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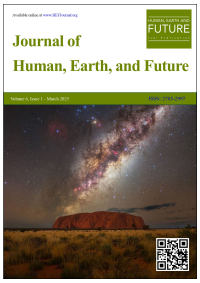

Financial Development, FDI, and Economic Growth in Low- and Middle-Income Countries: A Dynamic Panel Threshold

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Abstract

The study investigates the nonlinear relationship between financial development and economic growth, with a particular focus on the mediating role of FDI in low- and middle-income countries. Using annual panel data covering 81 countries from 1990 to 2019, the study applies a dynamic panel threshold regression model to identify the level of financial development at which its impact on economic growth changes. The analysis incorporates FDI as an additional conditioning variable to examine how its interaction with financial development influences the threshold dynamic. A significant threshold effect: below a certain level of financial development, the impact of FDI on growth is statistically insignificant, while above the threshold, FDI exerts a strong positive influence on economic growth. The findings imply that the growth-enhancing effect of financial development is not automatic and depends on reaching a critical level of financial maturity, as well as an enabling environment that leverages FDI inflows. The study contributes to the literature by offering empirical evidence of a nonlinear, FDI-conditioned finance-growth nexus, and it provides policy guidance for developing economies aiming to optimize the benefits of financial sector reforms.

Keywords: Financial Development; FDI; Economic Growth; Dynamic Panel Threshold; Low- and Middle-Income Countries.

1. Introduction

Foreign direct investment (FDI) has increasingly attracted the attention of academics, researchers, and policymakers due to its pivotal role in promoting economic growth globally. It's long been regarded as an essential ingredient and catalyst to economic growth, and this is because of its ability to transfer technologies from the source countries to the host nations. It also enhances the productivity and efficiency of domestic firms through accumulating capital, augmenting human resources, and promoting foreign transactions [1-2]. FDI remains central to the growth and development strategies of developing countries due to its ability to make even the local industries more competitive and resilient to change by adopting current technologies to meet the challenges of market competitiveness. When the domestic firms failed to accept the current reality, they would be suppressed by the foreign firms, and the foreign firms would take over their market share. Moreover, compared to other private capital inflows, FDI is considered more stable due to high entry costs and its long-term nature, making it less prone to reversal and less sensitive to economic shocks [3].

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Several pieces of empirical evidence reveal that countries with the lowest human capital but blessed with well-established financial market machinery and better financial institutions would efficiently utilize FDI [4]. FDI serves as a technological change knowledge transfer and new capital accumulation [5]. It also enhances the business environment of host economies. The FDI-growth hypothesis argues that a positive nexus between the inflow of FDI and growth is anticipated as much as the recipient nation has reached a given level of financial development [6-8]. This pinpoints the importance of financial sector development in the efficient utilization of the incoming inflows. FDI also serves as a source of generating capital financing and plays a crucial role in modernizing a domestic economy and enhancing its overall productivity.

The domestic financial sector plays a vital role in utilizing FDI, as it helps the local firms to respond to challenges and opportunities attached to it appropriately. For example, some notable articles by Hermes & Lensink [9] and Alfaro et al. [6] document that a viable financial system is critical for a host country to benefit from the growth advantage of FDI. The literature also reveals that, in most developing countries, FDI positively influences growth when it's in tandem with the indicator of financial development [10-11].

Most of the less developed countries have struggled to smooth restrictions and enlarge the investment potential to attract more foreign investment. Apart from stimulating the nature of FDI to growth, certainly, FDI is generally considered to contribute to the accumulation of capital and accelerate knowledge transmission and higher technology, which possibly hastens the long-run growth in developing countries [12]. Global multilateral establishments like the International Monetary Fund (IMF), the World Bank, and the Organization for Economic Cooperation and Development (OECD) urge developing countries to implement effective reforms that attract more inflows of FDI to spur economic growth and development. Hence, FDI is viewed as one of the main machineries of the policy instruments meant for promoting growth and development in the African sub-region [13]. Theoretically, FDI is presumed to affect growth both directly and indirectly. Although the empirical outcomes on the benefits of FDI to growth in developing countries are still unsettled. While some results reflect significant effects of FDI on growth in less developed countries, some findings reported no connection [14-16], and other results reveal a negative link between FDI and growth.

This study aims to empirically assess the impact of financial development on economic growth and, conditional on the level and effectiveness of FDI utilization, a less explored area in cross-country settings. Prior studies mainly focus on the role of financial development on growth and/or the influence of FDI on growth, emphasizing the direct relationships of these variables without highlighting the indirect nexus of financial development, FDI, and economic growth. Although some studies examined the importance of financial sector efficient utilization of FDI, for example, Lee & Chang (2009) [17] highlighted that for FDI to be efficiently utilized, it must be in cognizance with the level of financial development on international evidence. Nguyen et al. (2022) [18] point out the importance of financial development proxied by domestic credit to the private sector as one of the main determinants of FDI inflows. While Siddikee & Rahman (2020) [19] recommend substantial improvement in the banking sector to benefit from FDI. However, empirical studies that examine the impact of financial development on growth conditioned on the level of FDI are still rare in existing literature. For example, Adjasi et al. (2012) [10], Agbloyor et al. (2014) [11], and Yeboua (2019) [8] investigated this mediating relationship but were limited to the African subcontinent, and the current study tries to examine this issue across numerous developing countries from different continents.

The mediating role of the FDI in determining the impact of financial development on growth in developing countries is still not investigated. Despite its policy relevance, identifying the financial development relevance in examining its threshold level in determining the FDI growth benefits is still not duly explored in the context of many developing countries. Hence, our study will fill this important gap to identify the threshold level of finance beyond a specific limit at which FDI might still benefit the productivity of the developing countries or otherwise. Also, to investigate the possibility of an FDI threshold effect on the finance-growth nexus.

The remainder of the paper will be structured as follows: section two composes a literature review of the previous studies in the area under investigation. Section three highlighted the methodology applied to achieve the stated research objectives; it also deliberates on the models and their specifications and discusses the data and its respective measurements and sources. Section four is the presentation of empirical results and discussions. Lastly, section five concludes the study and provides possible recommendations and policy advice based on the research outcomes across the group of countries investigated.

