The relationship between external debt and foreign direct investment in D8 member countries (1995-2011)

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Abstract: As the structure and infrastructure of a country's economy become stronger, foreign investors are more likely to have direct investment in that country. On the other side, when the free market does not work properly and the market mechanism cannot use its facilities completely or develop new competitive advantages or fails to give an appropriate signal to economic agents' decision making for investments, government intervention in the economy increases. By reducing the burden of foreign debt, financing increase due to capital inflows into the country. Therefore, in this study, the relationship between external debt and foreign direct investment (FDI) in D-8 member countries over the period 2011-1995 have been analyzed using panel data. The results show that external debt have significant negative effect on foreign direct investment, and increasing foreign debt has destroyed foreign investors vision and created negative expectations of the future economy which together reduced investment in the country. The results also indicate that the government size has a negative effect on attracting foreign investment and presence of government leads to less participation of private sector. GDP has a positive effect on attracting foreign direct investment and that means increasing in production leads to higher potential consumption and investment which ultimately increases direct foreign investment. The results suggest that "population" as controlling independent variable has a positive effect on attracting foreign direct investment and increasing population creates a great potential of consumption and boosts the attraction of foreign direct investment.

Key words: *Foreign debt; Foreign direct investment (FDI); D8 member countries; Panel data method*

1. Introduction

Foreign direct investment (FDI) is a kind of investment in which the investor country directly invests on the assets and resources of the host country. In this kind of investment, through physical presence at the investment place and taking the financial responsibilities, the foreign investor takes direct control and management of the unit in the host country. UNCTAD's FDI consists of investments which involve long-term relationships and reflect continuing benefit of the real or legal personality resident in a company outside of the home country of investor. In Palgrave encyclopedia foreign direct investment is defined as ownership in a company or entity based in a foreign country. This kind of investment has high stability and in the event of a downturn in the host country, not only cannot easily leave the country, but also helps to pull the country out of crisis mode. FDI requires high risk and its income is not guaranteed. Also, the long period of foreign direct investment distinguishes it from foreign indirect investment. Buying bonds and shares in securities trading and certificates of deposits in the banks are among foreign indirect investments. The main characteristics of this type of investment are low risk, high income, short period of investment, and better liquidity.

As a result, increasing the amount of FDI and investigating the effective factors on FDI is of high importance. In the present study, first the theoretical foundations including the economic policy factors affecting the flow of foreign direct investment, the economic structure factors affecting the flow of foreign direct investment, encouraging and supporting factors affecting foreign direct investment, external debts, and the relationship between external debt and foreign direct investment flow are reviewed. Then, the research model and research variables and test are represented.

2. Theoretical background

2.1. The economic policy factors affecting the flow of foreign direct investment

The role of FDI has been long discussed in the economic development. Many researches address the effective factors on attracting foreign direct investment; the most important ones include domestic market size, growth, technical capabilities, infrastructure, government policies, institutions, etc. FDI plays an important role in economic promotion of development and growth, increasing the technological level of country and creating employment (Dinda, 2010). When the economic policies in the host country are in line with creating an open stable economic situation, the risk of

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investment decreases and following that, the flow of indirect foreign investment to that country increases. The economic policies effective on FDI flow can be summarized in the following items: monetary policy, fiscal policy, currency policy, trade policy, and regulatory policies.

2.2. The economic structure factors affecting the flow of foreign direct investment

As the structures and infrastructures of a country's economy be stronger, foreign investors are more likely to have direct investment in that country (Selian, 2010). The main factors of economic structure which affect directly on attracting foreign direct investments include: stable trade balance, market size and expansion, foreign debt, structure of financing, infrastructure installations, skilled workforce and development of human resources, information technology widely available.

2.3. Encouraging and supporting factors affecting foreign direct investment

Some countries offer incentives for attracting foreign investors. It is certain that as the amounts of incentives increase, the investors are more likely to invest. In this regard, the following instances can be mentioned: Tax exemption for foreign investor production companies, granting insurance covers to investors, granting customs exemptions on imported factors needed for foreign investment companies, subsidies for training local workforce, creating free trade areas for investment, granting infrastructure facilities and cheaper public services such as water and electricity, guaranteed return of principal capital and its interest, and prevent their confiscation and nationalization.

2.4. Foreign debts

The issue of "borrowing" has attracted more attentions of economic and political issues' pundits from different countries, and due to its economic, political and even managerial dimensions is of high significance. The discussions concerned with this subject are mainly around foreign debt and its positive and negative effects.

