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Effect of Exchange Rate Fluctuations on Foreign Direct Investment in Iran

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ABSTRACT

The aim of this research is to study the relationship between foreign investment and official exchange rate fluctuation, using auxiliary variables such as GDP, interest rates, inflation, economic freedom index and the degree of freedom in Iran during 1995-2012. Data analysis has been presented as time series in E views software.

According to the results obtained, foreign direct investment (FDI) in Iran has a significant and inverse relationship with exchange rate fluctuation, domestic inflation rate and degree of economic openness. In addition, FDI in this country has a direct and significant relationship with the level of GDP.

KEYWORDS: Foreign Direct Investment, Exchange Rate, Interest Rate, Inflation, The Index of Economic Freedom and Openness, Gross Domestic Product (GDP), Time Series

INTRODUCTION

Nowadays, attracting investment for production is one of the main concerns of the countries. This attraction can be from inside or abroad. Inflow of investment from out of a country can be a useful tool for development. Most countries, especially the least developed or developing countries, such as Iran due to low liquidity and low compact capital to perform economic projects, need to attract investment from abroad. Unfortunately, in these countries there are a few attractive economical designs and the major investments have been invested in mining projects, petroleum and petrochemical. Hence, the government should try to make their plans more attractive through reducing the risks resulted from investment such as exchange rate fluctuation.

Exchange rate plays a major role in the countries. In fact, it can be a key variable for determining the general level of prices of domestic goods and services. Therefore, the rate fluctuation can affect unfavorably on the economy (National production, Price level, etc) and accordingly on foreign direct investment (FDI).

Since FDI leads to domestic investment, attracting investment, employment, exports, and production, and also provides a possibility of access to facilities such as management of skilled labor, international production networks and supply trademarks, therefore, FDI can be considered as the engine of economic growth in the host country. Nowadays, FID is one of the main symbols of globalization. Economists and government are all in agreement on the critical importance of this type of investment. Basically, FID happens when the countries have abundant natural sources, but lack of sufficient investments or required technical knowledge for extracting and selling raw materials.

Exchange rate fluctuation (ERF) in many countries has been problematic. To avoid ERF, many countries stabilize the exchange value of currency against the most important currencies. However, it can be seen that some countries accept ERF by refusing to stabilize the exchange rate as well as accepting the floating system of exchange rate.

The hypothesis of the research is that there is a significant and inverse relationship between ERF and FDI.

1 - The main question of the research asks if there is a significant and inverse relationship between ERF and FDI.

The method of collection of data is to use library and internet as well as using data and statistics of the Central Bank and the World Bank and IMF, Heritage and the UNCTAD STAT.

In this research, we first focus on definition of the concepts related to FDI, exchange rate, interest rate, inflation, economic freedom and openness and GDP and drawing the diagrams of the variables in the period 1995-2012, and then the economic is estimated, afterwards the results and findings will be analyzed and recommendations have been discussed at the end.

FDI:

IMF introduces FDI as follows: FDI is an investment that is done by investors to gain a stable interest in a country other than their home and the purpose of this type of investment is to have an important role in the management agency. Foreign investment in Iran in the years 1990-2012 has been shown in Figure 1.

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Figure 1: FDI in the years 1995-2012



Rate of exchange

Exchange rate is one of the most important economic variables that can affect many of the basic variables. Both the demand side and the supply side will be influenced by ERF. The demand sector will be influenced by ERF through exports and imports as well as changing at reserves, and on the other hand the supply sector will be influenced by ERF through imported intermediate goods. Many economic researchers have focused on the changes in exchange rate due to its major role in the price of a set of economic variables, and the interplay of them. In addition, the real exchange rate, as a measure of equity value of the national currency against the currencies of other countries, reflects a country's economic situation compared with other countries. In this research the effect of ERF on FDI is examined, and in order to be explicit about the model, affective auxiliary variables such as GDP, degree of economic openness, interest rate, inflation, economic freedom index are added to the model.

Exchange rate is divided into two types: official and unofficial. The official exchange rate is set by the government according to the specific conditions that rule on the economy. It will be announced and supported by the central bank under a system of fixed exchange. In contrast, there is a parallel market. The unofficial market is known as free market or black market that is based on extra supply and demand in the market and its rate is usually higher than official rate.

