How Financial Development Moderates the Influence of FDI on Economic Growth: A Dynamic Panel Threshold Approach[1]

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Abstract

This study investigates how the influence of foreign direct investment (FDI) on economic growth changes conditional on the level of financial development. Using data from 83 countries over 2002 – 2022 and applying the dynamic panel threshold regression (DPTR) method, the analysis uncovers a nonlinear – specifically, inverted U-shaped – pattern in the influence of FDI on growth, depending on financial development. The findings indicate that FDI is associated with stronger economic growth at moderate levels of financial development, whereas excessive financial development is linked to a diminished or vanishing effect of FDI on growth. These patterns remain consistent across robustness checks, including sample splits (developed vs. developing countries), interaction-based specifications, and alternative financial development indicators. The study concludes with policy considerations tailored to different country groups.

Keywords: *economic growth, financial development, foreign direct investment, DPTR model, threshold model*

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Introduction

The growing integration of global markets has intensified cross-border flows of goods, services, and capital (Kalai et al., 2024). Within this landscape, FDI has become a key vehicle for transferring financial resources, productivity-enhancing technologies, and managerial expertise to host economies (Bhujabal et al., 2024). It also plays an essential role in industrial restructuring and employment generation, making it central to contemporary development strategies (Kalai et al., 2024; Bhujabal et al., 2024). The theoretical underpinnings for understanding the FDI – growth nexus originate from neoclassical growth theory (Solow, 1956) and endogenous growth theory (Romer, 1990), which emphasize channels such as technological spillovers, human capital accumulation, and market expansion (Alvarado et al., 2017).

Yet, despite strong theoretical expectations, empirical evidence remains deeply divided. A large body of studies documents positive effects of FDI on economic growth (Awad and Ragab, 2018; Owusu-Nantwi and Erickson, 2019; Sakyi and Egyir, 2017). Conversely, other research reports negative or insignificant effects (Elheddad et al., 2021; Joo and Shawl, 2023). These inconsistent findings underscore the importance of country-specific characteristics, especially absorptive capacity and institutional, structural, and policy environments, in determining the ultimate impact of FDI (Osei and Kim, 2020).

Among these factors, financial development has been repeatedly identified as a fundamental determinant shaping both the absorption of FDI spillovers and the efficiency with which capital inflows are translated into productive investment (Acquah and Ibrahim, 2020; An et al., 2025; An and Yeh, 2020; Ibrahim and Acquah, 2021; Osei and Kim, 2020). While well-developed financial markets can enhance the positive impact of FDI, excessively large financial sectors may contribute to misallocation, volatility, or asset bubbles, thereby weakening FDI's growth effects. Empirical studies support the notion of threshold behavior: FDI promotes growth only when financial development exceeds certain levels (Azman-Saini et al., 2010; Nguyen, 2022), whereas overly deep financial systems may diminish or reverse these benefits (Osei and Kim, 2020).

Despite these advances, existing studies typically rely on homogeneous country groups and seldom differentiate between developed and developing economies. This approach overlooks fundamental structural divergences – developed economies tend to feature market-based financial systems, whereas developing economies rely predominantly on bank-based systems. These differences may yield systematically distinct FDI – growth dynamics and imply that uniform policy prescriptions are inappropriate.

Motivated by these gaps, the present study examines how financial development shapes the growth effects of FDI across different stages of financial maturity. Adopting a DPTR framework and multiple indicators of financial development, the analysis identifies endogenous financial thresholds that give rise to nonlinear "kick-in" and "vanishing" effects of FDI. Using a balanced panel of 83 countries over 2002 – 2022, the study provides updated and policy-relevant insights, showing that these nonlinearities differ markedly between developed and developing economies. The subsample results reveal that developing economies must attain a minimum level of financial development for FDI to generate positive growth effects, whereas developed economies experience diminishing returns as financial systems become excessively deep. Moreover, the evidence supports an inverted U-shaped pattern, suggesting that financial development initially amplifies but eventually constrains the marginal growth contribution of FDI.

By incorporating threshold-based nonlinearities, cross-country heterogeneity, and updated multi-decade data, this study provides new empirical and conceptual insights into how financial development shapes the conditional association between FDI inflows and economic growth outcomes. The findings offer important implications for designing balanced financial and investment policies aimed at maximizing the developmental gains from global capital flows.

1. Literature Review

1.1. FDI and Economic Growth

The theoretical foundations underlying the influence of FDI on economic performance stem from both classical and endogenous growth frameworks. In the neoclassical model (Solow, 1956), FDI raises the steady-state level of output by augmenting per capita capital accumulation and enhancing investment efficiency (Duodu and Baidoo, 2022). Because foreign capital brings embodied technologies, it improves both capital and labor quality, thereby increasing productivity and short-run growth (Herzer et al., 2008). Endogenous growth theory further deepens this mechanism by emphasizing that FDI incorporates technological progress directly into the production function, thereby generating persistent learning and innovation effects (Romer, 1990; 1994). Through these channels, FDI promotes trade (Markusen and Venables, 1998), strengthens local capital efficiency (Driffield, 2001), and enhances long-run growth potential.

These foundational theories imply that FDI fosters growth through three main mechanisms. First, short-run spillovers materialize via technology transfer, managerial upgrading, and intensified competition. Second, absorptive capacity –

determined by local human capital, financial depth, and institutional quality – conditions whether these spillovers translate into productivity gains. Third, long-run structural transformation emerges when FDI-induced capabilities support industrial upgrading and improved resource allocation. Although both Solow and Romer highlight the centrality of capital formation, they differ in whether technological progress is exogenous or endogenously driven by foreign knowledge inflows.

Contrasting these optimistic views, dependency theory argues that external capital flows can entrench "underdevelopment" and weaken domestic productive capacity, particularly in economies dependent on low-cost labor or resources (Sonntag, 2001). Classic contributions (Cardoso and Faletto, 1979; Moran, 1978) warn that capital inflows may crowd out domestic investment (Papanek, 1973), widen income disparities (O'Rourke and Williamson, 2001), and induce political – economic fragility. These competing perspectives have motivated extensive empirical inquiry, especially as global production fragmentation and deindustrialization reshaped the role of FDI (Alvarado et al., 2017).

Empirical studies similarly present mixed findings. A large body of work documents a positive association between FDI and growth, noting that foreign capital stimulates demand, improves resource allocation, boosts employment, and reinforces global economic integration. Numerous studies across regions confirm these benefits (Awad and Ragab, 2018; Owusu-Nantwi and Erickson, 2019; Sakyi and Egyir, 2017).

However, another strand finds that FDI can hamper economic growth (Elheddad et al., 2021; Joo and Shawl, 2023; Rehman et al., 2023). Excessive or poorly allocated FDI may undermine domestic firms, overstretch resources, or perpetuate low-value activities (Nguyen, 2022). Consistent with Solow (1956), several studies also argue that FDI-induced gains may diminish over time due to decreasing returns (Joo and Shawl, 2023). The "resource curse" hypothesis likewise warns that FDI may involve outdated technologies or unsustainable extraction, reducing long-term productivity (Elheddad et al., 2021).

These inconsistencies have led scholars to consider nonlinear or asymmetric effects of FDI (Alvarado et al., 2017; Kalai et al., 2024; Yeboua, 2019; 2021). For instance, Alvarado et al. (2017) find that FDI is growth-enhancing in high-income countries, insignificant in upper-middle-income economies, and negative in lower-middle-income economies. Other studies stress the central role of absorptive capacity, showing that FDI contributes to growth only when host economies reach minimum thresholds in complementary factors (Yeboua, 2019; 2021). This evidence highlights that the benefits of FDI depend not merely on foreign capital inflows but on domestic capabilities that enable spillovers to translate into long-term structural transformation.

