Transnational Corporations Review

ISSN: 1918-6444 (Print) 1925-2099 (Online) Journal homepage: https://www.tandfonline.com/loi/rncr20

The dynamic impact of foreign portfolio investment on stock prices in Pakistan

Malik Shahzad Shabbir & Iftikhar Muhammad

To cite this article: Malik Shahzad Shabbir & Iftikhar Muhammad (2019) The dynamic impact of foreign portfolio investment on stock prices in Pakistan, Transnational Corporations Review, 11:2, 166-178, DOI: 10.1080/19186444.2019.1616508

To link to this article: https://doi.org/10.1080/19186444.2019.1616508

Published online: 03 Jun 2019.

TRANSNATIONAL CORPORATIONS REVIEW
2019, VOL. 11, NO. 2, 166–178
https://doi.org/10.1080/19186444.2019.1616508

Routledge
Taylor & Francis Group

RESEARCH ARTICLE

The dynamic impact of foreign portfolio investment on stock prices in Pakistan

Malik Shahzad Shabbir[a] and Iftikhar Muhammad[b]

[a]University of Lahore, Sialkot, Pakistan; [b]Ibn Haldun University, Istanbul, Turkey

ABSTRACT

The objective of this paper is to examine the short-run and long-run dynamic relationship between foreign portfolio investments (FPI) and stock prices of Pakistan. This study first ever attempts in the context of Pakistan economy to investigate the foreign portfolio investment and its impact on the domestic stock market. The surge in FPI in the developing countries is relatively due to growth of stock markets in these countries, liberalisation of their economies, high returns on investment, trade openness, improved communication and global technology. This study used annual time series data starting from 1984 to 2016. The autoregressive distributed lag (ARDL) method used for both the long-run and short-run relationship between FPI and various policy variables. All the results are statistically significant except the exchange rate and the model is best fitted which shows the diagnostic and stability test.

ARTICLE HISTORY
Received 7 February 2019
Revised 18 April 2019
Accepted 4 May 2019

KEYWORDS
Foreign portfolio investments; ARDL; dynamic analysis and Karachi stock market

1. Introduction

It is noted that in many developing countries, foreign direct investment (FDI) has been considered a dominant form of capital inflows. However, the situation is rapidly changing in recent days, with foreign portfolio investment (FPI) replacing the FDI as a source of foreign capital inflow in many developing economies. The FPI implies that foreigners can directly or indirectly purchase the shares in stock markets of other countries. Actually, this is the way of bringing foreign capital, which is desperately needed in developing countries like Pakistan. Guillaumont and Chauvet (2001) concluded that when economic ambiguity increases then it will affect the lesser growth of susceptible economies.

The surge in FPI in the developing countries is partly due to the growth of stock markets in these countries, liberalisation of these economies, high returns on investment, trade openness and improved communication and technology globally. However, it is observed that in short-terms the capital inflows have counterproductive Baharumshah and Thanoon (2006). While economic hamper can effect in both reverse shapes of rapid and rush due to the exterior instructed of the economic growth.

Despite foreign capital inflows have helped to enhance economic activities, a rapid surge of capital inflows is also more likely to bring some problems for the host economies. Indeed, some studies, such as Rashid (2010), Rashid and Husain (2011), Otker-Robe et al. (2007), Stevens (2006), and Edwards (2001), have examined that capital inflows create some difficulties for the host country in the form of real appreciation of their domestic currencies. Examples of these difficulties generally include spending boom; assets market babble, loss of competitiveness by the exporters, and banking sector crises. Therefore, it is an interest of policymakers and researchers to know the impact of capital inflows on real economic activities as well as on functioning of financial markets and institutions.

When we review the recent literature we come to know that most of the existing empirical studies have examined the impact of FDI on stock prices with a very little attention on the effect of FPI on stock market performance. Examples of these studies are Aqeel and Nishat, Froot and Stein (1991) and Love and Lage-Hidalgo (2000). However, in principle, FPI as compared to FDI is more likely to have direct and more prominent effects on the performance of stock market. This can be rationalised as follows. The cross-border flow of equity investments

CONTACT Malik Shahzad Shabbir Mshahzad786.pk11@gmail.com University of Lahore, Village & P O Bhakherwali via Jhakti ke, Sambrail, Sialkot, Punjab 5400, Pakistan

as a signal of increasing financial globalisation, mostly in the case of emerging economies, has generated an ensuring argue on the impact of foreign equity flows on domestic stock market. The purpose of acquisitions for the firms is to overvalue their equity stock, which motivated the local and international investors to invest more, so the firms can easily maintain its profit size, grow and survive relating with other firms on the basis of less or undervalued equity perspective. However, equity becomes incentives and targets for the firms (Shleifer & Vishny 2003).

Some flows are more defenceless to undesirable development, given their short–term view, and hence are usually highly unpredictable with a potentially destabilising impact on stock market volumes. This process is also exacerbated because of foreign investor's herd instincts, and positive feedback trading, both of which tend to move stock prices away from fundamentals, thereby increasing volatility. (Financial Stability & Risk Assessment, 2008). The foreign investors feel threads from risk of exchange rate, whereas they get some benefits in order to making some profit motive strategies in hedging. When we review the literature, we come to know a core question that hedging is a 'free lunch' or not for getting more returns from complex adjusted-risk. Actually, the purpose of currency hedging is to get the benefits from your desire exchange rate in short-term period. However, Perold and Schulman (1988) also discussed this issue and they explored that investors could get zero expected returns in order to hedge the currency in long period of time, whereas they got the edge to reduce the risk at zero cost. Hauser, Marcus, and Yaari (1994) examine the relationship between equity portfolio in emerging market and currency hedging. However, they conclude that hedged portfolio performs better rather than non-hedged portfolio and he also informed that diversified portfolio investors with minimum 10–15% investment in emerging markets, make the investors inferior in hedging. Walker (2008) takes a different approach; examining currency hedging from the perspective of an emerging market based global investor. He found that hedging on average increases volatility and concludes that no 'free lunch' exists. The reason is that hard (developed) currencies are a natural hedge against global portfolio losses.

