THE DETERMINANTS OF FOREIGN DIRECT INVESTMENT IN IRAN: BOUNDS TESTING APPROACH

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Abstract

Foreign direct investment (FDI) is counted to be an important variable to increase capital for domestic investors and improvement of capital formation in host country so almost all countries want to attract FDI. This paper attempted to investigate the impact of openness, exchange rate and infrastructures on FDI in Iran using the bounds testing (ARDL) approach

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to co integration. The data span is from 1975 to 2007. The results indicated that when FDI is the dependent variable there is co integration. We found all variables have positive and significant impact on Iran's FDI in long-run and short-run, except openness that has no impact on.

1 Introduction

Theoretically, economists believe that capital leads to economic development and growth, and then design all models and economic patterns based on this viewpoint. Using domestic and foreign investment tool by optimum use of product resources is one of the important factors of economic development. As we know countries prepare domestic capital formation costs from several ways such as internal saving, foreign debt and attracting foreign investment thus countries which don,t have enough capital, need foreign capital to develop (Zolqadr,2009,90).

Foreign direct investment inflow is counted to be an important variable to increase capital for domestic investors and improvement of capital formation in host country. It can stimulate local investment by increasing domestic investment through links in the production chain when foreign firms buy locally made inputs or when foreign firms supply or source intermediate inputs to local firms (Oteng et al, 2006,2079),(Azarbayejani,2009,2) and also provide greater exports, higher wages and greater productivity through technology spillovers to local firms (Goodspeed et al,2009,2).

Almost all developed and developing countries try to attract FDI to gain its benefits (Hojabr kiani, 2006, 163). They compete with each other to attract handsome amount of FDI by adopting different promotional policies, such as by liberalizing trade regimes, establishing special economic zones and offering incentives to the foreign investors (Mottaleb, 2007, 2). Since 1980s FDI has grown at a remarkable rate in result of information and communication technology and generally economic markets combination through globalization, however, more countries like Iran couldn't attract more FDI(Garretsen & Peeters, 2008, 2),(Nessabian, 2006, 101). Economists denote many factors that why some

countries can't attract FDI. For example, market size, exchange rate, inflation, openness, wage rate and Infrastructures are some of these factors (Mahdavi Aadeli, 2008, 89).
In comparison with other countries, Iran needs more investment because of high population growth rate in 1980-90s, having less capital efficiency (resulting of not using update technologies), using old machinery in production and restoring Iran and Iraq war demolitions in one hand and being balance with southeast economic growth on the other hand(Hojabr kiani,2006,163). Then this paper wants to investigate the impact of some factors such as openness, real exchange rate and Infrastructures on FDI in Iran.

2 Theoretical Review

United Nation Conference on Trade and Development (UNCTAD) define foreign direct investment like this:" Foreign direct investment (FDI) is a category of investment that reflects the objective by a resident enterprise in one economy (direct investor) of establishing a lasting interest in an enterprise (direct investment enterprise) that is resident in an economy other than that of the direct investor. Lasting interest implies the existence of a long-term relationship between the direct investor and the direct investment enterprise, and a significant degree of influence on the management of that enterprise" (UNCTAD, 2009, 38).
One of the most important reasons for FDI is the lack of market in buying and selling of technology. If host country could buy technology, FDI would never happen. But because no one sale technology and even no one can buy or sale technology like other goods and also ordinarily enterprises don't want to sale technology completely for some reasons: first they don't want their innovation to be revealed, second since management and technology are ever complement to each other, they can't left technology to other country with low management efficiency and finally foreign direct investment -that is done by enterprises - keeps enterprises benefits,(like availability to exclusively documented technology of enterprise, management skills that are special for specified managers and

special skills in marketing and trade mark ownership)(Nessabian,2006,100).

