FDI and economic growth: Evidence on the Role of the Size of Natural Resource Sector

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Abstract:

This paper uses a threshold regression model and split the sample into groups of low-natural resource and high-natural resource groups. This paper used data from 70 countries for the period 1996-2015 and found evidence that FDI has a positive impact on economic growth of the host country if the host country's natural resource sector is below the threshold. However, FDI inflow doesn't have any significant impact on growth in countries with natural resource sector larger than the threshold.

Key Words: FDI, Economic Growth, Natural Resources, Threshold Model
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I.   Introduction:

Foreign direct investment (FDI) and its impact on the host country economic growth has been studied extensively. While many studies suggest a positive impact of FDI on economic growth (see for example (Javorcik, 2004) (Reganati et al., 2008)), the idea of FDI induced economic growth is still debated and an overwhelming majority view the FDI-growth relationship to be ambiguous (Gorg & Greenaway, 2004) (Bruno & Campos, 2013). This has lead researchers to come up with modeling contingency effects in FDI-growth relationship. Studies have suggested that the FDI-growth relationship is contingent upon many other factors. For instance level of economic development (Blomstrom et al., 1994), financial markets development (Hermes & Lensink, 2003) (Alfaro et al., 2004) (Azman-Saini et al., 2010), trade liberalization (Balasubramanyam, 1996), human capital (Borensztein et al., 1998), economic stability and liberal markets (Bengoa & Sanchez-Robles, 2003), technology gap between the host and origin country (Havranek & Irsova, 2011).

This paper explores the role of the size of natural resource sector in altering the FDI-growth relationship. Natural resources abundance is an important factor in attracting foreign direct investments (Kekic, 2005). However, natural resource abundant countries are expected to growth slower than the resource scarce countries (Sachs & Warner, 2001). Therefore, an FDI inflow into the natural resource sector is expected to enlarge the resource sector and potential slower the growth rate of the country. Studies have also shown that resource rich countries tend to divert FDI inflow into resource sectors (Aseidu & Lien, 2011). This is expected to lower the FDI in the non-resource tradable sectors. This diversion of the FDI from non-resource tradable sector to natural resource sector is the reason behind the lack of positive spillovers and technology transfers taking place (Aseidu, 2006). Therefore, we expect the larger size of natural resource sector to divert FDI into the natural resource sector at the cost of non-resource sector and this will lead to any potential FDI induced growth to vanish.

However, the role of natural resources in the FDI-growth relationship has hardly been investigated. (Hayat, 2014) investigated the role of natural resource abundance on the FDI-growth relationship by using a linear interaction model and concluded that natural resource rich countries tend to receive no FDI induced growth while countries with lower levels of FDI receive positive FDI-induced growth. The limitation with such linear interaction model (a product of natural resource and FDI) is that it assumes the growth effect of FDI to be monotonically decreasing (increasing) with the increase (decrease) in the size of natural resource sector in the country. However, it maybe that FDI inflow into an economy with a natural resource sector beyond a certain size tend to be ineffective in

inducing economic growth. Therefore, there is a need for a different kind of model with more flexible specification in order to explain the FDI, natural resource and economic growth relationship.

This paper uses a different approach to investigate the same question of FDI-growth relationship altering role of natural resource sector. This paper uses threshold model to find the threshold size of natural resource sector which would give a clear difference in the FDI-growth relationship. Using a large panel data set of 70 countries for the period 1996-2015, the study found a strong and significant threshold effects. The rest of the paper is organized as follows: section II describes the methodology and data used in the paper, section III presents the results and section IV concludes the paper.

II.   Methodology and Data

This section describes the methods used in this paper. In order to estimate the regime switching threshold regression, consider the following single threshold model:

$$Y_{it} = \alpha + X_{it}\beta + FDI_{it}(NR \geq \gamma)\eta_1 + FDI_{it}(NR < \gamma)\eta_2 + u_i + e_{it} \tag{1}$$

The same equation (1) can also be written as the following

$$Y_{it} = \beta X_{it} + \begin{cases} \eta_1 FDI_{it} + e_{it} & NR \leq \gamma \\ \eta_2 FDI_{it} + e_{it} & NR > \gamma \end{cases}$$

where Y_{it} is the per capita GDP growth rate and X_{it} are the control variables including initial GDP which is GDP per capita for the year 1996, inflation rate, population growth rate, domestic investment, institutional and governance quality, trade volume and schooling. The variables are discussed in detail in the data section below. FDI_{it} is the net foreign direct investment inflow into the country. NR is the ratio of natural resource exports to the total goods exports and it is the threshold variable that acts as a sample-splitting variable. The threshold variable NR divides the equation into two regimes with coefficients $\eta_1 and \eta_2$. This specification enables us to quantify the impact of FDI inflow on economic growth in two different subsets depending on if the size of natural resource sector is greater or smaller than the threshold level of γ.

The coefficients β, η_1 and η_2 are estimated using fixed effects estimation method. The threshold variable $\hat{\gamma}$ is

estimated as described by (Hansen, 2000). The estimation method for panel data threshold regression is described by (Wang, 2015). The threshold parameter γ is tested for significance by conducting F- test, testing the following null hypothesis $Ho = \eta_1 = \eta_2$.

