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Oil Resource Dependence, Financial Sector Development and Sectoral Performance in Nigeria

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Abstract. This study examined the impact of oil resource dependence on the relationship between financial sector development and economic growth in Nigeria and explores whether the effect differ among key sectors of the economy. Time series econometrics analysis anchored on an aggregate production function theoretical framework of the augmented Solow's model is employed for the period 1981-2016. The study used a more robust measure of oil dependency. The effect of financial development when account is taken of oil dependence is negative in both manufacturing and agriculture sector but positive in the service sector and in the aggregate economy. This supports the hypothesis that oil resource dependency influences the finance-growth nexus in Nigeria with varied impact on the key sectors.

Keywords: Dutch Disease, financial sector, sectoral performance

1. Introduction

The quest to industrialize pulses with the desire to achieve sustained economic growth in Nigeria since independence. Industrialization as a key driver of economic growth is expected to instigate structural change in the economy. It does this by shifting resource from low productivity to high productivity uses. To facilitate this shift, both in theory and history, the development of a well-functioning and efficient financial sector could be crucial (Bittencourt, 2012; Barajas,Chami and Yousefi, 2013; Swamy, V. and Dharani, M. 2019 among others).However, the way the financial development growth facilitating or structural change stimulating impact play out in a natural dependent economy plays out appears little understood.

A well-functioning financial system could help transform the massive rent derivable from a resource endowed country into financial assets that can be deployed towards the development of other sectors within the economy. Contrarily, the abundant natural resources can have negative impact on the financial sector and other key sectors like agriculture, manufacturing and services resulting in poor growth performance. This is advocated in the Dutch disease hypothesis (Bedeeb and Lean, 2017). Nigeria economy is manifestly highly dependent oil resources. This is shown in total export that is more than 90% from oil over the last two decades. The same can be said of central government revenue of more the 70% coming from oil sector.

The question that arise from the foregoing are:

- How do the finance-growth nexus play out in the context of an oil dependent economy like Nigeria?
- Do the effects defer on the performance of agriculture, manufacturing, and service sector respectively?

This paper examines the impact of oil resource dependence on the relationship between financial sector development and economic growth in Nigeria. In addition it explores whether the impact differ in three key sectors of agriculture, manufacturing and services. Following the introduction is section II contains literature review while section III comprises methodology. Section IV dwells on presentation and

analysis of results while section V concludes the paper.

2. Literature Review

Nili and Rastad (2007) posit that oil revenue hampers investment that supposed to be ingredient for economic growth because of its negative effect on the financial system. Moradbeigi and Law found that better financial development overwrites the negative impact of oil abundance on economic growth. Beck (2011) argues that dependence on natural resources could lead to low level of financial development. Van der Ploeg and Poelhekke (2009) argues that oil resource dependence economies usually suffers from macroeconomic which is likely to dampen growth and lead to underdevelopment of the financial sector. Kurronen (2015) in study of 128 countries suggests three alternative hypotheses- demand, interest group and volatility, for the low level of financial sector development in resource dependent economies. The study conclude that there is the possibility that financial sector development based on large resource endowments might constitute the resource curse. Frankel (2010) in the survey of natural resource curse posit that the possession of oil, natural gas, or other valuable mineral deposits or natural resources does not necessarily confer economic success. Sachs and Warner (1995, 2001) found that economic dependence on natural resource is correlated with slow economic growth, and t that countries with great natural resource wealth grow more slowly than resource-poor countries. Other studies {Ross (2001); Sala-i-Martin and Subramanian (2003); and Smith (2004) also find that oil have negative effect of oil on economic performance. Badeeb and Lean (2017) posits that the possession of natural resources is not synonymous to economic success because many countries that are in oil and other natural resources are experiencing low per capita income and low quality of life. They found in their study on Natural Resources and Productivity that natural resource dependence negatively related to productivity which in turn depends on the level of banking development. The Algeria experience also supports the fact that oil has not contribute significantly to enhance economic growth (Elhannani, Boussalem and Benbouziane, 2016). Meanwhile, the study on Angola using Granger causality shows that the oil sector has been the great engine of Angolan economic growth (Quixina and Almeida, 2014)

3. Methodology and Data

The Model

The model used for the empirical analysis of the effects of oil dependence (ODI) and financial sector development (FD) on economic growth follows Fosu and Magnus (2006). We adopt the aggregate production function model as they did with some modifications. The model is specified thus:

$$Y_t = A_t K_t^{\beta} L_t^{\phi} \quad (1)$$

Where Y_t represent the aggregate output of the economy or sectors at time t, and A_t, K_t , L_t are total factor productivity (TFP), the capital stock, and stock of labour respectively.

