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Financial Liberalisation and Stock Markets Integration: Further Evidence from Nigeria, South Africa and Egypt

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ABSTRACT

The aim of this paper is to analyse the financial liberalisation and stock markets integration of Nigeria, South-Africa and Egypt. The study is conducted for the period of 1989-2016 and comprised both the pre- and post-liberalisation era. The paper employed the Vector Autoregressive methodology. The use of the financial liberalisation dummy gives a better insight into the impact of financial liberalization on the integration of markets. The result showed there is no long-run relationship between the selected stock exchange markets. The result further showed evidence of short-run dynamics between stock exchange markets. The generalized impulse response functions showed that all the markets responded from shock. The financial liberalization dummy is positive and significant and implied its impact on the integration of the markets. The paper concluded that the stock markets are not fully integrated. As such, investors who have long-term investment plans can diversify their portfolios across the three selected stock markets.

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1. Introduction

Financial liberalisation has been the basic policy tool of the emerging economies of 1960-1970. They were bedeviled with low economic growth as a result of interest rate distortion, which led to inefficient and poor investment. The basis of the financial liberalisation theory is capital accumulation through the stimulation of savings and investment coupled with decentralised financial intermediaries [1,2]. The most affected financial intermediary in the process after financial liberalisation is the stock markets. There is no doubt emerging stock markets witness growth in their indicators as a result of financial liberalisation. However, the subsequent consequence of market integration and co-movement of the crisis have gathered a lot of attention.

Theoretically, the free movement of capital across the globe will integrate the global stock markets. This has raised concern on the viability of international diversification of risk across segmented stock markets. Shawky *et al.*, [3] argued that portfolio diversification is always a

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reasonable method of reducing the risk of an investment portfolio without negatively affecting its return expectations. Studies such as Bekaert *et al.*, [4] Defusco *et al.*, [5] Masih *et al.*, [6] Ibrahim [7], Gilmore *et al.*, [8] Solarin and Mansourfar *et al.*, [9,10] have not reached consensus on the degree of integration between various stock markets. There is inconsistency in the results which show some markets are integrated, partially integrated and not integrated. This gives the motivation for this paper to further unveil the relationship. Similarly, no comprehensive study is dedicated to the three largest stock markets of Africa, Nigeria, South-Africa and Egypt. The three markets have the highest market capitalization, trade volume and international investments in the African continent (African Security Exchange Association (ASEA), 2015).

To analyse the impact of financial liberalisation on the integration of stock markets, previous studies, such as Bekaert *et al.*, [4], Phylaktis *et al.*, [11], Ibrahim [7] and Puan *et al.*, [12] dissected the data into pre- and post-liberalisation period. The contribution of this paper is by using a financial liberalisation dummy to capture the impact of financial liberalisation on the integration of markets. The financial liberalization dummy that accounts for liberalization dates has been used in studies, such as Demirgüç-Kunt *et al.*, Loayza *et al.*, Ndako and Njikam [13-16]. Coincidentally, Nigeria, South-Africa and Egypt officially liberalized their stock markets in 1995. This has facilitated the use of the financial liberalisation dummy conveniently in the Vector Autoregressive (VAR) equation.

2. Literature Review

Since the theoretical postulation that the financial liberalisation process, which has been mostly characterised by phasing out various barriers to international investment, which, in turn, lead or strengthen the integration of stock markets, there is a renewed interest on the existence and absence of integration. This is because the integration or segmentation of the markets involves important issues, including benefits of portfolio diversification and the development of a policy framework to mitigate the devastating consequences. Empirical literature shows a wide range of evidence. For instance, [4] found evidence that financial liberalisation leads to the integration of stock markets to the world portfolio. They showed that during the liberalisation process information becomes very vital and prices react to world information.

In a subsequent study, [17] used the liberalisation dates and analysed their effects on the stock markets. They found out that country funds, depository receipts and structural breaks in stock markets flow to the emerging markets. The study showed that the degree of integration varies across markets, depending on their information or financial links. Following this, Bekaert *et al.*, [18] improved the liberalisation date method with confidence intervals for 20 countries. The study provided evidence that the post-liberalisation period is associated with lower costs of capital, larger and more liquid investment and volatile and more correlation between the world markets.

Phylaktis *et al.*, [11] studied the effects of stock market liberalisation on the integration of seven Asian markets and the role of the United States (US) market in the integration process. The study dissected the period into pre-liberalization (1980-1989) and post-liberalization periods (1990-1998). There is no evidence that all the markets are integrated in both periods. Further evidence showed that the US has no significant role in the integration of the markets while Japan's role is more significant.

