FDI and Economic Growth: The Role of Natural Resources?

Hayat, Arshad

Institute of Economics Studies, Charles University Prague

2014

FDI and Economic Growth: The Role of Natural Resources

Arshad Hayat[a]

Abstract

In the paper, I explored links between inflow of FDI, natural resource abundance and economic growth. Natural resource abundance is considered to slow down the economic growth. The paper explores if the natural resource abundance reduce the FDI induced growth in the host country. Using panel data for a sample of 106 countries for the period 1993-2012, the paper conclude FDI inflow accelerates economic growth of the host country. However, the presence of natural resources slows down the FDI induced growth.

---

[a] PhD Economics Candidate at IES, FSV Charles University Prague, Email: arshadiiu@gmail.com

I.   Introduction:

The role of foreign direct investment (FDI) inflow in the economic growth of receiving countries has been studied extensively. While majority of studies reveal a positive effect of FDI on host country economic growth, the debate is still far from over. Empirical studies conclude mixed results about the impact of FDI on economic growth. Studies like (Javorcik 2004; Reganati et al. 2007; Horvath and Irsova 2011) conclude a positive effect of FDI on economic growth. However, other empirical studies failed to find any positive effect of FDI on economic growth (Borensztein et al. (1998).

The relationship between FDI and economic growth has been explored from many aspects. Studies reveal that the relationship between FDI and host country economic growth is dependent up on many other relevant factors and variations in these factors substantially alter the relationship. Absorptive capacity in the shape of human capital is an important factor for the host country in order to extract the growth benefit of FDI (Borenztein et.al 1998). Development level of financial markets is an important determinant of the FDI-economic growth relationship. Countries with well-developed financial markets gains significantly from FDI in terms of growth (Alfaro et.al 2010). Other factors affecting the impact of FDI on host country economic growth are the technology gap between the host and origin country (Horvath and Irsova 2011) and shared ownership of the FDI firm (Javorcik 2004).

FDI and Economic Growth (1993-2012)
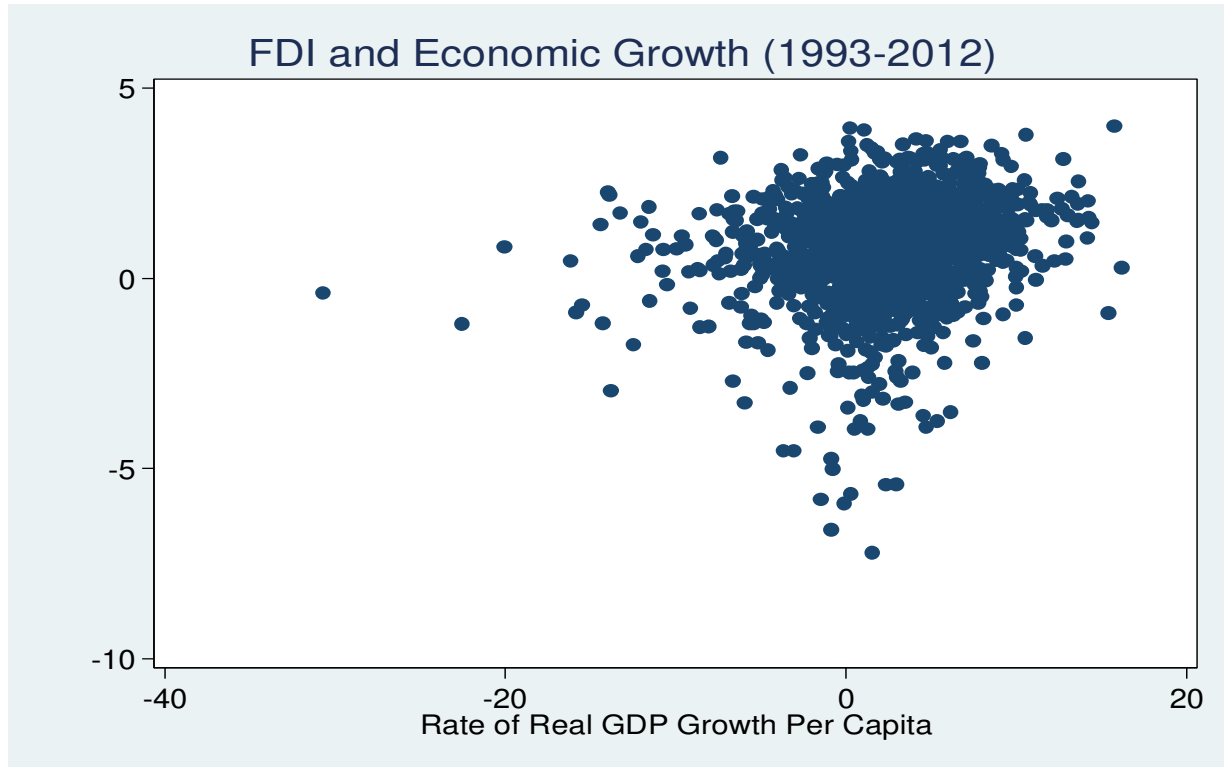
Natural recourse endowment is one of the many factors attracting FDI (Kekic 2005). However, natural resource rich countries fail to grow faster than the resource scarce countries (Sachs and Warner 1997). The phenomenon is often referred to as the "resource curse". The logic behind the negative effect of resource abundance on the economic growth of a country is that the increased revenue from the greater exploitation of natural resources increases the exchange rate of the country's currency and make exports from other sectors of the economy expensive and hence makes those sectors less competitive. This is also referred to as the Dutch disease.

