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FDI and economic growth: New evidence on the role of financial markets

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ABSTRACT

This study uses a threshold regression model and finds new evidence that the positive impact of FDI on growth "kicks in" only after financial market development exceeds a threshold level. Until then, the benefit of FDI is non-existent.

1. Introduction

There is a widespread view that the impact of foreign direct investment (FDI) on economic growth is ambiguous (Gorg and Greenaway, 2004).[1] One possible explanation for this mixed finding may be the failure to model contingency effects in the relationship between FDI and growth. A number of economic models suggest that the relationship between FDI and growth may be contingent on other intervening factors. For instance, the model by Hermes and Lensink (2003) predicts that the impact of FDI on economic growth is contingent on the development of financial markets of the host country. According to the authors, well-functioning financial markets reduce the risks inherent in the investment made by local firms that seek to imitate new technologies and thereby improve the absorptive capacity of a country with respect to FDI inflows.[2]

Unfortunately, the role of financial markets in the FDI-growth relation has been hardly investigated. An exception is the study by Alfaro et al. (2004), who, using a linear interaction model, find that the development of local financial markets is an important pre-condition for a positive impact of FDI on growth.[3] A limitation with this type of modeling strategy is that the interaction term (constructed as a product of FDI and financial markets indicator) imposes à priori restriction that the impact of FDI on growth monotonically increasing (or decreasing) with financial development. However, it may be the case that a certain level of financial development is required before host countries can benefit from FDI-generated externalities.[4] This suggests the need for a more flexible specification that can accommodate different kinds of FDI-growth-financial markets interactions.

In this paper, we use a different approach to examine the role local financial markets play in mediating FDI effects on output growth. We use a regression model based on the concept of threshold effects. Our fitted model allows the relationship between growth and FDI to be piecewise linear with the financial market indicator acting as a regime-switching trigger. Using cross country observations from 91 countries over the 1975–2005 period, we find strong evidence of threshold effects

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[1] Gorg and Greenway (2004) review a number of firm-level studies on FDI spillovers. They reported only six out of 25 studies find some positive evidence of FDI spillovers.

[2] Absorptive capacity can be defined as the firm's ability to value, assimilate and apply new knowledge (Cohen and Levinthal, 1989).

[3] This finding was further supported by Villegas-Sanchez (2009) using micro-level data from Mexico. The author finds that domestic firms benefit from FDI only if they are relatively large and located in financially developed regions.

[4] World Bank (2001) emphasizes that only countries with greatest absorptive capacity are likely to benefit from the presence of foreign capital. In countries with low absorptive capacity, the benefits of FDI are muted or non-existent.

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in FDI-growth link. Specifically, we find that the impact of FDI on growth 'kicks in" only after financial development exceeds a certain threshold level. Until then, the benefits of FDI are non-existent.

2. Model specification

We argue that a model particularly well suited to capture the presence of contingency effects and to offer a rich way of modelling the influence of financial markets on the dynamics of FDI and growth is the following threshold specification:[5]

$$GROWTH_i = \alpha X_i + \begin{cases} \beta_1 FDI_i + e_i, & FIN \le \gamma \\ \beta_2 FDI_i + e_i, & FIN > \gamma \end{cases} \quad (1)$$

where *GROWTH* is the average growth rates of real GDP over the 1975–2005 period, FDI is foreign direct investment, and X is a vector of variables hypothesized to affect output growth, which includes initial income (log value of per capita income at the beginning of the sample period), population growth rates, investment-GDP ratio, human capital (defined as average years of secondary schooling), and government expenditure–GDP ratio. In this model, financial market indicators (*FIN*) act as sample-splitting (or threshold) variables and will be explained in the following section. The above specification allows the effects of FDI on growth to take two different values depending on whether the level of financial development is smaller or larger than the threshold level γ. The impact of FDI on growth will be β_1 (β_2) for countries in low (high) regime.

There are two issues that need to be addressed here. The first is to determine the estimate of γ and the slope parameters α and β's. We determine $\hat{\gamma}$ by experimenting Eq. (1) with all possible values of γ, and $\hat{\gamma}$ is the minimiser of the residual sum of squares computed across all possible values of γ (see Hansen, 2000). Once $\hat{\gamma}$ is identified, estimates of the slope parameters follows trivially as $\hat{\alpha}(\hat{\gamma})$ and $\hat{\beta}(\hat{\gamma})$. The second issue is to test the significance of threshold parameter γ. Since γ is not identified under the null, we conduct inferences via a model-based bootstrap whose validity and properties have been established in Hansen (1996).

To sum up, our goal here is to first test for the presence of threshold effect and if it is supported by the data to estimate Eq. (1) so as to assess the statistical significance of β_1 and β_2.

