

The Effects of Exchange Rates Movements on Stock Market Capitalisation in Ghana

Philomena Korsah
University of Cape Coast, Ghana

Prince Fosu¹
University of Cape Coast, Ghana

Abstract

The study examined the relationship between exchange rates movements and stock market capitalisation in Ghana using Johansen cointegration technique and vector error correction model with quarterly time series data covering the period of 1990 to 2013. The study found a negative and significant relationship between exchange rates and stock market capitalisation both in the long-run and in the short run suggesting that a depreciation of the Ghana cedi against the US dollar is inimical to the performance of the Ghana Stock Exchange (GSE) Market. In order to increase stock market capitalisation, the study first recommends that the Central Bank of Ghana, the Ministry of Finance and the Ministry of Agriculture should adopt policies that will boost the real side of the economy such as increasing agricultural productivity to ensure increase in foreign exchange earnings in the country and hence preventing the cedi from depreciating.

JEL Classification: E44, F23, F31, G14

Key words: Exchange rate movements, Stock market capitalisation, VAR, Ghana.

Copyright © 2016 JAEBR

1. Introduction

The continuing increases in the international trade and movements of capital have made the exchange rates as one of the key determinants of business profitability and equity prices (Kim, 2003). Foreign exchange rate movement influences the stock market since the future net cash flows of the firm change with the variations in the foreign exchange rates. When there is appreciation of

¹ Correspondence to Prince Fosu, E-mail: pfosu60@yahoo.com

exchange rate, exporters do not only lose their competitiveness in world market, but also a reduction in sales revenue and profits thus leading to the decline in the stock prices. Contrary, in times of exchange rate appreciation importers increase their competitiveness in domestic markets leading to an increase in their profit and stock prices. This implies that depreciation of exchange rate will have adverse effects on importers and favorable effects on exporters. Domestic exporters will have advantage against foreign exporters because there is increase their sales and their stock prices (Yau and Nieh, 2006). That is, currency appreciation has negative effects on domestic exporter but has a positive effect on domestic importers (Ma and Kao, 1990).

Fluctuations in the exchange rates can also affect stock prices not only for international and export-based firms but also for domestic firms. For the multinational corporations, variations in exchange rates will result in an immediate change in value of their operations and in the profitability of its foreign operations. Therefore, the changes in economic value of foreign firm's operations may influence stock prices. Domestic firms on the other hand, can also be influenced by changes in exchange rates since most of these firms import part of their inputs for production and export their outputs. For instance, when there is a devaluation policy in an economy, prices of imported inputs become more expensive while prices of exported outputs also become cheaper for a firm. Devaluation will have positive effects for exporting firms and consequently, increase the income and average level of stock prices of these firms (Aggarwal, 2003; Wu, 2000). Thus, understanding of the link between exchange rate fluctuations and market capitalisation will help both domestic and international investors for hedging and diversifying their portfolio. Also, understanding this relationship between exchange rate and market capitalisation will enable investors to predict the future trends for each other (Mishra, Swain and Malhotra, 2007; Phylaktis and Ravazzolo, 2005).

Basically, stock market development has been the focus of the domestic financial liberalisation programmes of most African countries often with the encouragement of the World Bank and International Finance Corporation (Jefferis and Smith, 2005; Yartey and Adjasi, 2007). In Africa for example, new stock markets companies have been established thus raising the number from eight in 1989 to nineteen in 2006. Furthermore, apart from South Africa, most African countries stock markets doubled their market capitalisation between 1992 and 2002. In addition, total market capitalisation for African stock markets has increased from US\$ 113,423 million to US\$ 244,672 million between 1992 and 2002 (Yartey and Adjasi, 2007). After the financial challenges in Ghana between 1983 and 1988, the financial sector of the country witnessed a myriad of reforms which focused on liberalising and opening up access to long-term capital for investments (Frimpong, 2011). In 1988, the government introduced the Financial Sector Adjustment Program (FINSAP), with the objective of restructuring the financial sector and supporting the creation of new institutions to revitalise the financial sector. This resulted among other things, in the establishment of the Ghana Stock Exchange (GSE) in July 1989. Stock market trading commenced in 1990 with 11 listed companies and one government bond (Frimpong, 2011). GSE has attracted the attention of foreign investors and international institutions in recent time due to its sterling performance in terms of returns on investment to investors or capital appreciation since 1994. Furthermore, the market did not only provided the opportunity for raising long-term capital by both the listed companies and government for investment but also promoted saving and investment habit to investors of the country (Ziorklui, 2001).

