EFFECT OF FOREIGN DIRECT INVESTMENT ON FINANCIAL STABILITY IN NIGERIA

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Abstract

The relationship between Foreign Direct Investment (FDI) and financial stability is of increasing concern among economies. The volume and structure of FDI can affect the stability of the financial system. This study examines the effect of foreign direct investment on financial stability in Nigeria between the first quarter of 2003 and the last quarter of 2019. *An ex-post facto* research design was adopted in this study and data were obtained from secondary sources. The data were subjected to a stationarity test using the Augumented Dickey-Fuller test, and the test result shows that all variables were integrated in the order of 1. The Johansen cointegration test result showed a long-run relationship between all the dependent and independent variables. The hypotheses were tested using the Error Correction Mechanism (ECM). It was found that the short runs deviations will adjust to their long-run equilibrium by 17.3% quarterly. The findings show that FDI as a percentage of GDP positively affects Nigeria's financial stability. In contrast, FDI as a percentage of fixed investment and net FDI have a significant negative effect on Nigeria's financial stability. The study, therefore, concluded that inflows of FDI play a significant role in Nigeria's financial stability. Based on the findings, the study recommends that authorities such as Ministry responsible for trade, commerce, and investment create an enabling investment environment such as regulations for protecting investors' interests to attract FDI into the system.

Keywords: Net FDI, FDI as a percentage of GDP, FDI as a percentage of fixed investment financial stability

1. Introduction

Financial stability refers to the smooth operation of the financial system's critical components (financial markets, institutions, participants, instruments, and services). A stable financial system can efficiently allocate resources, manage financial risk, maintain employment levels, and eliminate volatile movements of financial assets that may affect its stability. Financial institutions such as commercial banks are reluctant to finance viable projects in the absence of financial stability, leading to a fall in assets' intrinsic values. Consequently, affecting confidence in the financial system, leading to bank runs, rising inflation rates, or stock market crashes (World Bank Group, 2020).

Capital flows such as Foreign Direct Investment (FDI) play a significant role in a country's financial stability. The volume and unexpected changes in FDI could disrupt financial stability. The inability of the financial system to absorb these shocks and, in turn, prevent disruptive tendencies could lead to crises. Data obtained from the National Bureau of

Statistics has shown that FDI flows to Nigeria have been unpredictable from the 1980s to date.

Prior studies on capital flows focused on the relationship between capital flows and economic growth. For example, Adeola (2017) study concentrated on South Africa, Nigeria, Kenya, and Mauritius. In Nigeria, studies such as Obiechina and Ukeje (2013); Olasode (2015); Akanyo and Ajie (2015); Okafor, Ugochukwu and Chijindu (2016), and Adekunle and Sulaimon (2018) studied FDI effect on economic growth in Nigeria.

Most empirical studies on financial stability have neglected the disaggregated inflow of FDI (Seghir, 2009, Milesi-Ferretti & Tille, 2011, Dornean, Isan & Oanea, 2012, Bhowmik, 2018). Thus, this study contributes to the existing body of knowledge in Nigeria by disaggregating FDI into inward FDI flow as a percentage of Gross Domestic Product (GDP), inward FDI flow, inward FDI flow as a percentage of fixed investment, and net FDI. The objective of this paper is to examine the effect of FDI on financial stability in Nigeria.

The following hypotheses are formulated to guide this study:

H_{01}: FDI as a percentage of GDP has no significant effect on financial stability in Nigeria.

H_{02}: FDI as a percentage of fixed investment has no significant effect on financial stability in Nigeria.

H_{03}: Net FDI has no significant effect on financial stability in Nigeria.

The remainder of this study is structured as follows. Following this introduction, the paper reviews the conceptual framework and empirical studies on FDI and financial stability. Methodological issues, including the estimation techniques and model specifications, were presented in section III. Section IV presented the econometric estimates, while section V concludes and presents policy recommendations.