2. Literature Review

In recent decades the debate over the causal relationships between financial development, FDI, and economic growth has been of great interest. In the empirical literature, research studies have drawn various conclusions on the FDI-growth nexus. For instance, Iamsiraroj & Ulubas (2015) [20], in their review of 108 empirical studies on the growth effect of FDI, claim that only 43% of the studies reported positive and statistically significant while 26% reported positive but insignificant effects, with nearly one-third reporting negative effects. Recent literature has shown

that FDI's effect on economic growth in the host economy depends on contingent variables such as economic freedom, human capital development, technology and innovation, inequality, and FD [21-25, 2, 6].

Sirag et al. (2018) [26] examined the impact of financial development and FDI on Sudan's economic growth. They found that the relationship between FDI and economic growth is affected by financial development. Also, Sunde (2017) [27] found evidence that South Africa's economic growth is strongly linked with the FDI. While for the cross-country analysis. Durusu-Ciftci et al. (2017) [28] investigated the role of financial development on economic growth for a panel of 40 countries over the period 1989–2011. Although the cross-sectional results vary from country to country, the panel data analyses confirmed that there is a positive effect on the per capita long-term GDP for both channels, and the contribution of the credit markets is significantly greater.

In groups of developing and developed countries, the role of financial development in the FDI-economic growth relationship has attracted many studies. For instance, Iamsiraroj & Ulubas (2015) [20], applying the meta-regression analysis with a wide range of global datasets of nearly 140 countries between the years 1970–2009, showed the nonlinearity in the interaction effect of FDI with financial markets in the growth model. As such, they proved the inverted-U-shaped effect, which means that the influence of foreign direct investment on growth increases at higher levels of financial development but disappears at very low levels of the financial development condition.

On the contrary, Abdul Bahri et al. (2019) [29] used a standard quadratic model for financial development and, considering the interaction conditions between this absorption capacity factor and FDI, examined the role of financial development in the relationship between FDI and growth for 65 developing countries from 2009 to 2013. They described the nonlinear relationship between financial development and growth as a U-shaped curve. Their different outcomes were linked to possible systemic changes in the economy after the global financial crisis. One of the recent studies conducted by Osei & Kim (2020) [30] investigated the threshold of financial development in the FDI-growth relationship. Their study applied dynamic threshold estimator and linear system GMM in different subgroups according to the level of financial development as well as income levels. Surprisingly, the empirical results confirm a potential maximum financial development threshold, and beyond the threshold level—when the ratio of private sector credit to gross domestic product exceeds 95.6%—the effect of FDI on economic growth becomes negligible.

Similarly, evidence from 26 African countries, Yeboua (2019) [8], argued that domestic credit to the private sector—as a proxy for financial development—should be roughly more than 16 percent of GDP for the materialization of the growth-enhancing effect of FDI. Countries below the threshold level of financial development exhibit a negative FDI-growth relationship. In contrast, those with a higher level of financial development (exceeding 16%) positively influence financial development [31-32]. Notably, these studies did not pay attention to the contingent role of FDI in stimulating the financial development-growth link. The mediating effect of FDI is still not well discussed in the previous literature. FDI that is presented with the liberalization of financial markets enables financial deepening, reflecting an increase in the use of financial intermediation by savers and investors, and hence leads to growth. It is worth mentioning that the interaction between FDI and FD has not been clearly established, particularly in the African continent, where the financial markets are still at the very developmental stage [33].

In addition, FDI may reduce the relative power of the elites in the economy, which can encourage them to adapt to market-friendly regulations, leading to a stronger financial sector and hence affecting growth [33]. Researchers have argued that institutional quality channels the FDI-growth effects, and others have highlighted the role of human capital for the institutional quality role. Investigate the link between FDI, economic freedom as an institutional quality proxy, and economic growth in a panel of four North African countries (Tunisia, Morocco, Algeria, and Egypt) over five years from 1980 to 2013 using the system generalized method-of-moment (S-GMM) estimator. They discovered signs of a positive relationship between FDI and economic development [34-42].

The role of human capital is also highlighted; for instance, Wogbe Agbola (2014) [43] and Li & Tanna (2019) [44] depict that the growth effect of FDI is dependent on increased human capital accumulation in developing countries. Using the Solow model, Su & Liu (2016) [40] detected FDI and human capital were found to have complementary effects on Chinese economic growth. Similarly, Anetor (2020) [42] found that FDI and human capital do not generate economic growth in these countries, although the interaction reduces economic growth, implying that human capital cannot absorb the positive spillovers of FDI and drive economic growth in sub-Saharan African countries.

Recent empirical research has continued to explore the multifaceted relationship among financial development, FDI, and economic growth, particularly in developing and transitional economies. For instance, a study on ASEAN-6 countries by Bui & Doan (2024) [45] examined the financial development threshold on the FDI-green-GDP nexus, using GMM and Bayesian regression techniques—an approach that aligns with the current study's modeling framework. Similarly, Utouh & Kitole (2025) [46] utilize a VAR-ECM approach to forecast the long-term effect of FDI on industrialization, underscoring FDI's structural role in development planning.

In the context of Vietnam, Pham et al. (2025) [47] highlight the significance of FDI by analyzing its interaction with public and private investment on provincial economic growth. In a multi-country context, Gizaw et al. (2024)

[48] employed a macro-panel estimation method that controls for cross-sectional dependence for emerging African and Asian countries. They found that financial development plays only a marginal influence on growth in African and Asian emerging economies—findings that closely mirror the nuanced threshold dynamic identified in the present study. Together, these recent contributions reinforce the argument that the relationship between FDI, financial development, and growth is context-specific, nonlinear, and contingent upon macroeconomic conditions. While these studies provide important insights, most either focus on linear associations or country-specific effects or do not explicitly consider interaction thresholds between financial development and FDI in a cross-country context. Moreover, few studies apply threshold regression models that can account for nonlinearities and conditional effects of FDI across varying levels of financial development.

In addition to previous research, this study aims to further explore the threshold relationship in the financial development–growth and FDI–growth nexus by identifying threshold levels for both financial development and FDI. While most earlier studies have focused primarily on the level of financial development, they often overlooked the influence of FDI levels on the financial development–growth relationship. Moreover, the literature remains inconclusive regarding the potential minimum and maximum thresholds of financial development. This study fills these gaps by applying a dynamic panel threshold model to examine whether the impact of financial development on economic growth in low- and middle-income countries varies according to the level of FDI inflows—thereby offering new insights into the threshold dynamics that influence the finance–FDI–growth nexus.