2. The Role of Financial Development in Shaping the Growth Effects of FDI

Financial development has increasingly been recognized as a key element shaping the transmission of FDI to growth. A well-functioning financial system enhances savings mobilization, improves capital allocation, and strengthens investment efficiency (Acquah and Ibrahim, 2020). From a theoretical standpoint, financial markets act as an essential absorptive capacity mechanism, ensuring that FDI-related technologies and knowledge are effectively intermediated and channeled toward productive sectors (Osei and Kim, 2020). Through this intermediation role, financial development may amplify both short-run spillovers and long-run structural transformation induced by FDI.

Institutional quality further conditions this relationship. A robust institutional framework reinforces transparency, reduces expropriation risks, and improves resource allocation (Acemoglu and Johnson, 2005; Alfaro et al., 2004). Empirical evidence shows that financial systems perform better in converting FDI into sustainable growth when institutions support property rights and credible contract enforcement (Hermes and Lensink, 2003). Conversely, weak institutions may distort financial incentives, causing FDI to be allocated inefficiently or driven by rent-seeking behavior (Law et al., 2020). Numerous studies affirm the enabling role of financial development in the growth effects of FDI (see Alfaro et al., 2004, 2010; Ibrahim and Acquah, 2021; Patra and Dastidar, 2018)

A growing body of research highlights the threshold nature of financial development. Several studies document a "kick-in effect," where FDI enhances growth only once financial development surpasses a critical level. Azman-Saini et al. (2010) show that domestic credit must exceed 49.7% for FDI to exert a positive effect. Baharumshah et al. (2017) and Nguyen (2022) similarly find that financial systems must reach specific development levels for FDI to contribute meaningfully to growth.

In contrast, other studies identify a "vanishing effect," in which excessive financial depth weakens the growth returns of FDI. Overdeveloped or fragile financial markets may generate asset bubbles, misallocate capital, or reduce the efficiency of FDI absorption (An and Yeh, 2020; Nguyen, 2022). This suggests that the financial system must be not only sufficiently developed but also efficient and stable.

Recent empirical work shows that the growth impact of FDI is fundamentally nonlinear, unfolding differently across distinct financial development thresholds (An et al, 2023; An and Yeh, 2020; Dua and Verma, 2026; Osei and Kim, 2020; 2023). An and Yeh (2020) document an inverted U-shaped effect of FDI on growth in 18 emerging Asian economies, while An et al. (2025) further show that financial development mediates this nonlinear effect. Dynamic panel threshold studies reinforce these findings: Osei and Kim (2020) identify a 95.6% private credit threshold beyond which FDI loses its growth effect, and Osei and Kim

(2023) confirm that positive spillovers "kick in" at low financial development but "vanish" when financial markets become excessively deep. In contrast, Dua and Verma (2026) report stronger FDI effects in financially deeper economies without evidence of a vanishing pattern.

Overall, these studies suggest that the impact of FDI on economic growth is not necessarily linear but rather contingent upon the level of financial development in host countries, exhibiting different effects at varying stages of financial system maturity.

3. Data and Methodology

3.1. Data

This study is based on annual panel data for the period from 2002 to 2022 of 83 countries. In this study, our variables include the dependent variable of economic growth, as measured by natural log of GDP per capita (lnGDP). The independent variable is FDI as measured by net FDI inflows (% of GDP). Next, we use different measures that represent financial development in turn. First, we use Private credit (FD_1), the value of credit granted by financial intermediaries to the private sector (% of GDP) as the measure used primarily to represent financial development. Besides, for more insight and to provide stronger evidence of the relationship between FDI and growth, we use two other measures of financial development which are Domestic credit by banks (% of GDP) (FD_2) and Liquid liabilities to GDP (%) (FD_3). However, instead of including all three financial development indicators simultaneously in the research model, we introduce them separately in different model specifications. This approach helps mitigate multicollinearity issues, as these financial development variables exhibit high correlations and could distort estimation results if included together (see Appendix, Table A2 for details). Following previous studies (Acquah and Ibrahim, 2020; Alfaro et al., 2004; An and Yeh, 2020; Owusu-Nantwi and Erickson, 2019; Yeboua, 2019), we select control variables that have been empirically demonstrated to significantly influence economic growth, including government expenditure (GE), Gross Fixed Capital Formation (GFCF), inflation (INF), population (POP), trade openness (TRADE), education (EDU), institutional quality (IQ), industrial capacity (Industry), information and communication technology (ICT) and natural resources (NRR). The selection of these variables is based on previous studies while the time period is selected based on data availability. All data are collected from various data sources, including World Development Indicators (WDI), Worldwide Governance Indicators (WGI), and Global Financial Development Database (GFDD). Table 1 provides a summary of data sources and a description of the research variable.

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Variables Definitions

Variables	Symbols	Definition	Sources
Economic growth	lnGDP	Natural log of GDP per capita (constant 2015 USD)	WDI
Foreign direct investment	FDI	Foreign direct investment, net inflows (% of GDP)	WDI
Government expenditure	GE	General government final consumption expenditure (% of GDP)	WDI
Investment	GFCF	Gross fixed capital formation (% of GDP)	WDI
Inflation	INF	Inflation, GDP deflator (annual %)	WDI
Population	POP	Population growth (annual %)	WDI
Trade openness	TRADE	Trade (% of GDP)	WDI
Education	EDU	School enrollment, primary (% gross)	WDI
Institutional quality	IQ	Composite index by simple average of six index WGI components (voice and accountability, control of corruption, government efficiency, political stability, regulation quality and rule of law), ranges from –2.5 (weak) to +2.5 (strong)	WGI
Financial development	FD_1	Domestic credit to private sector (% of GDP)	GFDD
	FD_2	Domestic credit by banks (% of GDP)	
	FD_3	Liquid liabilities to GDP (%)	
Industrial capacity	Industry	Industry (including construction), value added (% of GDP)	WDI
Information and communication technology	ICT	Mobile cellular subscriptions (per 100 people)	WDI
Natural resources	NRR	Total natural resources rents (% of GDP)	WDI

Notes: WDI: the World Development Indicators; WGI: the Worldwide Governance Indicators; GFDD: Global Financial Development Database (all in the World Bank).

Source: Author's.

3.2. Methodology

3.2.1. Dynamic Panel Threshold Regression Model

In this study, we employ the dynamic panel threshold model of Kremer et al. (2013) to examine whether financial development defines threshold regimes that condition the impact of FDI on economic growth. Building on Hansen (1999) and Caner and Hansen (2004), this approach allows for endogenous regressors in a dynamic panel setting. The underlying assumption is that if financial development shapes the growth benefits of FDI, the FDI – growth relationship should differ across financial-development regimes. While the model accounts for endogeneity and dynamics, it identifies conditional associations rather than definitive causal effects. Accordingly, the threshold values are estimated empirically rather than imposed a priori, making the method appropriate for identifying nonlinear regime-dependent effects in this study.

This model overcomes the limitations of the static threshold model proposed by Hansen (1999). According to Sikhawal (2023), there are two unresolved issues in conventional static threshold technique of Hansen (1999). First, in many cases, economic variables can be determined in part by their past behavior. Therefore, it

is necessary to incorporate the lag coefficient of the dependent variable into the regression equation to transform the static panel data model into a dynamic panel data model. Second, the static threshold approach requires the selection of a purely exogenous threshold variable, and that can create bias estimates.

The dynamic panel threshold model is an extension of the cross-sectional threshold model of Caner and Hansen (2004), in which the GMM-type estimators are used to account for endogenousness. The dynamic panel threshold model has the following general form:

$$y_{it} = \mu_i + \beta_1^{'} z_{it} I\left(q_{it} \le \gamma\right) + \beta_2^{'} z_{it} I\left(q_{it} > \gamma\right) + \varepsilon_{it} \tag{1}$$

In which the indices $i = 1,..., N$ represent the country and $t = 1,..., T$ is the time index. μ_i shows the country-specific impact and error ε_{it} complies with the distribution iid, $\varepsilon_{it} \sim \left(0, \sigma^2\right)$. I (·) is a function that indicates the mode determined by the threshold variable q_{it} and the threshold level γ. z_{it} is a m-dimensional vector of explanatory regression variables that may include latency values of y and other endogenous variables. Vectors of explanatory variables are divided into a subset z_{1it}, exogenous variables not correlated with ε_{it} and a subset of endogenous variables z_{2it}, correlated with ε_{it}. In addition to the structural Equation (1), the model requires a suitable set of $k \ge m$ instrumental variables z_{it} including z_{1it}.

