

**Does Financial System Influence Tax Revenue? The Case of Nigeria**

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**Abstract**

We examined the influence of financial system activities on tax revenue collection in Nigeria for the period of 1981-2014. After given consideration for the period of banking crisis with the employment of ARDL/ Bound test, causality test, variance decomposition and impulse response techniques, our analysis showed that financial system activities influence tax revenue collection in Nigeria. We showed that financial system variables such as stock market development, banking development, banking crisis and financial inclusion variables play a pivotal role in the tax revenue collection. The impulse response, causality test and variance decomposition results corroborate our regression results. Therefore, we conclude that financial system should be used efficiently by government to improve the level of revenue collection and hence, economic growth.

**Keywords:** Stock market, Tax, Banking crisis, Nigeria

**JEL classification:** G1, G38, H21.

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## **1. Introduction**

In recent years, the federal government of Nigeria has been anxious to improve the level of revenue generated with broad aim of diversifying the economy away from oil revenue. This occurs after realizing that the efficacy of the tax system and its collecting mechanism are very important. Tax revenue is the most sustainable revenue which is needed to meet the developmental goals and other non developmental expenditures. To further accelerate the tax collection procedures and reduce the incidence of tax evasion and avoidance, the Nigerian government engages the service of banks and other financial services providers. This is because banks and other non- financial institutions make liquidity available to businesses and individual consumers. In the process of performing their core functions of financial intermediations, financial institutions provide different forms of payment systems that are essential for noncash transactions (Elliott, 2010).

Believing that a well developed, transparent and efficient financial institution would motivates corporate body and individual tax payers to conduct with them, their financial transactions. In turn, the tax payers disclose their true identities such as sources of income and business transaction deals for a relevant period. This makes the Nigerian government to enact laws instructing the financial institutions to reveal the true identities of their customers to the relevant tax authorities upon request. This information assists in bringing the unknown taxpayers to tax net in Nigeria. Therefore, the tax authorities obtain valuable information from these institutions on taxpayers' income and assets. Although this phenomenon has increased the tax revenue to the government to certain extent coupled with other tax reforms but the level of underground economy in Nigeria has increased due to underdeveloped financial systems. It becomes impossible to collect accurate tax information from formal financial institutions.

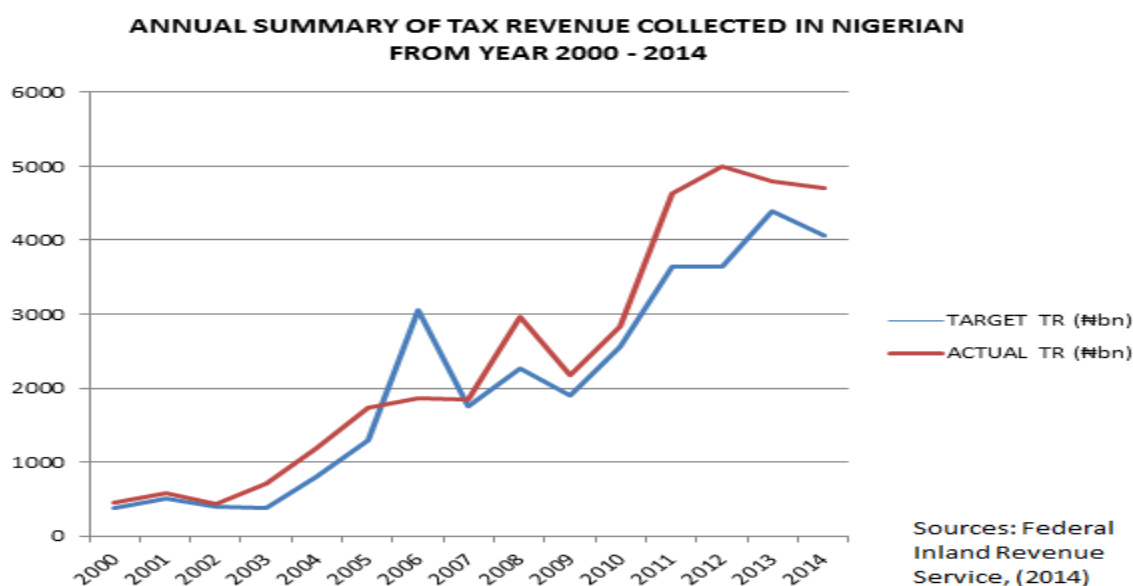
Financial systems may influence tax revenue. To start with, economic growth expands taxable economic activities, which increases tax revenue to the government. Second, economic growth brings prosperity and boosts the goods and services demanded in the economy which raises new investments. These activities cannot occur without a good financial system in place. As a result the income tax base would increase which contributes to tax revenues in a country. Financial development could directly influence increase tax revenues as a result of its roles in facilitating record tracking and tax collection (Capasso & Jappeli, 2013).

This revelation leads us to an important scientific inquiry, thus: does financial development influence tax revenue? In answering this question, few scientific papers have been identified in the literature with missed conclusions (Bohn,1990; Demirguc-Kunt & Huizinga, 2001; Tavares & Valkanov, 2001; Ardagna, 2009; Taha, Colombage, Maslyuk & Nanthakumar,2013; Akram, 2016). Taha, et al (2013) show that effect of the financial system on tax revenue is more profound in the short run than in the long run. Akram (2016)'s results supports both long run and short run impact of financial development on tax revenue. Bohn (1990), Demirguc-Kunt and Huizinga (2001), Tavares and Valkanov (2001), and Ardagna (2009), focus on either banking or non-banking activities in the financial system, but do not attempt to examine the impact of both types on tax revenue generated. While majority of these studies are either conducted in developed countries or Asian emerging countries, we find it difficult to trace any study of this nature conducted using African country as a case study.

