EVALUATING THE NEXUS BETWEEN FINANCIAL DEEPENING AND STOCK MARKET IN NIGERIA

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Abstract:

The paper examines the relationship between financial deepening and stock market returns and volatility in the Nigerian stock market. Estimation depending on the measures of financial deepening and market returns were evaluated using GARCH (1, 1) model. Four modeled equations were estimated and analysed. Financial deepening is represented by two variables, the ratio of the value of stock traded to GDP (FD_{1t}) and the ratio of market capitalization to GDP (FD_{2t}). Empirical results revealed that financial deepening (FD_{1t}) measured as the ratio of value of stock traded to GDP do not affect the stock market and there is no news about volatility. But financial deepening (FD_{2t}) measured as the ratio of market capitalization to GDP affect the stock market. It indicated that financial deepening reduces the level of risk (volatility) in the stock market. Result also recorded that the conditional volatility of returns is slightly persistent. Policy implications emanating from the study is that efforts should be made to improve financial development in the country by increasing the range of financial assets. Deepening finance intermediation may promote economic growth by mobilizing more investments, and lifting returns to financial resources, which raises productivity. Increased investors' confidence and less risk perception by them, will invariably further boost the market and ginger growth.

Keywords: Financial Deepening, Stock Market Returns, GARCH Model

Introduction

The nexus between financial intermediation–growth is a widely studied topic in the literature of development economics. Deepening finance intermediation may promote economic growth by mobilizing more investments, and lifting returns to financial resources, which raises productivity. Financial deepening is the product of the growth of financial intermediation. Financial markets undertake this vital role of intermediation process, by channeling funds from surplus units (savers) to deficit units (investors). (Goldsmith,1969; Ghani,1992; Greenwood and Jovanovic,1990 also confirmed that such a joining of spending units is likely to result in a more deepening of the financial system. Where this process is efficient and without repression, the outcome is usually a well developed financial sector with sustainable economic growth. But where the contrary is the case, the result is an economy beset with "financial shallowness" which is a common problem infecting the growth of development economics. Put differently, 'shallow finance' is a result of lack or stagnant growth of output of any country. Where the depth of financial assets of any country is narrow, it can be referred to as a shallow financial depth. This condition explains why countries in such situation experiences low or negative per capita income.

Many other authors have also defined financial deepening. The World Bank (1989:27) defines it as an increase in the stock of asset. Contributing, Shaw (1973:8) sees it as a process involving specialization in financial functions and institutions through which organized domestic institution and markets relate to foreign markets. He stressed that an increase in the real size of the monetary system will generate opportunity for the profitable operation of other institutions as well via bill dealers to industrial banks and insurance companies. Opinionating, Nnanna and Dogo (1998) said that financial deepening often refers to a state of an atomized financial system, meaning a financial system that is largely free from financial repression. Oloyede (1998) remarked thus, financial deepening is the outcome of accepting appropriate real finance policy such as relating real rate of return to real stock of finance.

Where then do we place the Nigerian financial system on the barometer of financial repression and subsequently financial deepening? There are evidences of financial repression in Nigeria as x-rayed by various administrative controls over the system. Talk for instance Ndekwe (1995), reviewing the monetary and financial controls revealed that interest rates were capped, ceiling were placed on the growth of credit, credit rationing was exercised as well as

compulsory credit allocations to preferred sectors through credit guidelines, and foreign exchange controls were imposed. Summarizing, Ndekwe (1998) concluded that the effect of all these repression is "financial shallowness''. This means that Nigeria financial system has been evidently limited in its resource mobilization and hence financial deepening. McKinnon (1973) and Shaw (1973), contend that the financial sector is growth inducing, but that when repressed becomes an obstacle in the path of real growth.

