**Foreign Portfolio Investment and Industrial Firm Performance: Theoretical and Methodological Issues.**

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**Abstract**

*Foreign capital flows from developed and emerging economies to developing has remained issue of interest to scholars, investment managers and policy makers. Foreign capital investment flow, as a form external sources of funds required in addition to domestic funds to industrial firms have remained a challenge in the face of macroeconomic uncertainty and structural issues. This study examined the theoretical and methodological issues in foreign portfolio investment and industrial firm performance. Three stages of methodological process was adopted; one was to examine the volatility effects of FPI on industrial firm performance using ARCH and GARCH techniques; the second was to examine the effects FPI and industrial firm performance in the fixed and dynamic models using panel data multiple regression technique and the third was to examine the known exogenous and unknown endogenous structural break effect on FPI and industrial firm performance using sequential methodology developed by Bai, Bai and Perron (1998). Findings indicated that measurements indicators of FPI and industrial firms performance varies due to conceptualisation of both terms by researchers and also techniques of data analysis varies and with mixed and inconclusive results. The study concluded that choice of data analysis and techniques should be guided by the characteristics of the dependent and independent variable under review.*

Keywords: Foreign Portfolio Investment, Portfolio flow, Volatility, Macroeconomic uncertainty, Structural breaks.

**1.0 Introduction**

Industrialization plays significant role in economic development of any country. The relationship between the two concepts for centuries have been observed as direct and till date almost all economically developed countries are industrialized (Mba, 2015). Industrialization process involves transformation of an extraction based economy into a manufacturing based economy and this is exhibited in every industrial sectors comprising of different industrial firms with different specialisations (Reiner & Staritz, 2013; Nigerian Industrial Revolution Plan (NIRP), 2014; Organisation for Economic Cooperation and Development (OECD), 2015).

The motivation for industrialisation in Nigeria is dated back 1960’s with four different phases of National Development Plans from (1962-1985), Structural Adjustment Programme (SAP) of 1986 and other industrial development programs (Chete, Adeoti, Adeyinka & Ogundele, 2014). Despite these efforts, the industrial sector still suffer setbacks in their contribution to GDP with a declining performances since 1970s from 7 per cent to 4 per cent in 2011 (NIRP, 2014). The sub-optimal utilization and poor performance of the industrial sector in Nigeria have been blamed majorly on funding problems in addition to systematic and macroeconomic uncertainties (Business Expectation Survey (BES), 2012).

Capital flows to developing countries have grown substantially since 1990s (Vita and Kyaw, 2008). The need to continued pull of foreign equity capital into developing economy have gained support as additional funds required to augment domestic capital in Nigeria (Fosu & Magnus, 2006; Okonkwo, 2016). Preference for investment into developing economy takes place mainly as a results of the desire for higher return on investment by foreign investors subject to macroeconomic uncertainty and unsystematic risks in host country. The resultant effects may create swings of FPI flow in and out of capital market thereby posing a serious implications on the economic stability and liquidity / allocation function of capital market to industrial firms in Nigeria (Ghose, 2004; Knill, 2005; Seabra, Flach & Santos, 2007; Prasanna, 2008).

This study therefore attempt to develop a model to examine the nexus between FPI and industrial firm performance. Specifically, the model is designed to measure; (i) the effect of volatility of relative FPI retention contribution on industrial firm performance; (ii) the relationship between FPI on industry-sectorial performance; (iii) the impact of structural breaks on FPI and industrial firm. The paper is organised as follows: Section Two discussed the on the theoretical framework and review of relevant literature. Section Three examined the methodology and models for measuring volatility and dynamic effect of FPI and Industrial Index Return of Nigerian Stock Exchange (NSE). Lastly, Section Four contained summary, conclusion and recommendations.