3. Methodology and Data

The flowchart of the research methodology that was used to achieve the study's aims is shown in Figure 1.

Figure 1. Flowchart of the methodology

3.1. Model Specification and Estimation Technique

To examine the relationship between financial development, FDI and economic growth, the following model was specified:

$$GDP_{it} = \alpha FD_{it} + \theta FDI_{it} + \pi Z_{it} + \nu_{it} \quad (1)$$

where, GDP_{it} is the real GDP per capita as a measure of economic growth, FD_{it} is financial development measured by domestic credit to private sector as a percentage of GDP and money supply or broad money as a percentage of GDP, FDI_{it} is foreign direct investment inflows as a percentage of GDP, Z_{it} is a vector of the explanatory variables: K_{it} is the physical capital measured by gross capital formation as a share of GDP, LE_{it} is life expectancy at birth, SE_{it} is secondary school enrolment, ν_{it} is the error term, i= 1, …, N denotes the country and t= 1, …, T represents the time.

As suggested in the existing literature, financial development should be treated as a moderating factor in the FDI–growth nexus. In particular, FDI can lead to higher economic growth only when the development of the financial sector is beyond a certain level. Therefore, it is critically important to control for the contingency of FDI–growth association on financial development. Various threshold-estimating procedures can be used, such as Hansen's (1999) [49] static panel method. However, economic growth models are dynamic in nature, and Hansen's (1999) [49] approach is not appropriate. Another dynamic panel threshold technique that allows for the existence of endogeneity of the right-hand-side variables is introduced by Kremer et al. (2013) [50]. To estimate the nonlinear relationship between financial development, FDI, and economic growth for the sample of 83 countries, the dynamic panel threshold technique is used, as suggested by Kremer et al. (2013) [50]. Law & Singh (2014) [51] prompted that financial development has a non-monotonic effect on economic growth. For that, let us consider the following threshold model:

$$GDP_{it} = u_i + \rho GDP_{it-1} + \beta_1 FD_{it} I(FD_{it} \leq \lambda) + \gamma_1 FD_{it} I(FD_{it} \leq \lambda) + \beta_2 FD_{it} I(FD_{it} > \lambda) + \theta FDI_{it} + \pi Z_{it} + \varepsilon_{it} \quad (2)$$

where, u_i is the individual-specific effect, and ε_{it} is the error term, which is assumed to be $\varepsilon_{it} \sim (0, \sigma^2)$. The indicator function $I(\cdot)$ indicated the regime, according to the threshold variable FD_{it}, and λ denotes the impact of financial development, depending on whether FD_{it} lay below or above the threshold level. Z_{it} contains a vector of the control variables, which are specified below Equation 1. The impact of financial development on economic growth can be explained by $\hat{\beta}_1(\hat{\beta}_2)$ which denote the marginal effect of financial development on growth in the low (high) regime, i.e., when financial development is below (above) the threshold. Normally, financial development is high in relatively more advanced economies. Note that Equation 2 help to investigate the effect of financial development on economic growth concerning its threshold level. Two regimes of financial development will be estimated to have a different effect on economic growth. Finally, all of the variables were transformed into natural logarithms as the coefficients are easier to interpret, and the data will most likely follow a normal distribution.

Alternatively, we can hypothesize the contingency effect of FDI–growth nexus on the financial development level. Following a similar specification of Yeboua (2019) [8], the dynamic panel threshold technique can be used to estimate the following model:

$$GDP_{it} = \mu_i + \rho GDP_{it-1} + \beta_1 FDI_{it} I(FD_{it} \leq \lambda) + \gamma_1 FD_{it} I(FD_{it} \leq \lambda) + \beta_2 FDI_{it} I(FD_{it} > \lambda) + \rho FD_{it} + \pi Z_{it} + e_{it} \quad (3)$$

where, μ_i is the individual-specific effect, and e_{it} is the error term, which is assumed to be $e_{it} \sim (0, \sigma^2)$. The indicator function $I(\cdot)$ indicated the regime, according to the threshold variable FD_{it}, and λ denoted the impact of FDI, contingent on whether it is below or above the threshold level of FD_{it}. Z_{it} contains a vector of the control variables, which were specified below Equation 1.

The impact of FDI on economic growth can be explained by $\hat{\beta}_1(\hat{\beta}_2)$ in Equation 3, which denoted the marginal effect of FDI on economic growth in the low (high) regime, i.e., when FDI is below (above) financial development threshold. Usually, in a well-developed financial sector's economy, FDI is expected to impact economic growth/performance positively. Therefore, Equation 3 aim to examine the effect of FDI on economic growth given the level of financial development. Two regimes of financial development will be estimated, and FDI is anticipated to have a greater effect on economic growth in the higher regime. Similar to Equation 2, all of the Equation 3 variables are transformed into natural logarithms.

According to Sirag et al. (2018) [26], the level of FDI in the recipient countries played a positive role in the relationship between financial development and economic growth. The dynamic panel threshold enables us to test such claim using the following specification:

$$GDP_{it} = \eta_i + \rho GDP_{it-1} + \beta_1 FD_{it} I(FDI_{it} \leq \lambda) + \gamma_1 FDI_{it} I(FDI_{it} \leq \lambda) + \beta_2 FD_{it} I(FDI_{it} > \lambda) + \rho FD_{it} + \pi Z_{it} + \xi_{it} \quad (4)$$

where, η_i is the individual-specific effect, and ξ_{it} is the error term, which was assumed to be $\xi_{it} \sim (0, \sigma^2)$. The indicator function $I(\cdot)$ indicated the regime, according to the threshold variable FDI_{it}, and λ denoted the impact of financial development, contingent on whether it is below or above the threshold level of FDI_{it}. Z_{it} contains a vector of the control variables, which are specified below Equation 1. The impact of finance on economic growth can be explained by $\hat{\beta}_1(\hat{\beta}_2)$ in Equation 4, which represented the marginal effect of financial development on economic growth in the low (high) regime, i.e., when financial development is below (above) FDI threshold. Generally, FDI inflows are anticipated to stimulate the role of the financial system on the economic performance of the recipient country [26]. Therefore, Equation 4 used to study the effect of financial development on economic growth while considering FDI inflows. Similar to Equations 2 and 3, all of the variables in Equation 4 are transformed into natural logarithms.

