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INSTITUTIONAL QUALITY, FINANCIAL INCLUSION AND SHADOW ECONOMY IN NIGERIA (1991-2020): AN ARDL APPROACH

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Abstract. The study examined the dynamic link between institutional quality, financial inclusion and the informal economy in Nigeria. These were with the view to examining the institutional influence of financial inclusion on the development of informal economy. Annual data covering the period 1991 to 2020 were used for the study. The study made use of Autoregressive Distributed Lag (ARDL) as the technique of estimation.

The study found a long run association between the variables and also reveal that financial inclusion and institutional quality directly has a negative but significant effect on shadow economy in Nigeria. This reveals that the development of financial sector as well as quality institutions aids formal sector participation as against the informal sector thus a decrease in shadow economy size in Nigeria. The effect of the interaction of financial inclusion and quality of institution on shadow economy is also found to be positive and significant meaning that weak institution quality has its toll effect on financial inclusion and which result to growth in informal economy in Nigeria. The study concludes that quality of institution in Nigeria is weak and must be improved to favorably promote financial inclusion and successfully mitigate the effect of shadow economy in Nigeria. Therefore, reforms and policies that are required to improve transparency and accountability at all levels of governance as well as improvement in financial system are hereby recommended for policy makers.

Keywords: ARDL, Institutional quality, financial inclusion, shadow economy

Introduction

There are various degrees of economic activities in an economy whose magnitude is best described by Gross Domestic Product (GDP). But in reality, GDP statistics do not track and record all economic activity. Due to this circumstances, a country's economic performance as measured and viewed through GDP seem bias. However, these economic activities not recorded in GDP are called shadow economy.

Shadow economy (SE) otherwise known as underground, informal, or parallel economy is the part of any economy that is untaxed and unregulated. Though this sector accounts for a sizable component of the GDP of developing nations, Nigeria inclusive. It is occasionally viewed as problematic and unthinkable. However, since 1960s, the shadow economy has been quickly growing and offers important economic prospects for the impoverished (Chem, 2001). Consequently, the financial and monetary impact of the informal sector in emerging economies is of first-rate challenge. Often times due to the contribution of the sector to a country's economic growth, "it is generally assumed that the authorities have nothing to lose, in the meantime it goes past the reputedly financial benefits, however presents an avenue whereby the authorities have to suffer financial losses through unavoidable and inherent tax evasions" (Cordellia, 2019).

Furthermore, various obstacles can limit the operations and expansion of businesses in the shadow economy among which include but not limited to public infrastructure (water, power and land); weak institutions (legal protection, property rights and corruption) or inclusive finance (credit availability, technological advancement, and increased public awareness of businesses (IFC, 2010). Therefore, overcoming these varying challenges is considered important, and one of the possible ways mentioned in the literature is inclusive financing.

Financial inclusion (FI) is seen as efforts to render financial products and services handy and low-priced to all persons and businesses, regardless of their private net worth or organisation size. Financial inclusion strives to cast off the obstacles that cut out people from taking part in the financial activities and the use of these services to enhance their lives. Therefore, "financial inclusion is seen as a core pillar of development policy in the

financial system" (Affandi, 2020). But despite financial inclusion being the pillar of development policy, the formality and complexity of the system and of course policies make it difficult for firms and individuals to access the advantages related with participation in the formal economy (CGAP, 2010). As a result, informal sector arises where these policies (both structural and fiscal) emerge as too onerous particularly policies that increase tax obligations for corporations and individual (Mathias *et al., 2015*). The shadow economy thus, "gives firms the chance to get around government rules and access to low-cost labour, supplies and human right abuse and all sorts of social menace and economic sabotage" (Goel *et al.,* 2017). Furthermore, aside tax burdens (high taxation incidence), and rigid laws which deter businesses, most developing countries' shoddy institutions also contribute to the growth of the shadow economy (Benjamin et al., 2012; Nguyem, 2019). However, if the rule of law is preserved, property rights protected, contracts right law-based and employment merit-based, investors are encouraged to formalize their businesses which in turn boost involvement of both individuals and institutions in the formal sector.

However, one major challenge is integrating the informal sector into the formal sector, hence the need for strong institutional quality as well as financial inclusion in this economy in order to integrate and revamp the economy.