Furthermore, due to lack of agreement among the scholars, this study intends to further give insightful information on how the financial system activities influence tax revenue using Nigeria as a case study. Our study contributes to the literature in many ways. Unlike previous studies, we demonstrate how financial system activities including banking crisis can affect tax revenue collection. Before the bank consolidation exercise in year 2005, the Nigerian banking sector experienced a lot of stress, uncertainty and anxiety. Investor's and depositor's funds were not guaranteed. This makes many banks to come under stress due to capital inadequacy.

Also, the value of investor shares in the Stock Market was also depreciating. These problems greatly impaired the quality of the bank's assets as non-performing assets became unbearable and became huge burdens on many of the banks. The financial intermediation role of the banks became heavily impaired while the macroeconomic activities seriously slowed down. This eroded the confidence of the general public which used to be a great asset of the banking sector in the past. The global financial crisis during the Nigerian post consolidation era (2008/2009) further fueled the banking crisis in Nigeria. This phenomenon has not been considered in the previous studies.

In addition, Nigeria represents one of the big countries in Africa in terms of economy and land size. The country has recorded an improvement in tax revenue generated which is even above the target tax revenue but one of the lowest in the world with tax revenue to GDP ratio of 1.5% (World bank indicators, 2013). For instance, a careful look at Figure 1 shows that the Federal Inland Revenue Service (FIRS) has reported tax revenue of N2.83 trillion in year 2010 which has increased to N4.71 trillion in year 2014. These figures do not include those taxes collected by tax authorities in the State Board the Local Government Revenue Committee (LGRC). Figure 1, also shows that the target and actual tax revenue collected increase from 2000 to 2014.



**Figure 1.** Annual Summary of Tax Revenue Collected in Nigeria From 2000 – 2014  
Source: FIRS (2014)

Despite the increase in tax revenue to Nigerian government and the use of financial institutions as an unpaid agent of receiving taxpayers’ information, to the best of our knowledge, no study has inquired into the relationship between financial system activities and tax revenue in Nigeria. Meanwhile, providing appropriate policy directions to stimulate the financial system as an engine of tax collections in Nigeria and other developing countries is not clear cut in the literature making it difficult to develop appropriate policy package which could encourage activity in the financial system that would, in turn, also contribute to economic growth (Taha et al, 2013). To this end, understanding of the relationship between financial system and tax revenue is necessary to forecast and facilitate more productive revenue collection.

We organize this paper into five sections. The next section deals with review of literature, followed by methodology. Section four deals with discussion and results while section five deals with conclusion.

## **2 Review of Literature**

### **2.1 The Roles of Financial Sector in Tax Collection and compliance in Nigeria**

Nigerian Tax system consists of three elements: tax laws, tax policy and tax administrations. Tax policy serves as the basis for tax laws while tax administration is concerned with the implementation of the tax laws. It means to establish an effective and efficient tax system, appropriate tax policies and legislations need be put in place and properly implemented (Dike, 2014). In a more specific sense, laws represent a whole body of enacted acts of legislation. In the context of Nigerian tax laws, the following are the available tax laws: Federal Inland Revenue Service (Establishment) Act No. 13 of 2007, Companies Income Tax Act (CITA) CAP C21 LFN, 2004 (commencement 1st Jan, 1958), Personal Income Tax Act (PITA) CAP 8 LFN, 2004 (as amended), Petroleum Profits Tax Act (PPTA) CAP 13 LFN, 2004 (commencement 1st Jan, 1958), Deep Offshore and Inland Basin Production Sharing Contracts Act, Value Added Tax Act (VATA) CAP D1 LFN, 2004 (commencement 1st Dec,

1993), Education Tax Act CAP E4 LFN, 2004 (commencement 1st Jan, 1993), Capital Gains Tax Act (CGT) CAP C1 LFN, 2004 (commencement 1st April, 1967), Stamp Duties Act CAP S8 LFN, 2004 (commencement 1st April, 1939), National Information Technology Development Agency Act (NITDA), Nigeria LNG (Fiscal Incentives, Guarantees & Assurances) Act, Industrial Development (Income Tax Relief) Act, Industrial Inspectorate Act, investment and Securities Act, 2007, and Insurance Act of 1997 (as amended) .

However, tax as a component of the Nigerian fiscal system has been experiencing unstable financial condition since 1980s resulting to inability to provide basic services to Nigerians. The financial resources remained inadequate; expenditure outstripped revenue growth rate. The levels of Tax compliance are still very low leading to large fiscal deficit in the national budget. Therefore, the tax collection efficiency in Nigeria's tax system remained focal point for that past decade. In a bid to improve the level of tax compliance, the Nigerian Government introduces some tax reforms into the system. The system has undergone significant changes in recent times with the involvement of financial institutions as one of the key agents. The tax administration in Nigeria cuts across the three-tiers of Government. The tax policy establishes guidelines on how crucial tax administration issues can be resolved. In the context of the Nigerian Tax Policy, tax authorities at all levels shall administer their mandates in accordance with the tax laws as updated from time to time.

