

EFFECT OF OIL PRICE INSTABILITY ON FINANCIAL SECTOR FRAGILITY IN NIGERIA

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Abstract

This study empirically seeks to investigate the relationship between oil price instability, financial sector stability in Nigeria using data from Central Bank of Nigeria Statistical bulletin from 1980 to 2017. Essentially, the main thrust of the study was to examine how fluctuations in oil prices in the international market transmit to fragility in the financial sector. Following the objectives of this study two main methodologies were adopted to analyze the data. Regression analysis was used to identify the impact of oil price instability on financial soundness indicators in the country. The method was also employed to investigate the relationship between financial soundness indicators and bank performance in Nigeria. The study showed that oil price instability has a significant relationship with financial soundness indicators, which in turn can lead to financial fragility. The result of Auto Regressive Distributed Lag (ARDL) also showed that oil price movements can be used to forecast financial sector stability in Nigeria only on short run. Based on the findings, it is recommended that government and other stakeholders should take proactive measures to stem the effect of oil price downward movements on the financial sector and adopt appropriate adjustment mechanism that will counter the adverse effect.

Key Words: Financial fragility, oil price, economic diversification, financial indicators.

1. Introduction

Recent happenings as regards major prices of commodities have been outstanding in various ways. Commodity price changes have not only deepened in the past few decades, the frequency of such changes has also become more rapid. The period between 2002 and 2008 witnessed a substantial boom in prices and this was immediately followed by a collapse in most commodity prices as a result of financial crises suffered globally that manifested in mid-2008. Basic understanding of the market suggests that the fundamental factors that drove commodity price movements during the boom period included increase in demand for most commodities from developing countries, decrease in supply from exporting countries and policies

encouraging use of food commodities for other purposes. However, a new and recent development in relation to financial assets has begun to play important roles in this direction. This has also coincided with greater weight being attached to commodity derivatives markets of financial investors, which considers commodities as an asset class (UNCTAD, 2011). This ‘financialisation’ of commodity markets has been on the increase since 2002. The overall effect on the financial sector could probably affect the processes of financial inclusion and credit supply observed in many African countries few years ago, most especially in the oil producing countries, where there are solid growth in credit supply with the resultant detrimental effects on economic diversification and growth (Spatafora & Tytell, 2009). Indeed, such spill over could be much stronger in Nigeria where the oil price fall has been quite phenomenal over the past two years. Another aspect to the scenario of deep fluctuations in oil prices is the associated exchange rate crises, which are quite rampant for many African economies, including Nigeria. In a few economies where dollar demand is often high, the currency depreciation that followed may also lead to the escalation of the financial sector susceptibilities. In such circumstances, the existing exchange rate depreciation will make foreign currency denominated loans expensive to maintain, especially for uncovered borrowers and potentially expose banks to huge losses, although banks themselves also do have mismatch in their currency transactions. High external debt stock may also build up and worsen these adverse effects for these countries, including where some firms involved in exporting these commodities have been borrowing in foreign currencies (Ilzetzki et al, 2008; Kaminsky and Reinhart, 1999).

Both theoretical and empirical studies demonstrate that commodity price instability can give rise to financial fragility through various channels (see Papyrakis and Gerlagh, 2004; Tiago et al, 2012; Kinda, Mlachila and Ouedraogo, 2016). First, following a crash in commodity prices of most commodity exporting countries, their earnings will be reduced drastically and this will lead to adjustment in the fiscal policy to deal with the lower revenue. These can negatively affect the economy and thus making it difficult for government (the agent of the economy) to meet its debt obligations when due, giving rise to a weak banks’ statement of financial position. Secondly, if the Government fails to bring down public expenditure in the light of decreasing revenues, arrears of salaries and other obligations might start to accumulate. This will put suppliers and other stakeholders in a difficult financial situation that may eventually increase the default or credit risk on their bank loans. Fourth, depending on the degree of shock, it can put a serious burden on the local currency. The exchange rate depreciation might then lead to bank losses given their net open position in foreign exchange in their statement of financial position, or if borrowers that are not hedged are unable to repay their loans. These create challenges to bank performance as well as the financial sector in general in terms of stability and coordinated activities. The recent round of sharp declines in commodity prices (including oil prices) are not actually a one off activity. Oil price has frequently experienced deep fluctuations for a very long time. Indeed, the frequent instability has led to several scholars analyzing the effect of lower oil prices on the economy (Deaton and Miller 1995; Dehn 2000) and on domestic and external debt (Arezki and

Bruckner 2012). However, various literatures reviewed lacks a clear cut empirical investigation of the impact of a particular commodity price instability on the financial sector of each country exporting commodities , especially those of the Sub-Saharan region. This has become a direct challenge to individual countries with different commodity exports. For Nigeria, the financial sector has been developing fairly rapidly over the past few decades, yet the linkage between the sector and the main price of export commodity in Nigeria has not been well defined. This study thus investigates the impact of instability in oil price on financial sector fragility in Nigeria. In the recent past, Nigeria has suffered dislocation in financial sector following sharp decline in oil price.

The central objective of this study is to investigate the relationship between oil price instability and fragilities in the Nigerian financial sector. In more specific terms, the study aims to:

- i. Examine the relationship between oil prices instability and financial sector indicators in Nigeria
- ii. Determine whether oil price changes could help forecast financial sector and banking performance in Nigeria

Based on the above, the hypothesis empirically tested in this study states that oil price instability does not have a significant relationship with financial sector indicators stability in Nigeria

2. Literature Review

2.1 Financial Fragility

According to the World Bank (2013), a stable financial system is one that maintains normal employment rate, efficiently allocates resources and ensures adequate management of financial risks. It also eliminates comparative movement in prices of real and financial assets that ensures monetary stability. A financial system is in a near stable state when there are imbalances in the system as a result of unforeseen adverse events. When there is stability, the system will on its own absorb the shocks through a self-correction mechanism that will prevent adverse conditions from having a disruptive effect on the whole economy and entire financial system. Since most transactions in an economy pass through financial system, stability is very important for economic growth. The value of stability in financial system is best appreciated when there is instability as the economy will usually be characterized by adverse conditions in form of hyperinflation, stock market crash etc. During this period, banks are not willing to lend to critical sectors and asset prices deteriorate significantly (World Bank, 2013).