As suggested by Kremer et al. (2013), we use the forward orthogonal deviation transformation of Arellano and Bover (1995) to eliminate country-specific fixed impacts in the first step of estimation. The advantage of the orthogonal deviation transformation is that it avoids the serial correlation of the modified error terms and thus maintains the basic distribution assumptions of Hansen (1999) and Caner and Hansen (2004). Therefore, instead of a first-order error resulting in a series correlation of error terms or minus the mean from each observation (in transformations) as in Hansen (1999), which can lead to inconsistent estimates, the forward orthogonal deviation transformation method will subtract the mean of all available future observations of a variable. Therefore, for the error term, the forward orthogonal deviation transformation is given by:

$$\varepsilon_{it^*} = \sqrt{\frac{T-t}{T-t+1}}\left[\varepsilon_{it} - \frac{1}{T-t}\left(\varepsilon_i\left(t+1\right) + \ldots + \varepsilon_{it}\right)\right] \tag{2}$$

Therefore, the forward orthogonal deviation transformation maintains the irrelevance of the error terms, that is:

$$Var\left(\varepsilon_i\right) = \delta^2 I_T \rightarrow Var\left(\varepsilon_i^*\right) = \delta^2 I_{T-1} \tag{3}$$

This ensures that the estimation procedure given by Caner and Hansen (2004) for the cross-sectional model can be applied to the dynamic panel.

Following Caner and Hansen (2004), we estimate a reduced form regression for the endogenous variables, z_{2it}, as a function of the instruments x_{1it}. The endogenous variables, z_{2it}, are then replaced in the structural equation by the predicted values $\hat{z}_{2it}$. In step two, Equation (1) is estimated via least squares for a fixed threshold γ where the z_{2it} are replaced by their predicted values from the first-step regression. Let $S(\gamma)$ denote the resulting sum of squared residuals. Finally, the estimator of the threshold value γ is chosen as the one associated with the smallest sum of squared residuals, that is $\hat{\gamma} = \underset{\gamma}{argmin}\, S_n(\gamma)$.

The critical values for determining the 95% confidence interval of the threshold value are given by $\Gamma = \{\gamma : LR(\gamma) \leq C(\alpha)\}$ (Caner and Hansen, 2004; Hansen, 1999), where $C(\alpha)$ is the 95 percentiles of the asymptotic distribution of the likelihood ratio statistic $LR(\gamma)$. Once the sample-splitting threshold estimate $\hat{\gamma}$ is obtained, the sample can be divided into two subsamples and, on each subsample, the slope parameters $\widehat{\beta_1}$ and $\widehat{\beta_2}$ can be estimated by GMM.

Next, we apply the dynamic panel threshold model to analyze the impact of FDI on economic growth with the threshold variable being financial development. To achieve this objective, consider the following threshold model:

$$\begin{aligned} lnGDP_{it} &= \mu_i + \beta_1 FDI_{it} I(FD_{it} \leq \gamma) + \delta_1 I(FD_{it} \leq \gamma) + \\ &+ \beta_2 FDI_{it} I(FD_{it} > \gamma) + \psi' Z_{it} + \varepsilon_{it} \end{aligned} \tag{4}$$

In equation (4), financial development (FD) is the threshold variable and FDI is the regime-dependent regressor. Threshold variable FD_{it} divides the sample into modes with regression parameters representing different slopes of β_1 and β_2. We use private credit, credit by banks, or liquid liabilities as a proxy for financial development, respectively. Next, following Bick (2010) and Kremer et al. (2013), we allow for differences in the mode-blocking coefficient δ_1. Initial growth (lnGDP$_{t\text{-}1)}$ is considered an endogenous variable, i.e. $z_{2it} = initial_{it} = lnGDP_{i,t-1}$, while z_{1it} contains the remaining control variables. This will help minimize any potential deviations in threshold estimates and marginal effects (Osei and Kim, 2020). Thus, the model accounts for dynamic effects by incorporating the lagged variable of economic growth ($lnGDP_{i,t-1}$). z_{it} is a vector of explanatory variables that can be divided into a subset of exogenous variables, z_{1it} includes Government expenditure (GE), Gross Fixed Capital Formation (GFCF), Inflation (INF), Population (POP),

Trade openness (Trade), Education (EDU), Institutional quality (IQ), Industrial capacity (Industry), Information and communication technology (ICT) and Natural resources (NRR) that are not correlated with ε_{it} and a subset of endogenous variables *(* $z_{2it} = lnGDP_{t\text{-}1}$*)* that are correlated with ε_{it} .

3.2.2. Heterogeneous Impact Analysis Using MMQR

To complement the threshold-based evidence obtained from the DPTR model, this study additionally employs the MMQR developed by Machado and Santos Silva (2019). MMQR addresses a distinct empirical question - namely, how the conditional distribution of economic growth responds to FDI across different points of the growth distribution. This allows us to explore distributional heterogeneity that cannot be captured by mean-based threshold regressions, thereby offering insights into whether the influence of FDI varies between low-growth and high-growth regimes under differing levels of financial development. The MMQR framework also accommodates conditional heteroskedasticity and potential endogeneity among regressors, making it well suited for detecting nonlinearities and asymmetric patterns in panel data (Machado and Santos Silva, 2019).

Recent studies have demonstrated the usefulness of MMQR in uncovering complex growth dynamics and distributional asymmetries (Ho et al., 2025; Leng et al., 2024). Accordingly, its inclusion in this study provides a complementary perspective on whether patterns such as the "vanishing effect" of financial development manifest consistently across the entire conditional distribution of growth.

The fixed-effects MMQR model is expressed as:

$$\mathcal{Q}_y\left(\tau \mid X_{it}\right) = \left(\alpha_i + \delta_i\left(\tau\right)\right) + X_{it}^{'}\beta + Z_{it}^{'}\gamma q\left(\tau\right) \tag{5}$$

In this specification, X_{it} denotes the vector of explanatory variables, while $\mathcal{Q}_y\left(\tau \mid X_{it}\right)$ represents the conditional quantile distribution of the dependent variable. The term $X_{it}^{'} - \alpha_i\left(\tau\right) = \alpha_i + \delta_i q\left(\tau\right)$ reflects a scalar coefficient representing the quantile-specific fixed effect, indicating that fixed effects in quantile regression do not simply shift the intercept as in conventional OLS models. Instead, these individual effects vary across quantiles and remain time-invariant. The parameters are influenced by changes in the conditional distribution of the dependent variable and are estimated by solving an optimization problem to identify the sample quantile τ (denoted as $q\left(\tau\right)$.

$$min_q \sum_i \sum_t \rho\tau\left(R_{it} - \left(\delta_i + z_{it}^{'}\gamma\right)q\right) \tag{6}$$

where $\rho_\tau\left(A\right) = \left(\tau - 1\right)AI\left\{A \le 0\right\} + TAI\left\{A > 0\right\}$ is the standard check function.