In this study, we have based our calculation on the official exchange rate.



Figure 2: Exchange rate in the years 1995-2012

Source: UNCTAD

Interest rates: Interest rate plays a key role as a monetary factor in economic fundamentals. The interest rate can be defined in various ways. From the macro perspective and economic enterprises: interest rate is the price paid to get credit or money, and sometimes it is called the cost to rent money, so the interest rate is cost of holding money. A.R.J. Turgot believes that interest rate is a price that is paid to use a certain amount of value in a period of time, French economist. Keynesian economists believe that interest is a premium to forbear from the liquidity or to postpone purchasing power, and the amount of interest rate is determined in the money market. Interest rate is known as compensation for inflation cost in the economy. Exchange rate also shows if efficiency and investment in a specific project is appropriate? Interest rate is the walue of money of a country. Also, while other factors are constant, lower interest rate decreases the value of money of the country, so investors should focus on the real interest rate than nominal interest rate. In simple word, nominal interest rate, in contrast to the real interest rate, brings inflation within its account. But in general, increase in the interest rate would increase FDI; on the contrary the decrease in the interest rates than global interest rate will lead to capital flight.



Inflation:

One of the main goals of any economic system is to achieve low and stable inflation and sustained economic growth. Achieving this goal will provide improved living standards. In economic view: inflation refers to increase in general level of price of goods and services in a given period of time (one year). Inflation generally is considered as a disproportionate increase in the general level of price.





Index of Economic Freedom:

The Index of Economic Freedom is an annual index and ranking created by The Heritage Foundation and The Wall Street Journal in 1995 to measure the degree of economic freedom in the world's nations. The creators of the index took an approach similar to Adam Smith's in The Wealth of Nations, that "basic institutions that protect the liberty of individuals to pursue their own economic interests result in greater prosperity for the larger society"

Index of Economic Freedom, measured on a scale of 0 to 100, this number represents economic freedom, with 0 as the lowest score, 100 as the highest. The numeric value is determined by grades in ten categories, which are averaged together for the overall score.

Economic liberalization is part of policies of the structural adjustment that includes a series of measures to reduce intervention of the government in financial markets, goods and services, labor and foreign sectors, and finally to leave it to the market mechanism.

The most important of these measures are:

- Reduction in intervention of the government in financial markets
- Reduction in controls over prices, and leave determination of price to market forces of supply and demand
- Elimination of subsidies and make adjustment for price subsidy
- Biased towards floating currency system
- Liberalization of foreign trade and make adjustment for any kind of trade tariffs and quantitative restrictions
- Liberalization of interest rate paid to bank deposits

In overall, economic freedom is nothing but the emphasis on the ownership of individual or private sector, and specifies an area where the economy is based on market acts, so people own their assets in use, exchange or maintenance, and no obstacle such as government should limit them.





Openness index economic freedom

The pure theory of international trade suggests that complete global free trade and the existence of economic openness lead to increased level of production, income as well as financial and commercial relations. The free trade also enables every country to have greater consumption and production. So that, believers in free trade, such as Edwards (1992) and Barro et al (1995), disagree with any trade policy that naturally affect foreign trade, because they believe that in this case (the complete free trade) the comparative advantage of countries in various commodities is naturally specified, and based on this they begin trading, and this will be the most lucrative way. In this case, the liberalization, by reducing restrictions and partial elimination of tariffs, minimizes trade barriers, and provides the context of economic exchanges, the country would be benefited from technology and innovation in other countries, and with increase in efficiency; it provides an increase in motivation and stimulate the investment which causes financial development. Economic openness index, which

is estimated and reported by the Fraser Institute, involving 68 institutions in 68 countries, is a suitable tool for the investigation of the concentration, monopoly and openness of a country for economic activities. The root of this index originated from the index of economic freedom that was presented for the first time in the conferences of Michael Walker in the Fraser Institute and Milton Friedman, in the Nobel Laureate, in the years 1994-1986. The criteria used to determine how policies and institutions relate to economic freedom in countries had been examined in the conference.

