Bah, S., I., Giritli, N. / Journal of Yasar University, 2020, 15/58, 368-380

What Drives Foreign Portfolio Investment Flows in South Africa?[1]

Güney Afrika'da Yabancı Portföy Yatırım Akışına Neden Olan Faktörler Nelerdir?

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Abstract: The aim of this study is to examine the macroeconomic indicators that pull and/or push foreign portfolio investment (FPI) inflows in South Africa. The ARDL method of co-integration and the bounds test are employed to establish a dynamic relationship between the macroeconomic indicators. The bounds test revealed that there is a long run relationship between FPI and its regressors where all the push and pull variables determine the FPI significantly. The short-run relationship between the FPI and its regressors are also estimated alongside with the rate at which diverging variables return to equilibrium after a short-run shock. Both pull and push variables are significant determinants of FPI in the short-run and it returns to the long-run equilibrium at the speed of 73 percent after a short-run shock.

Keywords: Foreign portfolio investment, Push and pull factors, South African Economy
JEL Classification: E22, F34, F35, G11

Özet: Bu çalışmanın amacı Güney Afrika'daki yabancı portföy yatırımı (FPI) girişlerini çeken ve / veya iten makroekonomik göstergeleri incelemektir. Makroekonomik göstergeler arasında dinamik bir ilişki kurmak için ARDL eşbütünleşme yöntemi ve sınır testi kullanılmıştır. Sınır testi, FPI ile regresörleri arasındaki tüm itme ve çekme değişkenlerinin FPI'yı anlamlı bir şekilde etkilediği ve aralarında uzun süreli bir ilişki olduğunu ortaya koymuştur. FPI ve regresörleri arasındaki kısa süreli ilişki, kısa süreli bir şokun ardından, değişkenlerin dengeye dönme hızı ile birlikte tahmin edilmektedir. Hem çekme hem de itme değişkenleri kısa vadede FPI'ın önemli belirleyicileriyken, kısa süreli bir şokun ardından tüm sapma değişkenleri yüzde 73 hızla uzun dönem dengesine geri dönmektedir.

Anahtar Kelimeler: Yabancı pörtföy yatırımları (FPI), Çeken ve İten Faktörler, Güney Afrika Ekonomisi
JEL Sınıflandırması: E22, F34, F35, G11

1. Introduction

Foreign capital investment in the form of foreign direct investment (FDI) and foreign portfolio investment (FPI) is the main way to invest in other countries. FPI, known as “hot money” is desired by developing countries and plays a vital role in bridging gap between savings and investments. Financial liberalization in 1980’s removed the restrictions on capital movement from one country to another creating a way of capital flow into the developing economies. Southeast Asian countries benefited from the capital liberalization and the FPI became the major source to finance their investments (Bakeart & Harvey, 1995). Portfolio flows to developing countries started booming in early 1990’s in the regions of Asia and Latin America and thus South Africa as an emerging market economy received a significant amount of FPI inflow prior to 1994.

Numerous emerging economies are capable of attracting capital from the international markets. Inflows of foreign capital play a role of augmenting capital available for investment, which can help countries to grow rapidly. Capital account liberalization and the pitch of the credit ratings in 1994 enabled South Africa re-integrating into the international capital market, attracting foreign investors. After gaining independence in 1994, South Africa engaged in a different policy reform and financial, economic and political structures of their economy is being restructured. This saw an abolishment of the financial rand system in 1995, merging the dual exchange rate system into one (Aron et al. 2010). The financial rand system was a system that blocked non-resident earnings back to their home countries that had two different exchange rates; an exchange rate for the current account transactions and an exchange rate for capital account transactions of non-residents. In the early years of the capital account liberalization, South Africa attracted more equity investors compare to debt investors. Equity portfolio investment increased immediately after the liberalization in the year 1995 and continued up until 1999 (South African Reserve Bank , 2010). During the dot-com financial crises in 2000, boom period slowed down. The financial crises triggered panic all over the world as investors were buying stocks from so many

[1] The study is produced from a Master’s Thesis.

Makale Geçmişi / Article History
Başvuru Tarihi / Date of Application : 29 Temmuz / July 2019
Kabul Tarihi / Acceptance Date : 18 Aralık / December 2019

technology oriented companies which led to a price bubble burst. This crisis led to deterioration of the South African currency and deterred some foreign investors which in return led to the decrease in equity investment in 2001 (IMF, 2011). The equity market of South Africa recovered from the crises and index traders took advantage of the capital account policies implemented by the government. South Africa became an investor-friendly environment and investment in equity securities continued to increase up until 2008.

