The Effects of Foreign Direct Investment on the Stock Market in Iran

Farzaneh Zare  
Department of Management, Ahram Branch, Islamic Azad University, Ahram, Iran  
(Phone: +989173732001; E-mail: f_zare59@yahoo.com)

Abdolkarim Hosseinpoor  
Department of economics, Persian Gulf University, Bushehr, Iran

Abstract

Financial markets play a crucial role in the economy of any country, especially in developing countries. This study examines the impact of foreign direct investment (FDI) on the stock market in the period of 1971 to 2011 in Iran using cointegration test. The results indicate that there are short-term and long-term relationships between model variables. Short-term and long-term patterns are completely related to each other and foreign direct investment has a significant positive impact on the stock market in Iran. As a result, it is recommended to encourage foreign investors to invest in Iran for the improvement of the stock market in Iran. On the other hand, transactions should be improved with the outside world for the improvement of the stock market.

Keywords: Foreign Direct Investment (FDI), Stock Market Index, Cointegration, Johansen Test.
1. Introduction
If financing is considered as one of the most important factors of economic growth, developing countries that rely only on internal resources are always in trouble due to the low level of national savings. The way of transferring funds to cover the financial needs of governments is still one of the major problems for the global financial system. Therefore, for the most statesmen of these countries reliance on foreign sources was considered the only practical solution for financing of the development. The use of foreign governments and obtaining short and long-term loans from foreign banks and institutions can only solve a part of problems, as it causes other problems such as repayment of the loan plus interest, and if it is not paid on time it will cause political problems.

Using foreign direct investment is another method for providing sufficient funds to advance the stock market and achieve economic growth that in recent years has considerably attracted the attention of countries and economic areas. In the new international economic conditions, foreign investment plays a very important role and the time of confrontation with foreign investment and its negation has come to an end and more relevant discussions are about the question that what type of investment is beneficial for the country and which ways can attract foreign investment to the country. In addition, foreign investors, especially multinational companies to improve competitiveness and profits are interested in investing in advantageous areas. The performance of multinational corporations can also affect economic, social, political development of host countries through different ways and in different aspects, which this issue is of great importance for the host governments. These effects have a very wide range, such as the impact on employment, balance of payments, industrial structure, stock market and financial market, etc., which each of them in turn has its own complexities.

Therefore, the main objective of this study was to investigate the impact of foreign investment on the stock market in Iran.

2. Theoretical Foundations and Research Background
The relationship between foreign direct investment and the stock market was raised indirectly in the neoclassical growth models. In neoclassical growth models, technological progress and labor are considered exogenous and it is believed that foreign direct investment can lead to economic growth of host countries and as a result the growth of the stock market only in a short term by increasing physical capital, but it has not significant effect on it in a long-term; as according to neoclassicism long-term growth only occurs through the growth of labor force and technological development (Solow, 1956). However, from the 1980s onwards, endogenous growth theories were proposed, in which technology is considered as an endogenous factor. In endogenous growth models it is assumed that FDI is more efficient than domestic investment. In these models, other channels such as research, human capital, exchange rates, external factors or spillover effects are emphasized, through which FDI can improve the development of financial markets, including the stock market and thus economic growth (Grossman and Helpman, 1991; Loungani and Razin, 2001). Foreign direct investment can affect economic growth; however, this effect depends on the state of development of the financial market of the host country. This relationship can be considered as a combined effect of foreign direct investment and the development of financial markets on investment efficiency or total productivity of production factors.

There are numerous studies on the effect of FDI on economic growth with financial market approach. But, alongside these studies which have considered the role of banking system on economic growth, there are studies on the relationship between the stock market and foreign investment.
Levin (1991) in his study derived a model that shows the power of stock market liquidity decreases the fear of investing in long-term projects; as investors are able to sell their share in the project at any time before completion. Therefore, increased liquidity power facilitates investment in long-term and increases projects’ efficiency and as a result enhances economic growth.

Alfro et al. (2004) in a study titled “Foreign Direct Investment and Economic Growth: The Role of Domestic Financial Markets” evaluated the relationship between FDI and economic growth through the development of financial markets using data from 71 developing countries for the period from 1975 to 1995 and panel data. Using this model, they concluded that low levels of development of financial markets can limit or even negative the positive effect of FDI on economic growth.

