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The impact of FDI on economic growth in developing countries: the role of FDI inflow and trade openness

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ABSTRACT

This study examines the relationship between foreign direct investment (FDI) inflow, trade openness, and the influence of FDI on economic growth. The threshold methodology and GMM estimation are employed to analyze panel data from 60 developing countries in the period between 1995 and 2019. This study demonstrates the positive impact of FDI on economic growth in developing countries. However, the study also finds a significant threshold of FDI inflow relative to GDP that changes the impact of inward FDI on GDP growth. Regarding the role of trade openness, a significant threshold is found, which also indicates the absorptive capacity of the host countries. Moving from below to above this threshold, an increase in FDI inflow leads to a lower increase in economic growth. An increase in FDI relative to GDP stimulates growth only when the host country has sufficient absorptive capacity with regard to trade openness above the threshold. We suggest developing countries tighten the coherence of trade liberalization and FDI attraction policies to obtain the benefits of FDI and make changes to attract new investors when they succeed in attracting massive FDI inflows.

Contribution/Originality: The study makes two key contributions to the body of recent work. First, it shows that as host nations receive large inflows of money, the positive effects of inward foreign direct investment on economic growth diminish. Second, it establishes the threshold level of trade openness above which FDI can provide more support to developing countries.

1. INTRODUCTION

In developing nations, the beneficial impact of foreign direct investment (FDI) on economic growth has drawn a lot of attention. One important external capital source has been FDI. Additionally, FDI is currently the primary force behind the advancement of technological expertise in the host nations. However, empirical evidence from the literature investigating the effects of FDI on growth in developing countries is not clear-cut. Following the linear assumption, most studies show the positive effect of FDI on economic growth in the host country (e.g., (Balasubramanyam, Salisu, & Sapsford, 1996; Borensztein & Loungani, 2011; De Mello Jr, 1997; Dinh, Vo, & Nguyen, 2019; Osei & Kim, 2020)). The effect of FDI on economic growth is even more powerful in low- and upper-middle-income countries (Bruno & Campos, 2018). Contrarily, some studies find no effect or a negative effect of FDI on economic growth (e.g., (Acquah & Ibrahim, 2020; Carkovic & Levine, 2002; Jyun-Yi & Chih-Chiang, 2008)). Given

that previous studies employ different methodologies and data, the diverse results also imply that FDI inflows affect the economic growth of countries differently.

Recently, the beneficial effect of FDI on growth has been argued to depend on the economic conditions of the host countries. According to Borensztein, De Gregorio, and Lee (1998), economies possessing absorption capacity have the potential to get greater advantages from the process of technological diffusion. According to later studies, absorption capacities are found using nonlinear estimation methods. These are the properly trained workforce (Batten & Vo, 2009; Hermes & Lensink, 2003; Li & Liu, 2005), the sufficient level of financial development (Alfaro, Chanda, Kalemli-Ozcan, & Sayek, 2004; De Mello Jr, 1997, 1999; Osei & Kim, 2020), and the sufficient degree of trade openness (Borensztein et al., 1998; Comin & Hobijn, 2004). This study also follows a non-linear approach to explore the relationship between FDI and economic growth, with a focus on the role of the level of FDI inflow and the degree of trade openness. We contribute to the current literature with respect to two main points.

First, to the best of our knowledge, this study is the first to examine this hypothesis with respect to the beneficial effect of inward FDI on economic growth in the host countries. Previously, De Mello Jr (1997) argued that the magnitude of FDI's influence on output growth is limited due to diminishing returns on capital. The law of diminishing marginal returns implies that an abundance of capital does not always consistently favour the host country. On the other hand, Ribakova, Horváth, Demekas, and Wu (2005) suggest a change in the nature of FDI when the host country attracts more foreign investment. As the nature of FDI changes, the effect of FDI as a source of additional capital for growth can also change. Second, the role of trade openness in the relationship between FDI and growth has not been explored appropriately. The endogenous growth theory indicates that the positive relationship between trade openness and economic growth is the result of the international diffusion of advanced technologies (Grossman & Helpman, 1993; Romer, 1994). The empirical evidence of the positive correlation between trade openness and growth is documented by various studies (see (Arif et al., 2022; Edwards, 1992; Freund & Bolaky, 2008; Rivera-Batiz & Romer, 1991; Wacziarg, 2001)). In addition, open trade is positively correlated with technological absorption in the host countries (Comin & Hobijn, 2004; Gonçalves, Taveira, Labrador, & Pio, 2021; Mingyong, Shuijun, & Qun, 2006; Sekkat & Veganzones-Varoudakis, 2007). An increase in trade openness brings more opportunities for a host country to imitate and learn from outsiders. A higher level of trade openness also encourages local firms to increase R&D spending due to international competition pressures (Grossman & Helpman, 1993). Although some studies imply trade openness as an absorptive factor of technological diffusion from FDI, the question of at what level trade openness benefits the spillover of FDI has not been answered. This study looks at the trade openness threshold that allows developing nations to gain more from foreign direct investment.