In 2008, global financial crises slowed down the capital flows across all countries. Both equity and debt portfolio investment figures plunged to negative numbers (IMF, 2018). Portfolio investors shifted from equities to debt immediately after 2009 and debt portfolio investments accounted for 78 percent of all South African foreign debt investment by 2012 (South African Reserve Bank , 2010). In 2013, the FPI share in GDP amounted to 3.1% in South Africa and this was higher than some major developing economies like China and India (OECD, 2013). South Africa further received FPI inflows of R408.1 billion (South African Rand) between the years of 2014 and 2017 which is three times higher than Foreign Direct Investment (FDI) inflows (OECD, 2018). Given that South Africa is between the highest recipients of FPI, it was ranked 1st out of 138 countries in the world to attain financing through the local equity markets (Schwab, 2017). Since capital inflows to developing countries are generally in the form of portfolio investments, severe fluctuations are observed in these investments. Portfolio investments can be converted to liquidity in a very short time and thus, it is the least risky type of investment for investors. Nevertheless, it is the most risky type of investment for the country where it can leave the country in case of political, financial and economic instability periods. It is known that the negative impact of the fund outflows on the country's economy is much higher than the positive effect on its inflow. Therefore, investigating the determinants of capital movements is of great importance in understanding how to avoid or minimize such costs. Al-Khouri (2015); Aron et al. (2010); Culha (2006); Fratzscher (2011) suggest that FPI is explained by the Push and Pull factors and only few studies examined the push and pull dynamics of FPI in South Africa. Fernandez-Arias, (1996); Calvo et al, (1993); and Ahmed & Zlate, (2013) empirically evidenced that the US interest rates and foreign industrial production index are the major push factors in most countries, while Gross Domestic Product, domestic interest rates, and country risk are major determinants of pull factors in the host country (Aron, Leape, & Thomas, 2010; Wesso, 2001). FPI also exposes the vulnerability of the host country to global financial crises. The financial institution of some developing countries is weak; hence, they are likely to suffer the reversal of FPI and thus, this discourages investment in the host country (Rothenberg & Warnock, 2011); (Chen & Quang, 2012).

South Africa has received significant amount of portfolio inflows after the political and financial liberalization in 1994 and only few studies investigated the dynamics of foreign portfolio inflows based on push and pull framework. The aim of the study is to identify the macroeconomic variables that push or pull FPI into South Africa between 1980 and 2017. Based on the ARDL method of co-integration, results indicate that there exists a long and short run relationship between FPI and its regressors. In the long-run, an increase in the real GDP per capita encourages FPI investors to continue purchasing securities in South Africa. However, external factors such as US Treasury bill rate and the industrial production index are also determinants of FPI in South Africa. The ARDL established the short-run coefficients and the ECTs. The domestic real interest rate and the foreign interest rate had a positive and negative significant relationship respectively while the ECT revealed that at the speed of 73%, the diverging variables return to a long-run equilibrium after a short-run shock. In the following section, theoretical framework and the empirical literature review is given. The third section presents the methodology of the study followed by the analysis and discussion of the empirical results. The final section concludes the study and highlights recommendations.

2. Literature Review

Since the 1980s, there have been significant changes in financial markets. Capital flows have changed direction from developed countries to developing countries and when the studies on foreign portfolio investments are examined by Al-Khouri,(2015); Aron et al. (2010); Fratzscher, (2011); Waqas et al. (2015) and Abdullah et al (2010), it is seen that the factors that affect funds are examined in the dimension of pull and push factors that are of great importance for policy makers. Push factors are exogenous factors that push capital from a country to another. Investors are constantly searching for higher yields and low risk investment to maximize the profit on their portfolios. This creates an appetite for international diversification. Fernandez-Arias, (1996) and Calvo et al., (1993) empirically evidenced that declining world interest rates and slow economic growth in developed countries are responsible for capital moving from advanced economies to developing countries. The study of Calvo et al. (1993) further mentioned that the mass movement of FPI into Latin American economies was due to the declining interest rates of the United States and the continuous recession they faced in the early 1990s. However, they highlighted the effect of the short-term capital surge and its reversal. This led to the bulk of capital moving out of the Latin American countries in subsequent years. The study of Jeanneau & Micu (2002) argues that developed countries with high economic growth have an excess fund to invest in developing economies. Economic growth was significant in explaining portfolio inflows to developing economies. The study by Ahmed & Zlate (2013) examined the net private capital inflows of emerging economies. The study underlined that push factors such as; foreign economic growth, global risk appetite, and interest rate differentials are factors that explained the inflow of private investment in the emerging economies of their study. The study attempted to check for drivers of portfolio inflows before and after the 2008 global financial crises. Interest rate differential was significant in explaining capital flight back to the source country after the global financial crises. A Bayesian dynamic latent factor model constructed by Sarno, Tsiakas, & Ulloa, (2016) to determine the factors of portfolio inflows of both bonds and equity from the United States to 55 other economies. They concluded that 80% of portfolio inflows to the economies are explained by the Push variables of the United States. They added that during the financial crises, the influence push factors have on capital flow diminishes.

Pull factors are based on the domestic country's macroeconomic policies, the rate of return and creditworthiness policies put in place to attract FPI into the country. There are various studies that emerged different pull factors to explain capital flow from developed economies to emerging economies like South Africa. The most cited pull variables on capital inflow are economic growth and the degree of openness of the domestic country (Fratzscher, (2011); Abdullah et al (2010) and Garg & Dua (2014)). Developing economies have raw materials in abundance and the opportunity cost of doing business is low. This entices foreign investors to invest in the developing country. Following Fernandez-Arias (1996) Return and creditworthiness model, a country can receive capital inflows if investors have confidence in the country. Having confidence in the country implies when sound monetary policies (higher interest rate, low real exchange rate variability, and money supply) and fiscal policies (low Inflation, enticing taxation, and sound capital control measures) are put in place way before investors seek investment. World Bank (1997) previously advised economies on the importance of having sound macroeconomic factors that encourages capital inflows. The study opines that countries with strong macroeconomic policies have been able to attract larger capital inflows as a percentage of gross domestic products compared to countries which have unstable economic conditions.

