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DISAGGREGATED TRADE OPENNESS ON SHADOW ECONOMY IN NIGERIA: DOES INSTITUTIONAL QUALITY MATTER?

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ABSTRACT

Introduction: It is likely that enterprises and entrepreneurs will be encouraged to engage in the formal sector as economies integrate more fully into the global economy. Thus, we begin our investigation by looking at the relationship between Nigeria's shadow economy and disaggregated trade openness. Based on Nigeria's inadequate institutional quality, our second purpose is to conduct further research on the role institutional quality plays in moderating the relationship between its shadow economy and disaggregated trade openness between 1991 and 2018.
Methods: The fully modified ordinary least squares (FMOLS) and Granger causality methods are used in this paper to investigate the nexus and causal effect in time-series analysis.
Results: The coefficients of institutional quality, import-to-GDP ratio, government expenditure, and financial development all have an adverse impact on Nigeria's shadow economy. The inflation proxy with the consumer price index, economic growth, and the export-to-GDP ratio all improve Nigeria's shadow economy. The findings of interaction between the import-export ratio and the quality of institutions positively affect the Nigerian shadow economy. The pairwise Granger causality exercise comes after the regression analysis.
Conclusion and suggestion: The study concludes that the size of Nigeria's shadow economy is influenced by institutional quality, import trade, government expenditures, and financial development. Similarly, we find no causal relationship

between disaggregated trade openness in Nigeria and institutional quality. As a result, policymakers and the country's government must act quickly and decisively to reduce the impact of informal activities on the country's economy.

INTRODUCTION

The focus of research in recent years has been on trade openness and shadow growth in developing economies. In addition to the increasing integration of economies at the global level (Shahbaz, 2012), most developing economies are likely to target shadow economy activities as a common policy priority. Theoretically, international trade is thought to facilitate technological progress and innovation, along with the transfer of new technologies (Grossman & Helpman, 1991). In this way, all developing countries have good reasons to open their respective economies to trade. As a result of absorbing capital and labour from the formal economy, the shadow economy hinders economic development. In addition, it creates distortions in official statistics that limit the effectiveness of domestic policies (La Porta and Schleifer, 2014). Shadow economies negatively affect the development of economies because they prevent a country from creating a diversified and large export market, which helps it integrate into the global economy (Bacchetta et al., 2009). There is, however, no conclusive evidence from recent empirical studies. The relationship between trade openness and the shadow economy has been found to be positive in some studies (Marjit et al., 2007), while others have found no significant relationship or even a negative or complex interaction (Birinci, 2013; Blannton et al., 2018; Beladi and Yabuuchi, 2001; Berdiev et al., 2018; Esaku, 2021).

Due to equivocal findings in the existing literature, this article explores, in the context of Nigeria, the degree of institutional quality that may influence the shadow economy-disaggregated trade openness relationship. There are numerous reasons to examine Nigeria as a nation. First, crude oil earnings have affected the trade balance and made it volatile, necessitating a substantial amount of external debt to finance the infrastructure. The volatility of total trade demonstrates how the policy environment influences the trade-based integration of the Nigerian economy. Second, Nigeria's shadow economy employs a greater number of people than its formal sector (Dada and Ajide, 2021). About 66 percent of employment opportunities are in the informal sector of the economy, making it challenging to plan for development in terms of income generation and other development objectives (Kathage, 2018). Nonetheless, it is now commonly recognized that institutions, particularly in developing nations, have a substantial effect

on the shadow economy (Alhassan and Kilishi, 2019; De Soto, 1989; Elgin and Erturk, 2019; Friedman, Johnson, Kaufmann, et al, 2000; Hendricks, 2002; Mohommad, Singh & Jain-Chandra, 2012). These studies contend that measures of institutional quality encourage firms to grow informally. Any economy with weak and inefficient institutions may be severely underdeveloped and lagging behind the rise of the shadow economy and the monitoring of trade activities (Dada and Ajide, 2021; Dreher and Schneider, 2009; Friedman et al., 2000; Ott, 2002; Zhanabekov, 2022). This illustrates why the bulk of African nations, including Nigeria, remain economically behind their Western counterparts.

