Foreign Capital and Macroeconomic Variables: fresh evidence

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Abstract

The connection between foreign capital and economic growth has received greater attention in economic literature. Evidence has shown that the necessity to build economic strength by many developing countries such as Nigeria would rather require sourcing for foreign capital. But foreign investors often pay attention to the presence of certain economic variables when deciding on where appropriate to make their investment. In this connection, we analyse the impact of certain macroeconomic variables in attracting foreign capital flow into Nigeria. We represent these variables with domestic monetary policy rate, exchange rate and industrial production index using ARDL with quarterly data set spanning from 2010 to 2021. The outcome of our finding gave evidence on the significance impact of industrial production index and exchange rate in attracting capital flows into the country both in short run and long run. However, while the impact of industrial production index was positive, that of exchange rate was negative. Our finding is robust given the choice of alternative monetary policy variable. This, thus, goes to say that necessary attention must be accorded to these macroeconomic variables while making policies to attract foreign capital.

Keywords: foreign capital; industrial production index; exchange rate; ARDL
JEL Classification Codes: E6, F4, F1, F3, O1, O4

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1. Introduction

While it becomes instructive to build economic strength, it is equally a necessity to source for every avenue to make such objective a reality. There are overwhelming evidences pointing to the relevance of sourcing international finance through foreign capital (see for example Dinh et al, 2019; Hayat, 2019; Badwan and Atta, 2020; Nguyen et al., 2021; Adebayo *et al.* 2022) but foreign investors often pay divergent attention to the presence of certain economic variables in the destination country when making decision relating to foreign investment. Recent literature on this subject matter attributes recent increase in foreign capital flows into developing countries like Nigeria [see figure 1 for details of recent capital inflows into the country] to factors such as large market size, better infrastructure, trade openness, political stability, currency strength and formidable monetary policy (e.g. see Ajide *et al.* 2022; Korsah *et al.*, 2022). By implication, the multi-nationals naturally setting focus on maximizing returns to their investing capitals. They are much driven by the size of market (or output level), cost of production (abundance of labour), policy stability and currency strength when targeting country of choice.
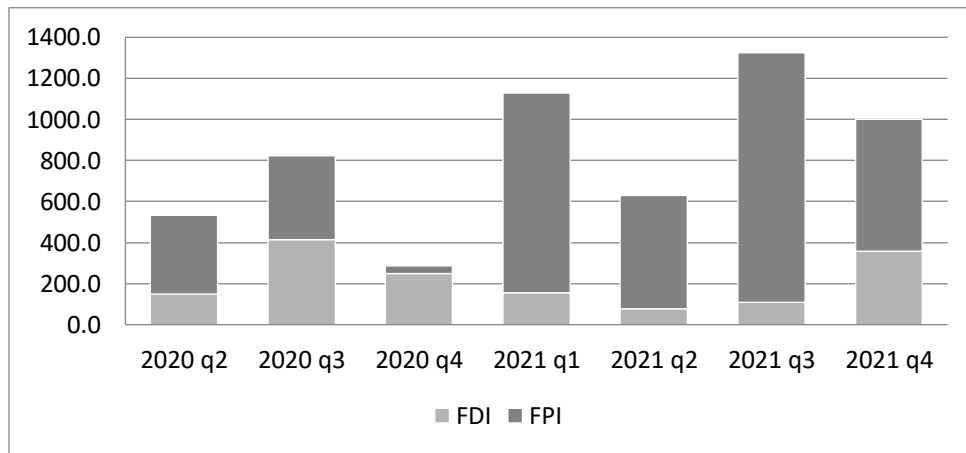

Figure1: Capital inflows into Nigeria between 2020 Q2 and 2021 Q4

Having the foregoing in mind, we focus our attention on various impacts of macroeconomic variables in attracting capital inflows in Nigeria. Yes, we are aware that numerous studies abound in the literature that have taken cognizance of such impact (see Adebayo *et al.*, 2022; Edo *et al.*, 2022), we defer when it comes to variables of choice. Some of this literature with respect to Nigeria makes proxy of market size with the level of GDP while we use industrial production index in lieu of this. Aside the fact that such proxy was used by Olani (2020) when investigating the dynamics effects of macroeconomic policies in emerging markets, we are equally influenced by the fact that most of the activities of foreign investors (particularly FDI) are usually infused to industrial sectors. With our quarterly data set and being very recent up to the last quarter of 2021, our outcome would rather reflect recent trends in the economy.