2. LITERATURE REVIEW

2.1. A Brief Review of Growth Models

The economic growth models show that the origin of economic growth depends on some factors, of which the critical factor is investment capital. Early studies of economic growth often use the aggregate production function approach (see, for example, (Cobb & Douglas, 1928; Samuelson & Solow, 1956)) to describe the relationship between the output of the economy and primary tangible inputs (capital and labour). In particular, Samuelson and Solow (1956) form the basis for most of the growth analysis applied in the neoclassical model when summarising the role of investment capital through the following two equations: First, the equation $Y = A * f(K, L)$ describes the aggregate production function, showing the relationship among output (Y), capital input (K), labour input (L), and technology (A). Second, the equation $\Delta K_t = I_t - \alpha K_{t-1}$ is the capital accumulation equation, reflecting the relationship between investment intangible assets (I) and total capital (K). In the second equation, Δ represents a discrete change, α is the depreciation, and I_t is the total investment. Notably, total investment can be determined endogenously by the firm's profit maximisation or a fixed rate of output. In addition, the neoclassical model assumes that competitive market factors and returns are fixed by scale. Thus, the neoclassical framework indicates that economic growth is determined

by capital accumulation. This framework still has some drawbacks. Since capital accumulation depends on diminishing returns, steady growth in capital income cannot be seen. Therefore, this model cannot account for any technical progress. Other limitations of the neoclassical model relate to the definition of the term capital accumulation. Investments are treated as purely tangible assets. Recently, there has been much discussion about a broader definition and role of capital in economic growth (Mankiw, Phelps, & Romer, 1995). In order to expand the neoclassical model, the endogenous growth models have added a number of other inputs for growth, such as technology, human resources, product development, organisational capital, social capital, institutions, etc. (Easterly, 2003). In addition, this model also assumes a non-linear relationship between capital formation and growth, allowing for different investigations from various facets and a more appropriate examination of the effect of external factors on growth.

2.2. The Effect of FDI on Economic Growth

FDI is widely known as cross-border investments associated with a resident in one economy having control of an enterprise resident in another economy. The measure of FDI in literature is popularly defined as a ratio of gross domestic product (GDP). FDI affects economic growth in two ways. From the perspective of neoclassical theories, foreign capital complements the shortage of capital and domestic investment; thus, FDI directly contributes to the physical capital factor for growth. When technological knowledge is considered a major driver in endogenous growth theory, the impact of FDI on growth is also known as the spillover effect, which has two channels: the horizontal effect and the vertical effect. Horizontal effects occur (i) when domestic manufacturers learn advanced technologies from FDI companies under competitive pressure or (ii) when engineers from FDI companies switch jobs to domestic firms (Keller, 2010; Saggi, 2002). Vertical effects occur among FDI firms and companies in the supply chain. FDI firms can train domestic ones through technology transfer to obtain intermediate goods of sufficient quality (Keller, 2010).

