NEXUS BETWEEN FINANCIAL INCLUSION, ECONOMIC GROWTH AND INCOME:
EVIDENCE FROM NIGERIA

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SUMMARY

Unlike most financial inclusion studies which focus on supply-side data, this work investigates the relationship between financial inclusion, economic growth and income in Nigeria using demand-side data. Our primary objective is to determine the extent of the impact if any, that changes to financial inclusion exert on economic growth and income.

The bi-annual access to finance (A2F) survey conducted by Enhancing Financial Innovation and Access (EFInA)[1] provides the demand-side measurement of the extent and type of financial inclusion. Given that the survey started in 2008 and thus does not offer sufficient observations, we 'spliced' the data to redress this apparent shortcoming. Data for other parameters, reported with quarterly frequency, were taken from various sources, covering the period between 2008 and 2016.

The results of Granger causality test show that changes in formal financial inclusion cause changes in economic growth and income but not the other way around. This pattern suggests that an environment that is formal financially inclusive will lead to improved economic growth and income, but improvements in economic growth and income will not necessarily enhance formal financial inclusion.

The results also suggest that changes in informal financial inclusion cause changes in GDP, and changes in GDP also leads to changes in informal financial inclusion. Changes in informal financial inclusion similarly cause changes in real income, but changes in real income do not necessarily lead to changes in informal financial inclusion.

In summary, a financially inclusive environment is beneficial and leads to improved economic activity and income. Levers such as financial literacy and digital financial services (DFS), which improve access to and use of financial products and services, act as catalysts for financial inclusion.

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1   *EFIna is a financial sector development organization promoting financial inclusion.*

INTRODUCTION

Financial inclusion requires that irrespective of income levels and location, all individuals, households and firms have access to and use of financial services appropriate to their needs and at an affordable cost. Improving financial inclusion could have significant implications for income, economic growth and development. The existence of a positive, substantial and lasting relationship between the access to and use of financial services and economic growth would present a strong case for concentrating on increasing financial inclusion as a critical pillar of policy development aimed at restoring and sustaining vitality to Nigeria's economy. A-priori, we expect access to and use of financial services will stimulate increased capital accumulation leading to higher economic activity and thus growth.

Public policy in Nigeria recognises the importance of improved financial inclusion as a fundamental pillar in developing the nation's financial system. The Financial System Strategy, otherwise known as FSS 2020[2], developed by the Central Bank of Nigeria (CBN) aims to make Nigeria one of the major global economies by 2020. Available survey data shows the extent of progress Nigeria has achieved with adult exclusion falling from 53 percent in 2008 to 41.6 percent in 2016[3].

Notwithstanding the progress recorded, the existing gaps are as a result of challenges such as:

- Low literacy levels, including financial literacy (EFInA 2014) ;
- Worsening income distribution levels as the effects of rising unemployment affect income and standards of living.

As noted earlier, this study aims to examine the nature of causal relationships between financial inclusion, economic growth and income. Following this introduction, we present an overview of Nigeria's socio-economic characteristics in section 3; section 4 reviews progress and constraints in the journey towards financial inclusion. Definitions in section 5 precede the review of the body of literature dealing with the nexus between financial inclusion, economic growth and income in section 6. Sections 7 and 8 present the explanatory framework and approach, while section 9 presents the data analysis. The concluding sections summarise the study and propose policy recommendations.

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2 FSS Strategy 2016
3 EFInA, "Access to Financial Services in Nigeria" 2016 Survey
4 Low levels of awareness of financial terms/products could hinder the uptake of financial service products such as mobile money (20.8 percent adult awareness), non-interest banking (25.3 percent adult awareness) and micro insurance (19.5 percent adult awareness). However, high level of awareness does not necessarily result in high levels of uptake or usage. For example, 48.2 percent of the adult population state that they are familiar with insurance, yet current penetration is 1.1 percent

NIGERIA:
CHARACTERISTICS AND TRENDS

FINANCIAL
INCLUSION OVERVIEW

With a population of 182 million and output - estimated in 2016 by the National Bureau of Statistics (NBS)[5] -, of approximately US$405.952bn[6] , Nigeria remains Africa's most populous nation and largest economy. Notwithstanding the economic growth contraction in 2016, output grew at an annual average of 5.4 percent in the decade between 2007 and 2016. The recent recession primarily reflects the adverse impact of falling crude oil prices[7] and security challenges. Though frequently described as an oil-dependent economy, oil accounts for less than 10 percent of total output. However, oil sector taxes and exports account for approximately sixty percent of government revenue and more than 90 percent of foreign currency inflows from exports.