Therefore, it is useful to examine the causal link between FPI and domestic stock market performance. However, reviewing the existing literature we do not find any comprehensive study to examine this causal relationship for Pakistan expect a short note on this issue published by State Bank of Pakistan in its report (Financial Stability Report, 2007–2008). An empirical examination of this issue is important as authority in Pakistan can exploit such relationship to attract FPI in domestic stock markets by making returns to domestic investment more attractive to foreign investors. Further such relationship can also help investors to forecast the behaviour of stock prices using information regarding FPI, and vice-versa. Finally, if the significant relationship will exist between the FPI and stock market performance then government can focus on utilising the FPI variable as a tool to stabilise domestic stock market during any financial crises.

Pakistan has shown the intention of foreign investment inflows and outflows in the form of foreign portfolio investments (FPI) after the liberalisation in 1990s. Initially, there was reasonable foreign portfolio investment up to 1998. Later in the FPI was very tiny in financial year (FY) 1999 and FY 2000 and sometimes even went into negative scale as outflows from FY01 and FY04. But in 2005 financial year Pakistan, capital inflows regained FPI and reached highest scale in the financial history of Pakistan in 2007 with US$861.5 million. (Financial Stability Report, 2007–2008). This increase in FPI is due to substantial liquidity in International markets, established macroeconomics essentials and enormous performance of equity markets in the last few years. The high short-term debt became common in almost all the financial crises and it plays a negative role in financial crises toward international reserved ratio Rodrik and Velasco (1999).

However, this increase stayed for a short period and again reversal in FPI in FY 2008 because of adverse economic conditions and developments both in domestic and International markets. When the domestic country removes the major portion of the property tax for the international investors then a significantly increased in return inflows come in host country. This benefit also affects the different policies like corporate which include different kinds of investments such as issuance of equity, dividends, debts and share repurchases. These policies may effect on the behaviour of the market and pricing.

However, FPI has a fine edge about changing position in the flows especially reserves and none reserves funds in recent years that can be affected as a key resource of stock market unstable in last two years. These flows are beneficial for the short term period but not for long term period and past record of FPI is insignificantly in FY08, some outflows made burden and also devalue the domestic currency of Pakistan. These changes in domestic currency must make some flection in the prices of domestic stock market. This decease stayed about exchange rate

flection in FY08 and it has a positive impact for foreign exchange market in Pakistan because domestic goods and services become cheaper for the foreigners[1]. Choong, Baharumshah, Yusop, and Habibullah (2010) provide an interesting result that coefficients of both variables foreign debt and portfolio investment have significantly positive; whereas these variables show a negative effect on growth of economy, even an assured least level occur in stock market and whole the benefit gets beneficiary country in term of capital flows.

2. Literature review

Several studies have done to examine the factors which have a significant impact on stock market performance. Most of these studies reflect the performance of stock market to domestic economic variables such as GDP, Interest rate, Exchange rate and prices. They fixed result that foreign portfolio investment (FPI) has a significant impact on stocks prices. A wide variety of literature shows that international equity flows tend to enhance the depth and liquidity of domestic markets, particularly in case of emerging economies, where equity markets are relatively illiquid. These flows also serve to strengthen domestic capital markets and decrease the cost of capital by reducing the country's risk premium. Foreign interest in the stock markets leads to a reduction in the cost of capital, which in turn encourages domestic investors to invest in profitable projects and thus further reinforces the performance of the capital market. The last quarter of 2007, was badly affected the Pakistan economy due to several reasons such as high rate of inflation, an expansionary fiscal policy, growing with imbalances of macroeconomic and most important one sudden incidents in political environment. They investigated the impact of terrorism on tourism in Pakistan by using annual time series data from the period of 1980 to 2010. Empirical evidence long-run negative relationship between terrorism and tourism and also the unidirectional causal relationship between terrorism and tourism; where causality runs from terrorism to tourism Raza and Jawaid (2013).

However, in that time our local political environment becomes a barrier for international investors in the perspective of our financial institutions and markets because foreign investors faced the problem of devaluation of their stocks, shares and exchange rate etc. The macroeconomic imbalances occurred due to increase in commodity price throughout the world such as food and oil and improper use of their factors, while on the other side of financial year (FY) 2008 the growth rate of Pakistani economy was 5.8% outstanding to the arrangement of factors (Stability Assessment of Financial Markets, 2007–2008). However, Pakistan economy upgraded the presentation of macroeconomic and then re-entered into global capital markets in 2004 and allotted four outstanding dominant bonds also. The KSE-100 index reached at a peak level of 15,676 points on April 18, 2008. While in same time foreign portfolio investment (FPI) impacted through flows of reversal in Pakistan. Whereas, equity market was declined 40.0% and KSE-100 index also decayed and touched at the points of 9144 on 28 August 2008, in Pakistan. In that particular period, the performance and position of domestic and global financial markets became the victim of crises in September 2008 (Institute of International Finance, 2008).

Uzma investigated the impact of corporate philanthropy (CP) and its effects on listed firms in Karachi stock market (KSE). She used annual reports of 234 listed firms on KSE from 2001 to 2011. However, panel date analytical techniques and Tobit model are used to find out relationship between firms specified factors and corporate philanthropy. The overall result of this study shows that firms are not using philanthropy for their image creation. Arif and Suleman (2017) examined the relation between stock prices of Karachi stock market and its impact on terrorism activities in Pakistan. For this purpose, they used monthly data from January 2002 to December 2011. Mixed results are shown by this study and at some extent, terrorism negatively affect the Karachi stock market.

Gordon and Gupta investigate those factors that mostly affect the portfolio equity flows in India, if we compare these flows to India with other emerging markets then we come to know these flows are small. These portfolio flows are determined by two factors: external and domestic factors. However, they use London Inter-Bank Offering Rate (LIBOR) and emerging market stock returns as external factors, while lagged stock return and changes in credit ratings for the determinant of primary domestic. In their study, they use Multivariate regression model by using monthly data from March 1993 to October 2001 in an array to come across the Financial Institution Investors (FIIs) equity flows in India. The overall results show that increases in external interest rate harmfully consequence on the Financial Institution investment (FIIs) flows into India, however, the performance of emerging stock markets have positively persuaded on FIIs flows to India.