2. Literature review

Conceptual review

Financial stability has no single consensus definition that is widely accepted. Several attempts by apex banks and scholars have been made to conceptualise the term. For example, the Central Bank of Nigeria (CBN) (2013) views financial stability as the financial system's resilience to unanticipated adverse shocks while enabling the continuing smooth functioning of the financial system intermediation process. Schinasi (2004) described financial stability as a financial system capable of promoting rather than impeding an economy's success and dissipating financial imbalances that occur endogenously or as a result of major adverse and unanticipated events. Therefore, this study defines financial stability as a financial system including financial intermediaries, markets, and infrastructures in a range of stability whenever it is capable of easing rather than complicating an economy's performance. This involves extending credit to productive investment opportunities to boost economic activities by providing financial intermediation processes and eliminating various forms of endogenous risks that occur naturally or due to major adverse and unexpected events. Based on the above definition, this study proxy financial stability as non-performing loans as a ratio to gross loans, which is defined as loans whose contracted payments have been unpaid or overdue for more than a specified number of days. NPL, if left unresolved, will compound into a financial crisis when they surpass bank capital in a relatively large number of banks. Prior empirical studies have linked non-performing loans to financial instability (Fofack, 2005; Kingu, Macha & Gwahula, 2015; Atoi, 2018; Nyarko-Baasi, 2018, Dhiman, 2018).

On the other hand, the United Nations Trade and Development Conference (UNCTAD) (1999) defined inward FDI as a long-term investment that reflects a company resident in a different economy's long-term interest and control (FDI), or parental enterprise, by a resident entity in the same economy (FDI enterprise, affiliate enterprise or foreign

affiliate). This view by UNCTAD emphasises that there is a long-term investment and significant control of the investor. However, it does not describe FDI characteristics and the percentage of foreign investment that qualifies an investment as FDI. On the other hand, the International Monetary Fund (IMF) (2008) described inward FDI as a type of cross-border investment that occurs when a resident of one economy exercises significant control or influence over the management of a business in another economy. However, the view by IMF does not stipulate the percentage of control that qualifies a flow as FDI.

Therefore, this study adopts the definition put forward by the OECD (2008), which refers to inward FDI as a cross-border investment made by a resident entity in one economy to acquire a long-term interest with a significant degree of influence over the enterprise's management of at least 10% of the voting power in a resident enterprise in another economy. Based on this definition, this study proxy FDI as a percentage of GDP, FDI as a percentage of fixed investment, and net FDI.

Theoretical Review

This study is based on the Financial Instability Hypothesis (FIH) and the theory of capital control. Minsky (1984) proposed the FIH, claiming that financial crises became inherent in capitalism as economic growth cycles made lenders and borrowers increasingly reckless. Excessive optimism causes financial bubbles and subsequent busts. Based on this hypothesis, he claimed that capitalism is prone to shifting from periods of financial stability to instability. Furthermore, Minsky (1984) asserts that financial instability can be defined as excess successes that lead to a crisis, or economic stability that creates instability.

The theory of capital control is based on the works of John Maynard Keynes. In his general theory, Keynes (1936) saw controls as an important measure for ensuring stability, directing investment toward productive growth, and successfully promoting capital transaction regulations at Bretton Woods. Therefore, the capital control theory is relevant in explaining the direction of capital flows. According to Palley (2009), capital controls theory explains the direction of capital flows, i.e., whether controls are placed on capital inflows or outflows. According to Erten, Korinek, and Ocampo (2019), policymakers in several emerging markets responded to the financial instability by actively managing capital flows, such as by imposing counter-cyclical capital controls that tighten during stability and relax during instability.

Empirical review

Various researchers have investigated the nexus between inward FDI and financial stability. For example, Seghir (2009) analysed the relationship between inward FDI and Tunisia's financial stability from 1980 to 2005. The variables used in this study include inward FDI and financial market stability, measured using dummy variables of 1 to represent periods of instability and 0 for otherwise. The Ordinary Least Square (OLS) result shows that the stock exchange market's stability may explain the large and statistically significant influence exerted on inward FDI. On the contrary, Bhowmik (2018) found that financial instability negatively impacts inward FDI. In his study of how inward FDI and outward FDI have changed during several financial instabilities in India, spanning from 1971 to 2015. Secondary data were adopted for this study, and the variables used include GDP, inflation rate, and inward FDI. Using causality, cointegration, and VECM. The study contended that inward FDI in India has been catapulting at the rate of 21.56% per year. Also, the study concluded that FDI does not granger cause financial instability but financial stability granger cause FDI.

