

MACROECONOMIC DETERMINANTS OF CAPITAL INFLOWS VOLATILITIES IN NIGERIA

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Abstract

This paper investigates the macroeconomic determinants of capital inflows volatilities in Nigeria between 1986 and 2018. Annual data were collected from World Development Indicators (WDI) and were estimated using the Autoregressive Distributive Lagged (ARDL) econometric method. Findings from our estimation revealed that the growth of the world economy is the core determinant of volatilities of capital inflow both in the short run and the long run. The only exception is the volatility of remittances which is mainly determined by the exchange rate, both in the short run and the long run. However, the volatility of the official Development Assistance (ODA) is more susceptible to domestic factors both in the short run and the long run. The study therefore concludes that volatilities of capital inflows into Nigeria depend on the agency mobilizing the flow. While the private inflows are largely determined by the push factors, the public inflow in form of aid is determined by pull factors.

Keywords: Macroeconomic determinants, ARDL, Capital Inflows, Volatilities,

JEL Classification Codes: B22, C22, F21, F32, P45

Introduction

Nigeria Enterprise Promotion Decree (1977) was designed to regulate foreign participation in Nigerian domestic economy. The policy was relaxed with the advent of Structural Adjustment Programme (SAP) and National Economic Promotion Commission Act (1995) employed as a policy direction. Part II section 4, subsection b of National Investment Promotion Commission Act 1995 empowers the commission to ‘initiate and support measures which shall enhance the investment climate in Nigeria for both Nigerian and non-Nigerian Investors’ The policy accepted financial openness and economic integration as tools for exposing the Nigerian economy to resources from other nations of the world. It emphasized in section 17 of the act that ‘a non-Nigerian may invest and participate in the operation of any enterprise in Nigeria’. This was backed up in section 24 of the act that a foreign investors ‘..... shall be guaranteed unconditional transferability of funds through an authorized dealer, in freely convertible currency’ the dividends or profit, the payment in respect of loan servicing and the remittances of proceeds. Nigerian Investment Promotion Commission (NIPC) and appropriate legal framework with Decree No. 16 and No. 17 of 1995, aimed at encouraging, promoting and coordinating foreign resources for domestic uses. Subsequent government authorities have continuously embarked on mobilization of foreign resources especially the private individuals and multilateral organization were persuaded with a lot of incentives to invest in the economy. Nigeria embassies worldwide have been committed to marketing the potentials of Nigerian economy and opportunities available for the international investors and as such gone into series of bilateral and multilateral agreements with other nations of the world.

Successive governments have been making efforts and recording modest progress in their quest to turn the country into major investments destination. In 1981, Nigeria achieved the feat of leading recipient of capital inflows, harnessing about 35 percent of the total foreign direct investment into sub-Saharan Africa well before the investment policy was introduced (World Bank, 2014). In the same vein, it attracted about 70 percent of the total inflow to West Africa’s in 2006 and about 11 percent of total inflow to Africa at large in 2006 (UNCTAD, 2006) while her equity inflow increased consistently from US\$3.18 million in 1981 to US\$9.94 billion in 2012.

Despite the remarkable growth in capital inflows, the Nigerian economy has consistently been characterized by rising unemployment, intractable inflation, worsening exchange rate, soaring lending rates and poverty, amidst other macroeconomic problems. This has been constituting serious concerns to policy makers as these challenges persist and seem obdurate.

1.2 Trend and Pattern of Capital Inflows into Nigeria

The trend of the inflows as shown in figure 1 below revealed upward trend of the capital inflows (in form of foreign direct investments, remittances, official development assistance, foreign portfolio investment and remittances) since the advent of democratic government in 1999. This is likely associated with increased confidence by the foreign investors in the economy under the democratic dispensation. This trend was consistent within the period of study except in few cases.