4. Empirical Results and Discussions

4.1. Descriptive Statistics

T a b l e 2

Descriptive Statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
Full Sample					
GDP	1,743	16,320.803	21,548.106	262.1848	112,417.878
FDI	1,743	5.1837	22.0576	–394.4716	449.0828
GE	1,743	15.9562	5.2323	3.4604	36.1431
GFCF	1,743	23.2128	6.5451	3.9487	78.0009
INF	1,743	4.8789	5.9824	–22.0914	84.6835
POP	1,743	1.2235	1.1916	–6.1873	11.7940
TRADE	1,743	87.4458	51.6457	21.6738	393.1412
EDU	1,743	101.9456	12.0219	38.6836	150.3542
IQ	1,743	0.1742	0.8875	–1.5463	1.9469
FD_1	1,743	66.6565	62.4749	0.1862	524.5754
FD_2	1,743	62.7541	60.3515	0.1862	524.5151
FD_3	1,743	72.728	82.9881	7.0362	927.4318
Industry	1,743	26.9963	9.2216	10.3967	76.4321
ICT	1,743	90.0112	41.1140	0.0864	181.767
NRR	1,743	4.5374	7.2660	0.0000	53.3148
Developed Countries (26 countries)					
GDP	546	41,763.3273	21,958.4913	9,640.8653	112,417.878
FDI	546	7.8654	38.1775	–394.4716	449.0828
GE	546	19.9764	3.6894	10.4244	28.1541
GFCF	546	22.5028	4.4937	10.6874	54.2742
INF	546	2.3035	2.5163	–5.1159	28.0716
POP	546	0.6641	0.7307	–1.8537	3.9314
TRADE	546	110.8183	71.3336	22.2864	393.1412
EDU	546	101.7589	4.0106	95.3834	123.7547
IQ	546	1.2398	0.4215	0.1296	1.9469
FD_1	546	105.1336	42.7967	0.1862	304.5751
FD_2	546	99.1271	40.0805	0.1862	304.5751
FD_3	546	117.8844	128.1948	37.8054	927.4318
Industry	546	23.3672	6.1317	10.3967	49.1582
ICT	546	112.9993	18.9585	49.1763	172.1508
NRR	546	0.8588	1.9710	0.0000	13.3579
Developing Countries (57 countries)					
GDP	1,197	4,715.4412	5,124.4	262.1848	35,213.2184
FDI	1,197	3.9605	6.3008	–40.0864	106.5942
GE	1,197	14.1224	4.7884	3.4604	36.1431
GFCF	1,197	23.5367	7.2704	3.9487	78.0009
INF	1,197	6.0537	6.6958	–22.0914	84.6835
POP	1,197	1.4787	1.2715	–6.1873	11.7940
TRADE	1,197	76.7846	34.6852	21.6738	210.3743
EDU	1,197	102.0307	14.2532	38.6836	150.3542
IQ	1,197	–0.3119	0.5579	–1.5463	1.2182
FD_1	1,197	49.1056	62.1787	2.0104	524.5754
FD_2	1,197	46.1629	60.7749	2.0104	524.5151
FD_3	1,197	52.1303	34.4513	7.0362	211.8906
Industry	1,197	28.6516	9.8981	10.5994	76.4321
ICT	1,197	79.5254	44.1244	0.0864	181.767
NRR	1,197	6.2153	8.1321	0.0024	53.3148

Source: Author's calculation.

The statistical results describing the data are presented in Table 2. The GDP per capita of the countries in the sample has an average value during this period of 16,320 USD/person/year. In particular, the developed countries have an average GDP per capita of 41,763 USD/person/year, 9 times higher than the average GDP per capita of the developing countries (4,715 USD/person/year). Net FDI inflows averaged 5.2% of GDP among the group of countries studied. Developed countries also witnessed an average net FDI inflow of nearly 2 times higher than developing countries. At the same time, financial development indicators (FD_1, FD_2, FD_3) also show that developing countries have poorer financial systems than developed countries.

4.2. Estimated Results of Dynamic Panel Threshold Regression

Before proceeding with the estimation of the Dynamic Panel Threshold Regression (DPTR) model, we conducted a series of diagnostic tests to ensure the appropriateness of the dataset and the estimation approach. Specifically, cross-sectional dependence tests (CD-test) and stationarity tests. The results of these diagnostics are presented in the Appendix (Tables A3, A4, and A5), indicating that the data meet the essential assumptions required for panel data regression. These preliminary checks provide a solid foundation for applying the threshold regression model to analyze the nonlinear relationship between FDI, financial development, and economic growth.

To empirically assess how financial development influences the impact of FDI on economic growth, and to verify whether this impact becomes nonlinear when financial development reaches excessive levels, we estimate the DPTR model using stationary variables, following the procedures outlined in the methodology section.

The results are presented in Table 3, where the financial development measures we considered were private credit (FD_1), bank credit (FD_2), and liquid liabilities (FD_3) – used as threshold variables, respectively. Section A of Table 3 shows the estimated financial development threshold value ($\hat{\gamma}$) and the corresponding 95% confidence interval (C.I), with different financial development representatives, respectively. Next, the regression coefficients of FDI on economic growth are presented in section B. In which, we consider the impact of FDI on economic growth in different financial development regimes. Finally, section C of Table 3 displays the coefficient of impact of control variables on economic growth. In the log-linear specification, the coefficients capture semi-elasticities, indicating the percentage change in economic growth associated with a one-percentage-point increase in net FDI inflows (as a share of GDP).

To comprehensively assess how financial development shapes the impact of FDI on economic growth, we begin by employing private credit (FD_1) as the proxy for financial development. The results indicate a distinct financial development threshold, below which FDI exerts a significantly positive effect on economic growth. Accordingly, under the low-financial-development regime, the estimated coefficients of 0.0011 (in the model without the interaction term) and 0.0009 (in the model with the interaction term) imply that a one-percentage-point increase in FDI inflows is associated with approximately a 0.09 – 0.11% increase in GDP per capita. This finding confirms that FDI exerts a growth-enhancing effect when financial systems remain below the identified threshold.

However, once financial development surpasses the estimated threshold – approximately 80.15% of GDP – the marginal effect of FDI becomes negative (–0.0002 and –0.0008). These values indicate that an additional percentage point of FDI inflows is associated with an estimated 0.02% to 0.08% decline in economic growth. This suggests that excessive financial deepening attenuates, and may even reverse, the growth contribution of FDI. The sign reversal is consistent with threshold-dependent nonlinearities, indicating that the benefits of FDI depend on a balanced level of financial development rather than unbounded financial expansion.

This finding aligns with previous research suggesting that the financial development environment can either enhance or limit the positive effects of FDI on growth (An and Yeh, 2020; Azman-Saini et al., 2010; Law et al., 2013; Swamy and Dharani, 2019). The estimated threshold value is 80.1489% of GDP, located within the 95% confidence interval [72.0142; 85.3551].

To ensure the robustness of these findings, we re-estimate the model using alternative financial development measures. Specifically, when substituting bank credit as the proxy, the results consistently confirm the existence of an inverted U-shaped relationship between FDI and economic growth. As indicated in Table 3, the threshold in this context is calculated at 80.0312% of GDP, with a 95% confidence interval of [72.6941; 91.6028], thereby demonstrating the stability of the threshold effect across different financial development proxies.

Furthermore, when using liquid debt as an indicator, the results reveal that FDI positively and significantly impacts economic growth below the threshold. However, in the model without the interaction variable (FDI×FD), no evidence emerges of a negative effect when the threshold is exceeded. In contrast, when incorporating the interaction variable, the inverted U-shaped relationship becomes more pronounced, with statistical significance at the 1% level. This finding indicates that excessive financial development diminishes the positive growth effect of FDI. The corresponding threshold for this indicator is estimated at 108.8852% of GDP.

