Stock Market Development in Ghana: Whither Trade Openness

Raphael Awiagah and Sungsup Brian Choi

***Abstract*—This paper empirically examines the relationship between trade openness and stock market development in Ghana. The analysis was framed in a multivariate setting consisting of trade openness, per capita GDP, turnover ratio, value traded ratio, ratio of bank credit to the private sector to GDP and institutional quality over the period of 1991(Q1) to 2015(Q4). The Johansen cointegration analysis in VAR was used to assess the existence of long-run relationship among the series. VECM causality tests was conducted to ascertain the direction of causality among the variables. Variance decomposition assessment was used to forecast the future relationship among the variables. The results revealed the presence of cointegration (long-run relationship) in the series. More importantly, trade openness and institutional quality had positive and significant impact on stock market development in the long and short run. The study also found evidence of substitutability between the stock market and development in the banking making in Ghana. Additionally, Innovations in each of the variables has effect on stock market development but more pronounced effect was found in innovations in trade openness.**

***Index Terms*—Ghana, Ghana stocks exchange, institutional development, stock market development, trade openness.**

I. Introduction

The importance of trade and the accumulation of profit balance through protectionism in macro-level economics was hugely emphasized by Mercantilists in the 16th century, arguing that trade surplus is the most rewarding advantage of international trade. They advocated for export stimulus schemes and the protection of domestics industries. Nonetheless, Mercantilism was gradually undone by the proponents of the laissez-faire economic policies (free trade thinkers) lead by Adam Smith. In his widely acknowledged and reputed book "*An Inquiry into the Nature and Causes of the Wealth of Nations*" he argued fervently that free trade and international competition are beneficial to an economy than the mercantilist protectionism proposition. Free trade thinkers perceived mercantilism as the economic counterpart political absolutism.

However, researches including Corden (1966) and Krueger (1978) heightened interest in trade and formed the foundation for an array of trade policy reforms. The failure of the Soviet economy and the historical rise of the South Eastern Asian industrial economies (Japan, South Korea, Singapore, Hong Kong and Thailand) further reinforced the position of free trade and greater openness [1] and occasioned an a trend of unilateral trade and free market reforms in the 1980s, particularly in developing countries [2].

Successive financial crises that plagued the 1990s (Mexican and Turkish crises-1994; Asian crises-1997; Russian crises-1998) have however rekindled debate on economic openness and financial sector development [3]. Additionally, the 2008 global financial meltdown has also presented greater challenge to neoliberal globalization and the integration hypothesis. Nonetheless, contemporary studies that focused on trade openness and financial development nexus have largely focused on developed economies with mixed conclusions Whereas [4] reports a positive relationship, [5] detected no evidence of relationship between trade openness and financial development.

A scrutiny of stock market development literature reveal fluctuating growth of stock markets in the developed and emerging economies [6]. This is largely a consequent of macroeconomic ambivalences, intermittent structural reforms in the financial sector and institutional uncertainties [7]. Notwithstanding, stock market development literature assert its significance and the ability to impart liquidity into long-term investments, improve allocation of capital and enhances the plausibility of long-term sustained growth [8]. Earlier researches (Beck and Levine, 2003) also did affirm the economic significance of stock markets and has triggered concurrent curiosity and quest for sustainable stock market development factors though by far, there exist little empirical works on the issue particularly in developing countries.

Ghana's development strategy is hugely hinged on active participation of the private and in particular the capital market given their ability to intermediate private sector access to finance. The quest for private sector-led economic development and the burgeoning essence of stocks markets informed the establishment of the Ghana Stocks Exchange (GSE) [9]. The GSE is largely an outcome of the Structural Adjustment Program (SAP) in the 1980s to generate sustainable economic growth. The echoed two concurrent policy initiatives viz (i) stabilization (sound money) and (ii) liberalization (free market). The stabilization component centered primarily on fiscal austerity whereas the liberalization or free market route aimed to engineer trade liberalization and openness [10]. As a result, trade policy reforms which emphasized greater openness became pivotal in the development process in Ghana. The anticipated gains as [11] describes included technology and innovation spill-overs, increased foreign direct investments (FDI), improved

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industrial competitiveness and financial development.