Equations 2 to 4 were estimated using the method of Kremer et al. (2013) [50], which permitted endogenous regressors and used the System Generalized Method of Moments (GMM) estimation technique, as proposed by Blundell & Bond (1998) [52]. This technique comprised two steps; first, for a given threshold (γ) the coefficients (ρ, β_1, β_2, π_i) were estimated using the GMM estimator, as proposed by Arellano & Bond (1991) [53]. Second, the first step was repeated for the value of the threshold's belonging in a strict subset of financial development or FDI support, resulting in different estimates for each selected threshold. The threshold value (λ), which minimized the objective function of the GMM estimator and its estimated parameters, is deemed to be the optimal threshold.

Parallel to other threshold estimating procedures, such as the Hansen (1999) [49] static method, the Kremer et al. (2013) [50] technique has the advantage of allowing for the endogenous estimation of any independent variables in the model. In a practical sense, this is applicable in this study because economic growth models are dynamic, and the endogeneity of the regressors is common. To fit the properties of the GMM estimator, Equations 2 to 4 were estimated using five years of averages. The use of five-year averages, which is widely adopted in GMM-based panel studies, helps smooth out business cycle fluctuations and reduce the influence of temporary shocks, thereby allowing the model to capture more stable and long-run relationships among financial development, FDI, and economic growth.

3.2. The Data

The study used GDP per capita (constant 2010 US$) to measure economic growth since it is the most common variable that is employed in literature. The GDP per capita constant price provides an overall summary of the economic activities in a country, considering price changes. Financial development is commonly measured using domestic credit to the private sector as a percentage of GDP. Although there are various measures for the development of the financial system, such as money supply and liquid liabilities, private sector credit as a percentage of GDP remains the most popular proxy in the empirical studies. Many studies' suggested argument is that a better financial sector helps to stimulate the link between FDI and economic growth [8, 26, 54]. Therefore, we measure financial development using private sector credit as a percentage of GDP and money supply as a percentage of GDP.

On the other hand, we used FDI inflows as a percentage of GDP to measure its effect on economic growth. In general, foreign direct investment is one of the pillars of the economic growth process. However, many argued that some prerequisites, such as the advancement of the financial system, are inevitable for FDI to be beneficial for the economic growth of the recipient country. Other control variables include life expectancy at birth, school enrollment ratio, and gross capital formation as a percentage of GDP. The data for all the variables are collected from the World Development Indicators.

Table 1 contains the results of the descriptive statistics and correlation matrix, respectively. It was apparent from the table that the number of observations was around 486 for all the variables. Interestingly, the data in this table showed that the real GDP had a large variation compared to the other variables, as it had the highest standard deviations. In addition, financial development indicators defined in this study using two proxies, domestic credit to the private sector as a percentage of GDP and money supply as a percentage of GDP (FD and MS), had the second highest variation. Nevertheless, FDI had a relatively low variation. These descriptive figures suggested huge income differences across nations where variations concerning financial development and FDI across countries exist; however, it remained comparatively lower. The results of the correlation matrix are summarized in Table 2. Closer inspection of the correlation coefficients showed a positive linear dependency growth measure and the independent variables. Most importantly, the correlation among the explanatory variables remained relatively low, which showed that the potential for collinearity was not of concern.

Table 1. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
GDP	486	7.5188	1.0035	5.3660	9.5938
FD	486	3.0082	0.9386	-0.3004	5.0578
FDI	486	1.6891	0.4559	-0.7177	3.5481
LE	486	4.1474	0.1559	3.3552	4.3805
SE	486	3.8829	0.6780	1.6806	4.8702
K	486	3.0874	0.3628	1.3758	4.1016
MS	486	3.5053	0.6906	0.6105	5.5524

Note: FD refers to domestic credit to private sector and MS refers to money supply.
The data from 1990 to 2019.

Table 2. Correlation Matrix

	GDP	*FD*	*FDI*	*LE*	*SE*	*K*	*MS*
GDP	1.0000						
FD	0.5589	1.0000					
FDI	0.1425	0.1556	1.0000				
LE	0.6661	0.6322	0.2330	1.0000			
SE	0.7332	0.5660	0.2433	0.7735	1.0000		
K	0.3332	0.3724	0.2530	0.4211	0.3501	1.0000	
MS	0.4807	0.8513	0.1355	0.5999	0.5112	0.3601	1.0000

Note: FD refers to domestic credit to the private sector and MS refers to money supply.

4. Empirical Results

The first objective of this study is to examine whether there is a threshold in the relationship between financial development and economic growth in developing countries, as suggested by Law & Singh (2014) [51]. First, the dynamic panel threshold starts with estimating the threshold values of financial development, as shown in Equation 2. Figures 2 and 3 display that the likelihood ratios (*LR*) are less than the 95% critical values of the asymptotic distribution when the two different measures for financial development are used.

This seems to support the soundness of a threshold relationship between financial development and economic growth. Table 3 shows the results attained from the dynamic panel threshold analysis. The threshold values are approximately 34.5 percent and 26.6 percent for private sector credit and money supply. Notably, the constructed 95% confidence intervals support the significance of the estimated thresholds. The findings indicate that the effect of financial development on economic growth below and above the threshold of domestic credit to the private sector is insignificant. When the broad money is used as an indicator of financial development, the effect is positive and significant below the threshold, whereas it appears to be insignificant above the threshold.

This shows the positive role played by the financial sector in improving the real GDP per capita. But the partial evidence of the significant impact on growth is up to a certain level of financial development, which is in line with findings obtained by Law & Singh (2014) [51]. The lagged-dependent variable of real GDP per capita is positive and statistically significant, signifying the importance of initial income for determining income differences across the countries. Also, the results of both models in Table 3 demonstrate the positive influence of FDI on economic growth in the sample of developing nations. However, the control variables are statistically insignificant in explaining the variations in economic growth across developing countries.