Hence, we begin by investigating the link between Nigeria's shadow economy and disaggregated trade openness. The second purpose is to further establish the moderating role of institutional quality in the relationship between Nigeria's shadow economy and disaggregated trade openness in light of the country's inadequate institutional quality. This is done to provide Nigerians with a realistic impression of the institution's ability to manage the degree of trade openness and further reduce the growth of the shadow economy. In two ways, this paper contributes to the body of literature. This study begins by dissecting the trade openness component, which has a lot of policy implications, in order to explore the relationship between trade openness and the shadow economy. What rules, for instance, are required to support an export or import-to-GDP ratio that can have negative effects on the informal economy? Addressing the expansion of shadow activities in a growing nation like Nigeria is definitely essential, as a significant shadow economy might undermine the government's economic goals and its ability to provide essential services that promote the well-being of its citizens. Second, to the best of our knowledge, this is the first study to investigate how institutional quality affects the relationship between trade openness and the Nigerian shadow economy. In terms of comprehension and policy direction, policymakers in Nigeria and the rest of Africa will gain from this paper's results. This paper's remaining sections are organized as follows: In the subsequent part, a literature review will be presented. In Section 3, a summary of the empirical methodology and data is provided. In Section 4, the results are summarised, and in Section 5, policy recommendations are presented.

LITERATURE REVIEW

The connection between shadow or underground economy activities and a variety of factors, such as economic growth, financial sector development, tax rate, institutional quality, democratic accountability, level of development, corrupt practices, income inequality, etc., has been extensively studied (see Ariyo and Bekoe, 2012; Berdiev and Saunoris, 2016; Bhattacharya, 2011; Chong and Gradstein, 2007; Dreher, Kotsogiannis, and McCorriston, 2009; Elgin and Erturk, 2016; Esaku, 2021; Guillermo and Deyvi, 2018;

Huynh & Nguyen, 2019; Ihendinihu, Uzoma, and Ochonma, 2010; Nchor, Adamec and Kolman, 2016; Saha et al., 2020; Teobaldelli and Schneider, 2013). For example, Saha et al. (2020) evaluated the association between corruption, the shadow economy, and income inequality using data from 21 Asian nations collected over 21 years. Huynh and Nguyen (2019) contend that, relative to earlier research, the link between income inequality and the shadow economy is negative for the panel data set of selected Asian nations covering 1990 to 2015. The authors reported that despite a positive and statistically significant effect of the shadow economy on income inequality and the income shares held by the lowest and highest quintiles, the effect is negative and statistically significant on the income shares held by the lowest and highest quintiles, respectively.

Recent research on Uganda's shadow economy and economic disparity by Esaku (2021) suggests a possible short- and long-term association between the shadow economy and income inequality. In addition, the results of the autoregressive distributed lag limits test suggested that all else being equal, income disparity contributes to substantial rises in Uganda's shadow economy. Although the nexus concerning an openness to trade and the size of the shadow economy is significant, it has acknowledged sparse theoretical and empirical attention. Theoretically, trading partners benefit from a more trade-friendly economy. However, growing contact with global trade only encourages larger, dynamic enterprises to participate in it, while the fewer successful businesses keep on working on the home market. Moreover, due to the impact of resource reallocation on aggregate industry productivity, international trade boosts welfare gains (Melitz, 2003). Consequently, the above-mentioned literature suggests that an increase in informality is a consequence of greater commercial openness. Nonetheless, according to Aleman-Castilla (2006), certain enterprises are compelled to function in the official sector rather than the shadow economy as a result of the drop in trade costs caused by trade liberalization. According to this viewpoint, reducing trade costs entails a reduction in marginal production costs, which enhances both productivity and citizen welfare. This highlights the need for additional research into the relationship between trade liberalization and the expansion of the shadow economy. Nguyen and Thank (2020) did a rigorous analysis of the non-linear effects of export diversification and export quality on the shadow economy for 116 countries from 2003 to 2014. Regarding the shadow economy, the authors suggest that the effects of export quality and export diversification are nonlinear. Consistently, both high- and low-income economies have been shown to exhibit nonlinear effects.