Fama and French this study aims to review the application of Capital Asset Pricing Model (CAPM) in economic market. It has divided into two parts, theory and practice of the CAPM. First, it discusses theoretical predictions

about measuring the risk and its relation to the expected return. Secondly, it examines the practical implications of this Model through its application on different cases. This paper discusses the assumptions of CAPM against its application in various studies. The studies show the difference between the predictions and results by applying this Model. It uses multiple methods like cross-section regression, correlation and time series. Test of the CAPM is based on three implications of the relation between expected return and market beta implied by the model. First, expected returns on all assets are linearly related to their betas and no other variable has minimal explanatory power.

Chercq et al. observed that several strategies of portfolio investment were implemented in venture capital firms (VCF). However, this study focuses on the acquisition knowledge, specialisation and diversification through venture capital investment and also identifies two types of risk for investors of venture capital, 'market risk' this kind of risk associated to unexpected rivalry situation which affect the market according to their desire needs 'agency risk' which deals with interest of divergent between portfolio firms and VCF. Risk can be reduced through knowledge of specialisation for developing VCFs and it can also be minimised by spreading the risk through diversification across the industries, geographical location and stages of company growth. The data was collected from 22 industries with their 469 portfolios by 28 VCFs and 1169 investments of Finnish from period 1994 to 1997. The results indicate that consistently diversified their portfolio in term of stage of growth and rapidly increased in the last year.

Agarwal (1997) described the determinants of foreign portfolio investment (FPI) and its impact on the economies of five Asian countries which include India, Thailand, Korea, Indonesia, and Malaysia. It is noted several times that developing countries invite the overseas investment in shape of FPI and host countries get many benefits in low cost and most of risk transferred to international investors through modification and constancy in secondary market. However, sometimes FPI creates some problem for the host country when the investors suddenly decided to withdraw its investments in the entire market. The annual data was used from span period 1986 to 1993. The inflation rate indicates negative coefficient whereas real exchange rate, shares of domestic market and index of economic activity have positive coefficients and statistically significant for cause of FPI.

Kumar (2013) investigated the nature and importance of returns and volatility spillovers between exchange rates and stock price in India, Brazil and South Africa. This study has recently attracted the attention of Indian, Brazilian and South African policymakers, market participants and academicians an offered them a long term benefits, especially for policymakers they are analysing the vibrant association between stock price and exchange rates which are important because link between two markets may influence their decisions about monetary and fiscal policy in different time frame of business. He uses VAR framework to examine the returns and volatility spillover between exchange rates and stock prices of India, Brazil and South Africa nations; however, multivariate GARCH is also used as a benchmark against the spillover methodology. He shows his overall results as stock markets participate in a comparatively more significant role than foreign exchange markets in the first and second instant interactions and spillovers.

Qayyum and Kemal (2006) investigated the causal relationship between returns of foreign exchange markets and financial markets of Pakistan through spill-over of volatility and its returns in percentage. In the last two decades, the financial sectors of Pakistan had adopted two policies, first the opening of financial markets, second adoption of flexible exchange rate system. Which positively effect and rapidly increase in the investment of portfolio inflows? Nowadays in Pakistan, three main stock exchanges are working, their names and establishment time are as follows, Karachi Stock Exchange (KSE) in 1947, Lahore Stock Exchange (LSE) in 1974 and Islamabad Stock Exchange in 1997. In order to make more Accuracy, Fairness, efficient and cost-effectiveness the KSE introduced a computerised system which name Karachi Automated Trading System (KATS). Before 1970, the Pakistani currency rupee was linked with the pond sterling of British. However, after this, it was pegged with US Dollar at efficient rate of PKR 4.76 per Dollar in 1971. They collected the data of rupees per US Dollar from State Bank of Pakistan (SBP). While the KSE-100 index data was collected from Karachi Stock Exchange. These data are weakly time series data from span period of 1 July 1998 to 31 May 2006. They used several tests like Kurtosis Jarque-Bera and Skewness to check the normality of their hypothesis.

In order to check the stationary and non-stationary of the data they used Augmented Dickey-Fuller (ADF) test. They also used Engle and Granger method to find out the relationship of co-integration between exchange rate and stock prices. Finally, they examined volatility spillover between Forex Market and Financial market, with the help of bi-variate EGARCH model. The data is not stationary for both variables which are described by ADF test.

The residual series found in the unit roots, so there is no co-integration in both series under the specific time period of data analysis. The bi-variate EGARCH model indicates that Forex market has a significant impact on price spill over toward the stock market has insignificant impact toward Forex market.

Muhammad, Rasheed and Husain (2002) examined that there is a bi-directional causality between stock prices and exchange rates in short-run but not in the long-run in south Asian countries such as Pakistan, India, Bangladesh, and Sri Lanka. They discussed in their study that, if the domestic stock prices increase, it effects the further demand for domestic assets, so the purchasing power of local investors will increase and their local currency value becomes positive reception from the market. They used Augmented Dickey-Fuller (ADF) and Philips-Perron tests in sort to locate out integration of both the series. Their results for Pakistan and India showed that there were no short-run and long-run associations between stock prices and exchange rates but they only found bi-directional long-run causality involve in Sri Lanka and Bangladesh.

3. Methodology

Every research programme has a research design that has a particular direction of methodology on the bases of its framework and purpose. The framework in the collection and analysis of data is known as research design. It has been considered the road map while processing the whole process of the study. It explains the direction to conclude the research question. This is a time series study which includes annual data for all variables from 1984 to 2016. This study used six different variables, the detail of these variables are as below. The International Financial Statistics (IFS) share index used as a proxy for domestic stock price (DSP). Especially, KSE-100 Index as a proxy for stock market performance. Data on the gross domestic product (GDP), exchange rate (EX), money market interest rate (MMR) and consumer price index (CPI) are collected from World Development Indicator (WDI). While foreign portfolio investment (FPI) obtained from Hand Book of statistics of Pakistan economy. FPI is an independent while DSP is dependent variable in this study. All variables are used in natural log form except the market interest rate. Most of studies that examined the casual link of stock prices with other variables have used Johanson Co-integration and standard Granger causality tests. There are several approaches used in the past in order to determine the relationships of long-run and short-run between different variables. One of them is the standard Johanson Co-integration and VECM framework. But this approach suffers from sober flaws as discussed by Pesaran, Shin, and Smith (2001). So, we adopt the autoregressive distributed lag (ARDL) framework popularised by Pesaran and Shin, Pesaran et al. and Pesaran to set up the way of causation between variables. This study formulated on following equation.