In the Nigerian Tax system, the role of financial institutions is a key to success being recorded in tax revenue generated. It is compulsory that all potential taxable persons or businesses must register and Taxpayer Identification Number (TIN) is issued accordingly. Tax authorities in each state and at federal level normally leverage on the database of commercial banks through the Central Bank of Nigeria on Bank Verification Number (BVN) to solicit and get the true identity of the taxpayers who happen to be commercial banks' customers. In order to further confirm the authenticity of the information, the relevant tax authorities also investigate through the database of the National Identity Management Commission (NIMC), Nigeria Communication Commission (NCC), Corporate Affairs Commission (CAC), Federal Road Safety Commission (FRSC), Nigeria Immigration Service (NIS) and other relevant sources. This activity enables the authorities get accurate identity of the relevant tax payers in Nigeria. The tax authorities have developed an efficient framework for cooperation which helps in sharing of information with other tax authorities and relevant local and international agencies. This mitigates tax evasion and revenue losses.

Apart from customers' information received from financial institutions, the financial institutions normally pay company income tax and serve as unpaid agents in tax revenue collection. For instance, Banks charge commission on turnover, fees, or other charges for services rendered to their customers. Value-Added Tax (VAT) calculations are based on the charges made for services rendered to bank customers. In addition VAT's are charged on ancillary services and fees charged to the provision of loans and advances. Non-bank financial institutions such as Insurance companies' brokers/agents also earn commission, loss adjusters earn fees, surveyors earn fees, brokers earn commission and agents earn commission for various services rendered to the Insurance Companies. The services which generated these incomes are vatable services, and even though the premium received on policies is not vatable as it represents cost of risk to the insured, the commission paid to brokers/agent from premium attracts VAT (Federal inland Revenue Board, 1995). Of recent, it is now compulsory for financial institution to charge stamp duties on every eligible transaction deals with customers (Central Bank of Nigeria, 2016).

## **2.2 Banking, Financial crisis and Tax revenue**

Financial and banking crisis are majorly featured with loss of outputs and a decrease in economic variables like consumption, investment, and industrial production. Financial variables like asset prices and credit usually follow similar patterns during crises (Claessens & Kose, 2013). A major decrease in national output can be translated into lower national income which deteriorates the debt servicing of the government as a result of reduction in tax revenues. Hence, national debt usually enlarges during banking and financial crisis and this may lead to fiscal imbalances (Amuakwa-Mensah, Marbuah & Ani-Asamaoh, 2017).

This means that global financial and economic crisis presents major challenges to revenue administration in every country. With worsening economic conditions, tax agencies around the world face growing compliance problems involving such issues as tax arrears, loss-reporting businesses, tax withholding, and cash economy. Therefore, financial crisis has important implications for banks, companies, investors, and governments (Claessens & van Horen, 2014). Specifically, for banks, the key implication is that the financial intermediation role may be interrupted during crisis periods. The number of bank failures may increase drastically during crisis and also bank stocks may drop (Kwan, 2010). For government agencies, taxpayers would be asking them to provide additional support and assistance to help them cope with their tax obligations. By complicating their response to the crisis, some tax agencies face prospective budget cuts as governments wrestle with increasing fiscal pressures (Brondolo, 2009). During the period of crisis, there are many different factors that could lead to decrease in tax revenue. First, the tax bases reduce at a faster rate than GDP in the face of crisis, a decline in commodity prices reduces tax revenues, and flexibility in tax policy. And, a significant decrease in tax compliance rate may eventually reduce tax revenue to government pulse.

Banking crises lead to the closure, merger, or takeover by the public sector of one or more financial institutions; or bailout of some important financial institutions by the government. Findings of Reinhart and Rogoff (2009) show that banking crises lead to sharp declines in tax revenues, as well as to significant increases in government spending. Financial crisis can decline the profitability of banks as a consequence of reducing lending activities and of deteriorating liquidity position of banks ability to pay tax liability (Živko & Kandžija, 2013). The direct effect of the crisis can mostly increase stock market volatility and wealth losses can take place in stock market causing depression in the stock market activities. Also, a drop in the quality of credit extended by banks for trading in the capital market can occur during crisis and an increase in loan-loss provision with a decrease in tax compliance (Ashamu & Abiola, 2012; Amuakwa-Mensah & Marbuah 2015).

## **2.3 Empirical review**

Before now, studies on the relationship between fiscal policies and financial development have focused on the effect of the former on the latter (Darrat, 1988, 1990; Ardagna, 2009; Arin & Koray, 2006; Laopodis, 2009). Also, most of these studies are either conducted in developed countries or lack useful insight on how the financial system activities can affect tax revenue as a key variable in such a relationship. Blackburn, Bose and Capasso (2012) investigated underground economy and financial development nexus in a proposed model of tax evasion and bank intermediation. It was stated that agents with diverse skills may seek loans in order to undertake risky investment projects. But asymmetric information in such loan contract induces self-selection in a separating equilibrium. By facing these contracts, agents choose how much of their income to declare by trading off their incentives to offer

collateral against their disincentives to comply with tax obligations. Their analysis implies that the marginal net benefit of income disclosure increases with the level of financial development. Thus, in accordance with empirical observation, it was established the result that the lower is the stage of such development, the higher is the incidence of tax evasion and the greater is the size of the underground economy. Several empirical studies have also examined the effect of resource mobilization at regional level on tax revenue with a general conclusion that such resources influence tax revenue. Tanzi (1981) investigated this scenario using Sub-Saharan African countries (SSA), he reported that mining and non-mineral export share positively affect the tax ratio. Leuthold (1991) used panel data of SSA and confirmed a positive impact from trade share, but a negative one from the share of agriculture; also see Stotsky Wolde and Mariam (1997) for 43 panel data of SSA.