Recent research by Esaku (2022) argued that increasing foreign trade exposure drastically reduces the shadow economy. As economies integrate more fully into the global economy in order to profit from global marketplaces, this may imply that

enterprises and individual entrepreneurs are encouraged to engage in the formal sector. Abu Alfoul, Khatatbeh, and Jamaani (2022) asserted that institutional quality is the primary predictor of the shadow economy. The findings indicate that only four of the six factors—the quality of bureaucracy, law, and order, corruption, and internal strife—are credible predictors of the shadow economy. Inflation and poverty are also significant factors in determining the shadow economy. From 1984 to 2018, Dada and Ajide 2020 argued that the interaction term between the institutional quality of the shadow economy and environmental deterioration is negative but marginal over time. It indicates that the quality of institutions is insufficient to significantly reduce environmental damage and the shadow economy. The foregoing suggests that no conclusive evidence from recent empirical studies. The relationship between trade openness and the shadow economy has been found to be positive in some studies while others have found no significant relationship or even a negative or complex interaction.

RESEARCH METHODS

Variables

Our empirical research, which is based on the literature, uses data for Nigeria from 1991 to 2018 from the World Bank, the World Development Indicators, the International Country Risk Guide (ICRG), and the Worldwide Governance Indicators. The amount of the shadow economy, inflation, the proportion of imports to GDP, the proportion of exports to GDP, the increase in GDP per capita, government spending, law and order, and financial development are among the factors for which sufficient statistics are available. Using Medina and Schneider's (2019) approach and data sets, the size of the shadow economy is predicted to be the main explanatory variable. Following Siami-Namini and Hudson, the consumer price index is used to calculate inflation (2019). GDP per capita growth is a proxy for economic growth that is used to evaluate Nigeria's rate of growth. This suggests that an improvement in economic growth could either cause the size of the shadow economy to increase or decrease (Rubin & Segal, 2015). In the literature, it has been noted that government spending plays a significant role in determining the shadow economy. These studies suggest that government expenditure on public goods and services may improve the welfare of low-income residents, hence reducing the disparity in income between the rich and the poor (see Doumbia & Kinda, 2019; Lustig et al., 2013). Government spending in this study was therefore calculated as a proportion of GDP.

Law and order, which was used to assess institutional quality, is another significant control variable. We argue that institutions' quality plays a key role in determining how the economy's economic activities are organized. However, research on how financial development affects the shadow economy has shown conflicting results. According to Safun, Habibullah, and Sugandi (2021), as the financial sector develops, there is an initial

expansion of the shadow economy that reaches a critical point, followed by a decline. The variables, descriptions, and sources are displayed in Table 1.

Table 1. Variables Description, and Sources

Variable	Description	Sources
Economic growth (GDP)	Gross domestic product per capita growth	WDI, 2021
Govt. expenditure (GEX)	Government expenditure as a share of GDP	WDI, 2021
Inflation (INFL)	Consumer price index	WDI, 2021
Financial devt. (FIN)	Money and quasi-money as a share of GDP (M2)	WDI, 2021
Export (EXP)	The ratio of export of goods and services to GDP	WDI, 2021
Import (IMP)	The ratio of import of goods and services to GDP	WDI, 2021
Law and Order (LOR)	Institutional quality	Worldwide Governance Indicators (2021)
Shadow economy (SES)	This captures the size of the shadow economy as a percent of the gross domestic product	Medina and Schneider (2019)