Various studies on the effects of FDI on economic growth have involved a diversity of countries, methods, and research periods. We focus more on studies related to developing countries, whose findings are also varied. Many studies indicate the beneficial spillover effects of FDI on economic growth. Balasubramanyam et al. (1996) employ cross-sectional data and OLS regression for a sample of 46 developing countries between 1970 and 1985. The results show that FDI has a positive impact on growth; however, this influence is limited to host countries adopting export-promotion policies. For host economies with import-substitution policies, the positive effects are weaker. Similarly, Borensztein et al. (1998) find a beneficial correlation between FDI and economic growth from data from 69 developing nations in the period between 1970 and 1989. The study also shows that the extent of this relationship depends on the quality of human resources in the host country, and the main reason for the good effects is the diffusion of technology. De Mello Jr (1999) investigates the connection between FDI, capital accumulation, and output growth using a data set of 32 developed and developing countries. The research supports evidence that technology and enhanced management in the host country are associated with larger FDI inflows; however, it could not find significant results for the question of whether FDI mainly generates growth. Dinh et al. (2019) study the connection between FDI inflow and economic growth in both the short and long run in 30 developing countries over the period 2000-2014. The study concludes that there is a positive long-run impact of FDI on economic growth but a negative short-run influence between them. Osei and Kim (2020) used the dynamic panel threshold methodology on 62 middle- and high-income countries in the period between 1987 and 2016. The research specifies that FDI fosters growth in general, but the growth effect of FDI becomes negligible when the ratio of private sector credit to GDP exceeds 95.6%.

Contrarily, some studies find evidence that does not support the positive effects of FDI on growth. Employing dynamic panel methodology, Carkovic and Levine (2002) estimate the impact of FDI inflows on the economic growth of 72 developed and developing countries. The study explores a weak connection between FDI inflows and economic growth in the host country. Jyun-Yi and Chih-Chiang (2008) analyse whether FDI promotes economic growth by

using threshold regression analysis for a sample of 62 countries during the observation period from 1975 to 2000. The results show that FDI alone plays an uncertain role in contributing to economic growth. FDI is found to have a positive and significant effect on growth when host nations have better levels of initial GDP and human capital. Similarly, Acquah and Ibrahim (2020) also indicate the ambiguous effects of FDI on growth in 45 African countries between 1980-2016. FDI can stimulate economic growth on its own but hurts economic growth if the host countries have weak infrastructure support, low human capital, and high inflation.

2.3. The Role of FDI Inflow and Trade Openness to FDI – Growth Nexus

Regarding the role of FDI as a physical capital factor for growth, the law of diminishing marginal returns challenges the linear approach. This law implies that each additional unit of production factor adds less to total output than previous units. Thus, the greater the amount of capital, the less the benefit per unit of capital. De Mello Jr (1997) argues that the extent of the FDI's impact on output growth is limited. Because of the diminishing return on capital, FDI can only affect income levels, not growth rates, in the long run. The potential impact of FDI on growth is limited in the short term, with the extent and duration dependent on the drivers of the transition to steady growth. Besides, Ribakova et al. (2005) state a change in the nature of FDI inflow when the host country receives more foreign investment. This study explores a threshold for FDI inflow and indicates the determinants of FDI change when moving from below to above the threshold. As the nature of FDI changes, its impact on economic growth will no longer be the same.

As for the spillover effects of FDI on economic growth, Borensztein et al. (1998) assert for the first time the importance of the host country's capacity to absorb advanced technologies. Using data on FDI flows from industrialised countries to 69 developing countries over two decades, the study shows that FDI is an important means for technology transfer and contributes relatively more to growth than domestic investment. However, the positive influence of FDI on growth only occurs when the host nation has minimal human capital. Therefore, FDI is associated with higher growth when the host country has sufficient capacity to absorb technological diffusion from FDI. In addition to human capital investment, trade openness is also another important factor in absorptive capacity. An increase in trade openness leads to an expansion in imports and exports and improves domestic technology. Therefore, the production process can be more efficient, and productivity increases. Opened economies will grow faster than those that are closed, and an increase in openness is assumed to have a positive effect on growth. Various empirical studies document the beneficial effects of trade openness on economic growth over time (see (Arif et al., 2022; Edwards, 1992; Freund & Bolaky, 2008; Rivera-Batiz & Romer, 1991; Wacziarg, 2001)). In order to promote growth, many countries' policies have aimed at liberalising trade and improving the competitiveness of enterprises, considering them as driving forces for the economic growth of the country (Belloumi, 2014).