While investigating the relationship between tax and the financial market, Mannaro, Marchesi and Setzu (2008) used foreign exchange and stock market variables as proxies for financial market. They examined this relationship taking into consideration the market conditions with and without tax using an artificial stock market. It was reported increase in tax rate significantly impacted on market behavior because it increases price volatility and reduces trading volumes. It was established the relationship between these two variables by focusing on the impact of taxation in determining the price of financial market instruments. It is believed that any taxation imposed on financial market activities will make the market less volatile as speculators leave the market due to the changes taking place. Thus, the levy of a small tax on financial system activities, specifically, stock exchange activities, could contribute to the reduction of instability in the domestic stock market. Chaudhry and Munir (2010) analyzed, using Pakistan as a case study, empirically the determinants of low tax revenue. They employed time series econometric techniques for the period 1973-2009. The results showed that openness, broad money, external debt, foreign aid and political stability are the significant determinants of tax efforts in Pakistan with expected signs. The results also indicates that the determinants of low tax revenue in Pakistan are narrow tax base, more dependence on agriculture sector, foreign aid and low level of literacy rate. It was empirically documented by Karagöz(2013) that tax revenues in Turkey significantly affected by agricultural and industrial sector share in GDP, foreign debt stock, monetization rate of the economy and urbanization rate whereas the sign of the agricultural sector's share is negative as expected. The results suggest that openness to foreign trade has no significant impact on tax revenues in Turkey.

Taha (2013) examined the relationship between stock market performance and taxation in Malaysia for the period 1980- 2008. The Gregory Hansen methodology was utilized to examine which tax collected by Malaysia's Government most impacted stock market performance in Malaysia. It was shown that stock market performance contributes most to the changes in company tax revenue as compared to personal taxes and real property gain taxes. it was concluded that stock market performance in Malaysia was influenced by strong growth of company tax revenue collection. The author suggested that fiscal policy authorities in Malaysia should enhance efforts to promote stock market activities, which will subsequently increase the tax revenue collection.

However, the recent work of Taha *et al* (2013) provided a useful insight on the relationship using Malaysia as a case study, within the period of 1997–2008 based on monthly data. Using ARDL bound test approach to co-integration, the study confirmed long run equilibrium among the variables. VECM also confirmed fast speed of adjustment. Ganger causality

confirmed unidirectional causality running from stock to tax revenue. It means an increase in stock market development improves tax revenue collection. In general, they confirmed that the effect of the financial sector in an economy on tax revenue is more profound in the short run than in the long run.

Furthering the work of Taha *et al* (2013) in Asia region, Akram (2016) analyzed the impact of financial markets on tax revenue in Pakistan for the period of 1975–2014. After employing Ganger causality and error correction mechanism, he found that the number of bank branches as a measure of financial inclusion and market capitalization as a measure of stock market activities have a positive and significant effect on tax revenue in the long run. He documented that credit to the private sector as a measure of banking development had a bidirectional relationship with tax revenue, public sector credit had an insignificant impact on tax revenue. However, only the number of bank branches and market capitalization had a significant impact on tax revenue in the short run.

The work of Ilievski (2015) considered the financial sector using the stock market sector indicators as a proxy for financial development. It was found that higher stock market total value traded sectors are associated with more tax revenue. This was documented after using a panel data set of 96 countries over the period 1990-2008. He further stressed that stock markets positively influence government's ability to raise tax revenue after batteries of robustness tests.

Using Turkey as a case for analysis, Akçay, Sağbaş and Demirtaş (2016) explored the nature of the relationship between financial development capturing banking and non-banking activities and direct tax revenue for the period 2006-2014 based on monthly data. They investigated the long run relationship using Johansen and found that the variables are co-integrated. Employing causality test within the framework of Vector Error Correction Model (VECM), it was revealed that banking and non-banking financial development Granger cause direct tax revenue in the long run. Only the banking sector Granger causes direct tax revenue in the short run.

### **3. Data and Methodology**

#### **3.1 Econometric model and variables measurement**

We adopt three approaches in the analysis: dynamic analysis ARDL/ Bound test, causality test, impulse response and variance decomposition. Since tax revenues are persistence, the dynamic analysis is considered for the study. Based on our literature review, it has been established that there is a link between tax revenue and financial development. Therefore, we follow the empirical model of Taha *et al* (2013), Ilievski (2015) and Akram (2016) in this study. Their model expresses the linear relationship between Tax revenue (TR) and financial development as stated below:

$$TR = f(\text{Financial system}) \quad (1)$$

Since financial system is made up of many components including banking activities and stock market. We further re-specify our model as;

$$TR = f(CS, CP, SM, BB) \quad (2)$$



In the period of financial and banking crisis, the intermediation activities are affected. The rate of bank failures increases. The level of Taxpayers compliances would reduce, hence tax revenue may drop. Even some tax payers may be asking for tax incentives and assistance to help cope with tax obligations. In order to consider this phenomenon in our study, we re-specify the model as shown in (3)

$$TR = f(CS, CP, SM, BB, BC) \quad (3)$$

Where TR represents tax revenues as a percentage of GDP, CS is the bank credit to public sector as a percentage of GDP, CP is the bank credit to private sector as a percentage of GDP, SM is stock market capitalization as a percentage of GDP, BB is the number of commercial bank branches. Number of bank branches is a proxy for financial inclusion (see Akram, 2016) and BC is the banking crisis. This study uses dummy variable to capture the period of banking crisis in Nigeria. The period 1991-1995 and 2008-2011 take 1 while others are 0.