The Model and Econometric Strategy

We specify a baseline model which addresses the interactive impact of institutional quality on the shadow economy and disaggregated trade openness in Nigeria. It expresses income inequality as a function of the shadow economy and a set of control variables:

$$\mathrm{SES_t} = \mathrm{z_0} + \mathrm{z_1 TRD_t} + \mathrm{z_i X_t} + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

From equation (1), trade openness is disaggregated into the ratio of import of goods and services to GDP (IMP) and the ratio of export of goods and services to GDP (EXP) to become (equation 2):

$$\mathrm{SES_t} = \mathrm{z_0} + \mathrm{z_1 IMP_t} + \mathrm{z_2 EXP_t} + \mathrm{z_i X_t} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

where SES represents the shadow economy size and trade openness (TRD) and X expresses the control variables. The model equation (3) was further re-modified to include the control factors as specified below:

$$\mathrm{SES_t} = \mathrm{z_0} + \mathrm{z_1 IMP_t} + \mathrm{z_2 EXP_t} + \mathrm{z_3 LOR_t} + \mathrm{z_4 GEX_t} + \mathrm{z_5 INFL_t} + \mathrm{z_6 GDP_t} + \mathrm{z_7 FIN_t} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

In addition to equation (2), as contained in equation (3), INFL denotes the inflation rate, which is a significant determinant of the size of the shadow economy (Siami-Namini

& Hudson, 2019). Therefore, to estimate, the moderating role of institutional quality on the trade-shadow economy nexus, requires modifying equation (4), and this becomes:

$$\mathrm{SES_t} = \mathrm{z_0} + \mathrm{z_1 IMP_t} + \mathrm{z_2 IMP} * \mathrm{LOR_t} + \mathrm{z_3 EXP_t} + \mathrm{z_4 EXP} * \mathrm{LOR_t} + \mathrm{z_5 LOR_t} + \mathrm{z_6 GEX_t} + \mathrm{z_7 INFL_t} + \mathrm{z_8 GDP_t} + \mathrm{z_9 FIN_t} + \varepsilon_t \ldots \ldots \ldots (4)$$

Thus, the coefficient of $z_1, z_4, z_5, z_6 < 0$; $z_2, z_3, z_8 > 0$; and $z_7, z_9 </> 0$.

The nexus between trade openness and the shadow economy in Nigeria is examined in the current study using the FMOLS approach by examining the role of institutional quality in light of the previous evidence as well as the specification in equation (4). The stated methodology offers accurate estimates for the small sample size and offers a way to assess how solid the findings are. As put forward by Philips and Hansen (1990) for estimating a single co-integrating relationship that has a combination of order one i.e. I (1). The t-test for long-run estimates is valid because the FMOLS method has an advantage over Engle-Granger (EG) procedures in that it introduces the proper correction to resolve the inference issue in EG techniques (Himansu & Lester, 2007). The Fully Modified Ordinary Least Squares (FMOLS) method's ability to modify least squares to account for serial correlation effects and test for the endogeneity in the regressors that results from the presence of a co-integrating nexus is a key factor in our decision to use it to achieve asymptotic efficiency (Ogede & Tiamiyu, 2022; Rukhsana & Shahbaz, 2008). Particularly because the ARDL approach has the same benefit of being able to account for any endogeneity issues among the regressand variables, this FMOLS was chosen above the other strategies (Wolde-Rufael, 2010, Ogede & Tiamiyu, 2022). Additionally, enables researchers to apply a proper dynamic framework, making it possible to draw conclusions about long-run estimations, which is not achievable with other co-integration methodologies (Adegboyega et. al., 2021). In conclusion, the ARDL approach to cointegration could be employed if the series are integrated of order one I(1) and not I(2), whereas FMOLS only clings to the series to be integrated of order one I(1) (1).