However, the important role of trade openness in growth is not consistent in empirical studies due to the method of measuring trade openness and the lack of appropriate control variables (Rodriguez & Rodrik, 2001). Some studies also indicate the detrimental impacts of trade openness on economic growth. Trade liberalisation places exogenous constraints on economic growth (Nicita, 2004). As a result, countries are vulnerable to the fluctuations of the international market on the one hand and highly dependent on international demand on the other. Similarly, Batra and Slottje (1993) suggest trade liberalisation could be a major source of economic recession. It forces countries to accept lower tariffs, which make imports more attractive than domestic goods. In addition, trade openness could cause macroeconomic instability by increasing inflation, depreciating the local currency, and leading to a balance of payments crisis (Rodrik, 1992). A higher degree of trade openness could negatively affect domestic investments (Levine & Renelt, 1992) and economic growth (Rahman, Saidi, & Mbarek, 2020). Specifically, Marilyne, Chantal, and Mariana (2018) indicate the correlation between trade openness and growth is negative when countries have specialized in low-quality products and positive if countries have concentrated on high-quality products.

Some studies show evidence that FDI and trade can negatively affect growth (see (Borensztein et al., 1998; De Mello Jr, 1999; Xu & Wang, 2000)). The different adjustments among countries in terms of economic size, political attitudes, stability, importance, and effectiveness of FDI would promote economic growth in the long run in countries pursuing an export promotion strategy more than in countries implementing an import substitution one (Asiedu, 2002).

Therefore, the efficiency of FDI and trade growth is not automatic but depends on the specific factors of the country, such as trade openness. Trade openness affects the spillover effects of FDI on economic growth mainly through technology diffusion from FDI enterprises to firms in the host country.

The effect of trade openness on technology absorption can be divided into two categories. The "pull effect" refers to more opportunities for the country to imitate and learn from outside when trade openness increases (Grossman & Helpman, 1993). The "push effect" indicates that competitive pressure from foreign firms pushes local ones to increase R&D spending and adapt themselves to fierce competition in the international market (Holmes & Schmitz Jr, 2001). Several studies find evidence for the positive effects of trade openness on technology spillover.

Comin and Hobijn (2004) investigate the technological diffusion of 25 technologies across 23 industrially leading economies in the period 1788-2001. The degree of trade openness is one of the important determinants of the adoption rate of technologies across countries. The role of trade openness seems to have increased post-1945. Sekkat and Veganzones-Varoudakis (2007) also indicate the role of trade openness as an attractiveness of FDI inflows to 72 developing countries during the 1990s.

The study also suggests a higher impact of trade openness on FDI in manufacturing than total FDI. By establishing an endogenous growth model with knowledge-based R&D, Mingyong et al. (2006) examined the relationship between international technology spillover, the host country's absorptive capacity, and endogenous economic growth. By using provincial data for the period 1996-2002 to estimate economic growth in China, the study shows the spillover effects of technology depend on human capital investment and the degree of openness of the host country, and FDI is a more important channel than imports.

Gonçalves et al. (2021) employ the system GMM for a data-panel model of 58 countries in 45 years to examine the role of trade openness as a technology transfer channel. The study indicates a positive impact of trade openness on productivity in high- and middle-income countries but a negative relationship between trade openness and productivity in low-income and emerging countries.

3. METHODOLOGY

3.1. Research Model

Based on the endogenous growth model, the study constructs a growth model for developing countries. In Model 1, economic growth (GDPG) is on the left-hand side, FDI measured by the ratio of net FDI inflow to GDP is on the right-hand side, along with other determinants of growth, including (i) domestic physical capital (CAP) measured by the ratio of capital formation to GDP; (ii) labour factor (LAB) calculated by the ratio of population aged 15-64 to the total population; (iii) government spending (GOV) figured out by the ratio of government expenditure to GDP; (iv) inflation (INF) measured by percent change in consumer price index; and (v) the openness of the economy (OPN) calculated by the ratio of total trade to GDP.

As the economic growth model is an endogenous phenomenon, the lagged variable of the dependent variable is also involved as an instrumental variable. In addition, we use dummy variables C97 and C08 to control for two crises, i.e., the Asian financial crisis in 1997 and the global financial crisis in 2008. Variables are described in detail in Table 1.

Table 1. Description of variables.

