



## RESEARCH ARTICLE

### DOES FINANCIAL DEEPENING FOLLOW SUPPLY LEADING OR DEMAND FOLLOWING HYPOTHESIS? : A LOOK AT THE NIGERIAN EVIDENCE

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#### ABSTRACT

This study employed the granger causality test to ascertain the direction of causality between various proxies of financial deepening and economic growth in Nigeria over the period, 1990-2009. The study utilized the Augmented Dickey-Fuller (ADF) test for unit root test and the variables were found to be uniformly stationary in their second difference. The co-integration test results indicated the presence of no co-integration among the variables. The result of the granger causality test showed that with the exception of market capitalisation which granger causes real GDP at lag 2 and 3 without feed back effect, causation runs from the growth indicator (RGDP) to other variants of financial deepening namely economic volatility, market liquidity, money market diversification and broad money velocity. Thus, financial deepening in Nigeria follows demand following hypothesis. In the light of the above findings, government policy while pursuing growth oriented programmes should also be geared towards a conducive and efficient capital market to encourage the flow of market capitalization to finance long term growth related investments.

**Key words:** Finance-Growth Nexus, Financial Deepening, Economic Growth, Granger Causality.

#### INTRODUCTION

Financial deepening can be defined as an increase in the supply of financial assets in the economy. It includes the aggregate or wide range of financial assets that are available in the economy. A shallow financial deepening in the economy means that the supply of financial assets is small while a high financial deepening means that the supply of financial assets is enormous. Since financial deepening means increase in the supply of financial assets, its measure involves a wide range of financial assets including money. Financial deepening has been argued to create enabling conditions for growth through two channels – the supply leading hypothesis which contends that financial development spurs economic growth and the demand following hypothesis which maintains that growth generates the demand for financial products. Finance has the significant function of adjusting economic structure through creating favourable conditions for readjustment of industrial structure through the capital market; Finance guides the flow of resources in the economy through banks and provides a convenient channel of financing for enterprise. The link between financial deepening and economic growth has attracted much attention in economics discussion. The study of the “finance –growth” nexus has been an issue of concern since finance is said to be a life wire of business and the economy. While most economists contend that financial intermediaries mobilise, pool and channel domestic savings into productive capital and in doing so contribute to economic growth, others argue that financial deepening is a consequence of economic growth, as economic growth increases demand for sophisticated financial instruments

which consequently leads to growth in the financial sector. Thus, available empirical and theoretical evidence have been mixed as to whether financial development is an engine to economic growth or economic growth leads financial development. The causal relationship of finance-growth nexus has important policy implications for the economy. If in the economy, financial development causes economic growth, reformation, creation and promotion of modern financial institutions become necessary and important for piloting economic growth. The consolidation of banks and non bank financial institution like stock market and insurance companies becomes necessary and predictive conditions for the growth of the economy. If on the other hands, causation runs from economic growth to financial development, policy effects to reform and promote financial development would be a waste of scarce resources. The purpose of this paper therefore is to analyse the theoretical argument on the finance growth nexus and to determine whether it is financial deepening that causes growth or that growth is a consequence of financial deepening in Nigeria. To do this, the work is divided into five sections. Section one is the introduction, section two deals with the literature review, section three discusses the methodological framework. Section four analyzes the data and discusses the findings under the umbrella of empirical results while section five discusses policy implications and conclusion.

#### Review of Related Literature

Patrick (1966) identified two possible causal relationships between financial development and economic growth. They are namely demand following hypothesis which sees the demand for financial services as dependent upon the growth of real output and the commercialization and modernization of

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agriculture and other subsistence sectors. The 'demand-following' hypothesis posits a unidirectional causation from economic growth to financial development. This implies financial system passive response to economic growth meaning that the increasing demand for financial services might lead to the, erase the aggressive expansion of the financial system as the real sector of the economy grows. Arestis and Demetriades (1997) using Johansen cointegration on time series analysis for the United States and Germany found insufficient evidence to claim that financial development spurs economic growth. Their analyzed data rather pointed to the direction that real GDP contributes to both banking system and stock market development.