T a b l e 3

Impact of FDI on Economic Growth and the Role of Financial Development

	Private Credit		**Bank Credit**		**Liquid Liabilities**	
A – Threshold estimates:						
$\hat{\gamma}$ C.I (95%)	80.1489 [72.0142; 85.3551]	80.1489 [72.0142; 85.3551]	80.0312 [72.6941; 91.6028]	80.0312 [72.6941; 91.6028]	108.8852 [99.1787; 123.9873]	108.8852 [99.1787; 123.9873]
B – Impact of FDI:						
$\widehat{\beta_1}\,(FD \leq \gamma)$	0.0011*** [0.0002]	0.0009*** [0.0001]	0.0012*** [0.0001]	0.001*** [0.0001]	0.0007*** [0.0001]	0.0008*** [0.0001]
$\widehat{\beta_2}\,(FD > \gamma)$	–0.0002** [0.0001]	–0.0008*** [0.0002]	–0.0002** [0.0001]	–0.0008*** [0.0002]	–0.0001 [0.0001]	–0.0007*** [0.0001]
C – Impact of control variables:						
$\ln GDP_{t-1}$	0.969*** [0.0044]	0.967*** [0.0044]	0.970*** [0.0045]	0.967*** [0.0045]	0.967*** [0.004]	0.969*** [0.0039]
GE	–0.0224*** [0.0008]	–0.0211*** [0.0005]	–0.0222*** [0.0007]	–0.0215*** [0.0006]	–0.0216*** [0.0008]	–0.022*** [0.0008]
GFCF	0.0764*** [0.0076]	0.0747*** [0.0081]	0.0755*** [0.0064]	0.075*** [0.008]	0.0792*** [0.0076]	0.08*** [0.0098]
INF	–0.0018*** [0.0001]	–0.0015*** [0.0002]	–0.0019*** [0.0002]	–0.0016*** [0.0002]	–0.0017*** [0.0002]	–0.0016*** [0.0002]
POP	–0.0095*** [0.002]	–0.011*** [0.0023]	–0.0101*** [0.0019]	–0.0115*** [0.0021]	–0.0089*** [0.0016]	–0.0115*** [0.0017]
TRADE	0.107*** [0.0057]	0.105*** [0.008]	0.107*** [0.0063]	0.102*** [0.0069]	0.113*** [0.0062]	0.105*** [0.0062]
EDU	0.0007** [0.0003]	0.0008*** [0.0002]	0.0008*** [0.0002]	0.001*** [0.0002]	0.0008*** [0.0002]	0.0009*** [0.0002]
IQ	0.0923*** [0.0083]	0.0931*** [0.0113]	0.0976*** [0.0111]	0.0929*** [0.0112]	0.0841*** [0.0073]	0.106*** [0.0127]
Industry	0.0045 [0.0084]	0.0294*** [0.0083]	0.0054 [0.0089]	0.0205** [0.0081]	–0.0023 [0.0076]	0.0180** [0.0073]
ICT	0.0248*** [0.0067]	0.0213*** [0.0048]	0.0259*** [0.007]	0.0227*** [0.0062]	0.0236*** [0.0064]	0.0245*** [0.0067]
NRR	0.0017*** [0.0002]	0.0013*** [0.0003]	0.0017*** [0.0002]	0.0014*** [0.0003]	0.0017*** [0.0003]	0.0012*** [0.0002]
FDI*FD_1		7.18e-06*** [1.24e-06]				
FDI*FD_2				6.75e-06*** [1.09e-06]		
FDI*FD_3						1.08e-06*** [1.92e-07]
Cons	0.277*** [0.032]	0.209*** [0.0423]	0.264*** [0.0358]	0.242*** [0.0372]	0.310*** [0.0332]	0.234*** [0.0428]
N T Observation	83 20 1660	83 20 1660	83 20 1660	83 20 1660	83 20 1660	83 20 1660

Notes: The point estimates of the thresholds and the corresponding 95% confidence intervals (C.I) are reported in the first two rows respectively. The regime-dependent marginal effects of FDI on economic growth are denoted by $\widehat{\beta_1}$ and $\widehat{\beta_2}$. In [ ] is the standard error; *, **, *** represent statistical significance at 10%, 5% and 1%.

Source: Author's calculation.

These findings support the "too much finance" hypothesis, which suggests that although financial development generally enhances the growth benefits of FDI,

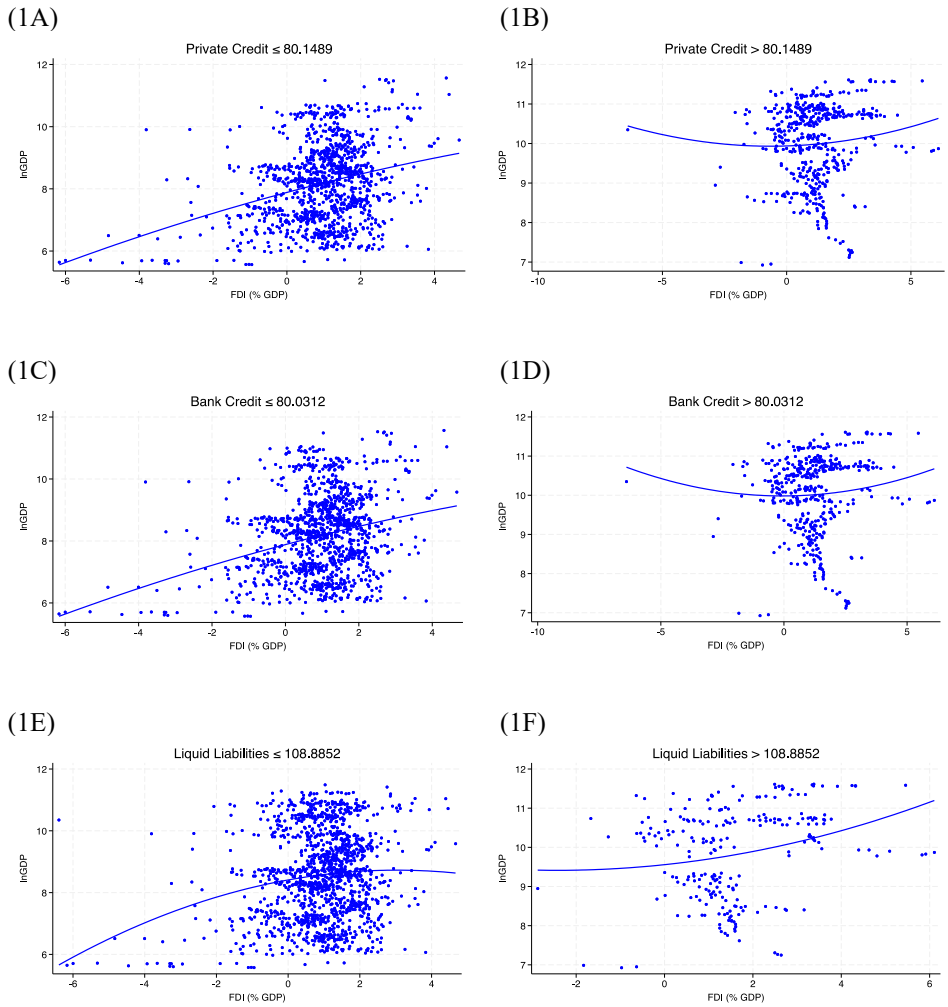
excessively high levels may generate abundant credit, asset bubbles, and inefficient resource allocation, thereby weakening these benefits (An and Yeh, 2020; Law and Singh, 2014). This pattern is consistent with the "vanishing effect" of financial development, whereby the positive impact of FDI diminishes as financial markets become overly developed Osei and Kim, 2020). One explanation is that the contribution of banking development to economic growth weakens as countries become wealthier (Azman-Saini et al., 2010). Moreover, excessive credit combined with inefficient financial services and resource allocation may fail to translate into higher growth and can increase financial fragility (An and Yeh, 2020). Thus, the FDI – growth effect becomes nonlinear at high levels of financial development, where additional credit may no longer support and may even constrain economic growth.

Our results challenge previous studies that predominantly emphasize the positive impact of FDI on growth (Awad and Ragab, 2018; Owusu-Nantwi and Erickson, 2019; Sakyi and Egyir, 2017). Instead, our study supplements the literature by demonstrating that the growth impact of FDI may become negative when financial development exceeds a certain threshold. This inverted U-shaped relationship between FDI and economic growth emphasizes that the effect of FDI is not uniform but varies depending on the level of financial system development in the host country.

Figure 1 illustrates the threshold-dependent and nonlinear effects of FDI on economic growth across three different measures of financial development such as private credit, bank credit, and liquid liabilities. In all three cases, a consistent pattern emerges. When financial development is below the estimated threshold (Fig. 1A, 1C, and 1E), FDI is associated with a positive and upward-sloping relationship with GDP, indicating that financial systems at lower levels can enhance the growth benefits of foreign capital inflows. Conversely, when financial development exceeds the threshold level (Figure 1B, 1D, and 1F), the marginal effect of FDI becomes weaker, flat, or even negative, suggesting the existence of a "vanishing effect".