Ljungwall (2007) in a study titled “Financial Development, Foreign Direct Investment and Economic Growth in China,” investigated the relationship between foreign direct investment and economic growth using the generalized method of moments (GMM) in 28 prefectures of China from 1986 to 2003. The results of this study suggest that the combination of foreign direct investment with the first and second indicators has a negative effect on economic growth and its combination with the third indicators has a positive effect on economic growth. In addition, the coefficient of FDI is more than the coefficient of combined effect of FDI and measurement indicators of government intervention and financial depth and the coefficient of FDI is lower than the coefficient of combined effect of FDI with market’s degree of freedom. Measurement indicators of government intervention and financial depth have a negative effect on economic growth, while market’s degree of freedom has a positive effect on economic growth. In addition, development in financial sector increases the positive reaction of the economic growth to FDI.

Ahmed and Malek (2009) in a study titled “Financial Sector Development and Economic Growth: an Empirical Analysis of Developing Countries” have studied this issue through FDI channel. They evaluated this relationship using panel data from 35 developing countries between 1970 and 2003 and the generalized method of moments. Their results show that even if the development of financial sector does not lead to high-level investments, it will result in the more efficient allocation of domestic capital and improvement of economic growth.

About the stock market and macroeconomic indicators such investment the following studies can be mentioned as well:

Mokhrejee and Naka (1995) in a study using a vector error correction model (VECM) observed that there is a long-term relationship between the stock market and macroeconomic variables in Japan.

Wongbangpo and Sharma (2001) in a study on the Southeast Asian countries showed that there is short-term and long-term relationships between stock price indicators and a set of macroeconomic variables such as GDP, money supply, interest rates and exchange rates during 1986 and 1988.

Kasman (2003) studied the relationship between exchange rate and stock prices in Turkey. The results indicate that there is a long-term stable relationship between stock prices and exchange rates in Turkey. However, Granger causality test indicates that there is a causal relationship between exchange rate and industry sector index.

Zakaria (2007) investigated the causality relationship of FDI and development of financial markets, including stock markets in 37 developing countries using multivariate regression. The results showed that FDI plays no role in the development of banking system and financial markets in these countries. On the other hand, financial development did not lead to increased foreign investment in these countries.
3. Data
Statistics used in the estimation have been collected from national accounts, statistical sources and published reports by the Central Bank and the Statistical Yearbook of different years for annual time series in the period from 1971 to 2011.

4. Econometric Method
The Engle-Granger method does not consider short-term dynamic interactions between variables. For this reason, using models that have short-term dynamics and lead to the estimation of more accurate coefficients of the model are taken into consideration. Therefore, the ARDL method was used in this study. ARDL consists of two stages. In the first stage, the long-term relationship between the variables of the model is tested. To evaluate the long-term relationship, bound testing approach of Pesaran, Shin and Smith (2001) based on unrestricted error correction model (UECM) estimation including dynamic relationship and long-term equilibrium relationship can be used.

In this method, to evaluate the long-term equilibrium relationship in a model such as $Y_t = f(X_{1t}, X_{2t}, X_{3t}, ..., X_{mt})$, an equation is estimated as follows:

$$\Delta Y_t = a + \sum_{i=1}^{k} b_{1i} \Delta Y_{t-i} + \sum_{i=0}^{k} b_{2i} \Delta X_{1t-i} + ... + \sum_{i=0}^{k} b_{mi} \Delta X_{mt-i} + \varepsilon_t$$

The above equation can be summarized as follows:

$$\Delta Y_t = a + \sum_{i=0}^{k} b_{10} \Delta Y_{t-i} + \sum_{j=1}^{n} \sum_{i=0}^{k} b_{ji} \Delta X_{jt-i} + \varepsilon_t$$

