

Article

Institutional Thresholds and the Distributional Effects of Foreign Direct Investment in ASEAN-5

Tin Maw Maw Tun ¹, Paravee Maneejuk ^{1,2,*} and Songsak Sriboonchitta ¹

¹ Faculty of Economics, Chiang Mai University, Chiang Mai 50200, Thailand; tinmawmawtun.nora@gmail.com (T.M.M.T.); songsakecon@gmail.com (S.S.)

² Center of Excellence in Econometric, Faculty of Economics, Chiang Mai University, Chiang Mai 50200, Thailand

* Correspondence: mparavee@gmail.com

Abstract

Using a fixed-effects panel threshold regression with Driscoll–Kraay inference, this paper examines how institutional quality shapes the distributional effects of foreign direct investment (FDI) in the ASEAN-5 economies (Indonesia, Malaysia, the Philippines, Thailand, and Vietnam) over 2002–2023. The empirical framework allows the impact of FDI on income inequality (net Gini index) to differ across low- and high-institutional regimes and to vary within regimes through interaction terms. Across governance indicators from the Worldwide Governance Indicators and a composite institutional quality index (IQ) constructed via principal component analysis (PCA), the results reveal pronounced nonlinearities, most clearly for government effectiveness, where the association between FDI and inequality switches sign across institutional regimes. For other governance dimensions, the FDI–inequality relationship is similarly regime-dependent and operates partly through regime-specific interaction effects, underscoring the importance of institutional thresholds in mediating distributional outcomes. Robustness checks confirm the directional consistency of the baseline results. Our findings imply that governance reforms must surpass critical institutional thresholds, particularly in effectiveness and implementation capacity, before FDI can contribute to reducing income inequality, highlighting the central role of deep governance improvements in enabling inclusive growth in ASEAN economies.

Keywords: income inequality; institutional quality; foreign direct investment; ASEAN-5; panel threshold regression



Academic Editor: Bruce Morley

Received: 7 January 2026

Revised: 23 January 2026

Accepted: 26 January 2026

Published: 31 January 2026

Copyright: © 2026 by the authors.

Licensee MDPI, Basel, Switzerland.

This article is an open access article distributed under the terms and conditions of the [Creative Commons Attribution \(CC BY\)](https://creativecommons.org/licenses/by/4.0/) license.

1. Introduction

Income inequality has become a central concern in development economics, particularly in emerging economies where rapid globalization and structural transformation have not translated into broadly shared development outcomes (UNDP, 2019). Despite sustained economic expansion, income disparities remain persistent or have widened in many developing regions due to skill-based technological change, uneven sectoral transformation, and differences in institutional capacity (Milanovic, 2016; Piketty, 2020; World Bank, 2022). FDI, often promoted as a catalyst for development, has generated mixed distributional outcomes, with its impact on income inequality varying substantially across countries and over time (Figini & Görg, 2011; Yuldashev et al., 2023). These contrasting outcomes suggest that the distributional effects of FDI are not uniform but are shaped by country-specific structural and institutional conditions (Shi & Murakami, 2025).

The ASEAN-5 economies (Indonesia, Malaysia, the Philippines, Thailand, and Vietnam) offer a policy-relevant setting in which strong FDI performance has coexisted with persistent income inequality, raising questions about the institutional conditions under which foreign investment can support more equitable development outcomes. Over the past two decades, the region has attracted substantial FDI inflows as part of deeper integration into global production networks (ASEAN Secretariat & UNCTAD, 2025; UNCTAD, 2023). At the same time, inequality outcomes have remained uneven across countries, reflecting heterogeneity in governance quality, labor-market institutions, and absorptive capacity (Ayyash et al., 2025; Opperman & Tita, 2025). Rather than treating ASEAN-5 country experiences as isolated cases, this study views them as part of a broader institutional spectrum in which similar investment shocks may generate divergent distributional outcomes.