In per capita we have:

$$\frac{Y_t}{L} = \frac{A_t}{L} * \frac{K_t^{\beta}}{L} * \frac{L_t^{\phi}}{L} \quad (2)$$

Then equation (1) becomes:

$$y_t = \alpha_t * k_t \quad (3)$$

Where y_t is output per capita in year t, α_t is TFP per capita in year t and k is capital stock per capita in t

It is posited as per Fosu and Magnus (2006) that the effect of ODI and FD on output in the economy will operate through TFP. We assume therefore that TFP is a function of ODI,FD and other exogenous factors (C_t) . Thus :

$$\alpha_t = f(ODI, FD, C) = ODI_t^{\phi} * FD_t^{\delta} * C_t \quad (4)$$

Combining equation (3) with (4) gives

$$y_t = c * k_t^{\beta} * ODI_t^{\phi} * FD_t^{\delta} \quad (5)$$

Where β, φ, δ, are constant elasticity coefficients of output with respect to k, ODI and FD after the usual logarithmic transformation.

From equation (5) the basic estimable equation after taking log of both sides becomes:

Log y_t=ct + β$\log k_t$ + φlog ODI_t +δlog FD_t + U_t (6)

C is constant parameter and U_t is the error term. All other variables are as defined.

From equation 6 the following are then derived :

$\text{LogGDP}_t = C + \beta \text{logPGFC}_t + \phi \text{logODI}_t + \delta \text{log FD1}_t + U_t$ (7)

$\text{LogGDP}_t = C + \beta \text{logPGFC}_t + \phi \text{logODI}_t + \delta \text{log FD2}_t + U_t$ (8)

$\text{LogGDP}_t = C + \beta \text{logPGFC}_t + \phi \text{logODI}_t * \text{FD1}_t + U_t$ (9)

$\text{LogGDP}_t = C + \beta \text{logPGFC}_t + \phi \text{logODI}_t * \text{FD2}_t + U_t$ (10)

$\text{LogPMVA}_t = C + \beta \text{logPGFC}_t + \phi \text{logODI}_t + \delta \text{log FD1}_t + U_t$ (11)

$LogPMVA_t = C + \beta logPGFC_t + \phi logODI_t + \delta log\ FD2_t + U_t$ (12)

$LogPMVA_t = C + \beta logPGFC_t + \phi logODI_t{*}FD1_t + U_t$ (13)

$LogPMVA_t = C + \beta logPGFC_t + \phi logODI_t{*}\ FD2_t + U_t$ (14)

$LogPAGVA_t = C + \beta logPGFC_t + \phi logODI_t + \delta log\ FD1_t + U_t$ (15)

$LogPAGVA_t = C + \beta logPGFC_t + \phi logODI_t + \delta log\ FD2_t + U_t$ (16)

$LogPAGVA_t = C + \beta logPGFC_t + \phi logODI_t{*}FD1_t + U_t$ (17)

$LogPAGVA_t = C + \beta logPGFC_t + \phi logODI_t{*}\ FD2_t + U_t$ (18)

$LogPSVA_t = C + \beta logPGFC_t + \phi logODI_t + \delta log\ FD1_t + U_t$ (19)

$LogPSVA_t = C + \beta logPGFC_t + \phi logODI_t + \delta log\ FD2_t + U_t$ (20)

$LogPSVA_t = C + \beta logPGFC_t + \phi logODI_t{*}FD1_t + U_t$ (21)

$LogPSVA_t = C + \beta logPGFC_t + \phi logODI_t{*}\ FD2_t + U_t$ (22)