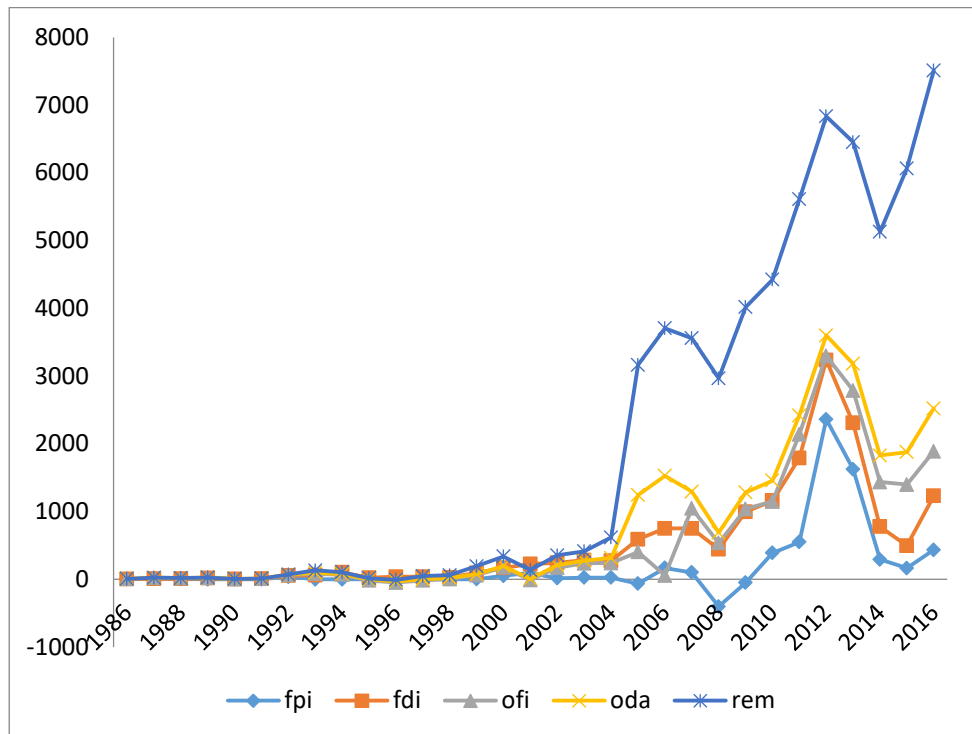


Figure 1: The trend of capital inflow to Nigeria between 1986 and 2016
Source: Ibrahim 2021

However, the trends show some instability in almost all the inflows to Nigeria between 2004 and 2016, this is more pronounced especially between 2006 and 2008, 2012 and 2014. Hutchinson and Noy, 2002 opined that this poses a serious threat to the economy, with several financial crises and its repercussion on the level of investment, employment and the growth of the economy. This trend confirms the fear of Keynesians that capital inflow would lead to macroeconomic distortions which would facilitate exchange rate appreciation, reduction in productivity, investment expenditure and net exports. This will eventually result to unemployment of both human and physical resources, inflation rate and subsequent retardation of growth of the host economy.

The regular inflows and retention of the inflows in the economy are motivated by several factors (both domestic and global) rationalizing the decisions of the foreign investors. Studies are replete on those factors that would attract foreign investors into the economy but are still very sparse on retentions and regularities of the inflow in Nigeria economy. Elucidating these factors will not only expose them but proffer policy measure that would enhance smooth and stable inflow.

Literature Review

Theories have contested the benefit of foreign resources as a source of financing domestic investment. For instance, the neoclassical ascribed tripartite collateral benefit to financing domestic economy through foreign capital inflow. These are benefit to the host economy through the escalation of their economic development and updating their mode of production and welfare; benefit to the investors through increase in their earnings and widen the gap between their cost and revenue and lastly, and benefit to the whole world by globalizing welfare through accessibility to varieties of product and as such increasing global output through efficiency of all factors (Palley, 2009). The Keynesians' criticized this position from the perspective of consequential macroeconomic distortions which results in the exchange rate appreciation and reduction in net exports and investment expenditure. These in turn affect the level of employment, inflation rate and may cause subsequent reduction in the output of the host economy.

There are series of empirical studies on capital inflow and its determinants but little efforts were made on factors driving its volatility especially in

Nigeria. Bronor and Rigobon (2004) investigated the determinants of capital flow volatility of developed and developing economies, and found quality of institutions, a high per capita income, and financial development predominantly determine volatility while macroeconomic controls does little. IMF (2007) submitted in its study that financial openness and institutional quality lower volatility while the volatility is heightened by global liquidity. Alfaro *et al.*, (2007) examined the determinants of capital inflow volatility between 1970 and 2000, and submitted that ‘both bad policies and quality of institutions were important determinants of capital flow volatility but bad policies predominantly determined capital inflow volatility over the quality of institution’.

Desai and Kharas (2010) found that some degrees of volatility in all aid-recipient countries between 1960 and 2008 was caused mainly by natural disasters, civil wars, and adverse regime change in recipient countries. But found the concentration of aid portfolios for many aid recipients combined with the prevalence of donor herding behavior “donor-patron” effect as push factors. Despite the scarcity of studies on aid volatility, the available one failed to consider both push and pull macroeconomic determinant especially in Nigeria. Mercado and Park (2011) investigated the determinants of capital flow between 1980 and 2009 their results suggested that ‘the institutional quality and pull factors such as trade openness, financial openness, and change in stock market capitalization were significant factors impacting on capital inflow volatility’.