As aforementioned, we adopt autoregressive distributed lag (ARDL) for the study. Following the work of Pesaran and Shin (1995, 1999) and Pesaran (1997), we transform model (3) in a dynamic framework of ARDL as follows.

$$\begin{aligned} \Delta TR_t = & \alpha_0 + \sum_{i=1}^k \pi_i \Delta TR_{t-i} + \sum_{i=0}^k \gamma_i \Delta CS_{t-i} + \sum_{i=0}^k \theta_i \Delta CP_{t-i} + \sum_{i=0}^k \psi_i \Delta SM_{t-i} \\ & + \sum_{i=0}^k \delta_i \Delta BB_{t-i} + \sum_{i=0}^k \tau_i \Delta BC_{t-i} + \alpha_1 TR_{t-1} + \alpha_2 CS_{t-1} + \alpha_3 CP_{t-1} \\ & + \alpha_4 SM_{t-1} + \alpha_5 BB_{t-1} + \alpha_6 BC_{t-1} + \epsilon_t \end{aligned} \quad (4)$$

This approach is applicable irrespective of the level of stationary of the variables, but must not exceed I(1). The technique tests for co-integration involving the conditional error correction version of the ARDL model for tax revenue and financial system as the determinant.  $\Delta$  is first-difference operator and  $k$  is the optimal lag length while  $\epsilon_t$  is the white noise.  $F$ -statistic test is used to test the existence of long-run relationship with null hypothesis of no co-integration among variables in equation (4) is represented as  $H_0: \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = 0$  against the alternative hypothesis  $H_1: \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq 0$ . Since our sample is relatively small in which the number of years is 34, the critical values used are as reported by Narayan(2004). The test is an asymptotic critical value bounds which depends on the variables properties, thus: I(0) or I(1) or a mixture of both.

To this end, we need to generate two sets of critical values with one set refers to the I(1) series and the other for the I(0) series. The critical values for the I(1) series are referred to as *upper* bound critical values, while the critical values for I(0) series are referred to as the *lower* bound critical values. Hence, to accept that the variables are co-integrated, the  $F$  test statistic must exceed their respective upper critical values. Where this occurs, we can then proceed to estimate the Error correction model. The error correction model shows the speed of adjustment back to long run equilibrium after shock.

### 3.2 Data and variable descriptions

Our study uses data from 1981-2014 sourced from National Bureau of Statistics, Central Bank of Nigeria and World Bank Development indicators. Data on stock market capitalization, credit to public sector and credit to private sector were sourced from World Bank Development indicators, while data on number of bank branches and Tax revenue were sourced from Central Bank of Nigeria and National Bureau of Statistics respectively. Table 1 shows the descriptive statistic of our variables while Table 2 shows the correlation analysis of the variables. The average total revenue is 22.16% with maximum of 39.7% and minimum of 1.48%. The level of volatility is 10.61%. Also, credit to private sector as a percentage of GDP has average of 15.03% compared to credit to public sector as a percentage of GDP which has an average of 6.31%. This shows that major credits from bank go to private sector. The maximum levels of both variables are 38.38% and 16.49% respectively. The standard deviations of the two variables also differ by 2.64%.

**Table 1: Descriptive Statistics of the Data**

	TR	CS	CP	SM	BB	BC
Mean	22.16059	6.310191	15.03407	9.483453	2904.500	0.235294
Median	22.10000	6.036000	13.20900	9.218950	2363.000	0.000000
Maximum	39.70000	16.49300	38.38600	35.89400	5809.000	1.000000
Minimum	1.480000	1.335000	8.709600	0.078100	869.0000	0.000000
Std. Dev.	10.61478	3.546889	6.280578	8.576771	1563.603	0.430562
Obs	34	34	34	34	34	34

Furthermore, stock market has means of 9.48% with maximum value of 35.89% and minimum of 0.07%.

**Table 2: Correlation Analysis of the variables**

	TR	CS	CP	SM	BB	BC
TR	1.000000	-0.152782	0.082932	0.20924	-0.35423	-0.04764
CS		1.000000	0.383932	-0.04828	-0.02709	-0.24749
CP			1.000000	0.244737	0.281388	0.069902
SM				1.000000	0.606233	-0.07312
BB					1.000000	0.220107
BC						1.000000

Among the financial development indicators, stock market development has the highest volatility rate except number of bank branches with standard deviation of 1563.6. The crisis variable has average score of 0.235 with expected maximum of 1 and minimum of 0.