Building on previous studies, and following similar work on Nigeria by Nwezeaku and Okpara (2010), this study uses GARCH (1, 1) equations model to estimate the relationship between financial deepening and stock market returns and volatility in Nigeria. For this reason it is necessary to understand what volatility is all about. Volatility can be defined as a measure of dispersion around the mean or average return of a security. One way to measure volatility is by using the standard deviation which tells you how tightly the price of a stock is grouped around the mean or moving average. When the price is tightly grouped together, the standard deviation is small. When the price is spread apart, you have a relatively large standard deviation. There is a strong relationship between volatility and market performance. Volatility tends to decline as the stock market prices rise and increase as the stock market prices fall. When volatility increases, risk increases and returns decrease. Risk is represented by the dispersion of returns around the mean. The greater the dispersion of returns around the mean, the larger the drop in the compound return is.

What then can one say is responsible for the change in stock market volatility? There is no doubt that financial analysts are in agreement on what constitutes stock market volatility and its measurement but the only bone of contention amongst them is agreeing on what actually causes the changes in the volatility. In line with the thinking of some researchers, the causes of volatility may be a result of the arrival of new unanticipated information that changes expected returns on a stock. Automatically it follows that changes in market volatility may be an outcome of changes in the local or global economic environment. Some researchers on the other hand, posit that volatility is a result of changes in trading volumes, practices or patterns. These in turn are driven by factors such as modifications in macroeconomic policies, shifts in investor tolerance of risk and increased uncertainly (Mala and Reddy, 2007). Interestingly, therefore the researcher hopes to join this search of finding out what actually causes the changes in stock market volatility. Unlocking this paradox is therefore the main objective of this paper. Given the

importance of volatility in financial theory, it becomes very essential to understand the behavior and nature of stock market volatility. Knowledge of the causes and degree of stock market volatility is beneficial to policy makers and investors and economic forecasters in predicting the direction of the economy's growth. This study therefore derives its objective from exploring the effects of financial deepening in stock market returns and volatility in Nigeria using "stock-market" based data. The commonly used measures of financial deepening include ratio of money supply to GPD, ratio of domestic credit to GDP, the size of non-bank institutions to the financial system, degree of monetization, the size of currency outside the bank etc (Oloyede.1998), ratio money supply to GDP and ratio of domestic credit to GDP Nwezeaku et al (2010). The point of departure of this study is the use of stock market based variables like the ratio of the value of stock traded to GDP, ratio of market capitalization to GDP.

Data:

Relying on data from Nigeria, this paper attempts to examine the link between the stock market and financial deepening. Towards this end, an appropriate measurement of financial depth is constructed. The data consist of Stock Market Return (R_t), the ratio of the value of stock traded to GDP (FD_{1t}), designated as SV/GDP, the ratio of market capitalization to GDP (FD_{2t}) written as MK/GDP. These data were calculated from data sourced from Central Bank of Nigeria Statistical Bulletin and the Stock Exchange 'Factbook'. The data spans the annual period 1980-2010 (thirty years), the maximum time period in which consistent data are available for all variables.

Methodology:

Mimicking the methods adopted by Nwezeaku et al (2010), but with some modifications in the variables, our study examines the nexus between financial deepening and stock market. Recent finance literature employs various non linear time series model of GARCH to study volatility. The modeling and estimation of this study take after the time series GARCH (1.1), mixed with some unit roots tests like Augmented Dickey Fuller (ADF) and the Correlogram test to examine the stationarity properties of the individual time series of the variables. The correlogram is a graphical presentation of autocorrelation and the partial autocorrelation functions. The graphs depict the stationarity or otherwise of time series data at various lags. Its

Q-Stat tests whether or not the series is auto correlated at any particular lag. The hypothesis (Ho) is that R_{1t}, FD_{it} and FD_{2t} are stationary.