Nigeria's National Population Commission (NPC) estimates population growth at 3.5 percent with more than half the population under the age of thirty. Despite the difficulties posed by recent output contraction, the economy appears to be moving from a subsistence economy to one driven by lifestyle spending. The share of food in total expenditure dropped to 51.1 percent in 2009 from 64.4 percent in 2003. Similar to the structure of spending, the composition of output is also changing with the share of extractive industries – agriculture and mining – dropping sharply. Competitiveness and productivity remain areas of concern. The 2016-17 edition of the World Economic Forum's Global Competitiveness Ranking places Nigeria 127th of 138 countries; with healthcare, primary education, inadequate infrastructure and weak institutions being critical hindrances to competitiveness. The United Nations Human Development Index (HDI) and the World Bank's Ease of Doing Business rank Nigeria 152nd of 188 countries and 169th of 190 countries respectively. These rankings make a strong case for upgrading institutions, infrastructure and other major development indicators.

Extending and intensifying the pace of financial inclusion has been an integral part of Nigeria's financial industry reform. The quest to strengthen the development of the financial services sector led the CBN and other stakeholders to launch, amongst other initiatives, the National Financial Inclusion Strategy (NFIS) in 2012. The NFIS aims to reduce overall financial exclusion to 20 percent by 2020 and attain the following product-specific targets among the adult population:

- Increase access to payment services to 70 percent from 21.6 percent in 2010;
- Raise access to savings products to 60 percent from 24 percent in 2010;
- Increase access to credit to 40 percent from 2 percent in 2010;
- Grow access to insurance services to 40 percent from 1 percent in 2010; and
- Extend access to pensions to 40 percent from 5 percent in 2010.

To achieve these broad objectives, the Central Bank aims to oversee increases in the number of access channels per 100,00 adults. In particular, (i) deposit money bank branches to 7.6 units from 6.8 units in 2010; (ii) microfinance bank branches to 5.5 units from 2.9 units in 2010; (iii) automated teller machines (ATMs) deployed to 203.6 units from 11.8 units in 2010; (iv) point of sale (PoS) terminals deployed to 850 units from 13.3 units in 2010; and (v) mobile agents to 62 units from 0 units in 2010.
Improvements in financial inclusion have accompanied growth in the national economy and significant developments in the financial services sector. A comparative analysis of the access to finance (A2F) survey conducted by EFInA between 2010 and 2016 reveal some fascinating developments.

Figure 1: Changes in financial access (2010 & 2016)
Compiled by Authors using data from EFInA

Figure 2: Geographic distribution of the financially excluded (2010 & 2016)
Compiled by Authors using data from EFInA

Figure 1 shows reductions in adult financial exclusion to 41.6 percent in 2016 from 46.3 percent in 2010, while the banked, categorised as financially included rose to 38.3 percent from 30.0 percent in 2010. Participation of adults using other formal financial services also increased to 10.3 percent from 6.3 percent in 2010. Finally, access to informal financial services reduced to 9.8 percent from 17.4 percent in 2010.

There are differences in the evolution of financial inclusion across the six geopolitical zones. Except for the North West region, Figure 2 illustrates, significant reductions in the number of financially excluded adults between 2010 and 2016. The recorded changes are South West, 18 percent from 58 percent; South East, 28 percent from 61 percent; South South, 31 percent from 59 percent; North Central, 39 percent from 87 percent; North East, 62 percent from 85 percent and North West 70 percent from 73 percent.

A.   Financial Inclusion (FI)

As noted earlier, FI defines the availability and delivery of financial services and products, at affordable costs, to all segments of the society. In contrast, financial exclusion is the outcome arising where these services are neither available nor affordable. Financial inclusion thus means that individuals and businesses have access to useful and affordable financial products and services that meet their needs such as payments; savings (pension and non-pension); credit, insurance, and the like – delivered responsibly and sustainably[8].

Understanding the challenges of financial inclusion requires providing a clear picture of its present characteristics using measurable proxies for economic growth and income. The range of financial services includes banking, insurance, pension, credit, security and asset management.
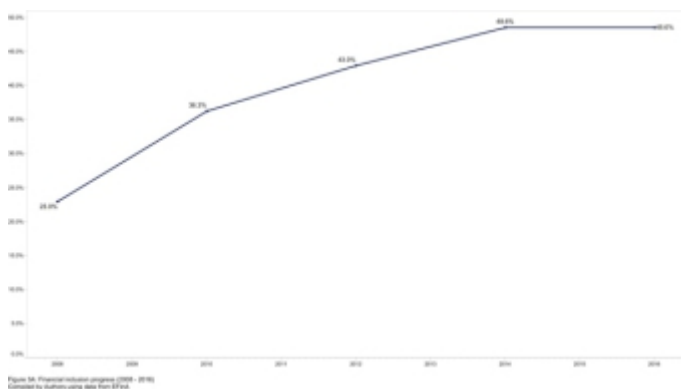
As shown in Figure 3A, while large sections of the population remain financially excluded, there have been significant improvements in both formal and informal financial inclusion with the rate of inclusion rising to 58.4 percent in 2016 from 47 percent in 2008. Available survey data also shows an increase in the proportion of banked adults to 48.6 percent in 2016 from 23 percent in 2008. The proportion of adults who use informal financial services