Table 2 shows the correlation analysis of the variables. Most of the variables show negative relationship with tax revenue with the exception of credit to private sector and stock market development indicator. We can state that there is positive correlation between credits to private sector tax revenue. The same applies to tax revenue and stock market development

while in the presence of banking credit, tax revenue reduces. From the table 2, we can observe that multicollinearity is not severe in our estimations.

### **3.3 Analytical Techniques**

We analyse the short and long-term dynamic influence of financial system on tax revenues within the ARDL framework. We first use Augmented Dickey–Fuller (ADF) test to confirm the presence of unit root test for all the variables before investigation under ARDL Model. Then we use bound test approach to co-integration to examine the existence of cointegration relationship among variables. Thirdly, we build Vector Error Correction (VEC) Model based on the VAR model and use Granger causality test to determine causal relationship between tax revenue and other variables. Finally, we further employ impulse response function and variance decomposition base on VEC model to examine the effects and contribution of shocks on the adjustment path of variables.

## **4 Empirical Results and Discussion**

### **4.1 Unit Root Test**

We begin our findings by checking the properties of our data for presence of unit root. We apply Augmented Dickey-Fuller (ADF) test to confirm the presence of unit root in the data as reported in Table 3.

**Table 3: Unit Root test results**

<b>Variables</b>	<b>ADF statistics</b>	<b>Critical value @ 5%</b>	<b>Remarks</b>
<b>TR</b>	-5.95858	-2.95711	I(1)
<b>CS</b>	-5.646092	-2.95711	I(1)
<b>CP</b>	-5.182138	-2.95711	I(1)
<b>SM</b>	-4.736073	-2.960411	I(1)
<b>BB</b>	-6.004122	-2.95711	I(1)
<b>BC</b>	-5.477226	-2.95711	I(1)

We confirm that all our data are stationary at first difference meaning they are integrated of order one I(1). Confirmation from this result leads us to proceed on co-integration test.

### **4.2 Co-integration Test**

Co-integration test is necessary to confirm the existence of long run equilibrium among our variables employed for the study. Therefore, Table 4 reports our results on bound test approach to co-integration test. It can be seen that the F-statistic value is 9.616197 which remains significant at all level. We conclude that the there is long run equilibrium among the variables.

**Table 4: ARDL Bounds Test**

Null Hypothesis: No long-run relationships exist			
Test Statistic	Value	K	
F-statistic	9.616197*	5	
Critical Value Bounds			
Significance	I0 Bound	I1 Bound	
10%	2.26	3.35	
5%	2.62	3.79	
2.50%	2.96	4.18	
1%	3.41	4.68	

\* Significance at all level

#### **4.3 Analysis of Financial Systems as its Influence Tax revenue**

We proceed to estimate short run and long relationship between tax revenue and financial system/development in Nigeria. Table 5 reports the long run relationship and Table 6 reports the short run effect of financial system on tax revenue. In the long run, credit to private sector (CP), credit to public sector (CS) and financial inclusion (BB) are negative and significantly influence tax revenue. This supports the theoretical prepositions and empirical findings of Ardagna, (2009), Laopodis (2009); Tavares and Valkanov, (2001). They report that there is a negative relationship between tax policy and financial system. Stock market(SM) is positive and has significant effect on tax revenue in Nigeria. This result is consistent with the submission of Akram (2016) and Taha, et al (2013). Furthermore, banking crisis (BC) is negatively significant influence tax revenue. This is because in the period of financial crisis, the tax bases contrast and therefore the level of taxpayers' compliance is reduced. This confirms the submission of Reinhart and Rogoff (2009). Financial crises reduce tax revenues and significantly increase government spending. It reduces financial intermediation function of the financial system and further deteriorates liquidity position of banks ability to pay tax liability in the long run (Živko & Kandžija, 2013).

**Table 5: Long run Relationship**

Variable	Coefficient	t-Statistic	Prob.
CS	-2.238452*	-6.933697	0.0001
CP	-0.495383*	-2.142235	0.0608
SM	0.381653*	3.727032	0.0047
BB	-0.001674*	-2.380553	0.0412
BC	-29.156407*	-8.198942	0.0000
C	52.600653*	16.619277	0.0000

<b>Diagnostic Test</b>			
R-sq.	0.98269		
Adj.(R-sq)	0.944225		
F-statistic	25.54718		
P-V(F-stat)	0.000013		
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.378311	P.Val.	0.9663
Obs*R-squ	13.70177	P.Val(Ch.sq)	0.8453

\* significant at 5%

In the short run estimation as reported in Table 6, we further confirm that there is long run relationship between the variables because the error correction coefficient is negative and significant showing the speed of adjustment to equilibrium.

**Table 6: Short run relationship  
Dependent variable TR**

Variable	Coefficient	t-Statistic	Prob.
D(CS)	-1.574884*	-5.512469	0.0004
D(CS(-3))	0.852776*	2.958508	0.016
D(CP(-2))	0.514235*	2.791905	0.021
D(SM)	0.420361*	2.864834	0.0186
D(BB)	-0.008356*	-3.000021	0.015
D(BB(-1))	-0.007118*	-2.345435	0.0436
D(BC(-1))	-2.920522	-1.308835	0.223
D(BC(-2))	12.719354*	4.995525	0.0007
D(BC(-3))	15.851736*	3.939733	0.0034
ECM(-1)	-1.101421*	-6.379396	0.0001

\*Significant at 5%

The short run results show that credit to private sector; stock market development and banking crisis have positive, significant influence on tax revenue in Nigeria. The banking crisis has a positive sign and also significant in its influence on tax revenue. This happens because during the period of crisis, tax authorities in some case do relax tax policy and encourage voluntary compliance through tax policy to further encourage settlement of tax liabilities. Brondolo (2009) states that taxpayers would temporarily seek support and assistance from relevant tax authorities to help for any possible ways of settling their tax

obligations. A positive response from the authorities would encourage tax revenue to government pulse.