About control variables, this study also shows an interesting finding, indicating that government expenditure (GE) has a negative short-term impact on economic growth. Specifically, the regression coefficient of GE is negative and statistically significant, indicating that increased government expenditure tends to hinder economic growth. This suggests that increased public expenditure, especially when financed by debt, can increase interest rates, which discourages private investment, thereby slowing growth (Awad and Ragab, 2018). This mechanism reflects the "crowding-out" effect according to Keynesian theory, in which the public sector crowds out the private sector in terms of capital mobilization and investment.

F i g u r e 1
Graph of the Relationship between FDI and Economic Growth with Financial Development Threshold



Note: The y-axis represents the natural logarithm of GDP per capita (lnGDP), which is the dependent variable in the DPTR model used to proxy economic growth.

Source: Author.

In contrast, the study finds a positive impact of domestic investment (GFCF) on economic growth. GFCF serves as a crucial driver of economic expansion by enhancing productivity, fostering industrial capacity, generating employment, and attracting further investment. Strong capital accumulation supports long-term development and convergence with advanced economies (Alfaro et al., 2004; Barro, 1991). Consistent with earlier studies, domestic investment acts as a key driver

of structural transformation in developing countries (Acquah and Ibrahim, 2020; Baharumshah et al., 2017; Sakyi and Egyir, 2017). The results also show that the impact of inflation (INF) on economic growth is negative. This impact can be explained by the fact that high inflation erodes purchasing power, causes price volatility, and reduces the efficiency of long-term investment decisions. In an unstable inflationary environment, businesses and households often face higher capital costs and unstable price expectations, thereby weakening the incentive to accumulate capital and spend on production.

Population growth (POP) negatively impacts economic growth. Rapid population growth puts great pressure on finite resources such as land, energy, and infrastructure, thereby reducing capital efficiency and discouraging investment in high value-added sectors. Furthermore, increased dependency ratios and unemployment lead to a decline in savings and investment, exacerbating inequality and social unrest (An and Yeh, 2020). Meanwhile, the level of trade openness (TRADE) has been shown to have a positive impact on economic growth. This outcome is consistent with previous research (Awad and Ragab, 2018; Sakyi and Egyir, 2017). Trade helps expand markets, increase export capacity, improve resource allocation efficiency, and promote technology spillover. International trade integration also helps improve labor productivity and competitiveness of industries, thereby creating momentum for long-term growth.

Additionally, the study confirms the positive impact of education (EDU) on economic growth. Education plays a fundamental role in improving human capital quality, increasing labor productivity, and fostering innovation. A highly skilled workforce enhances national competitiveness and supports economic structural transformation toward modernization. This finding is consistent with prior studies (Osei and Kim, 2020; 2023). Similarly, the study results show that institutional quality (IQ) has a positive impact on economic growth. Strong and transparent institutions foster a favorable business environment, enhance investment efficiency, and reduce corruption risks, thereby supporting long-term economic stability and development. These results align with previous studies (An and Yeh, 2020; Yeboua, 2019).

Industrial capacity (Industry) is positively associated with economic growth, particularly in models including FDI – FD interactions, as the industrial sector facilitates the absorption and diffusion of FDI through production linkages and spillovers (Saeed et al., 2025). ICT also shows a positive and stable association with growth by enhancing productivity, connectivity, innovation, and technology transfer (Saba et al., 2025). Natural resources (NRR) likewise contribute positively to growth by supporting public investment, fiscal stability, and infrastructure and education development when effectively managed.

4.3. Results of Robustness Test

To compare how financial development conditions the growth impact of FDI across developed and developing countries, we divide the sample according to the IMF classification and estimate equation (4). Table 4 reports the results for developed countries. The estimated threshold is 74.4767% of GDP for private credit, below which FDI has a positive effect on growth, while its effect becomes insignificant above the threshold. Similar patterns emerge for alternative measures of financial development, with thresholds of 52.4819% of GDP for bank credit and 107.9181% of GDP for liquid liabilities.

T a b l e 4
Impact of FDI on Economic Growth and the Role of Financial Development in Developed Countries

	Private Credit		**Bank Credit**		**Liquid Liabilities**	
A – Threshold estimates:						
$\hat{\gamma}$	74.4767	74.4767	52.4819	52.4819	107.9181	107.9181
C.I (95%)	[53.732; 85.057]	[53.732; 85.289]	[51.325; 74.635]	[51.325; 74.635]	[98.773; 129.747]	[98.773; 129.747]
B – Impact of FDI:						
$\widehat{\beta_1}\,(FD \leq \gamma)$	0.0011*** [0.0003]	0.001*** [0.0003]	0.0012** [0.0006]	0.0012** [0.0006]	0.0006 [0.0005]	0.0005** [0.0003]
$\widehat{\beta_2}\,(FD > \gamma)$	–3.53e-05 [3.63e-05]	–7.08e-05 [5.21e-05]	–2.71e-05 [3.77e-05]	–6.15e-05 [5.42e-05]	1.86e-05 [1.14e-04]	–5.82e-05 [5.44e-05]
C – Impact of control variables:						
$\ln GDP_{t-1}$	1.031*** [0.0144]	1.031*** [0.0145]	1.032*** [0.015]	1.032*** [0.0151]	1.048*** [0.0232]	1.037*** [0.0147]
FDI*FD_1		4.29e-07 [4.5e-07]				
FDI*FD_2				4.14e-07 [4.68e-07]		
FDI*FD_3						5.70e-08 [8.08e-08]
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Cons	–0.473*** [0.175]	–0.481*** [0.175]	–0.453** [0.183]	–0.460** [0.184]	–0.592 [0.368]	–0.524*** [0.178]
N	26	26	26	26	26	26
T	20	20	20	20	20	20
Observation	520	520	520	520	520	520

Notes: The point estimates of the thresholds and the corresponding 95% confidence intervals (C.I) are reported in the first two rows respectively. The regime-dependent marginal effects of FDI on economic growth are denoted by $\widehat{\beta_1}$ and $\widehat{\beta_2}$. In [ ] is the standard error; *, **, *** represent statistical significance at 10%, 5% and 1%.

Source: Author's calculation.

This implies that developed countries can benefit substantially from FDI when supported by well-developed financial markets that improve aggregate factor productivity. FDI and financial development are therefore complementary, with financial development serving as an absorptive capacity that enables host economies

to realize FDI-related growth benefits. Alfaro et al. (2004) likewise find that countries with more developed financial markets gain more from FDI, while Alfaro et al. (2010) show that sufficiently developed financial systems strengthen linkages between foreign and domestic firms and generate broader spillovers. However, Table 4 indicates that the growth effect of FDI becomes insignificant at excessively high levels of financial development, consistent with the "vanishing effect" (Osei and Kim, 2020).

Table 5 presents the threshold regression results for the group of developing countries using three alternative measures of financial development: private credit, bank credit, and liquid liabilities. Compared to previous estimations, the financial development thresholds in these countries remain relatively modest, estimated at 68.9586% of GDP for private credit, 59.7412% for bank credit, and 21.3575% for liquid liabilities, with all thresholds falling within acceptable 95% confidence intervals.