In assessing financial fragility of any nation, scholars and policy makers have focused on some quantitative measures. There are the direct measures that show how resilient the financial sector has been over time, especially during shocks from outside the system (World Bank, 2013; Kinda, 2012; IMF 2006; Hawkins and Klau, 2000). These measures have been aptly called financial soundness indicators.

There are also alternative indicators since a financial system is made up of a number of key sectors, and how these sectors relate to each other. This is further compounded by the non-linearity nature that can affect the transmission of shocks and their extension among the sectors (ECB, 2015). For example, there exists links between financial and monetary stability due to the fact that asset prices has effect on the monetary conditions and vice versa. For proper assessment of financial stability, it is not always enough to use benchmarks from individual sectors and focus only on deviations there from. Various attempts have been made by different authors to develop alternative assessment criteria that will better predict and signal financial distress at the onset instead of relying on indicators arising from analyzing the individual variables in the financial systems

There are on-going studies to develop leading indicators that would give signal to stress conditions beginning with early warning indicators. It is always better to combine multiple indicators where they are available in such a way that they will best capture the relationship between individual indicators. For the purpose of assessing and checking key sectors of the economy and also serve as key indicators in time of crisis, there are composite indicators that combine each variables (e.g. bank credit related to GDP) which are assigned benchmark or threshold values used in measuring economic conditions. A fall in commodity prices reduces bank lending, although this effect is confined to low-income countries and driven by commodity price busts. Banks with relatively lower deposits and poor asset quality transmit commodity price changes to lending more aggressively (Agarwal, Duttagupta, & Presbitero2018). Similarly, Khandelwal, Miyajima, & Santos (2017), asserts that the economies of developing countries can be adversely affected by fluctuations in oil prices due to high dependence on oil.

Kaminsky and Reinhart, Eichengreen et al (1999), used the “early warning indicator” techniques developed for balance of payments and currency crisis. This techniques or indicator was later introduced to identify banking crisis. Demirgüç-Kunt and Detragiache (1997) examined banking crisis determinants in developing and developed countries using multivariate logit approach. These determinants are: weak institutions and explicit deposit insurance, past credit growth, high ratio of credit to the private sector, low liquidity in the banking sector, susceptibility to sudden capital outflows, and high inflation and slow GDP growth.

In theory, ECB (2015) has noted that the composite indicators of financial stability are better suited in determining the standard or threshold values to show the position of the financial sector stability than individual variables. Besides, they are beneficial in measuring the level of stress or crisis in the system even in the absence of extreme events. Conversely, as pointed out by Francis (2003), “the construction of a single aggregate measure of financial stability is a difficult task given the complex nature of the financial system and the existence of complex links between various sectors.

In the absence of an overarching aggregate, partial composite measures such as a banking stability index or a market liquidity index are used in several FSRs". Nevertheless, FSRs would be needed in the examination of important variables in the real sector of the economy and financial systems as well as other external sector variables whether constructed as a single cumulative measure of financial stability or not.

Furthermore, when calculating a single cumulative indicator of financial stability, a different weight is assigned to each variable that make up such cumulative measure thus reflecting the characteristic of the aggregate. For example, a financial mismatch between long-term and short-term liabilities may be given a low weight since maturity conversion is a common characteristic of the financial business and banks can mitigate some portion of this risk using interest rate derivatives. Similarly, failures in the price discovery process and market volatility are considered in the assignment of weights to market volatility, since low volatility implies that there is a stable condition.

Alesandro and Matteo (2008) assert that variations in the prices of commodity can translate into changes in government fiscal performance. Fiscal performance depends significantly on the prices of commodity in countries that export such commodity. A reduction in the prices of commodity globally can worsen the terms of trade and decrease government tax revenue.

In the absence of fiscal adjustment (that is, reduction of unnecessary spending), a negative price shock transmits directly into drastic fall in government revenues as well as escalates fiscal deficits. Conversely, a fiscal adjustment that is as a result of a commodity burst can shrink the income of firms that survive on government contracts, thus weakening the banks' statement of financial position.

Government that implement fragile fiscal policy always carries out disorganized fiscal adjustments via the build-up of contractors and suppliers payment arrears. The combination of the competitiveness and losses of tax revenues in addition to fiscal deficits carry a heavy risk to the financial system. This resulted to the fall of the Angolan government revenue from 40.4% to 34.2% of GDP in 2013. As a result, the general fiscal balance deteriorated from a surplus of 0.3% to 4.8% of GDP in 2013 and 2014 respectively. IMF (2015) shows that the reductions in real government expenditure occurred frequently in the 1990s, but occasionally since 2000 due to downturns in real oil prices. It could also be linked to the build-up of fiscal shields over the last 20 years, which permitted government the time to curb economic activities during downturns in oil price.

Moreover, Omojolaibi and Egwaikhide (2013) empirically examined the general equilibrium effects of oil boom on developing and developed countries within the "Dutch Disease framework". This model is typically applied in the reallocation of productive factors among different economic activities. IMF (2015) asserts that movement in relative prices frequently affects sectoral variations resulting from

boom in resource. This model according to IMF (2015) is based on the assumptions that non- tradable and tradable goods and services are produced in a small open economy. The non-tradable comprise of prices adapted to changes in domestic supply and demand conditions, while the tradable is made up of exports and imports with exogenously determined world prices.

The export-competing sector and booming sector are the two forms of tradable sector. The booming sector affects the economy via the resource-movement mechanisms and spending channel. The spending channel analyses a model that reflect the booming sector within a non-existing supply side connection with the rest of the economy. The sector that is booming induces income received; hence changes in relative prices based on a high level of income are spent on tradable and non-tradable goods. The output of the non-tradable sectors poses a rising pressure on prices within the sector due to excess demand while an upsurge in demand for the tradable sector is enlarged via rise in imports. This leads to a decrease in output for the tradable sector and increase of activities in the non-tradable sector. The resource-movement influences the booming sector and links the whole economy through the supply side linkage. A rising swing in the demand curve for non-tradable due to a boom implies a rise in relative prices. The price change leads to a rising shift in wages of tradable sector due to the flow of labour services to other sectors since labour is assumed to be the only factor that is mobile.

2.2 Oil Prices and the Economy

Majority of work on oil price shocks effects have focused on how it relates to the economy at large or its real aggregates. For instance, Beck & Poelhkke (2017) affirmed that the role of the financial sector in intermediating oil windfall cause a relative decline in financial sector deposits of countries that experience an unexpected natural resource windfall as measured by shocks to exogenous world prices. In this study, we considered the literature in this area from which inferences can be drawn on the possible impact of oil price fluctuations on the financial system as well as for the economies.