The main objective of this study is to investigate the existence of short-run or long-run relationship among financial inclusion, institutional quality and shadow economy. In addition, the study examines the effect of institutional quality-financial inclusion nexus on shadow economy in Nigeria.

Literature review

Overview of Shadow Economy in Nigeria

Nigerian shadow economy is extremely large and diverse and Its range of operations includes trading, transportation, building, agriculture, raising cattle, producing food, providing loans, doing mechanical and electrical work, making clothes, information technology and communication, distilleries, and mining for gold and silver e t c. Businesses in this industry often have low income, one-man business with self-employed owners operating below the regulatory radar and not paying taxes. Entry hurdles into our official sector have been blamed for Nigeria's vast informal sector's prevalence.

Many have been discouraged from starting their own businesses because of the costs involved, including company registration. Significantly, due to its enormous size, it is very challenging to get accurate information on their membership and operations. Although taxes from the formal sector are used to pay for public services, it is claimed that informal producers evade taxes and only sometimes use public services due to their illegal status. As a result, their ability to acquire money or insurance from established financial services markets is limited, and their ability to grow is also constrained. However, many unregistered enterprises are victims of illegal money-extortion by dishonest members of society and may be forced to pay official taxes if they are straightforward, certain, and equitable. However, tax authorities find it very challenging to evaluate these enterprises due to the absence of information and paperwork on informal economic activity. Additionally, the normal noncompliance of these companies' forces tax authorities to invest enormous resources, raising concerns about the opportunity cost of anticipated tax returns.

Over the last three decades in many studies, estimates of shadow economy sizes in Nigeria was between 52% and over 60% of gross domestic product with about 67% in 2018. One important conclusion from studies is that, from 1999 to 2018, the shadow economy in Nigeria appeared to be growing. For example, Shadow economy in Nigeria in 1990 was 52.13 % of the GDP, 56.21 % in 2000 and 60.7 percent in 2010. This rose to 61.68 percent of GDP in 2015 and 67.65 in 2018. According to a report from 2018, the informal sector in Nigeria generated nearly 90% of all new jobs in the nation, 80% of all non-agricultural employment, and 60% of all new jobs in metropolitan areas, earning it the moniker «the backbone of the formal sector.» Despite these percentages, records show that it only makes a small tax contribution to the country's overall revenue. Furthermore, according to the Micro Small and Medium Enterprises (MSMEs) report issued July 2019, total MSMEs were projected to about 41.5 million in Nigeria. As of December 2017, the MSMEs, which account for 48 percent of Nigeria's GDP, had created over 59 million jobs, with 2.9 million of those positions coming primarily from businesses in the education sector. However, the continuous rise in shadow economy in Nigeria requires continuous attention and continuous efforts from policymakers.

The theoretical and empirical literature

This basic tenet of this study is drawn from Law and finance theory which is premised on the

institutional school of thought as put up by La Porta *et al.,* (1998). The theory stressed the significance of legal institutions in financial markets. It emphasizes that sound institutions facilitate the development of financial sector by ensuring efficient financial intermediation and easy access to financial services (financial inclusion). In essence, law and finance theory argued that institution is a precursor to financial development, particularly those protecting private property rights of investors in explaining regional differences in growth of financial sector. It explains that in an economy where private property rights and private contractual arrangement are supported by strong institutions, investors' confidence is built up which will aid their active participation in financial systemin the formal sector as opposed informal sector which is evidenced on their financial transactions.

Empirically, estimating the size of shadow economy for 162 developed and developing countries from 1999 to 2007, Schneider *et al.,* (2010) found a clear negative trend in the shadow economy size of about 38.4% as the weighted average size of the shadow economy as a % of GDP in Sub-Saharan Africa and 36.5 % in Europe and Central Asia (mostly transition countries), with 13.5% in OECD countries. Similarly, Using Error Correction Model to determine the speed of adjustment to long-run equilibrium with the employment of currency demand approach to estimate the size of the underground economy. Ariyo and Bekoe (2012) found out that the relationship between tax rate, magnitude of tax evasion and size of underground economy is positive. Furthermore, the study established shadow economy sizes that ranges between 42.54% –79.32% and 2.09% – 6.75% of GDP respectively. Also, Elgin and Birinci (2015) made an attempt to analyze the effect of the informal economies has on growth of economy for 161 countries from 1950-2010. They found out that shadow economy (small and large sizes) had association with little growth in per capita GDP while higher levels of growth in per capita GDP is associated with the medium sizes of informal economy. Furthermore, in a sample of 150 countries and for a period from 1999-2007, Kireenko and Nevzorova (2015) examined the impact of informal economy on life level and quality. They found that there exists an interrelationship between informal economy and quality of life, that informal economy positively affect life quality.