Over the years however, the link between Ghana's trade reforms and the development of the stock market measured as capitalization ratio to GDP remains elusive particularly given the relatively small size of the economy and the financial market. This dearth of literature is a surprising one given the relationship that trade openness has with different facets of macroeconomic fundamentals. This study thus examines the long and short-run causal relationship between trade openness and stock market development in Ghana. The study also accounts for banking market improvement and institutional development. The aim is to generate intriguing policy implications for the growth of the GSE.

The rest of the study is divided into four sections. The ensuing section captures the literature review of the study whiles the third section presents the methodology. The results and implications are presented in section four and the conclusion and plausible policy implications are presented in section five.

II. Review of Literature

The Calderon-Rossell (1991) equilibrium model infused new insights into stock market development literature. The model establishes GDP growth and stock market liquidity as the two foundations for stock market development. Since its proposition, the model has been used extensively in its original and modified form, though with mixed results.

The rising interest in government policy framework in financial development has enabled a growing popularity of the interest group theory by [13]. The theory presents that financial development is positively correlated with trade and capital openness. They conclude that trade openness creates efficiency effects on account of internal and external scale economics benefits, reduces rent seeking and promotes competition.

The telnets of the interest group theory converges to the "law and finance" theory which advocates that disparities in the financial development are a consequent of differences in legal rules that protect investors as well as differences in the effectiveness of their enforcement [14]. The law and finance theory holds that stock markets are not naturally arising bodies but are guarded by public laws and legal institutions that support their activities [15].

Empirically, studies on trade openness abound but a few focuses on the trade openness-stock market development nexus particularly in developing countries. Following the divergent views on the trade-financial development nexus, [16] asserts that liberalizing restrictions on trade has positive effect on stock market liquidity. Through a Generalized Method of Moments (GMM) approach [17] found that trade openness and institutional factors are important for stocks market development. In the context of developing economies, [18] found that trade openness negatively impacts stock market development in African countries by reinforcing economic fluctuations. [19] also reported that trade openness in Africa increases susceptibility to economic shocks which leads capital market distortions. On the contrary David et al (2014) found positive impact of trade openness on financial development in Sub-Sahara Africa but should be concurrent with institutional development.

III. Methodology

A. Empirical Specification

Following the multi-factor framework of the Arbitrage Pricing theory (APT), this study merges the intuition of the Calderon-Rossell hypothesis, the interest group theory as well as the law and finance theory. More specifically the Calderon-Rossell model was adopted and extended to incorporate the variables of the study. The Calderon-Rossell model defines Market capitalization as:

$$Y = NV \tag{1}$$

where: Y denotes market capitalization

N represents number of listed companies

V depicts average value of listed companies.

The model is thus formally presented as:

$$Y = NV = Y(G,T) \tag{2}$$

Given that,

$$V = V(G,N),\ N = N(T,V) \tag{3}$$

The exogenous variables G stands for Gross National Product (GNP) and T represents turnover ratio. The operational equation is thus expressed as:

$$LogY = \delta_1 LogG + \delta_2 LogT \tag{4}$$

Similarly, the reduced form model is represented as:

$$LogV = \propto_1 LogG + \propto_2 LogT \tag{5}$$

$$LogN = \vartheta_1 LogG + \vartheta_2 LogT \tag{6}$$

Hence, equation 2 is rewritten as follows:

$$LogY = Log(NV) = \propto_1 LogG + \propto_2 LogT + \vartheta_1 LogG + \vartheta_2 LogT \tag{7}$$