In this method, the long-term relationship between variables is tested by calculating the significance statistics of levels with lags in the form of error correction. The important point is that the distribution of $F$ is non-standard. Pesaran et al. (1996) calculated the appropriate critical values corresponding to the number of regressors and whether or not the model includes the intercept and trend. They provided two groups of critical values: the first group is based on that all variables are stationary and the other is based on that all of them are non-stationary, which can be stationary with one differencing, and if F-statistics is placed outside of this boundary, a definite decision is made regardless of the variables are $I(0)$ or $I(1)$. In this case, if F-statistics is placed beyond the upper limit, the null hypothesis is rejected that there is no long-term relationship, and if it is placed in the lower limit, the null hypothesis is accepted. If F-statistics is placed between the two limits, the results of inference are uncertain and depend on that variables are $I(0)$ or $I(1)$. Under these conditions, unit root tests should be performed on variables.

Autoregressive distributed lag (ARDL) model is somewhat lacking weaknesses of Engel-Granger model, and like Johansen - Juselius method it is not necessary that all variables be $I(1)$, but they can be $I(0)$ or $I(1)$. Therefore, ARDL is the best option to evaluate cointegration in these circumstances.

5. Model correction and estimation
The model presented in this study is derived from Zakaria (2007) model, which is corrected as follows:

$$SMI = f(FDI, INFL, OPEN, G)$$
where, SMI is stock exchange index, FDI is foreign direct investment, INFL is domestic inflation rate, OPEN is the indicator of openness, which is obtained by the sum of exports and imports to GDP, and G is the current expenditures of government.

Unit root test was used to study the stationary variables that showed all the variables are $I(1)$ or $I(0)$ that it allows us to be able to use ARDL bounds test. To determine the optimal lag, $k$, Akaike’s criterion was used. The results are shown in Tables (1) and (2).

### Table (1) ADF test results on variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model with intercept without trend</th>
<th>Model with intercept and trend</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistics</td>
<td>Critical value</td>
</tr>
<tr>
<td>SMI</td>
<td>-0.99</td>
<td>-3.02</td>
</tr>
<tr>
<td>FDI</td>
<td>-2.46</td>
<td>-3.02</td>
</tr>
<tr>
<td>INFL</td>
<td>-4.39</td>
<td>-3.02</td>
</tr>
<tr>
<td>OPEN</td>
<td>-3.62</td>
<td>-3.02</td>
</tr>
</tbody>
</table>

Source: Research findings

### Table (2) ADF test results on the first difference of variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model with intercept without trend</th>
<th>Model with intercept and trend</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistics</td>
<td>Critical value</td>
</tr>
<tr>
<td>SMI</td>
<td>-6.12</td>
<td>-3.04</td>
</tr>
<tr>
<td>FDI</td>
<td>-5.18</td>
<td>-3.04</td>
</tr>
</tbody>
</table>

Source: Research findings

In the previous section it was shown that all the variables are not $I(1)$, therefore, Johansen-Juselius method cannot be used to evaluate cointegration (long-term relationship) of variables. In this case, ARDL is used to estimate the dynamic, long-term relationship and error correction. Bound testing approach of Pesaran, Shin and Smith (2001) based on unrestricted error correction model including dynamic relationship and long term equilibrium relationship can be used to evaluate cointegration (long-term relationship) between SMI, FDI, INFL, and OPEN.

When the stock exchange index is a dependent variable, unrestricted error correction model is as follows:

\[
\Delta SMI_t = \alpha + \sum_{i=1}^p \Delta SMI_{t-i} + \sum_{i=0}^p \Delta FDI_{t-i} + \sum_{i=0}^p \Delta INFL_{t-i} + \sum_{i=0}^p \Delta OPEN_{t-i} + \sum_{i=1}^p \delta_i SMI_{t-i} + \delta_2 FDI_{t-i} + \delta_3 INFL_{t-i} + \delta_4 OPEN_{t-i} + \varepsilon_t
\]

where, $\Delta$ is the difference operator and $p$ is optimal lag.

According to Schwarz-Bayesian criterion and for the case in which the intercept is unrestricted and the trend is restricted, the optimal lag length according to the following table is one for model.