also reduced significantly in the same period.
The 'financially excluded' are predominantly located in
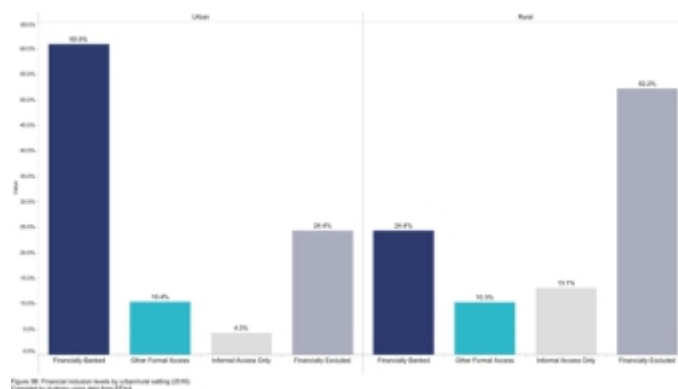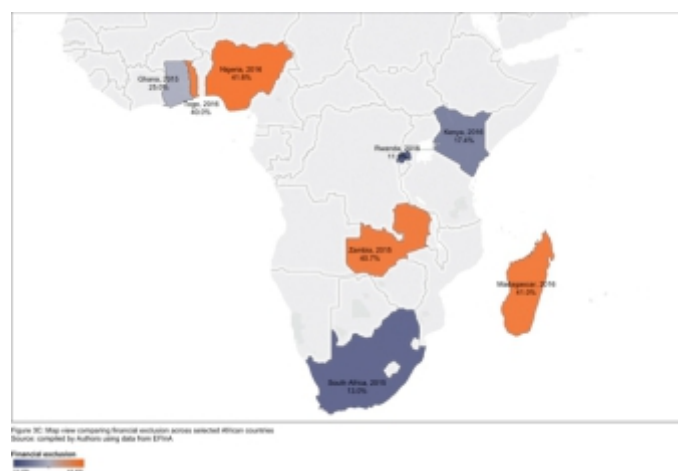

rural Nigeria as shown in Figure 3B.

Figure 3C shows higher financial exclusion rates in Nigeria compared with few other African countries. Notwithstanding the differences in measurements and explanatory factors, the map shows Rwanda, South Africa and Kenya have extraordinary financial inclusion levels in 2015 and 2016. Technology, policy targets and financial literacy are among factors which contributed to the success achieved in these comparator countries. Nigeria can borrow from to expedite higher level of financial inclusion.

We conclude that financial inclusion is measured using three key attributes - access to, usage of and quality of financial services[9]. While these attributes characterise the nature of financial inclusion, it is clear from existing studies that additional factors drive financial inclusion. Some of these factors include: (i) literacy, including financial literacy; (ii) income levels; (iii) cultural barriers; (iv) product attractiveness and usage cost; (v) identification documentation; (vi) gender; (vii) financial access points; (viii) technology infrastructure; and (ix) access to relevant data.

8 World Bank, 2016
9 Beck, T. (2016), Financial Inclusion – measuring progress and progress in measuring. Cass Business School, City, University of London; IMF 2016, Sub-Sahara Africa: Time for a Policy Reset.
   World Economic and Financial Surveys. Regional Economic Outlook.

DEFINITIONS AND DRIVERS:
ECONOMIC GROWTH AND INCOME

A. Economic Growth

Economic growth measures the relative change in a country's output over time. The measurement process involves comparing output over periods, where the output is represented by value-added. Gross domestic product (GDP) is the most widely used measure of national economic output. To focus attention on the actual volume of output and exclude the impact of rising prices, the inflation-adjusted measure of GDP – in other words, 'real GDP' is used. Increases in capital stock, advances in technology and improvement in the quality of labour are essential reasons for economic growth. In recent years, the UN sustainable development goals (SDGs) have brought environment and social concerns into focus. While the general trend is for economies to grow over time, such increments cannot be taken for granted.
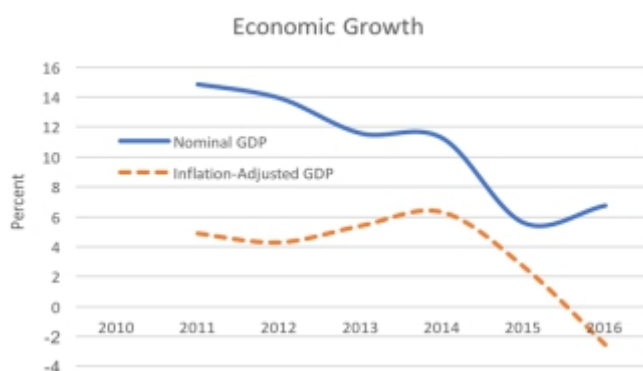

Figure 4A: Economic growth chart (2011 - 2016) (source: compiled by Authors using data from NBS, 2016)

Figure 4A shows that nominal gross output diminished between 2011 and 2015, but increased in 2016. Real gross output was relatively steady, around 4 percent between 2011 and 2014, but declined steadily since 2014 to 2016 with the economic recession.