While countries with natural resource abundance fails to achieve the goal of the faster economic growth than those with scarce natural resource, I try to investigate if the Dutch disease alter the relationship between the FDI inflow and economic growth in the host country. The phenomenon of Dutch disease result in a two speed economy with the natural resource sector growing faster and the other non-natural resource sectors

growing slower. The most recent example of the Dutch disease is due to the boom in the mineral sector of Australia. The economy experienced a three speed growth i.e. fast growing sector, slow growing sector and the declining sector (Corden 2012). The rest of the paper is organized as the following. A brief review of literature is presented section II, followed by description of data in section III and methodology in section IV. Results are presented in section V while section VI concludes the paper.

II.   Literature Review:

The role of FDI in fostering host country economic growth has been explored extensively. FDI inflow is considered to be positively correlated with the host country economic growth. Gorodnichenko et al. (2007) examined firm level data from 17 emerging economies for the period 2002-2005 in order to find out the impact of FDI inflow on the productivity and spillover effect on the host country firms. The study found a strong vertical spillover effect for both supplier and consumer firms in the domestic economy. Examining the data from 1970-1990 for a large group of OECD and non-OECD countries, De Mello (1999) found that FDI inflow affected economic growth in the host country via technology and knowledge spillovers.

However, there are studies that fails to find any positive association between FDI and economic growth of host country. In a metadata analysis of the FDI spillover, Horvath and Irsova (2011) found that the spillover effect of FDI in local economic is smaller than projected by most of the papers. Examining the firm level data from Venezuela, Aitken and Harrison (1999) doubts the spillover theory by finding that FDI inflow does have a positive but very small effect on the FDI receiving firm while a negative effect on the productivity of domestically owned firms.

The relationship between FDI inflow and economic growth vary across country with different conditions. Trade volume is considered one of the factors important for the

effect of FDI on economic growth in the host country. Examining a cross sectional data of 46 developing countries Balasubramanyam et al. (1996) conclude that the growth effect of FDI inflow is greater for export promoting countries as compared to the import substituting countries. In a metadata analysis Horvath and Irsova (2011) found that countries more open to international trade receive greater FDI spillover than others.

