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An Empirical Test of the Demand-following Hypothesis (DFH) in Nigeria

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Abstract
The role of financial development in economic growth has been settled in the literature. Still unsettled, however, is the Demand Following Hypothesis (DFH) that economic growth promotes financial development. This study investigates the veracity of this claim by applying the Structural Vector Autoregressive (SVAR) specification, the Bayesian Vector Autoregressive (BVAR) technique, and the Vector Error Correction (VEC) model to Nigerian data from 1986 to 2016. The DFH is invalidated in this study as results show that economic growth does not predict financial development in Nigeria during the period under review. Policy makers in Nigeria should therefore emphasize other variables when promoting financial deepening in the country.

Keywords: Economic Growth, Financial Development, Structural Vector Autoregressive (SVAR), Bayesian VAR (BVAR), Vector Error Correction (VEC) model

1. Introduction

The importance of economic growth in a country cannot be over emphasized. Its links with income, economic development and poverty, among other things, are also well documented in the literature (Nafziger, 2006; Todaro & Smith, 2012). The primary focus of growth economics over the years has been to clearly identify major determinants of economic growth (Durlauf, Johnson, & Temple, 2005). There is however no consensus regarding the variables to be included in the economic growth model (Durlauf et al., 2005).

One contentious issue is whether finance is a major determinant of economic growth. Robinson (1952), for instance, argues that finance does not promote economic growth, but rather, it responds to demands for financial services as the economy grows. Following arguments advanced by Bagehot (1873), Schumpeter (1912), Gurley and Shaw (1955), Goldsmith (1969), and McKinnon (1973), however, a substantial amount of theoretical and empirical literature has shown that the "services provided by the financial system exert a first-order impact on long-run economic growth" (Demirgüç-Kunt & Levine, 2008, p. 2).

Besides these two positions, the stage of development hypothesis (SDH) identifying a bidirectional causality between economic growth and financial development is supported by some extant studies (Levine, 1999; Luintel & Khan, 1999; Calderon & Liu, 2003; Rioja & Valev, 2004; Shan & Jianhong 2006; Apergis, Filippidis, & Economidou, 2007; Bangake & Eggoh, 2011). They show that financial development promotes economic growth in the early stage of economic development while the reverse holds later as the economy grows. The growth in the economy stimulates the establishment of financial institutions which creates financial instruments and related services to meet the demands in the economy.

A great number of studies have provided support for the growth enhancing role of financial development (Demirgüç-Kunt & Levine, 2008) while very little research has been carried out to validate the Demand Following Hypothesis (DFH) that indeed it is economic growth that promotes financial development and not vice versa. To fill this lacuna, this study empirically ascertains the DFH with focus on Nigeria.

This paper is divided into six sections. Relevant literature are reviewed in section two, methods and procedure of analysis are stated in section three, results of data analysis are presented in section four, research findings are discussed in section five while section 6 concludes.

2. Review of Literature

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Patrick (1966) uses three hypotheses to describe the possible causal relationships between finance and economic growth. The supply-leading hypothesis (SLH) posits that finance promotes economic growth while the demand-following hypothesis (DFH) postulates that the reverse holds. On its part, the stage of development hypothesis (SDH), theoretically supported by endogenous growth models, such as Greenwood and Bruce (1997), and Greenwood and Jovanovic (1990), argues in favour of a two-way causal relationship between financial development and economic growth. According to the SDH, finance promotes economic growth in the early stage of economic development. Thereafter, the growth of the economy motivates the establishment of financial institutions which creates financial instruments and related services to meet the demands in the economy. Ascertaining the causal relationship between finance and economic growth is crucial because the three causal relationships have different implications for development policy (Lian, 2006). Calderon and Liu (2003, p. 331) also note that "one could argue that, only in the case of supply-leading, policies should aim to financial sector liberalization; whereas in the case of demand-following, more emphasis should be placed on other growth-enhancing policies".

There are many theories of financial intermediation providing the rationale for the existence of financial intermediaries and of financial systems in the literature (Allen, 1991; Bhattacharya & Thakor, 1993; Van Damme, 1994; Allen & Santomero, 1996; Freixas & Rochet, 1997; Levine, 1997; Allen & Gale, 2000; Gorton & Winton, 2002; Scholtens & Van Wensveen, 2003; Levine, 2005; Ang, 2008; Demirgüç-Kunt & Levine, 2008; Pietrovito, 2009). Theoretically, finance promotes economic growth when a developed financial system (or financial development) performs five main functions. These are: mobilizing savings; allocating resources; facilitating the trading, hedging, diversifying, and pooling of risk; monitoring of managers and exerting corporate control; and facilitating the exchange of goods and services in the country (Levine, 2005). In performing these functions, an efficient financial system helps to ameliorate market frictions, such as transaction, enforcements, and information costs. By easing market frictions, the financial system enhances capital accumulation and technological innovation, and these in turn promote economic growth (Levine, 2005; Pietrovito, 2009).