The outcome of our study can be summarized as follows. While industrial production index exhibit both short- and long-run impact in attracting FPI and FDI in Nigeria, domestic monetary policy was rather found to be significantly impactful for FPI but not for FDI. Also, currency strength (proxy by exchange rate) assumes negative but significant effect for attracting both

choices of capital inflows as used in the study. Our alternative choice of monetary policy which is Treasury bill rate has positive impact on inflows of FPI only but rather suppressed the already established significant impact of currency strength in both models.

Immediately after this section, we present a brief review of literature in section 2 and in section 3 we focus on methodology for the study. Data and preliminary analysis together with the presentation of results are respectively done in sections 4 and 5. We conclude our analysis with policy recommendation in section 6.

2. Brief Literature Review

Literature on capital flows and macroeconomic variables is very replete. However, we make a brief review in this section with respect to recent works on the subject matter. In examining the dynamic effects of macroeconomic policies on various capital flows to emerging markets, Olani (2020) make a comprehensive analysis with structural VAR. The variables capturing macroeconomic variables as used in this study are industrial production index, exchange rate, short-term monetary policy rate and price level. Being a study on emerging markets, the study recognizes the possible spillover effect of US monetary policy on these economies and captures it with US shadow Fed Fund rate by Wu and Xia (2016). He comes to term that FDI responds weakly to all these macroeconomic variables than foreign portfolio investment. In another analysis, Oudat *et al*, (2020) has equally offered explanation on the impact of macroeconomic variables on foreign portfolio investment using ARDL for the case of Bahrain. In their study, the scope runs from 1989 to 2018 where they focus on CPI, GDP and exchange rate. For the short run analysis, only CPI was found to be significant. However, after establishing the long run relationship among the variables, the long run estimation indicates that both output and price levels have significant effect on portfolio investment while exchange rate was found to be negative and insignificant. Another related study by Yang and Du (2020) focus on the influence of macroeconomic variables, investment incentives and government agreement in attracting FDI inflows in China. In doing this, the study give consideration to variables such as infrastructural condition, labour cost, annual GDP growth, real effective exchange rate, tax policy incentives and bilateral investment treaties in relation to their impact on FDI inflows for the period of 25 years using OLS. They found macroeconomic variables and policy incentives to be highly influential in attracting FDI inflows while the impact of various government treaties was not obvious for the period covered.

Adebayo *et al* (2021) equally investigate the impact of macroeconomic variables on FDI for the case of Nigeria between 1981 and 2018 where ARDL was employed as the main methodology with wavelet analysis and FMOL for the alternative estimation. The study captures macroeconomic variables by using export volume, gross capital formation, trade openness, inflation and output level. However, out of all these macroeconomic variables, only exports and trade openness were found to have positive and significant impact on FDI inflows. The outcome from ARDL was in agreement with that from the alternative FMOL, DOLS and wavelet analysis. In a recent analysis by Azharuddin and Mehra (2022), efforts were made by investigating various determinant factors responsible for FDI inflows in BRICS countries. With fixed effect panel analysis and data coverage from 1996 to 2016, it was found that market size which was captured by using final consumption expenditure being a ratio of GDP, macroeconomic stability proxied with price level, interest rate, natural resource and labour volume are the main determinant of FDI inflows into BRICS. The study comes to term that most multi-nationals naturally have market

seeking behaviour, labour exploiting view and resource seeking tendency when making investment decision. A related work by Korsah *et al.,* (2022) had paid attention to West African region by focusing on the determinant of FDI inflows into 16 West African countries using data from 1989 to 2018. The study use panel fixed effect methodology and found that market size, trade openness and currency strength have significant impact in attracting FDI into the region. As against the previous findings, political stability, price level, tax policy and infrastructural facility are found to be insignificant for FDI inflows. There was also evidence from the study that French speaking countries do attract more FDI than English speaking countries.

While paying attention to infrastructural facility with respect to FDI inflows in Nigeria, Edo *et al.,* (2022) investigate the long run relationship between various infrastructural variables and FDI inflows in Nigeria within the period of 1996 and 2018 using OLS. According to this study, various infrastructural facilities considered are mobile cellular subscribers, railway rails line, air transport and seaport infrastructures. Out of all these infrastructural facilities, the study found only mobile cellular subscribers and quality of seaports infrastructure as having positive impact and long run relationship with FDI inflows in Nigeria. Elsewhere in a study on Oman by Al-Harrasia (2022), investigation was made on determinant of FDI inflows where attention was paid attention to variables such as trade openness, inflation and GDP growth with focus on causality and impulse response analysis. The result found export and import to negatively influence FDI inflows while inflation and GDP growth influence it positively. On causality, export, import and inflation were found to granger cause FDI. Additionally, Khudari *et al.,* (2022) also analyse the impact of both macroeconomic and political policies in attracting FDI inflows for the case of Turkey using annual data from 1974 to 2017. The methodology adopted was ARDL and co-integration analysis. According to the outcome of the finding, GDP, trade openness, domestic savings and political stability all have positive impact on FDI inflows into the country.

