + \sum_{i=0}^{n} \Gamma_{i2} \Delta lnGDP_{t-i} + \sum_{i=0}^{n} \Gamma_{i3} \Delta lnTVR_{t-i} + \phi_{21} lnGDP_{t-1} + \phi_{22} lnINF_{t-1} + \phi_{23} lnTVR_{t-1} + \epsilon_{2t} \quad (8)$$

$$\Delta lnTVR_t = \delta_{03} + \sum_{i=1}^{n} \eta_{i1} \Delta lnTVR_{t-i} + \sum_{i=0}^{n} \eta_{i2} \Delta lnINF_{t-i} + \sum_{i=0}^{n} \eta_{i3} \Delta lnGDP_{t-i} + \phi_{31} lnGDP_{t-1} + \phi_{32} lnINF_{t-1} + \phi_{33} lnTVR_{t-1} + \epsilon_{3t} \quad (9)$$

Where variables are captured in their log form to remove outliers, *GDP*=real GDP per capita, *INF*= quarterly inflation rate as proxy by change in consumer price index, *MCR*=market capitalization ratio, *TOR*=turnover ratio, *TVR*=total value of shares traded ratio, ε, μ, ϵ=iid error

terms or innovations, t=time period, Δ=first difference operator, and the remaining Greek alphabets are the parameters to be estimated.

We test whether inflation, economic growth, and market capitalization ratio (an index of stock market performance) are cointegrated by examining (for instance) the null hypothesis that $H_0: \sigma_{11} = \sigma_{12} = \sigma_{13} = 0$ in Equation (1) of *Model One*. The same approach is followed for models *Two* and *Three* to examine the existence of cointegrating relationships between indexes of stock market performance, inflation rate, and economic growth. The *F*-statistic emanating from restricting the coefficients in the null hypothesis to zero is then compared to a set of critical values computed by Pesaran et al. (2001). The null hypothesis is rejected if the *F*-statistic exceeds the critical upper bound value at 1%, 5%, or 10%. In that case, we conclude that the variables move together in the long run. On the other hand, we fail to reject the null hypothesis of no cointegration if the *F*-statistic exceeds the critical lower bound value at 1%, 5%, or 10%; we conclude that these variables do not move together in the long run. The inconclusive situation occurs when the *F*-statistic falls within the critical upper and lower bound values at 1%, 5%, or 10% (see Pesaran et al., 2001).

4.2 Testing for Granger Causality

We replaced the long-run terms in the above specifications with the one period lag error-correction terms, in order to examine the direction of Granger causality between indexes of stock market performance, inflation, and economic growth. This was done following recent studies (see Narayan and Smyth, 2006; and Odhiambo, 2014). The specifications are as follows:

Granger Causality Specification of Model One: Real GDP per capita, Inflation, and Market Capitalization Ratio

$$\Delta lnGDP_t = \alpha_{01} + \sum_{i=1}^{n} \psi_{i1} \Delta lnGDP_{t-i} + \sum_{i=0}^{n} \psi_{i2} \Delta lnINF_{t-i} + \sum_{i=0}^{n} \psi_{i3} \Delta lnMCR_{t-i} + ECM_{i,t-1} + \varepsilon_{1t} \quad (10)$$

$$\Delta lnINF_t = \alpha_{02} + \sum_{i=1}^{n} \varphi_{i1} \Delta lnINF_{t-i} + \sum_{i=0}^{n} \varphi_{i2} \Delta lnMCR_{t-i} + \sum_{i=0}^{n} \varphi_{i3} \Delta lnGDP_{t-i} + ECM_{i,t-1} + \varepsilon_{2t} \quad (11)$$

$$\Delta lnMCR_t = \alpha_{03} + \sum_{i=1}^{n} \gamma_{i1} \Delta lnMCR_{t-i} + \sum_{i=0}^{n} \gamma_{i2} \Delta lnINF_{t-i} + \sum_{i=0}^{n} \gamma_{i3} \Delta lnGDP_{t-i} + ECM_{i,t-1} + \varepsilon_{3t} \quad (12)$$