3. Data and empirical results

The data set consists of cross-country observations for 91 countries over the 1975–2005 period. FDI data was extracted from the World Development Indicators (WDI) and expressed as FDI inflows over GDP. Average years of secondary schooling were taken from Barro and Lee dataset. Real GDP and other explanatory variables were extracted from WDI. In this paper, we focus only on the banking sector because (i) bank credits are the only feasible sources of financing for the majority of developing countries in our sample[6], and (ii) the number of available observations for equity market indicators is insufficient to conduct sample-splitting regression.[7] Following Alfaro et al. (2004), we utilize four measures of banking sector development. The first is private sector credit (henceforth, PRC), which equals the value of credit issued by financial intermediaries to the private sector divided by GDP. This is the most preferred measure as it reflects more precisely the efficiency of the banking sector in credit provision (Levine et al., 2000). The second is bank credit (henceforth, BCR) defined as the credit by deposit money banks to the private sector as a share of GDP. The third is commercial bank assets (henceforth, CBA), defined as the ratio of commercial bank assets to commercial bank plus central bank assets. The final measure is the liquid liabilities of the financial system (henceforth, LLY). It measures the overall size of the financial system but may not accurately reflect the efficiency of the banking sector (Demetriades and Hussein, 1996). However, it is included for comparison purposes. The data were taken from the *Financial Structure Database* of the World Bank.

Table 1
Threshold regression using private sector credit as a threshold variable.

	Coefficient	s.e.	*t*-test
Initial income	−0.0040	0.0017	−2.3550
Population growth	−0.5472	0.2323	−2.3559
Investment/GDP	0.0015	0.0003	4.4672
Schooling	0.0051	0.0018	2.8186
Government spending/GDP	−0.0004	0.0003	−1.2297
FDI/GDP			
Low-FIN (PRC ≤ γ)	0.0001	0.0012	0.0856
High-FIN (PRC > γ)	0.0029	0.0013	2.2520
Threshold estimate	0.497		
LM-test for no threshold	30.707		
Boostrap *p*-value	0.034		

Notes: The dependent variable is average real GDP growth (1975–2005). Initial income is the log of per capita income at the beginning of 1975. *p*-value was bootstrapped with 10,000 replications and 10% trimming percentage. There are 31 and 60 countries in the high-FIN and low-FIN, respectively.

Table 1 presents the results of estimating Eq. (1) using private sector credit as a threshold variable. The statistical significance of the threshold estimate is evaluated by *p*-value calculated using bootstrap method with 10,000 replications and 10% trimming percentage. As shown in the table, the threshold estimate is 0.497 and the test of no threshold effect yields a *p*-value of 0.034. Thus, the sample can be split into two groups. Countries with private sector credits (over GDP) of more than 49.7% are classified into high-FIN group (i.e. more developed financial market) while the ones with smaller values are classified into low-FIN group (i.e. less developed financial markets). Additionally, the coefficient on FDI is positive and significant for the high-FIN group ($\beta_2 = 0.0029$; s.e. = 0.0013) but not for the low-FIN group ($\beta_1 = 0.0001$; s.e. = 0.0012). This suggests that the effects of FDI on growth are non-linear in nature and only 'kick in' after financial development exceeds a threshold level.

Table 2 reports the results for models utilizing other bank indicators. The upshot of this analysis is that the threshold effects remain intact in models utilizing bank credits and bank assets. However, the same effect cannot be established in the model utilizing liquid liabilities. This is not a surprise because liquid liabilities are not accurate measure of banking sector efficiency.

Several robustness checks are carried out for the main regression, i.e. private credit equation. Firstly, we assess the effect of outliers on the estimation results. Following a strategy advocated by Belsley et al. (1980), the so-called DFITS statistic is used to flag countries with high combinations of residuals and leverage statistics. The test results suggest Botswana, Guyana, and Lesotho as potential outliers. Interestingly, excluding these countries did not alter the results as the null of no threshold can be rejected at the usual level of significance (*p*-value = 0.011). Secondly, we check whether the high-FIN group can be split further into sub-groups.[8] The split produced an insignificant *p*-value of 0.712 which suggests that a two-regime specification is adequate. Finally, we replicate the sample used by Alfaro et al. (2004) and find that the threshold effect remains valid (not reported).[9] Therefore, previous interpretation is unchanged.

[5] Applying a similar threshold model to UK manufacturing data, Girma (2005) finds a minimum absorptive capacity threshold level below which productivity spillovers are negligible or even negative.

[6] For developing countries, several studies find that banks are a more important source of financing than equity markets (refer to Levine, 2005 and references therein).

[7] The restricted availability of equity markets indicators limit the sample to about 50 countries.

[8] We did not split the low-FIN group because of a small sample size.

[9] Alfaro et al. (2004) use a sample of 71 countries over the 1975–1995 period. For brevity, results are not reported but are available from the authors upon request.