Factorizing the coefficients yield the following:

$$LogY = (\propto_1 + \vartheta_1) LogG + (\propto_2 +) LogT \tag{8}$$

Equation (8) imply that stock market development Y is a function of economic growth G and stock market liquidity T where:

$$\delta_1 = \propto_1 + \vartheta_1 \text{ and } \delta_2 = \propto_2 + \vartheta_2.$$

The model for this follows the augmented function;

$$SMD = f(TO, GDPPC, TR, VTR, BD, IQ) \tag{9}$$

where SMD depicts stock market development, TO represents trade openness, GDPPC denotes GDP per capita, TR depicts stock market turnover ratio, VTR denote value traded ratio, BD represents banking sector development and IQ represent institutional quality. The linearized form of equation (10) is represented as:

$$SMD_{it} = \beta_0 + \beta_1 TO_{it} + \beta_2 GDPPC_{it} + \beta_3 TR_{it} + \beta_4 VTR_4 + \beta_5 BD_{it} + \beta_6 IQ_{it} + \mu_{it} \tag{10}$$

μ_{it} is hypothesized to have white noise properties and normally distributed.

B. Variables and Hypotheses Stock Market Development

This study used the (market capitalization ratio as the measure for stock market development as did earlier researches [20]. The ratio is a less arbitrary relative to the other measures and signify growth prospects of the stock market development [21]

Trade openness

The sum of export and import as a percentage of GDP $((X + M)/GDP)$ was used as proxy for trade openness. The ratio is well defined and an efficient measure of trade openness [22] and depict actual exposure to international markets [23]. This study proposes that:

H1: Trade openness have a positive and significant long-run and causal relationship with stock market development in Ghana ($H_1: \beta_1 > 0$).

GDP per capita (income levels)

The GDP per capita was measured as the total level of economic output divided by the total population in a given year. It depicts the level of prosperity of a country's citizenry. This study thus proposes that:

H2: Growth in GDP per capita have a positive and significant long-run and causal relationship with stock market development in Ghana ($H_2: \beta_2 > 0$).

Stock market liquidity

The study used two measures of stock market liquidity: the value traded ratio (ratio of the total value of traded shares to market GDP) and the turnover ratio (ratio of total shares traded to market capitalization). The value traded and the turnover ratio complement each other and present a comprehensive outlook of the liquidity of the market. This study holds that a weakening liquidity increases demand for real money balances, thus high liquidity will desirably impact stock market development.

H3: Value traded ratio has a positive and significant long-run and causal relationship with stock market development in Ghana ($H_3: \beta_3 > 0$).

H4: Turnover ratio has a positive and significant long-run and causal relationship with stock market development in Ghana ($H_4: \beta_4 > 0$

Banking development

The study used the ratio of banking sector credit to the private sector to GDP as a measure of banking sector development. It is the most comprehensive measure of the activity of commercial banks and an accurate indicator of financial intermediary development [24]. They add that banking sector development may occasion a substitutability phenomenon between debt and equity, but [25] presented an opposing argument that banks and stock markets are more likely to be complements rather than as substitutes. Following the dominance of banks in the Ghanaian capital market, and the "*non-monotonic*" argument by [26], the anticipation is that:

H5: Development in the banking sector have a negative and significant long-run and causal relationship with stock market development in Ghana ($H_5: \beta_5 < 0$).

Institutional development

The study used the economic freedom index as a proxy for institutional development. The index is defined by five sub-categories viz *government size, legal systems and property rights, sound money, freedom to trade internationally and regulations.* It encapsulates significant aspects of institutional and policy dynamics of a country, making it a good measure of institutional development [27]. The expectation therefore is that:

H6: *Institutional quality or development has a positive and significant long-run and causal relationship with stock market development in Ghana* ($H_6: \beta_6 > 0$).

C. Data and Sources

Data on all the variables but institutional development were sourced from the World Development Indicators (WDI) of the World Bank. Institutional development data was obtained from the data base of the heritage foundation. Annual data were transformed to quarterly using the quadratic-match averaging method. Quarterly data that spans the period of 1991(Q1) to 2016(Q4) were used for the analysis.