RESULT AND ANALYSIS

Summary statistics

Table 2 displays the summary statistics for the sample data used in this study's empirical analysis. Summary statistics for the variables used to determine the role of institutional quality on the shadow economy and disaggregated trade openness nexus are shown in Table 2. The average values of the key variables are shadow economy (SES), 56.608, institutional quality, (LOR), 8.712, inflation rate (INFL) 18.984, import (IMP), 22.106, government expenditure (GEX), 93.492, growth (GDP), 4.369, financial

development (FIN), 10.969 and export (EXP), 15.222. The output of both skewness and kurtosis revealed that the variables of interest were normally distributed.

Table 2: Summary of Statistics

Variables	SES	LOR	INFL	IMP	GEX	GDP	FIN	EXP
Mean	56.608	8.712	18.984	22.106	93.492	4.369	10.969	15.222
Median	57.7	9.94	12.94	22.18	93.57	4.823	8.673	13.414
Maximum	64	18.75	72.835	36.023	102.99	15.329	22.267	22.811
Minimum	47.6	0.000	5.382	9.218	76.949	-2.035	4.992	9.509
Std. Dev.	4.392	6.449	17.296	6.592	5.909	3.861	4.405	3.836
Skewness	-0.35	-0.243	1.964	-0.062	-0.73	0.408	0.904	0.714
Kurtosis	2.098	1.668	5.68	2.55	3.831	3.64	3.122	2.319

Source: Authors' Compilation (2022)

Table 3 displays the results of the Augmented-Dickey–Fuller (ADF) and Phillip–Perron (PP) tests, including the intercept and the trend and intercept. The table's conclusion indicates that all selected variables are either stationary in levels or after initial differencing, and change based on the type of stationarity test employed, indicating that they are integrated of order zero, I(0), and/or order one, I(1).The outcome of the unit root test in Table 3 shows the degree of integration to be I(1) for all variables of interest (i.e regressor and regressand), which provides us with the opportunity of using the Fully Modified Ordinary Least Square along with Ordinary Least Square approach for robustness check on the nexus. We opted for FMOLS since it addresses the activities of nuisance parameters, the possibility of endogeneity plight of regressand variables is good for small sample size analysis, and takes into account the serial correlation problem/bias (Menegaki, 2019).

Table 3. Outcome of the Unit Root Tests

Variable	**Level**				**First Difference**			
	Intercept		Trend &Intercept		Intercept		Trend & Intercept	
	ADF	**PP**	**ADF**	**PP**	**ADF**	**PP**	**ADF**	**PP**
SES	-1.407	-1.136	-3.211*	-3.243*	-5.961**	-6.801**	5.835**	-6.612**
LOR	-0.684	-2.467	-3.973**	-7.488**	-15.544**	-18.664**	-15.228**	-17.602**
INFL	-1.934	-2.099	-2.578	-2.891*	-5.035**	-5.203**	-4.925**	-5.502**
GDP	-2.662*	-2.608	-2.516	-2.451	-4.596**	-7.117**	-5.512**	-7.597**
GEX	-4.03**	-4.635**	-4.290**	-4.290**	-3.800**	-13.249**	-4.239**	-15.184**
IMP	-2.858	-2.858	-3.121	-3.121	-4.956**	-8.882**	-5.021**	-11.780**

EXP	-2.858	-3.626**	-3.741**	-3.741**	-4.717**	-9.365**	-5.005**	-9.739**
FIN	-1.951	-1.886	-3.691**	-2.526	-4.764**	-3.898**	-4.643**	-3.805**

Source: Authors' Compilation (2022), ** and * represents 5% and 10% respectively.