Other studies reveal the importance of many relevant factors in determining the FDI-host country economic growth relationships. For example Borensztein et al. (1998) found that while FDI is an important factor for technology transfer and economic growth. However, the growth enhancing effect takes place only when the host country has an absorptive capacity in terms of minimum threshold of human capital. Examining data from a panel of 18 Latin American countries, Bengoa et al. (2002) conclude that while FDI affect economic growth positively, adequate level of human capital, economic stability and liberalized markets in the host country are needed in order to benefit from FDI.

Besides the absorptive capacity in terms of human capital, developed financial sectors are considered to be an important factor in achieving the FDI induced economic growth. Azman-Saini et al. (2010) developed a threshold model for financial markets development for its role in determining the impact of FDI on economic growth in the host country. The study conclude that FDI is an important factor that positively affect economic growth. However, the positive effect of FDI takes place only when the host country has a minimum level of threshold financial sector development. Examining cross sectional data for a large group of countries Alfaro et al. (2004) developed four different measures for financial markets and conclude that countries with a well-developed financial system are better able to attain the economic growth from the inflow of FDI.

Multinational firms invest beyond the national boarder and are attracted to different locations for many reasons. According to Kekic (2005), natural recourse endowment is one of the many factors attracting FDI. However, the existence of natural resources in a

country also effects the type of FDI the country attracts. Analyzing the role of natural resources in attracting FDI, Poelhekke and Van der Ploeg (2010) conclude that natural resources attract higher resource FDI and crowds out the non-resource FDI.

The presence of natural resources in a country affect the amount and the type of FDI the country attracts, it also effects the economic growth of the country. Natural resource abundance might seem as an opportunity for attracting greater investment, economic growth and prosperity for the country. The empirical evidence on the effect of natural resources on economic growth is contradictory in this regard. Examining the economic performance of the resource rich countries Sachs and Warner (1997) found that the natural resource rich countries fail to grow faster than the resource scarce countries. The phenomenon is often referred to as the "resource curse". One explanation of this phenomenon often referred to in the literature is the "Dutch disease". The logic behind the negative effect of resource abundance on the economic growth of a country is that the increased revenue from the greater exploitation of natural resources increases the exchange rate of the country's currency and make exports from other sectors of the economy expensive and hence makes those sectors less competitive. The phenomenon of Dutch disease result in a two speed economy with the natural resource sector growing faster and the other non-resource sectors growing slower. The most recent example of the Dutch disease is due to the boom in the mineral sector of Australia. The economy experienced a three speed growth i.e. fast growing sector, slow growing sector and the declining sector Corden (2012). In a panel data study on the impact of natural resource abundance on the economic growth (De Rosa and Lootty 2012), found that while the resource driven economic growth gives a further boost to countries with a higher initial per capita income, countries with a lower initial per capital income find themselves in a poverty trap which is further accelerated by the resource dependence.

III.   Data:

In the section data, the data about all the variables used in the paper is described. The study is based on analyzing data for the period of 20 years from 1993 to 2012 from 106 countries classified into low income countries, middle income countries and high income countries according to the World Bank criteria. I used real per capital GDP growth and the ratio of net FDI inflow to GDP which is obtained from World Bank database [2].

In order to capture the role of human capital for economic growth (absorptive capacity), many studies have used schooling as a variable. Schooling is measured by the "average years of secondary school attainment" which is obtained from Barro and Lee (1996). Data on ratio of trade volume and GDP, initial GDP, ratio of gross domestic private investment and GDP, ratio of government spending and GDP and M2/GDP, population growth rate and inflation is also obtained from the World Bank database. Money supply (M2) is used as instrument for financial markets development which besides similar indicators is used as an instrument for the financial markets development by Alfaro et al. (2004). Natural resources exports as a share of total export is used as an indicator for natural resource. Studies exploring the impact of natural resource abundance on productivity (e.g. Sachs and Warner 1997) have used resource exports as an indicator for natural resources. Data is obtain in the form of fuels plus ore and metal exports as a share of good exports from the World Bank database.