TABLE I: DESCRIPTIVE STATISTICS AND CORRELATION

Panel A: Descriptive statistics

	SMD	TO	GDPPC	TR	VTR	BD	IQ
Mean	9.105286	75.08869	931.4578	4.667131	0.345166	17.73396	6.056035
Median	7.962266	72.95520	739.3855	3.215215	0.300263	22.64684	6.285887
Maximum	27.60933	120.1015	1901.531	13.06108	0.758122	27.31851	7.812696
Minimum	-0.462535	39.85261	403.5250	0.029920	0.015545	4.658644	3.066075
Std. Dev.	6.400147	20.58273	408.7981	3.477465	0.220405	8.165839	1.081527
Skewness	1.065035	0.164759	0.842203	0.883230	0.331291	-0.624181	-0.899873
Kurtosis	3.732639	2.175457	2.461056	2.601688	1.902664	1.673474	3.464688
Jarque-Bera	21.98717	3.416635	13.55331	14.20913	7.120361	14.37834	14.97177
Probability	0.000017	0.181170	0.001140	0.000821	0.028434	0.000755	0.000561
Sum	946.9497	7809.224	96871.61	485.3816	35.89723	1844.332	629.8276
Sum Sq. Dev.	4219.074	43635.82	17212940	1245.554	5.003576	6868.136	120.4792
Observations	104	104	104	104	104	104	104

Panel B: Correlation matrix

	SMD	TO	GDPPC	TR	VTR	BD	IQ
SMD	1						
TO	0.688990	1					
GDPPC	-0.133410	-0.170014	1				
TR	0.222735	0.219214	0.030325	1			
VTR	0.535179	0.259867	0.031469	0.510930	1		
BD	-0.210102	0.587673	0.457509	0.211691	0.144732	1	
IQ	0.152276	0.338898	0.584966	0.330242	0.378560	0.701558	1

TABLE II: ADF AND P-P UNIT ROOT TESTS

Variable	At level I(0)		At first-difference I(1)		Order of integration
	ADF Tau	PP	ADF Tau	PP	
SMD	-1.067368	-0.987166	-2.563184*	-3.928999*	I(1)
TO	-0.132177	-0.258020	-2.015032*	-4.816222*	I(1)
GDPPC	0.566013	0.665407	-2.342581*	-4.826808*	I(1)
TR	-0.779671	-1.246981	-2.574093*	-5.008293*	I(1)
VTR	-1.053243	-1.123214	-2.610241*	-5.102315*	I(1)
BD	1.468447	1.333033	-2.590826*	-5.304295*	I(1)
IQ	1.215603	1.838939	-2.023838*	-4.620572*	I(1)

** indicates stationary at first difference or rejection of null hypothesis of unit root.*

IV. EMPIRICAL ESTIMATIONS AND RESULTS

A. Descriptive Statistics

The descriptive statistics (Panel A) reveal all the variables are positively skewed except institutional quality and banking sector development which are negatively skewed. The Jarque-Bera test show that all the variables are not distributionally normal except trade openness (TO). This phenomena is probably an indication of their impulsive character. The abnormal distribution of SMD, could be an indication of information asymmetry on the market. The correlation analysis (Panel B) shows that all the variables but GDP per capita and banking development are positively correlated with stock market development. As was anticipated, trade openness has the highest positive correlation coefficient with stock market development.

TABLE III: VAR LAG ORDER SELECTION CRITERIA

LogL	LR	FPE	AIC	SC	HQ
-966.2219	NA	9.63e+08	40.55091	40.82380	40.65403
-577.6302	647.6527	704.9259	26.40126	28.58433*	27.22624
-489.5816	121.0668	157.6670	24.77423	28.86749	26.32108
-393.3516	104.2492*	31.73123	22.80632	28.80975	25.07502
-316.2682	61.02438	22.38221*	21.63617*	29.54979	24.62674*

** indicates lag order selected by the criterion*
FPE: Final prediction error
LR: sequential modified LR test statistic (each test at 5% level)
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion or the Bayes information criterion (BIC).