Thus, financial development influences economic growth through capital accumulation and technological innovation (Greenwood & Jovanovic, 1990; Bencivenga & Smith, 1991). The capital accumulation channel involves the allocation of funds by the financial system to the most productive sectors in the economy to finance productive ventures (Greenwood & Jovanovic, 1990). Finance, therefore, promotes economic growth through the growth-enhancing role that financial resources provided by financial institutions play in non-financial firms operating in an economy.

Although the growth enhancing roles of the financial systems have been established in the literature, finance has been shown to have a negative impact on growth. Kindleberger (1978) identifies the instability of expectation and asset speculation concerning overleveraged situations as sources of the negative impact. Similarly, Minsky (1991) "financial instability hypothesis" postulates that an economy moves from a robust financial structure to a fragile financial structure as a result of the adoption of riskier behaviour and speculative economic activities during economic booms. Some theories (Rajan, 1994; Wynne, 2002; Aghion, Bacchetta, & Banerjee, 2004; Dell'Ariccia & Marquez, 2004; Schneider & Tornell, 2004;) have also emerged to stress the short run negative effect of financial liberalization, a policy embarked upon by many countries to enhance the effectiveness of their financial systems.

These studies show that a rapid expansion of credit by banks in the aftermath of financial liberalization without proper credit appraisal (Dell'Ariccia & Marquez, 2004) and effective banking supervision (Rajan, 1994) leads to banking crises, financial instability and eventually, output losses. Wynne (2002) also presents a model showing that information asymmetry between potential borrowers and banks leads to high interest rates, risky banks' loan portfolios, and credit misallocation. Poor asset quality in turn results in banking crises and low growth.

On the other hand, economic growth is said to drive financial development. The declaration by Robinson (1952, p. 86) that "where enterprise leads, finance follows" provides the impetus for the DFH. She argues that finance does not promote economic growth, but rather, the former responds to demands for financial services as the economy grows. The role of income in financial development has been highlighted in the

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literature (Levine, 1997, 2005). Greenwood and Jovanovic (1990) and Saint-Paul (1992) show that competition among financial institutions leads to reduction in the costs of financial intermediation, inducing availability and accessible of funds for productive investment. Al-Awad and Harb (2005) use autoregressive techniques to show that real economic growth predicts financial development in the Middle East in the short run. Hurlin and Venet (2008) study of 63 industrial and developing countries over the 1960-1995 and 1960-2000 periods provides evidence that economic growth predicts financial development. Some studies have also validated the DFH in the insurance industry (Beck & Webb, 2003; Guochen & Wei, 2012; Pradhan et al., 2015a, 2015b; Alhassan & Biekpe, 2016).

A feedback mechanism between growth and financial development are also found in the literature (Luintel & Khan, 1999; Calderon & Liu, 2003; Rioja & Valev, 2004; Shan & Jianhong, 2006; Apergis, Filippidis, & Economidou, 2007; Bangake & Eggoh, 2011) while Chang et al. (2014), and Alhassan and Biekpe (2016) find evidence of a bi-directional causation between economic growth and the insurance industry.

3. Methods

3.1. Research Design

This study employs ex post facto research design to ascertain the effect of economic growth on financial development in Nigeria. The following sections describe the sampling, statistical, and operational designs employed in this study.

3.2. Data and Data Collection Method

Data used in this study were obtained from the Central Bank of Nigeria's Statistical Bulletin (2016) and the World Bank's World Development Indicators (2016). The data on economic growth were extracted from the latter while data from 1986 to 2016 on Financial Development, Trade Openness, Financial Openness, Inflation rate, and Exchange rate were obtained from the Statistical Bulletin.

3.3. Model Specification.

The functional relationship between economic growth and financial development is gives as:

$FINDEV_t = f$ (GDPg, INF, EXR, TOPEN, FINOPEN, SRAT) (3)

Following from equation 3 above, the model of relationship is specified as follows:

$$FINDEV_t = \alpha_t + \beta_1 TOPEN_t + \beta_2 REMMY_t + \beta_3 GDPg_t + \beta_4 INF_t + \beta_5 EXR_t + \beta_6 FINOPEN_t + \beta_7 SRAT_t + \mu_{it} \quad (4)$$

Where:

$FINDEV_t$ = Financial Development.

$GDPg_t$ = Gross Domestic Product.

INF = Inflation rate, measured as the percentage change in Consumer Price Index (CPI)

EXR_t = Exchange rate (₦/ $)

$TOPEN_t$ = Trade Openness, measured as the ratio of trade to GDP

$FINOPEN_t$ = Financial openness, measured by the ratio of foreign assets and liabilities to GDP.

