



AENSI Journals

Journal of Applied Science and Agriculture

ISSN 1816-9112

Journal home page: www.aensiweb.com/jasa/index.html



## Investigating the Role of Foreign Direct Investment on Stock Market: Evidence from Tehran Stock Exchange

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### ARTICLE INFO

Article history:

Received 20 March 2014

Received in revised form 20

April 2014

Accepted 15 May 2014

Available online 1 June 2014

Key words:

Stock market

Foreign Direct Investment

Tehran Stock Exchange

### ABSTRACT

**Background:** Macroeconomic variables have always been crucial for volatility of capital market. An integral part of capital market is the stock market, the development of which is linked with the country's level of savings, investment and the rate of economic growth. Iran's stock market has been classified as one of the fastest growing markets. Tehran Stock Exchange (TSE) is the biggest and most liquid exchange in Iran and is a major source of capital formation in Iran. The developing countries are witnessing changes in the composition of capital flows in their economies because of the expansion and integration of the world equity market. The stock markets are also experiencing this change. Foreign direct investments (FDIs) are becoming important source of finance in developing countries including Iran. **Objective:** The paper investigates the impact of FDI on the stock market development of Iran. The key interest revolves around the complementary or substituting role of FDI in the stock market development of Iran. The study also examines the other major contributing factors towards the development of stock market. An ARDL bound testing approach is used for long-run relationship among variables and the error correction model is used for short run dynamics. **Results:** Our results support the complementary role of FDI in the stock market development of Iran. Other macroeconomic variables affecting stock market development are domestic savings, GNP per capita, and inflation

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**To Cite This Article:** Ali Faez, Ghasem Parvarinejad, Mehran Orooei, Mahsa Lajevardi., Investigating the Role of Foreign Direct Investment on Stock Market: Evidence from Tehran Stock Exchange. *J. Appl. Sci. & Agric.*, 9(6): 2492-2500, 2014

## INTRODUCTION

It is generally recognized that a strong financial system guarantees the economic growth and stability. Stock market is an integral part of the financial system of the economy. It is a source of financing a new venture based on its expected profitability. The stock market is replica of the economic strength of any country. To boost investment, savings and economic growth, the development of stock market is imperative and cannot be ignored in any economy. Theoretical work shows the positive effect of stock market development on economic growth (Demirguc-Kunt and Levine 1996a; Sing, 1997; and Levine and Zervos, 1998). The development of stock market is the outcome of many factors like exchange rate, political stability, (Gay, 2008), foreign direct investment, and economic liberalization (Adam and Anokye *et al*, 2008).

In the era of globalization, FDI is a major source of capital inflow in most of developing economies where it bridges the gap of capital, technology, managerial skill, human capital formation and more competitive business environment. The role of FDI in economic development is found mixed in economic literature. It is argued on the one hand, that FDI in developing countries transfers business know-how and technology (Romer (1993). On the other hand, some predict that FDI in the presence of pre-existing trade, price, financial, and other distortions will hurt resource allocation and hence slow economic growth (Brecher and Diaz-Alejandro, 1977; Brecher, 1983; Boyd and Smith, 1999). Some studies show that FDI does not exert any independent influence on economic growth (Carkovic and Levine, 2002). FDI inflows have a positive effect on host country's economic growth in developing but not in developed economies (Johnson 2005). Thus, theory produces ambiguous predictions about the growth effects of FDI. Some models suggest that FDI will only promote economic growth under certain policy conditions.

The role of FDI in the development of stock markets of developing economies is considered very strong. It is observed that there is triangular causal relationship between these two; (1) FDI stimulates economic growth

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(2) Economic growth exerts positive impact on stock market development and (3) implication is that FDI promotes stock market development (Adam and Anokye *et al*, 2008). Given this background, the aim of the present study is to identify in general the major contributing factors to the development of Iran stock market with particular emphasis on the role of FDI. The question concerned is the complementary or substituting role played by FDI in stock market development of Iran. It is hypothesized that if FDI plays complementary role there is positive relationship between FDI and stock market development and if it is substituting there is negative relationship between these two.

The paper as customary is divided into different sections. Section II provides a brief overview of the literature on the determinants of stock market development. Section III highlights the salient features of the stock exchange market of Iran. Section IV outlines the methodology and explains the model and data collection procedure. Section V discusses results. Finally section VI concludes the major findings of the study followed by some policy implications.