Currently, the GSE is one of the best-performing stock markets in Sub-Saharan Africa (SSA) and also the principal capital market in Ghana. Market capitalisation of the Ghana Stock exchange, since its inception, has increased significantly from GH¢ 4.38 million in 1992 to GH¢ 618.38 in 2002 (GSE, 2003). The market capitalisation rose to 196.843 million in 1994 from 3.046 million from the years 1990 to 1993. However, the total market capitalisation after recording successive increases, declined from GH¢17,964.69 million to GH¢ 15,941.92 million at the end of 2009 which indicated a decrease of approximately 11.3 percent (GSE, 2013). Again, Ghana's stock market which was described as one of the emerging markets currently recorded its highest turnover of equities in volume in 1997 with GH¢ 125.63 million shares, from a volume of GH¢1.8 million shares by the end of 1991. However, the volume have been falling steadily from GH¢125.63 million in 1997 to GH¢ 91.45 million in 1998, GH¢ 49.57 million in 1999 to GH¢30.72 million in 2000. Again, in 2001, the volume increased to GH¢ 55.3 million, fell to GH¢ 44.12 million in 2002, crept up to GH¢96.33 million in 2003 and 104.35 million in 2004 (Adjasi and Biekpe, 2006). The All-Share index/composite index in 1994 was 124.34 percent and decline to -15.22 percent in 1999. In addition, the All-Share index, by the close of the year 2003, topped performance of stock markets in the world with yield of 154.7 per cent (or 142.7 percent in dollar terms) (GSE, 2013). After such a performance, the All-Share index has continued to fluctuate with an occasional increase or fall (see Figure 1).

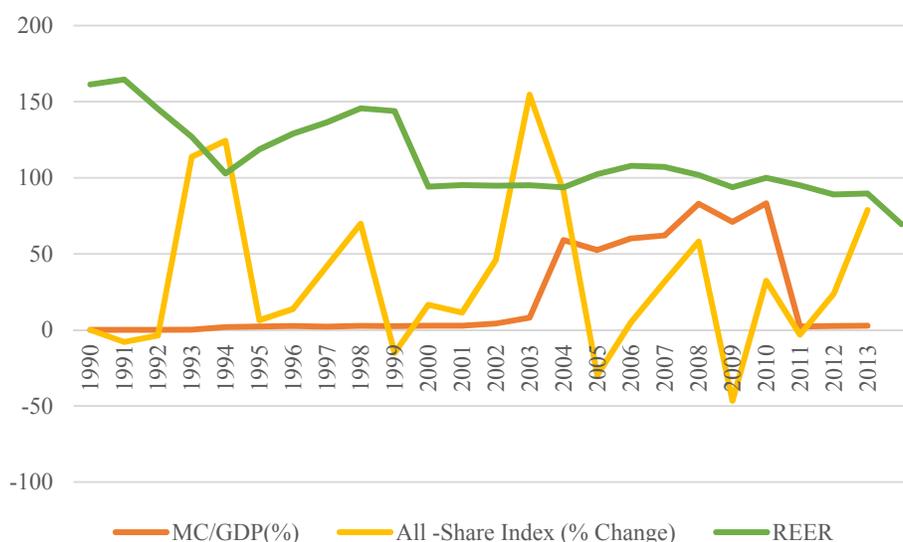


Figure 1: Trends of percentage change in GSE All- Share Index, market capitalisation and real effective exchange rate for Ghana (1990-2013)

Source: GSE (2013) and World Bank (2015)

While the exchange rate of some countries fluctuates, that is, showing sign of depreciation in sometimes and in other times appreciation, the exchange rate situation in Ghana recently has been the case of continuous depreciation (see Figure 1). Also from Figure 1, the downward trend in real effective exchange rate (REER) shows that the Ghana cedi is depreciating against the currency of its major trading partners. In addition, following the deregulation, the Cedi/Dollar exchange rate in Ghana on the average showed an upward trend throughout the period 1990 to 2013. For example, from the period of December 2008 to April 2012 as a whole, the cedi depreciated cumulatively about 43.4 percent against the basket of currencies in the nominal effective exchange (Center for Policy Analysis, 2012). Furthermore, according to the Ministry of

Finance (2014) Ghana Cedi recorded relatively higher depreciation averaging 20.1 percent and 16.7 percent against the Euro and the Pound Sterling respectively in 2013. Moreover, commutatively, the Ghana Cedi has depreciated by 26.7 percent against US dollar during the first half of 2014 against 3.4 percent cumulative depreciation in the same period of 2013 (Bank of Ghana report, 2014). Consequently, plethora of companies in Ghana especially those in the manufacturing sub-sector of the industrial sector were arguably one of the hardest hit sub-sectors because majority of these companies depended heavily on imported raw materials. Thus, continuous depreciation of the Cedi implies increasing cost of production to the companies that depends heavily on imported raw materials for its production hence leading to a fall in the sales and profit which tends to affect the value of these firms in terms of the quantity of stock they are likely hold at the market.

Even though surfeit of studies exist to examine the effect of exchange rate on the stock market, most of these studies focus much on developed countries such as US, UK, Australia, Turkey and Japan among others (Aggarwal; 2003, Alagidede, Panagiotidis and Zhang; 2011, Morales; 2009, Mun; 2007, Møller; 2009). For example, in the case of Ghana, most of the studies reviewed considered the effect of economic growth on the stock market (Dziwornu and Awunyovitor, 2013; Quaidoo, 2012; Osei, 2012; Osamwonyi and Abudu Kasimu, 2013) without paying particular attention to how the exchange rate fluctuations affect the Ghana Stock Market. In addition, giving the continues depreciation of the Ghana cedi coupled with the fact that Ghana is import-dependent economy and hence majority of the firms listed on the Ghana stock exchange market depends heavily on imports for their operations, call for the need to critically investigate the impact of exchange rate movements on the stock market capitalisation in Ghana. This paper fills the gap in the literature by being the first study to examine the impact of exchange rates fluctuations on stock market capitalisation in Ghana. The rest of the article is organised as follows: section 2 deals with the methodology including the empirical model specifications. Section 3 gives the results and discussions. Conclusions and recommendations are presented in section 4.