$$DSP = \beta_0 + \beta_1 \mathrm{FPI} + \beta_2\ GDP + \beta_3\ EX + \beta_4\ MMR + \beta_5\ CPI + \mu \tag{1}$$

A factor in a causal model or causal system whose value is determined by the states of other variables in the system (Woodward 1995). According to Pearl (2000) a factor can be classified as an endogenous or exogenous only relative to a specification of a model representing the causal relationships producing the outcome y among a set of causal factors X ($x_1, x_2, \ldots, x_k$), where ($y = M(X)$). A variable x_j is said to be endogenous within the causal model M if its value is determined or influenced by one or more of the independent variables X (excluding itself). A purely endogenous variable is a factor that is entirely determined by the states of other variables in the system Hendry (1995).

Furthermore, in this study, the Equation (1) FPI is a main explanatory variable of this study, so any positive or negative change occurs in this variable will directly influence DSP as a dependent variable of this study. Moreover, DSP, CPI and GDP come under the definition of endogenous variables because they are explained by the model, while FPI, EX and MMR are exogenous variables of this study and they are fixed and model is unable to explain them.

The ARDL method shows reliable and vigorous result both for the long-run and short-run relationship between FPI and various policy variables, and this method is also very beneficial and valuable because it measures extremely well the equilibrium/relationship level for the long-run and short-run dynamics exclusive of trailing long-run information. It is noted that the results of different variables show altered order of integration which apply the ARDL modelling with more accuracy and flexibility (Pesaran & Pesaran, 1997). Laurenceson and Chai (2003) examined that in a general-to-specific modelling framework to capture the data generating process, which takes sufficient numbers of lags, is another advantage of this approach. Moreover, Banerjee, Dolado, Galbraith, and Hendry (1993) suggest that a simple linear transformation can be derived through ARDL and a dynamic error

correction model (ECM). Without losing long-run information the ECM integrates the long run equilibrium with the short-run dynamics. Laurenceson and Chai (2003) argued that non-stationary time series data using the ARDL approach.

The ARDL technique moves toward of estimating the subsequent equation.

$$\Delta \ln DSP_t = \beta_o + \sum_{i=0}^{n} \beta_1 \Delta \ln DSP_{t-i} \sum_{i=1}^{n} \beta_2 \Delta \ln FPI_{t-i} + \sum_{i=0}^{n} \beta_3 \Delta \ln EX_{t-i} + \sum_{i=0}^{n} \beta_4 \ln MIR_{t-i} + \sum_{i=0}^{n} \beta_5 \Delta \ln CPI_{t-i} + \sum_{i=0}^{n} \beta_6 \Delta \ln GDP_{t-i} + \delta_1 \ln FPI_{t-1} + \delta_2 \ln DSP_{t-1} + \delta_3 \ln EX_{t-1} + \delta_4 \ln MIR_{t-1} + \delta_5 \ln CPI_{t-1} + \delta_6 \ln GDP_{t-1} + \varepsilon_i \quad (2)$$

where Δ denotes the first-difference operator. $\ln FPI_{t-i}$ is a long value of foreign portfolio investment, $\ln DSP_{t-i}$ is the long value of KSE-100 index, $\ln EX_{t-i}$ is a long value of exchange rate, $\ln MIR_{t-i}$ is a long value of market interest rate, $\ln CPI_{t-i}$ is a long value of consumer price index, $\ln GDP_{t-i}$ is a long value of income. The first part of the equation with β_1, β_2, β_3, β_4, β_5, and β_6 represents the short-run dynamics of the model whereas the parameters δ_1, δ_2, δ_3, δ_4, δ_5 and δ_6 represents the long-run relationship. The null hypothesis of the model is as below.

$$H_0: \ \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 \ = \ 0 \ (\text{there is no long} - \text{run relationship exist}).$$
$$H_1: \ \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq \delta_6 \neq \ 0 \ \ (\text{there is long} - \text{run relationship exist}).$$

The ARDL approach does not involve in pretesting variables, which shows the relationship among variables are irrespective pertinent, so the following regressors are purely *I* (0), purely *I* (1), or mixture of both. We are conducting a bounds test of no co-integration for the null hypothesis. To check the overall significance of the model, we compare F-statistics with the critical value, so we get some different results. If the test statistics exceeds the upper critical value then the null hypothesis for a long-run relationship cannot be accepted and if the test statistics value is fewer below of critical value, then the null hypothesis can be accepted. Therefore, if the test statistics falls between those two bounds, the result is inconclusive.

This method has two conditions for satisfaction of variables, one is integration of variables which is known. Secondly, all the variables are *I* (1), and the decision is based on basis of upper bound, and if all the variables are *I* (0), then the decision is based on the lower bound. This method is also useful for the estimation $(\rho + 1)^k$ of number of regressions, so it can simply get the most favourable lag span for every variable, where ρ denotes maximum number of lags to be used and k is the number of variables in the equation.