We use granger causality test to exam whether there exists causality between tax revenue and other variables. Table 7 presents the results of granger causality. As we can see, Credit to private sector (CP) and banking crisis (BC) are the Granger-cause of Tax revenue (TR) in Nigeria. CS, SM and BB are not Granger-cause of Tax revenue.

**Table 7: VEC Granger Causality/Block Exogeneity Wald Test**

Dependent variable: D (TR)

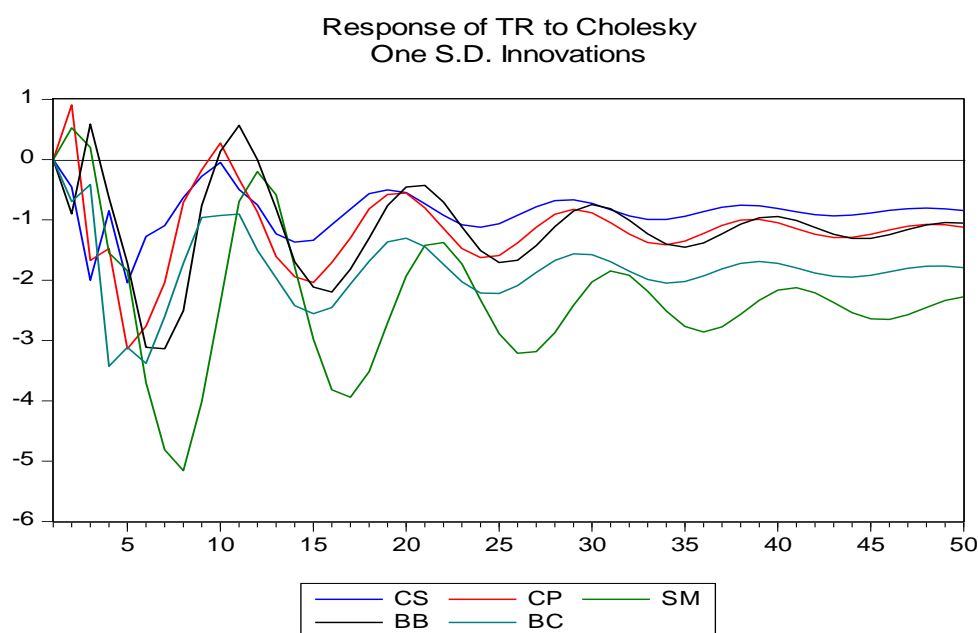
Excluded	Chi-sq	Df	Prob.
D(CS)	2.851737	2	0.2403
D(CP)	9.106524*	2	0.0105
D(SM)	1.525332	2	0.4664
D(BB)	2.672067	2	0.2629
D(BC)	12.98858*	2	0.0015
All	23.28570*	10	0.0097

To investigate the effect of an endogenous variable on current and future value of other variables, we employ impulse response function to analyse the dynamic effect of one standard deviation of the random interference on the overall system in VAR/VEC framework. We adopt this impulse response function to analysis the dynamic relationship between Tax revenue (TR) and other variables. Figure 2 shows the results of impulse response function.

**Table 8: Average impulse response of TR to cholesky in 50 period**

	CS	CP	SM	BB	BC
Average response	-0.86756	-1.1563	-2.32809	-1.13941	-1.81612

Cholesky Ordering: TR CS CP SM BB BC



**Figure 2: Response of TR to Cholesky One S.D. Inovation**

It shows that the impulse response of TR to all the other variables in the first period is zero. The impulse response of TR to CS, BB and BC are increasingly negative, but BB and CP become positive when they reach period 10, become negative. The impulse response of TR to CP and SM are positive at first, and become negative at period 5 onwards.

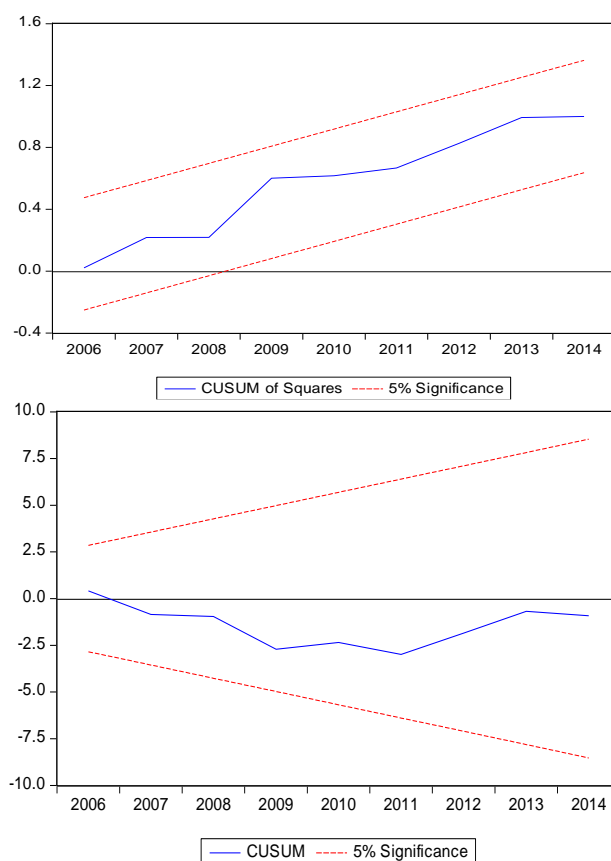
We further calculate the average impulse response to TR in 50 period, the results are present in Table 8. On average, stock market (SM) has the biggest influence on TR, which is a negative shock follow by banking crisis (BC), credit to public sector (CP), financial inclusion (BB) while credit to public sector (CS) has the weakest influence on Tax revenue (TR) in average.