B. Unit root Testing

The Augmented Dickey-Fuller (ADF, 1981) test was used to assess the order of integration of the series. But given the small sample size limitations of the ADF, it was augmented by the Phillips-Perron (P-P) (1988) test which is a robust alternative to the ADF. The ADF test in this study was of the form:

$$\Delta y_t = \mu + \gamma y_{t-1} + x_t'\delta + \beta_1 \Delta y_{t-1} + \beta_2 \Delta y_{t-2} + \beta_3 \Delta y_{t-3} + \cdots + \beta_i \Delta y_{t-i} + \varepsilon_t$$

Similarly, the Phillips-Perron test took the form:

$$\Delta Y = \alpha + \beta Y_{t-1} + \varepsilon_t$$

The univariate ADF and P-P unit root tests for each of the variables was performed and the results are shown in Table IV. The test procedure included a constant but no trend at level and first difference.

The results in Table II show the presence of unit root at level but stationarity at first difference. Thus all the variables are integrated of order one, *I*(1) in both the AFD and P-P tests.

C. Var Lag Order Selection Criterion

The study adopts the lag order suggested by the AIC and the FPE as reported in Table III given their superior and outperform others by revealing the true lag order.

D. Johansen Cointegration Test (Long Run Assessment)

The Johansen Maximum Likelihood (ML) test with unrestricted intercept and no trend aided the cointegration assessment. The cointegration test was conducted on two the models. The first model depict the main model of the second model is the restricted model. The essence of the restriction was driven by the need to hold true that the presence of cointegration as shown in table IV (model 1) could proportionately be attributed to the main variables of interest (TO, BD and IQ) of the study. The results of the restricted model are also shown in tables IV (model 2).

The trace and maximum eigenvalue statistics model 1 show the presence of three (3) cointegrating vectors. The evidence of cointegration depict long-run relationship and discounts the possibility spurious regression. (Enders, 2003, p. 326). The results model 2 also revealed the presence of one cointegrating equation. This ultimately affirm that the main variables of this study (TO, BD and IQ) proportionately accounted for the cointegration in the original model. The coefficients of the normalized estimation for models 1 and 2 are presented in table V.

Based on the normalization and the error correction dynamics the interpretational rule of thumb is that the signs of the normalized coefficients are reversed (Daneil and Robert, 2009). Thus, the results in model 1 (Table V) show that TO, VTR and IQ have positive and significant impact on stock market development. On the contrary, GDPPC, TR and BD show inverse relationships with SMD. Similarly TO and IQ showed positive and significant impact on SMD in model 2.

The significance of TO and IQ in the two models imply some level of permanency and lingering positive impact of trade and institutions on stock market development. The results on domestic credit to private sector (banking development) is harmonious with the corporate finance hypothesis (substitutability) and the attendant competition creates and inverse relationships (inn both models). The findings also syncs with Barnor and Wiafe (2015) who also

reported an inverse banks-stock market relationship in Ghana.

The inverse relationship between GDP per capita and stock market development is plausibly a consequent of the low income level (high poverty level) of which, growth in income propels consumption instead of investment. The liquidity measures showed opposing effects. However, liquidity conclusively has a positive impact on stock market development in Ghana.