Key elements of economic freedom are:

- 1- Freedom of individual choice
- 2- Regulated exchange through markets
- 3- Freedom of entry into markets and exit from markets
- 4- Protection of citizens' rights against encroachment by others





Gross Domestic Product (GDP):

GDP: is the total value of goods and services in terms of market price in a country during a given period (usually 1 year). GDP is a method of measuring national income and product in a country. Another definition of GDP is sum of value added at all stages of production of all goods and services produced in a country during a particular period of time, and its value is expressed via a particular currency.

Method of measuring GDP is:

GDP = consumption + gross investment + government costs + (exports - imports)

(exports - imports = net exports)

GDP = C + I + G + NX

The word "gross" means not to take account of the depreciation of capital in the equation. GDP of a country in compare to the other countries is determined by two methods: First, GDP is calculated based on the equality of exchange rate of countries in the global market via a global currency like the dollar. Second, calculate the purchasing power of the local currency in the local market in compare to a global currency like the dollar. Depending on the method of calculating the GDP of each country, the rank of countries in the rank table may change dramatically. In general one can say that the first method provides a better picture of the purchasing power. So that GDP growth causes a country to increase per capita income and living standards. Great merit of using per capita income for measuring standard of living in a country is to calculate it continuously and extensively worldwide among different countries and also is the fact that all countries use a unique technique to calculate it. This model assumes a positive relationship between FDI and GDP.





The research model

In this part of research, the relationship between the foreign investor and the official exchange rate, GDP, interest rate, inflation, Index of Economic Freedom, and the degree of freedom in Iran, in the years 1995-2012 are examined. Therefore, in this research we are going to examine how and how much the mentioned factors can affect FDI in Iran. Therefore, according to the mentioned content, we specify the model as follows. FDI function is provided in the following general form:

 $FDIt = \alpha 0 + \alpha 1 ERERt + \alpha 2GDPt + \alpha 3Rt + \alpha 4Pt + \alpha 5IFEt \alpha 6DFt + \epsilon_{it}$

Where FDI is foreign direct investment, ERER is official exchange rate, GDP is gross domestic product, R is

Interest rate, P is inflation, IFE is index of economic freedom, DF is the degree of economic freedom, and ε_{it} is disturbing part.

Statistics of time series have been collected from the central bank of Iran, the World Bank and Unctad site. To estimate the model Eviews7 software has been used.

Model Interpretation

The practical result

Scattering diagram of variables

In this section, the scattering diagram of independent variables of the model against the dependent variable is presented.



Figure 1: Scattering diagram indicates FDI versus exchange rate, GDP, interest rate, inflation, economic freedom index and the degree of economic freedom. The highest scattering belongs to GDP variable.

Durability test:

Durability test is performed mainly to avoid spurious regressions. To avoid spurious regression, variables must be durable; otherwise, difference of the variables which are usually durable.

Why is the durability test necessary?

Durable data are the ones with constant average, variance, and auto covariance for any definite lags. Durability or indurability of a time series can have a serious impact on its behavior and properties. For example, when a shock enters a stable (durable) time series, its effects on the variable is damping and gradually disappears, i.e., effect of a shock at time is less than time t-1 In contrast, endurable data are the ones for which the influence of a shock is unbounded, i.e., influence of the shock at time t is not less than its effect at time t-1.

The use of endurable data can lead to spurious regressions. For two durable variables which are independent random series, when one of them is fitted on the other one, they will have a relatively lower t and R2. This situation is obvious for independent variables, but if they have a time trend, and do not have any logical connection with each other, regression of one on the other will have a high R2. Therefore, in such circumstances, if standard regression techniques are applied, the results indicate a good regression that all coefficients are significant and also R2 is high, but obviously this is a spurious regression with a tidy appearance.