Puan *et al.*, [19] studied the relationship between the financial liberalisation and stock market integration of the five Association of South-East Asian Nations (ASEAN) economies. The study provided evidence of increased integration in the post-liberalisation period. Malaysia, Thailand, Philippines and Indonesia witnessed influences from other stock markets in both the long run and

the short run during the liberalisation process. However, Singapore remained unaffected by other markets in the period of the study.

Since the theory and some empirical literature have established the link between financial liberalisation and stock market integration, the attention of researches is given more to the degree of integration between the stock exchange markets. For instance, Masih *et al.*, [6], Syriopoulos [20] and Chudik *et al.*, [21] selected various stock markets across various regions and continents and found empirical evidence that the markets are integrated. As important as it may appear, it indicated the limitation of investing in these stock markets. Similarly, studies such as Chudik *et al.*, [21] and Solarin [9], which focused on frontier markets, found evidence of partial integration between selected stock markets. Contrary to the above findings, DeFusco *et al.*, [5], Ibrahim [7], Ncube *et al.*, [22], Agyei-Amponah [23] and Mansourfar [10] found no evidence of integration. This implied there is still diversification benefits across the stock markets. However, the inconsistency in the literature necessitated the need for further studies.

Recently, Alrafaya [24] investigated the relationship between the information and fluctuations in stocks return following the liberalisation process of the financial market in Amman-Jordan for the period 1994-2015. The data was dissected into pre and post liberalisation period and the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model was employed. Empirical evidence from the study showed that that fluctuation in the Jordan stock market increased in the post-liberalisation period and due to the integration of the stock market with other markets, the speed and accuracy of information flow to the market have increased. The result further indicates that the fluctuation in the pre-liberalisation period is attributed to events and factors such as wars and catastrophes. Yao *et al.*, [25] derived a normalised index on a weak form framework to analyse the impact of financial liberalisation on cross border integration of the Chinese stock market. The result revealed that the Chinese stock markets, in general, have become more integrated with the world markets due to financial liberalization. In particular, it is found that financial liberalisation have consistently and positive effects on the market integration of China, but other policy reforms act negatively.

It should be also pointed out that previous studies which have dealt with this subject used various econometric techniques that they found suitable. The most used methods are the Stochastic Volatility (SV) model and the VAR model framework. Hamao *et al.*, Li, darrat *et al.*, Martinez *et al.*, [26-29] and many more employed the GARCH model. Most of the studies found evidence of spillover across the markets, which is as a result of the integration of the markets. In the same vein, Eun *et al.*, Samitas *et al.*, Janakiramanan *et al.*, Gilmore *et al.*, Neaime, and Guyot *et al.*, [30-35] employed the VAR framework. Results from this model are inconsistent. However, most of the results show the influence of larger stock markets on the developing markets. This was further explained by the study of Gilmore [8].

4. Data

The paper analysed the relationship between financial liberalization and stock market integration in Nigeria, South Africa and Egypt. It employed Market Capitalisation of the selected countries for the analysis. The data was obtained from the World Bank database and Datastream International. The series are annual from 1989-2016. They were transformed (interpolated) into quarterly series using the Gandolfo [36] template. Its use has widespread acceptance and applied in empirical studies such as Baharushah *et al.*, [37], Tang [38] and Umar [39], among others.

Table 1 presents the descriptive statistic of the market capitalization of Nigeria, South-Africa and Egypt. Noticeably, South Africa has the highest mean, which shows that it is the largest of the three

selected stock markets. Similarly, South Africa has the highest Standard Deviation (Std. Dev.) compared to Nigeria and Egypt. This is partly an indication that it is the most volatile among the selected markets. There is evidence of the negative skewness of the distribution of return in South African market capitalization and statistical kurtosis, which suggests that the series are leptokurtic with a flatter tail and a high peak. The kurtosis implies that a shock of either sign is more often to be present.

Table 1
Descriptive Statistics

Markets	Mean	Std. Dev.	Skewness	Kurtosis
Nigeria	4.6606	2.6475	1.2037	4.426
South-Africa	46.951	16.573	-0.4085	4.584
Egypt	7.4750	5.9219	1.7834	5.943

5. Methodology

The objective of this paper is to determine whether financial liberalisation is significant to explain the integration of Nigeria, South Africa and Egypt stock exchange markets and also determine the degree of the integration of the markets. To achieve this objective, the paper follows some of the reviewed literature and employed the VAR model developed by Sims [40]. The model is a system method where all the variables are treated as endogenous. Henceforth, there is one equation for each variable as the dependent variable. VAR has lagged values of all the included variables as dependent variables, including the lag value of the dependent variable itself. Applications of VAR models to financial data are authoritative in a study such as Sims [40].