T a b l e 5
Impact of FDI on Economic Growth and the Role of Financial Development in Developing Countries

	Private Credit		**Bank Credit**		**Liquid Liabilities**	
A – Threshold estimates:						
$\hat{\gamma}$	68.9586	68.9586	59.7412	59.7412	21.3575	21.3575
C.I (95%)	[12.700; 90.399]	[12.700; 90.399]	[37.614; 77.558]	[37.614; 77.558]	[19.878; 97.491]	[19.878; 97.491]
B – Impact of FDI:						
$\widehat{\beta_1}\,(FD \leq \gamma)$	–0.0011*** [3.89e-04]	–0.0015*** [4.58e-04]	–0.0012*** [4.03e-04]	–0.0015*** [4.59e-04]	–0.0034*** [0.0011]	–0.0035*** [0.0011]
$\widehat{\beta_2}\,(FD > \gamma)$	0.0125*** [0.0033]	0.0094*** [0.0025]	0.0101*** [0.0026]	0.0096*** [0.0026]	–5.55e-04 [3.79e-04]	–7.86e-05 [4.79e-04]
C – Impact of control variables:						
$\ln GDP_{t-1}$	0.908*** [0.0142]	0.922*** [0.0135]	0.925*** [0.0135]	0.924*** [0.0135]	0.928*** [0.0128]	0.930*** [0.0130]
FDI*FD_1		1.11e-05 [8.59e-06]				
FDI*FD_2				1.16e-05 [8.74e-06]		
FDI*FD_3						–1.13e-05* [6.78e-06]
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Cons	0.654*** [0.135]	0.502*** [0.130]	0.472*** [0.129]	0.491*** [0.129]	0.468*** [0.123]	0.440*** [0.126]
N	57	57	57	57	57	57
T	20	20	20	20	20	20
Observation	1140	1140	1140	1140	1140	1140

Notes: The point estimates of the thresholds and the corresponding 95% confidence intervals (C.I) are reported in the first two rows respectively. The regime-dependent marginal effects of FDI on economic growth are denoted by $\widehat{\beta_1}$ and $\widehat{\beta_2}$. In [ ] is the standard error; *, **, *** represent statistical significance at 10%, 5% and 1%.

Source: Author's calculation.

A key finding is the reversal in the marginal effects of FDI across financial development regimes. FDI has a negative and significant effect on economic growth below the threshold but becomes positive and significant once the threshold is exceeded, a pattern consistently observed for both private and bank credit measures. This highlights a pronounced "kick-in effect" in developing countries: weak financial systems may limit the benefits of FDI, whereas sufficient financial development enables FDI to contribute positively to growth. This finding is consistent with Azman-Saini et al. (2010), who show that FDI enhances growth only when domestic credit exceeds 49.7% of GDP, and Baharumshah et al. (2017), who emphasize that the growth benefits of FDI require a minimum level of financial market development.

Interestingly, in the case of liquid liabilities, the threshold is much lower, and although the negative effect of FDI below the threshold remains statistically significant, we do not find robust evidence of a positive impact above the threshold. This finding suggests that the quality and depth of financial intermediation may matter more than sheer size, particularly when liquidity-driven metrics are used. It also highlights potential structural weaknesses in financial systems that may prevent capital inflows from translating into productivity-enhancing investments.

In summary, the results reinforce the importance of financial development as a mediating channel for the effectiveness of FDI. While developing countries with insufficient financial infrastructure may experience negative or null effects, those surpassing critical thresholds can unlock the growth potential of foreign capital. This reinforces both the "kick-in effect" and the risk of the "vanishing effect" when financial systems are either underdeveloped or poorly governed (Azman-Saini et al., 2010; Baharumshah et al., 2017; Nguyen, 2022).

4.4. Heterogeneous Impact Analysis Using MMQR Model

To complement the baseline DPTR model, this section employs the MMQR of Machado and Santos Silva (2019) to examine whether the moderating role of financial development in the FDI – growth relationship varies across the growth distribution. This extension captures heterogeneous FDI effects across countries at different stages of development, even within similar financial-development regimes.

Given the study's central objective – to examine how financial development shapes the growth effects of FDI – the MMQR specification incorporates two interaction terms, FDI × FD and FDI × $[FD]^2$, to capture potential nonlinear moderation. The first interaction term reflects how financial development amplifies or dampens the marginal effect of FDI when the financial system remains below the turning point. The squared interaction term captures how this marginal effect evolves as financial development rises beyond the threshold, thereby identifying whether excessive financial deepening alters or even reverses the growth contribution of FDI.

Table 6

Quantile Regression Results with MMQR Model

Variables	Location	Scale	Q10	Q20	Q30	Q40	Q50	Q60	Q70	Q80	Q90
Panel A: Financial development measured by private credit (FD_1)											
FDI*FD_1	0.201*** [0.0268]	–0.0727*** [0.0155]	0.317*** [0.0341]	0.279*** [0.0296]	0.253*** [0.0277]	0.229*** [0.0268]	0.205*** [0.0268]	0.179*** [0.0279]	0.154*** [0.0298]	0.125*** [0.0331]	0.0802** [0.0397]
FDI*[FD_1]^2	–0.0214*** [0.00348]	0.00641*** [0.00201]	–0.0316*** [0.00442]	–0.0283*** [0.00385]	–0.0260*** [0.00360]	–0.0239*** [0.00347]	–0.0217*** [0.00347]	–0.0195*** [0.00362]	–0.0173*** [0.00387]	–0.0147*** [0.00429]	–0.0108** [0.00514]
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cons	5.977*** [0.644]	–0.209 [0.372]	6.312*** [0.818]	6.203*** [0.713]	6.129*** [0.665]	6.058*** [0.642]	5.988*** [0.642]	5.914*** [0.669]	5.843*** [0.716]	5.759*** [0.795]	5.630*** [0.950]
Panel B: Financial development measured by bank credit (FD_2)											
FDI*FD_2	0.179*** [0.0297]	–0.0936*** [0.0183]	0.330*** [0.0419]	0.280*** [0.0356]	0.246*** [0.0325]	0.214*** [0.0306]	0.183*** [0.0299]	0.150*** [0.0304]	0.117*** [0.0321]	0.0814** [0.0353]	0.0248 [0.0424]
FDI*[FD_2]^2	–0.0188*** [0.00381]	0.00917*** [0.00234]	–0.0336*** [0.00537]	–0.0287*** [0.00458]	–0.0253*** [0.00417]	–0.0223*** [0.00392]	–0.0192*** [0.00382]	–0.0160*** [0.00389]	–0.0127*** [0.00411]	–0.00922** [0.00453]	–0.00367 [0.00543]
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cons	6.096*** [0.682]	–0.209 [0.420]	6.435*** [0.963]	6.324*** [0.821]	6.247*** [0.746]	6.177*** [0.701]	6.107*** [0.683]	6.032*** [0.694]	5.959*** [0.735]	5.879*** [0.809]	5.752*** [0.970]
Panel C: Financial development measured by liquid liabilities (FD_3)											
FDI*FD_3	0.329*** [0.0338]	–0.0601*** [0.0200]	0.426*** [0.0468]	0.393*** [0.0401]	0.369*** [0.0364]	0.350*** [0.0346]	0.329*** [0.0338]	0.309*** [0.0344]	0.291*** [0.0360]	0.267*** [0.0395]	0.230*** [0.0471]
FDI*[FD_3]^2	–0.0336*** [0.00426]	0.00683*** [0.00252]	–0.0446*** [0.00590]	–0.0409*** [0.00505]	–0.0382*** [0.00459]	–0.0360*** [0.00436]	–0.0336*** [0.00427]	–0.0314*** [0.00434]	–0.0293*** [0.00454]	–0.0266*** [0.00499]	–0.0224*** [0.00595]
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cons	5.746*** [0.627]	–0.493 [0.371]	6.540*** [0.867]	6.274*** [0.743]	6.078*** [0.675]	5.920*** [0.641]	5.745*** [0.627]	5.587*** [0.638]	5.438*** [0.668]	5.240*** [0.733]	4.938*** [0.873]
N	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650

Note: Standard errors in [ ]; *, **, *** represent statistical significance at 10%, 5% and 1%, respectively.

Source: Author's calculation.