Granger Causality Specification of Model Two: Real GDP per Capita, Inflation, and Turnover Ratio

$$\Delta lnGDP_t = \beta_{01} + \sum_{i=1}^{n} \tau_{i1} \Delta lnGDP_{t-i} + \sum_{i=0}^{n} \tau_{i2} \Delta lnINF_{t-i} + \sum_{i=0}^{n} \tau_{i3} \Delta lnTOR_{t-i} + ECM_{i,t-1} + \mu_{1t} \quad (13)$$

$$\Delta lnINF_t = \beta_{02} + \sum_{i=1}^{n} \pi_{i1} \Delta lnINF_{t-i} + \sum_{i=0}^{n} \pi_{i2} \Delta lnGDP_{t-i} + \sum_{i=0}^{n} \pi_{i3} \Delta lnTOR_{t-i} + ECM_{i,t-1} + \mu_{2t} \quad (14)$$

$$\Delta lnTOR_t = \beta_{03} + \sum_{i=1}^{n} \rho_{i1} \Delta lnTOR_{t-i} + \sum_{i=0}^{n} \rho_{i2} \Delta lnGDP_{t-i} + \sum_{i=0}^{n} \rho_{i3} \Delta lnINF_{t-i} + ECM_{i,t-1} + \mu_{3t} \quad (15)$$

Granger Causality Specification of Model Three: Real GDP per Capita, Inflation, and Total Value of Shares Traded Ratio

$$\Delta lnGDP_t = \delta_{01} + \sum_{i=1}^{n} \Theta_{i1} \Delta lnGDP_{t-i} + \sum_{i=0}^{n} \Theta_{i2} \Delta lnINF_{t-i} + \sum_{i=0}^{n} \Theta_{i3} \Delta lnTVR_{t-i} + ECM_{i,t-1} + \epsilon_{1t} \quad (16)$$

$$\Delta lnINF_t = \delta_{02} + \sum_{i=1}^{n} \Gamma_{i1} \Delta lnINF_{t-i} + \sum_{i=0}^{n} \Gamma_{i2} \Delta lnGDP_{t-i} + \sum_{i=0}^{n} \Gamma_{i3} \Delta lnTVR_{t-i} + ECM_{i,t-1} + \epsilon_{2t} \quad (17)$$

$$\Delta lnTVR_t = \delta_{03} + \sum_{i=1}^{n} \eta_{i1} \Delta lnTVR_{t-i} + \sum_{i=0}^{n} \eta_{i2} \Delta lnINF_{t-i} + \sum_{i=0}^{n} \eta_{i3} \Delta lnGDP_{t-i} + ECM_{i,t-1} + \epsilon_{3t} \quad (18)$$

Where $ECM_{i,t-1}$ is the lagged error-correction term for equation i, the Greek alphabets are the parameters to be estimated. The remaining terms are as before.

By establishing cointegration relationships between stock market performance, inflation, and economic growth, there is clear evidence of causality in at least one direction (see Narayan and Smyth, 2006; and Odhiambo, 2014). A *t*-test on the lagged error-correction term is then used to establish the direction of long-run causal relations between stock market performance, inflation, and economic growth. Finally, the direction of short-run Granger causality between these variables is established by performing an *F*-test on the explanatory variables in each of the equations in (10) to (18).[2]

The data for proxies of stock market performance, inflation rate, and economic growth was extracted from the GSE Database, the Bank of Ghana's quarterly bulletins, and the Ghana Statistical Service's reports, respectively. Since the Ghana Stock Exchange was established not long ago, the data consisted of quarterly observations from 1991Q1 to 2012Q4. Our choice of the three variables was also due to the short span of our data.