Odiambho (2004) investigated the finance-growth nexus in South Africa using cointegration approach and vector error correction model on monetization ratio namely the ratio of M2 to GDP and intermediation ratio, the ratio of bank claims on the private sector to GDP against economic growth proxied by real GDP per capita. Their results revealed demand-following response between financial development and economic growth and totally discredited the supply-leading hypothesis. Guryay *et al.* (2007) examined the relationship between financial development and economic growth for Northern Cyprus for the period of 1986-2004 and concluded that there was a negligible positive effect of financial development on economic growth of Northern Cyprus. Rather, the analysis showed that there was evidence of causality from economic growth to the development of financial intermediaries. In Nigeria, Agu and Chukwu (2008) found that the Nigerian evidence supported the demand – following hypothesis for bank-based financial deepening variables like private sector credit and broad money; while it supported the supply – leading hypothesis for “bank-based” financial deepening variables like loan deposit ratio and bank deposit liabilities. Their empirical findings suggested that the choice of bank-based financial deepening variable influenced the causality outcome.

Valverde *et al.* (2003) investigating the issue of causality between financial development and regional economic growth in Spain found that increased competition in the banking sector (which leads to higher deposit and lower loan rates) has not Granger-caused economic growth in Spanish provinces. Stern (1989) completely ignored the role of financial development in the economic growth process. Concluding his survey, Stern listed several topics omitted from the survey that are worthy of future research, and financial deepening was not even mentioned in that list. A similar neglect of the role of financial deepening in economic development can also be found in Meir and Seers' (1984) book which is a collection of essays by “pioneers of development economics.” On the other hand, the “supply-leading” hypothesis to mention a few, has been advanced and supported by many prominent economists like McKinnon (1973), Shaw (1973), Fry (1978), Calderon and Liu (2002), King and Levine (1993), Neusser and Kugler (1998), Levine, Beck and Loayza (2002), Diaz-Alejandro (1985), and Moore (1986). Earlier, Hicks (1969) believed that even history revealed that the industrial revolution in England in the 18<sup>th</sup> century was not due to new technological inventions. According to him, financial reforms were the main culprit behind the British industrial revolution. Recent empirical work by Gelb (1989), Ghani (1992), King

and Levine (1993), DeGregorio and Giudotti (1995), and Levine and Zervos (1996) have all lent support to the supply-leading hypothesis in the case of many developing and developed countries. Their empirical results revealed positive and statistically significant coefficients on the proxies of financial deepening in the real economic growth equations. Wadud (2005) in examining the long-run causal relationship between financial development and economic growth for three South Asian countries namely India, Pakistan and Bangladesh disaggregated financial system into “bank-based” and “capital market based” categories. His study by employing a cointegrated vector autoregressive model showed that the results of error correction model indicate causality that runs from financial development to economic growth. Ndebbio (2004) investigated financial deepening, economic growth and development for sub-Saharan African countries. The study used two financial deepening variables namely the degree of financial intermediation measured by M2 as ratio to GDP, and the growth rate of per capita real money balances. The study found that a developed financial sector spurs overall high but sustainable growth of an economy.

Levine *et al.* (2000) employing instrumental variables, while controlling for the differences in institutions across countries to partially overcome the unobserved heterogeneity due to omitted variables bias found that better legal systems provide a more suitable environment for financial sector development, and financial sector development, in turn, leads to higher economic growth. Studies such as that of Clarke, (2002) and Jayaratne and Strahan (1996) concluded that banking sector development following deregulation has led to state level economic growth in the U.S. Kwan *et al.* (1998) analyzed the relationship between financial deepening and economic growth for Hong Kong, South Korea and Taiwan. The findings suggested that financial deepening had a positive influence on output growth. Kings and Levine (1993) in their study that includes 80 countries between years 1960-1980 came out with the result that indicators of financial growth are related to the growth rate and increments in economic efficiency. Levine and Zervos (1996) using horizontal cross analysis with 3 growth rates as dependent variable which covers 72 countries found that there is a positive relationship between financial deepening and growth.