2. Methodology

2.1. Empirical model and strategy

Since the main objective of this study was to examine the impact of exchange rate movements on stock market capitalisation, we modified the Calderon-Rossell's (1990) model and incorporated other control variables such as exchange rate, domestic savings, stock market liquidity, crude oil price and real GDP per capita. Following the Calderon-Rossell (1990) model, the study modeled the following long-run regression equation to capture the relationship between exchange rate and stock market capitalisation:

$$SMC_t = \psi_0 + \psi_1 EXR_t + \psi_2 \log RGDP_t + \psi_3 SML_t + \psi_4 DS_t + \psi_5 COP_t + \varepsilon_t \quad (1)$$

Where SMC_t is stock market capitalisation proxied by market capitalisation ratio (i.e. $SMC = \text{Share Price} \times \text{Quantity of Shares} / GDP_t$), EXR_t is real exchange (LCU/\$US, period average), $RGDP_t$ is real GDP per capita (current US\$), SML_t is stock market liquidity (value traded as a percentage of GDP), DS_t is domestic savings (percent of GDP), COP_t is crude oil price (USD per barrel), t indicates time, \log is natural logarithm and ε_t stands for the random disturbance term. The slope coefficients $\psi_1, \psi_2, \psi_3, \psi_4$ and ψ_5 capture the elasticities and ψ_0 is the intercept parameter. Again, the study made use of quarterly data for all the variables used for the study from the period 1990:4 to 2013:4. Crude oil price data was gleaned from British Petroleum Statistical Review, stock market data were sourced from Ghana Stock Exchange and the rest of the data were sourced from work bank. The coefficient of exchange rate (ψ_1) is expected to be negative

(Aggarwal, 2003; Agrawal, Srivastav and Srivastava, 2010), the coefficient of real GDP (ψ_2) is expected to be positive (Adjasi and Biekpe; 2006, El-Wassal; 2006), the coefficient of stock market liquidity (ψ_3) is expected to be positive (Quaidoo, 2012), the coefficient of domestic saving (ψ_4) is expected to be positive (Garcia and Liu, 1999; Yartey 2008) and world price of crude oil (ψ_5) is expected to be positive (Hammoudeh and Li 2005; Sadorsky, 2001) or negative (Karunanayake, Valadkhani and Brien, 2009).

2.2. Estimation technique

The study adopts a dynamic vector autoregressive regression (VAR) approach which explores both cointegration and Granger causality analysis. The choice of this approach is to allow us capture both the long run and short run dynamics among exchange rate changes and market capitalisation and at the same to observe the causal relationship between these variables. The estimation procedures are as follows:

2.2.1. Unit root test

Unit root test is expected to be the first step to be taken in time series regression analysis. The reason for doing this test is to distinguish between stationary and non-stationary variables in order to come up with statistically reliable results. For instance, Granger and Newbold (1988) and Stock and Watson (1988) suggested that running regression on non-stationary data produces spurious results. Therefore one way to resolve the issue is by differencing the variables to reverse them to stationary variables in order to obtain consistent and reliable parameter estimates, even though this may lead to a loss of long-run properties of the data (Gujarati and Porter, 1999). We employed the Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) approach to test for the stationarity properties of all the variables in the study.

2.2.2. Cointegration test

The purpose of conducting cointegration estimation is to examine whether a linear combination of two or more non-stationary variables exists (Haley, 1997). Essentially, it involves testing for the existence of long-term equilibrium relationship among the variables. In particular, Johansen (1991) and Johansen and Juselius (1992) developed multivariate methods that explicitly use the vector autoregressive method (VAR) for the testing and estimation of long-run relationships among non-stationary data. The VAR provides an important framework for the investigation of both long-run cointegration relationships and short-run dynamics. In this study, we employed the Johansen (1991) and Johansen–Juselius (1992) technique to test for the cointegration among the variables. The Johansen and Juselius vector error correction (VCEM) representation of a VAR (p) model, of lag length p , can be specified as:

$$\Delta X_t = \eta X_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta X_{t-i} + \psi + D_t + \varepsilon_t \quad (2)$$

Where X_t is $(n \times 1)$ vector which comprises of non-stationary variables, η and Γ_t are $(n \times n)$ matrices of coefficients, t contains a vector of deterministic variables such as constant, trend and dummy variables, ε_t is $(n \times 1)$ vector of normally and independently distributed error terms with zero mean and non-diagonal covariance matrix and Σ is the summation sign. The rank of the matrix (η) gives the dimension of the cointegrating vector. Given that the variables are integrated of order one $I(1)$ are cointegrated, equation (2) will be reparameterised. In addition, if the rank of the matrix, r is $(0 < r < n)$, then η can be decomposed into $\eta = \alpha\beta'$ where α , β are $(n \times r)$ matrices containing

the adjustment coefficients and the cointegrating vectors respectively. Therefore equation (2) now becomes:

$$\Delta X_t = \varphi \beta' X_{t-1} + \sum_{i=1}^{\rho-1} \Gamma_t \Delta X_{t-1} + \psi + D_t + \eta_t \quad (3)$$

The term $\varphi \beta' X_{t-1}$ in equation (3) contains all the long-run information on the process of X_t . Therefore, emphasis will be on the matrix of $(n \times r)$ of cointegrating vectors, β , that quantify the long-run relationships between the variables in the model and the $(n \times r)$ matrix of equilibrium correction coefficients, φ , elements which load deviations from this equilibrium (i.e. $\beta' X_{t-1}$) into ΔX_t for correction.