Table1. Descriptive Statistics

Variable	Observation	Mean	Standard Deviation	Min	Max
Real GDP Growth Per Capita	2120	2.357184	4.042897	-30.69423	16.19617
Net Inflow as percent of GDP	2120	3.914004	5.030745	-16.41802	53.81077

Percentage Share of NR in Goods Exports	2120	23.25761	27.75933	.0009666	99.70905
Trade Volume	2120	0.8509623	0.5329907	0.1454222	4.602714
Schooling	2120	2.758	1.388604	0.08	7.48
Private Investment/GDP	2120	0.2272467	0.0820041	-0.5090844	0.8592907
Population Growth Rate	2120	1.317804	1.414712	-3.820174	17.31492

The table 1 above present descriptive statistics for net FDI inflow, real GDP growth rate per capita, share of resource exports in goods exports, trade volume, schooling, investment and population growth. There are huge variations in the data. The biggest negative growth in Real GDP is recorded in the year 1994 for Moldova while the biggest positive growth rate in real GDP per capita is recorded at 16.19 by Venezuela. Net FDI inflow also show a lot of variations ranging from -16.41% of GDP for Hungry in the year 2010 to 53.81% of GDP in Mongolia. Natural resource export ranges from as low as 0.0009 percent of total goods exports for Belize in 2003 to 99.70% of total goods export for Brunei Darussalam in the year 1993.

IV. Methodology:

In order to find out the impact of FDI on economic growth of the host country the following model is estimated

$$Growth_{i,t} = \beta_0 + \alpha_i + \beta_1 FDI_{i,t} + \beta_2(Control\ Variables_{i,t}) + \varepsilon_{i,t} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\ (1)$$

Growth in the model above refers to the real growth rate of GDP per capital, FDI is the log of net FDI inflow as a percentage of GDP. The control variables include initial GDP, population growth rate, trade volume, gross domestic investment, government consumption spending, Inflation rate, money supply (M2) and schooling. Money supply

(M2) is included in order to capture the level of financial markets development. I used M2 because it is easily available for the large sample of countries used in the paper. The α_i in the model (1) above is random variable and is fixed across the time series and it captures the unobserved heterogeneity across the cross-sections of the data. If the α_i is correlated with the error term then the appropriate model to estimate the coefficients would be the fixed effect model otherwise random effect model would be best to estimate. In order to choose appropriate panel data model the following Hausman specification test is estimated.

Ho: COV $(\alpha_i, \boldsymbol{\varepsilon}_{i,t})$ =0 (βRE is consistent and efficient and βFE is consistent but inefficient)

H1: COV $(\alpha_i, \boldsymbol{\varepsilon}_{i,t})$ ≠0 (βRE is inconsistent and βFE is consistent)

Based on the hausman test I chose the appropriate model to estimate the equation (1).

The Role of Natural Resources:

The purpose of the paper is to examine the impact of the natural resource abundance on the FDI-Economic growth relationship. Natural resource abundance is considered to be changing the pattern of FDI the country attracts in favor of resource sector. The phenomenon of Dutch disease explains the way in which the growth in the resource sector and increase in the exports of resources hurt the non-resource sector and the increased growth in the resource sector is not enough to offset the decrease in the non-resource sector which leads to an overall slow growth of the resource abundance economies. There I expect the resource abundance to slow down the FDI induced growth in the host country economies.

In order to capture the role of natural resources in altering the FDI, growth relationship, a modified model is estimated that include the variable natural resources and an interaction term between the natural resources and FDI.

$$Growth_{i,t} = \beta_0 + \alpha_i + \beta_1 FDI_{i,t} + \beta_2(Natural\ Resource_{i,t}) + \beta_3\left(Natural\ Resource_{i,t} \times\right.$$

$$\left.FDI_{i,t}\right) + \beta_4(Control\ Variables_{i,t}) + U_{i,t}\text{--- (2)}$$

In order to estimate the appropriate model again the Hausman test for specification is estimated and I choose the best model between the fixed effect and random effect model based on the results from the following hypothesis.