**2.0 Conceptual Framework and Literature Review**

**Concept of Foreign Portfolio Investment**

Foreign portfolio investment (FPI) is conceptualised from the term ‘investment’. Investment represents lay out money or capital fund into financial or capital assets of a firm (Jhingan, 2009). Portfolio Investment (FPI) is defined to consist of securities and other capital inflows of financial assets from foreign countries to host countries for return or profit motive (Onuorah & Akujuobi, 2013; Haider, *et al.,* 2016). It is often referred to as indirect, speculative and highly volatile funds because the foreign investor’s main purpose is to attain diversification benefits and increase their earnings from the arbitrage processes and it is more susceptible to induce high level of instability in any economy if not properly managed and controlled (Hatarri & Rajan, 2011).

The logic for the classifying FPI was derived from its composition in the ownership structure of affiliated firms. According to UNCTAD (1999) foreign portfolio investment in strict practical view, represents classified investment funds below ten per cent threshold and without control in affiliated firms in contrast to direct investment with more than ten percent threshold and with significant degree of influence in the management of the firm. However in practice, the ten percent threshold may not be universally applicable except in an attempt to attain consistent (Humanicki, Kelm, & Olszewski, 2013). Furthermore, the decision to attract FPI flow from foreign to domestic (home bias) economy by portfolio investors evolved from behavioural considerations in finance literature (Seabra *et al.,* 2007). From diversification point of view, portfolio investors hold foreign financial securities to hedge against unsystematic risk, hence investment proportion increase in favour of home bias with reduced attractiveness in foreign economy. A different perspective provided by information asymmetry hypothesis linked choice of investment bias in domestic market is due to information diversity between domestic and foreign investors (Grubel, 1968; Froot, O’connell & Seasholes, 2001; Seabra *et al*., 2007; Haider, *et al.,* 2016).

FPI by nature pose implications for the stability of any open economy with domestic and international capital market due to its high level of volatility emanating from information asymmetry. FPI investors are usually prone to host country and international information about investment interest in the market economy and at any slight form of liquidity shocks internally or externally, FPI investor may rush to liquidate investment in host country, through massive sales of financial assets. This action may lead to high incidence of capital flight and economic destabilization (Goldstein, *et al.,* 2010; Erzurumlu & Gozgor, 2014).

**Measurements of Foreign Portfolio Investment**

One of the main attributes of FPI is that it possess swings characteristics therefore its effects need to be captured and empirically tested. Also, since FPI is directly observable, its measurement varies in finance literature depending on aspect of perception of FPI either as flow, stock, domestic or foreign variables. Portfolio concentrationof FPI were measured in terms of home bias, foreign concentration and global industry concentration using logarithms of (ratio / (100 ratio) where ratio equal to the portion of foreigner’s ownership of total number of common stocks outstanding in Gong and Kim (2011). Size of FPI proxied with firm’s total numbers of foreign subsidiary were employed in Chen & Lin (2016). Some strands of literature employed aggregate value of FPI inflow proxied with logarithms value of FPI inflows where FPI inflow is the aggregate flow of foreign equity capital in (Gumus, Duru, & Gungor, 2013; Aziz, Anwar & Shawnawaz, 2015; Nwinee & Olulu-Briggs, 2016; Okonkwo, 2016; Haider, *et al*., 2016) and logarithm of cumulative nominal FPI inflow employed in the work of Humanicki *et al*., (2013).

Some studies capture FPI volatility with proxies logarithm value FPI retention where the retention equals the net value between inflow and outflow between two periods in Knill, (2005) and De Santis and Ehling, (2007) or with logarithm value of FPI volatility employed in the work of (Karimo & Tobi, 2013; Erzurumlu, & Gozgor, 2014). While some measure the ratio of FPI net flow in proportion to the Gross Domestic Product (GDP) in percentages as used in work of (Uctum & Uctum, 2005; Aron, Leape & Thomas, 2010; Atobrah, 2015). Net portfolio equity inflows equal to net inflows from equity securities other than those recorded as direct investment and including shares, stocks, depository receipts (American or global), and direct purchases of shares in local stock markets by foreign investors.