King and Levine (1993) reported that oil price shocks explain much of the time-series variation in the pace of labour reallocation (as proxied by a Lilien-type dispersion measure) and do so in a way predicted by the sectorial shifts hypothesis. Prasad et al (2009) reinforced the analysis and findings on the dispersion hypothesis and the result show that “the explanatory power of common, aggregate disturbances to industrial output is significant, but not very large for most industries. And that sectorial independent and random productivity shocks can cause co-movement of activity across different sectors”.

The crashes in the price of commodity have a tendency to destabilize economic performance. Deaton and Miller (1995) asserts that slumps in the global commodity prices triggered a lesser economic development in 35 Sub-Saharan African commodity-exporting countries. Similarly, Dehn (2000) investigated 113 emerging

economies from 1957 to 1997 and the result shows that high negative commodity price shocks extremely reduced the per capita growth rates in these countries examined. They also found out that despite volatile world prices, growth was not affected by the price uncertainty since growth is focused on the real realization of negative shocks.

Honoham and Beck (2010) investigated 39 African countries from 1980 to 2006 and found that the probabilities of an outbreak of civil war as well as growth in GDP were negatively related with commodity price shock during that period. They observed that most of the macro-economic adjustment policy emanating from decline in current spending was a clear reaction to the 2009 reduction in the prices of commodity demonstrated by pro-cyclical fiscal policies.

3. Methodology

The research design used in this study is the time series descriptive research design where the trend in certain variables over a period of time is observed, explained and analyzed. The co-movements of financial/banking sector activity indicators with oil price over a period of 35 years was investigated for Nigeria. The analysis involves determination of any form of relationships among the variables, estimation of such relationships and predication of the pattern of such relationships for other periods. The study comprises of examining oil price fluctuations in commodity exporting countries with specific reference to Nigeria. This study examined the financial performance in Nigeria under periods of oil boom and downturn. Nigeria was chosen among the commodity exporting countries in Africa being the largest economy in the continent.

Annual time series data covering the period 1982 to 2017 was used in the empirical analysis.

The data used in the study was obtained from different centers that provide financial statistics. The data on financial sector indicators were obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin and the World Bank Financial Structure database. The data on oil prices are obtained from the IMF World Financial Statistics (IFS) database for 2017.

3.1 Model Specification

The modeling in this study is based on the objectives of the study. The first modeling conducted is that of oil prices effects on financial sector. In order to get the correct estimate the effect of oil price fluctuation on financial sector fragility, two econometric models were stated. This is largely because we use continuous variables for financial soundness indicators and binary variables for banking crisis data. More specifically, we estimate the following equation for financial fragility model:

$$FSI_t = \alpha + \beta Price_{shock}_t + \sum_{m=1}^m \gamma_m X_{m,t-1} + e_t \quad (1)$$

Where FSI is the financial soundness indicator and *Price shock* represents oil price fluctuation, $X_{m,t-1}$ represents control variables of interest at time, t and e_t stands for the error term. The measures of financial soundness indicators for Nigeria included in the model are ratio of bank liabilities to total financial liabilities, ratio of bank

credit to total private sector credit, interest rate spread, ratio of non-performing loans, real deposit growth, and total bank credit growth. Each of the measures is obtained based on the empirical and theoretical literature earlier reviewed. The vector of control variables includes interest rate (the monetary policy rate), exchange rate, inflation, m2/reserve ratio, real GDP per capital growth, and fiscal deficit to GDP ratio to capture the effect of fiscal stance of government. In its expanded form, six equations are specified for estimation in the relationships as:

$$blr = \alpha_1 + \alpha_2priceshock + \alpha_3mpr + \alpha_4exrt + \alpha_5infl + \alpha_6rpci + \alpha_7fdr + u_1 \quad (2)$$

$$bcr = \beta_1 + \beta_2priceshock + \beta_3mpr + \beta_4exrt + \beta_5infl + \beta_6rpci + \beta_7fdr + u_1 \quad (3)$$

$$spread = \lambda_1 + \lambda_2priceshock + \lambda_3mpr + \lambda_4exrt + \lambda_5infl + \lambda_6rpci + \lambda_7fdr + u_1 \quad (4)$$

$$nplr = \delta_1 + \delta_2priceshock + \delta_3mpr + \delta_4exrt + \delta_5infl + \delta_6rpci + \delta_7fdr + u_1 \quad (5)$$

$$rdg = \gamma_1 + \gamma_2priceshock + \gamma_3mpr + \gamma_4exrt + \gamma_5infl + \gamma_6rpci + \gamma_7fdr + u_1 \quad (6)$$

$$berg = \varphi_1 + \varphi_2priceshock + \varphi_3mpr + \varphi_4exrt + \varphi_5infl + \varphi_6rpci + \varphi_7fdr + u_1 \quad (7)$$

Where

blr = ratio of bank liabilities to total financial liabilities

bcr = ratio of bank credit to total private sector credit;

spread = interest rate spread (difference between lending and deposit rates);

nplr = ratio of non-performing loans to total bank loans;

rdg = real deposit growth;

berg = total bank credit growth;

mpr = interest rate (the monetary policy rate);

exrt = exchange rate;

infl = inflation rate,

mrr = broad money/reserve ratio;

rpci= real GDP per capital growth; and

fdr = fiscal deficit to GDP

The model in equations (2 to 7) therefore explains how an oil shock primarily affects financial soundness in the country in the face of the monetary and fiscal landscape of the country. In terms of estimation, the model presented has variables on the right hand side, which are endogenous to each of the models. This is because the variables are primarily financial and nominal in nature. An appropriate estimation technique that takes care of the simultaneity problem is therefore adopted for the estimation of the equations. The method used is the generalized method of moments (GMM)

4. Data Analysis

The goal here is to estimate and analyze the models using appropriate techniques and also draw valuable outcomes for testing the hypotheses and also to draw valid conclusions. In conducting the empirical analysis, both econometric and statistical

methods are employed. The initial characterization of the data is done using the statistical techniques, while the estimation of relationships and other parameters for testing the hypotheses is done using econometric techniques. Moreover, because most macroeconomic and financial sector variables trends overtime indicate time variation, there is the need to investigate the time series properties of the variables used for the empirical analysis. These would involve testing for stationarity of variables in our model (unit root tests) and whether or not there is any proof of long run relationship among the variables included in the models in the study (co-integration tests) Gujarati (2003). In particular, a key additional assumption for the Generalized Method of Moments (GMM) estimator requires the first differences of the variables included in the models to be uncorrelated with the individual effects. This assumption is guaranteed to be valid if the series have constant means over time or are stationary. This is another justification for carrying out time series tests for the dataset.