Some studies on inward FDI and financial stability focused on developed economies. For example, Milesi-Ferretti and Tille (2011) revealed that the contraction flows during the instability were concentrated on inward FDI. Their study of the impact of capital flows

patterns during the financial instability of 75 OECD countries between 2006 to 2009. The variables used in this study include GDP growth, debt, inward FDI, inward portfolio investment, and a dummy variable of 1 to represent the period of instability and 0 for otherwise. The scope of four years may be too short and may affect this study's findings' robustness. Likewise, Dornean, Isan and Oanea (2012) findings align with Milesi-Ferretti and Tille (2011), who found that financial instability directly affects the inward FDI level. They analysed the relationship between financial instability and inward FDI in Central and Eastern Europe from 1994 to 2011. The variables used in this study include inward Flows, GDP growth, and financial instability (measured as a dummy variable taking 1 for years of financial instability and 0 for otherwise). The result from the panel regression implies that due to the magnitude of the financial instability in 2008, a negative effect on inward FDI was experienced in Central and Eastern European countries.

The above studies were conducted outside Nigeria and mainly concentrated on developed economies. Most of these studies used a panel of developed economies that eroded country-specific features. Previous studies focused on the impact of inward FDI on economic growth. Also, the findings from these empirical studies are mixed. While prior studies found a negative effect, others found no effect. This study, therefore, disaggregates FDI into FDI as a percentage of GDP, FDI as a percentage of fixed investment, and net FDI.

3. Methodology

This study employs an ex-post facto research design. Quarterly secondary data were used for this study, which was sourced from the World Bank data set (2020) and Economist Intelligence Unit (2020). The secondary data, which are time series, were collected on the following variables inward FDI as a percentage of GDP, inward FDI as a percentage of fixed investment, and net FDI between 2003Q1 and 2019Q4. This period is justified based on data availability and covers periods of instabilities in Nigeria.

Model specification

The multiple regression that captures the effect of FDI on financial stability in Nigeria is stated below:

$NPL_t = \beta_0 + \beta_1 FDI\_GDP_t + \beta_2 FDI\_FI_t + \beta_3 NFDI_t + \varepsilon_t$

Where,

NPL – Ratio of non-performing loans to total loans

FDI_GDP – FDI as a percentage of GDP

FDI_FI – FDI as a percentage of fixed investment

NFDI – Net FDI

β_0 is the constant term

β_1, β_2, and β_3, - beta coefficients

ε is the error term

t = Time

Table 1: Variables, Measurement, and Apriori Expectations

S/N	Variable	Nature	Measurement	Apriori expectation
1.	Non-performing Loans	Dependent variable	Measured as the ratio of defaulting loans to total loans	
2.	FDI as a percentage of GDP	Independent variable	Net flows of direct investment capital by non-residents into the country, as a percentage of GDP.	+
3.	FDI as a percentage of fixed investment	Independent variable	Net flows of direct investment capital by non-residents into the country, as a percentage of GDP.	+
4.	Net FDI	Independent variable	The net flow of direct investment	+

Source: Authors Compilation (2021)

Technique of estimation

The technique employed for this study is Error Correction Mechanism (ECM). The ECM method is an econometric technique developed by Engel and Granger (1987) to reconcile an economic variable's short-run behaviour with its long-run behaviour. The data were subjected to a stationarity test to avoid spurious regression and analysed using Eviews 10.

4. Results and discussion

The analysis of the data and discussion of the results are presented in this section. Below are the findings.

Presentation of data

Table 2: Descriptive statistics

	FDI_FI	FDI_GDP	NFDI	NPL
Mean	16.45882	1.617647	4.835294	12.39412
Median	10.90000	1.500000	4.900000	9.837500
Maximum	54.20000	3.000000	8.900000	39.58438
Minimum	4.200000	0.500000	1.900000	2.790625
Std. Dev.	12.73444	0.778238	2.343092	9.099455
Skewness	1.461410	0.274073	0.328423	1.189592
Kurtosis	4.998955	1.845334	1.811781	4.110094
Jarque-Bera	35.52630	4.628867	5.222714	19.52966
Probability	0.000000	0.098822	0.073435	0.000057
Sum	1119.200	110.0000	328.8000	842.8001
Sum Sq. Dev.	10865.12	40.57882	367.8353	5547.605
Observations	68	68	68	68

Source: Authors computation using Eviews 10

Table 2 shows the descriptive characteristics of the variables in this study. It is observed that the average of each variable is not exactly positioned in the middle (median) of the distribution. Table 2 also shows the distribution's skewness, which measures the length of

the tail of the distribution. Findings revealed that all variables FDI_FI, FDI_GDP, NFDI, and NPL are positively skewed. Thus, they have a long right tail. Implying that the distribution extends more to the positive side. The table also shows the kurtosis (peakedness or flatness) of the distribution. All variables are platykurtic, that is, the distributions are flat relative to the normal. Also, the result of the Jarque-Bera test shows that FDI_GDP and NFDI are normally distributed while FDI_FI and NPL are not normally distributed.