**Concept of Industrial Firm Performance**

The concept of firm performance emerged from organization theory and strategic management and its definition from finance perspective of corporate organization is debatable due to various perspectives of looking at it either as financial or organization performance such as profit on asset maximization, profit maximization, shareholder’s wealth maximization and so on (Simon-Oke & Afolabi, 2011). Industrial firm performance can be perceived as reward derived from efficient and effective use of the productive resources (manpower, machine, money and materials) in order to attain the shareholders wealth maximization objective of the firm (Chowdhury & Chowdhury, 2010; Goyal, 2013). Such reward as observed in literature can either be in form of financial return or operational performance (Cheng, Liu & Chien, 2010; Lin & Chang, 2011; Collins *et al.*, 2012; Rustam, 2014; Ogunsakin, 2014; Ajibola, 2015; Ogbeide & Joshua, 2016; Ogu, Aniebo, & Elekwa, 2016).

Operational performance, indicate growth rate in production output in terms of physical goods products, services, employments, capacity value added and so on in manufacturing setting and financial return performance or profitability represent expected future cash flow derived from the difference between operating revenue and all expenses and claims including taxes, dividends, interests on capital and so on (Damodaran, 2006; Olowe, 2011; Onwumere, Ibe and Ozoh, 2012; Sucuahi & Cambarihan, 2016). Profitability and operating performance are associated with firm market share price. The performance signalled to market may show an increasing or decreasing value of share price and which in turn serves as major parameter for the determination of shareholders wealth maximisation objective (Chowdhury & Chowdhury, 2010; Setiabudi & Agustia, 2012; Goyal, 2013). According to Kim, Kwak and Lee (2015) firms calibrates efficiency by signalling performance to market, forecast expected yields of investments and assesses realized efficiency of investment. But, performance signalled to market may vary based on firms’ earnings management and future earnings potentials (Onwumere, *et al*., 2012; Hong 2016).

**Measures of Industrial Firm Performance**

Industrial firm performance indicators in finance literature are derived from two main performance indicators (operating and financial return) and each metric varies depending on the objective of measurement. Profitability indicator are the most commonly used performance indicator and it includes accounting and market based indicators include return on equity (ROE), return on asset (ROA) as employed in the work of (Cheng, Liu & Chien, 2010). Market based indicators for example Tobin Q as employed in the works of (Lin & Chang, 2011; Rustam, 2014; Olaniyan & Soetan, 2015), Market adjusted return employed by Arsiraphongphisit and Ariff (2004), Market price per share used by (Coricelli Driffield, Pal & Roland, 2011; Collins *et al.*, 2012; Babalola, 2014) and Price-earnings ratio, performance index (Olaniyan & Soetan, 2015).

Some studies employed operational performance with indicators such as industrial output efficiency proxied with logarithms of aggregate industrial output employed in the work of (Udoh & Ogbuagu, 2012; Ajibola, 2015; Ogu *et al*., 2016). Logarithm of industrial production index as employed in (Edeme & Karimo, 2014; Aiyedogbon & Anyanwu, 2015; Okonkwo, 2016). Logarithm of manufacturing production growth rate in Ogunsakin (2014) and real manufacturing sector GDP employed by in the works of Ogbeide and Joshua (2016).

**Literature Review**

Empirical evidence obtained from developed, emerging and developing economy mostly linked FPI with macroeconomic determinants and stock market indices. De Santis and Ehling (2007) examined 108 observation of quarterly time-series data between Germany and major economies to investigate whether international portfolio investors follow firms' foreign investment decisions (FPI or FDI) using regression OLS model from 1980-2006? Capital flow growth rates (stock of FDI and FPI are calculated in Deutschmark and Euro) as dependent variable were regressed with explanatory variables (including Tobin’s q, relative foreign equity return, home equity return, resources (human capital, technology, and the production relevant information set available abroad) and lagged growth rates and stock of the foreign capital. Finding indicate that information about foreign fundamentals is showed via direct investment. The study concluded based on unambiguous evidence that international portfolio investors follow firms’ expected foreign investment decisions.