4.3 Variable Description

***Market Capitalization Ratio (MCR)*:** This measure is defined as the value of listed shares on the bourse to the gross domestic product. This measure equals the value of listed shares divided by GDP. The measure is based on the idea that the stock market size is positively related to the ability of listed firms to mobilize capital and diversify risk. The assumption behind the measure

[2] See recent application of the procedure in Oh and Lee (2004), and Narayan and Smyth (2006)

is that overall market size is positively correlated with the ability to mobilize capital and diversify risk. Generally, if this ratio is increasing over time, the stock market is said to be bullish, otherwise, it is bearish.

Total Value of Shares Traded Ratio (TVR): The measure is derived by dividing the total value of shares traded on the stock exchange by gross domestic product. This ratio, unlike the MCR, indicates the liquidity of the stock market and should positively reflect on an economy-wide basis. It is possible that the MCR may be increasing (i.e. the market size may be increasing) but actually no trading activity is taking place. This is usually the case of stock exchanges in developing countries.

Turnover Ratio (TOR): This ratio is derived by dividing the value of total shares traded by market capitalization. High turnover is used as an indicator of low transaction costs. A large, however, inactive market will have a large market capitalization ratio but a small turnover ratio. Turnover ratio measures trading relative to the size of the stock market. A small liquid market will have a high turnover ratio but a small total value traded ratio and vice versa.

Real GDP per Capita (GDP): This measure equals gross domestic product (at 2005 constant prices in US$) divided by the total population. It shows how much each person in a country will get if the gross domestic product were to be shared evenly. The measure has being adopted by the World Bank and IMF as an indicator of the level of economic growth in all countries.

Inflation Rate (INF): This measure defines the rate of growth of quarterly average price level in Ghana over the period 1991Q1—2012Q4. In this study, it indicates how stable the

macroeconomic climate is. We used the change in consumer price index (CPI) to proxy inflation rate, in this study.

5. Empirical Analysis

5.1 Unit Root Test

To perform the ARDL bounds testing, it is important to ensure that all the variables employed for the study are not integrated of order beyond one. This is because Pesaran et al. (2001) provided critical values for only I(0) and I(1) processes. Thus, the procedure collapses when our variables are I(2) or higher order processes. We tested for unit roots using the Phillips-Perron and the DF-GLS tests. The results, not reported here, indicated that the variables were non-stationary in levels. However, after differencing each of the variables once, they became stationary as shown in Table 1. Having satisfied the stationary properties required for ARDL bounds testing, we proceeded in the next step to investigate possible cointegration relationships between the variables.

Table 1: Test for Unit Roots in First Difference

Variable	Phillips-Perron		DF-GLS	
	No Trend	Trend	No Trend	Trend
Δ*lnMCR*	-8.550***	-8.757***	-8.542***	-8.724***
Δ*lnTOR*	-6.846***	-6.815***	-6.885***	-6.861***
Δ*lnTVR*	-7.593***	-7.635***	-2.939**	-4.311***
Δ*lnINF*	-6.481***	-6.437***	-6.343***	-6.423***
Δ*lnGDP*	-3.557**	-3.751**	-1.931*	-3.335**

Notes: (i) Truncation lag for DF-GLS is based Schwert Criterion.
(ii) Truncation lag for Phillips-Perron is based on Newey and West (1987) bandwidth.
(iii) *, ** and *** denote significance at 10%, 5%, and 1% levels, respectively.

5.2 Results of Bound Testing for Cointegration

In Table 1, we found that all the variables employed in the study were integrated of order one. One interesting property of such I(1) processes is that they may move together in the long run. Hence, accounting for such long-run relationships allows for efficient forecasting (see Pesaran and Shin, 1999). We therefore examine possible cointegration or long-run relationships between the variables using ARDL bounds testing procedure, as discussed earlier. This procedure requires establishing the optimal lags of our specifications in models One, Two, and Three; we employed the Schwarz Bayesian Criterion (SBC) to do this. We found the optimal lag as 4 in all cases. Using the optimal lags, we perform an *F*-test on equations (1)—(3), (4)—(6), and (7)—(9) and report the results in Table 2.