SRATt = Savings Rate, measured as the weighted average of deposit rates over 12 months

α_0 and β_i, i = 1,…, 7 are parameters estimated.

μ_{it} = the error term

We expect "a priori", β_1, β_2, β_3, β_6 and $\beta_7 > 0$ while β_4, and $\beta_5 < 0$.

The variables are in logarithmic form.

3.4. Analytical Variables

Indicators of trade and Financial Development: In this study, the ratio of credit to private sector to GDP is employed as the indicator of financial development (FINDEV). The rationale behind this is that financial systems that funnel more loanable funds to the private sector are more involved in performing the five functions of the financial system than financial systems that simply channel credit to the public sector. As noted by Rajan and Zingales (2003 p. 9), the indicator measures "the ease with which any entrepreneur or company with a sound project can obtain finance". Besides, economic growth, the dependent variable, is measured as the growth rate of the GDP.

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Control Variables: Some macroeconomic variables that have been shown to be predictors of financial development by extant literature are used as control variables in this study. These include: inflation rate (INF), exchange rate (EXR), Trade Openness (TOPEN), Financial Openness (FINOPEN), and Savings Rate (SRAT). For example, Zoli (2007) and Bittencourt (2008) show that inflation influences financial development; Dehesa, Druck, and Plekhanov (2007) demonstrate that higher real exchange rate volatility leads to lower ratios of credit-to-GDP; Baltagi and Demetriades (2009) reveal the significance of financial openness to financial development; Do and Levchenko (2004) show that openness to trade promotes financial development; while World Bank (1989) confirms that a positive nexus exists between savings rate and financial development.

3.5. Model Estimation Techniques

In this study, time series econometric techniques are employed to determine the relationship between economic growth and financial development nexus in Nigeria. Specifically, the Structural Vector Autoregressive (SVAR) specification, the Bayesian Vector Autoregressive (BVAR) technique, and the Vector Error Correction (VEC) model are applied to Nigerian data between 1986 and 2016. Although Vector Autoregressive (VAR) models are commonly used in extant studies, they often suffer from over-parameterization where insufficient observations are used to estimate the parameters of the model. To achieve shrinkage, the Bayesian VAR (BVAR) techniques (Doan, Litterman, & Sims, 1984; Litterman, 1986; Sims & Zha, 1998) use the Bayesian priors to impose parameter restrictions. In BVAR the parameters are viewed as random variables with prior probabilities. In this study, the Litterman/Minnesota Prior, commonly employed because it provides a very simple way of handling the variance covariance matrix of the VAR coefficients and mirrors the characteristic trending behavior of macroeconomic time series, is used. Further identifying restrictions are imposed by the SVAR which estimates structural matrices to transform VAR errors into uncorrelated structural shocks (Amisano & Giannini, 1997; Rubio-Ramirez & Zha, 2010; Martin, Hurn & Harris, 2013). Moreover, we use the VEC model, a restricted VAR which has specifications containing cointegration relations that permits short-run adjustment dynamics to correct deviations from long-run equilibrium.

4. Results

4.1. Descriptive Analysis

Table 1. Descriptive Statistics

	FINDEV	GDPg	EXR	INF	TOPEN	FINOPEN	SRAT
Mean	13.53226	4.509776	88.82697	20.33097	33.60774	8.893226	9.009677
Median	11.3	4.411065	111.9433	12.1	35.4	8.71	7.93
Maximum	36.9	33.73578	253.4923	76.8	58.92	19.91	23.25
Minimum	5.9	-10.7517	2.0206	0.2	7.36	1.26	3.34
Std. Dev.	6.996208	7.240175	70.29011	19.60401	11.08754	5.567549	4.090525
Skewness	1.509562	1.724053	0.209984	1.583958	-0.17562	0.533996	1.466601
Kurtosis	5.404656	10.33521	1.996447	4.246612	3.044418	2.298301	6.035987
Jarque-Bera	19.24257	84.85567	1.528678	14.97007	0.161905	2.109275	23.01865
Probability	0.000066	0.000000	0.465642	0.000561	0.922237	0.348319	0.00001
Sum	419.5	139.8031	2753.636	630.26	1041.84	275.69	279.3
Sum Sq. Dev.	1468.408	1572.604	148221	11529.52	3688.004	929.9281	501.9719
Observations	31	31	31	31	31	31	31

In table 1, the descriptive statistics of the variables in this study between 1986 and 2016 is presented while the graphs of the VAR residuals are shown in Fig 1 as the graphical representations of the series employed in this study. Varying degrees of fluctuations are exhibited by the series, with economic growth (GDPg), the least volatile but with a clear outlier in 2004 when the highest growth rate of 33.76 was recorded. The Nigerian economy grew by 4.51 percent on the average during the same period but declined by 10.75

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percent in 1987, a year after the Structural Adjustment Programme (SAP) was introduced in 1986. During the same period, financial development (FINDEV) averaged 13.53 percent with the minimum recorded value of 5.9 percent and an outlier of 36.9 percent in 2009.