2.5. The relationship between FDI direct flow and foreign debts

FDI is very important for economic development especially in the developing countries; since it brings about not only financial help, but also other investments, technology, new jobs, skills, management and expertise. It is obvious that increasing the investments on the projects leads to creation of more job opportunities. FDI is a main source of financing and investment for less developed countries all over the world. The FDI inflow helps to solve the problem of foreign

accumulated debt in developing countries, financing the developmental needs and also boosting per capita income. Excessive dependence to foreign debts is associated with tremendous risks; it impedes economic growth and development of the country (Khan, 2007).

3. Research methodology and variables

The model used in this research is as follows:

$$Y_{ij} = \alpha + \beta_1 x1_{ij} + \beta_2 x2_{ij} + U_i$$

Research variables include FDI (dependent variable), foreign debts (main independent variable), government size, GDP and population (control independent variables) of D-8 member countries.

In this study panel data method are used and the information related to during 1995-2011 are used in Eviews software for constructing the model. For data processing and summarizing Eviews software is used. The statistics and information are extracted from World Bank website.

3.1. Data referential analysis

3.1.1. Research variables' stationary test

Before estimating the model it is necessary to test the stationarity of all the variables used in the research calculations. To this aim, the following tests can be useful: Levin, Lin and Chu test (LLC), IM, Pesaran and Shin (ISP), Breitung test, Fisher-tests using ADF.

The results of tests indicate the stationary of all of the variables. In this test H0 refers to non-stationary of variables and H1 refers to stationary of the variables, and all the variables have stationary at the zero level.

Table 1: the results of variables' stationary

Variable	Levin, Lin & Chu t-Statistic	probability	result
Population	-1.83783	0.0330	I(0) - stationary
FDI	-3.80836	0.0001	I(0) - stationary
Govt. size	-5.44624	0.0001	I(0) - stationary
Foreign debt	-2.01600	0.0219	I(0) - stationary
GDP	-2.56456	0.0052	I(0) - stationary

In order to test research hypotheses, first it must be discussed whether the data are panel data or pooled data. For this, F-Limer statistics was used where if the calculated F is larger than F in the table, H0 is rejected and using panel data method is recommended, otherwise it is better to use pooled data.

In F-Limer test, H0 hypothesis represents equal intercept (pooled data) versus the opposite

hypothesis, the intercept anisotropy (panel data). Thus it can be:

$$H_0 : \alpha_1 = \alpha_2 = \cdots = \alpha$$

H1: at least one of the intercepts is different with the others.

This model is tested using Eviews software. To choose between panel data or pooled data method, F-Limer statistics is used. In this test, H0 is based on pooled data method and H1 is based on panel data method. F-Limer showed 26.36, with the zero probability which confirms using panel data; and regarding the value of this statistics and testing the panel data method it is accepted. For deciding on the application of fixed effects or random effects method, Hausman test is used. In fact this tests that individual effects are uncorrelated with explanatory variables under which the estimation of generalized least squares is consistent under H0, and inconsistent under H1. In other words, using random effects method in which generalized least squares estimators are used; H0 shows consistency of the coefficients while H1 rejects this consistency. If H0 is not rejected by doing Hausman test, the used method for estimation will be random effects method (Baltagi, 2005). The value calculated by Hausman test is 12.79 atzero probability which confirms fixed effects method.

The generalized least squares (GLS) method is used in panel data. Weighting is done based on companies. Cross-section (weights) and Wald chi-square statistics are also considered and regarding its value with the zero probability, the regression is significant. LR test is an estimator for heteroscedasticity of variance and has chi-square distribution. H0 is based on homoscedasticity.of variance and the opposite hypothesis is based on heteroscedasticity of variance. The estimated model in this research is as follows (Table 2, Table 3 and Table 4):

Table 2: F-Limer statistics

Result	F-Limer	Degree of freedom	Probability
Panel data	26.363176	4	0.0001

Table 3: Hausman test results

Result	Hausman-statistics	Degree of freedom	Probability
Panel data	12.791765	4	0.0123

Table 4: results of combined regression estimations over 1995-2011

variable	coefficient	Standard deviation	t-statistics	Sig.
C	-59.26237	8.553721	-6.928256	0.0001
GDP	0.596822	0.063915	9.337712	0.0001
DEP	-0.012602	0.004039	-3.120237	0.0024
POP	0.139708	0.043062	3.244329	0.0016
GO	-0.090190	0.036683	-2.458617	0.0158
1.84	Durbin-Watson statistics	R^2: coefficient of determination 0.90		
84.16 0.01	F-statistics F-statistics sig.	Adjusted R^2 0.89		
0.01	Prob (F)	F-Limer 26.36		

Regarding the coefficient of determination, the model has a good fitness and the variables used in this model indicate the explanatory strength of the model 90%, which is a good value in panel data method. Durbin-Watson demonstrates absence of autocorrelation by 1.84. F statistics in this fitness rejects coefficients' equality to zero.