Discussions on economic growth are incomplete without examining sectoral sources of goods and services produced. Typically, output sectors are in three (3) broad categories: primary sectors – output derived from natural endowments (agriculture and mining); secondary sectors – that transform natural endowments into other states (industry, construction and utilities); and tertiary/service sectors – that support production processes. Figure 4B illustrates output trends between 1981 and 2016.

Figure 4B: GDP by broad output sectors (1981 - 2016) (source: compiled by Authors using data from NBS, 2016)

B. Income
National disposable income (NDI) is the sum of (i) domestic factor income; (ii) income from abroad; and (iii) net business taxes. Domestic factor income is represented by employee compensation (salaries and wages), operating surplus and consumption of fixed capital. Income from abroad includes net compensation of employees, net property income and other income and net other transfers from the rest of the world.

Domestic factor incomes contribute approximately 96 percent to NDI. External income reduced disposable income by approximately 4 percent each year between 2010 and 2015 while 'other transfers from the rest of the world' brought in slightly over 6 percent of NDI (see Figure 5A). Decomposing the figures further shows that 'operating surplus', in other words, profit accounted for 69 percent of inflation-adjusted disposable income.
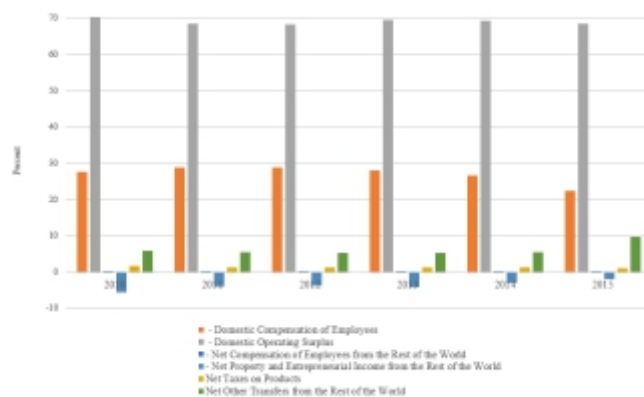

Figure 5A: Composition of inflation-adjusted disposable income (2010 – 2015) (source: compiled by Authors using data from NBS)

Figure 5B highlights the growth in income adjusted for inflation by an average of 5.22 percent between 2010 and 2015[10] while disposable income grew by 6.01 percent over the same period. Significant improvements of 'net other transfers from the rest of the world' were evident in 2014 and 2015. A review of the growth performance of various components of disposable income shows that while domestic factor income rose at an annual average of 4.54 percent, the wages and salaries sub-component contracted at an annual average of 1.9 percent – and shrank by almost 9 percent in 2015. In contrast, the 'operating surplus' sub-component showed a yearly increase of 6 percent.
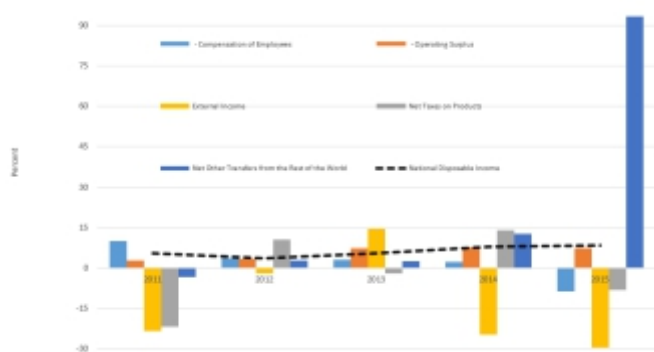

Figure 5B: Growth in real disposable income and its components (source: compiled by Authors using data from NBS, 2016)

REVIEW OF EMPIRICAL STUDIES

Empirical studies of the link between financial sector development and economic growth are quite extensive. The study, analysing the relationships between financial inclusion, economic growth and income, draws on current literature explaining the linkages. Furthermore, the study reviews financial sector development proxies for financial inclusion and economic activities.

Key measures of financial inclusion are bank deposits and savings. Increased deposit mobilisation and savings assists households in managing spikes in cash flow and unanticipated expenditure as well as generating additional capital stock. Surplus deposits improve standards of living and stimulate aggregate demand with direct impact on gross output (economic growth). Thus, this implies that excess savings lead to the development of households and the output growth of firms (Ahsraf, Karlan, & Yin, 2010; Dupas & Robinson, 2013; Brune, Giné, Goldberg & Yang, 2013).

Increased savings mobilisation on the part of financial institutions and cost-effective credit allocations to households and firms have are essential measures of financial inclusion that directly link investment and household welfare. An upward swing in access to low-cost credit directly stimulates aggregate investment and impacts household aggregate consumption expenditure (Banerjee, Duflo, Glennerster, & Kinnan, 2010, Banerjee & Duflo, 2011, Crépon, Devoto, Duflo & Parienté, 2011, Karlan & Zinman, 2010, Attanasio, Augsburg, de Haas, Fitzsimons & Harmgart, 2011, Augsburg, de Haas, Harmgart, & Meghir, 2012, Angelucci, Karlan, & Zinman, 2013, and Banerjee, 2013).