4.1 Summary Statistics of Data

Table 1: Descriptive Statistics

	Mean	Maximum	Minimum	Std. Dev.	Skewness
BLR	52.73	68.01	37.11	10.86	-0.02
BCR	85.36	98.93	51.66	15.93	-0.13
BAGDP	28.14	70.67	11.38	13.04	1.79
SPREAD	9.89	20.70	-0.25	5.75	-0.28
NPLR	20.33	39.37	3.24	9.66	-0.05
NBB	2875.41	5809.0	869.0	1540.21	0.75
MPR	12.92	26.0	6.0	4.19	0.76
CRG	23.23	99.94	-35.63	26.87	1.09
RDG	25.46	59.40	-6.50	16.94	0.44
RGDPG	4.23	11.40	-6.60	3.90	-0.47
FDR	-4.77	1.19	-12.44	3.69	-0.42
EXRT	68.31	168.29	0.61	64.31	0.23
INFL	21.21	72.81	4.67	18.36	1.40
OILP	38.82	106.20	10.1	31.19	1.19
OILPV	4.04	32.01	0.21	4.42	3.12

Source: Authors' compilation from regression estimates, Oct 2018

The summary of the descriptive statistics for all the variables used in the study is reported in Table 1. In the summary results, the proportion of bank liability in the financial system is 52.73 percent over the period of the analysis, which is a high proportion. This shows that over half of the financial system liability in the country is controlled by the banking system. Thus, the banking system is shown to have a full grip of the monetary liability in the country when compared with other financial institutions in the country. The maximum value reached as much as 68 percent of the total financial liabilities in the system. Compared with the mean value, the standard deviation value of 10.86 is low and indicates that much variation did not occur over the period in terms of the banking sector liability ratio.

The ratio of bank credit to the private sector was 85.36 percent average for the period. This is also high and reveals that the credit in the Nigerian economy has been critically dominated by the banking sector in the past decades. There were periods in the study when the ratio was almost 100 percent. Thus, the banking sector has played the biggest role in credit supply in Nigeria. This throws a very strong issue up for evaluation, namely, the extent to which the financial sector will be affected when the banking sector encounters crisis. As experience has shown, banking sector crisis has always translated to financial sector crisis in Nigeria at any given time. Bank asset to GDP ratio is 28.3 percent for the sample period, with a maximum value reaching 70 percent.

Average interest rate spread is below 10 percent for the entire sample period, although the maximum value of 20.7 percent reveals that the difference between deposit and lending rates in the country has been very large and unrealistic for adequate participation in the money market in Nigeria. The ratio of non-performing loans averaged at 20.3 percent in the entire period, suggesting that loan operations in the banking sector have not performed quite well over the period. As noted in Obadan and Adegboye (2016), this loan issues have been the perennial root cause of banking and financial sector fragility in Nigeria. Surprisingly, average monetary policy rate for the period is higher than the interest rate spread in the banking sector, while both credit and deposit growth have been almost at the same proportion for the analysis period.

For oil prices, the average level was 38.8 dollars per barrel for the period. The maximum value reached 106.3 dollars while the minimum value just 10.1 percent. This shows wide discrepancies over time as shown by the oil price volatility (OILPV) statistics. Average volatility rate of 4.04 percent shows that the variations in oil prices were over 400 percent over the periods, which have been above the expected levels for the period. The standard deviation is higher than the average value, suggesting wide variations in the series over time. The skewness value is also very high, and indicates that values of the volatility variables were below the average value for most of the years.

Table 2: Johansen Multivariate Cointegration Tests Results

<i>Trace Test</i>				<i>Max-Eigen Test</i>			
<i>Hypothesized No. of CE(s)</i>	<i>Statistic</i>	<i>Critical Value</i>	<i>Prob.**</i>	<i>Hypothesized No. of CE(s)</i>	<i>Statistic</i>	<i>Critical Value</i>	<i>Prob.**</i>
<i>None *</i>	178.3	125.6	0.0	<i>None *</i>	69.0	46.2	0.0
<i>At most 1 *</i>	109.3	95.8	0.0	<i>At most 1</i>	34.2	40.1	0.2
<i>At most 2 *</i>	75.1	69.8	0.0	<i>At most 2</i>	26.6	33.9	0.3
<i>At most 3 *</i>	48.5	47.9	0.0	<i>At most 3</i>	18.7	27.6	0.4
<i>At most 4</i>	29.8	29.8	0.1	<i>At most 4</i>	16.3	21.1	0.2
<i>At most 5</i>	13.5	15.5	0.1	<i>At most 5</i>	13.2	14.3	0.1
<i>At most 6</i>	0.3	3.8	0.6	<i>At most 6</i>	0.3	3.8	0.6
<i>None *</i>	249.69	159.53	0.00	<i>None *</i>	74.97	52.36	0.00
<i>At most 1 *</i>	174.72	125.62	0.00	<i>At most 1 *</i>	58.46	46.23	0.00
<i>At most 2 *</i>	116.26	95.75	0.00	<i>At most 2 *</i>	47.17	40.08	0.01
<i>At most 3</i>	69.09	69.82	0.06	<i>At most 3</i>	27.04	33.88	0.26
<i>At most 4</i>	42.05	47.86	0.16	<i>At most 4</i>	22.99	27.58	0.17
<i>At most 5</i>	19.06	29.80	0.49	<i>At most 5</i>	11.98	21.13	0.55
<i>At most 6</i>	7.08	15.49	0.57	<i>At most 6</i>	5.20	14.26	0.72
<i>At most 7</i>	1.88	3.84	0.17	<i>At most 7</i>	1.88	3.84	0.17
<i>None *</i>	133.98	125.62	0.01	<i>None</i>	43.58	46.23	0.09
<i>At most 1</i>	90.40	95.75	0.11	<i>At most 1</i>	30.89	40.08	0.37
<i>At most 2</i>	59.51	69.82	0.25	<i>At most 2</i>	16.92	33.88	0.93
<i>At most 3</i>	42.59	47.86	0.14	<i>At most 3</i>	16.19	27.58	0.65
<i>At most 4</i>	26.40	29.80	0.12	<i>At most 4</i>	13.29	21.13	0.43
<i>At most 5</i>	13.12	15.49	0.11	<i>At most 5</i>	12.31	14.26	0.10
<i>At most 6</i>	0.81	3.84	0.37	<i>At most 6</i>	0.81	3.84	0.37
<i>None</i>	86.65	95.75	0.18	<i>None</i>	32.34	40.08	0.29
<i>At most 1</i>	54.31	69.82	0.45	<i>At most 1</i>	23.04	33.88	0.53
<i>At most 2</i>	31.28	47.86	0.65	<i>At most 2</i>	11.98	27.58	0.93