Variable	Definition	Description
GDPG	Economic growth	Annual growth of GDP per capita
FDI	Foreign direct investment	Ratio of net FDI inflow to GDP
CAP	Physical capital	Ratio of capital formation to GDP
LAB	Labor	Ratio of population aged 15-64 to total population
GOV	Fiscal policy	Ratio of government expenditure to GDP
INF	Inflation	Percent change in consumer price index
OPN	Trade openness	Ratio of total imports and exports to GDP
C97	Asian financial crisis 1997	1, if observation in 1998; otherwise, 0
C08	Global crisis 2008	1, if observation in 2009, otherwise 0

$$GDPG_{it} = f(GDPG_{it-1}, FDI_{it}, CAP_{it}, LAB_{it}, GOV_{it}, INF_{it}, OPN_{it}, C97_t, C08_t) \quad (1)$$

Equation 1 presents that output growth in developing countries in the study period is explained by itself in the previous period: foreign direct investment, domestic physical capital, labor force, government spending, inflation, openness, and the shock of two crises.

3.2. Data and Estimation Methods

The data for estimation involves 60 developing countries from 1995 to 2019 (Appendix 1, taken from the World Bank Open Data) to ensure source consistency. The selection of countries and periods for study relies mainly on the availability of data.

Model (1) is called a dynamic panel data model because the lagged dependent variable is also an explanatory factor in the model. Due to the potential correlation between current and lagged economic growth and other explanatory variables, the endogenous problem should be controlled. We use the generalised method of moments (GMM) proposed by Arellano and Bond (1991). Two diagnostic tests are employed to certify that the selected instrumental variables in the estimated models are strictly exogenous and that there is no second-order residual autocorrelation. The first is the Hansen test of instrument validity, and the second is the Arellano-Bond test for the existence of residual autocorrelation in the second order.

Hansen (1999) and Hansen (2000) developed a threshold methodology to explain the role of net FDI inflow and trade openness in altering the impact of FDI on economic growth. This methodology uses a threshold variable to examine the different effects of the explanatory variables on dependent variables. Depending on the number of thresholds whose values are endogenously estimated, the studied sample can be split into sub-samples. For this study, FDI and OPN are used as the threshold variables in separate estimations. The methodology of Bai and Perron (1998) and Bai and Perron (2003) is employed to determine the number of thresholds. In the case of 2 regimes (1 threshold), model (1) is rewritten as models (2) and (3), in which FDI and OPN are threshold variables, respectively, γ is a threshold value, $X_{i,t}$ are explanatory variables as indicated in the model (1). Once thresholds are found and sub-samples are determined, the GMM methodology is also applied to estimate sub-samples.

$$GDPG_{i,t} = \alpha_1 + \beta_1' X_{i,t} I[FDI_{i,t} \le \gamma] + \beta_2' X_{i,t} I[FDI_{i,t} > \gamma] + u_{i,t} \quad (2)$$

$$GDPG_{i,t} = \alpha_1 + \beta_1' X_{i,t} I[OPN_{i,t} \le \gamma] + \beta_2' X_{i,t} I[OPN_{i,t} > \gamma] + u_{i,t} \quad (3)$$

An increase in FDI is expected to have a decreasing influence on economic growth when FDI is lower than the threshold value. This expectation relies on the law of diminishing marginal returns, which implies reduced output per unit of capital when the number of capital units increases. In terms of the role of trade openness, it is expected that FDI has no effect on economic growth when trade openness is lower than the threshold level, and FDI will have a beneficial impact on economic growth when trade openness is beyond the threshold level. The openness of the economy facilitates an increase in the size of the spillover effects of FDI on economic growth.

3.3. Robustness Test

Similar to previous studies, this study uses output growth in real terms on the left-hand side of research models and explanatory variables in nominal terms on the right-hand side. Research models in this study are built on the assumption that economic entities are perfectly informed and thus easily able to distinguish between nominal and real variables. This assumption is criticised by various economists, such as Carbonell and Werner (2018). In addition, there is no empirical evidence that economic decisions are made based on real variables, which are often difficult to observe in practise. Thus, for a robustness test, all models in the study are re-estimated with growth in nominal GDP (NGDPG) in place of real GDP growth (GDPG).

4. ESTIMATION RESULTS

The descriptive statistics in Table 2 reflect the main characteristics of the study's data. The diversity of data indicates different levels of development across economies as well as a variety of growth sources. The economic growth rate across developing countries differs between −36.557 to 28.676 with a sample mean of 2.252. The average FDI inflow relative to GDP varies from −11.625 to 58.519, with a standard deviation of 5.584. Diversity in FDI inflows predicts dissimilar effects on economic growth across developing countries. Trade openness ranges between 14.772 and 442.620, with a standard deviation of 62.006 and a sample mean of 76.728. Descriptive statistics of other variables also show the diversity of the sample in terms of capital formation, labour force, government expenditure, and inflation rate.