The error correction model is the second step of the cointegration estimation. According to Engle and Granger (1987) the theorem state that, a set of integrated time series that are cointegrated have an error correction representation and a set of time series that are error correcting are cointegrated. By implication, an appropriate procedure for estimating an integrated series is the error correction model. The error correction model (*ECM*) for the VAR can be specified as follows:

$$\Delta X_t = \sum_{i=1}^n \gamma_i \Delta X_{t-1} + \sum_{i=0}^n \beta_i Y_{t-1} + \alpha ECM_{t-1} + \eta_t \quad (4)$$

Where X_t and Y_t represent the series of cointegrated variables, ECM_{t-1} is a lagged value of the estimated error term from the cointegrated equation(s) and the parameter, α shows how changes in X_t react to deviation from the long-run equilibrium.

Since the existence of relationship between variables does not necessarily specify the direction of causation, we employed the Granger causality test developed by Granger and Newbold (1988) to examine the direction of causality between the economic series. The test involves the estimation of the following pair of regressions specified below:

$$SMC_t = \sum_{i=1}^n \alpha_i EXR_t + \sum_{i=0}^n \beta_j MC_{t-1} + \eta_t \quad (5)$$

$$EXR_t = \sum_{i=1}^n \gamma_i EXR_{t-i} + \sum_{i=0}^n \phi_j SMC_t + \epsilon_t \quad (6)$$

Where SMC and EXR are assumed to be stationary time series, η_t and ϵ_t are mutually uncorrelated error terms, n denotes optimal lag order, t and t-i denote the current time and lagged time values. The null hypothesis of $\alpha_i = 0$ and $\phi_j = 0$ is tested against the alternative hypothesis of $\alpha_i \neq 0$ and $\phi_j \neq 0$. Equation (5) postulates that current SMC is related to its own past values as well as that of EXR. Equation (6) also posits a similar behaviour for EXR.

3. Results and Discussion

This section of the paper presents the results of our empirical analysis. Table 1 presents the descriptive statistics of the variables used in the study. Table 1 showed that all the variables have

positive means and are positively skewed. Again, we report a high Jarque-Bera statistic value for crude oil price, exchange rate, log real GDP, market capitalisation and stock market liquidity, thus rejecting the null hypothesis that these variables are normally distributed with the exception of domestic saving. The non-normality of exchange rate and real GDP per capita is consistent to the empirical literature (see Alagidede and Ibrahim, 2016).

Table 1: Summary statistics

	COP	DS	EXR	logRGDP	SMC	SML
Mean	52.441	6.996	0.022	9.611	21.240	17.764
Median	37.069	7.031	0.020	9.584	2.620	13.166
Maximum	117.812	17.399	0.045	10.100	56.186	98.080
Minimum	17.243	4.411	0.009	9.077	10.427	0.840
Std. Dev.	30.331	4.625	0.012	0.316	30.592	157.684
Skewness	0.812	0.086	0.494	0.028	1.041	2.60837
Kurtosis	2.240	2.839	1.964	1.660	2.367	10.354
Jarque-Bera	12.858	0.221	8.198	7.199	18.926	325.175
Prob	0.002	0.895	0.017	0.027	0.000	0.000
Sum	5034.320	671.641	2.097	922.617	2039.00	8425.36
SumSqDv	87398.46	2031.908	0.012	41.506	88906.17	2362124
Obs	96	96	96	96	96	96

Source: Authors' construct.

Prior to the cointegration analysis, we carried out a unit root test on all the variables to investigate the stationarity properties of the variables. The tests was conducted on all the variables in levels and in first difference using the Augmented Dickey Fuller (ADF) and Philips Perron (PP). The test indicate that all the variables used for the study are $I(1)$ (see Table 2 and Table 3).

Table 2: Test for the order of integration (Augmented Dickey Fuller)

Var	Levels (Intercept)		First Difference (Intercept)			
	ADF-Statistic	Lag	Var	ADF-Statistic	Lag	OI
SMC	-1.8270(0.3653)	5	DSMC	-3.2650(0.0195) *	4	I(1)
EXR	-2.8837(0.1512)	5	DEXR	-3.3575(0.0152)*	4	I(1)
logRGDP	-0.9308(0.7740)	9	DlogRGDP	-6.3221(0.000) ***	7	I(1)
SML	1.9906(0.9999)	9	DSML	-11.61461(0.0001) ***	7	I(1)
DS	-2.7696(0.1669)	9	DDS	-3.4711(0.011) **	8	I(1)
COP	-0.4517(0.8943)	9	DCOP	-3.0896(0.0311)*	8	I(1)

Note: D denotes first difference. *** ** and * denotes 1%, 5% and 10% significance levels respectively. Numbers in brackets are P-Values. OI represents the order of integration.