<i>At most 3</i>	19.30	29.80	0.47	<i>At most 3</i>	11.43	21.13	0.60
<i>At most 4</i>	7.86	15.49	0.48	<i>At most 4</i>	7.84	14.26	0.40
<i>At most 5</i>	0.03	3.84	0.87	<i>At most 5</i>	0.03	3.84	0.87
<i>None *</i>	134.17	95.75	0.00	<i>None *</i>	52.03	40.08	0.00
<i>At most 1 *</i>	82.15	69.82	0.00	<i>At most 1 *</i>	41.00	33.88	0.01
<i>At most 2</i>	41.14	47.86	0.18	<i>At most 2</i>	17.95	27.58	0.50
<i>At most 3</i>	23.19	29.80	0.24	<i>At most 3</i>	13.44	21.13	0.41
<i>At most 4</i>	9.76	15.49	0.30	<i>At most 4</i>	9.72	14.26	0.23
<i>At most 5</i>	0.04	3.84	0.85	<i>At most 5</i>	0.04	3.84	0.85

()* denotes rejection of the hypothesis at 5% (1%) significance level.

Source: Authors compilation from regression estimates, Oct 2018.

To determine if they are co integrated, we shall go ahead to establish that the series in the analysis are all I (1) variables, possessing unit roots. The outcome from the multivariate cointegration test is shown in Table 4. Note that the results are for each of the equations estimated under the hypotheses of the study as specified in the previous chapter. As shown in the tables since the hypothesis of no cointegrating vector ($r=0$) is to be rejected, both the λ -max and the trace test statistics reveal that there is one significant cointegrating vector among the variables. Arguably, the number of cointegrating vectors (indicated by r) is at least one. This shows that there is a long run relationship among the variables.

In order to provide broader outlines for the analysis, the correlation matrix, which shows the relationship among all the variables, is presented in Table 5. The probability values for the significance of each of the correlation coefficient are also reported in the results. The result shows that bank liquidity ratio (*blr*) has a significant positive correlation with bank lending activities, suggesting that the liability of the banking sector moves in the same direction with bank credit provision. The more lending the banking sector does, the more the liability accrued in the sector. Interest rate spread does not have any significant correlation with any of the other banking sector fragility (or development) measures. This shows a rather strong disconnection between banking sector interest rates and actual banking sector activities in Nigeria. Interest rate application may not be tied to any fundamental operational factor in the banking sector. Interest rate spread is however strongly and positively correlated with number of bank branches and the banking sector asset ratio. Nonperforming loan is negatively correlated with banking sector liability ratio (in actual fact non-performing loan ratio has negative correlation with each of the financial sector indicator variables), but positively correlated with bank asset ratio. This suggests that bank assets and liabilities move together over time.

Table 3: Pair-Wise Correlation Matrix

Prob.	BL R	BC R	SPREA D	NPL R	CR G	RD G	BAGD P	MP R	NB B	EXR T	FD R	INF L	RGDP G
BCR	0.36												
Prob.	0.04	-----											
SPREA	-	0.03											
D	0.05												
Prob.	0.78	0.86	-----										
NPLR	-	-	-0.37										
	0.49	0.16											
Prob.	0.00	0.38	0.03	-----									
CRG	-	0.47	0.10	-0.06									
	0.16												
Prob.	0.37	0.00	0.58	0.73	-----								
RDG	-	0.05	0.18	0.12	0.56								
	0.46												
Prob.	0.01	0.79	0.30	0.48	0.00	-----							
BAGD P	0.46	0.32	0.42	-0.41	0.34	0.24							
Prob.	0.01	0.07	0.01	0.02	0.05	0.18	-----						
MPR	-	-	0.13	0.48	0.08	0.34	-0.37						
	0.65	0.36											
Prob.	0.00	0.04	0.48	0.00	0.66	0.05	0.03	-----					
NBB	0.18	-	0.70	-0.58	0.08	0.04	0.59	-					
		0.21						0.20					
Prob.	0.30	0.23	0.00	0.00	0.65	0.83	0.00	0.26	-----				
EXRT	0.24	0.02	0.83	-0.63	0.15	0.14	0.61	-	0.88				
								0.13					
Prob.	0.17	0.89	0.00	0.00	0.39	0.42	0.00	0.45	0.00	-----			
FDR	0.02	0.25	0.52	-0.45	0.33	0.14	0.31	-	0.53	0.56			
								0.17					
Prob.	0.93	0.16	0.00	0.01	0.06	0.42	0.07	0.33	0.00	0.00	-----		
INFL	-	-	-0.28	0.48	-	-	-0.38	0.34	-	-0.38	-		
	0.42	0.45			0.05	0.07			0.22		0.10		
Prob.	0.01	0.01	0.11	0.00	0.77	0.71	0.03	0.05	0.20	0.03	0.56	-----	
RGDP G	-	-	0.43	-0.33	0.05	0.02	0.27	0.09	0.50	0.49	0.39	-	
	0.02	0.05										0.21	
Prob.	0.90	0.79	0.01	0.06	0.80	0.93	0.12	0.63	0.00	0.00	0.02	0.24	-----
OILP	0.38	-	0.49	-0.75	-	-	0.49	-	0.86	0.78	0.40	-	0.37
		0.19			0.05	0.12		0.44				0.33	
Prob.	0.03	0.29	0.00	0.00	0.79	0.50	0.00	0.01	0.00	0.00	0.02	0.06	0.03

Source: Authors compilation from regression estimates, Oct 2018.