The Data

From equations 7 to 22, k is proxied by real value of per capita gross fixed capital formation (PGFC), financial sector development is proxied by two indicators FD_1 and $FD_{2..}$ FD_1 is obtained as broad money supply (M_2) as a share of GDP while FD_2 is determined as total credit to the private sector as a share of GDP. $ODI_t{*}FD1_t$, $ODI_t{*}\ FD2_t$ were used to measure the interaction of oil dependency with financial sector development. Other variables are as follows:

PMVA is per capita manufacturing value added

PAGVA is per capita Agriculture sector value added

PSVA is per capita service sector value added

PNOGDP is per capita non-oil sector value added

PGDP is per capita gross domestic product

The indicator for oil resource dependency ODI is the main contribution of this research. The index is constructed using a modified format of Hailu and Kipgen (2017) extractive sector dependency index thus:

$ODI_t = \sqrt{[OIXt * (1 - MEXt)] * [REVt * (1 - NORt)] * [OVAt * (1 - MVAt)]}$

Where

ODI_t is oil dependency index in year t

EIX_t is export revenue from oil as a share of total export revenue in year t

MEX_t is export of manufactured goods as a share of global MEX in year t

REV_t is revenue generated by the oil sector as a share of fiscal revenue in year t

NOR_t is total tax revenue collected from non oil sector as a share of GDP in year t

OVA_t is oil sector value added as a share of GDP in year t

MVA_t is manufacturing sector value added a share of GDP in year t

The annual time series that are used covered the period 1981-2016. Data for PGFC, MEX and population are sourced from World Bank Development Indicators 2016. All other series are computed with data sourced from Central bank of Nigeria statistical bulletin 2016.

Estimation Procedure

The analysis of the data proceed by first examining the time series properties of the variables. The involved carrying out the unit root tests, cointegration tests before estimating the specified equations. ADF statistic was used for the unit root tests while Johansen Cointegration Test was used to check for cointegrating relationships. Ordinary least square method that has heteroscedastic-autocorrelation consistent standard errors was applied for the equations estimation.

4. Results and Discussion

The analysis of the relationship between oil resource dependence, financial sector development and sectoral performance in Nigeria over the period 1981-2016 begins with the examination of the unit root of each of the variables. The result of the unit root test is presented in table one. The result indicates that all the variables are stationary at 1st difference. This suggests that inclusion of the variables in estimation may lead to spurious regression. Therefore we proceed to check whether the variables have long run relationship through the Johansen Cointegration Test

Table 1: Unit root tests

Variable	ADF statistics (at levels)	ADF statistics (at 1st Difference)	Order of Integration
LPGDP	-0.410274	-3.240453•	I(1)
LPMVA	-0.131431	-5.479821••	I(1)
LPAGVA	-2.095005	-5.673052••	I(1)
LPSVA	-2.244931	-2.955011•	I(1)
LPGFC	-3.222197	-3.193026•	I(1)
LFD1	-2.168124	-5.264732••	I(1)
LFD2	-1.916732	-5.453403••	I(1)
LODI	2.257041	-4.901698••	I(1)
LPNOGDP	-0.162386	-3.593733•	I(1)
LPODIFD1	-2.390712	-6.179173••	I(1)
LODIFD2	-2.519877	-6.036158••	I(1)
Critical value @1%	-3.639407		
Critical value @5%	-2.951125		
Critical value @10%	-2.614300		

significant @5%

•• Significant @1%

Source: Authors' Computation

Co-integration test

The Johansen cointegration test was applied and the result is presented in table two. Information from the results helped to guide the estimation of the specified equations. The most striking is the non cointegration of the variables with agriculture sector output variable. This is why the variables in the agriculture equations were entered at their 1st difference.