Our focus in this study is however to re-estimate the possible impact of macroeconomic variables such as currency strength (capture with exchange rate of naira to dollar), monetary policy rate and industrial production index. In our alternative analysis, we use a three-month Treasury bill in lieu of monetary policy rate. Our choice of using industrial production index to capture output size is in line with the analysis of Olani (2020) who find FDI and FPI to be highly responsive to shock coming from it. Aside, most multi-national often target industrial sectors when making their investment decision. Hence, information from industrial production will suffice as a variable measuring output level. Like previous studies, we include in our estimation monetary policy variable which is captured with monetary policy rate and Treasury bill rate from Central Bank of Nigeria (CBN). Also, foreign investors are known to pay certain attention to economic stability or otherwise of a country where they intend to make investment. Apart from this, the strength of currency for the concerned country of choice also matters. Investors often cherished stable currency as it is a strong premise to make analysis about possible returns on investment. Hence, our analysis is this study gives consideration to the aforementioned variables while estimating the impact of macroeconomic policies in attracting FDI inflows in Nigeria. Aside the introduction of IPI as a new variables, the outcome of this study gives a current stand as far as FDI-macroeconomic variables nexus is concerned in Nigeria.

3. Methodology

The features exhibited by the series of our variables necessitate the choice of methodology in this study. In the section under preliminary analysis, we found our variables as combination of both I(0) and I(1) variables. When this situation arises, one of the best methodologies to adopt as to estimating both short-run and long-run analysis is Autoregressive Distributed Lag (ARDL) model. It is a methodology that captures the impact information about the lag of the dependent variable and the distributed impact of the explanatory variables. Without much ado, we represent the functional form of our analysis in the following equations:

$$CF = f(EXR, MPR, IPI) \tag{1}$$

Where CF is capital flows, EXR is exchange rate, MPR is the monetary policy rate and IPI is industrial production index. We can further have the following by decomposing Capital flows into FDI and FPI and express them in log form:

$$\log(FPI) = \log(EXR) + MPR + \log(IPI) + \varepsilon_t \tag{2}$$

$$\log(FDI) = \log(EXR) + MPR + \log(IPI) + \varepsilon_t \tag{3}$$

We do not log MPR because it is already in rate form. Aside, logging it will make no meaningful economic interpretation. By general presentation, our ARDL model for this study can be presented as follows:

$$\Delta LFPI_t = \alpha_0 + \rho LFPI_{t-1} + \beta_1 LEXR_{t-1} + \beta_2 MPR_{t-1} + \beta_3 LIPI_{t-1} \sum_{i=1}^{p-1} \delta_i \Delta FPI_{t-1}$$

$$+ \sum_{J=0}^{q_1-1} \gamma_{1,i} \Delta LEXR_{t-1} \sum_{J=0}^{q_2-1} \gamma_{2,j} \Delta MPR_{t-1} + \sum_{J=0}^{q_3-1} \gamma_{3,j} \Delta LIPI_{t-1} + \epsilon_t$$

$$\tag{4}$$

$$\Delta LFDI_t = \alpha_0 + \rho LFDI_{t-1} + \beta_1 LEXR_{t-1} + \beta_2 MPR_{t-1} + \beta_3 LIPI_{t-1} \sum_{i=1}^{p-1} \delta_i \Delta FDI_{t-1}$$

$$+ \sum_{J=0}^{q_1-1} \gamma_{1,i} \Delta LEXR_{t-1} \sum_{J=0}^{q_2-1} \gamma_{2,j} \Delta MPR_{t-1} + \sum_{J=0}^{q_3-1} \gamma_{3,j} \Delta LIPI_{t-1} + \epsilon_t$$

$$\tag{5}$$

This is ARDL (p, q_1, q_2, q_2) where Δ is the first stage of differentiation and ϵ_t is the white noise error term. From the equation above, the short run impact is captured by γ_1, γ_2 and γ_3 with respect to each of the variables while the long run impact is represented by $\frac{\beta_1}{1-\rho}, \frac{\beta_2}{1-\rho}$ and $\frac{\beta_3}{1-\rho}$ respectively for exchange rate, monetary policy rate and industrial production index. The ECM term is thus captured by $1 - \rho$ in this analysis. For more comprehensive analysis on the derivation of ARDL model of various orders, see Salisu (2022)[1]

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[1] This can be found using this link: https://www.researchgate.net/publication/363534421.