Goldstein *et al.,* (2010) examined liquidity, institutional quality and the composition of international equity using regression analysis from 1985 to 2004. The study observed the variation of FPI relative to FDI by building a linear and threshold model in order to explain liquidity shock effects of FPI. Logarithm ratio of FPI to FDI as dependent variable were regressed with severity expected liquidity shocks explanatory variable proxied by episodes of economy-wide sales of external assets in addition to other four control variables (including country size, economic development, trade openness and financial reforms). Findings indicated that the predicted liquidity shock has a strong effect on the composition of foreign equity investment. Furthermore, greater capital market opacity in the source country strengthens the effect of the liquidity shock.

Seabra *et al.,* (2007) analysed the diversification and asymmetric information determinants of the European portfolio investment cross border portfolio holdings. with emphasis on the impacts of the European Monetary Union (EMU) and exchange rate uncertainty on panel data based on Granger causality analysis from 2001 to 2005. Foreign portfolio investment (FPI) and the exchange rate uncertainty measures explanatory variables (including interest rate differentials) were estimated using ARCH model and gravity models variables (including distance and GDP differentials). Findings show that investors behave negatively to exchange rate uncertainty, indicating that a currency area and exchange rate arrangements might be preferable to other systems where the instability is inherently higher. This is in consistence with the argument that most European portfolio investment is dominated by the transaction cost hypothesis. The study concluded that interest rate differentials and exchange rates non significance is an indication that portfolio investments are less prone short-run macroeconomic changes and long-run fundamentals driven.

Egly, Johnk & Liston (2010) investigated foreign portfolio investment inflows to the United States of 372 observations using a vector autoregressive model using on monthly data from January 1977 to December 2007. Two pull factors the investor risk aversion and US stock market performance were examined. Findings from the study indicated that positive shocks to the stock market elicit an insignificant response to the net corporate bond inflow and a significant short term positive response to the net corporate stock inflow. The net corporate stock inflow does not respond to risk aversion, while bond inflows do exhibit a significant midterm response to an increase in risk aversion. The study concluded that that country specific pull factors, such as stock market return, remain of significant importance in explaining foreign corporate portfolio investment inflows. However, other non-economic fundamentals such as risk aversion cannot be ignored given that investors’ risk aversion may change over time.

Turtle and Zhang (2015) investigated structural breaks and portfolio performance across global equity markets from US, developed and emerging markets using multivariate structural analysis subject to two common structural breaks on monthly data from January 1988 to January 2010. Variable of interest were proxied with monthly excess return of the one-month Eurodollar deposit rate to the MSCI in US markets, developed market and emerging market respectively. Risk models, one and two (including market and foreign exchange risk) multivariate structural factor were applied. Findings indicated that emerging market investments might provide significant performance benefits to a well-diversified global investor in various time periods and also, the marginal performance benefit associated with Latin American emerging markets may be as large as 2% per month in some regimes.

 Ahortor and Olopoenia (2010) analysed the determinants of portfolio flow to Ghana economy using simulation and Markov chain Monte Carlo technique to analyse money demand, capital accumulation, money supply, exchange rate market, fiscal policy, external factor, capital flow dynamic and shocks from 1984-2008. Findings from the study observed both positive and negative influence of macroeconomic variable and of prominence and significance is capital flow dynamics and shocks. The study concluded that Ghanaian government should continue foreign capital flow attraction to strategic investment area to facilitate growth.