In a further attempt to analyze the impact of shadow economy on growth of an economy, Yelwa and Adam (2017) using a data set from 1980 to 2014 for Nigeria found a positive impact of shadow economy on GDP. Using two models and China's economic background from 1978 to 2016, Chen and Schneider (2018) revealed an increase in shadow economy size from 18.44% to 32.16% in 1978 and 1989 respectively before decreasing to 4.27% in 2016. However, further findings showed that in the primary sector, the statistical impact of employment and regulation in the long run are strong and significant. In the same vein, to determine the average shadow economy size of 158 countries covering 1991 to 2015, Medina and Schneider (2018) found 31.9 percent as the average size of informal economy in those countries.

Using a different approach but obtained similar results, also a study by Omodero (2019) explored the impact of shadow economy from 1991-2018. The study employed Ordinary least squares (OLS) technique to examine the impact of earned and lost tax revenue on Nigeria's GDP. The finding revealed a positive and significant effect of earned tax revenue on the growth of the economy, and a negative and significant impact of the tax revenue loss on economic growth. Another study by Anoop *et al.,* (2012) analyzed the determinants of the underground economy, taking into consideration the role of institutions and the rule of law. The study found out that when businesses are faced with corruption, inconsistent enforcement and onerous regulation, they tend to hide their activities in the underground economy.

Analysis from the literature suggests that institutional framework plays a larger role in determining shadow economy size than taxes do. Using panel data set for more than 80 countries from 1999-2007, Andreas and Mohammad (2013) investigate the marginal influence of education on the informal economy while taking institutional quality into consideration. They found out that in an environment with weak institutions, higher educational level fuels the informal economy. Still addressing the connection between institutions and shadow economy, estimating seven developing economies of ASEAN using MIMIC approach for the period between 2007 and 2016, Maulida and Darwanto (2018) revealed that the relationship between shadow economy and institutions is negative. Also study by Dreher *et al.,* (2009) recorded a similar result by applying three-stage least square (3SLS) for a sample of 78-135 countries from various continents. They found that the mediating effect of institutions on corruption and shadow economy is significantly negative, meaning that the amount of

the shadow economy and the corruption practices will be reduced as quality of institution improves.

In a closely related study and obtaining similar results also, Torgler and Schneider (2007) examined the interrelationship between institutional quality and tax morale and shadow economy. Their study found a significant but negative association between the variables. This shows that shadow economy activity and institutional quality are substitutes i.e., quality institution helps to reduce the sizes of shadow economy. In determining the threshold level of institutional quality's effect on shadow economy and the resulting effect on environmental pollution between 1984 and 2018 using a data set from Nigeria, Dada & Ajide (2021) revealed that both in the short and long run, the effect of shadow economy on environmental pollution is significantly positive. This reveals that shadow economy degrades environmental quality while institutional quality reduces environmental pollution.

A further look into the interrelation between financial inclusion and shadow economy is also given consideration in this study. Using the nonlinear ARDL (i.e., NARDL) to investigate the impact of the shadow economy on financial inclusion for a sample of 18 selected merging economies from 1980 to 2013. Hajilee *et al.,* (2017) revealed a significant effects of shadow economy on the financial inclusion. Similarly, from a sample of 20 emerging economies from 2004-2014 using a two-stage linear panel regression (2SLS) to analyze the relationship between financial stability, financial inclusion and shadow economy, Elsherif (2019) found an insignificant effect of financial inclusion on shadow economy (SE) size; however, the level of financial instability can be increased by both inclusion and SE.