### Table (3) Determination of optimal lag

<table>
<thead>
<tr>
<th>Schwarz-Bayesian criterion</th>
<th>Degree</th>
</tr>
</thead>
</table>

http://www.ijhcs.com/index.php/ijhcs/index  Page 1488
According to the optimal lag length, model (2) is estimated by Microfit with OLS. Cointegration relationship is dependent on the importance of variables levels and lag. Therefore, the hypothesis testing is the null hypothesis of no long-term relationship, i.e.:

$$H_0: \delta_1 = \delta_2 = \delta_3 = \delta_4 = 0$$ (3)

Here, F-statistics is used to evaluate that all coefficients are zero (i.e. there is no long-term relationship). As F-statistics has not standard distribution, regardless variables are \(I(1)\) or \(I(0)\), critical values provided by Pesaran et al. (1996) should be used. There are 3 regressors and the above model has only fixed statement. On the other hand, the model has variables of \(I(1)\) and \(I(0)\). Therefore, the critical values in upper and lower limits are considered as the base. Since at level of 95%, the upper limit is 3.86 and lower limit is 3.12 (Table 4) and F-statistics value for significance testing of all coefficients (6.43) is higher than the upper limit, the null hypothesis of non long-term relationship can be rejected.

### Table (4) F test results for long-term relationship (hypothesis test results of removing additional variables)

<table>
<thead>
<tr>
<th>F-statistics</th>
<th>At level of 95%</th>
<th>At level of 90%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(I(1))</td>
<td>(I(0))</td>
</tr>
<tr>
<td>5.21</td>
<td>3.86</td>
<td>1.12</td>
</tr>
</tbody>
</table>

Source: Research findings

After performing the cointegration test and ensuring that there is a long-term relationship between variables, ARDL modeling of Pesaran and Shin (1999) and UECM provided in Equation (2) are used to estimate the long-term relationship and short-term dynamic adjustments.

At this stage, after ensuring there is a long-term relationship, dynamic model ARDL is estimated by lags determined by Schwarz-Bayesian criterion. This criterion allocates a lag to stock exchange index and does not any lag to other variables. When the model variables are determined, the model estimation using ARDL is as following table.

### Table (5) Results of estimation using ARDL

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-statistics</th>
<th>Result (90% confidence)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(SMI(-1))</td>
<td>62.2</td>
<td>0.44</td>
<td>Insignificant</td>
</tr>
<tr>
<td>(FDI)</td>
<td>0.37</td>
<td>1.95</td>
<td>Significant</td>
</tr>
<tr>
<td>(INFL)</td>
<td>1.95</td>
<td>9.65</td>
<td>Significant</td>
</tr>
<tr>
<td>(OPEN)</td>
<td>1.03</td>
<td>4.59</td>
<td>Significant</td>
</tr>
<tr>
<td>(C)</td>
<td>13.3</td>
<td>7.69</td>
<td>Significant</td>
</tr>
</tbody>
</table>

\(R^2 = 0.99\)  \(F = 477.9\) (0.00)  \(DW = 1.88\)

A: Serial correlation  \(F = 2.22\) (0.16)
B: Functional form  \(F = 1.01\) (0.23)
C: Normality  \(F = 1.32\) (0.51)
D: Heteroscedasticity $F = 1.01 (0.32)$

Source: Research findings

As observed, the sign of estimated coefficients is consistent with theoretical foundations and all of them are statistically significant at a confidence 90%. Determining coefficient of model is 99%. F-statistics is also significant at the level of 99%. According to serial correlation LM test, the model has not serial correlation, as F-statistics is 2.22 (0.16) and the null hypothesis is not rejected that there is no autocorrelation problem. There is also no problem in terms of model’s normality and normality test statistics BJ is 1.32 (0.51) and the null hypothesis based on normal distribution of residuals is accepted. The results of Ramsey RESET test show that the function form has not correction problem, and test F-statistics is 1.01 (0.23) and null hypothesis based on correct functional form is not rejected. Also, there is no heteroskedasticity in the model, as according to ARCH test, F-statistics test is 1.01 (0.32) and the null hypothesis based on heteroskedasticity is not rejected.

After ensuring the long-term relationship it can be interpreted. The results of long-term relationship related to the above ARDL model with lags determined by Schwarz-Bayesian criterion is as follows.