In addition to bank deposits and savings as measures of financial inclusion, some studies link insurance sector development to growth in financial inclusion because of the usefulness of insurance in risk mitigation at the household and firm levels. These studies, however, highlight barriers to the uptake of insurance services. These include lack of trust and liquidity constraints which have to be addressed to engender full potential utilisation of micro-insurance among households and small-scale business enterprises (Matul, Dalal, De Bock, & Gelade, 2013; Janzen & Carter, 2013; Cole, Giné, Tobacman, Topalova, Townsend & Vickery, 2013; Karlan, Osei-Akoto, Osei, & Udry, 2014).

Levine (2005) and Pasali (2013) suggest that under ideal conditions, the depth of financial intermediation is positively correlated with growth and employment and has a causal-effect on growth. The primary instrument linking financial deepening and economic growth is lower transaction costs and higher distribution of capital and risk across the different sectors of the economy. It is also established that broader access to bank deposits has a positive net effect on financial stability and growth in the economy (Rousseau & Wachtel, 2002; Demetriades & Law 2006; Loayza & Ranciere 2006; Clarke, Xu, & Zhou 2006; Beck, Demirgüç-Kunt, & Levine, 2007; Jahan & McDonald, 2011; Cecchetti & Kharroubi 2012; Han & Melecky 2013; Onaolapo (2015); Sharma, 2015).

Onaolapo (2015) asserts that financial inclusion has more significant influence on poverty reduction than economic growth in Nigeria. The study employed ordinary least square (OLS) techniques and concluded that there is need to have proper guidelines and regulations in place that will enhance financial intermediation for finance-growth nexus deepening in Nigeria.

> **Surplus deposits improve standards of living and stimulate aggregate demand with direct impact on gross output (economic growth).**

In recent studies, the focus has shifted to the exploration of the impact of "new wave" financial services - digital financial services (DFS). Studies, mostly in Kenya, revealed that DFS, especially mobile money payments reduce transaction cost, eliminate the risk of cash transfer and increase the real income of users (household/firm/government). With the advent of mobile money, financial institution operating costs are diminishing and requiring fewer branches efficient operations. These activities are known to stimulate

financial sector development and economic growth (Aker, Boumnijel, McClelland & Tierney, 2011; Blumenstock, Eagle, & Fafchamps, 2012; Batista & Vicente, 2012; Jack & Suri, 2014).

The emphasis in these studies is on the impact of financial inclusion on the economy with the primary drivers of financial inclusion identified as increased savings, availability of low-cost credit, increased utilisation of insurance services, financial sector development and increased availability of DFS. These views uphold the supply-side hypothesis of the relationship between financial inclusion and economic growth.

Earlier studies focused on the linkages of government's role in the real and financial sectors. This view, regarded as the demand-side hypothesis, emphasises that an increase in the quality of government services and spending leads directly to improvements in aggregate demand and economic activities which directly impact financial sector efficiency and development (La Porta, Lopez-de-Silanes & Shleifer, 1997; Barro, 1999; Acemoglu, Johnson, Robinson & Yared, 2008).

Institutions are a crucial driver of financial inclusion and economic growth. In general, countries, where legal systems protect investors against expropriation, are likely to have more mature and deeper financial markets. Thus, the argument that institutions, legal systems and governance can lead to the establishment of well-developed financial markets and efficient financial systems is valid. These arguments support the demand-side hypothesis of financial inclusion and economic growth.

In conclusion,
• Financial inclusion positively impacts economic activities – supply-side argument of financial sector development, income and growth nexus.
• Government spending directly stimulates the real sector and thereby supporting the overall financial system - demand-side argument of financial sector development, income and growth nexus.
• Most of the studies adopted the World Bank (2016) measurement of financial inclusion - access and usage of financial services. Also, proxies of financial inclusion range from credit, savings, insurance, mobile money payments, bank branches, automated teller machine (ATM) penetration, financial intermediation, financial depth/development and financial stability/regulations indicators.

EXPLANATORY FRAMEWORK

Three different perspectives explain the relationships between the identified variables: (i) supply-side hypothesis; (ii) demand-side hypothesis; (iii) feedback and neutral hypothesis. The supply-side hypothesis asserts that improvements in financial sector development (financial inclusion) have a positive effect on real sector variables (economic growth and income). The underlying framework suggests improvements in the provision and use of financial services enables the mobilisation of loanable funds, improves access to credit and may lower the cost of credit. In turn, these developments increase investment and capital accumulation efficiency. Likewise, higher investment increases employment, income, savings and transactions. These, in turn, increase the use of financial services.
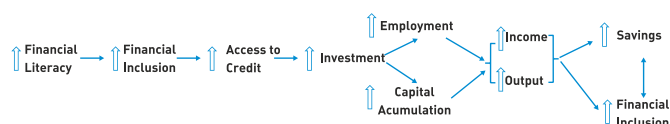
The demand-side hypothesis recognises the role of changes in other economic variables, for example, government fiscal activities - in stimulating financial inclusion. In this example, government spending raises financial inclusion by stimulating an increase in aggregate demand and investment. These raise income and output leading to improvements in financial inclusion.