Hypothesis:
Ho: COV $(\alpha_i, U_{i,t})$ =0 (βRE is consistent and efficient and βFE is consistent but inefficient)

H1: COV $(\alpha_i, U_{i,t})$ ≠0 (βRE is inconsistent and βFE is consistent)

V.   Analysis of Results:

In order to choose the appropriate model for estimation of equation (1), the hausman test for specification is estimated. The results from hausman tests are below.

Chi^2(9) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 32.36
Prob>chi2 = 0.0002

Based on the above test at 5% confidence interval we can reject the null hypothesis and therefore choose to estimate the fixed effect model based on equation (1) and the results are presented in the table 2 below. The table 2 below show the estimated coefficients against the p-values. It can be seen from the results clearly that the coefficient of FDI is significant and show that FDI inflow strongly enhances growth rate of the host country economy. The result is in line with the majority of earlier studies. The coefficients of Money supply (which is used as an indicator for the financial markets development) and domestic investment are both significant and positive. Coefficients of both initial GDP and trade volume are positive however insignificant. Government spending, inflation

rate and population growth rate are all negative and significant. However, the unexpected result is the negative coefficient of schooling.

Table.2 [Fixed Effect Estimates from Equation 1]

FDI and Economic Growth: Dependent Variable is Growth Rate of Real GDP Per Capita

EXPLANATORY VARIABLES	COEFFICIENTS	P-VALUES
FDI	0.3846175	0.000
POPULATION GROWTH RATE	-0.879311	0.000
INITIAL GDP	4.260287	0.553
SCHOOLING	-4.486108	0.000
INFLATION	-3.422823	0.000
MONEY SUPPLY (M2)	0.4761507	0.000
GOVT CONSUMPTION EXPENDITURE	-1.642311	0.000
TRADE VOLUME	0.0635273	0.893
INVESTMENT	1.85245	0.000
R-SQUARED	0.0.0011	
NO OF OBSERVATION	1965	
R-SQUARED	0.0011	
CORR(U_I, XB)	-0.9773	
F(11,1848)	29.69	
PROB > F	0.000	

Note: The regression has a constant term. FDI is log of net inflow of FDI as a percent of GDP, initial GDP is log of initial GDP, and schooling is log (1+ average number of secondary school years), inflation is log (1+inflation rate), money supply is log of ratio of M2 and GDP, Government consumption expenditure is log of the ratio of government consumption expenditure and GDP, trade volume is the log of ratio of trade volume and GDP and investment is the log of ratio of gross private investment and GDP.

In order to estimate the role of natural resources in economic growth and to estimate how much does a standard deviation increase in the natural resources brings about changes in the economic growth that is attracting average amount of FDI and how much does an increase in FDI bring about changes in the growth rate given that the country has a certain amount of natural resources, equation (2) is estimated with an interaction term between FDI and NR.

The following hausman test for specification is estimated again to choose the appropriate model for estimation of equation (2) and estimate the following Chi Square statistic
Chi^2 (11)   = (b-B)'[(V_b-V_B)^(-1)](b-B) =34.30
Prob>chi2 = 0.0003

From the test results above we can reject the null hypothesis and choose to estimate the fixed effect model for equation (2). Results of the fixed effect model are given in the table3 below.

Table. 3 FDI-GDP Relationship: The Role of Natural Resources
Dependent Variable—Growth Rate of Real GDP Per Capita

EXPLANATORY VARIABLES	COEFFICIENTS	P-VALUES
FDI	0.4801891	0.000
NATURAL RESOURCES (NR)	-0.2845437	0.012
FDI X NR	0.0973037	0.047
POPULATION GROWTH RATE	-0.9059393	0.000
INITIAL GDP	5.41383	0.453
SCHOOLING	-4.024678	0.001
INFLATION	-3.397252	0.000
MONEY SUPPLY (M2)	0.4708278	0.001
GOVT CONSUMPTION EXPENDITURE	-1.567963	0.000
TRADE VOLUME	0.2230292	0.638

INVESTMENT	1.859217	0.000
R-SQUARED	0.0005	
NO OF OBSERVATION	1965	
CORR(U_I, XB)	-0.9843	
F(11,1848)	25.09	
PROB > F	0.000	

Note: The regression has a constant term. Natural resources (NR) is the log of share of natural resources (fuels plus ore and metal exports) exports in the total goods export.