The use of this GARCH (1,1) requires the joint estimation of a mean and conditional variance equation. The GARCH (1, 1) model for this paper is therefore expressed as:

MODEL 1

$$R_t = \beta_o + \beta_1 R_{t-1} + \beta_2 FD_{1t(-1)} + u_t; \quad t = 1, 2, ..., 30 \tag{1}$$

$$\sigma_t^2 = \alpha_o + \alpha_1 u_{t-1}^2 + \beta \sigma_{t-1}^2 + \gamma FD_{1t(-1)}; \quad t = 1, 2, ..., 30 \tag{2}$$

Where:

R_t = stock market return

R_{t-1} = the lagged value of return

σ_t^2 = conditional variance

FD_{1t} = financial deepening measured as ratio of value of stock traded to GDP

MODEL 2:

$$R_t = \beta_o + \beta_1 R_{t-1} + \beta_2 FD_{2t} + u_t; \quad t = 1, 2, ..., 30 \tag{3}$$

$$\sigma_t^2 = \alpha_o + \alpha_1 u_{t-1}^2 + \beta \sigma_{t-1}^2 + \gamma FD_{2t}; \quad t = 1, 2, ..., 30 \tag{4}$$

Where:

FD_{2t} = financial deepening measured as the ratio of market capitalization to GDP.

The monthly returns are computed as logarithm of price relatives

$R_t = \text{In}\ (P_t/P_{t-1})$

Where R_t is the stock market returns

P_t = stock market price index for period t

P_{t-1}= price index for period t-1

In = the logarithm operator

Equation (1) and (3) are respectively the conditional mean equation with an error term u_t .Equation (2) and (4) are respectively the conditional variance equation with u^2_{t-1} as the news about volatility from previous period measured as the lag of squared residual from the mean equation, and σ^2_{t-1} stands for last period forecast variance.

Many measures of financial deepening abound; for example, the inverse of broad money income velocity-ratio of M2 to nominal GDP, ratio of demand deposits to the narrow money stock, credit issued by financial institutions to the non-financial private sectors as a share of GDP, etc. Given the above equations, the study utilizes two different measures of financial deepening for this study- the value of stock traded to GDP (FD_{1t}) and the ratio of market capitalization to GDP (FD_{2t}). These are "stock market" based data.

Finally, the study examines the time series properties of the model variables (stationarity) using the Augmented Dickey Fuller (ADF) for the unit root. The market returns will be examined with the summary statistics such as skewness, kurtosis etc to assess the normality, autocorrelation conditions of the market. Tests of hypotheses are at 5% level of significance.

Empirical Results

The study started the estimation with the Augmented Dickey Fuller stationary test. Results arising from the unit root or stationary tests confirm the findings of most empirical studies that almost every time series data lack stationary mainly because such data experience some degree of changes over time. Using the Augmented Dick Fuller procedures, the arising results indicate that R_{1t} and FD_{2t} are stationary in their original forms, but FD_{1t} have stationary series at its first difference. Confirming this, the results of the Correlogram test reinforced the findings of the Augmented Dick Fuller procedures.

The hypothesis (Ho) is that R_{1t} is stationary. From the 'Q-Stat' and 'Prob' columns we observe that for all the lags (1 to 16), the probability values are greater than 0.05 signifying that the hypothesis is accepted, that is, R_{1t} is stationary. For instance, the 'Q-Stat' and at lag 16 are respectively 10.135 and 0.86.

fig 2: The Correlogram of FD_{1t}

Sample: 1980 2009

Included observations: 30

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. |**** |	. |**** |	1	0.537	0.537	9.5472	0.002
. |*** |	. |* . |	2	0.402	0.159	15.079	0.001
. |*** |	. |* . |	3	0.383	0.167	20.281	0.000
. |**. |	. *| . |	4	0.224	-0.092	22.128	0.000
. |* . |	. | . |	5	0.139	-0.042	22.868	0.000
. |* . |	. | . |	6	0.114	0.005	23.391	0.001
. | . |	. | . |	7	0.030	-0.056	23.427	0.001
. | . |	. | . |	8	0.027	0.032	23.459	0.003
. | . |	. | . |	9	0.062	0.065	23.635	0.005
. | . |	. *| . |	10	-0.017	-0.077	23.649	0.009
. | . |	. | . |	11	-0.045	-0.050	23.752	0.014
. | . |	. | . |	12	-0.050	-0.039	23.885	0.021
. *| . |	. | . |	13	-0.063	0.008	24.108	0.030
. *| . |	. | . |	14	-0.071	-0.009	24.410	0.041
. | . |	. |* . |	15	0.000	0.095	24.410	0.058
. | . |	. | . |	16	0.000	0.011	24.410	0.081