Given that the contending alternative explanations of the relationships between financial inclusion, economic growth and income have different policy implications, it becomes imperative to establish which of these hypotheses is appropriate to explain the Nigerian experience. We use empirical estimation frameworks to guide the selection of the hypotheses supporting theses contending frameworks.

Figure 6A: Supply-side hypothesis: relationship between financial inclusion, economic growth and income

Figure 6A shows that improvements in financial inclusion lead to economic growth and higher income. Thus, the impulse of providing financial services, by facilitating capital formation and creating opportunities for savings improves standards of living. This premise, in the aggregate, improves economic growth and income[11].

The demand-side hypothesis provides an alternative view of the relationship between financial inclusion, economic growth and income. This framework asserts that government activities – policy and spending - initiate or spur developments in the real sector (economic growth and income) which promote financial services use, thereby deepening financial inclusion[12].
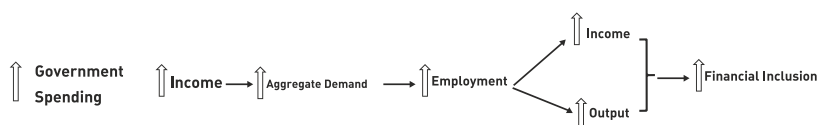

Figure 6B: Demand- side hypothesis: relationship between financial inclusion, economic growth and income.

11 Honohan 2013
12 See Goldsmith, 1969; Jung, 1986; Kar & Pentecost, 2000; Keynes, 1936; Lucas, 1988; Mckinnon, 1973; Robinson, 1952

APPROACH

To establish the relationships between financial inclusion, economic growth and income, the study employs vector autoregression (VAR) modelling techniques. Although theoretical, the VAR modelling technique is useful for establishing the causal relationships between variables in a model as well as the dynamic response of the endogenous variables to shocks emanating from the explanatory variables in a structural equation model.

A. Data

Table 1 describes the variables and sources utilised in this study.

Table 1: Data description and sources

IX. VARIABLE	X. DESCRIPTION	XI. SOURCE(S)	XII. PERIOD
Formal financial inclusion (FFI)	An index that measures the number of adult Nigerians categorised as either banked or having access to formal financial services. The variable is generated using principal component analysis (PCA).	EFinA	2008 – 2016
	A measure of the proportion of adults using informal financial services like "Ajo", "Esusu", piggy bank, and so on.	EFInA	2008 – 2016
Economic growth (GDP)	The relative change in GDP (in real terms) usually measured annually. However, to satisfy observation size requirements in a typical least square regression model, the data frequency has been modified from annual to quarterly using the interpolation and splicing functions built into Econometric Views (Eviews).	NBS	2008 – 2016
Income (NDI)	The national disposable income (NDI). It is the aggregation of domestic factor income, external income, business taxes and other transfers from the rest of the world that are similar to output growth. The variable is measured in real terms.	NBS	2008 – 2016

Additional data manipulation notes:
- Data splicing is a limitation that imposes certain assumptions[13] on the behaviour of the data and thus, may be sub-optimal in comparison to direct primary data.
- The missing years of the bi-annual EFInA data (financial inclusion variables – formal and informal) were generated using direct interpolation methods.

A. Estimation Model

This study draws from Sharma (2015) with a little modification and uses the VAR modelling technique to establish causal relationships between financial inclusion, economic growth and income. The VAR model assists in establishing variance of equilibrium in financial inclusion, economic growth and income in Nigeria. The Granger causality test generated in the VAR model is used to establish the direction of causality between financial inclusion, economic growth and income. The VAR model, in its structural form, is expressed in equations (1-4):

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13 See the Appendix for our discussion of the assumptions which underlie the methodologies involved.

$$\Delta GDP_t = \alpha_1 + \sum_{k=1}^{p_1} \phi_{1k} \Delta FI_{t-k} + \sum_{k=1}^{p_2} \tau_{1k} \Delta INFI_{t-k} + \sum_{k=1}^{p_3} \theta_{1k} \Delta NDI_{t-k} + \sum_{k=1}^{p_4} \psi_{1k} \Delta GDP_{t-k} + \xi_{1t} \qquad (1)$$

$$\Delta FFI_t = \alpha_1 + \sum_{k=1}^{p_1} \phi_{1k} \Delta GDP_{t-k} + \sum_{k=1}^{p_2} \tau_{1k} \Delta INFI_{t-k} + \sum_{k=1}^{p_3} \theta_{1k} \Delta NDI_{t-k} + \sum_{k=1}^{p_4} \psi_{1k} \Delta FFI_{t-k} + \xi_{2t} \qquad (2)$$