Table 2: Summary Results of Johansen Cointegration Test

Model no.	Included Variables	Remarks
1	LPGDP, LPGFC, LFD1, LODI	There is cointegration
2	LPGDP, LPGFC, LFD2, LODI	There is no cointegration
3	LPMVA, LPGFC, LFD1, LODI	There is cointegration
4	LPMVA, LPGFC, LFD2, LODI	There is cointegration
5	LPAGVA, LPGFC, LFD1, LODI	There is no cointegration
6	LPAGVA, LPGFC, LFD2, LODI	There is no cointegration
7	LPSVA, LPGFC, LFD1, LODI	There is cointegration
8	LPSVA, LPGFC, LFD2, LODI	There is cointegration
9	LPNOGDP, LPGFC, LFD1, LODI	There is cointegration
10	LPNOGDP, LPGFC, LFD2, LODI	There is cointegration

Source: *Authors' Computation*

Effect of oil dependency on finance–growth nexus: The aggregate Economy

Table 3 shows the results of models that were estimated to determine the effect of financial sector development on aggregate economy where the influence of oil dependency is accounted for. In model one of the estimated equations, included variables explained up to 82% of changes in real per capita GDP. This means these variable explains a considerable proportion of the changes in aggregate economy over the period 1981-2016. The F-Statistics confirm the model has a good fit. The relationship between financial sector development and aggregate economy is positive and significant even when oil dependency is accounted for. The oil dependency variable itself is negative and significant. This is similar to the findings of Kurronen (2015), Badeeb and Lean (2017a)

Table 3: The effect of oil dependence and financial development
On GDP. Dependent variable: per capita real GDP (LPGDP)

Independent variable	Model 1	Model 2	Model 3	Model 4
Constant	4.464826 (19.21416) •••	3.657068 (6.425532) •••		
LPGFC	0.012174 (0.251315)	0.293313 (1.912452) ••		
LODI	-0.551033			

	(-4.513816) •••			
LFD1	0.550717 (5.181832) •••			
LFD2				
LODIFD1		0.527795 (1.548996)		
LODIFD2				
R. Squared	0.827875	0.324205		
Adj. R. Squared	0.811217	0.281968		
D.W Statistics	0.589932	0.204620		
F. Statistics	49.70046•••	7.675824•••		

•significant @10%
••significant @5%
••• Significant @1%
Source: *Authors' Computation*

Effect of oil dependency on finance–growth nexus on the sectors: Manufacturing

In table four we have results of models estimated to determine the effect of financial sector development on manufacturing sector performance in the presence of oil dominant oil sector. The models (1 and 3) where oil dependency variable is included directly the R Square is up to 0.75. This shows that that the included variable explain up to 75% of the changes in performance of manufacturing sector. In the case of models 2 and 4 where the interaction variables log of ODI*FD1 and log of ODI*FD2 were included the R Square reduced considerably. However the F-Statistics of all the models are significant, indicating a good fit for the data. The relationship between financial sector development and manufacturing sector performance is not significant though positive when oil dependency is accounted for. Oil dependency itself has a negative and significant relationship with manufacturing sector performance. The variable that measuring the interaction of oil dependency and financial sector development on the manufacturing sector performance is clearly negative and significant. This strongly support the position that oil resource dependence in Nigeria over the period 1981-2016 interacts with the financial to produce a negative impact on the manufacturing sector.

Table 4: The effect of oil dependence and financial development
On manufacturing sector .Dependent variable: per capita manufacturing real GDP (LPMVA)

Independent variable	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Constant	4.767366 (35.74223) •••	5.230438 (17.30073) •••	4.839899 (36.99978) •••	5.354913 (18.27831•••)
LPGFC	0.033707 (1.042569)	-0.127464 (-1.407762)	0.033496 (1.025832)	-0.104111 (-1.557920)
LODI	0.753557 (8.530002) •••		0.751557 (7.349145) •••	
LFD1	0.121944 (1.879056)			
LFD2			0.066470 (1.377482)	
LODIFD1		0.135085 (0.701818)		
LODIFD2				-0.230014 (-2.366077) ••
R. Squared	0.785826	0.218819	0.777559	0.334374
Adj. R. Squared	0.765100	0.169995	0.756032	0.292773
D.W Statistics	0.964715	0.509754	0.902427	0.696191
F. Statistics	37.91410•••	4.481804••	36.12094•••	8.037538•••

•significant @10%
••significant @5%
••• Significant @1%
Source: Authors' Computation

Effect of oil dependency on finance–growth nexus on the sectors: Agriculture

In the agricultural sector as presented in table five, financial sector has a negative and significant relation with agriculture sector performance in the short run when account is taken of oil dependency. The 1st difference estimation was adopted because of absence of cointegrating relationship among the included variable. The results of F-Statistics indicates the model has a good fit for the data.