We also employ variance decomposition to analyse the relative importance of every innovation to all the endogenous variables by decomposing the fluctuation. Table 9 presents the variance decomposition of TR as the disturbance by itself decrease and impact from other variables increase. In lag period of 50, 12.1% of impact is from banking crisis (BC), 21.97% from Stock market (SM), 6.01% from financial inclusion (BB), 5.7% from CP and 2.89% from CP. Therefore, our study provides evidence to support the financial systems as a crucial factor for tax revenue collection in Nigeria (also, see Taha, Colombage, & Maslyuk, 2010 and Taha et al., 2013 for Malaysia, Akçay et al., 2016 for Turkey and Akram, 2016 for Pakistan).

**Table 9: Variance Decomposition of TR**

Period	S.E.	TR	CS	CP	SM	BB	BC
1	5.549109	100	0	0	0	0	0
2	6.503911	93.86157	0.49016	1.944893	0.656215	1.911089	1.136072
3	7.64652	82.98977	7.192283	6.185543	0.543408	1.973699	1.115299
4	10.11825	73.27056	4.809923	5.65484	2.644246	1.518634	12.1018
5	12.49947	63.24697	5.819395	10.02076	3.9057	2.873661	14.13351
6	15.07517	55.35664	4.71827	10.2517	8.698244	6.239946	14.73521
7	17.23883	50.67982	4.011181	9.236229	14.44362	8.078693	13.55047
8	18.61732	47.11654	3.552867	8.065627	20.05399	8.73911	12.47187
9	19.293	45.98747	3.32926	7.518389	23.00862	8.293785	11.86248
10	19.62758	46.10151	3.217354	7.283778	23.69437	8.018217	11.68477
20	26.16465	48.14508	3.080176	6.62347	23.04015	7.278191	11.83293
30	31.07641	49.68369	2.995694	6.222929	22.46894	6.656513	11.97223
40	35.26299	50.62342	2.937233	5.967837	22.14676	6.268296	12.05646
50	38.99291	51.21781	2.894262	5.792998	21.97335	6.014396	12.10718

Cholesky Ordering: TR CS CP SM BB BC



**Figure 3: CUSUM and CUSUM of Square**

Figure 3 shows the plot of CUSUM and CUSUM Q statistic lies within the critical bounds, implying that all the coefficient in the estimated model are stable. Therefore, it indicates no structural instability and that the parameters are stable.

## 5 Conclusion

This paper examines the influence of financial system on tax revenue in Nigeria with the consideration of banking crisis in the relationship using time series data ranging from 1981-2014. Nigerian banking industry has witnessed series of banking crisis. However, the most recent banking crisis occurred as a result of the collapse in the prices of commodities such as crude oil which serves as the main bedrock of the Nigerian economy, also a decline in capital inflows to the economy contributed; followed by reduction in foreign reserves and pressure on exchange rates. Also, the global financial crisis impacts negatively on the availability of foreign trade finances for Nigerian banks; and credit lines become unavailable. The crisis also leads to the downturn in capital market operations, which witnessed divestment by foreign investors. In addition, failures in banking corporate governance at banks, inadequate disclosure and transparency on financial position of banks and weaknesses in the Nigerian business environment add to the crisis.

After employing ARDL/ Bound test, Causality test, variance decomposition and impulse response, our analysis suggests that financial systems influence tax revenue in Nigeria. We find that stock market influences tax revenue positively and significantly in short run and long run while banking crisis influence tax revenue negatively and significantly in the long run, but positively in short run. This shows that the effect of banking crisis on tax revenue is conditioned on the kind of fiscal policy being pursued by the government. A fiscal expansion



policy on the part of the government by way of cuts in taxes and increases in public spending can shorten the duration of the crisis and sustain growth with a contributing effect on tax revenue. The positive effect of banking crisis implies that tax authorities during financial crisis do relax tax policy and encourage voluntary compliance to encourage settlement of tax liabilities. In addition, Banking development and financial variables are all significantly influence tax revenue. This means that financial system activities influence tax revenue generation in Nigeria. Hence, we conclude that tax revenue collection is being driven by changes in the financial system activities. The impulse response, causality test and variance decomposition results corroborate our regression results. Our analysis provides further evidences by confirming the relative importance of financial market activities in the economy and as an important factor of tax revenue collection as reported in other developing countries. We show that financial system variables such as stock market development, banking development with banking crisis and financial inclusion variables play a pivotal role in the tax revenue collection. Hence, they can be efficiently used by government to improve the level of economic growth in Nigeria.

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