Table 2. Descriptive statistics of variables.

Statistical indicator	GDPG	FDI	CAP	LAB	GOV	INF	OPN
Mean	2.252	3.947	24.439	61.837	12.803	6.846	76.728
Median	2.315	2.507	22.930	62.149	12.216	4.512	61.302
Maximum	28.676	58.519	79.401	78.746	30.003	132.823	442.620
Minimum	-36.557	-11.625	6.405	48.026	2.058	-8.975	14.772
Std. dev.	3.553	5.584	7.994	6.663	4.654	9.790	62.006
Skewness	-1.075	3.911	1.219	0.030	0.710	5.266	3.341
Kurrtosis	16.413	24.496	6.463	2.440	3.685	44.630	16.332
Observation	1499	1491	1488	1500	1480	1472	1496

Table 3. Estimation results of model (1).

Variable	GDPG	NGDPG for robustness test
(1)	(2)	(3)
GDPG(-1)	-0.361***	-0.432
NGDPG(-1)		-0.165***
FDI	0.117***	0.564***
CAP	0.026***	0.293***
LAB	-0.068***	-0.471
GOV	-0.677***	-1.878***
INF	-0.356***	-0.372***
OPN	0.096***	0.627***
C97	-2.241***	-4.808***
C08	-4.111***	-5.465***
J-stat	49.314 (0.540)	16.689 (0.273)
AR(1)	0.112	0.956
AR(2)	0.762	0.371

Note: *** indicate significant levels at 1%.

Table 3 summarises the estimation results of model (1) with economic growth in real and nominal terms in columns (2) and (3), respectively. All the parameters of model (1) with the real variable of economic growth are in

agreement with those of model (1) with the nominal variable of economic growth in terms of sign and significance, strongly confirming the robustness of the model. In addition, the results of the Hansen and Arellano-Bond tests presented at the bottom also indicate the estimated models are well behaved. According to the Hansen test, the J-statistics are insignificant, implying the instrumental variables are exogenous and not correlated with the residuals of the model. Regarding the results of the Arellano-Bond test, residual series correlation at the second difference order does not exist.

The lagged GDPG is negatively correlated with the current GDPG, implying the convergence of economic growth in developing countries. The coefficient of FDI is significantly positive, implying the beneficial impact of FDI on economic growth. This result supports the important role of FDI in growth in developing nations, as evidenced in various previous studies (i.e., (Balasubramanyam et al., 1996; Borensztein et al., 1998; De Mello Jr, 1999; Dinh et al., 2019; Osei & Kim, 2020)). The estimation results in Table 3 also show other determinants of economic growth in developing countries. Physical capital is positively correlated with economic growth, as indicated in classical theory and previous studies (e.g., (Garzarelli & Limam, 2019; Santiago, Koengkan, Fuinhas, & Marques, 2020)), confirming the role of domestic capital in production and growth in the long run. Trade openness is also a beneficial driver for the growth process of developing countries, as supported by Arif et al. (2022), Freund and Bolaky (2008), and Wacziarg (2001). The negative relationship between inflation and economic growth shows the relative price correlations between commodities, leading to an inefficient allocation of resources. Studies on the inflation-growth nexus also indicate the threshold beyond which an increase in inflation is detrimental to growth. For example, Vinayagathasan (2013) indicates inflation impedes Asian growth when it exceeds 5.43%, which is lower than the average inflation rate of countries in the studied period. The impact of government expenditure is significantly negative, reflecting the detrimental impact of public debt on economic growth.

Table 4 summarises the results of the estimation and test related to model (2). The Bai and Perron test identifies a threshold value for FDI relative to GDP of 6.275 percent. The coefficient of FDI is significantly positive below and above the threshold, implying the beneficial impact of FDI on economic growth in developing countries. This result is consistent with the estimation results of model 1. In addition, the effects of explanatory variables on GDP are quite consistent in sign, magnitude, and statistical significance in both regimes, which are also consistent with the estimation results of model 1.

Table 4. Results of estimation and test related to model (2).