Demircug-Kunt and Maksimovic (1998) carrying out analysis for 30 developed and developing countries concluded that real capital stock market and well growth system make a firm easy to develop. While Zhenhui Xu (2000) in his international study of VAR analysis in 41 countries (1960-1993) rejected the demand following model and effects of financial development on economic growth. At the cross-country level, evidence indicates that various measures of financial development (including assets of the financial intermediaries, liquid liabilities of financial institutions, domestic credit to private sector, stock and bond market capitalisation) are related to economic growth robustly and positively (King and Levine, 1993 and Levine and Zervos, 1998). Rajan and Zingales (1998) using time series analysis (1980-1990) found that financial development has a strong effect on economic growth. Also Thangevelu *et al.* (2004) time series analysis for Australia study represents evidences that financial markets have causal effect on growth. Nwazeaku and Okpara (2010) in investigating the effects of financial deepening on stock

market returns and volatility in Nigeria, showed that a high degree of financial deepening reduces significantly the level of risk in the stock market. They however found a low degree of volatility engendered by financial deepening and contended that the policy implication of the results is that the presence of low degree of volatility suggests that investors will demand for less risk premium in the stock market thereby creating lower cost of capital which is synonymous with increase in investment and hence economic development. This indirect channel we believe is capable of inducing economic growth. However, the effect of financial deepening on economic growth will be subjected to empirical investigation. On the other hand Murinde and Eng (1994), Luintel and Khan (1999) argued that a member of endogenous growth models show a two –way relationship between financial development and economic growth (Kar and Pentecost, 2000). Rousseau and Wachtel (2007) re-examined the core cross-country panel result and found that the impact of financial deepening on growth is not as strong with more recent data as it appeared in the original panel studies with data for the period from 1960 to 1989 and suggested that financial deepening has a positive effect on growth if not done to excess. Finally bi-directional causality hypothesis has been advocated by Altay and Atgur (2010). In his study, financial deepening and economic growth relationship using VAR model approach were investigated in Turkey over the period 1970-2006. His empirical findings showed that there was a bidirectional Granger causality relationship between financial deepening and economic growth in Turkey.

### Methodological Framework

The use of non-stationary variable(s) in a given model leads to the “spurious regression phenomenon” discussed by Granger and Newbold (1974), and Phillips (1986). Since most macroeconomics time series variables exhibit non-stationarity behaviour, capable of invalidating the quality of empirical inference drawn from such estimates if appropriate measures are not taken, it becomes imperative that the unit root test which is an instrument for guarding against the pitfall of spurious regression result arising from non-stationary time-series variables is used. The Dickey-Fuller (DF) test and the Augmented Dickey-Fuller (ADF) test developed by Dickey and Fuller (Dickey and Fuller, 1981) and the Phillip – Perron (PP) test developed by Philip and Perron (Philip and Perron, 1988) are used in conducting unit root test. If the unit root confirms non-stationarity, differences should be taken until series will be stationary at same level. If a non stationary series,  $Y_t$  must be differenced one times before it becomes stationary, then it is said to be integrated of order 1. This would be written as  $Y_t \sim I(1)$ . Thus, if  $Y_t \sim I(1)$ , then  $\Delta^d Y_t \sim I(0)$  implying that applying the different operator  $\Delta$ , 1 times, leads to  $I(0)$  process, a process with no unit roots. A stationary series has a constant mean, constant variance and constant auto covariance for each given lag. In this work, the Augmented Dickey-Fuller Unit root test is adopted to infer the number of unit roots or non-stationarity of the variables that are contained in the series. The ADF test determining whether the series are stationary or not can be defined as follows:

$$y_t = \psi_0 + \sum \psi_{1i} y_{t-i} + \sum \lambda X_{it} + \mu_t$$

where

$y_t$  is the vector of GDP growth,  $X_{it}$  are the vectors of financial deepening variants while  $\mu_t$  is the white-noise error term. Once the variables are converted to stationary time series, we then apply the Granger-causality to determine the direction of financial deepening and/or the growth of the economy. This is because tests of Granger causality require stationary time series (Granger and Newbold (1994) and Philips(1986). The Granger (1969) approach to the question of whether X causes Y is to see how much of the current Y can be explained by past values of Y and then to see whether adding lagged values of X can improve the explanation. Y is said to be granger-caused by X if X helps in the prediction of Y, or equivalently if the coefficients of the lagged X's are statistically significant. The Granger test is predicated on the following regression analysis:

$$Y_t = \beta_0 + \sum \beta_i Y_{t-i} + \sum \beta_u X_{t-i} + \mu_t$$

$$X_t = \alpha_0 + \sum \alpha_i X_{t-i} + \sum \alpha_i Y_{t-i} + v_t$$

Where  $Y_t$  and  $X_t$  are variables to be tested and  $\mu$  and  $v_t$  are the idiosyncratic terms that capture all variations in  $Y_t$  and  $X_t$  not in the lagged values.