Durability test of variables:

To avoid spurious regressions in the above estimation one must make sure the variables are durable. In the case of durability of variables the spurious regressions will not occur in the above estimations. For this purpose, first using panel unit root test, durability or indurability of the variables are examined. **Durability test in the level:**

Table (1) Durability test in the lovel

Table (1) Durability test in the level.				
Variable	Level	Probability		
FDI	2.0306	0.27		
ERER	1.2810	0.60		
GDP	0.715	0.93		
R	0.5298	0.86		
Р	4.1119	0.00		
IFE	8.3583	0.00		
DF	1.1900	0.65		
Т	-	-		
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Source: Calculations of the research

The results of conservation tests show that variables IFE and P have a lower probability than 0.05; therefore these two variables are in conservative level. The variables R, GDP, ERER, FDI and DF have a higher probability than 0.05; therefore these variables are not in conservative level. So that we use the first and the second order of difference to make conservation. The results of conservation have been presented in Table 2. **LLC unit root test:**

For the durability test of the model variables, in this part, the Levin, Lin Chu (LLC) test statistic has been used, the results of which are shown in Table (2).

Variable Level Probability					
D(FDI,2)	4.5165	0.00			
D(ERER,2)	6.4160	0.00			
D(GDP,2)	8.6403	0.00			
DR	3.9490	0.00			
Р	4.1119	0.00			
IFE	8.3583	0.00			
D(DF,2)	3.5648	0.02			
Т	-	-			

Source: Calculations of the research

Durability test results show that all variables have a probability of lower than 0.05, and thus all variables are durable, so the null hypothesis suggesting the existence of the unit root can be rejected .

Table (3) Initial estimate the model					
Probability	t-statistic	Estimated coefficients	Variables		
-	-	-	D(FDI,2)		
0.90	-0.126193	-358.7844	С		
0.05	-2.195114	-47.45199	D(ERER,2)		
0.00	3.965065	0.042075	D(GDP,2)		
0.38	0.911829	255.1819	DR		
0.49	-0.712761	-40.22210	Р		
0.62	0.513280	38.11517	IFE		
0.00	-3.508918	-7638.348	D(DF,2)		
0.30	-1.101305	-85.87504	Т		

Initial estimate of the model

Source: Calculations of the research

Variance heteroskedasticity test:

If variance of the error term is not constant, the OLS estimators will still remain unbiased, but will not have the minimum variance. Generally, ignorance the variance heteroskedasticity results in a more intercept variance, while the variance of the slope may have a positive or negative bias.

Table (4) variance heteroskedasticity test Heteroskedasticity Test: White				
F-statistic 0.585878 Prob. F(7.8) 0.7524				
Obs*R-squared	5.422492	Prob. Chi-Square(7)	0.6085	
Scaled explained SS	2.125740	Prob. Chi-Square(7)	0.9526	

Source: Calculations of the research

According to the results in Table (4), the amount of f = 0.585878 and its probability p = 0.7524 show that this model has the variance homogeneity. In fact, according to F at a level of 5%, the existence of variance homogeneity could not be rejected.

Autocorrelation test

If there is a correlation but we ignore it, the estimated coefficients are unbiased, but inefficient. This inefficiency does not disappear even in large samples, the standard deviations contain error. This can lead to incorrect inferences.

Table (5) autocorrelation test					
Breusch-Godfrey Serial Correlation LM Test:					
F-statistic Obs*R-squared	1.217932 4.620017	Prob. F(2,6) Prob. Chi-Square(2)	0.3598 0.0993		

Source: Calculations of the research

According to the results in Table (5), f = 1.217932, that its probability (p = 0.3598) which is more than 0.05 Shows there is not autocorrelation in this model and hypothesis H0 is not rejected. Estimation of the model and discussion and analysis of the results

Table (6) estimation of the model using dumn	ny variables
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Probability	1	t-statistic	Estimated coefficients	Variables
-	-	-	-	D(FDI,2)
0.25		1.254020	2422.301	С
0.02	-	-2.939236	-40.13933	D(ERER,2)
0.00	:	5.534476	0.037380	D(GDP,2)
0.96	-	-0.049678	-9.399275	DR
0.03	-	-2.697357	-107.0558	Р
0.85	-	-0.183703	-8.843495	IFE
0.00	-	-5.170311	-7078.249	D(DF,2)
0.69	-	-0.407509	-21.11991	Т
0.00	-	-3.671642	-1376.486	DUM1
DW = 2.34 F	R2 = 0.91	R-2 = 0.81	F= 9.101139	Prob = 0.004338

According to the results indicated in Table (6), explanatory variables D(R), IFE and T, which have the probability of 0.96, 0.85 and 0.69 respectively, have not a significant effect in the model and we shall remove them from the model. The final model is obtained as follows in Table (7).