$$\Delta INFI_t = \alpha_1 + \sum_{k=1}^{p_1} \phi_{1k} \Delta GDP_{t-k} + \sum_{k=1}^{p_2} \tau_{1k} \Delta FFI_{t-k} + \sum_{k=1}^{p_3} \theta_{1k} \Delta NDI_{t-k} + \sum_{k=1}^{p_4} \psi_{1k} \Delta INFI_{t-k} + \xi_{3t} \qquad (3)$$

$$\Delta NDI_t = \alpha_1 + \sum_{k=1}^{p_1} \phi_{1k} \Delta GDP_{t-k} + \sum_{k=1}^{p_2} \tau_{1k} \Delta FFI_{t-k} + \sum_{k=1}^{p_3} \theta_{1k} \Delta INFI_{t-k} + \sum_{k=1}^{p_4} \psi_{1k} \Delta NDI_{t-k} + \xi_{4t} \qquad (4)$$

Establishing the direction of causality also helps identify the dependent and independent variables in the relationships under consideration. With the causal question settled, emphasis will shift to explaining the response time with which the dependent variables respond to shocks arising from changes in each of the explanatory variables. This pattern is carried out through

GDP is real gross domestic product

FFI is formal financial inclusion

INFI is informal financial inclusion

NDI is national disposable income

is first difference operator

p_1, p_2, p_3 and p_4 are lag lengths

t is the year in the series (t= 1, 2,...T)

$\alpha, \phi, \tau, \theta$ and ψ represent the unknown parameters of the model while ξ_i denotes normally distributed stochastic term for the series.

the impulse response and variance decomposition exercise in the VAR estimation process.

RESULTS AND ANALYSIS

The characteristics of the time series data were required to estimate and analyse the VAR model. This pre-test comprises the testing for the existence of unit roots since estimating the equations at their individual levels could lead to spurious results and nonsense correlation.

Table 2 illustrates the result of the unit roots test using the Augmented-Dickey Fuller (ADF) and Philip-Perron (PP) tests of unit roots. The results show that formal financial inclusion (FFI), informal financial inclusion (INFI) and national disposable income (NDI) are integrated of order zero (i.e. 1(0)). GDP appears to be the only variable that is non-stationary at levels. This result suggests that there might be no unit root in formal financial inclusion, informal financial inclusion and disposable income.

Table 2: Unit root tests results

Series	Model	Level	First difference	Level	First difference	Order of integration I(d)
GDP	Constant and trend	4.9094 (1.0000)	-1.5939 (0.7744)	1.4458 (1.0000)	-1.5071 (0.8074)	I(2)
FFI	Constant and trend	-0.5464 (0.9760	-4.1559** (0.0155)	-5.5432*** (0.0003)	-4.1006** (0.0144)	I(0)
INFI	Constant and trend	-4.5083*** (0.0059)	-5.1118*** (0.0017)	-1.8525 (0.6573)	-1.6922 (0.7328)	I(0)
NDI	Constant and trend	-5.1597*** (0.0016)	-2.8462 (0.1927)	-4.2325*** (0.0103)	5.9433*** (0.0001)	I(0)

Notes: Null: Unit root (Automatic - based on SIC, max lag =9): ADF (t-statistic)
Null: Unit root (Newey-West automatic using Bartlett kernel): PP (adjusted t-statistic)
***, ** and * are 1%, 5% and 10% significance level respectively, NA: not applicable

Table 3: Lag length selection criterion

Test	Lag 0	1	2	3
LR	NA	507.6262	92.97780*	18.1744
FPE	3.28E-13	1.17E-20	6.70e-22*	8.06E-22
AIC	-17.3957	-34.5555	-37.45990*	-37.3989
SC	-17.2143	-33.6485	-35.82734*	-35.0408
HQ	-17.3347	-34.2504	-36.91059*	-36.6055

Notes: * indicates lag order selected by the criterion; LR: sequential modified LR test statistic (each test at 5% level), FPE: final prediction error
AIC: Akaike information criterion, SC: Schwarz information criterion and HQ: Hannan-Quinn information criterion
'Nominal' and 'Real' refer to GDP and NDI before and after adjustment for price increases

Having conducted the unit root tests, the lag length required to explain the relationships between financial inclusion, economic growth and income were established. Table 3 details the results of the lag length test.
The lag length criterion carried out with the aid of Akaike information criteria (AIC), the Schwarz criterion (SC), and the Hannan-Quinn (HQ) criterion. Using EViews, the results show that a two (2) period lag is the optimal length for relationships between financial inclusion, economic growth and income. This finding means that any policy intervention will take at least two quarters before effecting the policy targets.

A. Causality Test

Financial inclusion was decomposed to formal financial inclusion (FFI) and informal financial inclusion (INFI). The causality test results are presented in Table 4.