Fig 1: Graphical representation of time series data

4.2. Econometric Analysis

Table 2: Unit Root Tests

Variables	ADF Statistics	Probability	First Diff ADF Statistics	Probability	Order of Integration
FINDEV	-1.723006	0.4099	-5.431229	0.0001	I(1)
GDPg	-1.344679	0.5943	-9.165151	0.0000	I(1)
INF	-1.027260	0.7280	-4.667390	0.0010	I(1)
EXR	-0.888926	0.9939	-3.480327	0.0160	I(1)
TOPEN	-3.004535	0.1476	-7.273306	0.0000	I(1)
FINOPEN	-1.819711	0.3642	-4.802079	0.0006	I(1)
SRAT	-2.034146	0.2715	-5.861375	0.0000	I(1)

In order to avoid spurious regression (Granger & Newbold, 1974; Engel & Granger, 1987) unit root tests are performed on the univariate time series to ascertain the stationarity or otherwise of the series. The null hypothesis of a unit root is rejected against the one-sided alternative if the t-statistic is more than the critical value in absolute terms. The results from the Augmented Dickey-Fuller (ADF) test (Dickey & Fuller 1979) are presented in table 2. For all the variables, the ADF tests fail to reject the null hypothesis of a unit root at 5 percent significance level. In other words, the tests indicate that the variables are nonstationary at the level. Further differencing, however, shows that the variables are stationary at their first differences and are thus integrated of order 1, i.e., I (1).

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Table 3: VAR Lag Order Selection Criteria

To ascertain the appropriate lag for estimation of parameters of economic relationship between economic growth and financial development, the Akaike information criterion (AIC), Schwarz information criterion (SC) and the Hannan-Quinn information criterion (HQ) commonly employed for the purpose are used. Table 3 indicates that one year lag as appropriate for this study.

VAR Lag Order Selection Criteria
Endogenous variables: FINDEV1 GDPG INF EXR TOPEN FINOPEN SRAT
Exogenous variables: C
Sample: 1986 2016
Included observations: 29

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1558.261	NA	1.80e+38	107.9490	108.2790	108.0524
1	-1468.351	130.2134*	1.18e+37*	105.1277*	107.7680*	105.9546*
2	-1420.225	46.46705	2.46e+37	105.1879	110.1385	106.7384

* 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

Table 4: Cointegration Tests

Hypothe-sized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**	Hypothe-sized No. of CE(s)	Max-Eigen Statistic ((λmax)	0.05 Critical Value	Prob.**
None *	0.898364	162.5782	125.6154	0.0000	None *	66.30437	46.23142	0.0001
At most 1 *	0.690314	96.27379	95.75366	0.0460	At most 1	33.99371	40.07757	0.2064
At most 2	0.542648	62.28008	69.81889	0.1721	At most 2	22.68674	33.87687	0.5545
At most 3	0.460528	39.59335	47.85613	0.2374	At most 3	17.89778	27.58434	0.5037
At most 4	0.381238	21.69556	29.79707	0.3157	At most 4	13.92102	21.13162	0.3715
At most 5	0.213522	7.774544	15.49471	0.4898	At most 5	6.965540	14.26460	0.4932
At most 6	0.027511	0.809004	3.841466	0.3684	At most 6	0.809004	3.841466	0.3684

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

After establishing that the series are I(1), the Johansen (1992 and 1995) framework is used to carry out the cointegration tests. The results of the Trace test indicates 2 cointegrating equations at the 0.05 level while Max-eigenvalue test shows 1 cointegrating equation at the same level of significance (table 4). This means that there are dynamic long-run causal relationships involving indicators of economic growth (GDPg) and financial development (FINDEV) as well as the control variables: inflation (INF), exchange rate (EXR), trade openness (TOPEN), financial openness (FINOPEN), and the savings ratio (SRAT) in Nigeria during the period under consideration.

Bayesian VAR Estimation

Table 5 Bayesian VAR Estimates

Dependent Variable: FINDEV

Independent Variables	Coefficient	Std. Error	t-Statistic
D(FINDEV(-1))	0.123381	0.07788	1.58425
D(GDPg(-1))	-1.66E-15	3.5E-15	-0.47470

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D(INF(-1))	0.002342	0.01870	0.12522
D(EXR(-1))	0.027068	0.01136	2.38322
D(TOPEN(-1))	0.033954	0.03348	1.01405
D(FINOPEN(-1))	0.139737	0.09204	1.51826
D(SRAT(-1))	0.199111	0.12625	1.57711
C	5.514632	1.99110	2.76964
R-squared	0.575040	S.E. equation	5.316468
Adj. R-squared	0.439825	Mean dependent	13.60667
F-statistic	4.252797	S.D. dependent	7.103323
Sum sq. resids	621.8264		