4.2 Results and Interpretations

In this area the estimated models results are presented and analyzed. The estimations are done in line with the hypotheses of the study which forms the basis for reporting the results and forming the analysis.

4.2.1 Oil Price Instability and Financial Sector Indicators Stability in Nigeria

Table 4: Oil prices and financial sector. Dep. Variable is Bank liabilities to total financial liabilities

Variable	GMM			2SLS		
	Coefficient	t-Statistic	Prob.	Coefficient	t-Statistic	Prob.
C	91.5**	6.36	0.00	93.7**	5.92	0.00
OILPV	-0.11	-0.70	0.49	-0.15	-0.90	0.38
MPR	-2.96**	-3.67	0.00	-3.17*	-2.89	0.01
EXRT	0.08	0.82	0.42	0.09	1.00	0.33
INFL	0.09	0.44	0.67	0.11	0.44	0.66
RGDPG	-0.89	-0.92	0.37	-0.67	-0.54	0.59
FDR	0.11	0.11	0.91	0.01	0.21	0.98
R-squared	0.472					
Adj R	0.363					
J-stat	1.09					
F	-			2.68		

Source: Authors' compilation from regression estimates, Oct 2016.

The results for the empirical analysis are presented based on the different estimation of financial sector indicators noted in Chapter three. For robustness checks, the results shown in this section include the output of the Two Stage Least Squares estimates. This helps to provide a strong comparison in terms of the effectiveness of the GMM estimates reported. In Table 4.6, the result of oil price instability effect on banking sector liability ratio is reported. The diagnostic statistics for the results are rather low with adjusted R squared value of 0.363 (note that the value for the 2SLS estimates are even lower). This indicates that just above 36 percent of the systematic variations in bank liability ratio was explained in the specified model. The J-statistic value measures the appropriateness (or validity) of the instruments used for the estimation of the GMM models. The J-statistic value of 1.09 fails the significance

test at the 5 percent level, suggesting that the null hypotheses of regularity or validity of instruments is accepted. The F-value for the 2SLS passes the significance test at the 5 percent level and estimates is also high. This shows that a significant relationship actually exists between banking sector liability ratio and all the independent variables joined together.

In terms of the relevance of the explanatory variables in the model, we focus on the individual coefficients in terms of significance and signs. Apparently, the significance of the coefficients reveals how relevant and effective the particular variable is in explaining the dependent variable. We also focus on the results of the GMM for the analysis. Looking closely at the individual coefficients in the model, it shows that the coefficient of oil price volatility has the expected negative sign which suggest that instability in oil prices tends to reduce banking sector liability. The coefficient is however not significant at the 5 percent level (the probability value for the t-statistic is greater than 0.05). Hence, the result shows that oil price volatility does not have a significant impact on the proportion of banking sector liability in overall financial liabilities in the economy. Considered in a more general sense, the results suggest that the ability of the banking sector in Nigeria to create money is not affected by volatility in oil prices.

Indeed, of all the explanatory variables in the model, only the coefficient of monetary policy rate (MPR) was significant (at the 1 percent level). The coefficient of MPR is negative, which is in line with apriori theoretical expectations; when the policy rate rises, banking sector liabilities are likely to fall since the rise in the rate will reduce the capacity of banks to create more financial liabilities in the system. This shows that monetary policy rate is an effective means of controlling liability expansion by the banking sector in Nigeria. As mentioned earlier, the variables fail the significance test and imply that they do not have sound effects on banking sector liability ratio in Nigeria.

Table 5: Oil prices and financial sector. Dep. Variable is Ratio of bank credit to total private sector credit

Variable	GMM			2SLS		
	Coefficient	t-Statistic	Prob.	Coefficient	t-Statistic	Prob.
C	148.7**	13.90	0.00	144.6**	9.52	0.00
OILPV	-0.63**	-6.44	0.00	-0.60**	-3.79	0.00
MPR	-1.85**	-3.15	0.00	-2.11*	-2.01	0.06
EXRT	0.13	1.82	0.08	0.12	1.36	0.19
INFL	-0.56**	-4.27	0.00	-0.47*	-2.04	0.05
RGDPG	-0.50	-0.46	0.65	0.14	0.12	0.91

FDR	2.09*	2.55	0.02	1.70	1.48	0.15
R-squared	0.549				0.606	
Adj R	0.441				0.512	
J-stat	1.49				0.67	
F	-				6.27	

Source: Authors' compilation from regression estimates, Oct 2018.

The second financial sector indicator variable considered is bank credit to the private sector. It is a major indicator of the financial sector stability since credit provision is a core macroeconomic function of the banks. The results in Table 7 show the estimates from the models specified. Focusing of the GMM outcome, it can be seen that the overall performance of the model is generally impressive. The adjusted R-squared value shows that over 44 percent of the systematic variations in credit was captured in the model. Moreover, the F-value passed the significance test for the 2SLS result, while the J-statistic value shows that the instruments used in the estimation of the GMM model are valid.

Having completed the analysis, we will now focus on the importance of each of the explanatory variables. The result shows that the coefficient of oil price volatility is negative and significant at the 1 percent level. This implication of this is that oil price volatility has a strong negative impact on bank lending in Nigeria. The higher the instability in oil prices, the lesser the amount of loans advanced by the banks in the country. Thus, oil price instability tends to shrink banking sector loan availability in the country. MPR in the model also has a negative coefficient and scales through the significance test at the 5 percent level, indicating that rising policy rate tends to reduce credit supply by the banking sector (as expected). This result, when combined with the initial result, provides string basis for demonstrating that in terms of credit supply or liability expansion by banks, the Central bank seems to have a very effective tool to coordinate the banking sector in Nigeria.

The model reveals that coefficient of inflation is also significant and passes the test at the 1 percent level which shows that rising price level has a negative impact on loan supply by the commercial banks. When prices rise, loans tend to shrink, perhaps due to reduction in loan demand. The coefficient of fiscal deficit ratio also passes the test at the 5 percent level. Since the coefficient is positive, the result indicates that fiscal deficits positively impacts on bank credit supply. The more the government spends, the higher the level of loan supply by the banking sector.