This long-term relationship is shown in Table (6).

Table (6) Estimation results of long-term relationship

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-statistics</th>
<th>Result (90% confidence)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$SMI$ $(-1)$</td>
<td>0.39</td>
<td>7.38</td>
<td>Significant</td>
</tr>
<tr>
<td>$FDI$</td>
<td>0.31</td>
<td>5.89</td>
<td>Significant</td>
</tr>
<tr>
<td>$INFL$</td>
<td>0.68</td>
<td>6.96</td>
<td>Significant</td>
</tr>
<tr>
<td>$OPEN$</td>
<td>0.22</td>
<td>2.79</td>
<td>Significant</td>
</tr>
<tr>
<td>$C$</td>
<td>0.13</td>
<td>4.07</td>
<td>Significant</td>
</tr>
</tbody>
</table>

Source: Research findings

As observed, all coefficients are significant at the confidence level of 90%. Foreign direct investment coefficient is 0.31 in long-term, which indicates that FDI has a significant positive effect on the stock market.

Inflation rate coefficient is significant and 0.68, i.e. in the long term assuming other factors are constant one unit increment in the inflation rate causes 0.68 increase in the stock market index, as with the increase in the rate of inflation people rush into stock markets whose prices have been increased resulting in increased stock market exchange index.

Economic openness is 0.22 in a long-term relationship, that is, for every one unit increment in the economic openness index, the stock market exchange is increased by 0.22. In other words, the higher exchange with the outside economy and more openness affect stock exchange index and as a result the stock market will grow.

Error correction model

This model in fact evaluates the long-run equilibrium role of variables in short-term fluctuations adjustment. These models link the short-term fluctuations of variables to their long-run equilibrium values. Short-run influential forces and the rate of approaching to long-run equilibrium values are measured by these models. Here, the adjustment of short-run imbalances in the private investment in the agricultural sector toward long-run equilibrium is investigated by ECM model. Coefficient of ECM shows the percentage of short-run imbalance of private investment in the agricultural sector which is adjusted in each period to achieve long-run equilibrium. In other words, this coefficient indicates that how long (period)
it takes that the stock exchange index returns to its long-run trend. The results of estimating error correction model are shown in Table (7).

**Table (7) Results of error correction equation**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-statistics</th>
<th>Result (90% confidence)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔC</td>
<td>1.67</td>
<td>3.12</td>
<td>Significant</td>
</tr>
<tr>
<td>ΔFDI</td>
<td>0.05</td>
<td>5.22</td>
<td>Significant</td>
</tr>
<tr>
<td>ΔINFL</td>
<td>0.29</td>
<td>9.35</td>
<td>Significant</td>
</tr>
<tr>
<td>ΔOPEN</td>
<td>0.28</td>
<td>5.89</td>
<td>Significant</td>
</tr>
<tr>
<td>ecm (– 1)</td>
<td>-0.18</td>
<td>-1.99</td>
<td>Significant</td>
</tr>
</tbody>
</table>

Source: Research findings

Table 7 shows the results of error correction model that link short-term changes of variables to their long-run equilibrium. In error correction model the coefficients of all variables in short-term relationship are statistically significant at the confidence level of 95%

In this model the error correction coefficient is 0.18 and statistically significant. Therefore, short-term and long-term models are linked together, and 18% of the imbalance in every period will be corrected in the next period. In addition, long-term results are consistent with short-term results.

6. Conclusion

In the new international economic conditions, foreign direct investment plays an important role in the stock markets in each country. This study aimed to investigate the effect of foreign direct investment on the stock market in Iran. The relationship between foreign direct investment and the stock market was discussed indirectly in neoclassical growth models.

The results of estimating the model indicate that cointegration model variables are related to a long-term relationship. In addition, coefficients of inflation rate, economic openness and FDI were significant and positive in long-term relationship which indicates that increase in the mentioned indexes leads to increase in the stock market exchange. Therefore, it is suggested that a strong relationship be established with the outside world and domestic investment opportunity be provided for foreign investors to improve the stock market exchange.
References