Lee *et al.*, (2013) investigated the factors determining volatility of capital inflow in 49 emerging and developing economies from 1990 to 2009, and found ‘significant contagion effects from intra-regional volatilities in different private capital flow types to emerging economies’. Their findings further suggested that ‘the volatility dynamics differ between gross and net flows’.

Carvalho (2017) used GARCH method to examine the determinants of volatility of capital inflow to Brazil between 1995 and 2012, he submitted that *FDI* volatility was determined by quality of institution, financial crisis, lagged *FDI* volatility and change in the North American stock market while the *FPI* volatility was determined by institutional quality and the volatility of *OPI* was determined by its volatility and lagged *GDP* growth. The volatilities were however more pronounced in periods of crisis.

However, recent studies are now considering the determinants along pull and push factors. Broto *et al.*, (2011) considered the determinants of volatility of capital in Emerging Economies between 2000 and 2006; he identified global factors as significance determinants in all types of flows, he also identified some domestic factors that can reduce the volatility of a given category of capital flows without increasing that of others. Opperman *et al.*, (2017) studied the factors determining capital inflow volatility in Sub-Saharan Africa countries between 1990 and 2011; he discovered that ‘global liquidity lowers *FDI* volatility while private sector credit increases *FDI* volatility. Global liquidity increases equity volatility while growth and the quality of macroeconomic policies found to be lowering portfolio equity volatility. Financial openness increases cross-border bank lending volatility while the quality of macroeconomic policies and trade openness are important pull factors in lowering cross-border bank lending volatility’. In the Nigerian context, Ekeocha *et al.*, (2012) examined the factors determining volatility of portfolio inflow between 1981 and 2010 with finite distributed lag model. The study revealed that market capitalization and trade openness as determinants of portfolio inflow volatility in Nigeria. Nwosa and Adeleke (2017) investigated the determinants of Foreign Direct Investment (*FDI*) and Foreign Portfolio Inflow (*FPI*) volatilities in Nigeria using *E-GARCH* on data between 1986 and 2016. It was found that openness and world *GDP* as the determinants of *FDI* volatility, while domestic interest rate and stock market capitalization were identified as determinant of *FPI* volatility in Nigeria.

The shortcomings of these few studies considered only two forms of inflow and did not emphasize either the pull or push factors effect. So also, enough consideration was not given to macroeconomic policy variables such as domestic inflation, financial development, liquidity rate in the economy and growth of the economy were not given enough attention. This study is designed to examine macroeconomic pull and push factors determining volatility of capital inflows. It also seeks to know if volatilities of all capital inflows were dictated by different macroeconomic factors in Nigeria.

Data and Methodology

Model Specification, Technique of Analysis and Data Description

Standard deviation method on annual data is employed in line with Alfaro *et al.*, (2004). The model is presented thus:

$$\sigma = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (u_i - \bar{u})^2} \quad (1)$$

Where \bar{u} is the mean defined as: $\bar{u} = \frac{1}{n} \sum_{j=1}^n u_j$

This normalized standard deviation method was the most common method employed by several studies (Gabriele *et al.*, 2000 and Alfaro *et al.*, 2004). The study further account for the volatility of the inflows in the sample period by estimating equation 2 over rolling windows as employed by Alfaro *et al.*, (2004), Lee, (2013) and Opperman and Adjasi (2017). These studies were criticized for the loss of observations depending on the window length. In this study, three years rolling window was employed while extending the sample period by three years ahead at the beginning of the sample period to take care of the loss of observations.

We present volatility of particular capital flow by $vol(FCI)$, μ as $\frac{1}{n} \sum_{t-(n-1)}^t flow_j$ and $flow_j$ represent particular inflow at time j in equation 2.

$$vol(FCI)_t = \left(\frac{1}{n} \sum_{t-(n-1)}^t (flow_j - \mu)^2 \right)^2 \quad (2)$$

Capital inflow volatility determinant model is presented in equation 3 as FCI_v , where β_i represents coefficients of explanatory variables determining capital flows volatility; X_i refers to vector of determining variables, and ε_t is the error term which satisfy normal distribution $N(0, \sigma^2_t)$ property (Broto *et al.*, 2011; Mercado and Park, 2011; Nwosa & Adeleke, 2017; Opperman & Adjasi, 2017).

$$\begin{aligned} &FCI_v \\ &= \varpi_0 + \sum_{i=1}^m \beta_i X_i \\ &+ \varepsilon_t \end{aligned} \quad (3)$$

FCL_v in this model represent capital inflows volatilities, this model is estimated individually in succession to examine the determinants of volatilities of each component of capital inflows presented as $VFPI$, $VFPI$, $VOFI$, $VODA$ and $VREM$, where volatility of each capital inflow depends on vector of pull and push determinants as independent variables.