Source: Authors' construct

Table 3: Test for the order of integration (Phillips-Perron)

Var	Levels (Intercept)		First Difference (Intercept)			
	ADF-Statistic	Lag	Var	ADF-Statistic	Lag	OI
SMC	1.529775(0.8125)	4	DSMC	-5.68159(0.000)***	4	I(1)
EXR	-2.366801(0.3944)	5	DEXR	-4.844606(0.0008)***	5	I(1)
logRGDP	-1.798204(0.6980)	5	DlogRGDP	-5.365472(0.0001)***	5	I(1)
SML	-1.983694(0.6024)	4	DSML	-4.439718(0.0031)**	4	I(1)
DS	-2.998742(0.1381)	4	DDS	-5.691765(0.0000)***	4	I(1)
COP	-2.598175(0.2822)	5	DCOP	-5.024435(0.0004)***	4	I(1)

Note: D denotes first difference. *** ** and * denotes 1% 5% and 10% significance levels respectively. Numbers in brackets are P-Values. OI represents the order of integration.

Source: Authors' construct

In addition to the unit root test, we performed the various tests to choose the optimal lag length for this study given the sensitivity of the cointegration analysis to lag lengths (see Table 4). Choosing the appropriate lag length ensures normally distributed white noise errors with no serial correlation. As shown in Table 4, the appropriate lag length chosen for the estimation in this study is 6.

Table 4: Lag order selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-2030.03	NA	5.03e+12	46.27	46.44	46.34
1	-1239.09	1456.06	178138.6	29.12	30.30	29.59
2	-1113.33	214.36	23422.23	27.08	29.27	27.96
3	-1096.19	26.88	36988.76	27.50	30.71	28.80
4	-1082.19	20.03	64443.91	28.00	32.23	29.71
5	-885.05	255.39	1815.14	24.34	29.58	26.45
6	-776.75	125.53*	405.44*	22.70*	28.95*	25.22*
7	-750.57	26.77	627.92	22.92	30.19	25.85
8	-708.18	37.57	739.75	22.77	31.05	26.11

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error, AIC: Akaike information criterion

SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion

Source: Authors' construct

From Table 5, the results of the trace statistic of the Johansen cointegration indicate the presence of 2 cointegration among the variables. Specifically, the null hypothesis of no cointegrating relationship is rejected since the computed trace statistic values 162.56 and 97.71 are statistically significant at 1 percent.

Table 5: Johansen's cointegration tests (Trace) results

Hypothesised	Trace 0.05			
No. of CE(S)	Eigenvalue	Statistic	Critical	P-Value
None*	0.517442	162.5559	95.75366	0.0000
At most 1*	0.347040	97.70563	69.81889	0.0001
At most 2	0.218176	47.85613	59.77026	0.1026
At most 3	0.212810	29.7970	37.86507	0.0048
At most 4	0.136155	15.49471	16.56869	0.1343
At most 5	0.039022	3.542506	3.841466	0.1598

Trace statistic indicates 2 cointegration equations at 1% levels

Source: Authors' construct

The maximum-eigenvalue statistic from Table 6 also shows that there is at most 2 cointegration relationships among the variables of interest. Here, the null hypothesis of no cointegration relationship among the variables of interest is rejected at 1 percent significance level.

Table 6: Johansen's cointegration tests (Maximum Eigenvalue)

Hypothesised	Max-Eigen	0.05		
No. of CE(S)	Eigenvalue	Statistic	Critical	P-Value**
None *	0.517442	64.85023	40.07757	0.0000
At most 1*	0.347040	37.93536	33.87687	0.0155
At most 2	0.218176	21.90519	27.58434	0.2253
At most 3	0.212810	21.13162	21.29639	0.1474
At most 4	0.136155	31.02618	14.26460	0.2777
At most 5	0.039022	3.542506	3.841466	0.1598

Max-eigenvalue test indicates 2 cointegration equations at 1% levels

*** denotes rejection of the hypothesis at the 5% (1%) level*

Source: Authors' construct

Therefore, the presence of cointegration confirms that there is a stationary and dynamic long run causal relationships between exchange rate, real GDP per capita, stock market liquidity, domestic savings, crude oil price and stock market capitalisation in Ghana. The estimated long-run equilibrium relationship for stock market capitalisation function derived from the normalised vectors, with the standard errors in brackets and t-statistics in parentheses is presented as follows:

$$\begin{aligned}
 \text{SMC} = & 81.084 - 0.874\text{EXR} + 0.008\log\text{RGDP} + 0.639\text{SML} + 8.316\text{DS} + 2.15\text{COP} & (7) \\
 & (0.214) \quad (0.002) \quad (0.087) \quad (1.300) \quad (0.353) \\
 & [4.084] \quad [4.00] \quad [7.345] \quad [6.397] \quad [6.096]
 \end{aligned}$$

From equation (7), the positive constant term shows that the stock market capitalisation increases by approximately 81.084 percent due to the influence of all other variables that were not captured in the model. Expectedly, the study found evidence of negative relationship between exchange rate (*EXR*) and stock market capitalisation in the long run. That is, the coefficient of 0.874 indicates that stock market capitalisation decreases by about 87.4 percent for any one percent depreciation of the cedi against the US dollar (i.e. the vehicle currency) suggesting that cedi depreciation is inimical to the performance of the Ghana Stock Market. Intuitively, the result is true for an import dependant country such as Ghana because cedi depreciation increases cost of imports and cost of production of the firms listed on the stock market which in the long run leads to not only in the reduction of production and sales but also a decrease in profit and firm value. In addition, given the fact that Ghana is imports –dependent economy, cedi depreciation negatively affects economic growth and consequently results in the decline in the performance of the Ghana Stock Market. The result is consistent with the results obtained by Aggarwal (2003), Agrawal, Srivastav and

Srivastava (2010) who also found a negative relationship between stock market capitalisation and exchange rate.