From the discussions following fig 1, it is clear that FD_{1t} is not stationary since the probabilities of the Q-statistics are less than 0.05 up to lag 14.

Fig. 3: The Correlogram of FD_{2t}

Sample: 1980 2009

Included observations: 30

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. |*** |	. |*** |	1	0.379	0.379	4.7645	0.029
. |* . |	. | . |	2	0.182	0.044	5.8958	0.052
. |* . |	. | . |	3	0.075	-0.009	6.0934	0.107
. *| . |	. *| . |	4	-0.073	-0.123	6.2899	0.179
. *| . |	. *| . |	5	-0.145	-0.097	7.0936	0.214
.**| . |	. *| . |	6	-0.213	-0.130	8.9030	0.179
. *| . |	. | . |	7	-0.143	0.004	9.7591	0.203
. | . |	. |* . |	8	0.003	0.108	9.7594	0.282
. | . |	. | . |	9	-0.013	-0.041	9.7667	0.370
. | . |	. | . |	10	0.043	0.019	9.8548	0.453
. | . |	. | . |	11	0.047	-0.024	9.9652	0.534
. | . |	. *| . |	12	-0.026	-0.085	10.000	0.616
. | . |	. | . |	13	-0.036	-0.024	10.074	0.688
. | . |	. | . |	14	-0.029	0.027	10.125	0.753
. | . |	. | . |	15	0.000	0.040	10.125	0.812
. | . |	. | . |	16	0.000	-0.008	10.125	0.860

From the discussions following figs 1 and 2, it is also clear that FD_{2t} is stationary since the probabilities of the Q-statistics are greater than 0.05 up to lag 16.

Table 4: The estimates of the parameters of the models:

	β_0	β_1	β_2	α_0	α_1	B	Γ
Model 1 t-statistics	35.57 (2.378)	0.05 (0.151)	-1.56 (-1.198)	531.01 (0.535)	-0.06 (-0.451)	0.63 (0.729)	-42.20 (-0.555)
Model2 t-statistics	21.72 (1.924)	0.27 (1.658)	1.10 (1.076)	603.88 (2.077)	-0.07 (-0.099)	0.50 (0.785)	-70.35 (-1.993)

Table 4 above gives the result of equations 1-4. Results emerging from the estimation for Model 1 revealed that neither the first lag of R_t (β_1) nor the first lag of FD_{1t} (β_2) is significant in the mean equation, while neither the ARCH effect (α_1) nor the GARCH effect (β) is significant in the variance equation. The result exhibits a negative relationship with conditional volatility in both models. Furthermore, financial deepening affects the stock market negatively in mode 1 and positively in model 2. Also for the estimate of both ARCH and GARCH coefficient, it is only that of GARCh that is positive in the two models and this agrees with the assumptions of the model since variance can never be negative. In both models of alternative measures of financial deepening , the sum of the ARCH and GARCH coefficients sum up to approximately 0.57 for SV/GDP model and 0.43 FOR MK/GDP. Both are less than one thus agreeing with the assumption of the model which stipulates that it should less than one. With the low summation figures, it implies that the impact of volatility on the stock returns despite being positive shows that the shock is a non- persistent, that is, new info in the market die quickly. Furthermore, the relationship between financial deepening and conditional volatility can be described as negative and positive for Models 1 and 2 respectively. In model 1 an increase in volatility lowers the financial deepening while the opposite is the case for model2. It follows then that volatility in the stock market is reduced by high financial deepening while the opposite happens in model 2. Implicitly it suggests that investors are not under much risk and may remain indifferent. There may not be in a hurry to revise their investment decisions by seeking safety avenues to invest their funds like in government bonds or savings deposits in banks.