As a prerequisite for most of the econometric methods, especially time series analysis, there is the need to determine the stochastic properties of the series. This paper employed the Augmented Dickey-Fuller (ADF) test. The test in Equation (1) is to determine the stationary of the variables of Nigeria, South Africa and Egypt stock market capitalisation and also the order of the integration of the variables.

$$\Delta y_t = \gamma_0 + \gamma_1 t + (\beta - 1)y_{t-1} + \delta_1 \Delta y_{t-1} + \epsilon_t \quad (1)$$

After determining the stationary of the series and the order of their integration, the paper embarked on [42] and [42] and [43] cointegration tests using a maximum likelihood procedure to determine if the variables share a common stochastic trend and will grow proportionally. The basic argument for the Johansen test is that it is too sensitive to the lag length. As such, we determine the lag length through the lag length selection criteria of the Akaike information criterion (AIC) and the Schwarz information criterion (SIC). The Johansen method is summarized in Equation (2):

$$\Delta X_t = \sum_{i=j}^{p=1} \alpha_j X_{t-j} + \beta X_{t-f} + \epsilon_t \quad (2)$$

The cointegration rank from the Johansen cointegration test result does not fit the use of the Vector Error Correction Model (VECM). Therefore, we use the differenced series and estimate the unrestricted VAR in Equation (3) to determine the relationship in the short run.

$$X_t = \alpha + \phi_1 X_{t-1} + \phi_2 X_{t-2} \dots \phi_p X_{t-p} + \epsilon_t \quad (3)$$

After estimating the VAR model in Equation (3), we used both individual and joint coefficient tests to analyse the short-run dynamic interaction of the variables. Since the main objective of the paper is to determine the impact of financial liberalisation on the integration of the markets, we estimate another VAR model in equation (4):

$$X_t = \alpha + \phi_1 X_{t-1} + \phi_2 X_{t-2} \dots \phi_p X_{t-p} + \theta_i D + \varepsilon_t \quad (4)$$

$\theta_i D$ is a dummy variable that accounts for financial liberalisation and is specified as

$$\theta_i D = 1 \text{ if } t \geq 1996 \\ 0 \text{ if otherwise}$$

To further analyse the short run interaction, we generated impulse-response functions developed by [44] from the VAR model. This is because we are interested in the dynamic interactions between the selected stock exchange markets. The advantage of the method is that it is invariant to the variables ordering since the error structure is not orthogonalised. The initial impact response of a variable to various shocks can be analysed.

6. Results

This section presents the empirical results of the paper. It started by determining the stationary and order of the integration of the variables. This is done through the estimation of the ADF test. The paper also estimated the Phillips-Perron for robustness to complement the test. The result from the two tests is presented in Table 2. From the Table, it is evident that all the variables have unitroot at level. This is supported by both the ADF and PP tests. However, after the first difference, the variables became stationary in both tests. This implied that the variables have the same order of integration. That is at level their 1(0) and become 1(1) after the first difference.

Table 2
Unit root test

Variable	Level		First Difference	
	ADF	PP	ADF	PP
NMC	-1.618	-1.545	-4.028**	-5.398*
SMC	-1.177	-1.212	-4.339*	-5.617*
EMC	-1.672	-1.187	-6.428*	-5.019*

*, and **, imply 1%, and 5% levels of significance respectively.

The result of the Unit Root Test has given us the ability to test for the long run relationship between the selected stock exchange markets. As a pre-requisite, we first determined the optimal lag. Both the AIC and SIC recommended five lags for the model. We then estimated the Johansen– Juselius cointegration test. It is presented in Table 3. The Table presents both the trace and the maximum eigenvalue test. The trace statistics showed no evidence of cointegration between the selected stock exchange markets. The maximum eigenvalue test supported the trace statistic. It showed evidence that the markets are not cointegrated. This implies that the markets have no long-run relationship. The result obtained supports studies, such as Defusco *et al.*, [5], Agyei-Ampomah [23] and Mansoufar [10].

Table 3
 Cointegration Test

Null	Alternative	Trace-stat	Prob	Max-Eigen	Prob
$r = 0$	$r \geq 1$	21.94311	0.3016	10.64446	0.6826
$r \leq 1$	$r \geq 2$	11.29865	0.1938	7.809415	0.3984
$r \leq 2$	$r \geq 3$	3.489236	0.0618	3.489236	0.0618

Since the cointegration test has shown that there is no long-run relationship, we then estimated the VAR model to analyze the short-run dynamic between the markets. We estimated three different models from the VAR system with each market as a dependent variable. In each model, we found a mixed result. Some parameter coefficients are statistically significant while others are not. We also estimated the Wald joint coefficient test. The joint tests for all the three models are statistically significant. This showed evidence of short-run dynamics between the selected stock exchange markets. The result obtained is in accordance to earlier results in studies by Ibrahim [7] and Gilmore *et al.*, [8], which showed that the markets are not integrated in the long-run but only in the short run.