Again, the results show that a one percent increase in real GDP result in about 0.008 percent increase in market capitalisation in the long-run in Ghana. The positive long-run relationship between the stock market capitalisation and real GDP is consistent with the results reported by Adjasi and Biekpe (2006), El-Wassal (2005) and Yartey (2008). Furthermore, the result indicates that a one percent increases in real stock market liquidity (*SML*) increases real stock market capitalisation by approximately 0.639 percent. This suggests that an improvement in the market liquidity promote the development of the Ghana Stock Exchange since market liquidity induces additional listings. This result is akin to the empirical literature (see Quaidoo, 2012; El-Wassal, 2005; Yartey, 2008 for instance). Also, at one percent level of significance, one dollar increase in the world price of crude oil leads to about 2.152 percent increase in stock market capitalisation. It thus, suggests that the Ghana stock market also obeys the golden rule that state “oil up stock market up”. The positive effect of rising oil price on the stock market in the long run as recorded by the study may be considered reasonable for oil producing countries and particularly Ghana. The results is in line with a lot of studies by (Hammoudeh and Li 2005; Sadorsky, 2001) who also found a positive relationship between these two variables.

Interestingly, the results also show a significant and positive long-run relationship between domestic savings and stock market capitalisation suggesting that gross domestic savings is a good predictor of the stock market development in Ghana. Particularly, one percent increases in real domestic savings increases the real market capitalisation by about 8.316 percent. This implies an increase domestic saving would increase domestic investment which in turn increases productivity and profitability of firms hence resulting in the amount of outstanding shares own by domestic companies on the stock market. Again, increased domestic savings promote economic growth which also impact positively on the stock market performance. This result is in agreement with the findings by Garcia and Liu (1999) and Yartey (2008) who reported a positive relationship between domestic saving to GDP ratio and market capitalisation ratio.

When the variables are cointegrated in the long run it suggests that the VECM can be estimated to assess the linkages between the variables. First, an over parameterised model, which takes into account all the differenced variables with a lag length of 6 determined by AIC and SBC and a lagged error correction term, was reduced to a more parsimonious model. Again, all those variables that were found to be insignificant were deleted using the t-statistic and p-values to arrive at the final estimated dynamic equation which is presented in Table 7. From Table 7, it can be observed that the growth in real stock market capitalisation for the previous quarter has a positive feedback effect on the current stock market development. For instance, a percent increase in stock market capitalisation growth in the fifth quarter causes an increase in the current real stock market capitalisation by about 65.8546 percent. Table 7 also shows that exchange rate in the fifth quarter indicated a negative and 5 percent significant relationship with the stock market capitalisation. This result reinforce the negative long-run relationship between exchange rate and the stock market development. Furthermore, as shown by Table 7, a percentage increase in the growth of stock market liquidity increases the market capitalisation by about 3.6892 percent for the fourth quarter. Empirically, one dollar increase in crude oil price increase real stock market capitalisation by approximately 5.98763 in the fifth quarter and this is also consistent with the long run analysis.

Table 7: Short-run parsimonious vector error correction model (VECM)

Variable	Coefficient	Std.Err	t-Statistics	Prob
ECT(-1)	-0.023186	0.008622	-2.689100	0.0088***
DSMC(-1)	0.775367	0.070051	11.06858	0.0000***
DSMC(-4)	-0.770904	0.063479	-12.14433	0.0000***
DSMC(-5)	0.658546	0.099358	6.628016	0.0000***
DlogRGDP(-5)	-0.005571	0.002893	-1.92579	0.0578*
DEXR(-5)	-0.224433	0.102223	-2.19553	0.0311**
DCOP(-4)	-0.480069	0.137309	-3.49626	0.0008***
DCOP(-5)	0.598763	0.114007	5.251991	0.0000***
DSML(-4)	0.036892	0.013178	2.799545	0.0065***
C	0.21822	0.100596	2.169271	0.0524*
R-squared	0.825398	Mean dependent var		0.007358
Adjusted R-Squared	0.798187	S.D. dependent var		1.922073
S.E of regression	0.863464	Akaike info criterion		2.677156
Sum squared resid	57.40895	Schwarz criterion		3.03824
Log likelihood	-107.472	Hannan-Quinn criterion		2.822767
F-statistic	30.33354	Durbin-Watson stat		2.254664
Prob(F-statistic)	0.0000***			
<i>Diagnostic test</i>	Test Statistic	P-Values		
Autocorrelation test	0.45476	0.8395		
Normality	0.699328	0.8723		
Hetero test	1.377869	0.7473		
ARCH test	1.357869	0.2342		
RESET test	0.609086	0.4170		

*** ** and * denotes 1% 5% and 10% significance levels respectively

Source: Authors' construct

The error correction term (*ECT (-1)*) is negative as expected and significant at one percent. The significance of the error correction term explains the validity of an equilibrium relationship among the variables used for the cointegration test. The adjustment coefficient indicates that approximately about 2.3186 percent of the short-run disequilibrium is corrected in the long-run

every quarter when there is a shock into the system. The test results in the diagnostic section in Table 7 indicated that our empirical model is robust, reliable and adequate.