In the second stage of the model, there is found an indication in long-run relationship among the variables, so the below long-run model (Equation 2) is assessed.

$$DSP_t = \beta_o + \sum_{i=1}^{n} \beta_1 \Delta DSP_{t-i} \sum_{i=0}^{n} \alpha_1 FPI_{t-i} + \sum_{i=0}^{n} \delta_1 \ln(EX_{t-i}) + \sum_{i=0}^{n} \varphi_1 \ln(MIR_{t-i}) + \sum_{i=0}^{n} \lambda_1 \ln(CPI_{t-i}) + \sum_{i=0}^{n} \nu_1 \ln(GDP_{t-i}) + \varepsilon_i \quad (3)$$

If we find any evidence of a long- run relationship, then we estimate error correction model (ECM), the purpose of finding ECM is to check the back speed modification after a short –run disruption toward a long-run equilibrium. The standard ECM contains estimating the below equation.

$$\Delta \ln(DSP_t) = \alpha_o + \gamma_i (ECM_{t-i}) \sum_{i=1}^{n} \beta_1 \Delta \ln(DSP_{t-i}) \sum_{i=0}^{n} \delta_1 \Delta \ln(FPI_{t-i}) + \sum_{i=0}^{n} \Psi_1 \Delta \ln(EX_{t-i}) + \sum_{i=0}^{n} \&\text{Upsilon};_1 \Delta \ln(MIR_{t-i}) + \sum_{i=0}^{n} \eta_1 \Delta \ln(CPI_{t-i}) + \sum_{i=0}^{n} \lambda_1 \Delta \ln(\text{GDP}_{t-i}) + \varepsilon_i \quad (4)$$

The goodness of fit of the ARDL model is to make certain two kinds of tests, diagnostic and stability tests. The purpose of the diagnostic test is to investigate the serial correlation, functional form, normality and heteroscedasticity related with the model. In this study the variables, foreign portfolio investment (FPI) Domestic stock prices (DSP), interest rate (MIR), real exchange rate (EX), investment (CPI) and Income (GDP) are taken from Handbook

of statistics of Pakistan economy, International Financial Statistics database (IFS) and World Development Indicators (WDI). Furthermore, the data is annual that spans the time period 1984 to 2016.

4. Empirical results

4.1. Unit root tests

In a regression model, the variables are stationary or non-stationary is determined by the unit root tests. From stable long-run equilibrium, does not deviate temporarily through a large number of economic variables have provided the evidence by the concept of the unit root and the deviations are permanent.

4.1.1. Augmented dickey fuller test

First of all, we find the unit roots of the variables. However, we use these variables in our econometric model to identify stationary or non-stationary of the variables. For this purpose, we adopted Pesaran and Shinn test in order to find out the unit root values. The result of the stationary and non-stationary test are given in Table 1.

Table 1 shows results of the test for the variables at level and first difference form identifies the series which are stationary and non-stationary at the level. The test is further extended to the variables in their first difference form. The null hypothesis of the test states that the series is a unit root, which means that series is not stationary. However, in alternative hypothesis the series is stationary, which shows that series is not a unit root. The t-stats and the corresponding p-values for each of the variables show that only two variables (F*PI* and *LMMR*) are stationary at level or integrated order zero I (0). Whereas rest of four series are non-stationary at level, it means these series are integrated at order I (1), so these series become stationary at first difference. The above analysis clearly shows that there are more than one variable, which is non-stationary, so first we find a long-run relationship between foreign portfolio investment and domestic stock prices. Hence, it is satisfied that there is co-integration exist between the variables. The null hypothesis has been rejected on the result based on unit roots from Akaike information criteria and diagnostic test of serial correlation which is based on unit roots test and the result of regression.

4.2. VAR lag length

Enders analysing the system of variables on the dynamic impacts of random disturbances and the interrelation of time series is used the vector auto-regression (VAR) model. The VAR analysis determines the interrelationship among the parameter estimates rather than economic time series. In the previous periods, the interaction of the variables reveals the residual correlation in the VAR model. For selecting appropriate lag length, VAR has been used and describes the different VAR specific in Table 2 as below.

The VAR lag length shows the different criteria for selection of dependent variable lags. However, we select the Akaike information criteria (AIC), which indicate that maximum select two (2) lag for dependent variable in the model. On the basis of this criterion selected, it further proceeds.

Table 1. Stationary and non-stationary.

	Constant		Constant and trend	
Variables	Level	First difference	Level	First difference
DSP	0.086	−8.523***	−2.43	−8.70***
FPI	−4.33***	–	−4.80**	–
LEX	−1.36	−6.23***	−1.88	−6.60***
LMMR	−3.06**	–	−3.03	−4.38***
LCPI	1.01	−2.64*	−5.22***	–
LGDP	0.91	−5.34***	−1.17	−5.77***

***sig at 1% level.
**sig at 5% level.
*sig at 10% level.

Table 2. VAR.

Lag	Log	LR	FPE	AIC	SC	HQ
0	−112.561	NA	0.0001	7.904	8.184[a]	7.993
1	−58.731	82.537[a]	3.50[a]	6.715	8.677	7.433[a]
2	−20.597	43.221	4.17	6.573[a]	10.216	7.738

[a]Indicates the lag order selected by the criterion.
LR: Sequential modified LR test statistics (each test at 5% level); FPE: Final predictor error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criteria.

Following AIC Criteria, error correction version of ARDL (1 1 2 0 1) is:

$$\Delta DSP_t = \alpha_0 + \sum_{i=1}^{2} \alpha_{1i}\Delta DSP_{t-i} + \sum_{i=0}^{2} \alpha_{2i}\Delta FPI_{t-i} + \sum_{i=0}^{2} \alpha_{3i}\Delta LGDP_{t-i} + \sum_{i=0}^{2} \alpha_{4i}\Delta LMMR_{t-i} + \sum_{i=0}^{2} \alpha_{5i}\Delta LCP_{t-i} + \sum_{i=0}^{2} \alpha_{6i}\Delta LEX_{t-i} + \gamma_0 DSP_{t-1} + \gamma_1 FPI_{t-1} + \gamma_2 LGDP_{t-1} + \gamma_3 LMMR_{t-1} + \gamma_4 LCPI_{t-1} + \gamma_5 LEX_{t-1} + \epsilon_t + \text{ECM}$$

4.3. ARDL bounds testing

For testing the presence co-integration among variables, Wald F- statistics have been used. Calculated value of Wald F-Statistic has been compared with the bounds testing given by Pesaran and Shin (2001). Following table shows test statistics and bounds at 10, 5 and 1% level of significance. In the view of co-integration, to test the validity of theory is used for imposing restrictions which are derived by the long-run parameters. Thus co-integration regressions between economic variables show the equilibrium or long-run relationships. In the estimation of the short run disequilibrium relationship provides enables utilisation of the estimated long-run parameters and a direct test of the economic theory by the co-integration approach. However, in their papers from Shin and Pesaran tables was selected through $K = (n - 1)$ by the value of Wald F-Statistics and no trend and unrestricted intercept is selecting through ARDL bound test. AIC criteria is (1 1 2 0 1) is selected through the order of ARDL model. Whereas, AIC has lower prediction error and is based on this model, which is mention in below Table 3.