Empirical Results

This section begins by presenting results from the modelling of the interaction of the institutional quality on the disaggregated trade openness and the shadow economy. The results from the OLS and FM-OLS models are reported in Table 4. Table 4 summarizes the OLS and FM-OLS results for the Nigeria sample using shadow economy as the dependent variable. Table 4 Column (1) and (2) presents the OLS approach results. The OLS results in Column (1) reveal that the coefficients of institutional quality, the ratio of import to GDP, government expenditure, and financial development negatively affect the shadow economy in Nigeria. However, inflation proxy with the consumer price index, economic growth, and ratio of export to GDP in the same model positively enhances the shadow economy in Nigeria. Specifically, a 1% increase in institutional quality, the ratio of import to GDP, government expenditure, and financial development damages the shadow economy by 0.191, 3.35, 3.35, and 0.23 respectively. On the contrary, a one percent increase in inflation, economic growth, and the ratio of export to GDP increased up to 0.05, 0.07, and 3.29 respectively in the shadow economy. The findings that the coefficients of institutional quality are negative and statistically significant at 5 percent agreed with the submission by Esaku (2021). Besides, the coefficient of trade openness which is decomposed ratio of imports of goods and services to GDP, and the ratio of exports of goods and services to GDP exhibit the expected sign respectively. The coefficient of export trade is positive and statistically significant at a 5 percent significance level, which conforms to the Keynesian school of thought, which contended that import and export are withdrawal and injection. Our findings are corroborated by the study of Olubiyi (2014).

Table 4. OLS and FM-OLS Results for Nigeria (Dep Var.: Shadow Economy)

Variable	OLS				FM-OLS			
	Column (1)		Column (2)		Column (3)		Column (4)	
	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat
CONSTANT	388.44	5.71**	393.53	6.125**	459.86	8.161**	383.437	10.396**
LOR	-0.191	-1.80***	-0.865	-2.954**	-0.212	-2.301**	-0.836	-4.990**
INFL	0.048	1.492	0.03	0.997	0.048	1.635*	0.03	1.531*
IMP	-3.346	-4.95**	-3.524	-5.658**	-4.057	-7.253**	-3.465	-9.850**
GEX	-3.346	-4.776**	-3.245	-5.001**	-3.986	-7.041**	-3.139	-8.447**
GDP	0.072	0.543	0.03	0.245	0.042	0.376	0.028	0.4
FIN	-0.228	-1.690*	-0.249	-1.99***	-0.198	-1.76***	-0.266	-3.728**
EXP	3.291	4.748**	3.165	4.95**	4.073	7.079**	3.109	0.546**

IMP*LOR		0.013	0.730		0.015	1.263
EXP*LOR		0.025	0.914		0.02	1.065
R-Squared	0.82	0.86		0.79	0.86	
D-Watson	1.61	1.38				
F-Stat	13.055	12.83				

Source: Authors' Compilation (2022)
(***) (**) (*) represents 10%, 5% and 1% respectively.

However, another important component of national income that is expected to serve as an injection into the economy is government expenditure. The coefficient of government expenditure (GEX) exhibits a negative relationship with shadow economy size. Although, government expenditure is an injection which is aim to boost the shadow economy but rather decrease the shadow economy size. The findings as presented in Table 4 Column 1 in the case of Nigeria contradict studies conducted by Alm & Embaye, (2013); Goel & Nelson, (2016), who argued that more government expenditure leads to the expansion of the shadow economy. We further consider the level of development in Nigeria and found that the coefficient of growth of gross domestic product (GDP) was found to be positive, but not statistically significant. Also, the coefficient of inflation (INFL) exhibits a positive relationship with shadow economy size, although not statistically significant when estimated. This outcome reveals that a percentage increase in inflation results in an increase in the size of the shadow economy in Nigeria suggesting that the level of inflation rate in the country is seriously heating the polity, therefore, providing people partaking in informality business as a way to augment their livelihood. Hence, this outcome requires quick and urgent attention by the policymaker and the government of the country by putting up a policy that can curb inflationary pressure on the country's economy. In addition, the coefficient of domestic credit to the private sector as a measure of financial development in Nigeria (FIN) is negative and statistically significant at 1 and 10 percent levels, implying that an improvement in financial development reduces the shadow economy by 0.228 and 0.198 percent respectively. These findings are in tandem with the submission of Esaku (2021a); Berdiev & Saunoris, 2016), who indicated that a well-developed financial sector reduces the opportunity in the shadow economy.