Table 6: Oil prices and financial sector. Dep. Variable is Interest rate spread

Variable	GMM			2SLS		
	Coefficient	t-Stat.	Prob.	Coefficient	t-Stat.	Prob.
C	5.31	1.31	0.20	3.66	0.80	0.43
OILPV	-0.07	-2.78	0.01	-0.07	-1.44	0.16
MPR	0.20	0.84	0.41	0.20	0.65	0.52
EXRT	0.09	3.67	0.00	0.10	3.71	0.00
INFL	-0.03	-0.61	0.55	-0.01	-0.09	0.93
RGDPG	0.03	0.11	0.91	0.07	0.20	0.84
FDR	0.18	1.01	0.32	0.10	0.30	0.77
R-squared	0.741			0.746		
Adj. R-squared	0.679			0.685		
J-stat	0.43			0.3		
F stat				11.25		

Source: Authors' compilation from regression estimates, Oct 2018.

Another financial sector indicator used is the interest rate spread, which is the difference between the lending rate and the deposit rate in the banking sector. The result of the model is presented in Table 8. The result has high diagnostic statistics, with the adjusted R-squared value of 0.679. Thus, over 67 percent of the variations in interest rate spread is captured in the model. The J-statistic value for the GMM equation also proves that the instruments used in the model is valid.

Looking closely at the coefficients of the explanatory variables, it shows that oil price volatility is significant at the 5 percent level and has a negative coefficient. This shows that oil price volatility has a significant negative impact on interest rate spread in Nigeria. The interpretation of this result is rather ambiguous since it directly shows that volatility of oil prices tends to close the gap between lending and deposit rates. Apparently, minimizing this difference is a positive goal for financial sector development in any country. Thus, it appears from the result that oil price instability tends to improve the financial sector in terms of interest rate position in Nigeria. The only other significant coefficient in the model is that of exchange rate. The coefficient is positive, revealing that exchange rate depreciation tends to increase the interest rate spread in Nigeria. This result is interesting to note because it shows that

there is a significant link between exchange rate and interest rates in Nigeria. Oil prices may not have the direct impact expected to be shown on interest rates, but exchange rate does. Indeed, since oil prices have been known to distort exchange rate in Nigeria, the result suggests that oil prices may only have indirect impacts on the interest rate spread in Nigeria. All the other coefficients in the model fail the significance test at the 5 percent level.

Table 7: Oil prices and financial sector. Dep. Variable is Ratio of non-performing loans

Variable	GMM			2SLS		
	Coefficient	t-Statistic	Prob.	Coefficient	t-Statistic	Prob.
C	14.27	1.19	0.25	14.10	1.01	0.32
OILPV	0.32	2.88	0.01	0.33	2.35	0.03
MPR	-0.55	-0.68	0.50	-0.58	-0.62	0.54
EXRT	0.06	0.72	0.48	0.07	0.85	0.40
INFL	0.36	2.68	0.01	0.37	1.86	0.07
RGDPG	1.45	1.53	0.14	1.45	1.33	0.19
FDR	-1.66	-1.67	0.11	-1.66	-1.70	0.10
R-squared	0.277			0.263		
Adj. R-sq	0.104			0.086		
J-stat	0.03			0.021		
F stat				4.75		

Source: Authors' compilation from regression estimates, Oct 2018.

The ratio of non-performing loans is also one of the indicators of the financial sector in Nigeria from which the behavior of financial sector fragility may be observed in the face of oil price variations. The results shown in Table 9 indicate that impact of the oil price instability on the ratio of non-performing loans in Nigeria. The diagnostic indicators of the results are generally low, with adjusted R squared value of 0.104. Only 10 percent of the behavior of non-performing loans was explained by the selected explanatory variables in the model.

From the results in Table 4.9, it can be seen that the coefficient of oil price volatility passed the significance test at the 5 percent level with a positive value. The indication from this result is that oil price instability has a positive impact on the ratio of non-

performing loans. Thus, the more intensive the instability of oil prices, the more loans become non-performing in the banking sector in Nigeria. More loans run into redundancy when oil prices become highly volatile in Nigeria. The result also shows that inflation rate has a positive impact on non-performing loans. Loans fail either with oil price vagaries or when price levels are on the rise over time. the other variables in the model fail the significance test at the 5 percent level.

Table 8: Oil prices and financial sector. Dep. Variable is Real deposit growth

Variable	GMM			2SLS		
	Coefficient	t-Statistic	Prob.	Coefficient	t-Statistic	Prob.
C	30.52	0.50	0.62	28.97	0.35	0.73
OILPV	-0.94*	-2.61	0.02	-0.81	-1.22	0.23
EXRT	0.32	0.34	0.74	0.26	0.22	0.83
RGDPG	-3.67	-0.83	0.42	-2.98	-0.51	0.62
NBB	0.02	0.71	0.48	0.01	0.49	0.63
SPREAD	-1.89	-0.22	0.82	-1.34	-0.12	0.91
	0.478			0.246		
	0.320			0.204		
	1.96			1.65		
	-			0.58		

Source: Authors' compilation from regression estimates, Oct 2018.

The fifth financial sector indicator variable considered is the growth of real deposits in the banking system. For a developing economy like Nigeria, the growth of real deposits is a strong indicator of how well the financial sector has penetrated the economy in terms of savings coordination and overall financial participation. The results in Table 10 show the estimates from the models specified. Focusing of the GMM outcome, it can be seen that the overall performance of the model is generally impressive. The adjusted R-squared value shows that Over 44 percent of the systematic variations in credit was captured in the model. Moreover, the F-value

passed the significance test for the 2SLS result, while the J-statistic value shows that the instruments used in the estimation of the GMM model are valid.

From the result, only the coefficient of oil price volatility passes the significance test at the 5 percent level. This coefficient is negative, suggesting that oil price volatility has a negative impact on real deposit growth. The oil price instability coefficient shows that rising instability tends to limit the growth of deposits in the financial system in Nigeria. Thus, the results show that oil price volatility not only has debilitating impacts on the supply side of the financial system, but the impact is also negative on the demand side of the system. Rising instability invariably limits the capacity to make deposits in the financial system in Nigeria, thereby hurting the growth of the system and posing serious challenges for stability in the system. All the other coefficients in the model however fails the significance test at the 5 percent level.

4.3 Test of Hypothesis

Oil price instability does not have a significant relationship with financial sector indicators stability in Nigeria

To test this hypothesis, the results from Tables .6 to 10 are employed. In the results, the coefficient of oil prices possessed the expected signs for most of the estimates and also passed the significance tests at the 5 percent level. The significance of the oil price volatility coefficients shows that oil price volatility plays strong roles in the behavior of the financial sector variables in Nigeria. The null hypothesis can therefore be rejected; this implies that there is a significant relationship between oil price instability and financial sector indicators stability in Nigeria. This confirms the empirical work carried out by Amidu and Wilson (1990) that investigated the effect of oil price instability on financial sector growth.