A growing body of literature emphasizes institutional quality as a key factor shaping the economic and social outcomes associated with FDI, including the breadth of its distributional gains (Acemoglu & Robinson, 2012; IMF, 2021; Rodrik et al., 2004). From a political-economy perspective, FDI affects income inequality through competing channels: capital inflows and technology transfer may raise skill premiums and returns to capital under weak governance, while effective regulation, labor mobility, and enforcement capacity can facilitate broader employment spillovers. Because institutional capacity often improves nonlinearly, the distributional impact of FDI may shift discretely across governance regimes rather than evolve smoothly (Acemoglu & Robinson, 2012; Figini & Görg, 2011). This implies that governance quality may generate threshold effects that determine whether FDI exacerbates or mitigates income inequality.

Despite these insights, several gaps remain. Existing empirical evidence on the distributional effects of FDI in developing economies is uneven and often relies on linear specifications that may mask regime-dependent institutional effects (Guenichi & Omri, 2025; Shi & Murakami, 2025). ASEAN-specific studies remain limited despite pronounced heterogeneity in institutional quality across the region, and few combine nonlinear estimation with robust controls for endogeneity and cross-sectional dependence. This study addresses these gaps by examining whether the impact of FDI on income inequality in ASEAN-5 economies depends on whether governance quality surpasses identifiable institutional thresholds. The baseline analysis employs a fixed-effects panel threshold framework with Driscoll–Kraay inference, allowing the relationship between FDI and income inequality to vary across governance regimes while controlling for unobserved heterogeneity. Robustness is assessed using FD-GMM and CCE-MG estimators to address endogeneity, persistence, and common shocks.

The analysis is guided by two research questions: (i) does the effect of FDI on income inequality depend on institutional quality, and (ii) are there governance thresholds beyond which FDI contributes to more equal income distributions? This study expects the FDI–inequality relationship to be nonlinear and regime-dependent. It further expects governance improvements, particularly in government effectiveness, to condition this relationship across regimes. This study makes four original contributions. First, it shifts the focus from aggregate growth effects to the distributional consequences of FDI. Second, it introduces an institutional threshold framework to capture nonlinear and regime-dependent effects. Third, it provides ASEAN-5-specific evidence within a unified panel setting. Fourth, by identifying institutional thresholds at which the inequality response to FDI changes sign, the study offers policy-relevant guidance on sequencing governance reforms to enable more inclusive growth.

2. Literature Review

2.1. Theoretical Perspectives on FDI, Institutions, and Income Inequality

The political economy and institutional economics literature emphasizes that the distributional consequences of foreign direct investment (FDI) are fundamentally conditioned by the quality of domestic institutions. Institutions shape how the gains from economic integration are allocated across factors of production, social groups, and regions, thereby determining whether FDI contributes to inclusive growth or exacerbates income inequality (Acemoglu & Robinson, 2012; North, 1990). In economies characterized by inclusive institutions—marked by effective governance, rule of law, regulatory quality, and protection of property rights—FDI is more likely to foster competitive markets, facilitate labor mobility, and promote technology diffusion, resulting in broader income gains across the distribution (Borensztein et al., 1998; Rodrik et al., 2004).

From a factor-market perspective, FDI can influence income inequality through its effects on relative factor returns. Multinational firms often introduce advanced technologies and organizational practices that increase demand for skilled labor, potentially widening wage differentials in the presence of skill shortages (Lee & Wie, 2015). However, strong institutional frameworks can mitigate these distributional pressures by supporting education systems, labor market regulations, and redistributive mechanisms that enable a wider segment of the workforce to benefit from FDI-induced productivity gains (Piketty, 2020). In contrast, under weak institutional environments, limited regulatory oversight and ineffective enforcement may allow FDI rents to be disproportionately captured by capital owners, politically connected elites, or foreign firms, reinforcing existing income disparities (Alfaro & Chauvin, 2016; Milanovic, 2016).