#### *Determinants of stock market development: literature review:*

A considerable research on determinants of financial sector development has been done in economic literature. For example, Adam and Anokye *et al* (2009) in their study examined the impact of FDI on stock market in Ghana by using multivariate co integration and Innovation Accounting Methods. Their results indicate a long-run relationship between FDI, nominal exchange rate and stock market development in Ghana.

Chousa, and Krishna *et al* (2008) tried to assess whether stock markets are simply known to be mother of all speculative businesses, or whether they are importantly linked to attract firm level FDI in the form of cross-border Mergers & Acquisitions activities. They applied pooled regression technique by covering nine leading emerging economies for the period of 1987-2006. They found a strong positive impact of stock markets on cross border mergers & acquisitions deals and values. Robert (2008) analyzed the effects of exchange rate and oil prices on stock market returns for four emerging economies using the Box-Jenkins ARIMA model. No significant relationship was found between exchange rate and oil prices on the stock market index prices. Yartey (2008) identifies many factors like institutional and regulatory reform, adequate disclosure and listing requirements and fair trading practices important for foreign investment.

The relationship between stock market development and economic growth in Iran was investigated in the empirical study by Shabaz *et al*, (2008). They found long-run bi-directional causality between stock market development and economic growth. However, for short-run their results showed one-way causality i.e., from stock market development to economic growth. Singh (1997) also found positive relationship between economic growth and stock market development. Naceur *et al* (2007) investigated the role of stock markets in economic growth and identified the macroeconomic determinants of stock market development in the Middle Eastern and North African region. They found saving rate, financial intermediary, stock market liquidity and the stabilization variables as important determinants of stock market development.

Sarkar (2007) established the relationship between stock market development and capital accumulation in developing countries. He applied the ordinary least square technique (OLS) on time series data of 37 developed and less developed countries over the period 1976-2002 and showed that in the majority of cases (including France, UK and USA) the stock market turnover ratio an important indicator of stock market development- has no positive long-term relationship with gross fixed capital formation.

de la Torre, and Augusto (2007) studied the effects of reforms on domestic stock market development and internationalization by performing regressions on two variables: market capitalization and value traded by covering the period 1975-2004 for 117 countries. They concluded that reforms tend to be followed by increases in domestic market capitalization and trading.

Fritz and Mihir *et al* (2005) made an effort to explore the relationship between outbound FDI and levels of domestic capital formation through regression analyses for a much broader sample of countries for the 1980s and 1990s and concluded that it had been natural to assume that foreign investment came at the expense of domestic investment. Claessens, Daniela *et al* (2002-03) studied the determinants of Stock market development across the globe, the causes of internationalization and the effects on local exchanges by examining the data of 77 countries from January, 1975 to November, 2000. They concluded that the global migration of funds was beneficial for the stock market development due to more funds for corporations and more flexibility for investors. Krkoska (2001) explored the relationship between FDI and gross fixed capital formation in transition countries and showed that capital formation is positively associated with FDI. Garcia and Liu (1999) estimated the macroeconomic determinants of stock market development particularly stock market capitalization by using pooled data on fifteen industrialized and developing countries for the period of 1980-1995. The results showed that real income, saving rate, financial intermediary development, and stock market liquidity are the important determinants of stock market development. Macroeconomic volatility did not prove significant. Errunza (1983) found long term impact of foreign capital inflows on stock market development.

As far as our knowledge is concerned, there is no study so far being done on the macroeconomic determinants of stock market development of Iran. The role of FDI in stock market development of Iran is also

still untapped. An effort is made in this paper to investigate the relationship of different macro economic variables in general and FDI in particular with the stock market development of Iran.

### 1. Methodology:

In this study log-linear modeling specification has been used. Bowers and Pierce (1975) suggest that Ehrlich's (1975) findings with a log linear specification are sensitive to functional form. However, Ehrlich (1977) and Layson (1983) argue on theoretical and empirical grounds that not only log linear form is superior to the linear form but also makes results more favorable. To check the impact of foreign direct investment on stock market development following equation for empirical estimation is being modeled:

$$LMC = \alpha_1 + \alpha_2 LFDI + \alpha_3 LGNPC + \alpha_4 INF + \alpha_5 LSAV + \mu \quad (1)$$