Waqas *et al*., (2015) investigated macroeconomic factors and foreign portfolio investment volatility in selected South Asian countries using GARCH model on monthly and yearly data from 2000-2012. Returns of portfolio investment as dependent variable were analysed with macroeconomics variable including GDP growth, exchange rate, inflation rate and industrial production index, interest rates, FPI and FDI. Finding indicated a significant relationship between macroeconomic and foreign portfolio investment volatility. High interest rate, currency depreciation, foreign direct investment, lower inflation and higher GDP are associated with less volatility of international portfolio flow. The study concluded that foreign portfolio investors should focus on stable macroeconomic environment of country.

Lim and Sek (2013) compared the performances of GARCH-types ( GARCH, TGARCH and EGARCH) model used in capturing stock market volatility in Malaysia on monthly time series data divided into pre-crises 1997, during and post-crises 1997 using performance error mean squared error, root mean square error and mean absolute percentage error from 1990-2010. The stock return dependent variable were observed for changes with exchange rate and crude oil price explanatory variable. Findings showed that performances vary across periods and error measurement methods exchange rate and crude oil prices have significant impact on the Malaysia stock volatility in pre-crises and post-crises but not significant in crises period. The study concluded that asymmetric GARCH model is more preferred in volatility of stock market.

Ekeocha *et al.,* (2012) investigated the modelling of the long run determinants of foreign portfolio investment on quarterly time series data in Nigeria from 1981-2010 using multiple regression analysis of vector error correction model (VECM). The variable of interest employed net foreign portfolio investment (dependent) with other explanatory variables including market capitalization, real exchange rate, real interest rate, real gross domestic product and trade openness. Findings showed that foreign portfolio investment (FPI) has a positive long-run relationship with market capitalization, and trade openness in Nigeria. The study conclude that efforts should be intensified into sanitation of the capital market.

Onuorah and Akujuobi (2013) investigated the impact of macroeconomic indicators on the performance of foreign portfolio investment in Nigeria from 1980-2010 using ordinary least square (OLS) and Granger causality analysis. Logarithm value of foreign investment portfolio (FPI) was regressed with explanatory variable (including exchange rate,interest rate, inflation rate, money supply and GDP. Macroeconomic variables were found to be statistically insignificant to FPI based on F-statistic computed value. Also, the study found out that there was no run relationship existing between GDP, inflation rate, exchange rate, MS, interest rate and foreign portfolio investment. Granger causality results revealed that macroeconomic variables do not granger caused FPI. The study conclude that macroeconomic policy performance and national’s investments strategic plan is necessary enhance foreign capital flow into Nigeria.

**3.0 Theoretical Framework**

The theoretical framework of this study is the push and pull theory of capital investment flow, modern portfolio theory (MPT) and performance theory (Calvo, Leiderman & Reinhart, 1993; Shaikh, 1995; McClure, 2010).

The push factor theory attempt to provide explanations and justification for the causes of FPI flow to external factors other than economic issues in domestic country and of which prominence have been has been attributed to slow economic growth rate, low interest rate of industrialised countries or diversification due to decline interest rates in developed countries, rise in the tax rate of multinational corporations to mention few (Calvo *et al.,* 1993; Fernandez-Arias, 1996; Calvo & Reinhart, 1998). In addition, the increasing appetite of investors towards international diversification may also push capital flows into emerging economies (Calvo, Leiderman & Reinhart, 1996). A different perspective about capital flows into domestic economy was suggested by Jeanneau and Micu (2002) in that robust economic activities in industrialised countries are significant in explaining portfolio inflows of developing countries (Atobrah, 2015).

The pull factor theory attributes the flow of capital to inherent domestic fundamentals and qualities of the host country. These domestic factors include creditworthiness of a country, improvement in fiscal and monetary policies, externalities (interest rate and the price earnings ratio of the host country), increase in domestic output and domestic money demand (Calvo, *et al.,* 1996; Haque, Mathieson & Sharma, 1997). Other domestic factors also include the performance of macroeconomic variables such as financial development, inflation, GDP growth rate, current account balance, gross domestic investment, level of sound economic policies and the sustainability of capital flows, investment environment, infrastructure as well as the quality of institutions are also included as key domestic factors (Atobrah, 2015).