Reliability tests were further administered on the models by way of diagnostics tests. The diagnostic tests include the following summary statistics as presented below.

Table 5: Summary Statistics Results:

The result of the descriptive statistics is presented here.

	R_{1t}	Model 1	Model 2
Mean	28.42	5.91	1.95
Median	22.35	5.32	2.21
Maximum	130.90	17.60	10.14
Minimum	-11.90	1.02	-11.00
Std. Dev.	27.72	3.79	4.41
Skewness	1.60	0.90	-0.56
Kurtosis	7.32	4.06	3.98
Jarque-Bera	36.26	5.53	2.81
Probability	0.00	0.06	0.24
Sum	852.80	177.30	58.75
Sum Sq. Dev.	22286.38	418.73	565.02
Observations	30	30	30

From the above results, R_{1t} has a mean of 28.42667, a skewness of 1.602263, a kurtosis of 7.329423, and a Jarque - Bera value of 36.26611 with a probability value of 0.00000. The Jarque - Bera value signifies that R_{1t} is not normally distributed. The same values can be read for FD_{1t} and FD_{2t} from their respective columns. The descriptive statistics showed that there exist a positive relationship between the standard deviation and the returns for all the models. Comparing FD_{1t} and FD_{1t} with R_{1t}, we can see that FD_{1t} is positvely skewed while FD_{2t} has negative skewness showing moderate skewness. Looking at their kurtosis, again model 1 and 2 have lower values compared with R_{1t} with that of model 2 just greater than normal value. However, they are both leptokurtic as shown by their kurtosis measure which is greater than 3 the normal figure. Suggesting again, that their standard deviation is much lower than that of R_{1t} indicating that the distribution tends to be closer to the mean comparatively. Also there is an improvement in the values of their Jarque-Bera statistics which exhibited lower figures. On the

whole the model showed an improvement over the raw data. The Correlogram and ADF test have already taken care of the auto regression factor. We can then safely say that the mean equation is correctly specified.

Table 6: ADF-Fuller (Stationary) test for variables

Variable	ADF-statistic	Critical value	Decision rule
R_{1t}	-3.842639 (0.0007)	1%=-3.679322 5%=-2.967767 10%= -2.622989	Stationary at level
FD_{1t}	-7.976907 (0.0000)	1%=-3.689194 5%=-2.971853 10%= -2.62512	Stationary at 1^{st} difference
FD_{2t}	-3.198605 (0.0035)	1%=-3.69322 5%=-2.967767 10%=-2.622989	Stationary at level

Summary and Conclusion:

Motivated by unending search in financial literature on the relationship between financial deepening and stock market return and volatility, this study aimed at contributing to the growing literature by applying the study on Nigeria. Utilizing GARCH model with two different measures of financial deepening - the value of stock traded to GDP (FD_{1t}) and the ratio of market capitalization to GDP (FD_{2t}) ,the study reported that financial deepening (FD_{1t}) measured as the ratio of value of stock traded to GDP and the first lag of R_t (Market Returns) do not affect the stock market. Also, there are no ARCH and GARCH effects in this model, that is, there is no news about volatility from previous period .For model 2 there is significance at 10% in the mean equation while only FD2 is significant in the variance equation at 5%level of significance. . It indicated that financial deepening reduces the level of risk (volatility) in the stock market. Result also recorded that the conditional volatility of returns is slightly persistent.

Policy implication emanating from the study is that there is volatility in the market but it is non-persistent. Investors are still not under great risk. Efforts should then be made to deepen the financial development in the country by increasing the range of financial assets. This will result

in increased investment and improvement in the volume and structure of savings. Incidence of stagnant growth may then be reduced. With strong growth, investors will have confidence to invest in the system.

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