Table 5: The Effect of Oil Dependence and Financial Development
On Agric sector. Dependent variable: per capita agric real GDP (LPAGVA)

Independent variable	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Constant	0.013260 (2.442349) ••	0.014277 (2.824577) ••	0.012642 (2.303871) ••	0.015220 (2.853645) ••
D(LPGFC)	0.116747 (2.151002) ••	0.122163 (2.313841) ••	0.102209 (1.882070)	0.110750 (2.007386••)
D(LODI)	-0.332426 (-2.068010) ••		-0.388018 (-2.320417••)	
D(LFD1)	-0.224717 (-2.030345) ••			
D(LFD2)			-0.130641 (-1.729473)	
D(LODIFD1)		-0.259055 (-2.852014) ••		
D(LODIFD2)				-0.158266 (-2.112735) ••
R. Squared	0.289020	0.281688	0.264641	0.207346
Adj. R. Squared	0.217922	0.235345	0.191105	0.156207
D.W Statistics	1.580549	1.610673	1.704824	1.887409
F. Statistics	4.065087••	6.078364••	3.598801••	4.054553••

•significant @10%
••significant @5%
•••• Significant @1%
Source: Authors' Computation

Effect of Oil Dependency on Finance-Growth Nexus on the Service Sectors

The result of the effect of financial sector development on the service sector performance when account is taken of oil resource dependency is presented in table six. As the estimated models shows, there is a good fit of the data and variables included explain around 85% of service sector output performance. Contrary to the cases of manufacturing and agriculture sectors, the effect of financial sector development on service sector output performance is positive and significant with oil dependency accounted for. This outcome holds with the effects of oil dependency itself being negative and significant. This largely follows the experience of Yemen as reported in Badeeb and Lean (2017b).

Table 6: The Effect of Oil Dependence and Financial Development
On Service Sector. Dependent Variable: Per Capita Service Sector Real GDP (LPSVA)

Independent Variable	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Constant	3.688986 (11.00318) •••	2.446894 (2.798824) ••	4.070483 (13.82890) ••	3.146215 (6.278201) ••
LPGFC	-0.028423 (-0.489630)	0.403886 (1.728869)	-0.018973 (-0.302607)	0.227984 (1.976341) •
LODI	-0.903793 (-4.918001) ••		-0.646512 (-2.990732) ••	
LFD1	0.790374 (5.039189) ••			
LFD2			0.582979 (5.461521) •••	
LODIFD1		0.755127		

		(1.445870)		
LODIFD2				1.115062 (5.408236) •••
R. Squared	0.877804	0.302009	0.865652	0.664181
Adj. R. Squared	0.865979	0.258384	0.852651	0.643193
D.W Statistics	0.604506	0.202466	0.580515	0.729610
F. Statistics	74.23052•••	6.922917••	66.58150•••	31.64476•••

•significant @10%
••significant @5%
••• Significant @1%
Source: *Authors' Computation*

5. Concluding Remarks

This study examined the impact of oil resource dependence on the relationship between financial sector development and economic growth in Nigeria. Furthermore it explores whether the effect differ among key sectors of the economy. Time series econometrics analysis anchored on an aggregate production function theoretical framework of the augmented Solow's model is employed for the period 1981-2016. The study used a more robust measure of oil dependency. The effect of financial development when account is taken of oil dependence is negative in both manufacturing and agriculture sector but positive in the service sector and in the aggregate economy.

The findings of this study support the hypothesis that oil resource dependency influences the finance-growth nexus in Nigeria over the period 1981-2016. In addition, it has different impact on the key sectors. There is negative impact on agriculture and manufacturing sectors but its influence results in positive impact on financial development on service sector.

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