Where **MC** = Market capitalization as share of GDP proxy stock market development, **FDI** = Foreign direct investment as share of GDP, **GNPC** = GNP per capita proxied for economic growth, **INF** = Inflation rate, **SAV** = Domestic savings as share of GDP and  $\mu$  is error term. All variables are taken into log form except inflation. Justification of variables taken in the model is discussed below:

#### Market Capitalization:

Stock market development is usually measured by stock market size, liquidity, volatility, concentration, and integration with world capital markets Following Adam and Anokye *et al.* (2009), market capitalization as a proportion of GDP is used as a proxy for stock market development. Market capitalization is defined as the total market value of all listed shares divided by GDP. It is argued this measure is less arbitrary than other measures of stock market development (Garcia and Liu, 1999).

#### FDI:

The relationship between FDI and stock market development has been widely discussed in economic literature (see for example, Errunza, 1983; Gracia and Liu, 1999; Yartey and Adajasi, 2007; and Adam and Anokye *et al.* 2009). The role of FDI in stock market development is twofold. It may either complement or substitute the development of stock market. In the former case a positive sign and in the latter case a negative sign is expected.

#### Gnp per capita:

Numerous studies have suggested that economic growth and stock market development are positively related to each other (Spears, 1991; Atje and Jovanic, 1993; Garcia and Liu, 1999; Luintel and Khan, 1999; Shabaz *et al.*, 2008). In this paper GNP per capita is taken as a proxy for economic growth. It is hypothesized that economic growth promotes stock market development.

#### Domestic Savings:

Higher rate of domestic savings in the economy accelerates the stock market activity. In their empirical study a strong statistical positive relationship is found between stock market development and savings (Garcia and Liu, 1999). It is argued that larger savings boost higher amount of capital flows through stock markets (Garcia and Liu, 1999).

#### Inflation:

Garcia and Liu (1990) and Naceur *et al.* (2007) have taken inflation as a proxy for macroeconomic stability in their empirical studies and found positive relationship between the economic stability and stock market development. Shahbaz (2007) has tested the Fisher hypothesis that stocks hedge against inflation for Iran for the period of 1971-2006. His results supported the Fisher hypothesis by finding positive relationship between nominal stock returns and inflation. Naceur (2007) also found positive relationship between stock market development and inflation. In the present paper the positive relationship between stock market development and inflation is expected.

Data for said macroeconomic variables have been obtained from different sources. Data span ranges from 1971 to 2006. World Development Indicators (WDI, 2007) for time series data of GNP per capita, FDI as share of GDP have been used. Data on domestic savings rate have been collected from Economic Survey of Iran (2007). Finally, data for market capitalization has been obtained from statistical bulletins of State Bank of Iran (various issues). International Financial Statistics of various years have been used to collect data on inflation.

### 1.1. Methodological Strategy:

#### ADF Unit Root test:

In the time series realization is used to draw inference about the underlying stochastic process. To draw inference from the time series analysis, stationarity tests become essential. A stationary test which has been widely popular over the past several years is unit root test. In this study Augmented Dickey Fuller (ADF) test is applied to estimate the unit root. ADF test to check the stationarity series is based on the equation of the below given form:

$$\Delta y_t = \beta_1 + \beta_2 t + \delta y_{t-1} + \alpha_i \sum_{i=1}^m \Delta y_{t-i} + \varepsilon_t \quad (2)$$

Where  $\varepsilon_t$  is a pure white noise error term and

$$\Delta y_{t-1} = (y_{t-1} - y_{t-2}), \Delta y_{t-2} = (y_{t-2} - y_{t-3}) \text{ etc}$$

These tests determine whether the estimates of  $\delta$  are equal to zero. Fuller (1979) provided cumulative distribution of the ADF statistics, if the calculate-ratio (value) of the coefficient  $\delta$  is less than  $\tau$  critical value from Fuller table, then y is said to be stationary.