4. Data and Preliminary Analysis and Unit Root

In this analysis, we pay close attention to the macroeconomic variables impact on two basic compositions of capital flows, namely: foreign direct investment and foreign portfolio investment. The scope for all our variables runs from 2010 Q1 to 2021 Q2. For proxies of macroeconomic variables, we use industrial production to capture the level of output in the economy. More often, foreign investment activities are targeted to productive sectors of the economy. Other variables as used for our estimation are exchange rate and monetary policy rate. For the alternative analysis, we capture monetary policy with three-month Treasury bill of the Central Bank of Nigeria (CBN). Originally, exchange rate and three-month Treasury bill rate occur in monthly frequency and we derive quarterly equivalent by finding the average on three month periods. Our data are sourced from various statistical bulletins which mainly include Central Bank on Nigeria (CBN) and National Bureau of Statistics (NBS).

Table 1 present the descriptive statistics for our variables. This gives information about our variables with respect to average value, level of dispersion, skewness and kurtosis. Within the periods cover, average value of FPI is almost seven times the value of FDI and having higher level of dispersion of 1812.07 in value. Although, they are positively skewed, FDI is moderately peaked with value of 3.17 (a little bit higher than the threshold value of 3) while FPI is moderately flat with a value of 2.76 (being slightly lower than the threshold of 3). The average value of industrial production index and exchange rate are 115.18 billion dollar and 242.95 naira to dollar respectively. Exchange rate is much more volatile than the industrial production index given the value of standard deviation of 90.11 for exchange rate and 14.61 for the production index. They are positively skewed and moderately flat. As for the variables of monetary policy and Treasury bill rate, they have average value of 11.85 and 8.83 respectively. Treasury bill rate higher level of dispersion than monetary policy rate and they are negatively skewed. While MPR is highly peaked, TBR is relatively flat, having value of 2.07 which is lower than the threshold. Total number of our observation is 48 and is in line with the requirement for any time series analysis (see Narayan, 2005).

The figures presenting the co-movement among our variables offer us further information about likely relationship among them. In figures 1 and 2, we have FDI and FPI respectively with IPI and EXR. We observed one directional movement among FDI, FPI and exchange rate while industrial production index move in the alternative direction. Also, in figures 3 and 4, while FDI, FPI and TBR were found to be unstable, MPR was relatively stables throughout the period of consideration.

Table 1: Summary Statistic

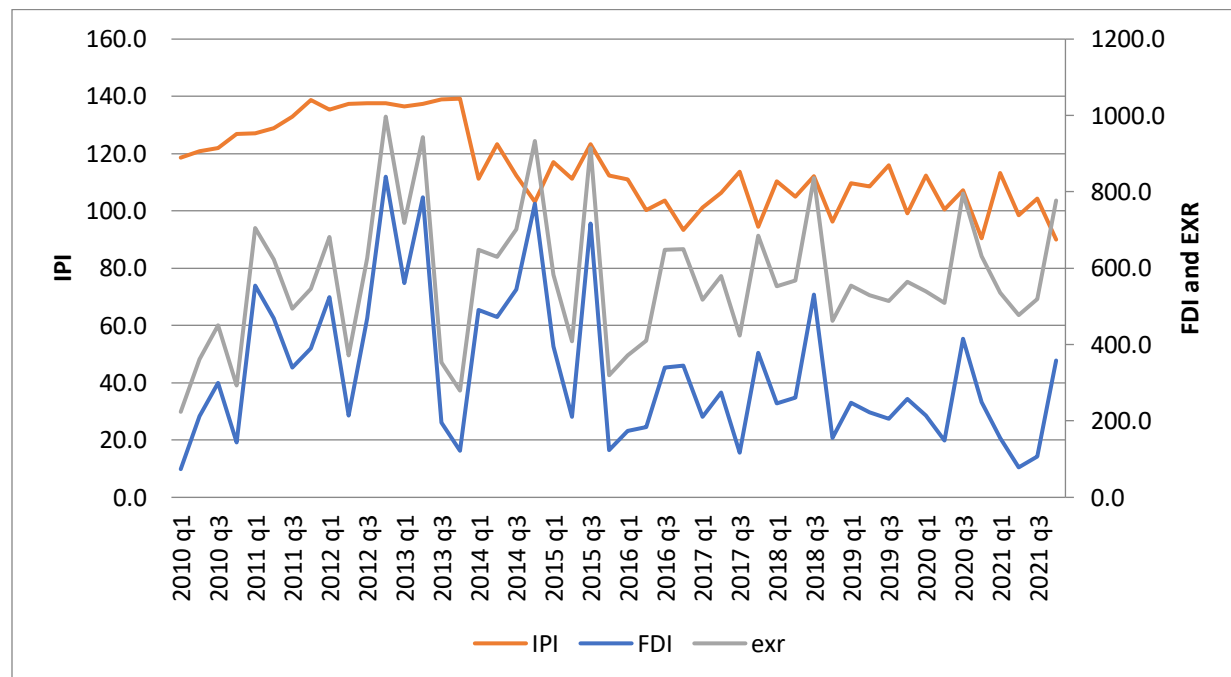| Variables	Mean	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Observations
FDI	329.15	839.71	73.93	194.26	0.94	3.17	48
FPI	2243.51	7106.16	35.15	1812.07	0.86	2.76	48
IPI	115.18	139.20	90.00	14.61	0.23	1.98	48
EXR	242.95	418.83	150.06	90.11	0.40	1.68	48
MPR	11.85	14.00	6.00	2.31	-1.49	4.33	48
TBR	8.83	14.70	0.31	4.29	-0.58	2.07	48