Table 8: Results of the pairwise granger-causality test

Null Hypothesis	F-Statistic	Prob
EXR does not Granger cause SMC	3.46304	0.0130**
SMC does not Granger cause EXR	0.15182	0.8594
SML does not Granger cause SMC	4.3353	0.0025***
SMC does not Granger cause SML	0.63435	0.5327
logRGDP does not Granger cause SMC	3.7066	0.0088***
SMC does not Granger cause logRGDP	0.0896	0.9144
DS does not Granger cause SMC	1.67704	0.1928
SMC does not Granger cause DS	0.23849	0.7489
COP does not Granger cause SMC	0.29015	0.7489
SMC does not Granger cause COP	3.31952	0.0407**

*** ** and * denotes 1% 5% and 10% significance levels respectively

Source: Authors' construct

The presence of long- run equilibrium relationship among the variables does not give any indication about the nature and direction of causality between the variables. In view of this, we carried out a Pairwise Granger-causality test to examine the causal relationship between stock market capitalisation ratio and exchange rate including the other control variables. The results show existence of unidirectional causality running from exchange rates to stock market capitalisation suggesting that exchange rate helps in predicting real stock market capitalisation at 5 percent significance level in Ghana. This result is consistent with empirical results obtained by (Smyth and Nandha 2003) who found unidirectional relationship running from exchange rate to stock market price in South Asia.

4. Conclusion

The current study revealed these key findings: First, exchange rate exerted a significant negative effects on stock market capitalisation both in the long run and short run suggesting that the continuous depreciation of the cedi against the US dollar poses a serious threat to the performance of the stock market in Ghana. Secondly, real GDP per capita, stock market liquidity, domestic savings and crude oil price impacted positively on stock market capitalisation. More so, the Granger Causality test revealed a uni-directional causality running from exchange rates to stock market capitalisation. Based on the findings of this study, the following recommendations were made to boost stock market capitalisation and therefore improve the activities of the Ghana Stock Exchange. The study first recommends that the Ministry of Finance and the Ministry of Agriculture should adopt policies that will boost the real side of the economy such as increasing agricultural productivity to ensure increase in foreign exchange earnings in the country and hence preventing

the cedi from depreciating. Again, listed firms on the Ghana stock market are encourage to patronise locally-produced raw materials for their production in order to prevent the cedi from depreciating. There is also the need for the government and GSE to initiate policies to promote increase in domestic savings, real GDP per capita and stock market liquidity because these variables were found to be impacting positively on stock market capitalisation.

References

- Adjasi CK, Biekpe NB. 2006. Stock market development and economic growth: the case of selected African countries. *African Development Review* 18:1, 144–161.
- Aggarwal R. 2003. Exchange rates and stock prices: A study of the US capital markets under floating exchange rates. Retrieved on 27th October, 2014 from: <http://en.journals.sid.ir>
- Agrawal G, Srivastav AK, Srivastava A. 2010. A study of exchange rates movement and stock market volatility. *International Journal of Business and Management* 5:2, 62-78
- Alagidede P, Ibrahim M. 2016. On the causes and effects of exchange rate volatility on economic growth: Evidence from Ghana. *International Growth Centre Working Paper*, pp 9. Retrieved on 10th March, 2016 from <http://www.theigc.org/project/on-the-causes-and-effects-of-exchange-rate-volatility-on-economic-growth-evidence-from-ghana>.
- Alagidede P, Panagiotidis T, Zhang X. 2011. Causal relationship between stock prices and exchange rates. *The Journal of International Trade and Economic Development* 20:1, 67–86.
- Arestis P, Demetriades PO, Luintel KB. 2001. Financial development and economic growth: the role of stock markets. *Journal of Money, Credit and Banking* 12:3, 16–41.
- Bank of Ghana. 2014. The Ghana Cedi crisis: implications and way forward. Retrieved on 5th November, 2014 from: <http://www.modernghana.com>.
- Calderon-Rossell RJ. 1990. The Structure and Evolution of World Stock Markets, in S. Ghon Rhee and Rosita P. Chang (eds.), *Pacific Basin Capital Markets Research Proceeding of the First Annual Pacific Basin Finance Conference*. Taipei, China, 13- 15 March 1989, (Amsterdam: North Holland). Retrieved 2th December, 2015 from <https://www.imf.org>.
- Centre for Policy Analysis. 2012. Ghana selected economic issue. Retrieved on 6th December, 2014 from: <http://www.cepa.org>.
- Dziwornu RK, Awunyo-Vitor D. 2013. Stock Exchange Performance and Economic Growth in Ghana: Is there a Causal Link?.
- El-Wassal KA. 2005. Understanding the growth in emerging stock markets. *Journal of Emerging Market Finance* 4:3, 227–261.
- Engle RF, Granger CW. 1987. Co-integration and error correction: representation, estimation and testing. *Econometrica: Journal of the Econometric Society* 23:3, 251–276.
- Frimpong S. 2011. Speed of adjustment of stock prices to macroeconomic information: Evidence from Ghanaian Stock Exchange. *International Business and Management* 2:1, 151–156.