TABLE IV: JOHANSEN CO-INTEGRATION TEST

Hypothesized No. of CE(s)	Trace test				Maximum Eigenvalue test		
	Trace Statistic	Critical Value (5%)	Prob.		Max-Eigen Statistic	Critical Value (5%)	Prob.
Model 1							
None *	243.3065	125.6154	0.0000		103.1051	46.23142	0.0000
At most 1*	140.2014	95.75366	0.0000		60.51923	40.07757	0.0001
At most 2*	79.68215	69.81889	0.0066		37.65334	33.87687	0.0169
At most 3	42.02881	47.85613	0.1579		16.89730	27.58434	0.5888
At most 4	25.13151	29.79707	0.1568		15.22891	21.13162	0.2732
At most 5	9.902596	15.49471	0.2883		9.419415	14.26460	0.2529
At most 6	0.483181	3.841466	0.4870		0.483181	3.841466	0.4870
** denotes rejection of the hypothesis at the 0.05 level* *Trace and Max-eigenvalue tests indicates3 cointegrating eqn(s) at the 0.05 level*							
Model 2							
None *	64.40069	47.85613	0.0007		40.81565	27.58434	0.0006
At most 1	23.58413	29.79707	0.2186		15.28402	21.13162	0.2695
At most 2	8.300108	15.49471	0.4339		5.803932	14.26460	0.6385
At most 3	2.496177	3.841466	0.1141		2.496177	3.841466	0.1141
** denotes rejection of the hypothesis at the 0.05 level* *Trace test and Max-eigenvalue tests indicates 1 cointegrating eqn(s) at the 0.05 level*							

TABLE V: LONG RUN NORMALIZED ESTIMATION

Variable	Coefficient	Std. Error	T-Statistic
Model 1			
TO	-0.427730	0.07755	-5.5155
GDPPC	0.017623	0.00335	5.2610
TR	3.421462	0.38049	8.9923
VTR	-68.93856	7.33139	-9.4032
BD	0.926686	0.22190	4.1761
IQ	-5.862573	1.55799	-3.7630
Model 2			
TO	-0.462286	0.08253	-5.6014
BD	1.087593	0.28519	3.8136
IQ	-10.06943	1.90209	-5.2940

TABLE VI: VECTOR ERROR CORRECTION ESTIMATION

	Coefficient	Std. Error	t-Statistic	Prob.
ECT	-0.470856	0.150430	-3.130067	0.0014***
D(SMD(-1))	0.714337	0.186526	3.829687	0.0003***
D(SMD(-4))	-0.654564	0.173360	-3.775761	0.0003***
D(TR(-1))	0.366191	0.147116	2.489136	0.0411**
D(TR(-2))	0.449077	0.152689	2.941124	0.0020***
D(TR(-4))	0.300857	0.153820	1.955903	0.0266**
D(VTR(-4))	8.346841	3.388650	2.463176	0.0163**
D(TO(-1))	0.004050	0.034642	0.116910	0.9073
D(TO(-2))	0.091966	0.040298	2.282147	0.0487**
D(TO(-3))	0.110703	0.040518	2.732201	0.0037***
D(TO(-4))	0.321091	0.136387	2.354263	0.0170**
D(IQ(-1))	0.805625	0.416022	1.936496	0.5969*
D(IQ(-2))	0.553195	0.276043	2.004017	0.0517**
D(IQ(-3))	1.276176	0.564352	2.261312	0.0445**
D(IQ(-4))	4.075138	1.435556	2.838718	0.0060***
C	-0.072988	0.121366	-0.601390	0.5496

E. Short Run Dynamic Modeling (VECM)

The results of the estimated VECM is presented in Table VI. The VECM used in this study was of the form:

$$SMD_t = \alpha_0 + \sum_{i=1}^{n} \varphi SMD_{t-1} + \sum_{i=1}^{n} \vartheta TO_{t-1} + \sum_{i=1}^{n} \delta GDPPC_{t-1} + \sum_{i=1}^{n} \Omega TR_{t-1} + \sum_{i=1}^{n} \lambda VTR_{t-1} + \sum_{i=1}^{n} \Upsilon BD_{t-1} \sum_{i=1}^{n} \psi IQ_{t-1} + \Phi ECT_{t-1} + \varepsilon_t$$

The VECM estimates show negative and significant error correction term (-0.470856). This suggest that 47% of the deviations are corrected quarterly. Intuitively imply that disequilibria in the short term take approximately 3 quarters to reestablish full long-term equilibrium.