### Definition of the Variables of the Research

Given the above general function, our specific variables proxies are named as follows:

RGDP	=	Real gross domestic product
BMV	=	broad money velocity or monetization variable
MSD	=	Money stock diversification
EV	=	economic volatility
MC	=	market capitalisation ratio
ML	=	market liquidity

Growth variable is proxied by real GDP. While broad money velocity is given by ratio of broad money supply to GDP ( $M_2/GDP$ ). This is also called the monetization variable or financial depth which is the measure of the size of financial market. The money stock diversification is given by the ratio of demand deposits to the narrow money stock ( $DD/M_1$ ). This ratio is a measure of complexity or sophistication of financial market. An increase in this ratio indicates the higher degree of diversification of financial institutions or a higher use of non currency balances in the transaction process. Economic volatility is given by credit to private sector divided by GDP ( $CPS/GDP$ ). This shows the extent to which financial services are provided to the private sector. It is the part of financial deepening that captures the activities of financial institutions in providing funds to the private sector. Market capitalization ratio which is that part of financial deepening that captures the activities of capital market on the economy. It is given by the value of listed shares divided by GDP. While market liquidity can either be proxied by market turnover ratio which is calculated by the value of total shares traded divided by market capitalisation ( $VST/MKTCAP$ ) or on the other hand, the market value traded ratio which is given by total value of shares traded divided by GDP ( $VST/GDP$ ). In this study we shall use the market value traded ratio as a proxy for market liquidity.

### Empirical Results

In this section, the result of the augmented unit root test of the series, cointegration test among growth variables and financial

deepening variants and the granger causality test are presented in Tables 1, 2 and 3 and are analyzed as follows. The number of lags included in the test is determined by the Schwarz criterion. Table 1 shows that the null hypothesis of unit root is not accepted because the test statistic is more negative than the critical values. In other words, the absolute values of the test statistic of the series are greater than the critical (absolute) values of the series at 5 percent level of significance. Thus, the series is stationary at the first difference and at 5 percent critical level. The co-integration test reveals no co-integration among the growth variables and the variants of financial deepening in Nigeria. This is shown in Table 2 that follows.

Having concluded with the above, we resorted to Granger causality test. The results of the test carried out from lags 1-3, show that with the exception of market capitalization that granger causes real GDP at lags 2 and 3 without feed back effect, causation runs from the growth indicator (RGDP) to economic volatility and market liquidity (at all lags), money market diversification (at lag 2) and broad money velocity (at lag 3). Thus, broad money velocity, money stock diversification, economic volatility and market liquidity could not granger cause real GDP rather real GDP causes them. These results are shown in Tables 3, 4 and 5 as follows.

**Table 1. Financial Deepening and GDP Growth**

Year	BMV	MSD	EV	MC	ML	GDPGR	RGDP
1990	25.7	48.34	13.2	3	0.04	23.24	267550
1991	28	35.48	13.5	4.31	0.046	16.88	265379.1
1992	24.06	73.88	14.2	5.82	0.09	69.36	271365.5
1993	28.84	76.39	13.26	6.9	0.12	28.31	274833.3
1994	29.52	80.76	16.05	7.33	0.11	31.38	275450.6
1995	16.47	80.58	10.59	9.32	0.1	114.03	281407.4
1996	13.69	77.93	9.45	10.57	0.26	39.74	293745.4
1997	15.33	85.62	11.3	10.06	0.37	3.63	302022.5
1998	19.31	78.16	13.62	9.65	0.5	-2.88	310890.1
1999	21.11	67.37	13.65	9.05	0.42	21.77	312183.5
2000	21.91	91.76	12.43	99.84	0.6	42.67	329178.7
2001	24.48	95.76	15.39	12.33	1.07	13.68	356994.3
2002	25.66	85.62	15.06	12.27	0.95	15.96	433203.5
2003	32.74	107.78	19.66	22.42	1.99	-2.74	477533
2004	19.83	93.47	13.21	18.51	1.98	88.25	527576
2005	21.18	106.67	12.49	18.58	1.68	36.8	561931.4
2006	21.69	93.27	13.77	27.58	2.53	18.92	595821.6
2007	28.12	88.29	24.05	64.36	5.21	11.27	634251.1
2008	38.44	92	33.18	39.91	7.04	15.42	672202.6
2009	43.4	81.47	14.3	28.45	2.77	3.66	716949.7