Results reported in Table 6 show a consistent nonlinear pattern across a broad segment of the conditional growth distribution (from Q10 to Q70) and across all three financial-development measures – private credit (FD_1), bank credit (FD_2), and liquid liabilities (FD_3). Specifically, FDI × FD is positive and statistically significant across most quantiles, while FDI × $[FD]^2$ is negative and significant, indicating an inverted U-shaped moderation pattern. These findings suggest that FDI enhances growth when financial development is at moderate levels, but its marginal contribution decreases – and may eventually become negative – as financial development becomes excessive. This aligns with the "diminishing returns" and "vanishing effect" hypotheses (An et al., 2025; An and Yeh, 2020). While the pattern is strongest for FD_1 and FD_2, it remains detectable for FD_3, albeit weaker at upper quantiles.

Overall, the MMQR results complement the DPTR findings by demonstrating that the nonlinear impact of FDI on growth – conditional on financial development – persists across the growth distribution.

Conclusion and Policy Implications

The relationship between financial development, FDI, and economic growth has garnered considerable attention in the economic growth literature. A well-developed financial system serves as a vital intermediary, enhancing savings accumulation, attracting FDI, and providing financial support for sustained economic growth. In this study, we examine the role of financial development in the association between FDI and economic growth in 83 countries (26 developed countries and 57 developing countries) between 2002 and 2022 and answer the question "Does higher financial development amplify the growth impact of FDI?".

Using the DPTR method proposed by Kremer et al. (2013), this study contributes to the existing literature by revealing a nonlinear pattern in the FDI – economic growth association, shaped by the level of financial development. The results indicate an inverted U-shaped pattern, highlighting a financial development threshold beyond which the positive impact of FDI on economic growth turns negative.

Subsample analyses further show meaningful cross-country heterogeneity. In developed economies, the results provide evidence of the "vanishing effect," where excessive financial development reduces the positive impact of FDI on growth. Conversely, in developing economies, the findings support the "kick-in effect," suggesting that only when financial markets reach a specific development threshold can the host country fully capitalize on the growth potential of FDI.

The findings suggest that excessive credit expansion may increase financial fragility, including credit bubbles and crisis risks, thereby constraining economic

activity. Policymakers should therefore pursue macroeconomic strategies that balance financial development with economic stability and improve resource allocation to maximize the growth benefits of FDI. For developed countries, the "vanishing effect" implies that attracting additional FDI should be accompanied by efforts to improve the efficiency and stability of domestic financial systems, including location-based incentives and policies that maintain stable FDI inflows. For developing countries, FDI and other capital flows should be encouraged alongside the expansion and restructuring of financial systems, particularly banking systems, to improve the allocation of financial resources toward productive investment. However, countries with underdeveloped financial markets should avoid premature financial liberalization and remain cautious about certain forms of foreign capital until sufficient financial development is achieved. Maintaining an open, transparent, and predictable investment environment is also essential for attracting and sustaining FDI.

While our study provides valuable insights into the moderating role of financial development in the growth effects of FDI, it does not explicitly account for the interaction between financial development and institutional quality. Given the well-documented role of institutions in shaping economic outcomes (Acemoglu and Johnson, 2005), future research could extend our analysis by incorporating institutional factors – such as governance quality, property rights protection, and financial stability – as interactive terms in the model. This would offer a more nuanced understanding of how institutional environments influence the effectiveness of financial development in channeling FDI toward economic growth. Moreover, future studies could employ alternative methodological approaches, such as dynamic threshold models or instrumental variable techniques, to address potential endogeneity concerns and further validate the robustness of these interactions. Such extensions would provide deeper policy implications regarding the complementary roles of financial and institutional development in maximizing the growth benefits of FDI.

An important avenue for future research involves distinguishing between the sectoral characteristics of FDI inflows, particularly to differentiate between extractive-oriented investments (e.g., mining and agriculture) and those in high-productivity sectors such as manufacturing or ICT. Such disaggregation may help capture heterogeneities in the technological spillovers and growth effects of FDI. Unfortunately, due to data limitations, our study is unable to classify FDI by sectoral destination in a consistent cross-country panel framework. We acknowledge this as a limitation and encourage further empirical work leveraging more disaggregated FDI datasets to enrich the understanding of how the quality and sectoral composition of FDI influence economic growth.

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Appendix

Table A1

List of Research Countries

Developed countries (26 countries)
Australia, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Korea Rep., Luxembourg, Malta, Netherlands, Norway, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom and United States.
Developing countries (57 countries)
Albania, Algeria, Armenia, Bangladesh, Belize, Botswana, Brazil, Brunei Darussalam, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Chad, Chile, China, Colombia, Congo Rep., Costa Rica, Croatia, Dominican Republic, Ecuador, Egypt Arab Rep., Ghana, Guatemala, Honduras, Hungary, India, Indonesia, Jamaica, Jordan, Kenya, Kyrgyz Republic, Madagascar, Malaysia, Mali, Mauritius, Mexico, Moldova, Mongolia, Nepal, Nicaragua, Niger, Pakistan, Paraguay, Peru, Philippines, Poland, Romania, Senegal, South Africa, Tajikistan, Tanzania, Thailand, Togo, Tunisia and Viet Nam.

Table A2

Correlation Matrix between Financial Development Variables

	FD_1	**FD_2**	**FD_3**
FD_1	1.0000		
FD_2	0.9637***	1.0000	
	(0.0000)		
FD_3	0.2763***	0.2940***	1.0000
	(0.0000)	(0.0000)	

Note: *, **, *** represent statistical significance at 10%, 5% and 1%, respectively.

Source: Author's calculation.

Table A3

Result of Cross-Sectional Dependence Test

Variables	**Pesaran's CD-test**		**Freidman CD-test**	
	Statistics	**p-value**	**Statistics**	**p-value**
lnGDP	161.162***	0.0000	981.311***	0.0000
FDI	20.702***	0.0000	136.041***	0.0002
GE	45.949***	0.0000	261.153***	0.0000
GFCF	15.522***	0.0000	99.016*	0.0972
INF	74.114***	0.0000	476.372***	0.0000
POP	141.864***	0.0000	895.173***	0.0000
TRADE	45.363***	0.0000	269.262***	0.0000
EDU	33.570***	0.0000	213.158***	0.0000
IQ	1.574	0.1156	22.616	1.0000
FD_1	70.220***	0.0000	426.100***	0.0000
FD_2	73.204***	0.0000	446.179***	0.0000
FD_3	139.028***	0.0000	858.530***	0.0000
Industry	55.884***	0.0000	374.313***	0.0000
ICT	221.647***	0.0000	1126.529***	0.0000
NRR	78.407***	0.0000	509.629***	0.0000

Note: *, **, *** represent statistical significance at 10%, 5% and 1%, respectively.

Source: Author's calculation.

T a b l e A4
Results of the Unit Root Test with CIPS

Variables	Level	First difference	Decision
lnGDP	–1.755	–3.114***	I(1)
FDI	–3.119***	–	I(0)
GE	–1.789	–3.763***	I(1)
GFCF	–1.786	–3.791***	I(1)
INF	–3.241***	–	I(0)
POP	–1.794	–2.849***	I(1)
TRADE	–1.276	–3.523***	I(1)
EDU	–2.341***	–	I(0)
FD_1	–1.396	–3.260***	I(1)
FD_2	–1.490	–3.205***	I(1)
FD_3	–2.002	–4.450***	I(1)
Industry	–2.250***	–	I(0)
ICT	–2.514***	–	I(0)
NRR	–2.115**	–	I(0)

Note: *, **, *** represent statistical significance at 10%, 5% and 1%, respectively.

Source: Author's calculation.

T a b l e A5
Results of the Unit Root Test for IQ Variable

Methods	Level		First difference	
	Statistics	p-value	Statistics	p-value
Im, Pesaran and Shin (IPS) test	0.9706	0.8341	–7.6727***	0.0000
Levin-Lin-Chu (LLC) test	3.0503	0.9989	–10.0536***	0.0000
ADF-Fisher test	184.42	0.1557	327.9093***	0.0000
Breitung test	0.8405	0.7997	–2.7754***	0.0028

Note: *, **, *** represent statistical significance at 10%, 5% and 1%, respectively.

Source: Author's calculation.