Source: Author's computation 2018

Note: (1) *** denotes significance at 1 %; ** denotes significance at 5 %; * denotes significance at 10 %.
(2) Prior type: Litterman/Minnesota
(3) Initial residual covariance: Full VAR
(4) Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1

Results of the Bayesian VAR estimates of the economic growth and financial development nexus are presented in table 5. The results indicate that the coefficient of GDPg is wrongly signed and is not significant at 5 percent level. This implies that economic growth is not a predictor of financial development in Nigeria during the period under consideration. The negative sign could be attributed to the recession experienced in the country in 2016 and the negative growth of GDP over the years. With respect to the control variables, only the coefficient of exchange rate (EXR) is shown to be significant and it enters with positive sign, implying that the financial system is deepened by the exchange rate movements in Nigeria during the period under review. Moreover, in table 5 the R-squared is 0.575040, implying that about 58 percent of variations in financial development is to be attributable to changes in the independent variables.

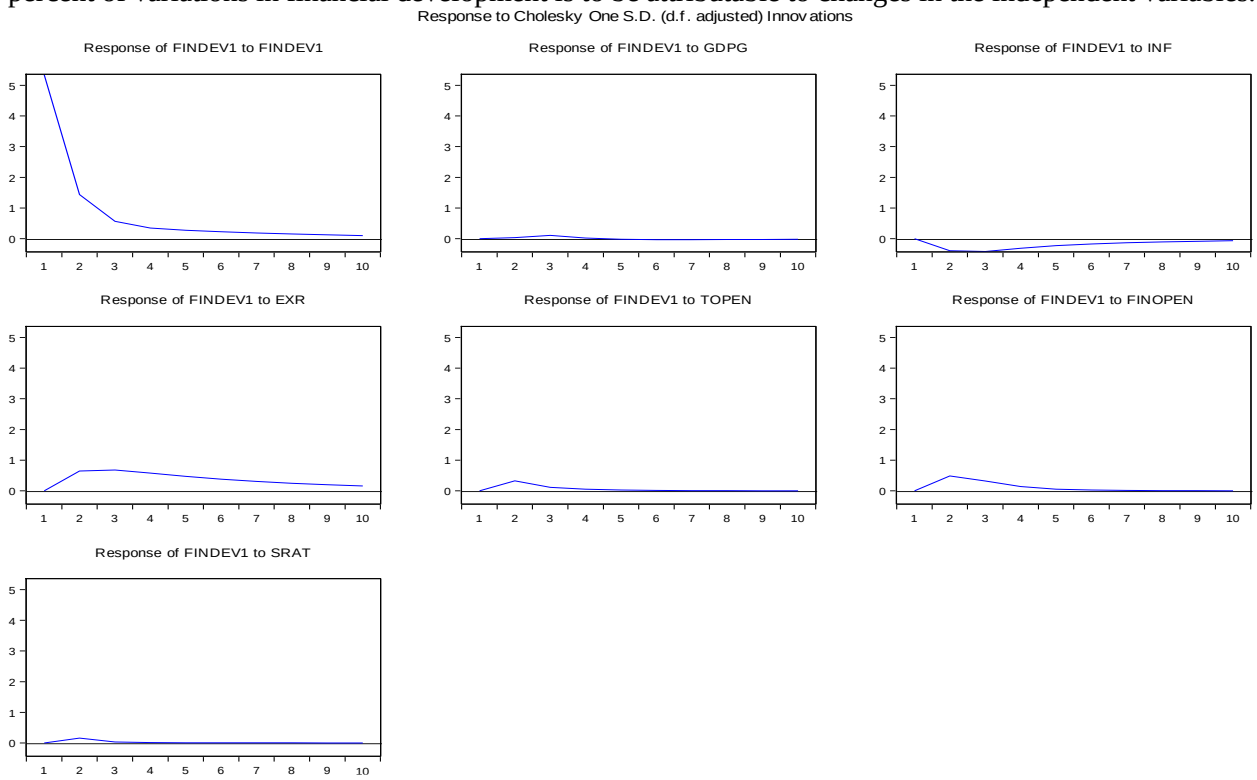

Fig 2: Impulse Response Function Graph

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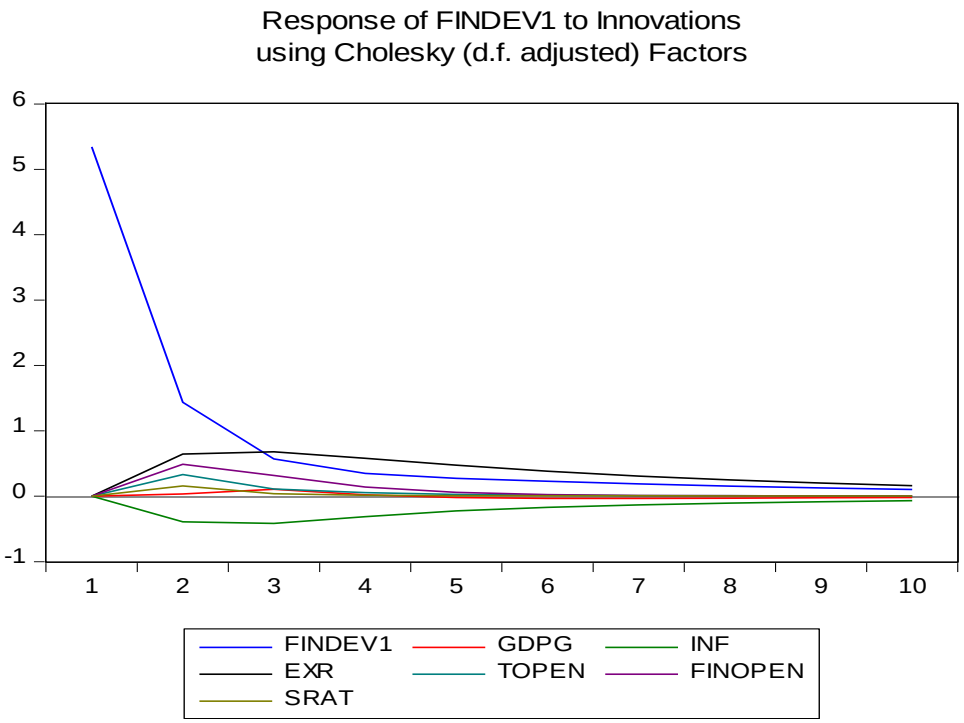

Figure 3: Combined Impulse Response Function Graph

Table 6: Impulse Response Function

Period	FINDEV1	GDPG	INF	EXR	TOPEN	FINOPEN	SRAT
1	5.342213	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	1.437874	0.035090	-0.389753	0.646955	0.330807	0.489725	0.159583
3	0.570195	0.106312	-0.414291	0.681093	0.111685	0.318977	0.037742
4	0.348123	0.022327	-0.311460	0.581102	0.056116	0.142325	0.014735
5	0.274867	-0.019928	-0.225202	0.474314	0.028102	0.058149	0.009475
6	0.229003	-0.032603	-0.168919	0.383153	0.015106	0.024966	0.007841
7	0.189607	-0.032357	-0.131470	0.308980	0.009235	0.012728	0.006668
8	0.155156	-0.028089	-0.104522	0.249219	0.006424	0.008009	0.005562
9	0.126027	-0.023259	-0.083904	0.201097	0.004859	0.005837	0.004562
10	0.101995	-0.018933	-0.067609	0.162309	0.003829	0.004556	0.003708

Cholesky Ordering: FINDEV1 GDPG INF EXR TOPEN FINOPEN SRAT

Impulse Response Function (IRF)