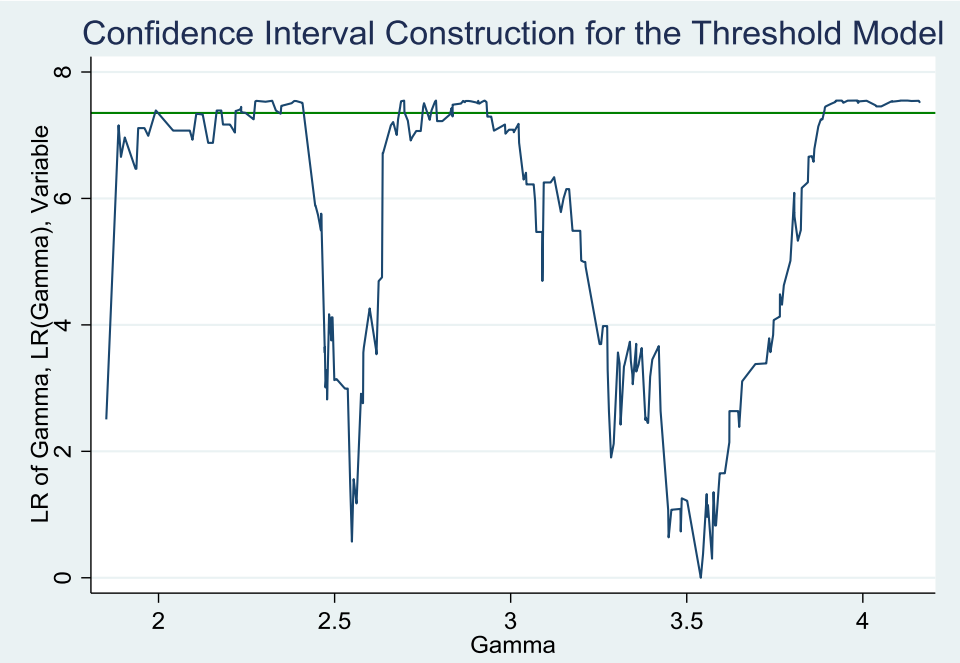

Figure 2. Domestic Credit to Private Sector Threshold

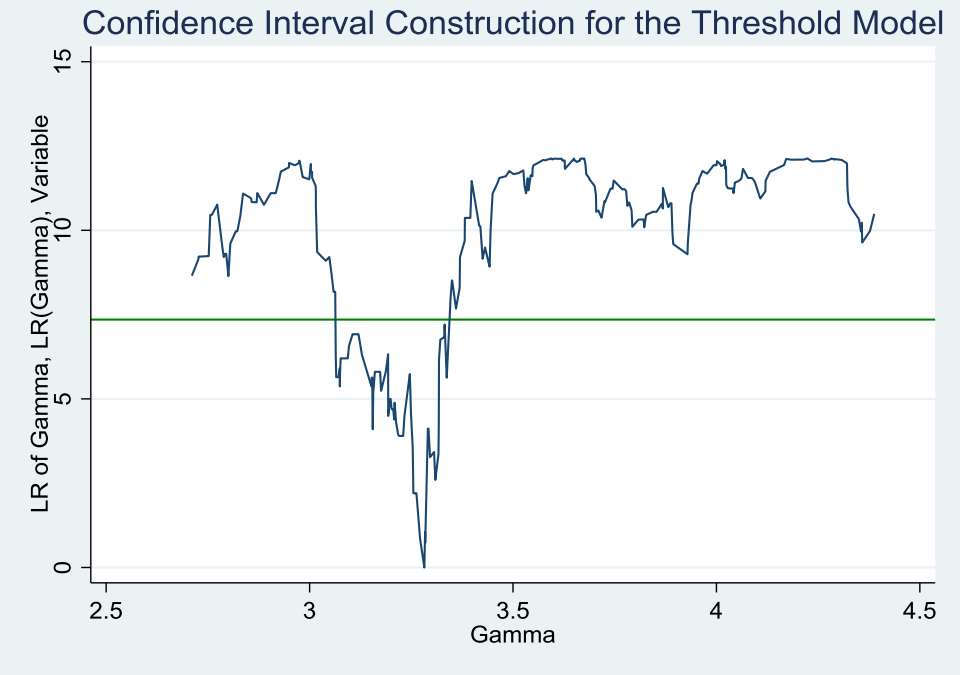

Figure 3. Money Supply Threshold

Table 3. Dynamic Panel Threshold Regression Results (Financial Development & Growth – Financial Development Threshold)

	Private Sector Credit	**Money Supply**
Threshold	3.5399 {34.4635}	3.2821 {26.6316}
Confidence interval (95%)	[1.8364 – 3.8853]	[3.0642 – 3.3371]
$\hat{\beta}_1$	-0.0527 (0.790)	0.3290 (0.058)
$\hat{\beta}_2$	0.0008 (0.997)	0.2509 (0.103)
GDP_{t-1}	0.8006 (0.000)	0.783461 (0.000)
FDI	0.3846 (0.081)	0.3347 (0.017)
LE	1.7847 (0.606)	-0.3995 (0.693)
SE	-0.3404 (0.587)	0.2323 (0.351)
K	0.1856 (0.631)	-0.2250 (0.259)
$Intercept$	-5.6448 (0.590)	1.6037 (0.656)
Observation	405	405
N	81	81
Upper regime (%)	29.7	60.0
Moment Conditions	15	15

Note: The values between () are the P-values. The values between {} are the thresholds as a percentage of GDP. The 95% confidence intervals are reported within [].

When we examine the FDI–growth association considering the level of financial development, the dynamic panel threshold begins with estimating the threshold values of financial development as indicated in Equation 3. Figures 4 and 5 show the likelihood ratios (*LR*), which are less than the 95% critical values of the asymptotic distribution for the two measures of financial development. These results reveal the reliability of the contingency of FDI–growth association on a certain threshold of financial development. Table 4 demonstrates the findings reached applying the dynamic panel threshold testing procedure. The estimated threshold values are around 12.8 percent and 15.7 percent for private sector credit and money supply, respectively. Notably, the 95% confidence intervals provide support for the significance of the thresholds.