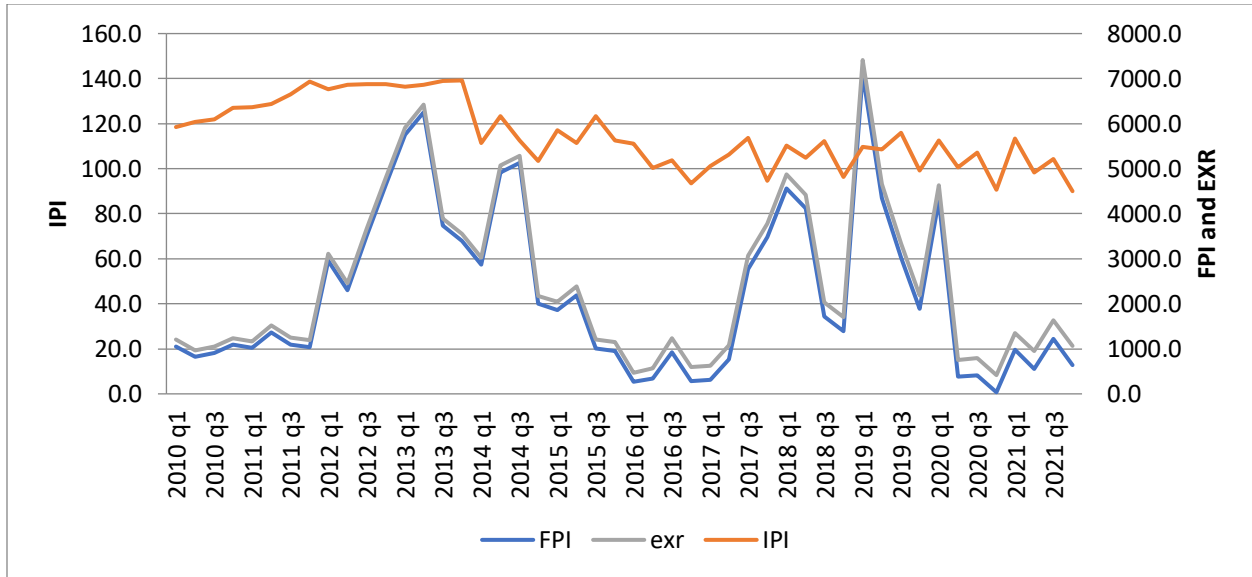**Figure 2: Co-movement among IPI, FDI and EXR between 2010 and 2021**