To achieve this, equation 3 was transformed into Autoregressive Distribution Method (ARDL) as follow;

$$y_t = \alpha_0 + \sum_{i=1}^a \alpha_{1i} \Delta y_{t-i} + \sum_{i=0}^b \beta_{2i} \Delta X_{t-i} + \sum_{i=0}^c \beta_{3i} X_{t-1} + \mu_t \quad (4)$$

Where y_t is the capital inflow volatility, X_{t-i} represent the vector of variables determining volatility of a particular capital inflow and its lagged. Δ distinguishes the shortrun effects from the longrun effects and μ_t is the idiosyncratic error term at time t.

It is *a priori* expectation that the relationship between the growth of domestic economy and the volatility of capital inflow be negative, in which case, the higher the economy grows, the lower the volatility of capital inflow and vice versa (Lee *et al.*, 2013). Interest rate was proxy for the quality of monetary policies and a positive relationship was expected between domestic interest rate and capital inflow volatility. When monetary policy is unstable, capital inflows tended to have higher volatility rate (Opperman, 2017). The relationship between world economic growth and world liquidity with capital inflow volatility could be negative or positive (Broto *et al.*, 2011) while world interest rate was proxy for the quality of world monetary policies and it is expected to have positive relationship.

Data Description

Foreign direct investment (FDI) is ‘an inflow of investment by a foreign investor in an economy other than his domestic economy to gain a lasting management and control over an enterprise which is usually at least 10% of the shares of the target asset in an enterprise operating in the economy’ (Patterson *et al.*, 2004).

Foreign portfolio investments (FPI) are ‘investments in another economy which is referred to as the passive holdings of securities such as foreign stocks, bonds, or other financial assets which is less than 10% of voting stock.

Other foreign investment (OFI) are bank-related international investment includes deposit holdings by foreigners and loans to foreign individuals, businesses, and governments.

Remittances (REM) refers to ‘all transfers from abroad in cash or kind received in a country by residents or non-residents’ (World Bank, 2017).

Foreign aid (ODA) is an official grant or loan received from the developed economy or their agents and international organization which can either be through bilateral or multilateral arrangement by developing countries for developmental purpose of their economy.

Sources of Data

Annual secondary data on foreign direct investment, foreign portfolio investments, other foreign investment, remittances and foreign aid were sourced from World Development Indicators (WDI) data base. Data on both domestic and world gross domestic product, lending rate, inflation rate, exchange rate, domestic credit to private sector and broad money were also source from World Development Indicators (WDI) data base

Summary of data information.

Variable	Notation	Definition	Unit	Source	A priori Expectation
Lending Rate	NLR	Bank rate to private sector.	Percent	WDI	Positive
Foreign Direct Investment	FDI	Equity capital, earnings reinvestment, and other capital above 10 percent ownership in the reporting economy.	Billion Naira	WDI	Positive

Foreign Portfolio Investment	FPI	Equity securities and debt securities below 10 percent ownership in the reporting economy.	Billion Naira	WDI	Positive
Other Investment	OFI	Short term and long term external debt	Billion Naira	WDI	Positive
Remittances	REM	Personal transfers and compensation of employees.	Billion Naira	WDI	Positive
Aids	ODA	Sum of ODA and foreign Aid	Billion Naira	WDI	Positive
Nigeria liquidity	NBM	Nigeria money and quasi money (M3)	Percentage of GDP	WDI	Positive/ Negative
Global liquidity	WBM	Global money and quasi money (M3)	Percentage of GDP	WDI	Positive/ Negative
World lending rate	WLR	UK lending rate	percent	WDI	Positive/ Negative
Nigeria GDP	NGDP	The net value of the output in Nigeria	Billion Naira	WDI	Positive/ Negative
World GDP	WGDP	The net value of the output of all the nation in the world	Billion Naira	WDI	Positive/ Negative
Financial Development	CPS	Private sector credit	Percentage of GDP	WDI	Positive

Results and Discussion

Unit Root of Variables of Volatility Models

This test is essential to ascertain the stationary property of the variables to avoid wrong estimation and hence biased result. We specifically employed Phillips-Perron test (*PP*) as a robust check on Augmented Dickey Fuller (*ADF*) test for a unit root mainly to avert the effect of possibility of serially uncorrelated and homogeneous condition of error term required by Dickey-Fuller tests since the test takes care of heterogeneous and serially correlated disturbances. In all the models we used Schwarz Information Criteria (*SIC*) and *AR* spectral - Bartlett estimation methods to select suitable *ADF* lag length and bandwidth in Phillip Peron test respectively.