Another contribution was made by Affand and Malik (2019) to the extant literatures to investigate the linkage between shadow economy and financial institutions and the resulting effect on financial inclusion for the year 2006-2017. The study revealed that shadow economy and financial institutions significantly impacted on financial inclusion. Also, investigating the link between shadow economy and financial in selected African countries, Ajide (2021) found that financial inclusion negatively affects shadow economy. The causality results also revealed a unidirectional causal relationship which means that financial inclusion better predict shadow economy. The findings also show that through financial inclusion, country with lower degree of corruption and higher economic growth tend to gain more from the reduction in the size of shadow economy.

In summary, there appears to be a lack of clear-cut direction on the interaction among shadow economy, financial inclusion and quality of institution in the literature. Despite the numerous studies on SE-FI, SE-INS and FI-INS nexus across the globe, little attention has been given to the interaction among the variables simultaneously. However, the institutional influence on financial inclusion on the development of shadow in Nigeria has not been accorded enough attention in the literature, hence this study.

Table 1 – Measurement of variables and sources

Variable	Symbol	Description	Sources	Measurement
Financial Inclusion	FI	Number of commercial bank branches per 100,000 adults Private credit by deposit money banks as a % of GDP	World development indicator, 2020	Index
Institutional Quality	INS	Democratic Accountability Corruption control Law and order	International Country Risk Guide (ICRG) assembled by the Political Risk Services (PRS) group.	Index
Shadow economy	SE	Size of shadow economy as a percentage of GDP	World development indicator, 2020	% GDP
Inflation rate	INF	Consumer Price Index (CPI), annual variation in %	CBN statistical Bulletin, 2020	CPI, annual variation in %

Source: Authors' Compilation, 2022

Methodology

The primary goal of this research is to determine the link between institutions, financial inclusion and shadow economy in Nigeria as well as to investigate the moderating role quality of institution plays on financial inclusion on the advancement of shadow economy in Nigeria over the period 1991-2020. The study relies on Law and finance theory which is premised on the institutional school of thought which state the importance of legal institution in financial market and emphasizes that in an economy where private property rights and private contractual arrangement are supported by strong institutions, businesses are formalized and consequently, formal sector participation as against the informal sector participation is encouraged, thus a reduction in shadow economy size of the nation. In essence this theory includes institutions and financial inclusion as impacting the shadow economy. Following this line of thought, and the literatures and supporting empirical evidence in line with Maulida & Darwanto (2018); Dada & Ajide (2021); and Affand& Malik (2019), the study specify of shadow economy size as a function of financial inclusion and institutional quality.

$$SE_t = f(FI_t, INS_t, Z_t) \quad (1)$$

Where *SE* measures the size of shadow economy; *FI* is financial inclusion indicator; *INS* represent quality of institution indicator and *Z* the control variable. Control variable incorporated is inflation rate. The functional specification of the model is as follows:

$$SE_t = \beta_0 + \beta_1 FI_t + \beta_2 INS_t + \beta_3 \mathrm{INF}_t + \mu_t \quad (2)$$

where INF and μ are inflation rate and disturbance term respectively. However, to capture the mediating role of institutions on financial inclusion on the shadow economy, financial inclusion and institutions have been included as interactive term to equation (2).

$$SE_t = \beta_0 + \beta_1 FI_t + \beta_2 INS_t + \beta_3 (FI_t * INS_t) + \beta_4 \mathrm{INF}_t + \mu_t \quad (3)$$

where $FI_t * INS_t$ represents the interactive term between financial inclusion and quality of institutional and coefficients β_1, β_2, β_3, and β_4 denote the parameters to be estimated.

Estimation techniques

In achieving the objectives, this study employed auto regressive distributed lag model of technique (ARDL). However, the technique works regardless of the order in which the variables are integrated as long as the variables are not more than one [I (1)]. ARDL also has the ability to produce short term and long-term unbiased estimates in a dynamic setting. In line with work of Pesaran *et al.,* (2001), equation (3) is re-specified as follows:

$$\Delta SE_t = \beta_0 + \sum_{j=1}^{n} \partial_j \Delta SE_{t-j} + \sum_{J=1}^{0} \alpha_j \Delta FI_{t-j} + \sum_{j=1}^{p} \varphi_j \Delta INS_{t-j} + \sum_{j=1}^{p} \Phi_j \Delta (FI_t * INS_t) + \sum_{j=1}^{r} \theta_j \Delta INF_{t-j} + \beta_1 SE_{t-1} + \beta_2 FI_{t-1} + \beta_3 INS_{t-1} + \beta_4 (FI_t * INS_t) + \beta_5 INF_{t-1} + \mu_t \quad (4)$$