Institutional quality also shapes the extent and direction of FDI spillovers. Effective governance enhances backward and forward linkages between multinational enterprises and domestic firms, facilitating knowledge transfer, productivity spillovers, and employment creation beyond enclave sectors (Javorcik, 2004). Conversely, in institutional contexts characterized by corruption, weak contract enforcement, or regulatory capture, FDI may remain concentrated in capital-intensive or extractive activities with limited domestic linkages, thereby generating growth without commensurate improvements in income distribution (Herzer & Nunnenkamp, 2013). These mechanisms imply that institutional quality operates not merely as a linear moderator, but as a structural condition that governs whether FDI spillovers translate into inclusive outcomes. Importantly, recent theoretical and empirical contributions suggest that the institutional role in the FDI–inequality nexus may be inherently nonlinear. Below certain institutional thresholds, governance deficiencies can dominate, rendering FDI ineffective or even inequality-enhancing. Once institutional quality surpasses critical levels—particularly in government effectiveness, regulatory capacity, and implementation credibility—the distributional impact of FDI may shift, allowing productivity gains and employment effects to outweigh rent-seeking dynamics (Guenichi & Omri, 2025; Hansen, 1999; Kurul, 2017). This threshold-based perspective implies that incremental institutional improvements may be insufficient; instead, substantive governance reforms are required before FDI can contribute meaningfully to reducing income inequality.

2.2. Empirical Evidence

Empirical evidence on the relationship between foreign direct investment (FDI) and income inequality remains inconclusive, reflecting substantial heterogeneity across institutional, structural, and regional contexts. A prominent strand of the literature reports inequality-reducing effects of FDI in economies with strong absorptive capacity, well-developed human capital, and effective institutional frameworks. In such settings, foreign firms facilitate employment creation, productivity spillovers, and wage conver-

gence through technology transfer and integration into domestic production networks (Borensztein et al., 1998; Herzer & Nunnenkamp, 2013; Javorcik, 2004). These studies emphasize the role of complementary domestic conditions in enabling FDI to generate broad-based income gains. In contrast, a growing body of empirical work finds that FDI is associated with rising income inequality, particularly in developing and emerging economies characterized by segmented labor markets, limited skill supply, and weak institutional oversight (Figini & Görg, 2011; Milanovic, 2016). When foreign investment is concentrated in capital- and skill-intensive sectors, the resulting increase in skill premiums and capital returns may disproportionately benefit high-income groups, thereby widening wage dispersion (Lee & Wie, 2015). Evidence from Southeast Asia reinforces this view, suggesting that FDI inflows often favor high-productivity enclaves with limited domestic linkages, amplifying distributional disparities when institutional and labor market constraints inhibit the diffusion of gains (Athukorala & Kohpaiboon, 2014; Le et al., 2021).

The coexistence of these opposing findings points to a fundamental tension in the literature: identical FDI inflows can generate markedly different distributional outcomes depending on the institutional and structural environment. While some studies attribute these discrepancies to differences in human capital, sectoral composition, or financial development, others highlight the mediating role of governance quality and state capacity in shaping the allocation of FDI-induced rents (Alfaro & Chauvin, 2016; North, 1990). This divergence suggests that linear empirical frameworks may be ill-suited to capture the conditional and potentially non-monotonic nature of the FDI–inequality relationship.

Recent methodological advances address this limitation by allowing for nonlinear and regime-dependent effects. Threshold models formalize the notion that economic relationships may shift discretely once key conditioning variables exceed critical levels (Hansen, 1999; Kremer et al., 2013). Applied to the FDI–inequality nexus, this perspective implies that foreign investment may exacerbate income inequality under weak governance conditions but contribute to more equitable outcomes once institutional capacity—particularly in regulation, enforcement, and implementation—surpasses minimum thresholds. Empirical applications of threshold frameworks provide support for this view in the contexts of economic growth and productivity, showing that institutional quality fundamentally alters the effectiveness of FDI (Guenichi & Omri, 2025; Kurul, 2017). However, evidence explicitly linking institutional thresholds to income inequality remains limited and fragmented.