Table 7 the final estimation of the model after removing insignificant variables from the model

Probability	t-statistic	Estimated coefficients	Variables
-	-	-	D(FDI,2)
0.007	3.340205	1906.410	С
0.006	-3.385585	-40.37140	D(ERER,2)
0.000	6.569339	0.036672	D(GDP,2)
0.006	-3.452967	-110.8037	Р
0.000	-6.323634	-6856.400	D(DF,2)
0.000	-4.702650	-1378.672	DUM1
DW = 2.08 $R2 = 0.90$	R-2 = 0.85	F = 18.23095	Prob = (0.000097)

Source: Calculations of the research

	Coefficient	Std. Error	t-Statistic	Prob.
C D(ERER,2)	1906.410 -40.37140	570.7465 11.92450	3.340205 -3.385585 6.569339	0.0075
P D(DF,2)	-110.8038 -6856.400	32.08943 1084.250	-3.452967 -6.323634	0.0062
R-squared	0.901142	Mean depend	lent var	-26.71630
Adjusted R-squared S.E. of regression Sum squared resid	0.851712 472.0290 2228114	S.D. depende Akaike info cri Schwarz crite	ent var iterion rion	1225.790 15.43199 15.72168
Log likelihood F-statistic Prob(F-statistic)	-117.4556 18.23095 0.000097	Hannan-Quin Durbin-Watso	n criter. on stat	15.4467 2.08230

Source: Calculations of the research

DISCUSSION AND ANALYSIS OF THE RESULTS

In this section, the discussion and analysis of the results will be discussed. The results of the relationship between FDI and effective variables in Iran during 1995-2012 using time series data can be analyzed as follows:

The statistic R2 indicates that 0.90 of changes in the variable FDI is explained by the mentioned variables in the model. Also, according to amount of statistics f = 18.23095 and relevant probabilities associated with all the variables that are less than 0.5 the significance of the entire model is confirmed.

According to the results in Table (7), with increasing of one unit in the second-order of difference of the official exchange rate, FDI decreases by 40.37 million, and with increasing of one unit in the second order of difference of GDP level, FDI increases by 0.03 million dollars, and with increasing the percentage of domestic inflation by 1%, FDI decreases by 110.80 million, and in Iran with increasing in the second order of difference of economic openness by one degree, FDI decreases by 6856.40 million (that of course is not compatible with the economic theory in which with increasing the degree of economic openness, FDI should be increased). Perhaps its cause can be special economic conditions in Iran, including sanctions. Also, dummy variables show that a period in which the data has been jumped, entering these variables have neutralized the jump.

Hypotheses test results:

The present study attempted to test the two following hypotheses:

1- There is a significant and inverse relationship between ERF and DFI.

The research hypotheses were analyzed based on time series data in Iran during 1995-2012 using time series approach. So that, the relevant hypothesis, that indicates a significant relationship between ERF and FDI, is confirmed. Because ERF increases the risk which is from investment and increases its cost, and ultimately can lead to reduced investment.

Suggestions:

Since FDI is a way of financing for the economy without making debt for the government, politicians are trying to attract more resources, and since the exchange rate is an important factor in calculating the cost that is from investment, and also ERF increases the risk that from investment and increases its cost, it finally can lead to reduced investment, so that the following suggestions are recommended:

- Efforts of governments to single out the exchange rate in a multi-currency system and reduce fluctuation of these multiple system.
- reducing the injection sources of funds, that earn from the sale of oil, into the economy of oil producing countries, that will cause Dutch disease and skyrocketing prices and ERF which finally can lead to a reduction in foreign investment.
- Necessity of using incentive and supportive packages for foreign investors, and legislation to attract investors.
- Creating conditions for stable economy and creating financial security to reduce the risk from investment for foreign investors.
- Appropriate development of financial market
- Deregulation of complex rules and cumbersome bureaucracy.
- Infrastructural reform, improving ports, development of roads and communication networks of water, air and road
- Increasing the working hours of customs and provide facilities for the payroll of customs and port fees.

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