#### ARDL Approach for Co-integration:

In this study, stock market development is measured through market capitalization (MC) as function of foreign direct investment (FDI), GNP per capita (GNPC), inflation (INF) and domestic savings (SAV). Most advanced approach of bounds testing is used to establish the cointegration among macroeconomic variables, where  $x_t$  is time series vector  $x_t = \{FDI, GNPC, INF, SAV\}$  with  $y_t = MC$ , this approach begins with an unrestricted vector autoregression:

$$z_t = \mu + \sum_{j=1}^q \delta_j z_t + \varepsilon_t \quad (3)$$

Where  $z_t = [y_t, x_t]'$ ;  $\mu$  is showing vector of constant term,  $\mu = [\mu_y, \mu_x]'$  and  $\delta$  is indicating matrix of vector autoregressive (VAR) parameters for lag  $j$ . As mentioned by Pesaran, Shin and Smith (2001), two time series  $y_t$  and  $x_t$  can be integrated at either  $I(0)$  or  $I(1)$  or mutually cointegrated. In this case where time series vector  $x_t$ , foreign direct investment, GNP per capita, inflation and domestic savings can also be integrated at different orders. The error terms vector  $\varepsilon_t = [\varepsilon_{y,t}, \varepsilon_{x,t}]' \sim N(0, \Omega)$ , where  $\Omega$  is definitely a positive. Equation-4 in modified form can be written as a vector error correction model as given below:

$$\Delta z_t = \mu + \gamma z_{t-1} + \sum_{j=1}^{q-1} \lambda_j \Delta z_t + \varepsilon_t \quad (4)$$

Where  $\Delta = 1 - L$ , and

$$\lambda_j = \begin{bmatrix} \lambda_{yy}, j \lambda_{yx}, j \\ \lambda_{xy}, j \lambda_{xx}, j \end{bmatrix} = - \sum_{k=j+1}^q \varphi_k \quad (5)$$

Here,  $\gamma$  is multiplier matrix for long run as following:

$$\gamma_j = \begin{bmatrix} \gamma_{yy} \gamma_{yx} \\ \gamma_{xy} \gamma_{xx} \end{bmatrix} = - (I - \sum_{j=1}^q \varphi_j) \quad (6)$$

$I$  is indicating an identity matrix. The diagonal essentials for said matrix are left unrestricted. This implies that each of series can be stationary either at  $I(0)$  or  $I(1)$ . This approach enables to examine the maximum cointegrating vectors that includes both  $y_t$  &  $x_t$ . This would investigate that either  $\gamma^{yx}$  &  $\gamma^{xy}$  can be non-zero but not both of them. In this paper, our main objective is to find out the long run impact of foreign direct investment, GNP per capita, inflation and domestic savings on the stock market development. The restriction imposed is  $\gamma^{xy} = 0$  which indicates that foreign direct investment, GNP per capita, inflation and domestic savings have no long run impact on stock market development. Under said assumption that is  $\gamma^{xy} = 0$ , equation-4 can be rewritten as follows:

$$\Delta y_t = \beta_0 + \beta_1 y_{t-1} + \beta_2 x_{t-1} + \sum_{j=1}^{q-1} \beta_{y,j} \Delta y_{t-j} + \sum_{j=1}^{q-1} \beta_{x,j} \Delta x_{t-j} + \varphi \Delta x_t + \mu_t \quad (7)$$

Where;

$$\beta_0 = \mu_y - \omega' \mu_x; \beta_1 = \lambda_{yy}; \beta_2 = \lambda_{yx} - \omega' \lambda_{xx}; \beta_{y,j} = \lambda_{yy,j} - \omega' \lambda_{xy,j} \text{ And } \beta_{x,j} = \lambda_{yx,j} - \omega' \lambda_{xx,j}$$

This is termed as Auto Regressive Distributed Lag Model (Pesaran, Shin and Smith, 2001) and is denoted by unrestricted error correction model (UECM). Empirical evidence on coefficients of the equation-7 can be investigated by ordinary least squares and non-existence of long run link between said variables can be tested by the calculating F-statistics for the null hypothesis of  $\beta_1 = \beta_2 = 0$ . Under the alternative hypothesis  $\beta_1 \neq \beta_2 \neq 0$  stable relationship in long run between said variables can be described as following:

$$y_t = \varphi_1 + \varphi_2 x_t + v_t \quad (8)$$

Where  $\varphi_1 = -\beta_0 / \beta_1$ ,  $\varphi_2 = \beta_2 / \beta_1$  and  $v_t$  is stationary process having mean zero. Pesaran, Shin and Smith, (2001) reveal that the distribution of F-statistics is based on the order of integration of the empirical data series. The ARDL method estimates  $(p+1)^k$  number of regressions in order to obtain optimal lag length for each variable, where  $p$  is the maximum number of lags to be used and  $k$  is the number of variables in the equation. To establish the stability of the ARDL model, sensitivity analysis is also conducted that examines the serial correlation, functional form, normality and heteroscedasticity associated with the model. The cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMsq tests are applied for checking the stability of the model. Examining the prediction error of the model is another way of ascertaining the reliability of the ARDL model. If the error or the difference between the real observation and the forecast is infinitesimal, then the model can be regarded as best fitting.