Exchange rate fluctuation is an example of a potential economic disruption and it is explained by the Pull factor framework. Foreign investors purchase the various type of securities in domestic currencies which is funded in the foreign exchange market. This creates a mismatch for foreign investors. Investors are very sensitive to an unexpected exchange rate change, subsequently increasing the volatility of their investment decision. These adverse exchange rate movements can have devastating consequences for industrial production and employment. Fratzscher (2011) investigated the push factors against the pull factors concentrating on global financial crises. The paper discovered that the drivers of capital flows are mostly the pull factors. The study concluded that sound macroeconomic policies and improvement in the financial institutions helped countries reduce their exposure to global crises. The study further revealed that other variables like financial openness have little impact on determining capital inflows. Capital control policy as a pull factor is indeed a policy measure that tries to protect the domestic economy from volatile economic growth and has proven successful in controlling capital inflows into economies (Prasad et al., 2003; Lane & Millesi-Ferretti, 2008). Limiting capital inflows and regulating taxes on transactions are examples of policies that can be implemented to protect the capital account of its economy. Political environment of the domestic country is also an important factor for foreign investors. Investors are confident in countries with political stability, good governance and less corruption (Gerlach & Yook, 2016). This creates a favourable economic environment for investors. According to the research on emerging economies political instability and foreign capital inflows have an inverse relationship (Dupasquier and Osakwe, 2006; Li, 2008 and Cleeve, 2008).

Wesso (2001) investigated the dynamics of capital flows in South Africa through the use of Engel and Granger (1987) ECM, for the period between 1991 and 2000 based on quarterly data. The study combined FDI, FPI, and other investments included in the balance of payments to obtain the net capital flows in South Africa. The net capital flow was further normalized by nominal gross domestic product. The independent variables included are; domestic inflation rate relative to international foreign inflation, real GDP growth rate, the ratio of South Africa's adjusted exchange rate, the budget deficit, current account deficit and price-earnings ratios. Exogenous variables also included the US government bond rate as a proxy for the international interest rate. Estimating the model revealed that the government deficit and inflation were negative and significant while real GDP and the financial incentive variable are significant determinants of net capital flows. The results were all in favour of the pull factors in explaining capital flows in South Africa. Aron et al. (2010), examined the volume and composition of foreign investment in South Africa focusing on FPI as the main source of international investment. The net capital flows and the portfolio equity investment measured as a percentage of nominal GDP are used as the dependent variables and. eighteen variables are included as regressors in the research. The study also included dummy variables to take account of the liquidity crises for the period between 1987Q1 and 2007Q4. The study examined the drivers of capital net inflows and portfolio equity inflows using an error correction model and found positive effects from real US GDP and US stock market index on capital inflows. The negative effect of inflation differential and long-term bond differential was also expected. The plausible dummy variables applied proved to be significant. Gossel and Biekpe (2015) employed a Vector Error Correction Model (VECM) and performed an impulse response function to inspect the Push and Pull effects of South Africa's capital inflows over the period of 1986 and 2013. The study differentiated and estimated the capital inflows separately into FDI, FPI, and other investment all normalized to nominal GDP. The use of the VECM model allowed the identification of co-integrating equation that is more than one. Due to South Africa's data structural changes, the study employed the ADF with structural unit root to test for stationarity of the variables. The logarithm of US real GDP, the US 3-month T-bill rate, domestic real GDP, domestic Treasury bill rate, trade openness, real exchange rate volatility, share price index and the budget deficit were all used as explanatory variables. The ADF test revealed all variables were stationary at first difference and there are at least two co-integrating equations in the model. The FPI inflow results revealed that the US GDP and Treasury bill rate are the most determining factors of FPI in the short-run. This further indicates that South Africa's FPI is constrained by the push factors in the short-run. Majority of the capital flow literature in the South African aspect has focused on FDI but only few studies examined the drivers of FPI. This study will fill the existing gaps in the literature in the following ways;

- Wesso (2001) did not differentiate the components of capital flow into the three conventional capital flows (FDI, FPI, and ODA) and thus, does not consider that the majority of South Africa's capital inflows is FPI rather than FDI. The study further used quarterly data to investigate the long-run determinants of capital flows. Quarterly data are known to break the trend of portfolio inflows and certain long-run information might be lost. In contrast to the study of Wesso (2001), this study will solely look at FPI and employ yearly data.
- Aron et al. (2010) examined the drivers of net capital flow and portfolio equity separately, however, the study did not examine FPI as a whole.
- Gossel and Biekpe (2015) also studied the push and pull factors of FPI and FDI from 1986 up until 2013. This study will analyze the latest trends of portfolio investment up until 2017.
- The methodology applied in this study also differs from other South African studies. With the data we used in our model, stationary exist at level while others at first difference. ARDL allows a mixture of both level and first difference variables for estimation.

3. Data & Methodology

In this study the quantitative method applied to explain pull and push factors of FPI inflows of South Africa is similar to Garg & Dua (2014) and the objective of this study is to determine the relationship between foreign portfolio investment inflows and its push and pull factors using yearly data between 1980 and 2017. The data is obtained from the IFS of the IMF data base and due to a lack of data availability for the year 2018, it was not possible to use 2018 data for our analysis. Push factors that affect inflows of FPI into South Africa are the US 3-month Treasury bill (USIR) as a proxy of foreign interest rate and the Industrial Production Index (IPI) as a proxy for foreign economic growth. Pull factors that are considered are; real GDP per capita (RGDPpc), real interest rate (RIR), US dollar to South African Rand real exchange rate (RER), and general government expenditure (EXP). The variables used in the study are defined in Table 1 below.