After introducing an interactive variable of institutional quality in column 2, the direction of influence remained the same for each variable's coefficient but differed in magnitude. Focusing on the interactive variable, particularly, the results indicate that the interaction of both ratio of import and export to GDP with the quality of institutions, positively impacts the shadow economy in Nigeria. The positive relationship between the coefficient of the interaction term (IMP*LOR) and the shadow economy size in Nigeria suggests that as institutional quality (law and order) improves, so do the negative long-

term effects of import trade. In other words, when institutional frameworks that uphold law and order are weak, opening up import trade leads to economic conditions that have a detrimental impact on the operations of the shadow economy. It's possible that the importation of products and services is causing unsustainable consumption and diverting financial resources through unethical business methods and tax laws, among other things. The extent of the shadow economy is positively correlated with the coefficient of the interaction term between export trade and institution quality, or (EXP*LOR), in a statistically insignificant manner. This demonstrates that the contribution of imports and exports to the extent of the shadow economy in Nigeria is independent of institutional quality. The research conducted by Baliamoune-Lutz & Ndikumana supports this conclusion (2007).

The estimates of the FM-OLS for the same variable in Columns 3-4 exert the same signs and diverse magnitude. Specifically in Column 3, the coefficients of import (-4.057) and exports (4.073) in the trade exert negative and positive impacts respectively on the shadow economy. For the interactive variable of institutional quality in column 4, the direction of influence remained the same for each variable's coefficient remains same but differs in magnitude as presented for OLS. This confirms the robustness of the model. Using the normality, Ramsey reset, Breusch-Godfrey serial correlation LM, and heteroskedasticity-Breusch-Pagan-Godfrey (BPG) tests, we performed residual diagnostics to ensure that there was no bias impacting these results (see Table 5). The findings of these tests do not give evidence that the empirical results of the completely modified ordinary least square models are in any way distorted. In conclusion, institutional quality does not influence the significance of imports and exports to the size of Nigeria's shadow economy.

Table 5. Diagnostic Tests

Test	F-Stat
Normality	0.575
Ramsey RESET Test	2.884
Correlation LM Test :Breusch-Godfrey Serial	0.718
Heteroskedasticity Test: Breusch-Pagan-Godfrey	0.775

Source: Authors Computation, (2022)

The regression analysis is followed by the pairwise Granger causality exercise. Table 6 reports the findings from the Granger causality analysis. The statistical significance of the predicted test statistic shows a two-way causal relationship between institutional quality (LOR) and financial development (FIN). The findings suggest that the level of financial liberalization undertaken in the country had improved significantly as a result of the law and order put in place in the country. Aside from the above, we equally found a one-way directional relationship between shadow economy (SES) and institutional quality

(LOR), trade import (IMP), government expenditure (GEX), and financial development (FIN). All were found to be statistically significant as well. Given this, we conclude that, in Nigeria institutional quality, import trade, government expenditure, and financial development are also contributing factors to the size of the shadow economy. Similarly, a one-way causal relationship was observed between inflation rate and financial development, and a one-way causal relationship between import and growth rate of GDP per capita. Above all, no causal relationship was found either between disaggregated trade openness and institutional quality in Nigeria.