As calculated F-statistic is greater than 4.68, the upper bound at 1 per cent level of significance, so it is enough evidence to conclude that there is a strong co-integration exists between independent and dependent variables. In order to select the maximum lag length is 2 from AIC in conditional ARDL from specific to general modelling approach. These results allow to proceed for long-run coefficients of fitted ARD L model in Table 4.

4.4. Long run coefficients

$$DSP_t = \beta_0 + \beta_1 FPI_t + \beta_2 LCPI_t + \beta_3 LGDP_t + \beta_4 LMMR_t + \beta_5 LEX_t + \epsilon_t$$

The model shows that if one unit increases in FPI it causes 0.043 unit increase in the indexes of DSP. While CPI increases one per cent then DSP causes to decrease 2.273 units. However, one unit increase in GDP positively impact at 6.06 units in DSP. While one per cent increases in MMR causes 1.046 units decrease in DSP. Whereas, one percent increase in EX rate will negatively affect 1.323 units decrease in DSP. However, all the variables are statistically significant at *p*-values expect the exchange rate.

4.5. Short run coefficients

Within the error correction models utilising the estimates of the long-run parameters are estimated by the short run or the dynamic disequilibrium relationships. Banerjee, Dolado, Hendry, and Smith (2009) suggest the 'Error Correction Model' (ECM) as a Box-Jenkins modelling approaches and convenient alternative modelling to the static. In fact, the ECM provides both long runs (in levels) adjustment process and short-run dynamics (in difference) is combined model by these two approaches and shows in Table 5.

The short-run result shows that one unit increases in FPI affects 0.026 units approximately in the index of DSP. Whereas, one unit increase in MMR causes to increase 1.131 per cent in DSP. However, one unit increase in EX rate negatively impacts 2.129 units decrease in DSP. While one per cent increases in GDP will also negatively

Table 3. Bounds Testing.

	ARDL Bounds					
	10%		5%		1%	
Wald F-Statistics	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
6.358	2.26	3.35	2.62	3.79	3.41	4.68

Table 4. Long run coefficients.

Variables	Coefficients	T-statistics	Standard errors	*p*-value
FPI	0.043***	3.308	0.013	.013
LCPI	−2.273*	−1.91	1.190	.098
LGDP	6.060***	9.720	0.623	.000
LMMR	−1.046**	−2.420	0.432	.046
LEX	−1.323	−1.651	0.801	.142

*Significant at 1%.
**Significant at 5%.
***Significant at 10%.

Table 5. Short run coefficients.

Variable	Coefficient	Std. error	T-statistic	*p*-value
ΔFPI	0.026	0.007	3.557	.001
ΔEX	−2.129	1.331	−1.598	.122
ΔGDPB	0.829	0.586	1.413	.169
ΔMMR	1.131	1.816	0.622	.538
ΔCPI	0.230	0.697	0.330	.744
ECM(-1)	−0.690	0.201	−3.422	.002

*Significant at 1%.
**Significant at 5%.
***Significant at 10%.

Table 6. Diagnostic test.

Indicator	Statistic (*p*-Value)
R square	.98
Adjusted R Square	.93
Durbin Watson	2.196
Breusch-Godfrey Serial Correlation LM Test	2.22 (.824)
Breusch-Pegan-Godfery Hetroscedaksticity Test	17.61 (.729)
ARCH	3.166 (.366)

impact 0.829 per cent approximately decreases in DSP. While one unit increases in CPI positively causes of 0.23 units increase in DSP.

In Table 5, the important one is error correction model (ECM) and its values, two main things are must understandable in ECM. First one is value of coefficient should be in negative and second value of T-test be significant, which means that T-statistics value is more than two (2) and P-value is less than 5 per cent. Hence, both conditions are satisfied in our ECM value and it is statistically significant at 5 per cent level. It means that 69 per cent values are adjusted from the previous year at *p*-value is .002 and details are mentioned in below Table 6.

4.6. Diagnostic test

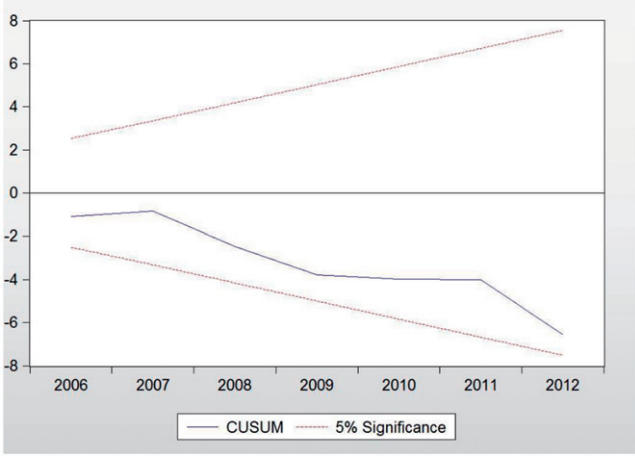
The diagnostic test confirms the specification of the whole model and its results. The values of R-Square and Adjusted R-square clearly shows that the model is best fitted. Whereas, Durbin Watson value shows the first order correlation. However, rest of all test such as LM test, Heteroscedasticity test and ARCH test have *p*-value greater than .05, which shows that error term is white noise and there is no problem of serial correlation, heteroscedasticity and autoregressive conditional heteroscedasticity (ARCH).

4.7. Stability test

The objective of stability tests is directed by employing the cumulative sum of residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ).