#### Results:

Table-4 shows the descriptive statistics.

**Table 4:** Correlation Matrix and Descriptive Statistics.

Variables	LMC	LGNPC	LFDI	LSAV	LINF
Mean	24.6329	9.5067	-0.9958	2.3853	2.0357
Median	24.2712	9.5384	-0.7936	2.4046	2.0853
Maximum	28.3291	10.2399	0.6787	2.9116	3.2831
Minimum	21.9902	8.5725	-4.6636	1.5451	1.0681
Std. Dev.	2.03523	0.3521	1.1505	0.3833	0.5474
Skewness	0.19959	-0.1187	-1.0469	-0.3326	0.2439
Kurtosis	1.51210	3.3143	4.2682	1.9774	2.6474
LMC	1.0000				
LGNPC	0.8813	1.0000			
LFDI	0.8035	0.7573	1.0000		
LSAV	0.7763	0.7368	0.5803	1.0000	
LINF	-0.3075	-0.5017	-0.1166	-0.2748	1.0000

ARDL has the advantage of avoiding the classification of variable into  $I(0)$  or  $I(1)$  as there is no need for unit root pre-testing. According to Sezgin and Yildirim, (2002) and Ouattara (2004), in the presence of  $I(2)$  variables, the computed F-statistics provided by PSS (2001) become invalid because bounds test is based on the assumption that the variables are  $I(0)$  or  $I(1)$  or mutually cointegrated. Therefore, the implementation of unit root test in the ARDL procedure might still be necessary to ensure that none of the variable is integrated at order 2 i.e.  $I(2)$  or beyond. For this purpose, Augmented Dickey Fuller (ADF) unit-root test has been employed to find out order of integration of concerned actors in the study. The results in Table-5 show that inflation (INF) is stationary at  $I(0)$  while market capitalization (MC), foreign direct investment (FDI), economic growth (GNPC) and domestic savings (SAV) are integrated of order 1 i.e.  $I(1)$ . This dissimilarity in the order of integration of the variables lends to support for the implementation of the ARDL bounds testing approach rather than one of the alternative co-integration tests.

**Table-5** Unit-Root Estimation.

Variables	Level		First Difference	
	Intercept and trend	Prob-value	Intercept and trend	Prob-value
LMC	-2.8223	0.2001	-5.0297	0.0015
LFDI	-3.0809	0.1269	-7.4962	0.0000
LGNPC	-1.3699	0.8506	-6.0279	0.0001
LINF	-3.6526	0.0400	-4.8539	0.0023
LSAV	-3.1266	0.1170	-5.2366	0.0009

**Table 6:** Lag length Selection.

Order of lags	Akaike Information Criteria	Schwartz Bayesian Criteria	F-test Statistics
---------------	-----------------------------	----------------------------	-------------------

0	5.9335	6.1580	3.4517
1	2.6781	4.0249	4.8281
Sensitivity Analysis			
Serial Correlation Test = 1.9079 (0.1827)			
ARCH Test = 0.6802 (0.5146)			
Heteroscedasticity Test = 1.7967 (0.4210)			

Now turn is to two-step ARDL co-integration (See Pesaran *et al.* 2001) procedure to apply. In the first stage, the order of lag length on the first differenced estimating the conditional error correction version of the ARDL model for equation-7, is usually obtained from unrestricted vector autoregression (VAR) by means of Akaike Information Criterion, which is 1 based on the minimum value of (AIC) as shown in Table-6. The total number of regressions estimated following the ARDL method in the equation-1 is  $(1+1)^5 = 32$ . The results of the bounds testing approach for co-integration posit that the calculated *F-statistics* is 4.83 which is higher than the upper level of bounds critical value of 4.78 at 10 percent level of significance while value of lower bounds is 4.04. This implies that the null hypothesis of no cointegration cannot be accepted. It means that, there is indeed a co-integration relationship among the variables. Next step is to find a long-run relationship. Partial long run links are pasted in Table-7 through ARDL-OLS investigation.