**Table 1: Result of the Unit Root Test of the Series Using ADF**

Series	Max Lag Based on Schwarz criterion	Augmented Dickey-Fuller test statistic			Remark	At % Difference
		Level	1 <sup>st</sup> difference	2 <sup>nd</sup> difference		
RGDP	4	0.891121 (-3.040391) <sup>1</sup>	-3.664528 (-3.040391)	-5.450866 (-3.052169)	Stationary	5% at 1 <sup>st</sup> and 2 <sup>nd</sup> difference
BMV	4	-0.872090 (-3.029970)	-3.770383 (-3.040391)	-6.621910 (-3.052169)	Stationary	5% at 1 <sup>st</sup> and 2 <sup>nd</sup>
MSD	4	-2.635493 (-3.029970)	-6.525637 (-3.040391)	-6.970346 (-3.065585)	Stationary	5% at 1 <sup>st</sup> and 2 <sup>nd</sup>
ML	3	4.077666 (-3.065585)	-6.377551 (3.052169)	-7.366301 (-3.098896)	Stationary	5% at level, 1 <sup>st</sup> and 2 <sup>nd</sup>
MC	4	-3.694569 (-3.029970)	-4.856870 (-3.052169)	-4.413399 (-3.081002)	Stationary	5% at level, 1 <sup>st</sup> and 2 <sup>nd</sup>
EV	4	-3.246211 (-3.040391)	-4.275813 (-3.081002)	-6.584994 (-3.098896)	Stationary	5% at level, 1 <sup>st</sup> and 2 <sup>nd</sup>

1. The figures in parentheses are the ADF test critical values at 5%

**Table 2. Cointegration Test Among Growth Variables and Financial Deepening Variants**

Sample (adjusted): 1991 2009  
 Included observations: 19 after adjustments  
 Trend assumption: Linear deterministic trend  
 Series: RGDP BMV EV MC ML MSD  
 Lags interval (in first differences): No lags  
 Unrestricted Cointegration Rank Test (Trace)

Hypothesized	No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None		0.811178	94.61802	95.75366	0.0597
At most 1		0.676541	62.94597	69.81889	0.1563
At most 2		0.568637	41.50100	47.85613	0.1732
At most 3		0.535610	25.52572	29.79707	0.1435
At most 4		0.403098	10.95215	15.49471	0.2144
At most 5		0.058637	1.148102	3.841466	0.2839

Trace test indicates no cointegration at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

**Table 3. Results of the Granger Causality Test for Lag 1**

Pairwise Granger Causality Tests  
 Sample: 1990 2009  
 Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
BMV does not Granger Cause RGDP	19	0.09993	0.7560
RGDP does not Granger Cause BMV		4.30256	0.0546
EV does not Granger Cause RGDP	19	0.00235	0.9620
RGDP does not Granger Cause EV		4.58262	0.0480
MC does not Granger Cause RGDP	19	0.14233	0.7109
RGDP does not Granger Cause MC		2.63296	0.1242
ML does not Granger Cause RGDP	19	0.21490	0.6492
RGDP does not Granger Cause ML		10.3355	0.0054
MSD does not Granger Cause RGDP	19	4.06876	0.0608
RGDP does not Granger Cause MSD		0.29606	0.5939