Despite a rapidly expanding literature, three important gaps persist. First, empirical findings on the distributional effects of FDI remain conflicting, reflecting unresolved heterogeneity across institutional regimes. Second, many existing studies rely on linear specifications that may mask regime-dependent dynamics and obscure potential sign reversals in the FDI–inequality relationship. Third, ASEAN-focused analyses that jointly account for institutional thresholds, cross-sectional dependence, and heteroskedasticity in panel data settings are scarce. The present study addresses these gaps by employing a fixed-effects panel threshold framework with Driscoll–Kraay inference to identify governance regimes under which the distributional effects of FDI differ systematically across the ASEAN-5 economies.

According to these theoretical and empirical considerations, the study advances the following testable hypotheses:

Hypothesis 1. *The effect of foreign direct investment on income inequality in ASEAN-5 economies is nonlinear, with institutional thresholds determining whether FDI reduces or exacerbates income inequality.*

Hypothesis 2. *The distributional impact of foreign direct investment is conditioned by governance quality in a regime-dependent manner, such that improvements in institutional effectiveness alter the inequality response to FDI inflows.*

3. Materials and Methods

3.1. Data Sources

The net Gini index, used as the dependent variable, is obtained from the Standardized World Income Inequality Database (SWIID), Version 9.9 (Solt, 2020). Data on FDI inflows; macroeconomic control variables, including GDP, URB, and INF; and institutional variables are drawn from the World Development Indicators and the Worldwide Governance Indicators (World Bank, 2023). The Worldwide Governance Indicators (WGIs) consist of six dimensions: CC, GE, PS, RQ, RL, and VA. The eigenvalues and variance explained are also presented and discussed. Table 1 provides an overview of the variables and their corresponding data sources.

Table 1. Description of variables.

Variables	Symbols	Sources
Net Gini (scale from 0 to 100, unitless index)	GINI	SWIID (Solt, 2020)
FDI, net inflows, log (% of GDP)	FDI	World Bank (World Bank, 2023)
Control of corruption (WGI index: −2.5 to 2.5)	CC	World Bank (World Bank, 2023)
Government effectiveness (WGI index: −2.5 to 2.5)	GE	World Bank (World Bank, 2023)
Political stability and absence of violence/terrorism	PS	World Bank (World Bank, 2023)
Regulatory quality (WGI index: −2.5 to 2.5)	RQ	World Bank (World Bank, 2023)
Rule of law (WGI index: −2.5 to 2.5)	RL	World Bank (World Bank, 2023)
Voice and accountability (WGI index: −2.5 to 2.5)	VA	World Bank (World Bank, 2023)
Institutional quality index (PCA on WGI indicators)	IQ	World Bank (World Bank, 2023)
GDP per capita growth (annual %)	GDP	World Bank (World Bank, 2023)
Urban population (% of total population)	URB	World Bank (World Bank, 2023)
Inflation, consumer prices (annual %)	INF	World Bank (World Bank, 2023)

Note: IQ is a composite index constructed using PCA of the six WGI indicators (CC, GE, PS, RQ, RL, VA). GDP denotes GDP per capita growth (annual %), URB denotes urban population (% of total population), and INF denotes inflation (consumer prices, annual %).

The empirical analysis covers the period 2002–2023 for the ASEAN-5 countries, i.e., Indonesia, Malaysia, the Philippines, Thailand, and Vietnam. The final sample comprises $N = 5$ countries observed over $T = 22$ years, yielding a total of 110 country-year observations. The sample period 2002–2023 is chosen to capture the post-early-2000s phase of accelerated FDI integration in ASEAN economies while ensuring consistent availability of income inequality and governance indicators across all countries; it also spans major global and regional shocks, including the global financial crisis and the COVID-19 pandemic, that may influence the distributional effects of FDI. Table 2 summarizes the key descriptive statistics of the variables employed in the empirical analysis. FDI is included in logarithmic form, measured as net inflows relative to GDP. GINI, GDP, URB, INF, and the six Worldwide Governance Indicators (CC, GE, PS, RQ, RL, and VA) are presented in their original values. The Gini coefficient averages 40.27, indicating moderate but persistent income inequality within the ASEAN-5 region. IQ has a mean of zero by construction and exhibits substantial variation, reflecting notable cross-country differences in governance quality. In addition, GDP growth (3.54), urbanization (49.39), and inflation (4.06) indicate considerable macroeconomic diversity across the sample. This observed heterogeneity provides empirical justification for the threshold analysis.