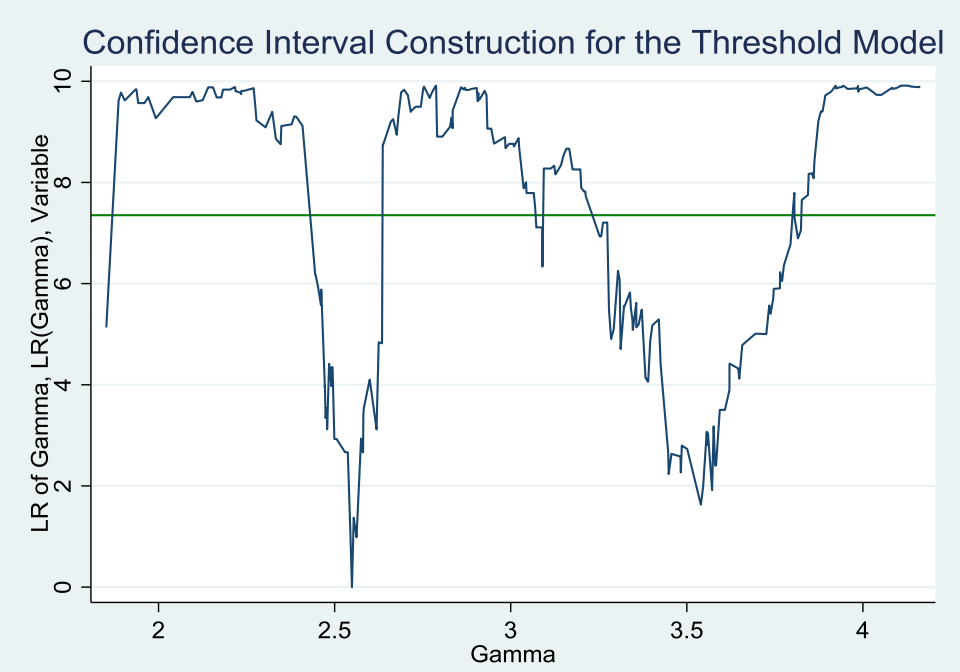

Figure 4. Domestic Credit to Private Sector Threshold

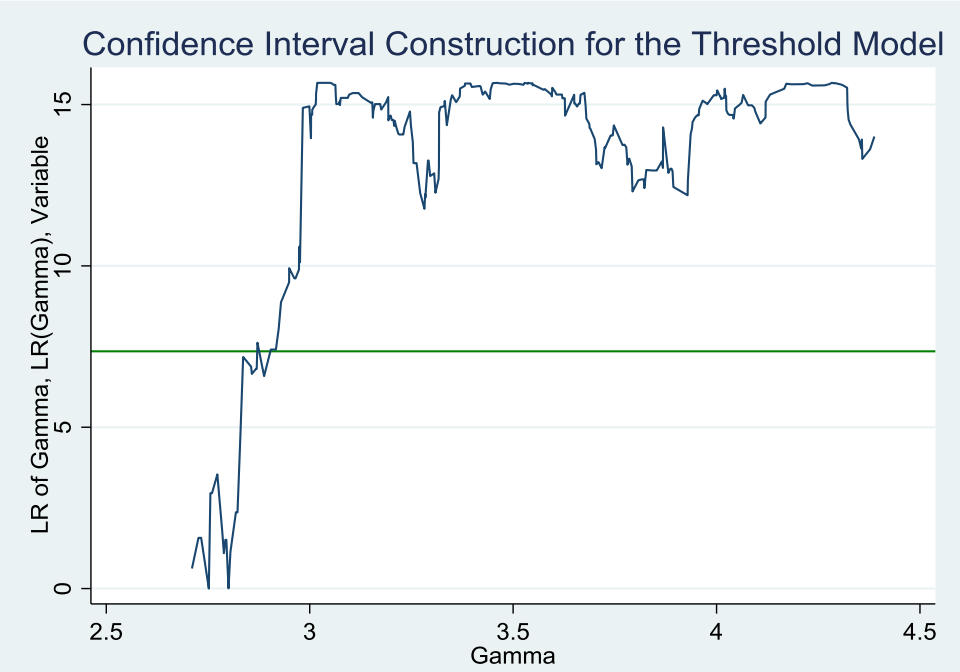

Figure 5. Money Supply Threshold

As shown by the results in Table 4, the effect of FDI on economic growth below the threshold of private sector credit appears to be positive but insignificant. In contrast, it is positive and significant above the threshold. Moreover, we find a positive and meaningful relationship between FDI and economic growth below and above the threshold of money supply as a percentage of GDP. Therefore, money supply indicators are sounder and more significant compared to private sector credit.

FDI has a higher coefficient above the turning point of money supply, implying a more significant effect on real GDP per capita when financial development is relatively high. These findings confirm many of the previous studies that for FDI to be beneficial to economic growth, some level of financial development is a prerequisite. Also, the results show that the lagged-dependent variable is positive and statistically significant, indicating the influence of initial income in controlling for growth disparities across nations. However, the results reveal that financial

development has an insignificant impact on economic growth when domestic credit and money supply are used, respectively. This indicates the role of financial development is more of a moderating one that helps to improve the effect of FDI on economic growth. Similar to the findings of Equation 2, the explanatory variables are statistically insignificant in determinants of economic growth in the sampled countries.

Table 4. Dynamic Panel Threshold Regression Results (FDI & Growth–Financial Development Threshold)

	Private Sector Credit	**Money Supply**
Threshold	2.5493 {12.7981}	2.7520 {15.6739}
Confidence interval (95%)	[1.8364 – 3.8241]	[2.7104 – 2.8879]
$\hat{\beta}_1$	0.2915 (0.205)	0.3408 (0.094)
$\hat{\beta}_2$	0.3889 (0.047)	0.3638 (0.020)
GDP_{t-1}	0.6895 (0.000)	0.7694 (0.000)
FD	0.2570 (0.206)	0.2252 (0.357)
LE	-1.3384 (0.359)	-0.1029 (0.944)
SE	0.2435 (0.410)	0.0159 (0.957)
K	-0.4038 (0.336)	-0.1743 (0.481)
$Intercept$	6.8505 (0.234)	1.2939 (0.820)
Observation	405	405
N	81	81
Upper regime (%)	69.7	61.8
Moment Conditions	15	15

Note: The values between () are the P-values. The values between {} are the thresholds as a percentage of GDP. The 95% confidence intervals are reported within [].