Equation (4) is the ARDL model which comprised both short-run and long-run association between the variables. With an assumption that there exist long run relationship between them, equation (3) reflects the impact of financial inclusion and institutional quality on the advancement of shadow economy both in the short-run and long-run. From the model, Δ is differencing operator, $\partial_j, \alpha_j, \varphi_j, \theta_j$ and Φ_j are the coefficient of speed of convergence in the short run from long run equilibrium path while $\beta_1, \beta_2, \beta_3, \beta_4$ and β_5 represents the long run relationship between the variables; $\mu_t$is the disturbance term at time *t*.

Measurement, description and sources of data

This study employed data covering 1991-2018 to analytically produce empirical evidence on the relationship between the variables. The choice of scope of this study is as a result of transformation in governance i.e., the roadmaps, the various approaches, change in leadership structure in the 1990s and the bank consolidation program of the 2000s.

For the **Shadow Economy Size (SE)** in Nigeria, Schneider and Medina (2018) data set was adopted in this study. They estimated shadow economy sizes of 158 countries spanning from 1999 to 2015 using MIMIC approach. The MIMIC approach is a principle-based approach that takes into consideration the causal effect of some exogenous variables on shadow economy.

For **Financial inclusion (FI) indexes** in Nigeria, using Principal component analysis (PCA), the study employ (1) Number of commercial bank's branches per 100,000 adults' proxy for accessibility and

utilization of financial services depicting financial services availability and (2) Private credit by deposit money banks as a percentage of GDP indicating the depth of financial services.

And lastly, **Institutional quality (INS) indexes** as constructed by Kaufmann *et al.,* (2004). However, Law *et al.* (2018) and Gazdar & Cherif (2015) measured the overall institutional quality by five (5) Indicators or indexes, namely: democratic accountability, political stability, bureaucracy, law and order and control of corruption. Higher values when ranged imply a better institutional quality while lower values denote a weak institution. In order to generate institutional quality index for this study, three indicators employed are averaged which are in line with the work of Kose *et al.,* (2011) and Agbloyor *et al.,* (2016).

This study however adopts inflation rate as a control variable. The study takes this because the decision to engage in business activities in the informal economy is also influenced by economic conditions and institutional factors (Keneck *et al.,* (2019). However, "economic instability (i.e. inflation rate) including the opportunities it creates may attract economic agents to informal sector" (Goel and Nelson, 2016).

Results & Discussions

Descriptive statistics

Descriptive statistics are conducted to highlight the features and nature of data, as well as the behaviour of the variables within the study period. The descriptive statistics result is therefore presented in Table 1.

Table 2 – Descriptive Statistics

	SE	FI	INS	INF
Mean	60.87117	1.07E-15	2.291667	18.45445
Median	60.69500	0.521915	2.333333	12.71577
Maximum	67.65000	1.448110	2.833333	72.83550
Minimum	51.95000	-2.181778	1.638889	5.388008
Std. Dev	3.993564	1.149458	0.284029	16.79690
Skewness	-0.016910	-0.446029	-0.709493	2.085270
Kurtosis	2.346646	1.807810	3.219481	6.194997
Observations	30	30	30	30

Source: Authors' computation, 2022

An important finding is that the mean and the median shows exceptional consistency as their values fall between the minimum and maximum (see Table 2). The mean value of SE is 60.87 with 67.65 and 51.95 (% of GDP) as maximum and minimum value respectively. The coefficients of the standard deviation significantly spread out from their mean; this shows that the variables are volatile.

Also, on average, mean values for FI and INS are 1.07% and 2.29% with 2.18% and 1.63% ,1.44%. and 2.8333% as minimum and maximum value of respectively. The descriptive analysis results also reveal that SE, FI and INS skewed negatively, while INF skewed positively. Also, Kurtosis which measure the level of peakness of the variables revealed that SE and FI platykurtic while INS and INF are leptokurtic.