The VECM estimation reveal that the lagged values of trade openness have statistically significant impact on stock market development. Similar results is found in the case of institutional development. This is consistent with the long-run estimates. Liquidity comprehensively has a positive impact on stock market development in Ghana.

F. Post VECM Regression and Residual Diagnostics

The value of the R-square (R^2) as reported in Table VII show that the model explains 74% of the variations in stock market development. The F-statistic also reject the null hypothesis of jointly insignificant coefficients. The value of the Durban-Watson statistic of approx. 2.0 suggest the absence of serial correlation and ultimately indicates a properly defined model. Results of residual assessment Table VIII shows the absence of serial correlation and heteroscedasticity.

TABLE VII: POST REGRESSION DIAGNOSTICS

R-squared	0.743584	Mean dependent var	0.071000
Adj. R-sq.	0.624944	S.D. dependent var	1.247911
S.E. of reg.	0.764243	Akaike info criterion	2.556175
Sum sq. resid	39.13248	Schwarz criterion	3.395001
Log likelihood	-94.53065	Hannan-Quinn criter.	2.895565
F-statistic	6.267568	Durbin-Watson stat	1.989288
Prob(F-statistic)	0.000000		

The model stability was assessed using the CUSUM and the CUSUM of squares. The graphs of the stability test as shown in Fig. 1 and Fig. 2 suggest that the residual plots are suitably fitted within the 5% bounds indicating a stable regression.

G. Structural Pattern Assessment

Given that cointegration is already confirmed, the

VECM-based Wald test approach was used to assess the causality pattern as guided by (Granger 1988). The null hypothesis of no granger causality was tested against the alternative hypothesis of granger causality and the results are shown in table IX.

TABLE VIII: RESIDUAL DIAGNOSTICS

Breusch-Godfrey Serial Correlation LM Test				
F-statistic	0.696093	Prob.	F(2,65)	0.5022
Obs*R-squared	2.075943	Prob.	Chi-Square(2)	0.3542
Heteroscedasticity Test: Breusch-Pagan-Godfrey				
F-statistic	0.697455	Prob.	F(35,63)	0.8751
Obs*R-squared	27.64738	Prob.	Chi-Square(35)	0.8073
Scaled explained SS	45.12868	Prob.	Chi-Square(35)	0.1174

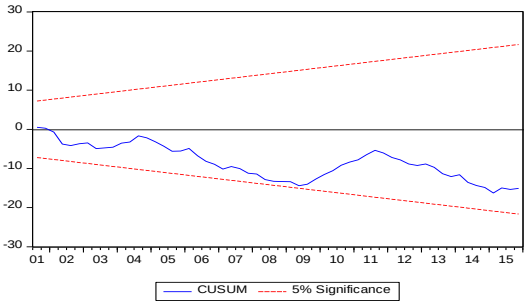

Fig. 1. CUSUM.

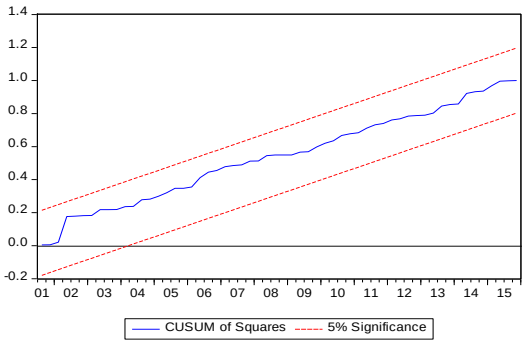

Fig. 2. CUSUM of squares.