Unit root test

All variables were subjected to a stationary test of time series to avoid the problem of spurious regression. This study applies the Augmented Dickey-Fuller (ADF) (1981) unit root test.

The ADF model is specified as:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^{m} \propto_i \Delta Y_{t-i} + \varepsilon_t$$

Table 3: Augmented Dickey-Fuller Tests

Variable	ADF t-statistics	P-value	Order
NPL	-4.554664	0.0027	1
FDI_GDP	-6.942975	0.0000	1
FDI_FI	-7.904641	0.0083	1
NFDI	-8.246972	0.0000	1

Source: Authors computation using Eviews 10

Table 3 displays the stationarity test results used to check for the existence of the unit root, which was done at a 5% Mackinnon critical value. The ADF method was used in this analysis since it involves supplementing the previous three equations with the dependent variable's lagged values. The aim is to use enough terms so that the error term is serially uncorrelated. All variables (NPL, FDI_GDP, FDI_FI, and NFDI) were stationary at the first difference, that is, I(1).

Table 4: Lag Length Criteria

VAR Lag Order Selection Criteria
Endogenous variables: FDI_FI FDI_GDP NFDI NPL
Exogenous variables: C
Date: 08/30/21 Time: 22:29
Sample: 2003Q1 2019Q4
Included observations: 64

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-590.1217	NA	1359.409	18.56630	18.70123	18.61946
1	-366.3874	412.5102	2.063436	12.07460	12.74926*	12.34038*
2	-347.3438	32.73109*	1.887948*	11.97949*	13.19387	12.45790
3	-342.4855	7.742937	2.715789	12.32767	14.08176	13.01870
4	-336.8124	8.332307	3.861619	12.65039	14.94420	13.55404

* 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
HQ: Hannan-Quinn information criterion

To estimate the long-run relationship between the variables, and the optimal lag length requirements for the variables we determined using the lag length criteria. From the analysis, it was found the 2 lag was more appropriate.

Table 5: Johansen Cointegration test

The cointegration technique is employed in this study to test the non-stationarity of time series variables using the Johansen cointegration test.

Date: 08/30/21 Time: 22:30
Sample (adjusted): 2003Q4 2019Q4
Included observations: 65 after adjustments
Trend assumption: Linear deterministic trend
Series: FDI_FI FDI_GDP NFDI NPL
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.279402	49.56901	47.85613	0.0342
At most 1	0.198334	28.27020	29.79707	0.0742
At most 2	0.156497	13.90106	15.49471	0.0857
At most 3	0.042731	2.838603	3.841466	0.0920

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

From the Johansen cointegration test, the trace statistics show one significant cointegration equation at 5%. This implies a long-run relationship between the variables. Therefore, an Error Correction Mechanism (ECM) is employed to estimate the hypothesis.

Error correction mechanism

The ECM was used to describe short-run deviations that may have occurred in estimating the long-run cointegration equation and test the hypotheses that had been proposed as presented below:

$$\Delta NPL_t = \beta_0 + \beta_1 \Delta NPL_t + \beta_2 \Delta FDI\_GDP_t + \beta_3 \Delta FDI\_GDP_{t-1} + \beta_4 \Delta FDI\_FI_t + \beta_5 \Delta FDI\_FI_{t-1} + \beta_6 \Delta NFDI_t + \beta_7 \Delta NFDI_{t-1} + \propto_i \Delta Y_{t-i} + \varepsilon_t$$

Table 6: Error correction Mechanism

Variables	Coefficient	t-statistics	P-value
D(NPL(-1))	0.589960	5.579666	0.0000
D(FDI_GDP)	15.78630	7.072746	0.0000
D(FDI_GDP(-1))	-5.964856	-2.099147	0.0402
D(FDI_FI)	-0.428087	-4.876967	0.0000
D(FDI_FI(-1))	0.200913	1.975671	0.0530
D(NFDI)	-2.991534	-4.795192	0.0000
D(NFDI(-1))	0.784426	1.135095	0.2611
ECM (-1)	-0.172491	-3.472845	0.0010
R^2	0.654006		
Adj R^2	0.605446		
F-statistics	13.46787		
DW	2.50		