2.1 *Theoretical Link between FDI and Trade Openness*

Openness has two opposed effects on FDI: 1) develop export-oriented FDI. 2) Has a negative effect on market-oriented FDI. Low degree of openness attracts market-oriented FDI, because enterprises want to avoid tariffs, transportation cost and for producing in order to export using host country cheap resources and this would happen when tariffs decrease. The main purpose of this kind of investment is the exporting of goods not domestic market. Because this kind of FDI tendencies to get other markets, require using cheap local productions- without omitting market-oriented FDI- that openness attracts it(ShahAbadi,2006,101). High degree of openness leads to more economic relations of the host country with other countries and make them to have international markets, so prepares suitable conditions for multiple countries to invest in those countries (Nahidi, 2010, 111).

Studies have found a positive relationship between openness and FDI flows (Chakrabarti, 2001, Morisset, 2000). However, the relationship between openness and FDI is very complex, and needs careful explanation. To simplify this complexity, I recognize two categories of openness - "openness to trade" and "openness to capital flows." While the former refers to the ease by which goods and services are imported and exported, the latter refers to the absence of controls on the movement of capital. Trade openness attracts export-oriented FDI, while trade restriction attracts "tariff-jumping" FDI, whose primary interest is to take advantage of the domestic market (Onyeiwu, 2003, 5-6).

The degree of openness, which reflects the willingness of a country to accept foreign investment, has proved to be important in attracting capital (Nonnemberg et al. 2004) (Marial A. & Ngie Teng, 2009, 9)

In this study, we use the ratio of (exports+imports) to GDP to measure trade openness. Contrary to the previous studies, however, we expect the sign of the coefficient on OPEN to be indeterminate a priori in Iran. While a positive sign is the norm, a negative sign would suggest that FDI in a country is tariff-jumping, as foreign investors seek to locate in the host economy to avoid high tariffs.

Then high openness leads to more FDI flows.

2.2 *Theoretical Links between FDI and Foreign Exchange*

Traditionally, it was supposed that exchange rate level doesn't affect FDI, so determining where to invest has no relation to exchange rate level. But recently this belief has been objected (Hojabr kiani, 2006, 185).

Bouoiyour(2003) explain exchange rate effect on FDI as follows:

"The competitiveness is approximated by the real exchange rate. In theory, the influence of this variable on FDI is ambiguous, and depends on the motivation of foreign investors. For instance, depreciation makes local assets and production cost cheaper, leading to higher in inflows of FDI. However, it can also soften protectionism and hence reduce the incentive for foreign firms to enter the local market through producing locally, as tariff jumping becomes less useful (see Bénassy et al, 2000). In fact, the effect of the real exchange rate should depend on whether foreign production is to be re-exported (in this case, FDI and trade are complements, and hence an appreciation of the local currency reduces FDI inflows through lower competitiveness), or to serve the local market (FDI and trade are then substitutes, and an appreciation of the local currency increases FDI inflows due to higher purchasing power)" (Bouoiyour, 2007, 9).

The effect of real exchange rate, whether in the short run or long run has been consistently mixed. Based on the currency area hypothesis, the assumption is that firms would not invest in countries with weaker currencies. Aliber(1970) has observed that capital market bias arises because income streams from countries with weaker currencies are associated with an exchange rate risk, and therefore, an income stream is capitalized at a higher rate by the market when it is owned by a weaker currency firm(Marial A & Ngie Teng,2009,10).

From another viewpoint, attention to supply and demand of exchange, exchange rate fluctuations affect FDI from supply side. Exchange rate increase - in result of exchange supply shortage – make exchange movement volume to decrease thus FDI inflows reduce (Nahidi, 2010, 112).

Exchange rate stability improves certainty in domestic economy so increases investment probability in the current time and future. Expanded exchange rate

fluctuations make expanded changes in assets value, so make difficult projects benefit-cast analysis. Exchange rate variety prepares the way for financial abuses and deepens economic instability (ShahAbadi, 2006, 106).