Threshold test	F-stat	Threshold value
0 vs 1	2.997**	6.275
1 vs 2	1.677	
Regime	FDI < 6.275	6.275 <= FDI
Observation	1206	236
GDPG (-1)	-0.097	-0.082*
FDI	0.121**	0.033*
CAP	0.075***	0.026*
LAB	-0.018*	-0.158*
GOV	-0.197***	0.192***
INF	-0.044***	-0.141***
OPN	0.006*	0.024***
D97	-1.132**	-4.057**
D08	-2.174***	-4.453***
J-stat	28.039 (0.856)	51.144 (0.467)
AR(1)	0.101	0.325
AR(2)	0.379	0.897

Note: ***, **, * indicate significant levels at 1%, 5% và 10% respectively.

The relationship between foreign direct investment (FDI) and economic growth exhibits a shift in influence as the FDI levels transition from below to above a certain threshold. Specifically, once the threshold is exceeded, the effect of FDI on gross domestic product (GDP) becomes comparatively less pronounced. Therefore, the impact of foreign direct investment (FDI) on the economic growth of emerging nations diminishes progressively with the expansion of the inflow magnitude.

The obtained outcome provides empirical substantiation for the principle of diminishing marginal returns. It also supports the change in nature of FDI when host countries receive more foreign inflow, as argued by Ribakova et al. (2005). As the average value of the FDI variable is much lower than the threshold value (3.947 < 6.275), the relationship between FDI and economic growth in developing nations stays in the early stages.

The results of the estimation and testing of the model (3) are summarized in Table 5. The threshold value of trade openness is 55.236 and is statistically significant at the 1% level. The coefficient of FDI is positive in both regimes but turns from insignificant to significant when moving from below to above the threshold. FDI has no effect on economic growth below the threshold. An increase in FDI relative to GDP boosts the economy when the degree of trade openness is greater than the threshold value.

This result confirms the hypothesis that the spillover effect of FDI does not occur in the host country if its trade openness is low. As the average trade openness of developing nations is much higher than the threshold, most countries have enough capacity in terms of trade openness to absorb advanced technologies.

Table 5. Results of estimation and testing of model (3).

Threshold test	F-stat	Threshold value
0 vs 1	8.441***	55.236
1 vs 2	3.967	
Observation	596	846
Regimes	OPN < 55.236	55.236 <= OPN
GDPG (-1)	-0.018	0.207***
FDI	0.209	0.050**
CAP	0.144***	0.027*
LAB	-0.070	-0.046
GOV	-0.341***	-0.128***
INF	-0.029**	-0.095***
OPN	0.054***	-0.011***
D97	0.235	-3.243***
D08	-1.289**	3.391***
J-stat	23.406 (0.112)	52.067 (0.432)
AR(1)	0.404	0.387
AR(2)	0.568	0.850

Note: ***, **, * indicate significant level at 1%, 5% và 10% respectively.

The results of the robustness test by re-estimating models (2) and (3) with the dependent variable in terms of nominal GDP (NGDPG) are summarised in Table 6.

The threshold value is significant at 1% and not much different from the results of the estimates of the dependent variable in terms of real GDP. In the model with FDI as the threshold variable, the relationship between FDI and economic growth is significantly positive in both regimes. In the first regime, when FDI is smaller than the threshold level, the impact of FDI on growth is more powerful.

For the model with the threshold variables of OPN, FDI is significantly correlated with growth in the second regime when trade openness is beyond the threshold level. As the estimation results generated by the models with economic growth in real and nominal terms are consistent, the robustness of the estimated results is demonstrated.

Table 6. Results of estimation and testing of models (2) and (3) with nominal GDP growth.

Threshold test	Model (2)		Model (3)	
	F-stat	Threshold value	F-stat	Threshold value
0 vs 1	3.981***	4.847	11.029***	51.492
Observation	1074	345	522	881
Regime	FDI < 4.847	4.847 <= FDI	OPN < 51.492	51.492 <= OPN
NGDPG (-1)	0.314***	0.052*	0.133***	-0.200*
FDI	0.508***	0.067*	-0.339	0.130*
CAP	-0.051	-0.149	0.367***	-0.187***
LAB	-0.278***	0.232	-0.563***	-0.206*
GOV	-1.013***	-0.737**	-0.974***	-0.867**
INF	-0.117***	0.507***	-0.067*	-0.023***
OPN	0.112***	0.075***	0.332***	0.046*
D97	-6.587***	-12.419**	-2.718	-11.830***
D08	-10.029	-11.906	-7.923***	-15.697
J-stat	21.003 (0.101)	10.638 (0.714)	24.267 (0.231)	10.948 (0.690)
AR(1)	0.134	0.834	0.367	0.391
AR(2)	0.003	0.275	0.146	0.097

Note: ***, **, * indicate significant level at 1%, 5% và 10% respectively.