To obtain the IQ index, we apply PCA to the six Worldwide Governance Indicators (CC, GE, PS, RQ, RL, and VA) using standardized variables. PCA is preferred to a simple average because the WGI dimensions are highly correlated and may contribute unequally to the common governance factor; PCA provides data-driven weights that maximize the variance captured by the composite index.

Table 2. Descriptive statistics.

Variable	Obs.	Mean	Std. Dev.	Min	Max
GINI	110	40.270	2.950	35.500	46.200
FDI	110	1.243	0.461	0.000	2.367
CC	110	−0.406	0.341	−1.137	0.397
GE	110	0.201	0.463	−0.596	1.238
PS	110	−0.508	0.684	−2.095	0.566
RQ	110	−0.015	0.416	−0.866	0.799
RL	110	−0.192	0.401	−0.910	0.573
VA	110	−0.449	0.569	−1.538	0.322
IQ	110	0.000	1.976	−4.044	4.226
GDP	110	3.542	2.682	−10.549	7.726
URB	110	49.392	13.762	25.511	78.716
INF	110	4.060	3.587	−1.611	23.115

Note: FDI is measured as $\ln(1 + \text{net inflows as a percentage of GDP})$ to address skewness and zero values.

As shown in Table 3, the first principal component explains 65.06% of the total variance and has an eigenvalue greater than one, indicating that a single latent governance factor captures the majority of common institutional information across the six WGI dimensions. IQ is constructed as the first principal component (PC1) obtained from PCA of the six standardized Worldwide Governance Indicators (CC, GE, PS, RQ, RL, and VA), based on the correlation matrix. The resulting PC1 score has a mean of zero by construction, while its dispersion reflects the associated eigenvalue rather than being normalized to unit variance.

Table 3. Eigenvalues and variance explained by PCA (Worldwide Governance Indicators).

Component	Std. Dev.	Variance Explained (%)	Cumulative (%)
PC1	1.976	65.060	65.060
PC2	1.249	26.000	91.060
PC3	0.550	5.043	96.110
PC4	0.326	1.773	97.880
PC5	0.270	1.217	99.100
PC6	0.233	0.904	100.000

Note: PCA is based on standardized governance indicators (correlation matrix).

3.2. Preprocessing

Before estimation, the dataset was processed to ensure internal consistency and econometric validity across the ASEAN-5 countries panel. Variables were transformed where necessary to improve numerical stability and facilitate comparability across cross-sectional units. The empirical analysis combines a threshold regression framework with the FE-DK estimator. The time-series characteristics of the panel variables were evaluated using both the Im–Pesaran–Shin (IPS) unit root test (Im et al., 2003) and its cross-sectionally augmented variant, the CIPS test developed by Pesaran (2007). Whereas the IPS test assesses stationarity under the assumption of cross-sectional independence, the CIPS procedure accounts for unobserved common factors by incorporating cross-sectional averages of lagged levels and first differences into the testing framework. Employing both tests allows stationarity to be assessed under alternative assumptions regarding cross-sectional dependence,

thereby serving as a robustness check against misspecification arising from unobserved common factors. Cross-sectional dependence is assessed using the Friedman chi-square test (Friedman, 1937), which rejects the null of cross-sectional independence for all variables at the 1% significance level with test statistics ranging from 16.627 to 97.525, indicating the presence of common shocks and interdependence across ASEAN-5 economies. Multicollinearity is assessed using correlation analysis and variance inflation factors (Belsley et al., 1980), with results presented in Section 4.