**Table 7:** Long Run Elasticities.

Variables	Dependent variable = LMC					
	OLS Model			Monotonous OLS Model		
	Coefficient	T-statistics	Inst-values	Coefficient	T-statistics	Inst-values
Constant	-11.083	-1.327	0.1944	3.249	0.457	0.6503
LFDI	0.409	1.994	0.0553	1.220	2.992	0.0054
LFDI <sup>2</sup>	-	-	-	0.159	1.852	0.0734
LGNPC	0.341	3.530	0.0014	0.204	2.639	0.0129
LINF	0.050	1.985	0.0564		-	-
LSAV	1.353	2.002	0.0544	1.205	2.291	0.0289
R-squared = 0.8567 Adjusted R-squared = 0.8376 Durbin-Watson stat = 1.55 Akaike info criterion = 2.5615 F-statistic = 44.84			R-squared = 0.8665 Adjusted R-squared = 0.8492 Durbin-Watson stat = 1.44 Akaike info criterion = 2.4953 F-statistic = 50.28			

It is documented that one percent increase in foreign direct investment is associated with 0.409 percent increase in market capitalization. This shows that relationship between foreign direct investment and stock market development is complementary not substitute. Economic growth (GNPC) is linked positively with development of stock markets in the country. Impact of inflation on stock market development is positive but minimal. The positive association between inflation and stock market development supports the earlier study's proposition that Iran stock markets are hedge against inflation (Shahbaz, 2007). It may be documented that stock market is safe place for investors to invest in Iran. Domestic savings seem to improve the efficiency of stock market in the country. It is concluded that 5 percent increase in domestic savings increases growth of stock markets by 6.765 percent. Spontaneous impact of foreign direct investment is also complementary.

The existence of an error-correction term among a number of co-integrated variables implies that changes in dependant variable are a function of both the levels of disequilibrium in the co-integration relationship (represented by the ECM) and the changes in the other explanatory variables. This tells us that any deviation from the long run equilibrium will feed back on the changes in the dependant variable in order to force the movement towards the long run equilibrium (Masih and Masih, 2002).

The  $ecm_{t-1}$  coefficient shows speed of adjustment from short run to long span of time and it should have a statistically significant estimate with negative sign. According to Bannerjee *et al.*, (1998) "a highly significant error correction term is further proof of the existence of stable long run relationship". The coefficient of  $ecm_{t-1}$  is -0.709 for short run model and implies that deviation from the long-term economic growth is corrected by 70.9 percent over each year (Table 8). The lag length of short run model is selected on basis of Schwartz Bayesian Criteria.

**Table 8:** Short Run Dynamics.

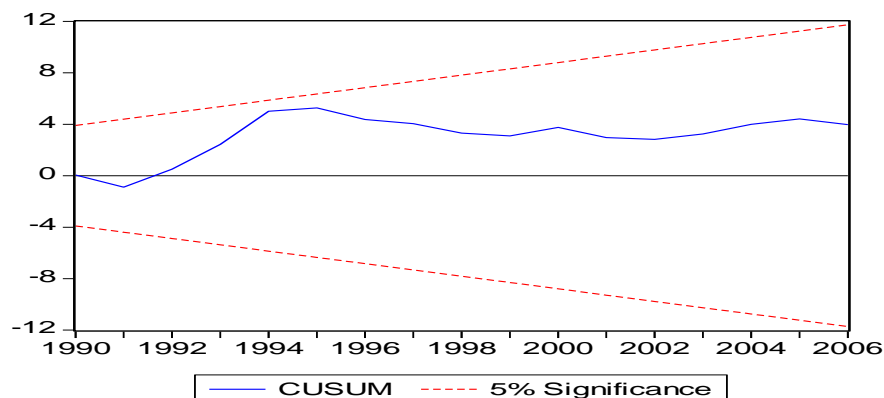
Dependent Variable: $\Delta LMC$			
Variable	Coefficient	T-Statistic	Prob-value
Constant	0.104	0.949	0.3504
$\Delta FDI$	0.210	1.652	0.1097
$\Delta INF$	-0.011	-0.413	0.6830
$\Delta GNPC$	2.076	2.686	0.0120
$\Delta LSAV$	-0.935	-1.282	0.2104
$ecm_{t-1}$	-0.709	-4.667	0.0001
R-squared = 0.4761			

Adjusted R-squared = 0.3825
Akaike info criterion = 1.972
F-statistic = 5.089
Prob(F-statistic) = 0.002
Durbin-Watson stat = 1.984

In short run, foreign direct investment is linked positively. This again shows that in short span of time foreign direct investment and stock market development nexus is complementary. Increase in inflation and domestic saving are associated negatively with stock market development but insignificant. GNP per capita and stock market development are correlated positively and GNP per capita is showing dominating impact on stock market development in short run.