3.1.2. Analyzing model's coefficient of determination

Coefficient of determination examines the suitability of fitted regression line based on a series of dat. As the value of this coefficient increases, independent variables are more capable of explaining the behavior of dependent variable. The value of coefficient of determination in the estimated results of regression model is calculated as $R^2 = 0.90$. The estimated value of coefficient of determination indicates that about 90% of dependent variable behavior is explained by independent variable; this represents the rather high relationship between independent variables and the dependent variable.

3.1.3. Collinearity Test

For Collinearity Diagnostics two methods of condition index and Eigen value by SPSS software are used. As the condition index gets closer to zero i.e. lower than 30, it represents lack of serious Collinearity in the intended estimation. Also, as the Eigen values are different than zero, it represents lack of serious Collinearity in the intended estimation. Hence, regarding the values of the two tests, collinearity in the research results is rejected.

3.1.4. Residuals' variance heteroscedasticity test

One of the classic assumptions of regression models is Residuals' variance heteroscedasticity which is regarded a basic assumption in any relationship. For testing variance heteroscedasticity in this research, ARCH-LM test is used. The test results are presented in the attachment but following table represents a summary of this test for the relationships of research. As it was explained

before, the null hypothesis and its opposite hypothesis is defined as follows:

H0: the variance of errors is homogenous.

H1: the variance of errors is not homogenous.

Table 5: Collinearity Test

				Variance Proportions					
Model	Dimension	Eigenvalue	Condition Index	(Constant)	FDI	GDP	go	de	pop
1	1	2.993	1.000	.00	.00	.00	.00	.00	.00
	2	2.363	1.125	.05	.00	.03	.00	.00	.02
	3	2.000	1.223	.00	.07	.00	.00	.00	.00
	4	.356	2.899	.74	.04	.05	.00	.00	.10
	5	.211	3.764	.04	.66	.21	.00	.00	.05

Collinearity Diagnostics[a]

Table 6: Residuals' variance heteroscedasticity test

Test-result	P-value	Obs*R-squared statistics	F-statistics	Null hypothesis and opposite hypothesis
Null hypothesis accepted (variance)	0.14	18.62	1.74	Homoscedasticity of H0 Variance
				Hetrooscedasticity of H1 variance

In this test null hypothesis indicates homoscedasticity of variance and the p-value calculated by ARCH-LM test for the relationship is estimated 0.14 i.e. bigger than 0.05, the significance level (p-value≥0.05); as a result the null hypothesis is accepted indicating that variance heteroscedasticity does not exist.

3.1.5. Examining the normality of residuals of multiple regression model

For investigating the normality of residuals of multiple regression model Q-Q plot, Jarque-Bera Normality Test and Histogram of error values are used. The null hypothesis and the opposite hypothesis in Jarque-Bera Test are as follows:

H0: the residuals of model follow a normal distribution.

H1: the residuals of model do not follow a normal distribution.

Regarding the value of probability or p-value estimated for Jacque-bera test, it is observed that the null hypothesis is not rejected; hence, the residuals of model use normal distribution.

3.1.6. Residuals autocorrelation test

In order to test the autocorrelation between the error values B-G test is used. The null and opposite hypotheses are as follows:

H0: there is no correlation between error values.

H1: there is autocorrelation between error values.

Table 7: testing the residuals autocorrelation

Test-result	P-value	Obs*R-squared statistics	F-statistics	Null hypothesis and opposite hypothesis
Null hypothesis accepted	0.82	8.6	0.5	H0: lack of autocorrelation
				H1: autocorrelation

Regarding the output table of this test and observing the value of probability or p-value, it is found that the value of probability is above 5% level so the null hypothesis is confirmed and the existence of autocorrelation between error values is rejected.

4. Conclusion

The research findings show that foreign debts has a negative significant effect on FDI and that increasing foreign debts destroys foreign investors attitude and creates negative expectations from the economic future and thus, reduces the degree of investments in that country.

Also, the results indicated that the government size has negative effect on attracting foreign investment. This is in line with crowding out effects and shows that the presence of government reduces the presence of private sector.

Findings also show that GDP has a positive effect on attracting FDI as the dependent variable. This means that increase in the production implies higher potential for consumption and investment which ultimately increases FDI.

Moreover, the results indicate that population as a controlling independent variable has positive effect on attracting FDI as the dependent variable which means that population growth has created a high potential for consumption and increases foreign direct investment.

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