Vita and Kyaw (2008) employed a foreign portfolio investment push or pull factors in their work as stated:

$y\_{qi,t}$ = $α\_{i}$ + $\sum\_{i=1}^{N}\sum\_{t=1}^{T}β\_{j}x\_{ji,t}$ + $\sum\_{i=1}^{N}\sum\_{t=1}^{T}β\_{f}x\_{fi,t}$ + $ε\_{i,t}$ (1)

Where:

$y\_{qi,t}$ = Capital flow type *q* (FPI or FDI) received by country *i* at time *t*;

$α\_{i}$ = Country specific effect;

$x\_{ji,t}$ = Vector of domestic variable *j* at time *t* in country *i;*

$x\_{fi,t}$ = Vector of external variable *f* at time *t* in country *i*;

$α\_{i}$, $β\_{j}'s$, $β\_{f}$’s = Parameters to be estimated;

$ε\_{i,t}$ = error terms

Modem Portfolio Theory (MPT) is comprised of Markowitz Portfolio Selection theory developed in 1952 and William Sharpe's contributions to the theory of financial asset price formation (CAPM) introduced in 1964. MPT is an investment framework for the selection and construction of investment portfolios based on the maximization of expected returns of the portfolio and the simultaneous minimization of investment risk (Fabozzi, Gupta, & Markowitz, 2002). Efficient frontier model is derived from the concept of MPT. It represents the best combination of securities those producing the maximum expected return for a given risk level within an investment portfolio. It describes the relationship between expected portfolio returns and the riskiness or volatility of the portfolio (McClure, 2010). The efficient frontier model is stated in the work of Onyeisi *et al.,* (2016)

MEF = $ ∑\_{i=1}^{n} X\_{i}^{2}$ $ σ\_{i}^{2}$ + $ ∑\_{i=1}^{n} X\_{i}^{2}$ $ σ\_{i}^{\infty }$ ij …(2)

Subject to $\sum\_{}^{}xi$ = 1, Rp = $\sum\_{}^{}xi$ = Ri ; Xi $\geq $0, I = 1,…,N.

Where:

Rp = total return to the portfolio,

xi = fraction of portfolio represented by assets, I,

Ri = return to asset I, I = 1,…,N,

$ σ\_{i}^{2}$= variance of asset I,

σij = covariance of asset I & j,

I = 1,…,N, i$\ne $ j

 Performance theory emanated from expectation in terms of reward and compensations available to foreign investors for the decision to invest in leading firms. The performance is based on operational and profitability performance (Alexiou *et al*, 2014; Ogunsakin, 2014). Incremental rate of profit (IROP) was first described in Shaikh (1995) based on the fact that investors’ motivation to invest is profit driven and attraction is more on recent returns on investment than return on past investment. This implies that current period flow of profits is derived from two sources that is profit from most recent investment multiplied by mark up (ρ) and accumulated profits on past investment. The IROP model is stated as follows:

$Π\_{t}$ = $ρI\_{t-1}$ + $Π^{\*}$ (3)

Where:

$Π\_{t}$ = current period flow of profit;

$I\_{t-1}$ = profits on most recent investment;

$ρ$ = determined mark-up;

$Π^{\*}$ = profit on past investment

Subtracting previous profit Πt-1 from both sides in equation (3)

$ΔΠ\_{t}$ = $Π\_{t}$-$ Π\_{t-1}$ = $ρI\_{t-1}$ + $(Π^{\*}$- $ Π\_{t-1})$ (4)

Current rate of return on new investment is:

$ρ ≈$ $ΔΠ\_{t}$ / $I\_{t-1}$ (5)