Table 1. Definition of Variables

Name	*Description*
Foreign Portfolio Investment (FPI) (dependent variable)	This is a stock variable gathered from the IFS under the international investment position section, which includes transactions of foreign investor (Liabilities) other than those recorded in FDI. The study of Lane & Milesi-Ferretti, (2008) also used this as a dependnet variable.
Real GDP per capita (RGDPpc)	The GDP per capita is utilized in the study as a proxy for market size or economic development of South Africa.
Real interest rate (RIR)	The rate of return for an investor (%)
Real exchange rate (RER)	The US Dollar – South African Rand is used as the proxy of currency risk.
Government Expenditure (GE)	General government final consumption expenditure is the total expenditure of the government on the country excluding military expenditure that forms part of its capital formation. (World Bank, 2017). To the best of our knowledge, this variable has not been used to explain foreign portfolio investment into South Africa.
US Treasury bill rate (USIR)	US government-backed securities yield which is a proxy for foreign interest rate
Industrial Production Index (IPI)	IPI measures levels of production by the manufacturing sector, mining sector, electrical and gas utilities. An improvement in this index indicates capital accumulation that can be used to finance investment in developing countries.

Source: Author's creation

3.1 Model specification

The functional form of the model is shown in the following equations below are:

$$FPI = f(push\ factors, pull\ factors) \quad \text{Eq1}$$

Hence, the economic function in equation 2 as;

$$FPI = f(RGDPpc, RIR, RER, EXP, USIR, IPI) \quad \text{Eq2}$$

The econometric model specified in the form of logarithm is given in equation 3 below;

$$FPI = \beta_0 + \beta_1 LRGDP + \beta_2 RIR + \beta_3 LRER + \beta_4 LEXP + \beta_5 LUSIR + \beta_6 LIPI + \varepsilon_t \quad \text{Eq3}$$

The error term is added to the economic model to capture the difference between the estimated relationship of variables and the actual relationship between the variables. The built-in functions and special add-ins introduced in this version allow testing of all unit root test types are ARDL analysis, and several other functions.

3.2 Data analysis

The study started its analysis with first transforming the variables into their natural logarithm forms to eliminate any form of nonlinearity between the variables, or improving the skewness of a variable to achieve a normally distributed error. Transforming a variable into its log form also makes the interpretation of the analysis very easy as the coefficient β gives us directly how much the dependent variable changes, for each 1% change in the independent variable.

Unit root testing

The mean and variance of a variable remain constant over time only it the variable is stationary. The easier way to deal with non-stationary variables is using differences of the variables after taking the natural logarithm of the data (Baumohl & Lyocsa, 2011). Differences of variables are given by $\Delta y_t = y_t - y_{t-1}$, where Δy_t is the first differencing of the non-stationary variable, and if the variable contains at least one unit root, then it is considered as integrated at order of one denoted as I (1). In general, the number of differences to achieve a stationary time series is given as I (d), where d is denoted as the number of unit roots the variable contains. The two conventional method of stationarity adopted in this study is the Augmented Dickey-Fuller test (ADF) (Dickey & Fuller, 1981) and Phillip-Perron test (PP) (Phillips & Perron, 1988).

- Augmented Dickey-Fuller test (ADF)
  $$\Delta y_t = \beta_1 t + \delta y_{t-1} + \sum_{i=1}^{M} a_i \Delta y_{t-1} + \varepsilon_t \quad \text{Eq4}$$

- Phillip-Perron test (PP)
  $$\Delta y_t = \beta' Dt + \pi y_{t-1} + \epsilon_t \quad \text{Eq5}$$

H_0: Variable has a unit root
H_a: Variable does not have a unit root

The equations above depicts ADF and PP test. The difference between the equations is that ADF uses the t-statistic on the coefficient of the lagged dependent variable to compare against the critical values in order to reject the null hypothesis of the series containing a unit root, while PP fits a regression model and the result is used to calculate the test statistics to be compared against the critical values. If the t-statistics of the variable is greater than the critical values, then it means that there is no integration and the series is considered as I(0). On the other hand, when the t-statistic is less than the critical values, then the series will have to be differenced and tested against the null hypothesis again, indicating a first order of integration or I(1).

Co-integration

The Auto-Regressive Distributed Lag Model (ARDL) of Pesaran, Shin, and Smith (2001) is used to find the co-integrating relationship between series in the study. The main objective of this study is to identify the push or pull variables that have a significant relationship with FPI either in the short-run or long-run. ARDL model is used instead of other co-integration models like Johansen Co-integration Model of Johansen and Juselius (1990), the Engle-Granger Co-integration of Engle and Granger (1987) and the Fully Modified Ordinary Least Square (FMOLS) model by Philips and Hansen (1990) for several reasons. This is due to its power of identifying the co-integrating vectors in a series where underlying series has a single long-run equilibrium equation.

Auto-Regressive Distributed Lag Model (ARDL)

The Auto-Regressive Distributed Lag (ARDL) model is a co-integration model that contains both the lagged variables of the dependent variable, the current and the lagged variable of the independent variables used in regression (Carter, Griffiths, & Lim, 2011).