Table 1: Results from Unit Root Tests

Series	ADF I(0)		PP I(0)	
	Level statistics	1 st diff statistics	Level statistics	1 st diff statistics
LVFDI	-1.40	-4.18*	-2.81	-11.62*
LVFPI	-1.89	-6.23*	-1.83	-8.05*
LVODA	-1.72	-5.54*	-1.73	-5.54*
LVOFI	-1.84	-5.25*	-1.75	-8.57*
LVREM	-3.59*	-4.65*	-3.11*	-5.44*
NGDPG	-3.72*	-9.59*	-3.72*	-11.01*
NBM	-1.11	-4.49*	-1.28	-3.36*
NCPS	-1.95	-5.00*	-1.03	-5.11*
NINF	-4.17*	-2.34	-2.71	-6.18*
NEXH	-3.28*	-6.21*	-3.35*	-6.32*
WLR	-1.00	-4.06*	-0.77	-3.99*
WBM	0.44	-5.04*	1.33	-5.05*
WGDPG	-4.46*	-5.88*	-4.52*	-19.39*
WCPS	-2.85	-4.79*	-3.05*	-4.89*

5 percent critical value is -2.96, significant at not more than 5 percent *
 Source: Author's Computation, 2023.

The Table 1 presents the outcomes of both the *ADF* and *PP* test estimated at level and first difference. The results of both test showed that all the variables were stationary at not more than first difference ($d \leq 1$). However, since the model combined both stationary and non-stationary variables, the

best method in this case is *ARDL*. *ARDL* model was designed to accommodate variables of $I(d)$ where $d \leq 1$. However, the model is no longer suitable when $d > 1$. This method also has provision to diffuse short run from long run effects.

Cointegration Test

It is essential to establish the existence or otherwise of a long run relationship among the variables irrespective of their order of integration, the most appropriate method in this case is the Autoregressive Distributed Lag (*ARDL*) Bound Cointegration test. This is because of the mixed order of integration of the individual variables in the model.

Table 2: *ARDL* Cointegration Bound Test of Capital Inflow Models

	K	F Stat	1% Lower bound	1% Upper bound	Remark
FDI	4	7.18*	3.07	4.44	Cointegrated
FPI	4	14.46	3.07	4.44	Cointegrated
OFI	4	3.97	3.07	4.44	Cointegrated
ODA	4	6.29	3.07	4.44	Cointegrated
REM	4	9.29	3.74	5.06	Cointegrated

Source: Author's Computation, 2023.

The outcome of the test in Table 2 shows that for almost all the capital inflow variables, the F-calculated statistics are greater than 4.44 the F-tabulated critical value of the upper bound at 1 percent level of statistical significance except in *OFI* which cointegrated at 5 percent level of statistical significance. This rules out spurious regression and indicates that long run relationship exists among all the variables of capital inflow volatility and world *GDP* growth rate (*WGDPG*), Domestic *GDP* growth rate (*NGDPG*), World broad money (*WBM*), World credit to private sector (*WCPS*), Nigeria credit to private sector (*NCPS*), Nigeria inflation rate (*NINF*), Nigeria official exchange rate to dollar (*NEXH*) Nigeria broad money (*NBM*) and World lending rate (*WLR*). The cointegration among these variables enables us to estimate the determinants of the volatility of capital inflow both in the short run and long run.

Table 3: Short run Coefficients of FDI Volatility Model

Dependent Variable	FDI	FPI	OFI	ODA	REM
ARDL Lags	(1, 3, 3, 2, 3)	(1, 3, 3, 3, 3)	(1, 3, 3, 3, 3)	(1, 3, 3, 1, 3)	(1, 3, 2, 3, 3)
D(WGDPG)	1.30(4.22)*	1.30(4.34)*	0.93(3.11)*	2.16(4.87)*	0.68(2.49)**
D(WBM)	0.33(2.27)**	0.29(1.80)	0.16(0.98)	0.02(0.11)	0.02(0.13)
D(WLR)	-0.74(-2.37)***	-0.96(-2.97)**	-0.35(-1.33)	-0.25(-0.64)	-0.06(-0.21)
D(WCPS)	-0.15(-1.22)	-0.32(-2.30)***	-0.14(-1.05)	0.13(0.81)	0.08(0.58)
D(NGDPG)	0.21(1.98)**	0.24(2.34)**	0.12(1.36)	0.44(3.35)**	0.17(1.71)
D(NBM)	0.10(0.56)	-0.01(-0.05)	0.02(0.09)	0.58(2.94)**	0.43(1.89)
D(NINF)	0.04(3.23)**	-0.07(-2.62)***	-0.01(-0.57)	0.08(4.29)*	0.04(1.62)
D(NEXH)	0.02(0.74)	0.04(1.32)	0.00(0.20)	0.09(2.31)**	0.13(5.23)*
D(NCPS)	-0.18(-1.71)	-0.10(-0.87)	0.02(0.20)	-0.11(-0.81)	-0.33(-2.50)***
CointEq(-1)	-1.08(-5.44)*	-1.04(-6.14)*	-0.95(-3.16)**	-0.84(-4.17)*	-0.54(-4.27)*