- Garcia VF, Liu L. 1999. Macroeconomic determinants of stock market development. *Journal of Applied Economics* 2:1, 29–59.
- Ghana Stock Exchange. 2003. Ghana stock exchange market 2003 report.
- Ghana Stock Exchange. 2013. Ghana stock exchange market 2013 report.
- Granger CW, Newbold P. 1988. Spurious regressions in econometrics. *Journal of Econometrics* 2: 2, 111–120.
- Gujarati DN, Porter, DC. 1999. Essentials of econometrics. Retrieved on 17th January, 2015 from: <http://mint.jnu.edu.cn>.
- Haley JD. 1997. A cointegration analysis of the relationship between underwriting margins and interest rates: 1930-1989. *Journal of Risk and Insurance* 2:3, 480–493.
- Hammoudeh S, Li H. 2005. Oil sensitivity and systematic risk in oil-sensitive stock indices. *Journal of Economics and Business* 57:1, 1–21.
- Jefferis K, Smith G. 2005. The changing efficiency of African stock markets. *South African Journal of Economics*, 73:1, 54–67.
- Johansen S. 1991. Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models. *Econometrica. Journal of the Econometric Society* 45:4, 1551–1580.
- Johansen S, Juselius, K. 1992. Testing structural hypotheses in a multivariate cointegration analysis of the PPP and the UIP for UK. *Journal of Econometrics* 53:1, 211–244.
- Karunanayake I, Valadkhani A, Brien M. 2009. Modeling Australian stock market volatility: a multivariate GARCH approach. Retrieved on 28th March, 2015 from: <http://ro.uow.edu.au>.
- Kim K. 2003. Dollar exchange rate and stock price: evidence from multivariate cointegration and error correction model. *Review of Financial Economics* 12:3, 301–313.
- Ma CK, Kao GW. 1990. On exchange rate changes and stock price reactions. *Journal of Business Finance and Accounting* 17:3, 441–449.
- Ministry of Finance. 2014. Continued Cedi depreciation is affecting economics activities. Accra. Retrieved on 10th December, 2015 from <http://www.myjoyonline.com>.
- Mishra AK, Swain N, Malhotra DK. 2007. Volatility spillover between stock and foreign exchange markets: Indian evidence. *International Journal of Business* 12:3, 343–359.
- Møller SV. 2009. Stock Returns and Exchange rate Volatility. Retrieved on 14th July, 2015 from <http://pure.au.dk>.
- Morales L. 2009. Volatility spillovers between stock returns and foreign exchange rates: evidence from four eastern European countries. In Conference papers (p. 8). Retrieved on 23th April, 2014 from: <http://arrow.dit.ie>.
- Mun KC. 2007. Volatility and correlation in international stock markets and the role of exchange rate fluctuations. *Journal of International Financial Markets, Institutions and Money* 17:1, 25–41.

- Osamwonyi IO, Kasimu A. 2013. Stock market and economic growth in Ghana, Kenya and Nigeria. *International Journal of Financial Research* 4:2, 83.
- Osei V. 2005. Does the stock market matter in Ghana? A granger-causality analysis. Bank of Ghana WP/BOG-05/13.
- Phylaktis K, Ravazzolo F. 2005. Stock prices and exchange rate dynamics. *Journal of International Money and Finance* 24:4, 1031–1053.
- Quaidoo C. 2012. Stock market capitalisation and economic growth in Ghana. Retrieved on 12th March, 2015 from: <http://ir.ucc.edu.gh>.
- Sadorsky P. 2001. Risk factors in stock returns of Canadian oil and gas companies. *Energy Economics* 23:1,17–28.
- Smyth R, Nandha M. 2003. Bivariate causality between exchange rates and stock prices in South Asia. *Applied Economics Letters* 10:2, 699–704.
- Stock JH, Watson MW. 1988. Testing for common trends. *Journal of the American Statistical Association* 83:4,1097–1107.
- World Bank. 2015. World development indicators, World Bank Publications. Retrieved on 2nd November, 2015 from <http://www.books.google.com>.
- Wu Y. 2000. Stock prices and exchange rates in VEC model-The case of Singapore in the 1990s. *Journal of Economics and Finance* 24:3, 260–274.
- Yartey CA. 2008. The determinants of stock market development in emerging economies: is South Africa different? *IMF Working Papers* 3:2, 4–31.
- Yartey CA, Adjasi CK. 2007. Stock market development in Sub-Saharan Africa: Critical issues and challenges. International Monetary Fund. Retrieved on 20th December, 2015 from: <http://books.google.com>.
- Yau HY, Nieh CC. 2006. Interrelationships among stock prices of Taiwan and Japan and NTD/Yen exchange rate. *Journal of Asian Economics* 17:3, 535–552.
- Ziorklui SQ. 2001. The Impact of Financial Sector Reform on Bank Efficiency and Financial Deepening for Savings Mobilisation in Ghana. Retrieved on 7th December, 2015 from: <http://pdf.usaid.gov>.