**4.0 Methodology**

*Ex-post facto* (after the event) research design will be adopted in this study and data will be obtained from periodical information from Central Bank of Nigeria (CBN), the National Bureau of Statistics (NBS) and Nigerian Stock Exchange (NSE) to explain and infer suitable conclusions on operational variables under review. The study will combine both elements of descriptive quantitative and explanatory research design to describe and explain the investor’s behaviour in terms of the risk-return trade-off, FPI flows dynamics and structural shifts (known and unknown) effects on capital importation issues with respect to industrial firm performance. Model will be developed to test the volatility and structural changes to explain characteristics of FPI flow shifts and industrial firms’ performance combining both bivariate and multivariate dimension of econometric estimates using (i) descriptive and inferential statistics, ARCH (Autoregressive Conditional Heteroskedacity) and GARCH (Generalised Autoregressive Conditional Heteroskedacity) (ii) Panel data regression technique. The population of the study comprises of firms defined within industrial firm sector frame including consumer goods, industrial goods and healthcare as listed on Nigerian Stock Exchange (NSE). Sampling analysis is not required in this exercise. The sample size comprises of the aggregate foreign portfolio (equities only) data obtained from National Bureau of Statistics (NBS) data bank and industrial index data collected from Nigerian Stock Exchange (NSE) domestic and foreign portfolio participation in equity trading reports for the period under review.

This study proxied expected returns of foreign investors from industrial firms with NSE industrial index of industrial firm using logarithm ratio of NSE industrial index value to lagged NSE industrial index value (Wong & Kok, 2005; Ilo 2015). FPI variance (inflow minus outflow) and FPI ratio to GDP were used to capture FPI at macro panel level Knill (2005); Uctum and Uctum (2005); Aron, Leape and Thomas, (2010).

Rt *=* Ln (nseINDXt / nseINDX t-1) (6)

Where: Rt = industrial firm return for month *t*, and

*nseINDX* = the month end value of NSE industrial index and *t* represents the month of reference;

*nseINDXt-1* = lagged value of NSE industrial index;

*Ln* = natural logarithms.

(1). fpvt =Ln ($FPI\_{t}^{in}$–$ FPI\_{t}^{out}$) (7)

Where: fpv represent retained FPI flow value, subscript *t* represent time dimension;

*Ln* represent logarithm.

(2). fpgt = Ln ∆ ($FPI\_{t}^{inflow}$/ GDP) (8)

Where: Fpg = FPI flow to Gross Domestic Product (GDP), subscript *t* represent time dimension; *Ln* represent logarithm and ∆ change in value.

**5.0 Model Specification**

Vita and Kyaw (2008) developed a model to examine the push and pull factor of FPI. The model shows the FPI flow is a determinants of domestic and foreign factor in emanating from the host country and foreign country at different time horizon. The model of Vita and Kyaw (2008) is as stated in linear form:

FPI or FDI = f ($u\_{i,t}^{dpg}, u\_{2,t}^{dmg}$,$u\_{3,t}^{fog}$,$u\_{4,t}^{fir}$) (9)

Where:

dpg = domestic productivity growth;

dmg = domestic money growth;

fog = foreign output growth;

fir = foreign interest rate.

Equation (9) is expanded to accommodate equation (7) and (8) and other stock market and macroeconomic variables as indicated in with ARCH and GARCH model, macro panel multiple regression techniques following Ilo (2015); Lim and Sek (2013) with modification.

Rt =α 0 + βRt-1 (ARCH mean equation) (10)

$σ\_{t}^{2}$ = α0 +$∑\_{i=1}^{n}$ αi $ε\_{t-1}^{2}$ + $α\_{t,1}^{fpv}$ + $α\_{t,2}^{gfc}$ + $α\_{t,3}^{inq}$ + εt (ARCH model) (11)

Rt = η0 + ɗRt-1 + α1B1,t + α2B2,t + εt (GARCH mean equation) (12)

$σ\_{t}^{2}$ = α0 + αi $ε\_{t-1}^{2}$+ βi $σ\_{t-1}^{2} $ (GARCH variance equation) (13)