Note: *, **and *** denotes 1%, 5% and 10% level of significant respectively. The values in brackets are t-Statistic values while those outside the brackets are the coefficient values of the variables.

Source: Author's Computation, 2023

From the table 3 above, it is evident that both world *GDP* growth rate (*WGDPG*) and Nigeria's inflation rate (*NINF*) are the major determinants of the volatility of *FDI*, while world *GDP* growth rate (*WGDPG*) and World lending rate (*WLR*) determined the volatility of portfolio investment in the country. Apart from the world *GDP* growth rate (*WGDPG*), volatility of *ODA* was also determined by the Domestic *GDP* growth rate (*NGDPG*), Nigeria inflation rate (*NINF*) and Nigeria broad money (*NBM*) while other foreign investment *OFI* volatility and the volatility of remittances resulted only from the world *GDP* growth rate (*WGDPG*) and Nigeria's official exchange rate to dollar (*NEXH*) respectively.

From the analysis above, it is obvious that both pull and push factors were responsible for the volatilities of the capital inflow to Nigeria in the short run as established in the study of emerging economies by Brono *et al.* (2011). However, it is evident from the result that the inflow of capital volatility in Nigeria is more externally induced than domestic. This is consistent with Engle and Rangel (2008) which submitted that global factors are more important and significant determinants of capital inflow volatility compared to country specific factors. Specifically, in conformity to Nwosa and Adeleke (2017) which found the growth of global GDP as a determinant of volatility in *FDI* in Nigeria, world *GDP* growth rate (*WGDPG*) was the major determinant of the volatilities of all the components capital inflow in Nigeria in the short run. Its effect was statistically significant in determining the volatility of all inflows except remittances inflows which is only significant at 10 percent level. This suggests that the capital inflows into the economy respond to the happenings in the global economy, any shock to the world's economy would have significant impact on the volatility of the capital inflows into the economy. This explains better the reason why global economic recessions and any global crisis impressed heavily on the domestic economy of the country. The sunk of the resources needed in domestic production were not readily available as a result of shortage in the world output stemming from war among countries of the world or global pandemic, which leads to reduction in aggregate demand. Capital inflows are more stable when the world economy grows, this is shown with the positive effect that the growth of the world economy had on the volatilities of all forms of capital inflows.

World lending rate (*WLR*) is only relevant in determining the volatility of portfolio investment in Nigeria in the short run. Since international investors would prefer to borrow from the developed economy with low interest, a speculative movement in the interest rate of the developed economy as represented by the world interest rate would have significant impact on the volatility of the portfolio inflow into the economy. Portfolio inflows into the economy are more stable when the world interest rate is stable, international investors had more courage to borrow from international financial institutions and direct it to investment in a nation where its return and Marginal productivity of capital is high like Nigeria. However, with an increase in world lending rate, international borrowing is

discouraged and creates disincentive to finance hot investment in the country.

Apart from the world economy in Table 3, we can also affirm ODA volatility resulted mostly from the domestic factors. Such factors as Domestic *GDP* growth rate (*NGDPG*), Nigeria broad money (*NBM*) and Nigeria inflation rate (*NINF*) significantly determined the volatility of foreign aid in Nigeria. The effect of all these variables are positive and as such the stability of all these macroeconomic variables are necessary for the stability of aid inflow. Foreign aid inflows being special intervention from the developed economies tend to have direct bearing on the recipient economies, mostly developing. However, the volume of these inflows depends on the growth of the funding economies while the destination of their resources is informed by both international politics and domestic policies of the host country. In Nigeria, monetary policy of the government has been very receptive to the aid inflow and policy inconsistencies would only lead to the volatility of its inflow into the economy. The use of monetary policy at curbing the price instability via increase or decrease in the level of liquidity in the economy had played a prominent role at stabilizing the inflow of foreign aid.