2.3 *Theoretical Links between FDI and Infrastructures*

Foreign investors prefer economies with a well-developed network of roads, airports, water supply, uninterrupted power supply, telephones, and Internet access. Poor infrastructures increases the cost of doing business and reduces the rate of return on investment. Other things constant, production costs are typically lower in countries with well-developed infrastructures than in countries with poor infrastructures. Countries with good infrastructures are therefore expected to attract more FDI (Morisset, 2000) (ShahAbadi, 2006, 101).
Infrastructures is proxied by the number of telephone lines per 1000 people in a country, and is expected to be positively correlated with FDI. The use of this proxy is informed by the fact that countries with a large number of telephone lines are more likely to have better roads, modern airports/seaports, Internet access, and water/electricity supply (Onyeiwu, 2003, 5-6).

3 Review of Empirical Studies

Lim (2001), studies the causality relationship between FDI and its determinants, and finds that market size, infrastructure quality, openness and labor cost are important for FDI.
Ahmed et al. (2003), have applied Granger,s concept of causality on the data for the time period of 1972-2000, to examine the effect of export, domestic output and exchange rate on inflow of FDI in Pakistan. They conclude that export and exchange rate are effective factors on Pakistan's FDI.
Bouoiyour (2003), using an econometric model, he investigates the determining factors of foreign direct investment (FDI) in Morocco from 1960 to 2001. He finds that market size, infrastructures and openness have positive impact on FDI, and however, inflation and real exchange rate have negative impact on

FDI.

Onyeiwu (2003) investigates the determinants of FDI in MENA countries by using fixed effects panel regressions. The results indicate that some of the variables that influence FDI flows to developing countries are not important for flows to MENA countries. These include the infrastructures, economic growth, and inflation. While trade openness increases FDI flows to MENA countries.

Alaya (2004), using panel data, investigates how FDI can be beneficial for 7 countries of Mediterranean basin (Morocco, Tunis, Turkey, Algeria, Egypt, Jordan, Syria) during the years 1975-2002. He finds that economic growth, openness and telephone lines per 1000 people in countries have positive and significant effect while exchange rate has negative and significant effect on FDI.

Tanna & Topaiboul (2005), investigate the causal links between human capital, openness through trade and FDI, and economic growth using quarterly data for Thailand over the period 1973:2-2000:4. They find significant effects of domestic investment and trade openness, providing support for import-led growth, but direct support for FDI-led growth as well as growth-led FDI is again relatively weak, reinforcing the conclusion that trade openness has played a more significant role than FDI in influencing Thai economic growth.

Hojabr kiani & sabzi (2006), using ARDL approach, investigate the impact of effective factors on FDI during 1966-2002 in Iran. They find that there isn't a long-run relationship for FDI in Iran. And in short-run real exchange rate, human capital and GDP have positive impact on FDI.

ShahAbadi & Mahmoodi (2006), by using ordinary least squares (OLS) method they investigate the impact of effective factors on FDI flows in Iran over period 1959- 2003. They use FDI/GDP as FDI and results show: 1) human capital and infrastructures have direct and significant effect on FDI. 2) Revolution dummy variable has reverse and significant effect on FDI. 3) Openness has positive and insignificant effect and exchange rate has negative and insignificant effect on FDI.

Mottaleb(2007), by using panel data from 60 low-income and lower-middle income countries, he identifies the influential factors that determine FDI inflow in the developing countries and finds that countries with larger GDP and high