Figure 2 and 3 above show the individual and combined impulse response function (IRF) graphs respectively. In the former, responses of FINDEV to shocks from individual determinants are shown while the combined graph reveals the responses of FINDEV to all the shocks from these independent variables. Similarly, table 6 mirrors the graphs as it shows the responses of FINDEV to innovations, using the Cholesky ordering. A major advantage of using the Bayesian VAR is that impulse response functions are more accurate. In the IRFs depicted in graphs 2 and 3 as well as in table 6, the response of FINDEV to economic growth (GDPg) is very weak and negative for most periods. This result is similar to those earlier presented with the BVAR estimates. With respect to responses of FINDEV to shocks from the control variables, the IRF reveals a robust response to innovation from exchange rate (EXR) although this

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diminishes over time while responses to innovations from others are generally weak. The implication is that exchange rate is major predictor of financial development in Nigeria.

Structural Vector Autoregressive (SVAR)

Table 7 Structural Vector Autoregressive (SVAR) Estimates

Dependent Variable: FINDEV

Independent Variables	Coefficient	Std. Error	t-Statistic
D(FINDEV(-1))	1.000000		
D(GDP(-1))	-1.01E-14	9.2E-15	-1.10028
D(INF(-1))	-0.008318	0.04341	-0.19161
D(EXR(-1))	-0.002856	0.01604	-0.17809
D(TOPEN(-1))	-0.049059	0.07848	-0.62510
D(FINOPEN(-1))	0.452652	0.19202	2.35734
D(SRAT(-1))	-0.495272	0.22789	-2.17327
C	2.942554	3.63722	0.80901
R-squared	0.702744	Mean dependent	13.60667
Sum sq. resids	434.9630	S.D. dependent	7.103323

Source: Author's computation 2018

Iterated GLS convergence achieved after 81 iterations

In SVAR, the structural matrices are estimated to transform VAR errors into uncorrelated structural shocks. Results of the SVAR estimation show that GDPg is wrongly signed and does not drive financial development at 5 percent level of significance. Similarly, none of the control variables exerts significant influence over financial development, although coefficients of exchange rate, inflation and trade openness enter with the right sign. Besides, table 7 shows that R-squared is 0.702744, meaning that about 70 percent of variations in financial development can be attributed to changes in the independent variables.