Table 4:

MODEL	NULL HYPOTHESIS	OBSERVATIONS	STATISTIC (P-VALUE)	DIRECTION OF RELATIONSHIP
A	FFI does not Granger cause GDP	34	2.8446* (0.0745)	FFI $\Rightarrow$ GDP
	GDP does not Granger cause FFI		1.4536 (0.2503)	
B	INFI does not Granger cause GDP	34	3.3147** (0.0505)	INFI $\Leftrightarrow$ GDP
	GDP does not Granger cause INFI		3.1187* (0.0593)	
C	NDI does not Granger cause GDP	34	0.2626 (0.7709)	GDP $\Rightarrow$ NDI
	GDP does not Granger cause NDI		19.005*** (0.0000)	
D	INFI does not Granger cause FFI	34	3.8760** (0.0322)	INFI $\Rightarrow$ FFI
	FFI does not Granger cause INFI		1.0127 (0.3757)	
E	NDI does not Granger cause FFI	34	2.0129 (0.1518)	NDI $\Leftarrow$ FFI
	FFI does not Granger cause NDI		3.7194** (0.0365)	
F	NDI does not Granger cause INFI	34	0.7744 (0.4703)	NDI $\Leftarrow$ INFI
	INFI does not Granger cause NDI		9.0681*** (0.0009)	

Notes:(I) ***, ** and * are 1%, 5% and 10% significance level respectively
(ii) real gross domestic product (GDP) and national disposable income (NDI) after adjustment for increases in prices

Causality test results
Causality tests to determine the hypotheses – (i) supply-side and (ii) demand-side and (iii) feedback and neutral - is consistent with the experience in Nigeria as revealed by available data. From the preliminary result reported in Table 4, the direction of causality flows from formal financial inclusion (FFI) to 'real' economic growth (GDP) and disposable income. Hence, higher rates of formal financial inclusion improve economic activities and income. However, note that the level of confidence in this relationship is higher for effect on income than that on economic activity.

The result shows the existence of a bi-directional relationship between informal financial inclusion (INFI) and 'real' economic growth. In other words, informal financial inclusion Granger causes real economic activities and vice-versa. There appears to be a higher level of certainty[14] in the flow from informal financial inclusion to economic activities and vice-versa.

The results also show the causal relationship between changes in 'real' income and informal financial inclusion

(INFI) runs from informal financial inclusion to 'real' income. Hence, there is a 99 percent degree of certainty that INFI Granger causes real income (NDI).

Hence, we infer that:

- Improvements in real economic activities result from increased financial inclusion. There is evidence that irrespective of the use of formal or informal channels in the provision of the financial services and products, greater access to and use of these services enables greater economic participation thereby raising economic growth and 'real' income.

- The feedback from rising real economic activities to increased informal financial inclusion and not formal financial inclusion requires further investigation.

- The absence of a causal relationship between 'real' income and formal financial inclusion remains puzzling and requires further investigation. This gap stems from the hypothesis that as formal financial inclusion elevates real economic activities, 'real' income should rise. This phenomenon ought to be the case with the generation of higher income from economic activities; it should serve to improve access to and use of formal financial services and products.

The theoretical assumptions of this study lie in explaining the supply- and demand-side arguments that financial inclusion spurs growth in economic activities and income. The results of the empirical analyses confirm that supply-side assumption of Schumpeter theory holds for causality between formal financial inclusion and economic growth. The results also suggest that informal financial inclusion plays a vital role in the expansion of formal financial inclusion since informal sector activities contribute significantly to gross output.

14 While, informal financial inclusion causes economic growth at 5 percent significance level, economic growth causes informal financial inclusion at 10 percent significance level

CONCLUSION

The causality test reveals the direction of relationships between formal financial inclusion, economic growth and real income is unidirectional; from formal financial inclusion to real economic growth and real income. On the other hand, the direction of causality between informal financial inclusion and economic growth is bidirectional. Real economic growth has a unidirectional causal relationship with real income. Informal financial inclusion has a unidirectional causal relationship with formal financial inclusion. These outcomes show that the supply-side hypothesis holds for the nexus of financial inclusion, economic growth and income, and financial inclusion has spillover effects on economic activities and income.

POLICY RECOMMENDATIONS

The policy proposals emanating from a better understanding of the relationship between financial inclusion, economic growth and income require:

i.   Building inclusive financial systems that facilitate financial access and use.

ii.   Expanding the portfolio of financial services available in the mainstream beyond banking and payments.

iii.   Incorporating informal financial institutions into the financial services ecosystem.

iv.   Correcting dwindling real income by normalising and stabilising price levels to facilitate automatic adjustment.

APPENDIX

Econometric Estimation Techniques: General Unit Root Model

$$\Delta Y_t = \alpha_i + \beta_i Y_{t-j} + \sum_{j=1}^{p_i} \beta_j \Delta Y_{t-j} + \xi_i t + \varepsilon_t$$

where t= 1, 2...T; Δ = first difference operator; Yt is endogenous variables included in the system; pi is the number of lags selected for the ADF regression and Et is the normally distributed random error for all t.

FOOTNOTES

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