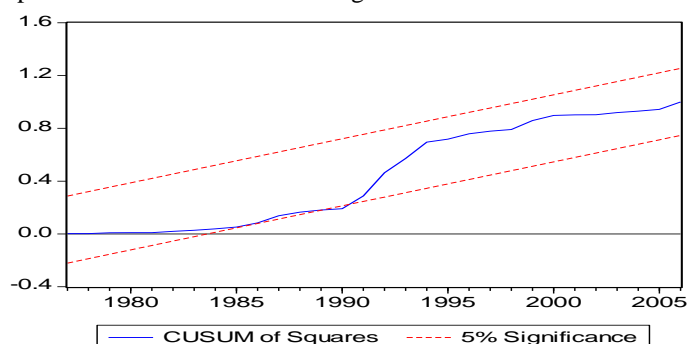
#### Sensitivity Analysis:

To check serial correlation, autoregressive conditional heteroscedasticity, and white heteroscedasticity diagnostic tests have conducted (Table 6). The results suggest that short-run model passes through the sensitivity analysis or diagnostic tests in the first stage. No evidence of autocorrelation, white heteroscedasticity and autoregressive conditional heteroscedasticity is found in the model. Finally, the stability of the long-run coefficients together with the short run dynamics, is checked by the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMsq) with recursive residual (Figures 1 and 2). Bahmani-Oskooee and Nasir (2004) state that null hypothesis (*i.e.* that the regression equation is correctly specified) cannot be rejected if the plot of these statistics remains within the critical bounds of the 5% significance level. Figures A and B show that the plots of both the CUSUM and the CUSUMsq are within the boundaries. These statistics confirm the stability of the long run coefficients of regressors that affect the stock market development.



**Fig. 1:** Plot of Cumulative Sum of Recursive Residuals.

The straight lines represent critical bounds at 5% significance level.



**Fig. 2:** Plot of Cumulative Sum of Squares of Recursive Residuals.

The straight lines represent critical bounds at 5% significance level.

#### VI. Conclusion and policy implications:

An effort has been made in this paper to identify macroeconomic variables with particular emphasis on FDI affecting stock market development of Iran. Thirty five years data was collected. Log linear form model for regression was formulated. The macroeconomic variables included in the model were market capitalization, FDI, GNP per capita, domestic savings and inflation rate. As this was the time series analysis. Stationarity of the series was checked by applying ADF test for the estimate of unit root. ARDL approach for testing co-integration was applied. Results indicated that inflation was stationary at  $I(0)$  while market capitalization (MC),

FDI, economic growth (GNPC), and domestic savings (SAV) were integrated of order 1, i.e.,  $I(1)$ . Regression results indicated a positive statistically strong relationship between FDI and market capitalization thus reflecting the complementary role of FDI in the stock market development of Iran. Savings also show a strong positive relationship with the stock market development. These results are in conformity with the empirical findings of Garcia and Liu (1999) in the case of developing and developed countries. Impact of GNP per capita as a proxy for economic growth on stock market development is positive and statistically strong implying that economic growth of the economy is imperative for the development of the stock market of Iran. Earlier Sing (1977) Garcia and Liu (1999) and Shabaz et al (2008) found the similar findings.

The Error Correction Model was applied to see the speed of adjustment in the disequilibrium in the long-run. The coefficient of  $ecm_{t-1}$  is -0.709 for short run model and implies that deviation from the long-term economic growth is corrected by 70.9 percent over each year.

The implications of empirical results are multifaceted. The government can encourage FDI in Iran by taking various steps. First and foremost measure may be the assurance of political stability in the country. Adequate provision of infrastructure can enhance the FDI. Volatility of foreign exchange and the rate of interest should be minimized through appropriate monetary policy. Results suggest positive impact of all macro economic variables on the stock market development of Iran. Among these are economic growth, domestic savings, and inflation rate. If the government seriously targets these macro economic variables, the stock market development will boost.

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