Figure 3: Co-movement among IPI, FPI and EXR between 2010 and 2021
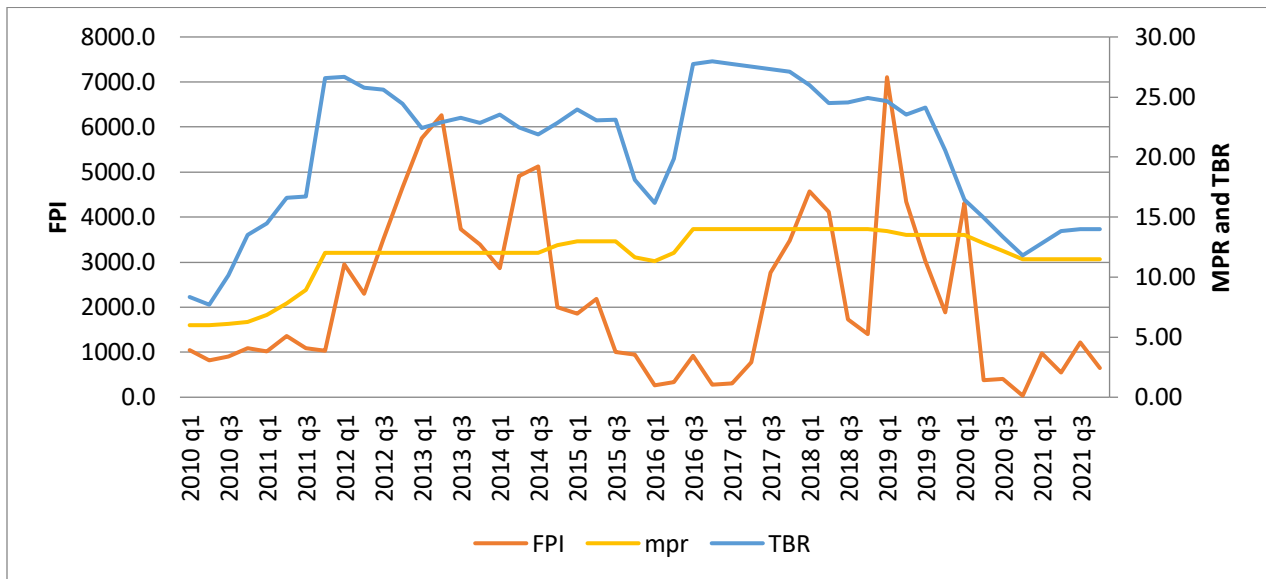

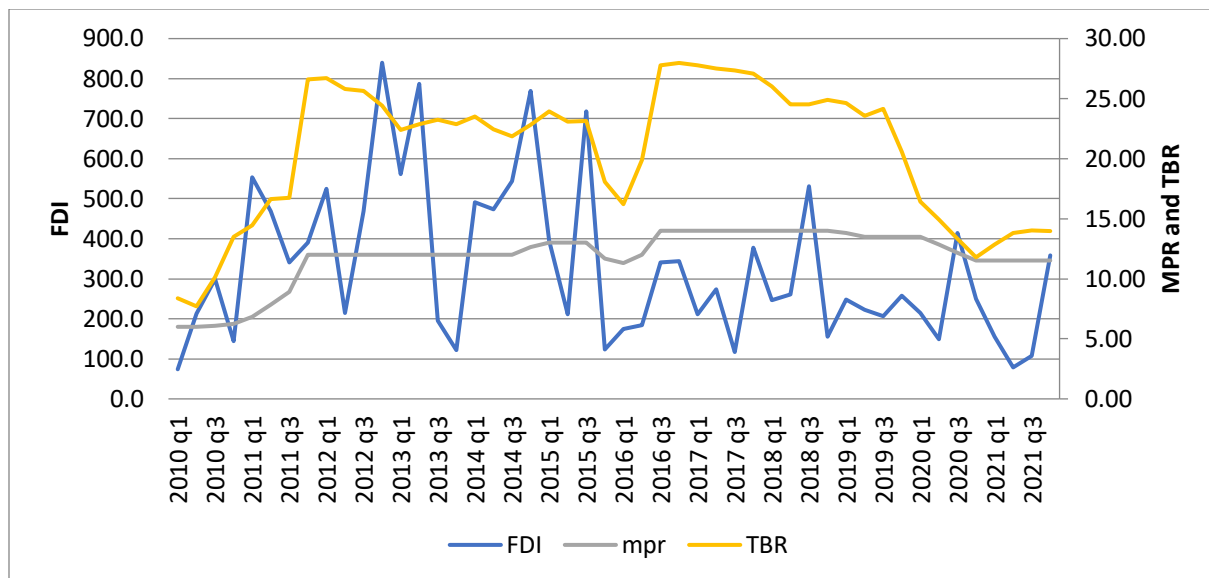**Figure 4: Co-movement among FPI, MPR and TBR between 2010 and 2021**

Figure 5: Co-movement among FDI, MPR and TBR between 2010 and 2021

Unit Root

Unit root test is very necessary for any time series analysis. When series are not stationary, it becomes difficult to account for the long-run relationship and the result from such an analysis may be spurious. Hence, we subject our series to the test of unit root. Table 2 presents the result of unit root analysis for our variables. Our variables are combination of both I(0) and I(1). This indicates that ARDL will be sufficient for our analysis. They are significant at either 1% or 5% respectively.