The model also does not require the testing of unit roots before co-integration testing, as it can contain only I(0) variables, I(1) variables or a mixture of both. Nevertheless ARDL model cannot contain an I(2) variable. Using the equation below, we also test for a long-run relationship between the variables under a joint hypothesis using the Pesaran et al. (2001) F-statistics (Wald test) and its critical values.

$$\Delta LFPI_t = a_0 + \sum_{i=1}^{l} \alpha_1 \Delta LFPI_{t-i} + \sum_{i=1}^{l} a_2 \ \Delta LRGDPpc_{t-i} + \sum_{i=1}^{l} a_3 \ \Delta RIR_{t-i} + \sum_{i=1}^{l} a_4 \ \Delta LEXP_{t-i} + \sum_{i=1}^{l} a_5 \ \Delta LRER_{t-i} + \sum_{i=1}^{l} a_6 \ \Delta LIPI_{t-i} + \sum_{i=1}^{l} a_7 \ \Delta LUSIR_{t-i} + \beta_1 LFPI_{t-i} + \beta_2 RGDPpc_{t-i} + \beta_3 RIR_{t-i} + \beta_4 LEXP_{t-i} + \beta_5 LRER_{t-i} + \beta_6 LIPI_{t-i} + \beta_7 LUSIR_{t-i} + \varepsilon t_{\ t-i}$$

Eq6

Where;

Δ = Operator of the first difference, **α**= Coefficients of the short-run variables, β= coefficients of the long-run variables, ί= ARDL model maximum lag order, and **ε** = Error term.

The maximum lags for the dependent and independent variables can be selected separately, and the best lags for the ARDL model is selected automatically by Eviews10 through the minimum value of the Akaike Information Criterion (AIC). F-statistics will be used to test for the long-run relationship among variables. Hence, the long run hypothesis of co-integration would be estimated as;

- H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = 0$
- H_1: At least one β is $\neq 0$

There are two computed sets of critical values (bounds) at different significant levels with five different ARDL cases based on the linear form of the data. The variables integrated at I(0) is the first set of the two computed critical values while the second set is of the variables integrated at I(1)

Narayan (2005)[2] provides the critical values of these bounds and they are compared to the F-statistics of the estimated long-run equation. If the computed F-statistic falls above the I(1) at the 5% significance level, we reject the null hypothesis of no co-integration among the variables. These critical values are outlined in the table below:

Table 2. Bounds Test Critical Values

Bounds test critical values at 5% significance level		
ARDL Case	I(0)	I(1)
Case 1: No intercept and no trend	2.04	3.24
Case 2: Restricted constant and no trend	2.27	3.28
Case 3: Unrestricted constant and no trend	2.45	3.61
Case 4: Unrestricted constant and trend	2.63	3.62
Case 5: Unrestricted constant and unrestricted trend	2.87	4.00

Source: Narayan (2005)

An error correction model (ECM) can be reparametrized through a simple linear transformation when a long-run relationship exists between the variables. The ECM model gives us both the short-run coefficients and the long-run equilibrium in a single equation while preserving most of the long-run relationship. However, when there is no long-run relationship between the variables, an ECM cannot be constructed from the model.

The ECM also contains an Error Correction Term (ECT) which shows the speed of adjustment of the variables returning back to equilibrium when variables converge over time. The desired sign for the ECT is a negative sign and should be significant to show variables are converging over time. A positive sign indicates that variables are diverging and will not return to equilibrium. The ECM is specified as follows:

$$\Delta LFPI_t = a_0 + \sum_{i=1}^{l} \alpha_1 \Delta LFPI_{t-i} + \sum_{i=1}^{l} a_2 \ \Delta LRGDPpc_{t-i} + \sum_{i=1}^{l} a_3 \ \Delta RIR_{t-i} + \sum_{i=1}^{l} a_4 \ \Delta LEXP_{t-i} + \sum_{i=1}^{l} a_6 \ \Delta RER_{t-i} + \sum_{i=1}^{l} a_6 \ \Delta LIPI_{t-i} + \sum_{i=1}^{l} a_7 \ \Delta LUSIR_{t-i} + \varpi ECT_{t-1} + \varepsilon_{\ t-i}$$

Eq7

However, if the computed F-statistics fails to reject the null hypothesis of long-run relationship, where the computed F-statistics falls below the lower bounds critical value, then it suffices the variables are I(0) variables and only the short-run model will be estimated. The short-run coefficients are also tested using the Wald test statistics to find out if causality between the variables exists in the short-run.

[2] Narayan (2005) recalculated the critical values of Peseran et al. (2001) for better estimation due to difference in sample size.

Diagnostics tests

To account for a well specified and accurate ARDL model, the study performs the following tests;

Normality test: following the assumptions of multiple regression, the errors of a linear regression should be normally distributed. This test is important to carry out in order to validate the estimation.
Serial correlation: The third assumption of a multiple regression states that the residuals of regression should be free from serial correlation. Serial correlation occurs when the residuals of the observations for a specific period carry over into the future.
Heteroskedasticity: Heteroskedasticity occurs when the variance of the error term is not constant. This simply means that the variance of the dependent variable is different from the variance of the error term, and this does not satisfy one of the assumptions of multiple regression (homoskedasticity).
Ramsey Reset Test: Ramsey Regression Equation Specification Error Test (RESET), is a general specification test for the linear regression model. The test has the power to determine if a linear model is fitted well and not mis-specified.
The functional form to be tested is outlined in equation 8 below;

$$LFPI = \beta_0 + \beta_1 LRGDP + \beta_2 RIR + \beta_3 LRER + \beta_4 LEXP + \beta_5 LIPI + \beta_6 LUSIR + \Upsilon_1 LFPI^2 + \Upsilon_2 LFPI^3 + e \quad \text{Eq8}$$

- $H_0: \Upsilon_1 = \Upsilon_2 = 0$
- Ha : $\Upsilon_1 \neq \Upsilon_2 \neq 0$

We fail to reject the null hypothesis of no misspecification when the F-statistics is greater than the critical values at the 10% significance level. CUSUM and CUSUMSQ Test: The ARDL model sometimes is sensitive towards structural breaks within the data. Financial variables such as foreign portfolio investment inflow are sensitive towards events that happen around the world and this creates breaks within the data. CUSUM and CUSUMSQ tests proposed by Brown et al. (1975) are used to test the stability of both the long-run and short-run coefficients of the ARDL model.