Data:

This section describes the data used in the paper. The summary statistics of the data used are presented in the table.1 below. This paper uses annual real GDP growth rate per capita, ratio of net FDI inflow to GDP and the variable used for natural resource is the ratio of natural resource export to the total goods export. The same indicator is used by most of the studies investigating the role of natural resources. Other control variables used in this paper are gross domestic investment as the ratio of gross domestic capital formation to GDP, the population growth rate, trade volume as the ratio of exports plus imports to GDP, inflation rate, institutional quality variable is the average value of six institutional quality indicator including "Rule of law", "Regulatory quality", " Government efficiency", "Political stability and absence of violence", "Voice and accountability" and " Control of corruption".

Table.1 Comparative Statistics

Variable	Mean	Std. Deviation	Minimum	Maximum
Real GDP Growth/Capita	2.493	3.736	-14.420	22.998
FDI/GDP	0.037	0.045	-0.160	0.507
NR Exports/Total Goods Exports	0.230	0.252	0.000	0.988
Initial GDP/Capita	10603.26	15104.13	149.36	88002.61
Population Growth	1.380	1.144	-3.820	8.723
Inflation	0.075	0.302	-0.036	10.583
Investment/GDP	0.234	0.066	0.002	0.544
Schooling	2.745	1.453	0.08	6.821
Institutional Quality	55.056	25.394	4.718	99.676
Trade Volume/GDP	0.786	0.484	0.156	4.396

These indicators are produced by the World Bank project called the Worldwide Governance Indicators (WGI)[2].

Schooling is used as an indicator for human capital which is the average years of secondary schooling. The paper

is based on a yearly data sample of 70 countries for the period 1996- 2015. The country selection is solely based

on the availability of data. Data on all the variables is obtained from the World Bank database that can be accessed

online[3]

III.   Analysis of Results:

This section analyses the results. Table.2 presents based on estimation of equation (1) using natural resources (NR)

as the threshold variable. The threshold is estimated to be 0.204 which is significant at 5% confidence interval

with p-value 0.03 which is calculated using bootstrap method with 10,000 replications and a trimming of 10%.

Table2: *Natural Resources and Growth: Threshold Regression using the size of Natural Resource Sector as a threshold variable*

Variable	Coefficients	Standard Errors
Initial GDP	-0.443**	0.198
Population Growth	-4.246***	0.681
Inflation	-3.498***	0.940
Institution Quality	0.216	0.143
Investment	3.252***	0.438
Schooling	2.325*	1.260
Trade Volume	1.607***	0.529
FDI		
Low NR NR $\leq \gamma$	12.518***	3.097
High NR NR $> \gamma$	-2.270	3.654
Threshold Estimate ($\hat{\gamma}$)	0.204**	
F Test for no Threshold	12.65	
Bootstrap p-value	0.036	
No of Countries	70	
No of Observations	1400	
R-Squared	0.126	

Notes: The dependent variable is real GDP growth (1996–2015). Initial GDP is the log of per capita GDP at the during the year 1996. p-value for the threshold test was bootstrapped with 10,000 replications and 10% trimming percentage. There are 478 and 922 observations in the high-NR and low-NR, respectively.

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[2] http://info.worldbank.org/governance/wgi/index.aspx#home
[3] http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators

Therefore, as the threshold estimate is significant we can divide the sample into two subsets. Countries with the natural resource export of more than 20.44% can be classified as the high-NR group (i.e. natural resource abundant countries) and countries with the natural resource export less than the threshold can be classified into the low-NR group (i.e. natural resource scare countries). As can be seen in table 2 the FDI impact on economic growth for the low-NR group is ($\eta_1 = 12.518$ with s.e.=3.094) while the the impact of FDI on economic growth in the high-NR countries is ($\eta_2 = -2.290$ with s.e.=3.650). The coefficient of FDI for the low-NR is $\eta_1 = 12.518$, which is significant at 1% confidence interval which means that a one percent increase in the FDI inflow into resource scarce countries increase economic growth by a 0.125 percentage points. While the coefficient of FDI for the high-NR is $\eta_2 = -2.290$ which is negative, however, insignificant. This suggest that FDI inflow into resource rich countries doesn't induce any economic growth. However, in resource scarce countries FDI inflow has a strong and significant impact on economic growth. This is very much inline with the expectation that larger size of natural resource sector in a country alters the FDI inflow in favor of the natural resource sector at the cost of non-resources tradable sector and studies have shown that the size of natural resource sector is associated with the slower growth rates. Therefore, further FDI inflows into the already large resource sector will expand the resource sector but the impact on the overall economy is insignificant. While the FDI inflow into non-resource tradable sector is strongly positive and significant. The rest of the results are very much inline with the expectation. Initial GDP, population growth rate and inflation rate all have a significant negative impact on the growth rate of real GDP per capita. Investment, schooling and trade volume all have a strong positive and significant impact on the growth rate of real GDP per capita. Institutional quality, though have positive however insignificant impact on economic growth.

IV. Conclusion:

This paper presents new evidence on the role that the size of natural resource sector plays in altering the FDI-growth relationship using data from 70 countries for the period 1996-2015. The main contribution of this paper is that the paper adopted new methodology based on the threshold regression and split data into high-NR and low-NR groups and found that FDI inflow into the low natural resource countries have a positive and significant affect on economic growth of the host country. However, the FDI inflow into the high natural resource group had no significant impact on economic growth.

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