Remittances is the money repatriated back into the economy by Nigerians in the diaspora. The decision to withhold their money or send it back home is mainly influenced by the exchange rate of Nigeria currency to the America dollar. Usually, Nigerians in diaspora are richer at home when the little earned abroad are sent home for domestic uses. The lower the value of Nigerian currency, the more Nigerians in the diaspora would be willing to invest in the domestic economy. If naira appreciates, their money would be more valuable abroad. Apparently, it would be more appropriate for them to keep their money in dollar than to send it home if the value of naira continues to appreciate in the world market. Over the period, this has been the case with the Nigerian naira since 1986 when averagely 2 naira was exchanged for a dollar, 92 naira to a dollar in 1999, 253 naira to a dollar in 2016 and averagely 307 naira to a dollar in 2019. A relative stability in exchange rate will guarantee the value of their money. The sharp decline in the remittances inflow in 2008 could be explained by the fall in the exchange rate from about 126 naira to a dollar in 2007 to about 119 naira in

2008 and subsequently rose to about 149 naira in 2009 spur a rise in the remittances inflow.

From table 3, world *GDP* growth rate (*WGDPG*) also played a prominent role in determining the rate of volatility of capital inflow in Nigeria in the long run; its role is significant in all the inflow except the remittances. Apart from the growth of the world economy, World credit to private sector (*WCPS*) and Nigeria inflation rate (*NINF*) also determined the volatility of *FDI* in the country, while World credit to private sector (*WCPS*) and in conformity with Opperman *et al.*, (2017) on sub Saharan Africa countries, the World broad money (*WBM*) determined the volatility of portfolio investment in the country. Apart from the world *GDP* growth rate (*WGDPG*), volatility of *ODA* was also determined by the World credit to private sector (*WCPS*), Domestic *GDP* growth rate (*NGDPG*), Nigeria inflation rate (*NINF*), Nigeria official exchange rate to dollar (*NEXH*) and Nigeria broad money (*NBM*) while other foreign investment *OFI* results only from the world *GDP* growth rate (*WGDPG*).

World credit to private sector (*WCPS*) was germane to the volatility of foreign direct and portfolio investment in the longrun. The rate at which resources are disposed or withheld in the international financial market had significant effect on the volatilities of both foreign direct investment and foreign portfolio investment. More resources were available to the investors with the availability of credit in the international market which afforded them the opportunity to expand their businesses in Nigeria and the converse was also true.

The speed of adjustment from short run to long run as indicated by the CointEq(-1) are all negative and relatively significant at 1 percent level of significance except *OFI* which is significant at 5 percent. This indicates that the model adjusted from the short run to the long run

Table 4: Long run Coefficients of Capital Inflow Volatility Model

Dependent Variable	FDI	FPI	OFI	ODA	REM
WGDPG	1.77(3.13)**	4.21(4.68)*	2.31(3.14)**	3.32(3.39)*	-0.19(-0.15)
WBM	0.10(1.77)	0.36(3.27)**	0.12(1.25)	-0.16(-1.54)	-0.65(-2.52)***
WLR	-0.12(-0.44)	0.25(0.99)	-0.22(-0.83)	0.68(1.67)	1.03(1.64)
WCPS	-0.12(-2.79)**	-0.41(-5.33)*	-0.12(-1.83)	-0.18(-2.78)**	-0.32(-1.79)
NGDPG	0.19(1.77)	0.23(2.33)***	0.13(1.23)	0.52(2.56)**	0.31(1.52)
NBM	0.09(0.55)	-0.01(-0.05)	0.02(0.09)	0.69(2.48)**	0.81(1.81)
NINF	0.04(2.87)**	-0.06(-2.17)***	-0.01(-0.53)	0.10(4.51)*	0.07(1.59)
NEXH	0.02(0.76)	0.04(1.49)	0.00(0.21)	0.11(2.90)**	0.23(3.71)*
NCPS	-0.16(-1.55)	-0.09(-0.91)	0.02(0.20)	-0.13(-0.75)	-0.62(-2.08)

Note: *, **and *** denotes 1%, 5% and 10% level of significant respectively. The values in brackets are t-Statistic values while those outside the brackets are the coefficient values of the variables.