4. Empirical Findings and Discussion

The first step towards the estimation was determining the level of stationarity of the variables. The two conventional unit root testing methods adopted in this study are the ADF test and the PP test. The hypothesis for the unit root testing is as follows;

- H_0: Variable has a unit root
- H_a: Variable does not have a unit root

Table 3. Unit Root Test Results

	ADF Test with Intercept			*PP Test with intercept*		
Variable	I(0)	I(1)	decision	I(0)	I(1)	Decision
LFPI	-0.3192	- 6.747*	I(1)	-0.0863	- 6.721*	I(1)
*LRGDP*c	-0.6085	- 3.655*	I(1)	-0.2630	- 3.705*	I(I)
RIR	-1.1431*	- 6.080*	I(0)	- 2.5305*	- 10.80*	I(0)
LRER	-1.7519	- 4.368*	I(1)	-1.7577	- 4.209*	I(1)
LEXP	0.9824	- 5.350*	I(1)	0.6291	- 5.406*	I(1)
LUSIR	-0.3354	- 4.367*	I(1)	-0.0693	- 4.213*	I(1)
LIPI	-1.3272	- 4.485*	I(1)	-1.3058	- 4.404*	I(1)
*,** and *** represents 1%, 5% and 10% significance levels respectively						

Source: Author's Computation

Unlike the studies of Wesso (2001), Aron et al. (2010), and Gossel and Biekpe (2015), not all variables were found to be differenced stationary variables after conducting the ADF and the PP test, hence, the appropriate use of an ARDL model. Some other variables were stationary at level while others are stationary at first difference. The dependent variable is stationary after first difference at the 1% significance level when only an intercept term is introduced. The study accepted the unit root results and applied the ARDL case of restricted constant and no trend (case 2) for the estimation. The next step of the ARDL analysis was to estimate equation (6) through the bounds testing, in order to reveal the presence of a long-run relationship among the variables. The ARDL model was further specified before estimation by including the appropriate maximum lag length of 2 with the guidance of the AIC. The best model is selected automatically by eviews10.

Table 4. Bounds Test Results

Model	Lags	ARDL case	F-stats	I(0)	I(1)	Decision
f(lfpi, lrgdppc , lrer , rir, lexp, lipi lusir)	(1,0,2,1,2,2,2)	2	5.53	2.27	3.28	Reject H_0

Source: Author's Computation

- H_0: β1 = β2 = β3 = β4 = β5= β6= β7= 0
- H_a: At least one β is ≠0

The table above depicts the results of the bounds test for the estimation of Equation 6. The lags included in the models are also indicated above. The model passed all the diagnostics tests, rendering it well specified and suitable for interpretation. The bounds test result indicated that there is a long-run relationship among all the variables. The F-statistics of 5.53 is greater than the upper bounds critical value of 3.28 which leads to rejecting the null hypothesis of no long-run relationship. This finding is in line with the findings of Garg and Dua (2014), Aron et al. (2010) and Gossel and Biekpe (2015) who found a long-run relationship between Net FPI and some macroeconomic variables. Since the bounds test has revealed the existence of long-run co-integration between the variables, the next step is to obtain the long-run and short-run coefficients from the estimated ARDL model. The table 5 below presents the long-run coefficients obtained from the estimation.

Table 5. ARDL Model Results

Method: ARDL				
Maximum dependent lags: 2 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (2 lag, automatic): LRGDPpc RIR LEXP LRER LIPI LUSIR				
Selected Model: ARDL(1, 0, 2, 1, 2, 2, 2)				
Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob.*
LFPI(-1)	-0.02636	0.263501	-0.10004	0.9214
LRGDP	3.603484	1.410192	2.555315	0.0193**
LRER	1.866404	0.562029	3.320831	0.0036*
LRER(-1)	-0.87649	0.439453	-1.99449	0.0606***
LRER(-2)	1.185682	0.359716	3.296161	0.0038*
RIR	-0.02097	0.011891	-1.76379	0.0938***
RIR(-1)	0.031095	0.012004	2.590518	0.0179**
LEXP	3.264109	1.678627	1.944511	0.0668***
LIPI	1.610096	1.210687	1.329903	0.1993
LIPI(-1)	-2.16057	1.385583	-1.55932	0.1354
LIPI(-2)	2.835367	1.063911	2.665042	0.0153**
USIR	-0.04498	0.039373	-1.14233	0.2675
USIR(-1)	0.0187	0.038563	0.48492	0.6333
USIR(-2)	-0.06769	0.031344	-2.15967	0.0438**
C	-103.83	31.63364	-3.28228	0.0039*
R-squared	0.914999	Akaike info criterion		-0.70359
Adjusted R-squared	0.909806	Schwarz criterion		-0.26373
S.E. of regression	0.151707	F-statistic		189.6881

Sum squared resid	0.598393	Prob(F-statistic)	0
*,** and *** represents 1%, 5% and 10% significance levels respectively			

Source: Author's Estimation

The coefficients above revealed that FPI inflow to South Africa is jointly explained by pull and a push factors. The R-squared indicates that 91.5% of the variables explains the FPI inflows. Hence, the model is suitable for interpretation and policymaking. The ECM and the short-run coefficient was estimated and the results are outlined below.