Vector Error Correction Model (VECM)

The vector error correction estimates are presented in table 8 while the Least Squares (Gauss-Newton / Marquardt steps) is subsequently employed to obtain the P-values are shown in table 9. From table 8, the equilibrium structure of the parsimonious error correction model is validated by the significance of the error correction term (ECM -1). The error correction term shows significant correction of about 150 percent from short run disequilibrium to long run equilibrium.

Table 8: Vector Error Correction Estimates

Dependent Variable: FINDEV

Independent Variables	Coefficient	Std. Error	t-Statistic
CointEq1	-1.502875	0.69035	-2.17698
D(FINDEV(-1))	1.515450	0.62567	2.42213
D(GDP(-1))	-7.57E-15	7.6E-15	-0.99948
D(INF(-1))	0.059929	0.05013	1.19553
D(EXR(-1))	-0.136449	0.05398	-2.52781
D(TOPEN(-1))	-0.090962	0.10193	-0.89236
D(FINOPEN(-1))	0.593301	0.30072	1.97292
D(SRAT(-1))	-2.346958	0.97798	-2.39980
C	0.919126	0.86311	1.06490
R-squared	0.445472	S.E. equation	4.201365
Adj. R-squared	0.223661	Mean dependent	0.341379
F-statistic	2.008339	S.D. dependent	4.768312

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Sum sq. resids	353.0293	Akaike AIC	5.957822
		Schwarz SC	6.382155

Source: Author's computation 2018

Table 8 also shows that the coefficient of GDPg is negative and insignificant at 5 percent level of significance. This means that economic growth does not drive financial development in Nigeria. The insignificance of GDPg in the VECM is confirmed by the p value of GDPg in the least squares (Gauss-Newton / Marquardt steps) presented in table 9.

On the other hand, results of the ECM estimator in table 8 and the least squares (Gauss-Newton / Marquardt steps) in table 9 indicate that FINDEVt-1, EXT, FINOPEN and SRAT are predictors of FINDEV at 5 percent level of significance. This implies that previous level of financial development, exchange rate, financial openness and savings ratio are drivers of financial development in Nigeria during the period under review.

Furthermore, the F. statistics and the p-value of the F. statistics presented in table 9 show that all the incorporated variables have simultaneous and significant effects on financial development in Nigeria. Besides, the R-squared of 0.445472 indicates that about 45 percent of variations in financial development can be attributed to changes in the independent variables.

Table 9: Least Squares (Gauss-Newton / Marquardt steps) Estimates
Dependent Variable: FINDEV

	Coefficient	Std. Error	t-Statistic	Prob.
CointEq1	-1.780513	0.662139	-2.689033	0.0141
D(FINDEV(-1))	1.635413	0.586848	2.786774	0.0114
D(GDP(-1))	-0.063746	0.094301	-0.675982	0.5068
D(INF(-1))	0.070464	0.048034	1.466964	0.1579
D(EXR(-1))	-0.142940	0.051645	-2.767745	0.0119
D(TOPEN(-1))	-0.100812	0.096230	-1.047617	0.3073
D(FINOPEN(-1))	0.594363	0.279115	2.129458	0.0458
D(SRAT(-1))	-2.487184	0.908138	-2.738773	0.0127
C	0.967204	0.823629	1.174319	0.2541

R-squared	0.495574	Mean dependent var	0.341379
Adjusted R-squared	0.293804	S.D. dependent var	4.768312
S.E. of regression	4.007073	Akaike info criterion	5.863125
Sum squared resid	321.1326	Schwarz criterion	6.287458
Log likelihood	-76.01531	Hannan-Quinn criter.	5.996021
F-statistic	2.456133	Durbin-Watson stat	1.905157
Prob(F-statistic)	0.049316		

Source: Author's computation 2018

Diagnostic Tests for the Model

In tables 10 to 13, we present results of relevant diagnostic tests for the model. The results in general are satisfactory. The VEC Residual Serial Correlation LM Tests (table 10) and the VEC Residual Portmanteau Tests for Autocorrelations (table 11) show that there is no serial correlation in the series, while both the Jarque Bera test and the VEC Residual Normality Tests, with the Cholesky (Lutkepohl) orthogonalization ((table 12), indicate that residuals are multivariate normal. Finally, the absence of heteroskedasticity in the autoregressive model is confirmed by the VEC Residual Heteroskedasticity Tests (Levels and Squares) in table 13.