GDP growth rate and maintain business friendly environment with abundant modern infrastructural facilities, such as internet can successfully attract FDI.
Azarbayegani et al. (2009), investigate the relationship between foreign direct investment, trade and economic growth during 1974-2005 periods in Iran. They use ARDL bound tests to investigate the existence of long-run relationship between variables. Results show that only when FDI is the dependent variable, there is cointegration relationship between variables.
Goodspeed et al. (2009), examine the impact of taxation, good governance and infrastructure of three host country on the host's FDI stock. The regression results indicate that FDI is sensitive to host country infrastructure quality in both developed and developing host countries.
Marial & Teng (2009), investigate the domestic short-run and long-run factors that influence FDI flows into Malaysia using annual data over period 1975-2006. They employ Johanson multivariate co integration analysis to estimate the model. The results of the long-run FDI equation indicate that FDI flows in Malaysia are positively influenced by real exchange rate, GDP growth, infrastructure and openness while negatively by exports. In the short-run FDI flows are negatively influenced by its own lags, GDP growth, infrastructure and exports, while positively affected by economy's openness and real exchange rate variables.
Mazbahul & Tanin(2010), study major factors determining FDI in Bangladesh over the period 1975- 2006. They find that degree of openness; exchange rate and infrastructures have positive impact on FDI in Bangladesh.
Nahidi (2010) examines the effect of main economic variables on FDI in Iran, under stable and instable conditions during 1973-2006. Stable condition study is on basis Auto Regressive Distribution Lag (ARDL), and instable condition is on basis heteroscedasticity group models. Results show positive effects of labor productivity, economic openness and investment security, also negative effect of exchange rate on FDI.

4 Econometric Methodology

4.1 *Data and Model*

The annual time series data used in this paper for Iran is from 1975-2007 and is sourced from world development indicators as follows:
FDI is net foreign direct investment as a percentage of GDP, OPN is trade openness that measured by the sum of export and import values to GDP ratio, REX is real exchange rate and INFR is infrastructures that proxied by number of telephone lines per 1000 people. Also DE is a dummy variable that is 1 for years 1978 to 88 (revolution and war years) and zero elsewhere.
All variables are in logs except FDI due to negative numbers in the series. So the semi-log model used in this paper is as follows:

$$FDI_t = \alpha LOPN_t + \beta LREX_t + \phi LINFR_t - \gamma DE_t + _t \qquad (1)$$

t is the white noise error term. The sign of the constant elasticity coefficient α, β and ϕ are all expected to be positive and the sign of γ expected to be negative. Equation (1) represents only the long-run equilibrium relationship and may form a co integration set provided all the variables are integrated of order 0 and 1, i.e. I(0) and I(1).

4.2 *ARDL Model Specifications*

To empirically analyze the long-run relationships and dynamic interactions among the variables of interest, the model has been estimated by using the bounds testing (or autoregressive distributed lag (ARDL)) co integration procedure, developed by Pesaran et al. (2001).The procedure is adopted for the following three reasons. Firstly, the bounds test procedure is simple. As opposed to other multivariate co integration techniques such as Johansen and Juselius, it allows the co integration relationship to be estimated by OLS once the lag order of the model is identified. Secondly, the bounds testing procedure does not require the pre-testing of the variables included in the model for unit roots

unlike other techniques such as the Johansen approach. It is applicable irrespective of whether the regressors in the model are purely I(0), purely I(1) or mutually co integrated. Thirdly, the test is relatively more efficient in small or finite sample data sizes as is the case in this study.

Following Pesaran et al (2001) as summarized in Choong et al (2005), we apply the bounds test procedure by modeling the long-run equation (1) as a general vector autoregressive (VAR) model of order p, in zt:

$$Z_t = c_0 + B_t + \sum_{i=1}^{p} \Phi_i Z_{t-i} + \varepsilon_t t = 1, 2, 3 \ldots, T \tag{2}$$

with c0 representing a (k+1)-vector of intercepts (drift), and β denoting a (k+1)-vector of trend coefficients. Pesaran et al (2001) further derived the following vector equilibrium correction model (VECM) corresponding to (2):

$$\Delta Z_t = c_0 + B_t + \Pi z_{t-1} \sum_{i=1}^{p-1} \Gamma_i \Delta Z_{t-i} + \varepsilon_t t = 1, 2, 3, \ldots, T \tag{3}$$