4.7.1. Cumulative sum of residuals (CUSUM)

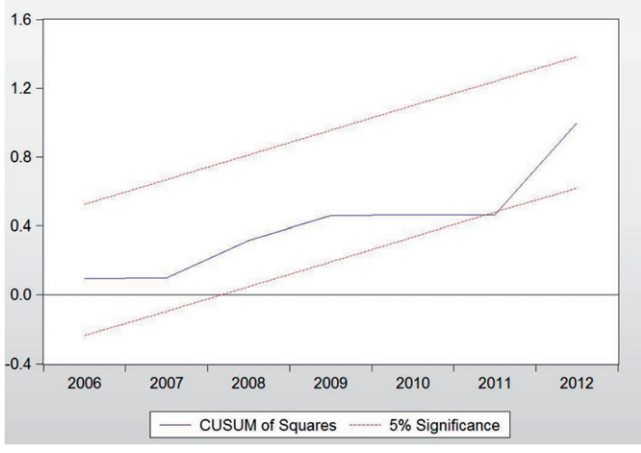
However, these both techniques (CUSUM) and (CUSUMSQ) are used to detect the structural break in the model. The CUSUM plot is applied with recursive residuals that behave very different from the OLS residual in a misspecified model. If the model is misspecified, there would likely be a tendency for disproportionate number of recursive residual to have the same sign. The cumulative effect of this will tend to move away from the horizontal axis.



In order to find out and understand the goodness of fit in ARDL model, we perform two kinds of test, diagnostic and stability test. Whereas, we discussed the diagnostic test in Section 4.5 and Table 5. However, now we will discuss the stability test. The stability test further categories into cumulative sum of residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ). Now we discuss the CUSUM according to the above diagram. The diagram shows blue line for CUSUM and both red lines for significance level at 5%. The CUSUM line clearly shows between the 5% significance level, which means that CUSUM stability test is statistically significant.

4.7.2. Cumulative sum of squares of recursive residuals (CUSUMSQ)

Whereas, CUSUMSQ plot provides a complement to the CUSUM plots and is used with OLS and recursive residuals. These tests provide further information about the robustness of the regression model to changes in the data, Aysu.



As we discussed above the objectives and functions of stability test in detail and now we discuss cumulative sum of squares of recursive residuals (CUSUMSQ). The red line shows the 5% significant level and blue line shows the CUSUMSQ in the diagram. The CUSUMSQ line start above from actual point and continually increase to upward and then suddenly decrease in 2009 and slightly touch at red line or significance level in 2011 and then quickly moves to upward. Hence, the overall results of CUSUMSQ stability test are statistical significant at 5% level.

5. Conclusion

The FPI implies that the foreigners can directly or indirectly purchase the shares in stock markets of other countries. This is the way of bringing foreign capital, which is desperately needed in developing countries like Pakistan. When the domestic country removes the major portion of the taxes for the international investors then we see a significantly increased in return inflows. This benefit also affects the different policies like corporate which include different kinds of investments such as issuance of equity, dividends, debts and share repurchases. In the last two decades, the financial sectors of Pakistan had adopted two policies, first the opening of financial markets, second adoption of flexible exchange rate system. It positively affects and rapidly increases in the investment of portfolio inflows. The last quarter of 2007, was very badly affected the Pakistan economy due to several reasons such as high rate of inflation, an expansionary fiscal policy, growing with imbalances of macroeconomic and most important one sudden incidents in political environment.

In FY 2004–2008, the average economic growth rate was 7.1% of Pakistan economy in those 5 years. While in FY2005 the growth rate was 9.0% due to stability of macroeconomic in Pakistan on justification of both inward and outward exposures. The emerging markets primarily depend upon internal and external environment of the country, behaviour and performance of the market players and the role of foreign funds in the shape of capital inflows. On 18nApril 2008, the KSE-100 reached its ever highest peak at points 15,676, while a declining practice started steadily in a consequently weeks and continue until the 28th August 2008. However, in this period the management of KSE arranged several meeting to identify and control this process of decline and finally they decided to close the index value at 9144 points on 27th August 2008. The results show that all the variables are statistically significant, expect exchange rate (EX). Whereas, ECM result shows both conditions are satisfied in our ECM value and it is statistical significant at 5% level. It means that 69% values are adjusted from the previous year at *p*-value is .002. Furthermore, an increase in FPI ethically leads in DSP, which indicates the capital inflows rise in Pakistan and people will get more benefits. Moreover, a significant increase in CPI effect DSP and purchasing behaviour of people will morally decrease. The most important component GDP has ethically impact on DSP, which indicate that a number of GDP increase the living and purchasing standard of people also increase, it has positive effect on society.

The short-run analysis of variables describe that they all variables have positively significant impact on DSP, excluding exchange rate, which will further affect the behaviour and attitude of people regarding their choices. However, a positive change in people attitude and behaviour leads toward ethical and moral foundation of good society. Whereas, everyone from society must play their vital role to sustain this moral position of people forever, and guide the rest of people according to your will for betterment of society. It also clears the picture of error term, which means there is no white noise. However, dynamic analysis between FPI and stock market performance confirm the relationship, so the government can focus on utilising the FPI variable as a tool to stabilise stock market during any financial crises.

6. Recommendations

The investors have some advantages to use FPI such as, They can withdraw or transfer their investment easily in FPI as compared to FDI to other local investors in political instability condition, sudden attacks like (bad governance issues or war) in that country. The investors are also getting benefits to put small share of investment in many sectors, instead of a large investment in one sector. The result of this investment must favour the FPI as compared to FDI, maybe investors get some loss in roughly the investment of FPI but they also gain profit from rest of investment, overall FPI investors will manage their loss from their rest of investment profit, whereas, in FDI, the investors will face a full loss or profit respectively.

In future, the researchers may study in a panel group of countries to identify the behaviour of stock market, its return, spill over and volatility through different policy variables, in short-run and long-run period. They will also check the causality relationship among emerging markets of other countries. Therefore, it is an interest of policymakers and researchers to know the impact of capital inflows on real economic activities as well as on functioning of financial markets and institutions.

Note

1. For detail see 'Volatility Spillover between the Stock Market and the Foreign Exchange Market in Pakistan' by Qayyum & Kemal, 2006. This study suggests 'the returns of stock market are sensitive to the returns as well as the volatility of foreign exchange Market'.

Availability of data and material

The author will provide all the data used in this research on request.

Disclosure statement

The author declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Notes on contributors

Mr Malik Shahzad Shabbir, visiting Lecturer at University of Lahore. Previously he has provided his services as Finance Manager in Eid Almabadee Est, Makkah Saudi Arabia. Mr Malik has published numerous articles in National and International reputed journals.