3.3. Model Specification

The institutional threshold is determined endogenously by searching over admissible values within the support of the institutional variable. In the initial stage, a static panel threshold model is estimated to determine the governance threshold, following the approach proposed by Seo et al. (2019). This estimated threshold is then used to define regime-specific variables for institutional variables, FDI, and their interaction terms. The resulting threshold is interpreted as a data-driven regime split, and the analysis focuses on the robustness and stability of the estimated regime-specific coefficients. The analysis focuses on a single institutional threshold and relies on asymptotic tests of slope changes for inference, without relying on bootstrap procedures, because estimating multiple thresholds would substantially reduce regime-specific sample sizes given the very small cross-sectional dimension ($N = 5$), undermining reliable inference; this modeling choice is consistent with recommendations for threshold estimation in small panels (Seo et al., 2019). To capture potential nonlinearities in the relationship between FDI, institutional variables, and income inequality, the baseline analysis employs a fixed-effects panel threshold regression model following the Hansen-style threshold framework (Hansen, 1999), extended to allow for endogenous regressors as in Kremer et al. (2013). Institutional variables are used as the threshold variables to examine whether the impact of FDI on income inequality differs systematically across low- and high-institutional regimes. The specification is presented in Equation (1). The baseline analysis employs a static fixed-effects panel threshold model estimated with Driscoll–Kraay standard errors. Persistence in income inequality and potential endogeneity concerns are addressed as robustness checks using the FD-GMM estimator, which includes a one-period lag of the dependent variable, and the CCE-MG estimator to account for unobserved common factors.

This study adopts a hybrid threshold–interaction specification, allowing both discrete regime shifts in the FDI–income inequality relationship across institutional thresholds and continuous moderation effects through interaction terms. The threshold component captures structural differences between low- and high-institutional-quality regimes, while the interaction terms allow the estimated relationship between FDI and income inequality to vary within each regime as institutional quality improves. Relying solely on either a pure threshold model or a linear interaction term would be inadequate, since the former overlooks within-regime heterogeneity while the latter obscures structural regime shifts. The FDI–inequality relationship is interpreted using the regime-specific coefficients on FDI and the interaction term. The model’s key parameters are the regime-specific FDI coefficients and the regime-specific FDI–institution interaction terms, which together describe how the FDI–inequality relationship differs below versus above the estimated threshold.

$$\begin{aligned} GINI_{it} = & \mu_i + \alpha + (\beta_1 FDI_{it} + \beta_3 q_{it} + \beta_5 FDI_{it} \times q_{it}) \mathbf{1}(q_{it} \leq \gamma) \\ & + (\beta_2 FDI_{it} + \beta_4 q_{it} + \beta_6 FDI_{it} \times q_{it}) \mathbf{1}(q_{it} > \gamma) + \mathbf{Z}'_{it} \delta + \varepsilon_{it}, \end{aligned} \quad (1)$$

where q_{it} represents institutional quality (CC, GE, PS, RQ, RL, and VA), serving as the threshold variable. Note that each indicator, as well as the PCA-based composite institutional quality index, is considered separately. The indicator function $\mathbf{1}(\cdot)$ partitions the

sample into low- and high-institutional regimes according to whether institutional quality is below or above the estimated threshold γ . Country-specific fixed effects are captured by μ_i , $\mathbf{Z}_{it}$ is a vector of control variables, and ε_{it} is the idiosyncratic error term. Equation (1) implies regime-specific marginal effects of foreign direct investment on income inequality. In the low-institutional regime ($q_{it} \leq \gamma$), the marginal effect of FDI is given by

$$\frac{\partial GINI_{it}}{\partial FDI_{it}} = \beta_1 + \beta_5 q_{it}, \quad (2)$$