The natural resource coefficient $\beta_2 = -0.2845437$, so in case the FDI inflow is zero, the coefficient of natural resource is negative and significant. So in the absence of FDI inflow the natural resource contributes negatively to the economic growth of the country. This is in line with the idea of "resource curse" and with the earlier studies. However, in case there is an inflow of FDI and the FDI inflow is controlled for in the model then the effect of natural resource is dGrowth/dlnNR = $\beta_2 + \beta_3$ lnFDI. So at the mean value of FDI inflow the net effect of NR on the economic growth is -0.2845437+0.0973037(-0.15066) ≈ -0.2992. This shows a marginally stronger negative effect of natural resources on economic growth when a mean level of FDI inflow occurs. This can be explained as the FDI inflow into countries with natural resource sector accelerates the negative effect on the non-resource sector caused by the growth in the resource sector.

The FDI coefficient $\beta_1 = 0.480$ is positive and significant. However, considering the FDI alone would be misleading because this tells us the impact of FDI inflow incase where the natural resources in a country is zero. Therefore, the total effect of FDI inflow on the economic growth of host country would be dGrowth/dlnFDI = $\beta_1 + \beta_3$ lnNR. So at the mean value of natural resources the net effect of FDI inflow on economic growth is 0.480 + 0.09730 (-1.4585) ≈ 0.3385. The statistical significance of the term $\beta_1 + \beta_3$ lnNR is tested by re-running the model and replacing the interaction term by ln_FDI X (ln_NR- ln Mean of NR). The P-value is less than 0.05 therefore, the term is concluded to be statistically

significant. In this case of mean natural resources the impact of FDI inflow on the host country economic growth is still positive however a lot smaller than the impact the FDI inflow had on the economic growth without controlling for natural resources. Which is an evidence of the fact that the FDI inflow into the resource sector might speed up the growth rate, however, the non-resource sector is negatively affected and the overall growth rate remains relatively lower. However, if the resource sector is already a huge portion of the economy then it is possible that slowing down effect on the non-resource sector might be very small or insignificant. For countries with the natural resources above the 90% of the good export share, the FDI effect on growth is 0.46978 which is just a little less than $\beta_1 = 0.480$ (FDI effect on growth while not controlling for NR).

VI. Conclusion:

The paper focuses on the role the abundance of natural resources in a country plays in altering the relationship between the inflow of FDI and economic growth. While the impact of FDI inflow on economic growth of the host country is still being debated, majority of studies conclude a positive impact of FDI inflow on the domestic economic growth. The size and sign of the impact of FDI on economic growth varies greatly due to changes in different variables. The host country absorptive capacity in the shape of human capital, developed financial markets and open trade policies are considered to be detrimental in extracting the FDI induced growth. Countries with developed financial markets, greater absorptive capacity and maintaining trade tend to benefit more from the inflow of FDI. Natural resources is one of the reasons firms take into consideration while moving into a country and countries with natural resources in abundance do attract large amount of FDI. However, natural resources and growth in the natural resource sector is considered to be negatively associated with growth in the non-resource sector and an overall slower growth economic growth.

In this paper, I examined the impact of FDI inflow and natural resource abundance on the economic growth. The paper conclude that the FDI inflow accelerates economic

growth in the host country. However, the natural resource abundance in the country slows down the FDI induced economic growth.

Appendix

A1

106 countries are included in the study which are divided into three categories of poor income, middle income and high income countries by the World Bank. The countries are the following.