Table 2: Unit Root

Variable	ADF		PP	
	Level	status	Level	status
FDI	-6.0329[a]	I(0)	-3.0329[a]	I(0)
FPI	-3.1257[b]	I(0)	-3.0537[b]	I(0)
GDP	-0.0494	I(1)	-3.8888[b]	I(0)
IPI	-2.4618	I(1)	-4.3718	I(0)
EXR	-4.4564	I(1)	-2.0010	I(1)
MPR	-2.1974	I(1)	-1.8160	I(1)
TBR	-3.0018	I(1)	-2.2802	I(1)

Note: [a] and [b] indicate significance at 1% and 5% respectively

5. Results

Model 1: FPI and Macroeconomic Variables

We estimate our model of short run and long run, as shown in tables 3, 4 and 5, for the impact of macroeconomic variables on the foreign portfolio investment (FPI) using monetary policy rate, exchange rate and industrial production index to capture macroeconomic variables. In the short run, both lag of FPI and exchange rate have negative and significant effect on portfolio investment at 1% and 10% respectively. Specifically, the short-run coefficient [0.992] (i.e. the coefficient of lag of IPI) is found to be positive and significant. This implies that industrial output exhibit a significant factor in attracting foreign portfolio investor into the country in the short run. By interpretation, a 1% increase in industrial production index will lead to an increase of 0.99% in foreign portfolio investment in the short run. The error correction term (the speed of adjustment) is found to be significant with value of -0.442. This indicates that any changes in the short-run behaviour can be easily adjusted with in the rate of 44.2%. We present the alternative model by using three month Treasury bill. In this model, the short-run term is still positive but not significant and the error correction term was found around 39.7%.

Table 3: Model 1: Short Run Results (ARDL)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(FPI(-1))	-0.442039	0.125619	-3.518877	0.0011
LOG(EXR)	-0.531974	0.302586	-1.758091	0.0860
MPR	0.119867	0.063579	1.885313	0.0663
LOG(IPI(-1))	0.992463	0.377368	2.629961	0.0119
DLOG(IPI)	4.518751	1.084112	4.168157	0.0001
CointEq(-1)*	-0.442039	0.120762	-3.660424	0.0007

The bound test for the existence of long-run relationship is presented in table 5. We find long run relationship among our variables at 10% significant level. According to the long run estimation, exchange rate has a negative and significant relationship with FPI while both monetary policy rate and industrial production index are found to have positive and significant impact on FPI. With 1% changes in exchange rate, monetary policy and industrial production index, FPI will fall by 1.2% and rise by 0.27% and 2.25% respectively. In the alternative model, where we use three month Treasury bill rate for monetary policy, the rate is equally found to have significant and positive impact on FPI. However, in this model, the impact of exchange rate is suppressed to be insignificant, though still negative (see appendix for the table of analysis).

Table 4: Model 1: Long Run Results (ARDL)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(EXR)	-1.203455	0.602763	-1.996566	0.0524
MPR	0.271168	0.127672	2.123942	0.0396
LOG(IPI)	2.245197	0.563806	3.982218	0.0003

Table 5: Long-Run Relationship

F-Bound statistics	Value	Signif.	I(0)	I(1)
F-statistic	3.126364	10%	2.01	3.1
K	3	5%	2.45	3.63
		2.5%	2.87	4.16
		1%	3.42	4.84

Model 2: FDI and Macroeconomic Variables

In the second model, instead of FPI, we now estimate the model with Foreign Direct Investment (hence FDI). As presented in tables 6, 7 and 8, in the short run, the lag of FDI and exchange rate have negative impact on FDI at 1% and 10% respectively. For the monetary policy rate, the impact was positive but not significant while that of the industrial production index was fund to significant and positive. The error correction coefficient was -0.968 which implies that any change to short behaviour of this model can be correction within the rate of 96.8%. In the alternative model with three month Treasury bill for the monetary policy, the rate itself and the exchange rate were found to be insignificant. In other words, the significant impact in the model with monetary policy rate was suppressed by the introduction of Treasury bill rate as alternative variable for the monetary policy. Error correction in this model is now reduced to -0.937%.

Table 6: Model 1: Short Run Results (ARDL)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(FDI(-1))	-0.968276	0.156068	-6.204198	0.0000
LOG(EXR)	-0.396534	0.221615	-1.789292	0.0806
MPR	0.068399	0.047414	1.442596	0.1564
LOG(IPI)	1.437043	0.304100	4.725565	0.0000
CointEq(-1)	-0.968276	0.147893	-6.547139	0.0000

Having established the long-run relationship among our variables which is found at 1% significant level, we proceed to estimating the long-run analysis for our model. In this model, the impact of exchange rate on FDI was negative and significant while that of industrial production index was positive and significant. As for the monetary policy variable, we found positive but insignificant effect with FDI in the long run. In the alternative model with Treasury bill rate, both the treasury rate and exchange rate were found to have insignificant impact on FDI, albeit with exchange rate have negative effect and Treasury bill having positive impact.