Table 6. ECM Results With Short-run Coefficients

ECM Regression				
Case 2: Restricted Constant and No Trend				
Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob.*
Δ(LRER)	1.866404	0.311511	5.991445	0
Δ (LRER(-1))	-1.18568	0.23579	-5.02856	0.0001
Δ (RIR)	-0.02097	0.007734	-2.71192	0.0138
Δ (LEXP)	-2.03434	0.971507	-2.09401	0.0499**
Δ (LEXP(-1))	-3.26411	1.068159	-3.05583	0.0065*
Δ (LIPI)	1.610096	0.637597	2.525257	0.0206**
Δ (LIPI(-1))	-2.83537	0.752621	-3.76732	0.0013**
Δ (USIR)	-0.04498	0.021665	-2.07606	0.0517**
Δ (USIR(-1))	0.067693	0.019267	3.513375	0.0023*
*ECT(-1)**	-0.72636	0.131895	-5.53863	0*
*,** and *** represents 1%, 5% and 10% significance levels respectively				

Source: Authors Computation

The expected outcome for the ECM is for the lagged ECT to have a negative and significant coefficient, in order to indicate the speed of adjustment or the divergence of the variables returning back to the long-run equilibrium after a short-run shock. The results of the ECM was as expected as the coefficient of ECT is negative and significant. This confirms once again, the existence of the co-integration relationship among the variables. The coefficients of ECT (-1) is equal to (-0.726). This implies that at the speed of 73%, the deviating variables from the LFPI is corrected back long-run equilibrium after a short-run shock. This results also indicate that the macroeconomic variables in the short-run respond fast in the long-run.

Table 7. Short-run Wald test

Wald Test			
Equation: EQ01			
Test Statistic	*Value*	*df*	*Probability*
F-statistic	189.6881	(9, 26)	0.000
Chi-square	1707.193	9	0.000

Source: Authors Computation

- H_0: C(1)=C(2)=C(3)=C(4)=C(5)=C(6)=C(7)=C(8)=C(9)=0
- H_0: C(1)≠C(2) ≠C(3) ≠C(4) ≠C(5) ≠C(6) ≠C(7) ≠C(8) ≠C(9) ≠0

The main aim of the short-run Wald test is to check if the independent variables and the dependent variable have a causal relationship in the short-run. This test also confirms the ECM results. The result indicates that the coefficients of all the independent variables jointly explain the short-run relationship of FPI and its regressors.

Diagnostics

To check the accuracy of the ARDL estimation, the presence for serial correlation, abnormal error distribution, and the stability of the coefficients were all tested against their null hypothesis. The Jarqu-Bera's statistics of 1.16 with a probability of 0.559 indicated that, the error are normally distributed. The Breusch- Godfrey LM statistics of 0.451 with a probability of 0.5079 indicates that the errors are free from serial correlation. The RAMSEY test also indicated a well specified estimation. The Bruecsh-Pagan-Godfrey for heteroscedasticity test also indicated a constant variance, hence homoscedastic. To ensure that there are no significant break-point in the estimation a CUSUM and CUSUMSQ is plotted.

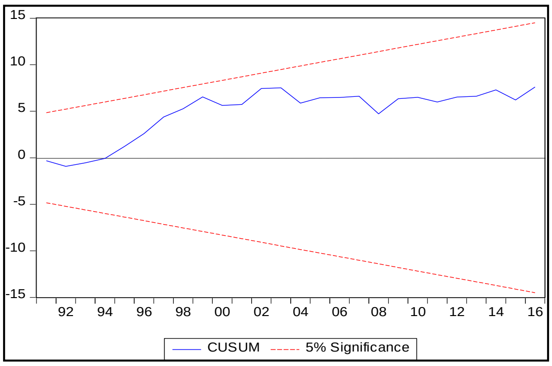

Figure 1. CUSUM Plot
Source: Authors Computation

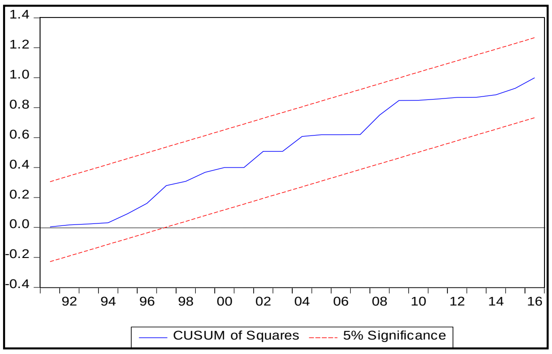

Figure 2. CUSUMSQ Plot
Source: Authors Computation

The plots of the CUSUM and CUSUM of square indicates no significant break-points in the data of both models. The CUSUM and CUSUMSQUARE lines are within the boundaries of the 5% significance level, indicating no deviations in the data set. This result confirms the coefficients in the estimation are stable.

Based on the aim, following two hypotheses are proposed to determine whether pull and push factors determine FPI flows.