Low income countries are

Benin Cambodia Kenya Kyrgyz Republic Malawi Mali Mozambique Tanzania Togo Uganda

Middle income countries are

Albania Algeria Argentina Armenia Belize Bolivia Botswana Brazil Bulgaria Cameroon China Colombia Costa Rica Cote d'Ivoire Dominican Republic Ecuador Arab Republic of Egypt El Salvador Gabon Ghana Guatemala Honduras Hungary India Indonesia Islamic Republic of Iran Jordan Kazakhstan Malaysia Mauritius Mexico Moldova Mongolia Morocco Nicaragua Pakistan Panama Paraguay Peru Philippines Romania Senegal South Africa Sri Lanka Sudan Thailand Tunisia Turkey Ukraine Venezuela, RB Vietnam Yemen Republic Zambia

High income countries

Australia Austria Bahrain Belgium Brunei Darussalam Canada Chile Croatia Cyprus Czech Republic Denmark Estonia Finland France Germany Greece Hong Kong SAR, China Iceland Ireland Israel Italy Japan Korea, Republic Latvia Lithuania Malta Netherlands New Zealand Norway Poland Portugal Russian Federation Saudi Arabia Singapore Slovak Republic Slovenia Spain Sweden Switzerland United Arab Emirates United Kingdom United States Uruguay

Reference:

Alfaro, L Chanda, A Ozcan, S. K and Sayek, S (2010), "FDI and Economic Growth: The Role of Local Financial Markets", *Journal of International Economics 64, pp. 89–112*

Azman-Saini. WNW, Law. S.L and Ahmad. A.H (2010), "FDI and Economic Growth: New Evidence on the Role of Financial Markets, *Economics Letters 107, pp. 211–213*

Bengoa. M and Sanchez-Robles, Blanca (2003), "Foreign Direct Investment, Economic Freedom and Growth: New Evidence from Latin America, *European Journal of Political Economy Vol. 19 529–545*

Borensztein, E., De Gregorio, J., Lee, J.-W (1998), "How Does Foreign Direct Investment Affect Economic Growth", *Journal of International Economics 45, 115– 135*

Cameron, A.C and Trivedi, P.K (2005), *Microeconometrics; Methods and Applications,* Cambridge University Press, NY

Corden, W.M (2012), "The Dutch Disease in Australia: Policy Options for a Three-Speed Economy", *Melbourne Institute Working Paper Series, Working Paper No. 5/12*

De Rosa, D and Lootty, M (2012), "Are Natural Resources Cursed? An Investigation of the Dynamic Effects of Resource Dependence on Institutional Quality", *World Bank, Policy Research Working Paper 6151*

Hausman, J.A (1978), "Specification Tests in Econometrics", *Econometrica, No. 6 Volume 46, pp. 1251-1271*

Horvat, T and Irsova, Z (2011), "Estimating Vertical Spillovers from FDI: Why Results Vary and What the True Effect Is?" *Journal of International Economics, Volume No. 85(2), 234-244*

Kekic, L (2005), "Foreign direct investment in the Balkans: recent trends and prospects", *Southeast European and Black Sea Studies Volume 5, Issue 2, 2005*

Kottaridi, C and Stengos, T (2010), "Foreign Direct Investment, Human Capital and Non-Linearities in Economic Growth," *Journal of Macroeconomics vol. 32(3), pages 858-871, September*

Poelhekke, S and Pleog, F (2013), "Do Natural Resources Attract Non-Resource FDI?" *The Review of Economics and Statistics, No. 3, Volume. 95, pp. 1047-1065*

Reganati, F, Pittiglio, R and Sica, E (2008), "Horizontal and Vertical Spillovers from FDI in the Italian Productive System", *Dipartimento di Scienze Economiche, Matematiche e Statistiche Università degli Studi di Foggia*

Sachs, J.D and Warner, A.M (1997), "Natural Resource Abundance and Economic Growth", *NBER Working Paper No. 5398*

Wooldridge, J.M (2008), *Introductory Econometrics; A Modern Approach,* South Western College Publishing, Massachusetts USA