Mr Iftikhar Muhammad, PhD scholar (Economics) at Ibn Haldun University, Istanbul, Turkey.

References

Agarwal, R. (1997). Foreign portfolio investment in some developing countries: a study of determinants and macroeconomic impact. *Indian Economic Review*, *32*, 217–229. https://www.jstor.org/stable/29794138

Arif, I., & Suleman, T. (2017). Terrorism and stock market linkages: an empirical study from a front-line state. *Global Business Review*, *18*, 365–378. doi:10.1177/0972150916668604

Baharumshah, A.Z., & Thanoon, M.A.M. (2006). Foreign capital flows and economic growth in East Asian countries. *China Economic Review*, *17*, 70–83. doi:10.1016/j.chieco.2005.09.001

Banerjee, A., Dolado, J., Galbraith, J., & Hendry, D. (1993). *Co-integration error correction and the econometric analysis of non-stationary data*. Oxford: Oxford University Press.

Banerjee, A., Dolado, J.J., Hendry, D.F., & Smith, G.W. (2009). Exploring equilibrium relationships in econometrics through static models: some Monte Carlo evidence. *Oxford Bulletin of Economics and Statistics*, *48*, 253–277. doi:10.1111/j.1468-0084.1986.mp48003005.x

Choong, C.K., Baharumshah, A.Z., Yusop, Z., & Habibullah, M.S. (2010). Private capital flows, stock market and economic growth in developed and developing countries: a comparative analysis. *Japan and the World Economy*, *22*, 107–117. doi:10.1016/j.japwor.2009.07.001

Edwards, S. (2001) Exchange Rate Regimes, Capital Inflows and Crisis Prevention, NBER and University of California Working Paper.

Financial Stability and Risk Assessment. (2008). Karachi: State Bank of Pakistan.

Financial Stability report. (2007–2008). State Bank of Pakistan.

French, E.F. (2004). The capital asset pricing model: theory and evidence. *The Journal of Economic Perspectives*, *18*, 25–46. doi: 10.1257/0895330042162430

Froot, K.A., & Stein, J.C. (1991). Exchange rates and foreign direct investment: an imperfect capital markets approach. *Quarterly Journal of Economics*, *106*, 191–217.

Guillaumont, P., & Chauvet, L. (2001). Aid and performance: a reassessment. *Journal of Development Studies*, *37*, 66–92. doi: 10.1080/713601083

Hauser, S., Marcus, M., & Yaari, U. (1994). Investing in emerging stock markets. *The Journal of Portfolio Management*, *20*, 76–81. doi:10.3905/jpm.1994.76

Hendry, D.F. (1995). *Dynamic Econometrics*. Oxford: Oxford University Press.

Institute of International Finance. (2008). Rising Global Commodity Prices: Causes and Consequences, Special Briefing, June 12, IMF DC Washington.

Kumar, M. (2013). Returns and volatility spillover between stock prices and exchange rates: Empirical evidence from IBSA countries. *International Journal of Emerging Markets*, *8*, 1–1. doi:10.1108/17468801311306984

Laurenceson, J., & Chai, J. (2003). *Financial reform and economic development in China*. Cheltenham, UK: Edward Elgar.

Love, J.H., & Lage-Hidalgo, F. (2000). Analysing the determinants of US direct investment in Mexico. *Applied Economics*, *32*, 1259–1267. doi:10.1080/000368400404416

Muhammad N., Rasheed A., & Husain F. (2002). Stock prices and exchange rates: are they related. *The Pakistan Development Review*, *41*, 16. https://www.jstor.org/stable/41263367

Vávra, D., Ötker, M. I., Topf, B., & Polanski, Z. (2007). Coping with capital inflows: experiences of selected European countries (No. 7–190). International Monetary Fund.

Pearl, J. (2000). *Causality: models, reasoning, and inference*. Cambridge: Cambridge University Press.

Perold, A.F., & Schulman, E.C. (1988). The free lunch in currency hedging: implications for investment policy and performance standards. *Financial Analysts Journal*, *44*, 45–50. doi:10.2469/faj.v44.n3.45

Pesaran, M.H., & Pesaran, B. (1997). *Working with Microfit 4.0: Interactive Econometric Analysis*. Oxford: Oxford University Press

Pesaran, M., Shin, Y., & Smith, R. (2001). Bounds testing approaches to the analysis of long-run relationships. *Journal of Applied Econometrics*, *16*, 289–326. doi:10.1002/jae.616

Qayyum, A., & Kemal, A.R. (2006). Volatility spill overs between the stock market and the foreign exchange market in Pakistan, Pakistan Development Review, MPRA No. 1715.

Rashid, A. (2010). Capital inflows and exchange rate volatility in Pakistan. *International Review of Applied Economic Research*, *5*, 8.

Rashid, A., & Husain, F. (2011). Capital inflows, inflation and exchange rate volatility: an investigation for linear and nonlinear causal linkages. *Working Papers & Research Reports*, *2010, 16–28*.

Raza, S.A., & Jawaid, S.T. (2013). Terrorism and tourism: a conjunction and ramification in Pakistan. *Economic Modelling*, *33*, 65–70. doi:10.1016/j.econmod.2013.03.008

Rodrik, D., & Velasco, A. (1999). Short-term capital flows (No. w7364). National Bureau of Economic Research. SAGE publisher.

Shleifer, A., & Vishny, R.W. (2003). Stock market driven acquisitions. *Journal of Financial Economics*, *70*, 295–311. doi:10.1016/S0304-405X(03)00211-3

Stability Assessment of Financial Markets. (2007–2008). Karachi: State Bank of Pakistan.

Stevens, G.R. (2006), Capital flows and monetary policy, Bulletin October 2006, Reserve Bank of Australia.

Walker, E. (2008). Strategic currency hedging and global portfolio investments upside down. *Journal of Business Research*, *61*, 657–668. doi:10.1016/j.jbusres.2007.06.041

Woodward, J. (1995). Causation and explanation in econometrics. In D. Little (ed). *On the reliability of economic models: essays in the philosophy of economics.* Bostn: Kluwer Academic Publishers.