$σ\_{t}^{2}$ = α0 + αi $ε\_{t-1}^{2}$+ βi $σ\_{t-1}^{2}$ + $α\_{t,1}^{fpv}$ + $α\_{t,2}^{gfc}$ + $α\_{t,3}^{inq}$ + εt (GARCH model) (14)

$R\_{i,t}$ = α0 + $α\_{1,t}^{fpg}$ + $α\_{2,t}^{sms}$ + $α\_{3,t}^{mlq}$ + $α\_{4,t}^{exr}$ + $α\_{5,t}^{int}$ + $α\_{6,t}^{bap}$ + $α\_{7,t}^{inf}$ + $α\_{8,t}^{rsk}$ +$α\_{9,t}^{gfc}$

+ $α\_{10,t}^{inq}$ + εt (Fixed panel multiple regression model) (15)

$R\_{i,t}$ = α0 +$R\_{igi,t-1}$ + $α\_{1,t}^{fpg}$ + $α\_{2,t}^{sms}$ + $α\_{3,t}^{mlq}$ + $α\_{4,t}^{exr}$ + $α\_{5,t}^{int}$ + $α\_{6,t}^{bap}$ + $α\_{7,t}^{inf}$ +

 $α\_{8,t}^{rsk}$ +$α\_{9,t}^{gfc}$ + $α\_{10,t}^{inq}$ + εt (Dynamic panel multiple regression model) (16).

Where;

Rt = industrial index return, at time *t*;

fpvt = FPI variance

fpgt = FPI to GDP ratio

gfct = structural breaks - global financial crises - dummy;

inqt = institutional quality - accounting quality dummy;

smst = market size;

mlqt = market liquidity;

exrt = exchange rate;

intt = interest rate;

bapt = balance of payment;

inft = inflation rate;

rsk = risk.

The sequential methodology of FPI and Industrial firm performance using Bai, Bai and Perron (1998) to determine known exogenous and unknown endogenous breaks is stated as follows:

 $R\_{t }$= $ ∑\_{j=1}^{m+1}α\_{j}^{'}$ (fpvt) 1t∈Ij + $β\_{1}Z\_{it}^{'}$ + ϵit  (17)

Where:

$R\_{t }$= Ln (nseINDXt / nseINDX t-1) \* 100;

fpvt = (qx1) vector of foreign portfolio investment with the parameters are subject to shift (*q* is unknown;

 Zit = (px1) vector of (exrt); (intt); (bapt); (inft); ($rsk\_{t}^{i})$variables of which the parameters are not subject to shift (*p* is unknown) are affected by *m* structural break(s);

Ij = sub-period between break dates tj-1;

tj, ∈Ij = an indicator function such that = 1 for tj-1 < t ≤ tj and 0 elsewhere (t0 = 1 and

t m+1 = T);

αj, β = vector parameters and the vector of coefficients αj characterize the effects of these variables on the dependent variable over the *j*th sub-period (*j=1,…,m+1*). The coefficients  are not altered by the breaks. (m=0) when no break occurs;

ϵit = disturbance term specific to the foreign investment flow considered

**6.0 Conclusion**

The study tested the link between foreign portfolio investment and industrial firm’s performance by exploring the theoretical and methodological issues. Findings from reviewed literature show that FPI and industrial return performance of firms possess swinging characteristics due to favourable or adverse macroeconomic and systematic factors which are significant to foreign investor’s decisions about their investment entry and exits in host country. The theoretical issues shows that FPI and industrial return have evolved through different thoughts and this influence researchers opinion in choosing appropriate metric to represent FPI and industrial firm performance. Similarly, evidences obtained from empirical literature on methodological perspectives also indicated the link between FPI and industrial returns to be volatile and therefore appropriate volatility and dynamic analytical techniques will be more suitable to capture the effects of FPI on industrial firm performance in conformity with relevant theoretical underpinning.

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