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Table 10: VEC Residual Serial Correlation LM Tests

VEC Residual Serial Correlation LM Tests
Sample: 1986 2016
Included observations: 29

Null hypothesis: No serial correlation at lag h

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	43.42909	49	0. 6976	0. 801232	(49, 40.0)	0.7713

*Edgeworth expansion corrected likelihood ratio statistic.

Table 11: VEC Residual Portmanteau Tests for Autocorrelations

Null Hypothesis: No residual autocorrelations up to lag h
Sample: 1986 2017
Included observations: 29

Lags	Q-Stat	Prob.*	Adj Q-Stat	Prob.*	df
1	30.58493	---	31.67725	---	---
2	79.57921	0.7981	84.30073	0.6771	91
3	110.2499	0.9701	118.5103	0.9059	140
4	162.7901	0.9164	179.4570	0.6790	189

*Test is valid only for lags larger than the VAR lag order
df is degrees of freedom for (approximate) chi-square distribution after adjustment for VEC estimation (Bruggemann, et al. 2005)

Table 12: VEC Residual Normality Tests

Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: Residuals are multivariate normal
Sample: 1986 2017
Included observations: 29

Component	Skewness	Chi-sq	df	Prob.*
1	-0.366734	0.650052	1	0.4201
2	0.294403	0.418920	1	0.5175
3	1.326792	8.508490	1	0.0035
4	-0.084941	0.034872	1	0.8519
5	-0.006283	0.000191	1	0.9890
6	0.164600	0.130950	1	0.7174
7	0.387099	0.724252	1	0.3948
Joint		10.46773	7	0.1636

Component	Kurtosis	Chi-sq	df	Prob.
1	4.067818	1.377785	1	0.2405
2	2.446670	0.369961	1	0.5430
3	5.124695	5.454813	1	0.0195

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4	3.329355	0.131074	1	0.7173
5	2.983831	0.000316	1	0.9858
6	2.840565	0.030715	1	0.8609
7	2.787688	0.054467	1	0.8155
Joint		7.419130	7	0.3866

Component	Jarque-Bera	df	Prob.
1	2.027836	2	0.3628
2	0.788881	2	0.6741
3	13.96330	2	0.0009
4	0.165946	2	0.9204
5	0.000507	2	0.9997
6	0.161666	2	0.9223
7	0.778719	2	0.6775
Joint	17.88686	14	0.2120

*Approximate p-values do not account for coefficient estimation

Table 13: VEC Residual Heteroskedasticity Tests (Levels and Squares)
Sample: 1986 2017
Included observations: 29

Joint test:		
Chi-sq	df	Prob.
464.0000	448	0.2910

5. Discussion.

In this study, we apply the BVAR, SVAR and the VECM techniques to investigate the effect of economic growth on financial development between 1986 and 2016. Results from VAR estimations indicate that there is no significant nexus between the two variables. The Demand Following Hypothesis (DFH) that economic growth promotes financial development is thus rejected in this study. Indeed, the coefficient of economic growth is insignificant and wrongly signed in all the three autoregressive estimators. This is similar to the findings from the impulse response function (IRF), in which the response of FINDEV to shock from economic growth (GDPg) is very weak and negative for most periods.

Results of this study do not substantiate the declaration by Robinson (1952, p. 86) that "where enterprise leads, finance follows" or provide empirical support for similar studies by Al-Awad and Harb (2005) in the Middle East, and Hurlin and Venet (2008) in 63 industrial and developing countries over the 1960-1995 and 1960-2000 periods. Our results are also not in agreement with studies that validate the DFH in the insurance industry (Beck & Webb, 2003; Guochen & Wei, 2012; Pradhan et al., 2015a, 2015b; Alhassan & Biekpe, 2016). This study can also be viewed as a test of the nexus between economic growth and banking sector development in Nigeria since the indicator of our financial development, FINDEV, also measures the size of the banking sector or banking sector development. This implies that economic growth does not drive banking sector development in Nigeria during the period under review.

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6. Conclusions and Recommendations

This study provides empirical tests of the Demand Following Hypothesis (DFH) which postulates that economic growth is a predictor of financial development. The Structural Vector Autoregressive (SVAR) specification, the Bayesian Vector Autoregressive (BVAR) technique, and the Vector Error Correction (VEC) model are applied to Nigerian data from 1986 to 2016 to test the veracity of this claim. This study shows that economic growth is not a predictor of financial development in Nigeria during the period under review and thus fails to provide empirical support for the DFH in the country. This implies that the Nigerian financial system is independent of the growth of the Nigerian economy. Policy makers in Nigeria should therefore look beyond economic growth in an attempt to deepening the nation's financial system.

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