**Table 4: Results of the Granger Causality Test for Lag 2**

Pairwise Granger Causality Tests  
Date: 06/18/12 Time: 22:41  
Sample: 1990 2009  
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
BMV does not Granger Cause RGDP	18	0.28741	0.7549
RGDP does not Granger Cause BMV		2.26089	0.1437
EV does not Granger Cause RGDP	18	0.37694	0.6932
RGDP does not Granger Cause EV		4.26692	0.0376
MC does not Granger Cause RGDP	18	15.7897	0.0003
RGDP does not Granger Cause MC		1.55933	0.2472
ML does not Granger Cause RGDP	18	0.29951	0.7462
RGDP does not Granger Cause ML		25.8157	3.E-05
MSD does not Granger Cause RGDP	18	0.65567	0.5354
RGDP does not Granger Cause MSD		5.10131	0.0232

**Table 5: Results of the Granger Causality Test for Lag 3**

Pairwise Granger Causality Tests  
Date: 06/18/12 Time: 22:43  
Sample: 1990 2009  
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
BMV does not Granger Cause RGDP	17	0.18890	0.9016
RGDP does not Granger Cause BMV		9.09408	0.0033
EV does not Granger Cause RGDP	17	0.29385	0.8290
RGDP does not Granger Cause EV		6.45450	0.0105
MC does not Granger Cause RGDP	17	15.6403	0.0004
RGDP does not Granger Cause MC		1.25760	0.3407
ML does not Granger Cause RGDP	17	0.58194	0.6402
RGDP does not Granger Cause ML		30.9387	2.E-05
MSD does not Granger Cause RGDP	17	1.13055	0.3829
RGDP does not Granger Cause MSD		2.60936	0.1094

## DISCUSSION OF FINDINGS

In discussing market capitalization ratio (MKT/GDP) which represents the stock market value of a country, a result that is greater than 100% is usually used to indicate that the market is overvalued while a value around 50% is said to show undervaluation. Though the accurate percentage level has been hotly debated, resting on this assumption, the Nigeria stock market size apart from the year 2000 that registered a ratio of 99.84% and 2007 that has 64.3% fall below 50%. The lowest ratio over these years being 3.0% and the highest ratio is 39.91%, signalling undervaluation of the Nigeria capital market (see table 1 in the appendix). The researchers believe that this measure however has exposed its inaccuracy or inefficiency since the Nigerian capital market following practical experience of the day, cannot be said to be over valued. Our finding shows that this ratio, market capitalization causes growth and therefore can be used as a good predictor of economic growth.

However, all other variants of financial deepening namely broad money velocity, money stock diversification, economic volatility and market liquidity are found not to granger cause growth. The growth indicator (RGDP) on the other hand is found to granger cause all the financial deepening variants except market capitalization ratio as said earlier. Thus, causation generally runs from growth to financial deepening thereby lending credence to demand following hypothesis. Thus, financial deepening in Nigeria follows demand following hypothesis. We did not find enough evidence to conclude otherwise. This finding corroborates the findings of Odiambho (2004), Guryay *et al.* (2007), Arestis and Demetriades (1997), Agu Chukwu (2008) in Nigeria but contradicts the findings of McKinnon (1973), Shaw (1973), Fry (1978), Calderon and Liu (2002), King and Levine (1993), Neusser and Kugler (1998), Levine, Beck and Loayza (2002),

Diaz-Alejandro (1985), and Moore (1986), Hicks (1969), Wadud (2005) and a host of others. When there is increase in the growth of real economy, financial markets develop and progress. In other words the expansion of the real sector of the economy will generate increased new demands for financial services, consequently new financial institutions will emerge to diversify and satisfy the new financial services demand. Invariably, this is why series of financial reforms especially the case of bank reforms have been a failure in Nigeria.

## Policy Implications/ Conclusion

Our empirical evidence revealed that financial deepening follows a demand following hypothesis. Economic stimulus of more sophisticated and efficient financial markets in Nigeria becomes noticeable as the economy grows and matures. The growth of the economy is necessary for financial development and not necessarily otherwise. This is why series of financial reforms in Nigeria keep failing to address the financial system problem and propagate economic growth. In addition to the above implication, the empirical results however suggest policy attention to market capitalization ratio which is also an important stimulus to growth. Government policy should therefore be directed to diversifying the economy through the tapping of potentially endowed natural resources and expansion of agricultural sector as this will engender growth of the economy which will in turn boost the financial deepening. While pursuing growth oriented programmes and long term growth related investment, government policy should also be geared towards a conducive and efficient capital market to encourage the flow of market capitalization which is a rough measure of the true size of the market.

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