Source: Authors computation using Eviews 10

The ECM estimation suggests that the $R^{2,}$ also known as the coefficient of determination, is 65.4%, implying that the explanatory variables – FDI_GDP, FDI_FI, AND NFDI account for 65.4% of the total variations in financial stability. The remaining 34.6% represents the changes in the dependent variables, which were not included in the equation. Therefore, after the R^2 is adjusted, the total variation is 60.5%. Additionally, the model's fitness was evaluated using F-statistics, which indicates that the model is statistically fit at a 1% level of significance. Also, the Durbin Watson test shows that serial correlation is absent as indicated by the test statistics of 2.27, which is within the threshold.

From the econometric analysis in table 6, The ECM term corresponds to the *apriori* expectation. The ECM's negative sign and statistical significance of 1% indicate that 17.2% of the adjustment will be done quarterly. As a result, the ECM will behave appropriately to correct any short-run dynamics deviations to the long-run equilibrium by 17.2% quarterly.

The study residuals were subjected to a variety of diagnostic tests. The residuals were tested for serial correlation using Breush-Godfrey serial correlation LM test (See appendix B). Findings indicated that there was no serial correlation. Lastly, the study tested for Heteroskedasticity using Autoregressive Conditional Heteroskedasticity (ARCH) (See appendix C), and findings indicated that the residuals were not heteroskedastic (i.e., there were homoskedastic). This is important because ignoring the impact of heteroskedasticity on time series residuals can negatively affect the estimators.

Discussions of Findings

The empirical result shows that a one-year lag of NPL positively affects financial stability in Nigeria at a 5% significant level. Similarly, FDI as a percentage of GDP positively and significantly affects Nigeria's financial stability, which is evident at a 5% level of significance. Based on this result, the null hypothesis is rejected. This finding implies that a unit increase in FDI as a percentage of GDP increases financial stability by 0.59 units. Also, the one-year lag of FDI as a percentage of GDP was negative but statistically significant at 5%. These findings align with the studies of Milesi-Ferretti and Tille (2011) and Dornean et al. (2012), who found a significant positive relationship between inward FDI and financial stability.

The result shows a negative significant effect of FDI as a percentage of fixed investment on financial stability in Nigeria at a 5% level of significance. As a result, the null hypothesis is rejected. Implying that a unit increase in FDI as a percentage of fixed investment results in a 0.43 unit decrease in financial stability in Nigeria. On the other hand, an increase in the one-year lag of FDI as a percentage of fixed investment positively affects Nigeria's financial stability. This study corroborates Bhowmik (2018) findings who found that FDI negatively affects financial stability.

The analysis shows that net FDI negatively affects financial stability in Nigeria at a 5% level of significance. This finding implies that an increase in net FDI decreases financial stability by 2.99 units.

5. Conclusions and Recommendations

This study examines the effect of FDI on Nigeria's financial stability between the first quarter of 2003 to the last quarter of 2019. An econometric model was specified using the ECM method to ascertain the independent variables' effect on the dependent variables. The variables were first tested for stationarity, using ADF and the analysis revealed that all variables were integrated in the order of 1 that is, I (1). This influenced the decision to conduct a cointegration analysis to ascertain the long-run relationship between the variables, which revealed a long-run relationship. The ECM test confirmed that long-term equilibrium speed was achieved with an adjustment of 17.3% quarterly. The hypothesis testing results revealed that one year lag of financial stability positively affects the financial stability in

Nigeria. Also, FDI as a percentage of GDP positively affects financial stability in Nigeria. However, the one-year lag of FDI as a percentage of GDP negatively affects financial stability in Nigeria. FDI as a percentage of fixed investment and net FDI negatively affect financial stability. Based on this finding, the study concludes that FDI significantly affects financial stability in Nigeria. The following recommendations are made based on the findings:

i. FDI was found to increase financial stability in Nigeria. Therefore, the Ministry responsible for trade, commerce, and investment needs to create an enabling investment environment such as regulations protecting investors' interests to attract FDI into the system.
ii. An increase in FDI as a percentage of fixed investment leads to expansion of economic activities, but if not properly managed, it can affect the financial system. Therefore, Federal and state tiers of government in Nigeria should guarantee long-term investment to attract and secure investment into the state and country at large.