where the (k+1)x(k+1)-matrices $\Pi = I_{k+1} + \sum_{i=1}^{p} \Phi_i$and $\Gamma_i = -\sum_{i=i+1}^{p} \Phi j$, i=1,2,. . . ,p-1 contain the long-run multipliers and short-run dynamic coefficients of the VECM. z_t is the vector of variables y_t and x_t respectively. y_t is an I(1) dependent variable defined as FDI and $x_t = [\mathrm{OPN}_t, \mathrm{REX}_t, \mathrm{INFR}_t]$ is a vector matrix of 'forcing' I(0) and I(1) regressors as already defined with a multivariate identically and independently distributed (i.i.d) zero mean error vector t =(1t , ′2t)′, and a homoskedastic process. Further assuming that a unique long-run relationship exists among the variables, the conditional VECM (3) now becomes:

$$\Delta y_t = c_{y0} + B_t + \delta_{yy} y_{t-1} + \delta_{xx} x_{t-1} + \sum_{i=1}^{p-1} \lambda_i \Delta y_{t-i} + \sum_{i=0}^{p-1} \xi_i \Delta x_{t-i} + \varepsilon_{yt} \tag{4}$$

On the basis of equation (4), the conditional VECM of interest can be specified as:

$$\begin{aligned} &\Delta FDI_t = c_0 + \delta_1 FDI_{t-1} + \delta_2 \ln OPN_{t-1} + \delta_3 \ln REX_{t-1} + \delta_4 \ln INFR_{t-1} \\ &+ \textstyle\sum_{i=1}^{p} \phi_i \Delta FDI_{t-i} + \sum_{j=1}^{q} \varpi_j \Delta \ln OPN_{t-j} + \sum_{l=1}^{q} \varphi_1 \Delta \ln REX_{t-l} \\ &+ \textstyle\sum_{m=1}^{q} \gamma_m \Delta \ln INFR_{t-m} + \eta DE_t + \varepsilon_t \end{aligned} \tag{5}$$

where δ_i are the long run multipliers, c_0 is the drift, and ϵ_t? are white noise errors.

4.3 *Bounds Testing Procedure*

The first step in the ARDL bounds testing approach is to estimate equation (5) by ordinary least squares (OLS) in order to test for the existence of a long-run relationship among the variables by conducting an F-test for the joint significance of the coefficients of the lagged levels of the variables, i.e., HN: $\delta_1 = \delta_2 = \delta_3 = \delta_4 = 0$ against the alternative HA: $\delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq 0$. We denote the test which normalize on FDI by F_{FDI}(FDI\OPN,REX, INFR). Two asymptotic critical values bounds provide a test for co integration when the independent variables are I (d) (where 0=d=1): a lower value assuming the regressors are I (0), and an upper value assuming purely I (1) regressors. If the F-statistic is above the upper critical value, the null hypothesis of no long-run relationship can be rejected irrespective of the orders of integration for the time series. Conversely, if the test statistic falls below the lower critical value the null hypothesis cannot be rejected. Finally, if the statistic falls between the lower and upper critical values, the result is inconclusive. The approximate critical values for the F-test were obtained from Pesaran and Pesaran, 1997, p.478).
In the second step, once co integration is established the conditional ARDL (p_1, q_1, q_2, q_3) long-run model for FDIt can be estimated as:

$$\begin{aligned} FDI_t &= c_0 + \sum_{i=1}^{p} \delta_1 FDI_{t-i} + \sum_{i=0}^{q_1} \delta_2 \ln OPN_{t-i} + \sum_{i=0}^{q_2} \delta_3 \ln REX_{t-i} \\ &\quad + \sum_{i=0}^{q_3} \delta_4 \ln INFR_{t-i} + \eta DE_t + \varepsilon_t \end{aligned} \tag{6}$$

Where, all variables are as previously defined. This involves selecting the orders of the ARDL (p_1, q_1, q_2, q_3) model in the four variables using Akaike information criteria (AIC).
In the third and final step, we obtain the short-run dynamic parameters by estimating an error correction model associated with the long-run estimates.