The results in Table 2 show that economic growth, inflation, and market capitalization ratio are cointegrated in *Model One*. In *Model One*, *lnMCR* was the cointegrating vector since the *F*-statistic of 5.09 for equation (3) was greater than upper bound value at 5% level of significance. The evidence of cointegrating relationship between turnover ratio, inflation, and economic growth was found in the *lnTOR* equation for *Model Two* since the *F*-statistic of 7.26 was greater than the upper bound value at 1% level of significance. Finally, in *Model Three*, economic growth, inflation, and total value of shares traded ratio were not cointegrated as could be seen by the *F*-statistics associated with the bound test on equations (7)—(9) in Table 2.

Table 2: Results of the ARDL Bounds Test for Cointegration

Dependent Variable	**Function**	**F-statistic**
Model One		
lnGDP	*lnGDP(lnINF, lnMCR)*	1.62
lnINF	*lnINF(lnGDP, lnMCR)*	4.13
lnMCR	*lnMCR(lnGDP, lnINF*)	5.09**
Model Two		
lnGDP	*lnGDP(lnINF, lnTOR)*	1.62
lnINF	*lnINF(lnGDP,lnTOR)*	3.54
lnTOR	*lnTOR(lnGDP, lnINF)*	7.26***
Model Three		
lnGDP	*lnGDP(lnINF, lnTVR)*	1.56
lnINF	*lnINF(lnGDP, lnTVR)*	3.16
lnTVR	*lnTVR(lnGDP, lnINF)*	1.49

Asymptotic critical values for unrestricted intercept and no trend reported from Table CI(iii) p. 300 of Pesaran et al., 2001.	1% I(0)	1% I(1)	5% I(0)	5% I(1)	10% I(0)	10% I(1)
	5.15	6.36	3.79	4.85	3.17	4.14

Note: ** and *** imply significance at 5% and 1% levels, respectively.

We proceeded to examine the stability of our coefficients over the sample period, following the evidence of cointegrating relationships between these variables in specifications One and Two. It is well-known that unstable regression coefficients render conclusions worthless, especially for policymaking and forecasting purposes (Pesaran et al., 2001). The results, not reported, show that the cointegrating equations passed the stability tests. The existence of cointegrating relationships between these variables was an indication that there was causal flow in one or more

directions (Pesaran et al., 2001). In the next stage, we examine the direction of causal relations in a dynamic setting.

5.3 Results of Granger Causality Test

As described earlier, testing for causality between variables in our error-correction models requires two steps. In the first step, we perform *F*-test on lagged explanatory variables to established short-run causality. In the second step, we perform *t*-test on the coefficients of the error-correction terms to establish long-run causality. Following these steps, we simulated the data and presented the results in Table 3.

The results indicate a unidirectional causal flow from economic growth to market capitalization ratio both in the short run and in the long run. The evidence of short-run causal flow from economic growth to market capitalization ratio was supported by the *p-value* of 0.019 associated with the joint restriction of the coefficients of real GDP per capita in Equation (12). The evidence of long-run causal flow from economic to market capitalization ratio, on the other hand, was supported by the significance and negativity of the error-correction term in Equation (12). In addition, the results indicate a unidirectional causal flow from economic growth to turnover ratio both in the short run and the long run. Similarly, the evidence of short-run causal flow from economic growth to turnover ratio was supported by the *p-value* of 0.003 associated with the joint restriction of the coefficients of real GDP per capita in Equation (15). Besides, the evidence of long-run causal flow from economic to turnover ratio was supported by the significance and negativity of the error-correction term in Equation (15). There was, however, no evidence in

support of short-run causal flow from economic growth to total value of shares traded ratio both in the short run and in the long run. The results, therefore, underscore the relevance of economic growth in stimulating the need for stock markets in Ghana. This appears to be the case as the idea of establishing the Ghana Stock Exchange was only conceived after the implementation of the structural adjustment and economic recovery programmes which sufficiently generated growth. Our findings agree with Dritsaki and Dritsaki-Bargiota (2005) who found economic growth to Granger-cause stock market development in Greece. However, our findings contradict recent findings such as those of Hondoyiannis et al. (2005), Shen and Lee (2006), Ben Naceur (2007), and Cooray (2010).