Also, we investigate the effect of financial development on economic growth, taking the level of FDI inflows into account. Initially, the dynamic panel threshold provides estimates of the threshold levels of FDI as specified in Equation 4. Figures 6 and 7 present the likelihood ratios (*LR*) and the 95% critical values of the asymptotic distribution for the two model specifications regarding financial development measures. Table 5 reveals the results of the dynamic panel threshold. The FDI threshold values are 3.9 percent and 4.1 percent for the specification of private sector credit and money supply, respectively. Also, the 95% confidence intervals endorse the meaningfulness of the estimated thresholds.

The outcomes show that the effect of financial development on economic growth below and above the threshold of FDI is positive but insignificant for both measures of financial development. These findings provide no support to the one provided by Sirag et al. (2018) [26], indicating the absence of a direct role played by the financial sector in enhancing GDP growth and suggesting the earlier evidence documented in the literature could be conveying the experience for a single country. Furthermore, the dynamic term of the lagged-dependent variable is a positive and statistically significant growth determinant, denoting the importance of initial income for higher growth. Also, both models in Table 5 reveal that FDI has a positive and direct impact on economic growth in developing countries. Nonetheless, the independent variables are found to be statistically insignificant in determining the differences in economic growth across the sampled countries.

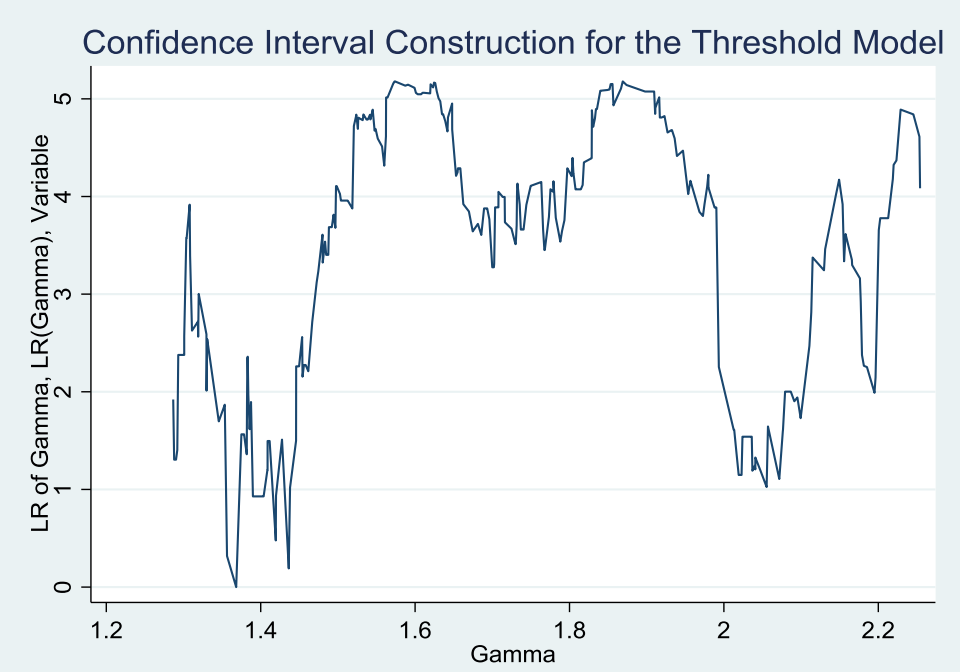

Figure 6. FDI Threshold

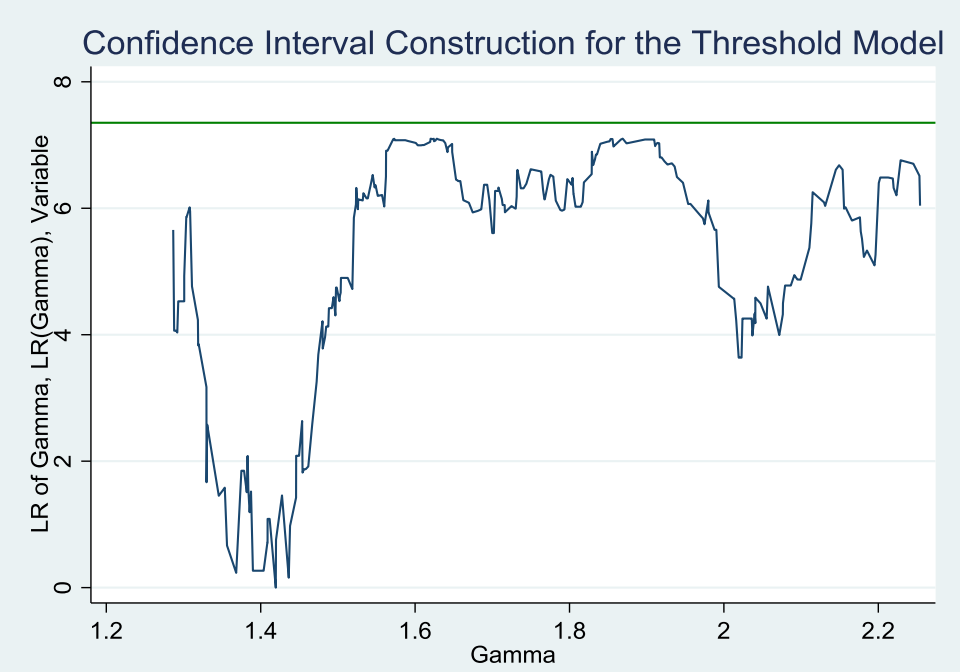

Figure 7. FDI Threshold

Table 5. Dynamic Panel Threshold Regression Results (Financial Development & Growth – FDI Threshold)

	FDI (Domestic Credit)	**FDI (Money Supply)**
Threshold	1.3683 {3.9287}	1.4195 {4.1351}
Confidence interval (95%)	[1.2387 – 2.2541]	[1.2837 – 2.2541]
$\hat{\beta}_1$	0.4943 (0.106)	0.2639 (0.285)
$\hat{\beta}_2$	0.4016 (0.113)	0.2087 (0.312)
GDP_{t-1}	0.6232 (0.003)	0.7566 (0.000)
FDI	0.4937 (0.013)	0.4614 (0.045)

LE	-1.8623 (0.261)	-0.6644 (0.592)
SE	0.3231 (0.270)	0.2253 (0.354)
K	-0.5441 (0.222)	-0.2688 (0.278)
$Intercept$	8.9232 (0.185)	3.0325 (0.501)
Observation	405	405
N	81	81
Upper regime (%)	95.1	99.4
Moment Conditions	15	15

Note: The values between () are the P-values. The values between {} are the thresholds as a percentage of GDP. The 95% confidence intervals are reported within [].