5. Summary of Findings

In this study, the relationship between oil price instability, financial sector stability in Nigeria was empirically investigated. Essentially, the main thrust of the study was to examine how fluctuations in oil prices in the international market transmit to fragility in the financial sector in country. As was noted in the study; oil prices, while being one of the most volatile commodity prices in the international market has had wide-ranging effects on the Nigerian economy. The continued and intensified linkages of the financial sector to international commodity price movements around the world have also motivated the present study. Though most of the studies have focused on the linkages between capital (or stock) markets with international oil price variations, this study slightly deviates from extant literature and focuses on how the oil prices movements affects other components in the financial sector thus, it can be said that the study seeks to locate the effect of oil price instability on the overall market segment of the Nigerian financial sector.

In order to carry out the main tenets of the study, a theoretical foundation was provided for the empirical analyses while the pattern of movements of the main

variables in the study were initially characterized. The nature of the study entails that both economy-wide and firm-level analysis is carried out. The data used for the study therefore included macroeconomic-based variables that capture the financial sector as well as the banking sector in Nigeria. In this regard, macroeconomic data used in the study covered the period 1981 to 2016. Also, the main econometric techniques applied in the study were the Generalised Method of Moments (GMM) for the main estimates; the Probit technique for the estimation of banking sector crises; and the fixed-effect panel data analysis technique for the bank-specific data. The overall results obtained from the study are generally in line with previous studies like Kinda et al. (2016), IMF (2015), Amidu & Wilson (2012) and Fanizza (2009) which showed that on a broad level oil price instability either limits financial sector growth, weakens the ability of the sector to withstand external shocks, increases the likelihood for banking sector crises or reduce the level of integration of the financial sector with the international markets. More specifically, the empirical findings of the study revealed several issues.

1. There is a significant relationship between oil price instability and stability of most of the financial sector indicators in Nigeria. The effect is negative, leading to weakening of lending capacity, intensification of non-performing loans in the banks, and reduction in deposits in the banking sector. The effect on interest rates is however desirable since it reduces the rate spread in the banking. Also, the effect on liquidity or financial deepening is not significant and suggests that growth of liquidity does not immediately fall following oil price destabilization.
2. Thus, oil prices instability was shown to have extensive capacity to weaken the financial sector in Nigeria and cause fragility in the system, especially with respect to the money market.
3. Fragility in the financial system tends to negatively affect banking sector performance in Nigeria. When financial sector indicators drop, the study reveals that banking sector performance indicators also tend to fall.

6. Conclusion

The adverse effects of oil price shocks on the nation's economy are real since oil remains the major foreign exchange earner for the country. In a globalized world economy with highly interlinked market patterns, the need to devise appropriate policies to shield the economy as much as possible from the external shocks is becoming more and more relevant. This study has placed in perspective how the financial system may become weakened by oil price movements over time and the roles that policy could play in ensuring domestic stabilization of the financial sector in the economy. Although the outline of the study is not exhaustive, it has shown the extensive effect of instability oil prices on the financial and banking sector in Nigeria. In this study, we attributed this poor performance to the nature of linkages between the financial and banking sector as well as the amplified effects of supply shocks (arising from volatile oil revenues) that persistently deride the use of overall economic performance in Nigeria.

However, other factors may have also contributed to the low financial and banking sector performance in Nigeria over the years. (Obadan & Adegboye, 2004), James (1999) and Kaminsky & Reinhart (1999) have considered the place of weak institutional setups, poor policy applications and unstable regulatory frameworks as major factors that lead to financial sector problems in the African region, including Nigeria. Indeed, poor financial structure planning and execution, as well as pure financial corruption may have bedevilled the financial landscape in Nigeria, leading to easy susceptibility to financial fragility and crises. Moreover, the increasing rate of financial development in the country calls for more considerations towards the use of monetary policy (even if combined with fiscal policy) as a tool for macroeconomic adjustment. This has constituted a great deal of academic and policy evaluation over the years and provides a formidable alternative to an ever increasing size of government in macroeconomic stabilisation.

Finally, the world currently is moving in search for greener energy, thereby cutting the inflows of oil revenue into the country. Apparently, the diversification of the economy is essential in order to provide a strong macroeconomic background for financial system development and adequate linkage with the external sector. As suggested by Iztzki et al (2008), there is therefore need for other foreign exchange management measures which ensures that the high demand for foreign currency are met as the overall economic performance and trade balance in Nigeria largely depended on it.

7. Recommendations

The overall findings in this study have positive implications on some policy directions which may be a useful tool for the policy authorities. Firstly, the results showed the debilitating effects of oil price volatility on the financial and banking sector in Nigeria. Thus, there is need for the financial system to adopt measures to at least, limit the impact of oil price movements over time. Such measures would have to include exchange rate management techniques that will ensure sustainability of international financial transactions even when oil prices are down (or rising rapidly).

Moreover, the effectiveness of the role of the monetary policy authority in Nigeria has been quite highlighted in the study. It was shown that proper use of policy instrument can effectively shield the financial sector from excessive oil price volatility transmission into the system. Hence the Central Bank should be proactive in its monetary policy conduct by ensuring the policy actions do not directly relate with oil price variations. One way of doing this is to de-couple policy instruments from fiscal entanglements such that monetary policy does not become subservient to fiscal operations. The situation where the Central Bank always acts as a back-up factor for fiscal policy activities will lead to a system where monetary policy would also follow oil price movements in the international market.

Finally, the results also show the role of income levels and fiscal activities on the financial sector in the country. Thus, a key policy objective of government should be to pursue fiscal strategies that have the goal of reducing long term direct responses

of expenditure to oil price movements. This would imply eliminating spending patterns that are expansionary during output (and oil) booms, and critically, targeting prudent fiscal balances over time. The study showed that rising income levels is inimical to banking sector stability, suggesting that spending spree during oil booms could hurt the financial system. A prudent fiscal strategy would create fiscal room that could become available if needed when an output cycle dips, place government in a better position to deal with oil market volatility, and increase the likelihood that it can weather temporary oil shocks without drastic short-run fiscal and financial sector adjustments.

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