Since we determined the degree of integration between the selected stock exchange markets and the main objective of the paper is to determine the impact of financial liberalization on the integration of the markets, the paper estimated another VAR model specified in Equation (4). The target in this model is to see whether the financial liberalisation dummy is significant. The result showed evidence that the financial liberalisation dummy is positive and statistically significant in all the three models representing each market. This is in accordance with most empirical studies, such as Bekaert *et al.*, [4], Huang [45] and Puan *et al.*, [12]. This also supports the argument that the effect of financial liberalization is most effective in the short run. This includes a decrease in the cost of capital, an increase in stock market volatility and in return covariance with world stock markets.

The paper further generated the generalised impulse response functions from the VAR model as a basis for inferences. This has given us another insight into the short run dynamics between the selected stock exchange markets. The result is presented in Figure 1. From the result, it is evident that there is an immediate response from the three markets to their own shock. This is continued for sometimes (period 5) and then becomes negative in all the three markets. Similarly, there is a positive immediate response to a standard deviation shock from each market to another. This happened till period 4 and then died out. This showed the influence of each market and that the markets felt directly the shock from the other markets in the short run.

Finally, the paper conducted diagnostic checking in each of the models estimated. The result of the test indicates no serial correlation and also passed the heteroskedasticity test. Unfortunately, all the models failed the normality test. However, Gonzalo [46] explained that there is no problem when the normality test fails particularly under the Johansen [42] cointegrating framework. This is because the procedures of reduced rank simultaneous least squares do not make any assumption about the distribution error term. Similarly, Enders [47] argued that, although it is a common practice to assume that the sequence is normally distributed, it is not necessarily the case that the forecast errors are normally distributed with a mean of zero.

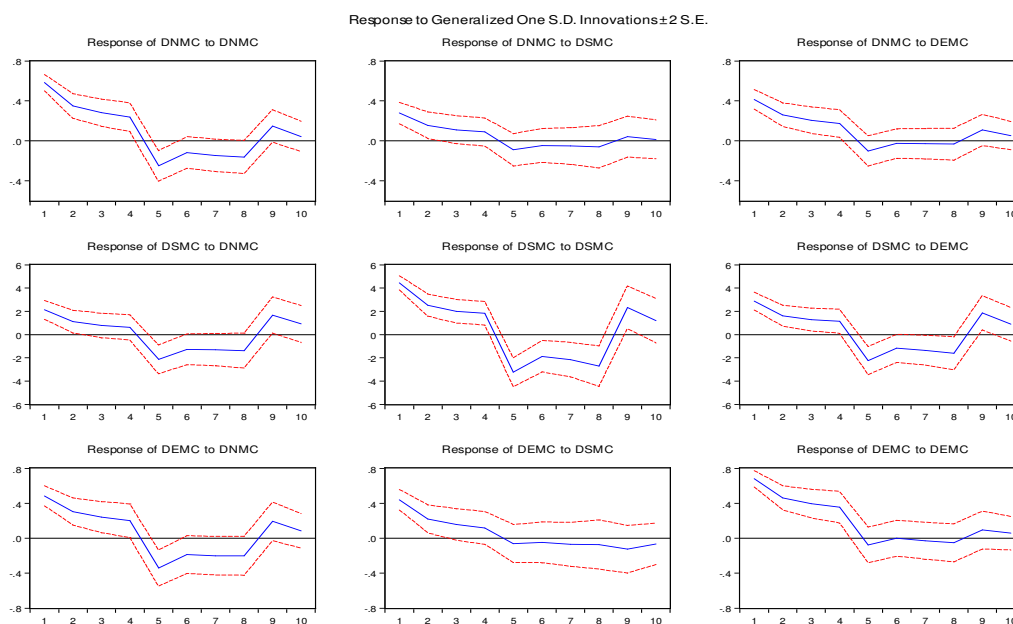


Fig. 1. Generalised impulse response function

4. Conclusions

Analysing the relationship between financial liberalisation and stock market integration is very important. It also appears that the implementation of the financial liberalization process is likely to enhance the level of the integration of stock markets. This led to numerous implications, especially on the emerging markets. This paper conducted this study on Nigeria, South Africa and Egypt Stock exchange markets. It employed the VAR framework, which enables us to investigate both the long run relationship and the short run dynamics between the selected stock exchange markets. We used a financial liberalization dummy and investigated the impact of financial liberalisation on the integration of the selected stock exchange markets. The empirical results showed evidence of no long-run relationship between the selected stock exchange markets. The result only showed evidence of short-run dynamics among the selected stock exchange markets. The result also showed that financial liberalisation exerts an impact on the integration of the stock markets. From the analysis of the empirical result, we concluded that the stock markets are not fully integrated. As such, investors who have long-term investment plan can diversify their portfolios across the three selected stock markets. We also concluded that government shall establish a policy that will be immune to the stock markets when embarking on financial liberalisation policy.

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