The findings of this study offer a more nuanced contribution to the existing literature on the finance–FDI–growth nexus. Specifically, the results show that when financial development is treated as a threshold variable, there is no statistically significant threshold effect. In other words, the influence of financial development on economic growth remains statistically insignificant both below and above the estimated threshold levels, regardless of the financial development indicator used.

This implies that, within the sample of low- and middle-income countries analyzed, financial development alone does not exert a direct influence on economic growth across different stages of financial sector maturity. In contrast, when FDI is introduced as the threshold variable, a clear and statistically significant pattern emerges. The results reveal that FDI has no significant effect on economic growth when financial development is below a certain critical threshold. However, once this threshold is exceeded, the relationship becomes positive and statistically significant. This finding supports the hypothesis that financial development is a necessary precondition for FDI to positively influence growth, aligning with the absorptive capacity theory [6, 9].

This conclusion is also consistent with recent empirical studies. For instance, Bui and Doan (2024) [45] find that the positive impact of FDI on green GDP in ASEAN economies only materializes beyond a specific financial development threshold. Similarly, Emako et al. (2022) [55] emphasize the importance of institutional and financial readiness for converting FDI inflows into structural economic transformation. Collectively, these studies reinforce the idea that the growth-enhancing effects of FDI are not automatic but contingent upon the strength of financial institutions and markets—a finding corroborated by the present study.

Moreover, this study investigates an alternative threshold specification: whether the impact of financial development on economic growth depends on the level of FDI. The analysis indicates that FDI does not function as a statistically significant threshold variable. That is, the effect of financial development on growth does not differ significantly between low and high levels of FDI. This null result diverges from some earlier studies (e.g., Yeboua [8]) that suggested conditional effects of FDI on the finance–growth relationship, yet it aligns with the broader conclusion that financial development is more likely to facilitate the impact of FDI rather than be conditioned by it.

In sum, the primary contribution of this study is in clarifying that while financial development may not independently drive economic growth across threshold levels, it serves a crucial enabling function in allowing FDI to deliver its growth benefits. This dual insight—the absence of a threshold effect for financial development and the presence of one for FDI—adds empirical precision to ongoing debates and offers a stronger basis for designing targeted policies in capital-scarce economies.

5. Conclusion

Over the past years, a large body of previous studies examined the link between financial development, FDI, and economic growth from various perspectives. A significant common finding is that financial development played a moderating role in the FDI–growth association. However, the potential stimulating impact of FDI on the finance–growth nexus remained unexplored. Therefore, in this empirical investigation, the aim was to reassess the relationship between financial sector development, FDI inflows, and economic growth for a sample of 81 low- and middle-income countries. More specifically, the contingencies of the finance–growth nexus on the level of the financial system, the finance–growth nexus on the FDI inflows, and the FDI–growth nexus on financial development were examined by this study. The study covered the period from 1990 to 2019.

The dynamic panel threshold that allows for the endogeneity of the right-hand-side variables was adopted as an appropriate econometric technique. The investigation of financial development has shown no evidence of a threshold

effect on economic growth in developing countries. The most apparent finding that emerged from this study was that FDI had a positive and significant impact on the economic growth of the host countries only after a certain level of financial development, which was in line with the majority of findings in the literature. Contrary to a few existing studies, the FDI inflows made no significant contribution to the relationship between financial development and per capita income. The current findings clearly supported the relevance of FDI inflows to the improvement of developing economies. At the same time, the effect of the financial sector on economic performance was through stimulating the positive influence of FDI on economic growth.

Taken together, the findings of this study suggest a direct role for FDI inflows in promoting real per capita income in developing countries. An implication of this is that robust foreign investment policies are necessary to improve the economic performance in low- and middle-income economies. Moreover, to benefit most from FDI, a tactic that attracts foreign investors in productive sectors such as agriculture and manufacturing is needed. Importantly, FDI is one way to add value to the primary products of many developing nations. Producing value-added products will enable countries to gain a comparative advantage in the international market and increase the sophistication of their domestic economic activities.

Therefore, the governments in developing countries must sustain their efforts to improve the business environment for investment. The threshold model's findings assist in understanding the passive role of financial development on economic growth in many developing economies. The current data highlights the importance of financial development as an intermediary factor to stimulate the relationship between FDI and economic growth. Therefore, financial systems in these countries require massive reform so that the economy will benefit from such an important sector. Future research may view the contingency effect of other factors on the finance–growth and FDI–growth connections. For instance, institutional quality and economic complexity are among the substantial factors that may influence how financial development and/or FDI affect economic growth. Future region-specific studies are needed to limit the degree of heterogeneity in the samples when exploring the finance-FDI-growth nexus.

6. Declarations

6.1. Author Contributions

Conceptualization, A.S.; methodology, H.S.A. and Z.L.; software, H.S.A.; validation, E.E.O. and A.S.; formal analysis, E.E.O.; investigation, A.S.; data curation, A.S.A. and E.E.O.; writing—original draft preparation, O.S.A. and A.S.; writing—review and editing, O.S.A.; visualization, A.S.A. and Z.L.; supervision, O.S.A.; project administration, A.S. and Z.L.; funding acquisition, E.E.O. and H.S.A. All authors have read and agreed to the published version of the manuscript.

6.2. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

6.3. Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

6.4. Institutional Review Board Statement

Not applicable.

6.5. Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

6.6. Declaration of Competing Interest

The authors declare that there are no conflicts of interest concerning the publication of this manuscript. Furthermore, all ethical considerations, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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