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Appendices

A. ECM

Dependent Variable: D(NPL)
Method: Least Squares
Date: 08/31/21 Time: 08:51
Sample (adjusted): 2003Q3 2019Q4
Included observations: 66 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.057389	0.279076	0.205641	0.8378
D(NPL(-1))	0.589960	0.105734	5.579666	0.0000
D(FDI_GDP)	15.78630	2.231990	7.072746	0.0000
D(FDI_GDP(-1))	-5.964856	2.841562	-2.099147	0.0402
D(FDI_FI)	-0.428087	0.087777	-4.876967	0.0000
D(FDI_FI(-1))	0.200913	0.101693	1.975671	0.0530
D(NFDI)	-2.991534	0.623861	-4.795192	0.0000
D(NFDI(-1))	0.784426	0.691067	1.135095	0.2611
ECM(-1)	-0.172491	0.049668	-3.472845	0.0010

R-squared	0.654006	Mean dependent var	-0.251894
Adjusted R-squared	0.605446	S.D. dependent var	3.547003
S.E. of regression	2.227998	Akaike info criterion	4.566208
Sum squared resid	282.9467	Schwarz criterion	4.864797
Log likelihood	-141.6849	Hannan-Quinn criter.	4.684195
F-statistic	13.46787	Durbin-Watson stat	2.277079
Prob(F-statistic)	0.000000		

B. Serial correlation

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.666629	Prob. F(2,51)	0.5179
Obs*R-squared	1.655959	Prob. Chi-Square(2)	0.4369

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 08/30/21 Time: 22:46
Sample: 2003Q4 2019Q4
Included observations: 65
Pre-sample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.029505	0.339582	-0.086885	0.9311
D(NPL(-1))	1.229721	3.365700	0.365369	0.7163
D(NPL(-2))	-0.869087	1.853148	-0.468979	0.6411
D(FDI_GDP)	-0.158679	2.553078	-0.062152	0.9507
D(FDI_GDP(-1))	-18.21833	50.00498	-0.364330	0.7171
D(FDI_GDP(-2))	9.627447	17.59179	0.547269	0.5866
D(FDI_FI)	0.005189	0.100666	0.051551	0.9591
D(FDI_FI(-1))	0.501411	1.373679	0.365013	0.7166
D(FDI_FI(-2))	-0.264316	0.491956	-0.537276	0.5934
D(NFDI)	-0.017731	0.710546	-0.024954	0.9802
D(NFDI(-1))	3.172086	8.851222	0.358378	0.7215
D(NFDI(-2))	-1.795732	3.314340	-0.541807	0.5903
RESID(-1)	-1.227175	3.368045	-0.364358	0.7171
RESID(-2)	0.327560	0.287262	1.140281	0.2595

R-squared	0.025476	Mean dependent var	-2.31E-16
Adjusted R-squared	-0.222932	S.D. dependent var	2.311917
S.E. of regression	2.556662	Akaike info criterion	4.903489
Sum squared resid	333.3625	Schwarz criterion	5.371819
Log likelihood	-145.3634	Hannan-Quinn criter.	5.088275
F-statistic	0.102558	Durbin-Watson stat	2.141105
Prob(F-statistic)	0.999964		

C. Heteroscedasticity

Heteroskedasticity Test: ARCH

F-statistic	0.465714	Prob. F(1,63)	0.4975
Obs*R-squared	0.476973	Prob. Chi-Square(1)	0.4898

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 08/31/21 Time: 09:43
Sample (adjusted): 2003Q4 2019Q4
Included observations: 65 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.972400	1.650049	2.407444	0.0190
RESID^2(-1)	0.085671	0.125538	0.682433	0.4975

R-squared	0.007338	Mean dependent var	4.344988
Adjusted R-squared	-0.008418	S.D. dependent var	12.50128
S.E. of regression	12.55379	Akaike info criterion	7.928208
Sum squared resid	9928.651	Schwarz criterion	7.995112
Log likelihood	-255.6668	Hannan-Quinn criter.	7.954606
F-statistic	0.465714	Durbin-Watson stat	1.992205
Prob(F-statistic)	0.497467		