The rest of the results indicate that there is bidirectional causality, in the short run, between inflation and market capitalization ratio. There is also causal flow from inflation to market capitalization ratio in the long run. In addition, we found a long run causal flow from inflation to turnover ratio. However, there was no causality between total value of shares traded ratio and inflation. Finally, we found no evidence of Granger causality between inflation and economic growth in our results.

Table 3: Granger Causality between Stock Market Performance, Inflation and Economic Growth

	F-statistics [P-value]			Coefficient [t-statistics]
	$\Delta lnGDP$	$\Delta lnINF$	$\Delta lnMCR$	ECM_{t-1}
Model One				
$\Delta lnGDP$	-----	0.668[.457]	0.796[.556]	-----
$\Delta lnINF$	1.402[0.235]	-----	2.402[0.046]	-----
$\Delta lnMCR$	2.877[0.019]	2.036[0.098]	-----	-0.165[-3.227]***
Model Two				
	$\Delta lnGDP$	$\Delta lnINF$	$\Delta lnTOR$	ECM_{t-1}
$\Delta lnGDP$	-----	0.288[0.918]	0.810[0.547]	-----
$\Delta lnINF$	0.894[0.490]	-----	0.407[0.842]	-----
$\Delta lnTOR$	3.610[0.003]	0.020[0.999]	-----	-0.441[-4.672]***
Model Three				
	$\Delta lnGDP$	$\Delta lnINF$	$\Delta lnTVR$	ECM_{t-1}
$\Delta lnGDP$	-----	0.247[0.940]	0.167[0.974]	-----
$\Delta lnINF$	0.761[0.581]	-----	0.908[0.481]	-----
$\Delta lnTVR$	2.895[0.015]	0.445[0.815]	-----	-----

Note: ** and *** imply significance at 5% and 10% levels, respectively.

6. Conclusions

The long standing debate between financial development and economic growth has still not yielded a unanimous conclusion. Research on this debate have mostly focused on banking sector development, thus, relegating the role of stock markets. Even so, the few available studies have either examined the impact of stock market performance on economic growth or used a single proxy (i.e. market capitalization ratio) to measure the level of stock market performance when

testing the causal relationships between stock market performance and economic growth. Finally, the available studies on the causal relationships between stock market performance and economic growth were based on bivariate models; hence, unreliable due to a potential omission-of-variable bias problem inherent in bivariate models. Taking all these limitations into account, we examined the relationship between stock market performance and economic growth in Ghana over the period 1991Q1 and 2012Q4 using ARDL procedure for testing cointegration and Granger causality. To avoid the problem of omission-of-variable-bias that has featured most studies, inflation was included in our models as an intervening variable. We also employed three distinct indexes to capture stock market performance, namely: market capitalization ratio, turnover ratio, and total value of shares traded ratio. We found market capitalization ratio, inflation rate, and economic growth to be cointegrated when market capitalization ratio was treated as the dependent variable. We also found turnover ratio, inflation, and economic growth to be cointegrated when turnover ratio was the dependent variable. However, total value of shares traded ratio, inflation, and economic growth were not cointegrated. In terms of causality, we found economic growth to Granger-cause market capitalization ratio, and turnover ratio both in the short run and in the long run. In addition, we found economic growth to Granger-cause total value of shares traded ratio in the short run. Our paper concludes that in the Ghanaian case, economic growth leads to stock market performance. The paper also found causal links between inflation and two indexes of stock market performance, namely: market capitalization ratio, and turnover ratio. For instance, we found bidirectional causality between inflation and market capitalization ratio in the short run, a causal flow from inflation to market capitalization ratio in the long run, and a causal flow from inflation to turnover ratio in the long run. We recommend that while building a conducive climate for nurturing the stock market in Ghana was necessary,

policymakers should also focus on implementing policies and programmes which enhance economic growth. A sustained economic growth would be required to spur the performance of the stock market in Ghana.

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