This is specified as follows:

$$\Delta FDI_t = u + \sum_{i=1}^{p} \phi_i \Delta FDI_{t-i} + \sum_{j=1}^{q} \varpi_j \Delta \ln OPN_{t-j} + \sum_{l=1}^{q} \varphi_1 \Delta \ln REX_{t-l} + \sum_{m=1}^{q} \gamma_m \Delta \ln INFR_{t-m} + \vartheta ecm_{t-1} + \varepsilon_t \quad (7)$$

Here ϕ,ϖ,φ, and γ are the short-run dynamic coefficients of the model's convergence to equilibrium, and ϑ is the speed of adjustment.

5 Estimatiom Results And Discussions

5.1 *Unit Roots Tests*

Before we proceed with the ARDL bounds test, we test for the stationary status of all variables to determine their order of integration. This is to ensure that the variables are not I(2) stationary so as to avoid spurious results. According to Ouattara(2004) in the presence of I(2) variables the computed F-statistics provided by Pesaran et al.(2001) are not valid because the bounds test is based on the assumption that the variables are I(0) or I(1). Therefore, the implementation of unit root tests in the ARDL procedure might still be necessary in order to ensure that none of the variables is integrated of order 2 or beyond.

We applied a more efficient univariate DF-GLS test for autoregressive unit root recommended by Elliot, Rothenberg, and Stock (ERS, 1996). The DF-GLS unit root tests results for the variables that obtain from Eviews 6 reported in Table 1 indicate that all variables are I(1).

We rejected the null hypothesis of unit root process in all cases based on the Schwartz Bayesian Criteria (SBC) and serial correlations diagnostic test from the unit root test regression results.

TABLE 1— DF-GLS Unit Root Tests on Variables

Variable	SBC Lag	DFGLS state	Variable	SBC Lag	DFGLS state	I(d)
FDI	2	-0.836725	ΔFDI	0	-5.918538	I(1)
LOPN	0	-1.245312	ΔLOPN	0	-5.099066	I(1)
LREX	3	-1.55297	ΔLREX	1	-5.026367	I(1)
LICT	1	-1.67304	ΔLICT	0	-4.266903	I(1)

Source: Authors calculation Note: All variables are in logs except FDI due to negative numbers in the series.Δ is difference operator. MacKinon critical value (1%) = -3.77

5.2 *Bounds Tests for Co integration*

In the first step of the ARDL analysis, we tested for the presence of long-run relationships in equation (2), using equation (5). We used a general-to-specific modeling approach guided by the short data span and Schwartz Bayesian Criterion SBC respectively to select a maximum lag order of 2 for the conditional ARDL-VECM Because computation of F-statistic is sensitive with lag length. Following the procedure in Pesaran and Pesaran, (1997, p.305), we first estimated an OLS regression for the first differences part of equation (5) and then test for the joint significance of the parameters of the lagged level variables when added to the first regression. According to Pesaran and Pesaran, (1997, p.305), "this OLS regression in first differences are of no direct interest" to the bounds co integration test. The F-statistic tests the joint null hypothesis that the coefficients of the lagged level variables are zero (i.e. no long-run relationship exists between them). Table 2 reports the results of the calculated F-statistics when each variable is considered as a dependent variable (normalized) in the ARDL-OLS regressions.

TABLE 2—Results from bounds Tests on Equation (5)

Dep. Var.	SBC Lags	F-statistic	Probability
F_{FDI}(FDI\ OPN, REX, INFR)	2	5.5834	0.004
F_{OPN}(OPN\ FDI, REX, INFR)	2	1.8243	0.168
F_{REX}(REX\ FDI, OPN, INFR)	2	2.3333	0.95
F_{INFR}(INFR\ FDI, OPN, REX)	2	2.0646	0.128

Source: Authors Calculation Notes: Lower bound I(0) = 3.372 and Upper bound I(1) = 4.797 at 1% significance level.