TABLE IX: VECM GRANGER CAUSALITY

Variable	Test Statistic	Value	df	Prob
TO	F-statistic (Chi-square)	3.291992 (10.167968)	4, 67 (4)	0.0159** 0.0377**
GDPPC		0.454482 (1.817929)		0.7688 0.7692
TR		5.190004 (9.760018)		0.0011*** 0.0447**
VTR		3.081465 (12.32586)		0.0217** 0.0151**
BD		0.637938 (2.551753)		0.6372 0.6354
IQ		3.259181 (12.036722)		0.0167** 0.0171**

The granger results in the VECM (table IX) failed to confirm causality running from per capita GDP and banking development. This imply that growth in per capita income and bank credits to the private sector cannot be used to predict short term stock market development. However, the null hypothesis of no granger causality is rejected in respect of trade openness (TO), turnover ratio (TR), value traded ratio (VTR) and institutional quality (IQ). The implication is that the past values of TO, TR, VTR and IQ can predict stock market development in Ghana in the short-run.

H. Dynamic Simulation (Innovation Accounting)

The study used the Cholesky orthogonalization strategy by Sims' (1980) to generate forecast error variance (variance decompositions) of stock market development. The variance decomposition attributes or reveals the proportion of the variability in stock market development accounted for by its own shocks and shocks arising from other variables in the system at a specified horizon. Following the cholesky requirement, the ordering in this study follows: IQ, BD, VTR, TR, GDPPC, TO and SMD. The cholesky factorization in E-views was used to generate up to 10 period to enable a realistic term policy intuition and the results are presented in Table X.

The results reported in Table X show that innovations in trade openness accounts for a greater proportion of the stock market development from the seventh to tenth periods relative to the other variables. This results underpins earlier argument an increasing pattern in trade openness significant proportion in stock market development patterns [28]. The estimates for BD also show an increasing trend along the periods but the magnitude of its relative importance is minimal compared to trade openness. However, innovations in BD over the long-term has an attention requiring influence on the variations in stock market development in Ghana. It is worth mentioning that the importance per capita GDP and liquidity revealed by the innovation accounting assessment also highlights the significance of the Calderon-Rossell (1991).

TABLE X: VARIANCE DECOMPOSITION OF SMD

Period	S.E.	SMD	TO	GDPPC	TR	VTR	BD	IQ
1	0.764243	28.21040	4.231881	0.111217	14.45360	34.14113	1.482570	17.36920
2	1.383534	30.73976	7.515211	0.284470	14.32493	29.60954	0.473853	17.05223
3	2.073083	31.88124	10.52625	0.905557	14.51833	25.46494	0.446231	16.25745
4	2.848622	33.16552	12.74252	1.656986	14.63953	21.63531	1.010201	15.14994
5	3.615205	29.64656	17.11148	3.615435	12.96713	20.07969	1.812056	14.76765
6	4.381822	26.20165	20.71593	5.756542	12.03614	18.04564	2.933939	14.31016
7	5.145207	23.02261	23.58801	7.891482	11.51434	15.88977	4.273338	13.82045
8	5.919671	20.17047	25.66770	9.814125	11.29146	13.72855	5.878808	13.44888
9	6.621907	18.56593	26.78432	11.23878	11.53158	11.60624	7.464629	12.80852
10	7.267149	17.48006	27.35519	12.32517	11.86258	9.879129	8.969096	12.12878

V. Summary and Conclusion

The paper principally examined how trade openness impacts stock market development in Ghana. The results generated interesting intuition for policy, practitioners and future research. The results revealed that increasing trade has a huge and concurrent positive impact on financial development. Similarly, institutional quality is positively correlated with stock market development. This plausibly signify that congenial institutional and legal systems significantly unlocks growth prospects and explain the extent of stock market development. The short-run assessment also also showed some level of permanency and lingering positive impact of trade and institutions on stock market development following the significance of their lagged values. The study also found evidence of substitutability between the stock market and development in the banking making but the null hypothesis of no causality in the short-run could not be rejected. But the substitutability relationship is interpreted with caution. In effect, the concurrent significance of trade openness and institutional quality in the long and short term estimations intuitively reiterates that higher trade openness intensity pursued simultaneously with institutional development will engender greater impetus for stock market development. Future research may focus on multivariate framework of different measures of trade openness as well as the different components of the index of economic freedom and their relationships with stock market development.

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