Table 3 – Correlation Matrix

	SE	FI	INS	INF
SHADOW	1.000000			
FII	0.410900	1.000000		
INS	0.426704	0.308839	1.000000	
INF	0.099757	-0.377080	0.188659	1.000000

Source: Authors' computation, 2022

Table 3 showed the correlation matrix result which demonstrated the nature, degree and direction of the correlation between the variables. Notably, the coefficients of the correlation ranged from -0.377 to 0.426, which indicate absence of multicollinearity. However, since all correlation coefficients are less than the benchmark (0.8), this demonstrates no multicollinearity between the variables. The results also showed that SE had a positive correlation with FI, INS and INF.

Preliminary test

In empirical analysis, time series data that are non-stationarity has been viewed as been problematic. Consequently, regression on series that are non-stationary may lead to spurious results. Therefore, this study employed (ADF) and (PP) tests for the unit root.

Unit root test

Table 4 – ADF and PP unit root Test

Variable	Augmented Dickey Fuller (ADF)Test				Phillip-Perron (PP) Test			
	@Level	@1st Diff	5% CV	Remarks	@Level	@1st Diff	5% CV	Remarks
SE	-2.023313	-7.162559	-2.971853	I(1)	-1.880571	-7.662592	-2.971853	I(1)
FI	-2.201198	-7.133395	-2.971853	I(1)	-2.236149	-7.133395	-2.971853	I(1)
INS	-3.280621	-4.660995	-2.967767	I(0)	-3.434647	-9.106944	-2.967767	I(0)
INF	-1.991441	-4.251095	-2.976263	I(1)	-2.230861	-5.909278	-2.976263	I(1)

Source: Authors' computation, 2022

Table 4 revealed that SE, FI and INF are stationary at first difference and INS at levels i.e. this shows a mixed "order of integration" among them.

Selection of Lag Order

The lag length for the model is presented in Table 5. The AIC, HQ and FPE revealed three (3) lag length. This study chose AIC because it could handle the risk of over fitting and under fitting while FPE information criterion is appropriate when the number of observations is small or less than 60.

Table 5 – Optimal lag length

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-75.76760	NA	17.26438	5.686489	5.734483	5.700760
1	-67.49191	15.32534	10.07386	5.147549	5.243537*	5.176091
2	-66.95568	0.953304*	10.43271	5.181902	5.325884	5.224715
3	-66.93602	0.033496	11.23282*	5.254520*	5.446496	5.311604*

Source: Authors' computation, 2022

* Indicates selected lag order

Autoregressive Distributed Lag (ARDL)

Since the Unit root test revealed a mixed result, and more importantly, then "using autoregressive distributed lag (ARDL) as the estimation technique is appropriate" (Fabiyi and Dada, 2017). From Table 5, the F statistic value is 5.344569 and the lower and upper bound test result at 5% level of significance are 2.72 and 3.77 respectively. Since the F-Bound test statistic value of 5.344569 is greater than the lower and upper bound result, we the reject the hypothesis of no long-run relationship and accept that there exists a long-run relationship between them.

Table 6 – ARDL bound test

Model	Test statistic	Value	K
	F-statistic	5.344569	3
Critical Value Bounds Significance	I(0)	I(1)	
10%	2.72	3.77	
5%	3.23	4.35	
2.5%	3.69	4.89	
1%	4.29	5.61	

Source: Authors' computation, 2022

In Table 6, the short run dynamic impacts of financial inclusion, institutional quality, and inflation on shadow economy is significant at 5% level and negatively signed. ECM is also significant and correctly signed with an estimated value of -0.73 with probability value of 0.0022. This means that approximately 73% of the discrepancy of the previous year is adjusted for by the current year.

In the long run, the coefficient of financial inclusion is negative and significant and insignificant in the short run and also higher in the long run when compared with the short. This implies that financial inclusion reduces shadow economy in Nigeria which is quite evident in the long run i.e., both in the short and long run, a unit increase in financial inclusion would on average decrease the shadow economy by 6.56 and 29.3% respectively in Nigeria. This is in line with the submission of Bittencourt *et al.,* (2014), Hajilee *et al.,* (2017) and Ajide (2021). They document that the move to make financial services affordable and accessible to firms and individuals reduces shadow economy in Nigeria.