The calculated F-statistics F_{FDI}(FDI\OPN, REX, INFR)= 5.5834 is higher than the upper bound critical value 4.797 at the 1% level. Thus, the null hypotheses of no co integration are rejected, implying long-run co integration relationship amongst the variables when the regression is normalized on FDI_t(Table 2). However, we used FDI_t as the dependent variable. Once we established that a long-run co integration relationship existed, equation (6) was estimated using the following ARDL (2, 1, 0, 0) specification. The results obtained by normalizing on foreign direct investment (FDI_t), in the long run are reported in Table 3.

TABLE 3— Estimated Long Run Coefficients using the ARDL Approach

Equation (6): ARDL (2, 1, 0, 0) selected based on SBC. Dependent variable is FDI_t.				
Regressor	Coefficient	Standard Error	T-Ratio	T-Probability
LOPN	0.42317	0.16331	2.5911	0.016
LREX	0.099384	0.021417	4.6404	0.000
LINFR	0.12998	0.033553	3.8738	0.001
DE	-0.79169	0.22798	-3.4727	0.002

Source: Authors calculation

The estimated coefficients of the long-run relationship show that openness in Iran has a very high significant positive effect on FDI. A 1% increase in trade openness leads to approximately 0.42% increase in FDI, all things being equal. The real exchange rate and infrastructures have very high significant positive impact on FDI too. A 1% increase in real exchange rate and infrastructures lead to approximately 0.1% and 0.13% increase in FDI. As we expected the dummy variable has a very high significant negative effect and show that revolution and war have negative effects on Iran's FDI and made it decrease during this period. The results of the short-run dynamic coefficients associated with the long-run relationships obtained from the ECM equation (7) are given in Table 4. The signs of the short-run dynamic impacts are maintained to the long-run except openness that is insignificant and have negative sign, then in Iran openness has no effect on FDI in short-run.

TABLE 4: Error Correction Representation for the Selected ARDL Model

ARDL (2, 1, 0, 0) selected based on Schwarz Bayesian Criterion. Dependent variable is ΔFDI_t				
Regressor	Coefficient	Standard Error	T-Ratio	T-Probability
dFDI1	0.19676	0.093112	2.1132	0.045
DlOPN	-0.17939	0.26369	-0.68032	0.503
dlREX	0.097755	0.015937	6.1338	0.000
dlINFR	0.12785	0.033728	3.7907	0.001
dDE	-0.77871	0.16803	-4.6344	0.000
ecm(-1)	-0.98361	0.14856	-6.6207	0.000
ECM= FDI – 0.42317*LOPN – 0.099384*LREX – 0.12998*LICT + 0.79169*DE				
R-Squared= 0.81191	R-Bar-Squared= 0.76489		F-state. F(5,25)= 0.7203[0.000]	
SER= 0.15648	RSS= 0.58764		DW-statistic= 2.2336	
Akaike Info. Criterion = 10.4802		Schwarz Bayesian Criterion = 5.4613		

Source: Authors calculation

The equilibrium correction coefficient, estimated -0.98361 is highly significant, has the correct sign, and imply a fairly high speed of adjustment to equilibrium after a shock. Approximately 98% of disequilibria from the previous year's shock converge back to the long-run equilibrium in the current year.

The regression for the underlying ARDL equation (5) fits well at R^2=75% and also passes the diagnostic tests against serial correlation, functional form mis-

specification, heteroscedasticity test and non-normal errors(Table 5).
TABLE 5: ARDL-VECM Model Diagnostic Test

LM Test Statistics			
Serial Correlation	$\chi 2$ (1)= 0.93031[0.335]	Functional Form	$\chi 2$ (1)= 0.17122[0.679]
Normality	$\chi 2$ (2)= 1.4319[0.489]	Heteroscedasticity	$\chi 2$ (1)= 0.080264[0.777]

Source: Authors calculation

The cumulative sum (CUSUM) and cumulative sum of squares (CUSUMQ) plots (fig.1) from a recursive estimation of the model also indicate stability in the coefficients over the sample period for Iran.