Table 7: Model 1: Long Run Results (ARDL)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(EXR)	-0.409526	0.211387	-1.937327	0.0593
MPR	0.070640	0.045533	1.551397	0.1281
LOG(IPI)	1.484126	0.195995	7.572265	0.0000

Table 8: Long-Run Relationship

F-Bound statistics	Value	Signif.	I(0)	I(1)
F-statistic	10.01737	10%	2.01	3.1
K	3	5%	2.45	3.63
		2.5%	2.87	4.16
		1%	3.42	4.84

6. Conclusion

Essentially, this study pays attention to the impact of macroeconomic variables on the two main components of capital flows into Nigeria, namely: FDI and FPI using quarterly data from the periods between 2010Q1 and 2021Q4. We proxy macroeconomic variables with exchange rate, monetary policy rate and industrial production index while three-month Treasury bill rate was used for the alternative analysis. as revealed by the preliminary analysis for the study, the features exhibited by our variables and the fact that they are co-integrated at levels suggests that ARDL would be more appropriate for the study's estimation. Hence, our analysis was based on ARDL. Given this, we are able to present both short- and long-run estimates from our finding. The outcome from our findings could be summarized as follows: industrial production index exhibit both short- and long-run impact in attracting FPI and FDI in Nigeria; domestic monetary policy was found significant in impacting FPI but not FDI; and lastly, currency strength assume negative but significant effect in attracting both choice of capital inflows as used in the study. Our alternative choice of monetary policy which is Treasury bill rate has positive impact on inflows of FPI only but rather suppressed the already established significant impact of currency strength in both models. Given this outcome, we recommend that decisive policies should be put in place to ensure increase in industrial production. With rising market size, capital flows of both types are bound to increase. Aside, the CBN is expect to play is fundamental roles by ensuring stability in the country's exchange rate. The current weakness of the currency against many currencies of the world constitutes a threat to inflows of FDI and FPI for the country. We also offer to advise that various instrument of monetary policies such as monetary policy rate and Treasury bill rate should be relatively maintained and well-coordinated to attract foreign investors.

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Appendix
Model A1: FPI and Macroeconomic Variables with alternative choice for monetary policy

A11: ARDL Result: Model 1: Short Run Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(FPI(-1))	-0.397063	0.113234	-3.506570	0.0011
LOG(EXR)	-0.017337	0.224459	-0.077238	0.9388
TBR	0.060179	0.026861	2.240370	0.0304
LOG(IPI(-1))	0.522103	0.340527	1.533217	0.1327
DLOG(IPI)	4.244619	1.080432	3.928631	0.0003
CointEq(-1)	-0.397063	0.101589	-3.908527	0.0003

A12: ARDL Result: Model 1: Long Run Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(EXR)	-0.043662	0.563409	-0.077497	0.9386
TBR	0.151559	0.070273	2.156723	0.0368
LOG(IPI)	1.314910	0.701653	1.874019	0.0679

A13: Long-Run Relationship

F-Bound statistics	Value	Signif.	I(0)	I(1)
F-statistic	3.564535	10%	2.01	3.1
K	3	5%	2.45	3.63
		2.5%	2.87	4.16
		1%	3.42	4.84

Model A2: FDI and Macroeconomic Variables with alternative choice for monetary policy

A21: ARDL Result: Model 1: Short Run Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(FDI(-1))	-0.937623	0.147915	-6.338933	0.0000
LOG(EXR)	-0.115762	0.171896	-0.673442	0.5043
MPR	0.031703	0.021063	1.505139	0.1396
LOG(IPI)	1.191588	0.280667	4.245557	0.0001
CointEq(-1)	-0.937623	0.142608	-6.574834	0.0000

A22: ARDL Result: Model 1: Long Run Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(EXR)	-0.123463	0.182378	-0.676962	0.5021
MPR	0.033813	0.021619	1.563987	0.1252
LOG(IPI)	1.270861	0.225521	5.635231	0.0000

A23: Long-Run Relationship

F-Bound statistics	Value	Signif.	I(0)	I(1)
F-statistic	10.10230	10%	2.01	3.1
K	3	5%	2.45	3.63
		2.5%	2.87	4.16
		1%	3.42	4.84