Table 7 – Impact of institutional quality on financial inclusion on the advancement of shadow economy

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Short run				
D(SE(-1))	-0.403570	0.198952	-2.028483	0.0674
D(FI)	-6.562286	6.498392	-1.009832	0.3343
D(FI(-1))	2.585579	1.146573	2.255049	0.0455
D(FI(-2))	-1.776754	0.717785	-2.475329	0.0308
D(INS)	-3.382798	3.085710	-1.096279	0.2964
D(INS(-1))	-5.697865	3.163581	-1.801081	0.0991
D(INF)	0.140491	0.083995	1.672620	0.1226
D(INF)	0.186436	0.114313	1.630933	0.1312
D(INF)	-0.103715	0.078092	-1.328100	0.2110
D(FI * INS)	3.036531	2.976352	1.020219	0.3295
CointEq(-1)	-0.731013	0.184144	-3.969801	0.0022
Long run				
FI	-29.395303	12.882146	-2.281864	0.0434
INS	12.050156	4.877474	2.470573	0.0311
INF	0.168665	0.079242	2.128495	0.0567
FI*INS	14.007110	5.725793	2.446318	0.0325
C	29.556355	10.931746	2.703718	0.0205

Source: Authors' computation, 2022

Also, in Table 7, institutional quality (INS) has a negative non-significant effect on shadow economy and positive and also significant in the short and long run respectively. This implies that INS has the potential to reduce shadow economy size.i.e., a reduction in shadow economy size is associated with an improvement in institutional quality in Nigeria. This result corroborated the empirical work of Maulida & Darwanto (2018), Dreher *et al.,* (2009) and Torgler and Schneider (2007) which posits that

strong institutional framework is required to reduce shadow economy activity in an economy. In addition, inflation coefficient is insignificant in the short run while in the long run, it is positive and significant. This means that inflation aide the development and rise of shadow economy in Nigeria which the impact is felt more over a long period than the short while. This supports the empirical work of Mazhar and Méon (2017) which emphasize positive relation between inflation and shadow economy which are in line with their model's prediction.

Furthermore, the coefficient of (FI * INS) showed a positive and significant impact on shadow economy in the long run and an insignificant impact in the short run. Meaning that institutions and financial inclusion aids the advancement of informal economy in Nigeria. This finding suggests that feeble institutional quality which is characterized by governance and regulatory deficiencies, high degree of corruption etc. recorded in the country hinders firms and individuals' access and usage to financial services which in turn result to a rise in informal economy. Consequently, a rise in informal economy however provides avenue whereby government suffers financial loss resulting in a reduction in national revenue due to tax evasion.

Conclusion

This study is aimed at evaluating the dynamic link between financial inclusion, institutional quality and shadow economy as well as examining the moderating role quality of institutional plays on nexus between financial inclusion and shadow economy in Nigeria for a period of 1991-2020. ARDL technique was employed by the study to investigate relationships among the variables. Bound test results show the existence of long-run relationship among shadow economy, financial inclusion and quality of institution. The study also revealed that financial inclusion negatively and significantly affects shadow economy both in the short and long run. By implication, inclusive financing is indeed one of the primary factors influencing shadow economy in Nigeria. It becomes necessary for Nigerian governments to continue to place priority on revamping the financial sector by ensuring financial intermediation thus easy access to various financial services. Furthermore, the study also reveals that the effect of institutional quality on shadow economy in Nigeria is significantly negative. By implication, quality of institutions also plays a role in decreasing size of informal economy in Nigeria. In the same vein, Inflation also positively and significantly impacted on shadow economy in Nigeria. This shows that inflation is another factor that positively and significantly affects shadow economy in Nigeria. By implication, "a larger informal economy gives governments an impetus to switch its source of revenue from taxes to inflation, this erodes the tax base and decreases tax revenues, forcing governments to find alternative sources finance their expenditures" (Mazhar and Meon , 2017).

Furthermore, the interaction of financial inclusion and quality of institution on shadow economy in Nigeria is significantly positive. This means that the effect of institutions on financial inclusion aid the growth in shadow economy size in Nigeria. Similarly, weak institutional quality has its ripple effect on financial development which not only disrupts financial intermediation, but also undermines the effectiveness of monetary policy, thus discouraging formal sector participation in Nigeria. To this end, the study suggests that key reforms and policies that are needed to improve transparency and accountability at all levels of governance should be given a priority. In turn, this would ensure improvement in financial institutions and thus reduces shadow economy size in Nigeria.

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