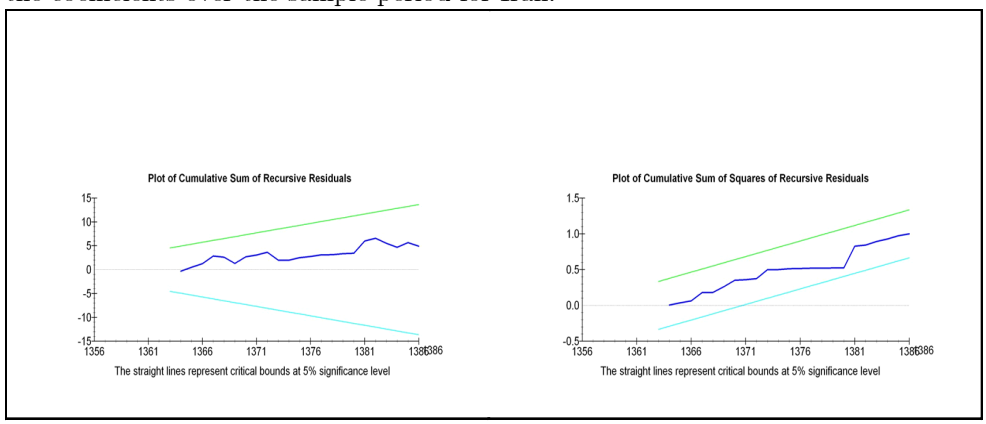

FIGURE 1: Plot of Cusum and Cusumq for Coefficients Stability for ECM Model

Source: Authors calculation

6 Conclusion

This study has employed the bounds testing (ARDL) approach to co integration to examine the long run and short run relationships between foreign direct

investment, openness, real exchange rate and infrastructures during 1975-2007 using Iran as the case study. The associated equilibrium correction was also significant confirming the existence of long-run relationship. The equilibrium correction is very fast and is restored by the first quarter of the year.
The results also indicate that openness, real exchange rate and infrastructures are important in explaining foreign direct investment in the long-run in Iran. Also the dummy variable has a very high significant negative effect and shows that evolution and war have negative effects on Iran's FDI and make it decrease in this period.
From the results, policy suggestions for enhanced FDI in Iran will be to review the tariff system and any other barriers that may act to inhabit a smooth FDI flows into the country, because with liberalization and openness, the country has to move to higher value added, skill intensive and high wages industries. Policy makers and managers especially in developing countries should focus on infrastructures and try to well-developed network of roads, airports, telephones, internet access and water and power supply to attract more FDI.

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ODREDNICE IZRAVNIH STRANIH ULAGANJA U IRANU: PRISTUP GRANIČNIM TESTOVIMA

Sažetak:

Izravna strana ulaganja (FDI) se smatraju važnom varijablom za povećanje kapitala domaćih investitora i poboljšanja stvaranja kapitala u zemlji domaćinu tako da gotovo sve zemlje žele privući FDI. Ovaj rad je pokušao istražiti utjecaj otvorenosti, tečaja i infrastrukture na FDI u Iranu koristeći granične testove (ARDL) u pristupu kointegraciji. Raspon podataka ide od 1975. do 2007. Rezultati ukazuju da postoji kointegracija kada je FDI zavisna varijabla. Zaključili smo da sve varijable imaju značajan pozitivan efekt na FDI u Iranu kako dugoročno tako i kratkoročno, osim otvorenosti koja kratkoročno gledano nema nikakav utjecaj na FDI.

Ključne riječi: ARDL granični test, izravna strana ulaganja, model ispravljanja grešaka, Iran