5. CONCLUSIONS AND RECOMMENDATIONS

The effect of FDI on economic growth in developing countries is a controversial issue. This study joins the debate with a concentration on the role of FDI level and trade openness in the relationship between FDI and economic growth in developing countries. The study uses panel data from 60 developing countries from 1995 to 2019 to build a growth model based on endogenous growth theory. It does this by using threshold regression methodology and GMM estimation. In general, the results support the positive impact of FDI on economic growth, which is consistent with previous studies in these countries. Moreover, the study shows strong evidence for the dependency of this correlation on the level of FDI inflow and the degree of trade openness.

The study finds a significant threshold for FDI relative to GDP of 6.275 percent, above which an increase in FDI relative to GDP leads to a less positive impact on output growth. This result reflects the decreasing benefit of FDI when the host countries receive abundant capital. The study also indicates the impact of FDI on growth in developing countries is still at an early stage; thus, they can continue their FDI attraction strategy to take advantage of FDI.

Trade openness also plays an important role in the relationship between FDI and economic growth as an absorptive factor. The study finds significant evidence of a threshold level of trade openness at 55.236. Below this threshold, the host country fails to absorb technological knowledge from abroad; thus, FDI has no positive effect on economic growth. An increase in FDI relative to GDP leads to higher economic growth when the host country has sufficient absorptive capacity in terms of trade openness above the threshold.

The benefits of a high level of FDI entry are diminishing, which challenges the policy of FDI attractiveness across developing countries. Consequently, in order to sustain FDI's positive growth-promoting effects, strategies to raise inflow relative to GDP should be combined with measures to improve the economy's absorptive capacity. A host nation should also alter its policies to draw in new investors if it is successful in drawing large FDI inflows. To ensure that the advantages of FDI continue to increase, these adjustments should concentrate on allocating FDI to relevant and essential industries. For pull and push effects to be effective, the economy must be sufficiently open as one of the absorptive elements. To achieve the technical diffusion of foreign direct investment (FDI) for growth, developing nations should tighten the coherence of their trade liberalization and FDI attractiveness policies.

This study examines the dynamics of foreign direct investment inflow into emerging nations using the metric of flow. Using the stock measure, future research can examine the static character of foreign direct investment in the host nations. Furthermore, the emergence of novel information and communication technologies has significantly influenced economic endeavors. Because of this, the host countries' digital capabilities may be the main driver of

inward FDI. Analyzing how digital progress and competitiveness affect FDI flows should yield some fascinating findings.

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APPENDIX

Appendix 1. List of developing countries in the study.

No	Country	No	Country	No	Country
1	Algeria	21	Egypt	41	Morocco
2	Argentina	22	El Salvador	42	Nepal
3	Bahrain	23	Gabon	43	Nicaragua
4	Bangladesh	24	Guatemala	44	Oman
5	Bardados	25	Haiti	45	Pakistan
6	Bolivia	26	Honduras	46	Panama
7	Brazil	27	Hong Kong	47	Paraguay
8	Brunei	28	India	48	Peru
9	Cambodia	29	Indonesia	49	Philippines
10	Cameroon	30	Iran, Islamic Republic	50	Saudi Arabia
11	Central Africa	31	Israel	51	Singapore
12	Chad	32	Jamaica	52	Sri Lanka
13	Chile	33	Jordan	53	Sudan
14	China	34	Kenya	54	Tanzania
15	Colombia	35	Korea	55	Thailand
16	Comoros	36	Laos	56	Tunisia
17	Congo Republic	37	Madagascar	57	Turkey
18	Costa Rica	38	Malaysia	58	Uganda
19	Dominican Republic	39	Mauritania	59	Uruguay
20	Ecuador	40	Mexico	60	Vietnam