Source: Author's Computation, 2023

Diagnostic Tests of the Volatility Model

The short run and long run analyses above are subject to validity of certain test which guarantee sufficient representation, specifically, both the R^2 and adjusted R^2 of the model reflect the adequacy of the variables employed to explain the volatilities of the capital inflows into the country. The least is the adjusted R^2 of the *FDI* volatility model. This suggests that the variables employed explained about 84 percent of factors determining volatility of foreign direct inflow into Nigeria. The stabilities of the models were guaranteed at 0.05 level of significance by Ramsey stability test while Jarque-Bera statistics indicate the normality of the models at the same level of significance. aAutocorrelation test showed that there were no serial correlations of the variables in the model with f statistics and probabilities of FDI, FPI, OFI, ODA and REM as 0.46 (0.73), 0.62 (0.71), 1.35 (0.54), 15.47 (0.18), 15.47 (0.18) respectively. Heteroskedasticity test of the models show showed the evidence of equal variance at 0.05 level of significance.

Table 5: Diagnostic Test of the Volatility Model

	FDI	FPI	OFI	ODA	REM
R-sqrd	0.97	0.99	0.99	0.99	0.99
Adj. R-sqrd	0.84	0.96	0.92	0.96	0.97
Normality:	0.05(0.97)	3.13 (0.21)	12.45 (0.06)	0.23 (0.89)	0.52 (0.77)
Auto cor	0.46 (0.73)	0.62 (0.71)	1.35 (0.54)	15.47 (0.18)	15.47 (0.18)
Het.	0.92 (0.61)	0.71 (0.73)	0.25 (0.98)	2.57 (0.15)	0.27 (0.98)
Ramsey Stability	7.15 (0.06)	1.87 (0.24)	0.01 (0.94)	1.06 (1.00)	1.19 (0.39)

Probability values in parentheses

Source: Author's Computation, 2023

Table 6: Summary of the determinants of capital inflow

VARIABLES	FDI		FPI		OFI		ODA		REM	
	SR	LR	SR	LR		LR	SR	LR	SR	LR
WGDPG	D	D	D	D	D	D	D	D		
WBM				D						
WLR			D							
WCPS		D		D				D		
NGDPG							D	D		
NBM							D	D		
NINF	D	D					D	D		
NEXH								D	D	D

Source: Author's Computation, 2023

The Push Factors

From the table 6 above, the pull determinant of capital inflow volatility was predominantly the growth of the world economy. It determined the volatilities of all the inflows except remittances both in the short run and the long run. The global liquidity has no significant determining effect on volatility of any capital inflow both in the short run and the long run except a long run determinant effect of volatility of portfolio investment. This is contrary to Nwosa and Adeleke (2017) which discovered a determinant effect of global liquidity on direct investment. The world lending rate determined volatility of portfolio investment in the short run. World credit to private sector determined the volatilities of foreign direct investment, portfolio investment and foreign aid only in the long run.

The Pull Factors

Moreover, the growth of Nigerian economy, volume of money in circulation, inflation rate and exchange rate were all determinants of foreign aid volatilities in the short run and the long run except exchange

rate which only have long run determinants. The rate of inflation also has both short run and long run deterministic effect on direct investment volatility. Likewise, the volatility of remittances was determined both in the short run and the long run by exchange rate.

Conclusion and Policy Implications

This paper investigates the macroeconomic determinants of capital inflow volatilities in Nigeria between 1986 and 2018. Annual data were collected from World Development Indicators (WDI) database. The time series properties of the variables were checked through Augmented Dickey Fuller and Phillip Perron tests to ascertain their order of stationary, mixed order of stationary were discovered which prompted the use of Auto Regressive Distributive Lagged (ARDL) methods for the estimation. Stable long run relationships were established through cointegration bound test. The main findings that emerged from the study were that both pull and push factors were responsible for the volatilities of capital inflows into Nigeria but the most prominent determinant both in the short run and the long run is the growth of the world economy. The only exception is the volatility of remittances which is predominantly determined by exchange rate both in the short run and the long run. ODA volatility is more susceptible to domestic factors both in the short run and the long run. This study therefore concludes that volatilities of capital inflow were determined by both push and pull factors in Nigeria. It however, concludes that while the growth of the world economy dominates the push factors, the pull factors remain the major determinants of volatility of foreign aids inflow to the country.

Since there is little or nothing that can be done on the push factors that determined the volatilities of capital inflow, attention should be concentrated only on the way of mitigating the effect of instability in the push factors. This study now recommends that government should through the central bank of Nigeria employ appropriate monetary policy mix that will stabilize the capital inflow by regulating the rate of inflation and exchange rate in the economy. The stand of the monetary authority on the managed floating exchange rate regime adopted should be better managed to discourage further depreciation of the currency. A stable currency will enhance stability of price to some extent; this is because of the consumption pattern of the economy which is skewed mostly towards

imported goods. The stable exchange rate would have direct effect on the rate of inflation in the economy.

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