Table 6. Outcome of the Pairwise Granger Causality test

Null Hypothesis:	F-Statistic	Decision
LOR ≠> SES	2.47859	One way Causality : (SES → LOR)
SES ≠> LOR	6.28423**	
INFL ≠> SES	0.16303	Zero Causality
SES ≠> INFL	1.96877	
IMP ≠> SES	1.41505	One way Causality: (SES → IMP)
SES ≠> IMP	4.3516**	
GEX ≠> SES	0.36792	One way Causality: (SES → GEX)
SES ≠> GEX	3.13578*	
GDP ≠> SES	0.40921	Zero Causality
SES ≠> GDP	0.00083	
FIN ≠> SES	1.8523	One-way Causality:(SES → FIN)
SES ≠> FIN	3.7777*	
EXP ≠> SES	1.35714	Zero Causality
SES ≠> EXP	0.65544	
GEX ≠> LOR	1.46471	Zero Causality
LOR ≠> GEX	2.41552	
GDP ≠> LOR	0.06981	Zero Causality
LOR ≠> GDP	0.62917	
FIN ≠> LOR	4.83071**	Two-way Causality: (FIN ↔ LOR)
LOR ≠> FIN	8.44802**	
FIN ≠> INFL	0.18428	One way Causality: (INFL→ FIN)
INFL ≠> FIN	3.78155*	
GDP ≠> IMP	0.40507	One way Causality: (IMP → GDP)
IMP ≠> GDP	4.4113**	
FIN ≠> IMP	0.25449	Zero Causality

IMP ≠> FIN	0.30288	
EXP ≠> IMP	0.16156	One way Causality: (IMP → EXP)
IMP ≠> EXP	3.55547*	
EXP ≠> GEX	0.41631	One way Causality: (GEX → EXP)
GEX ≠> EXP	4.16803**	

** and * stands for 5%, 10%, *and* the symbol ≠> implies does not Granger cause.
Source: Authors' Compilation (2022)

CONCLUSION

The purpose of this study is to determine whether greater international trade freedom has any impact on the shadow economy. Second, from 1991 to 2018, the study examines the moderating impact of institutional quality on the shadow economy and trade openness in Nigeria. The results from the OLS and FM-OLS models reveal that the coefficients of institutional quality, the ratio of import to GDP, government expenditure, and financial development negatively affect the shadow economy in Nigeria. However, inflation proxy with the consumer price index, economic growth, and ratio of export to GDP in the models positively enhance the shadow economy in Nigeria.

Our results further indicate that the interaction of both ratios of import and export to GDP with the quality of institutions positively impacts the shadow economy in Nigeria. We contend that the positive association shows that as institutional quality (law and order) improves, the negative long-term consequences of import trade on the extent of the shadow economy in Nigeria diminish. In other words, when institutional frameworks that uphold law and order are weak, opening up import trade leads to economic conditions that have a detrimental impact on the operations of the shadow economy. It's possible that the importation of products and services is causing unsustainable consumption and diverting financial resources through unethical business methods and tax laws, among other things. Similarly, the coefficient of the interaction term between export trade and quality of institutions also exhibits a positive and statistically insignificant relationship with shadow economy size. The regression analysis is followed by the pairwise Granger causality exercise. The Granger causality analysis shows bi-directional causality between institutional quality (LOR) and financial development (FIN). The findings suggest that the level of financial liberalization undertaken in the country had improved significantly as a result of the law and order put in place in the country. Aside from the above, we equally found a one-way directional relationship between shadow economy (SES) and institutional quality (LOR), trade import (IMP), government expenditure (GEX), and financial development (FIN).

As a consequence, the study concludes that, in Nigeria institutional quality, import trade, government expenditure, and financial development are also contributing factors to the size of the shadow economy. Similarly, we confirm the neutrality or no causal relationship between disaggregated trade openness and institutional quality in Nigeria. Hence, this outcome requires quick and urgent attention by the policymaker and the government of the country by putting up

a policy that can curb the informal activities pressure on the country's economy. We believe that in the context of globalisation, increasing export-driven economic openness is the wisest course of action. This is defended by Farzanegan, Hassan, and Badreldin (2019). Economic transparency, according to the authors, is the key to reducing the shadow economy. Economic openness that lowers the costs of conducting business, as well as imports and exports, is expected to improve chances for productivity growth in the formal economy, hence decreasing the informal economy. Furthermore, we believe that trade openness, in conjunction with export diversity and export quality, can contribute to increase domestic market expansion, international competitiveness, and effective resource allocation in the formal sector.

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