Test 1

- H_0: Pull factors are not determinants of Foreign Portfolio Inflows of South Africa between 1980 and 2017
- H_a: Pull factors are determinants of Foreign Portfolio Inflows of South Africa between 1980 and 2017

Test 2

- H_0: Push factors are not determinants of Foreign Portfolio Inflows of South Africa between 1980 and 2017
- H_a: Push factors are determinants of Foreign Portfolio Inflows of South Africa between 1980 and 2017

The ARDL method of co-integration was employed to investigate if a long-run relationship exists between FPI and it regressors. The result of the ARDL estimation confirmed the theoretical expectation of push and pull factors. The null hypotheses for the two tests were rejected. The one lag period of FPI inflows has a positive but insignificant effect on the current portfolio inflows of South Africa. A 1% change in RGDP will increase FPI inflow by 3.60% in the long-run, while a 1 percent change in the real interest rate will decrease FPI inflows by 0.02%. However, the lagged RIR suggest a positive relationship between FPI and RIR as expected. A percent change in the real interest rate will increase FPI inflows by 0.03% and exchange rate volatility has a negative relationship on FPI inflow in the long-run. A 1% change in exchange rate will increase FPI inflow by 1.86%.

Long-run coefficient for government expenditure is positive and significant. This is because the government spends to improve the welfare of the country. The LUSIR results revealed a negative relationship between the international interest rate and portfolio inflows of South Africa and the long-run result of the US industrial production index coefficient is positive and significant at the 1% significance level. The result concurs with the findings of Abdullah et al (2010), De Vita and Kyaw (2008), and Garg and Dua (2014) as pull factors were the major influencers of FPI. These factors in this study are; real GDP per capita, real interest rate, real exchnage rate, and general government expenditure. In the study of Abdullah et al (2010), domestic rate of returns (real GDP, and Treasury bill rate) were significant in explaining FPI into Malaysia, while the study of De Vita and Kyaw (2008) also revealed a positive relationship between domestic real GDP and FPI. Similarily, the study of Garg and Dua (2014) also found a long-run relationship between pull factors and FPI in india whilst using the ARDL model of cointegration. This study also produced similar results obtained from the studies of Wesso (2001), Aron et al (2010) and Gossel and Biekpe (2015), despite using different methodology. The ADF and PP unit root test result were different compared to this study. The studies of Wesso (2001), Aron et al (2010) and Gossel and Biekpe (2015) had all push and pull variables cointegrated at the order (1), unlike this study where a mixture of integrated variables was revealed. Despite the differences in the unit root test results, the study of Wesso (2001) employed the Engel and Granger (1987) ECM and found out there exist a long-run relationship between FPI and the push

However, the study of Gossel and Biekpe (2015) with the use of a VECM established a long and short run relationship between FPI and the push and pull factors, where the push factors were the major determinants of FPI in the short-run instead of the pull factors.

5. Conclusion & Recommendations

The surge of FPI into developing economies such as South Africa have raised interest amongst government officials, investors, and researchers. FPI as capital inflow serves as a bridging gap between domestic investment and the savings of the country and the push and pull framework is utilized as the theoretical base of the findings. Push factors are simply external factors that influence FPI inflows in South Africa, while pull factors are internal or domestic macroeconomic factors that influence FPI. The push factors included in this study are the US Treasury bill rate and industrial production index and pull factors are the real GDP per capita, real interest rate, real exchange rate and general government expenditures. The ARDL method of co-integration is used to determine if a long and short run relationship exists between the variables. This methodology was suitable for the analysis due to the small sample size and the nature of the data. The results indicated that there exists a long and short run relationship between FPI and its regressors. In the long-run, an increase in the real GDP per capita will encourage FPI investors to continue purchasing securities in the country. The rate of return and the general government expenditure were also determinants of FPI in the long-run. The external factors which are US Treasury bill rate and the industrial production index were also determinant of FPI in South Africa. The ARDL established the short-run coefficients and the ECT. The domestic real interest rate and the foreign interest rate had a positive and negative significant relationship respectively while the ECT revealed that at the speed of 73%, the diverging variables will return to long-run equilibrium after a short-run shock.

Based on the results gathered from the estimation, the study recommends the following policies to continue achieving growth in FPI;

- First of all, the indication that there is a long-run relationship between economic growth (real GDP per capita) and FPI constitute for policy recommendation to improve this relationship. South Africa should continue to improve their demand-side policies and also pay attention to their supply-side policies to continue achieving economic growth. Expansionary fiscal policies such as lowering corporate tax to attract more investors and increase investment should be implemented. The government also needs to increase expenditure on research and development to improve production efficiency, hence an increase in output in the long-run.
- The result of the estimation also revealed that the pull factors are the major determinants of FPI. This implies that the domestic macroeconomic environment should be encouraging towards external investors. The government needs to apply policies that create such a friendly environment. Despite pull factors are the main determinants, push factors are also significant influencers of FPI in South Africa. The government needs strong capital account policies that protect the domestic investment from the volatility of FPI and at the same time encourage apply policies that will encourage investment.
- Exchange rate variability is also a concern for investors. The gap in the exchange rate market between domestic and world prices should not be too wide, as this may cause foreign investors to lose confidence in the domestic currency, hence deciding not to invest. A currency peg is an option for government agents to control the exchange rate variability in the country. South Africa can peg its domestic currency to the US dollars to improve export to the US, hence decreasing the trade deficit.
- The government also needs to widen its financial instruments in its stock market. Investors are attracted to a variety of financial instruments which spurs economic growth. Government agents can create different financial assets that have different maturities, risk, and return from different financial intermediaries.

One of the main obstacles faced by the most developing economies such as South Africa is the reversal of FPI inflows. Effective macroeconomic policies that protect the nation from the reversal of such flows should be encouraged.

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