where β_1 captures the baseline effect of FDI on income inequality when institutional quality is weak, and β_5 measures how incremental improvements in institutions modify the distributional impact of FDI within this regime. In the high-institutional regime ($q_{it} > \gamma$), the marginal effect of FDI becomes

$$\frac{\partial GINI_{it}}{\partial FDI_{it}} = \beta_2 + \beta_6 q_{it}. \quad (3)$$

where β_2 represents the baseline effect of FDI once institutional quality surpasses the threshold, while β_6 captures how institutional improvements further condition the inequality response to FDI in the high-governance regime. Accordingly, the interaction terms β_5 and β_6 have a clear economic interpretation: they indicate whether and to what extent stronger institutions amplify or attenuate the inequality effects of FDI within each regime. A negative marginal effect in the high-institutional regime is consistent with the view that sufficiently strong governance enables FDI to contribute to reducing income inequality, whereas a positive effect suggests that FDI remains inequality-enhancing despite institutional improvements.

Several complementary estimation strategies are employed to examine the regime-dependent effects of foreign direct investment (FDI) on income inequality in the ASEAN-5 economies. The baseline analysis is conducted using a fixed-effects panel threshold model, which allows the impact of FDI on income inequality to vary discretely across institutional regimes defined by an endogenously estimated threshold. This framework is particularly well suited to the research question, as it explicitly captures structural regime shifts in the FDI–inequality relationship rather than imposing a uniform effect across institutional environments.

Country fixed effects are included to control for unobserved, time-invariant heterogeneity across economies, such as historical, geographic, and structural characteristics. Inference is based on Driscoll–Kraay standard errors, which are computed after the regime-specific transformations implied by the threshold model and are robust to heteroskedasticity, serial correlation, and cross-sectional dependence (Driscoll & Kraay, 1998). Given the very small cross-sectional dimension of the sample ($N = 5$), year fixed effects are not included in the baseline specification to avoid excessive loss of degrees of freedom. Instead, the presence of common shocks and cross-sectional dependence is addressed directly through Driscoll–Kraay inference and further assessed through robustness checks.

The use of Driscoll–Kraay standard errors is theoretically consistent with the ASEAN context, where economies are highly integrated and jointly exposed to global and regional shocks (Pesaran, 2004; Rodrik et al., 2004). Moreover, the identification of a single institutional threshold reflects the conceptual expectation that governance capacity in these economies crosses a critical functional level beyond which the distributional transmission of FDI changes regime, rather than evolving through a sequence of marginal and continuous adjustments (Acemoglu & Robinson, 2012; North, 1990).

To assess the robustness of the baseline findings, the analysis is complemented by dynamic and common-factor estimators. First, a dynamic panel specification is estimated

using the first-difference generalized method of moments (FD-GMM) estimator, in which a one-period lag of income inequality is included to capture persistence. Potential endogeneity of FDI and other covariates is addressed using internal instruments with the lag depth restricted to one period. Given the very small number of cross-sectional units, this specification generates a relatively large number of instruments compared with N . Consequently, FD-GMM estimates are interpreted strictly as qualitative sensitivity checks to evaluate directional consistency rather than as a basis for formal statistical inference. Model validity is assessed primarily using the Arellano–Bond serial correlation tests, while over-identification tests are reported for completeness but interpreted cautiously due to their limited reliability in small samples. In addition, the common correlated effects mean group (CCE-MG) estimator is employed to account explicitly for unobserved common factors and cross-sectional dependence arising from shared regional and global shocks, including major episodes such as the global financial crisis and the COVID-19 pandemic. Given the study’s primary focus on regime-dependent institutional effects and the limited cross-sectional dimension of the data, the CCE-MG estimator is used solely as a robustness check to verify whether the sign and qualitative patterns of the results are robust to alternative treatments of cross-sectional dependence, rather than as a baseline estimator.

4. Results and Discussion

Table 4 reports the results of the CIPS and IPS panel unit root tests, both of which reject the null hypothesis of a unit root for all variables, indicating that the series are stationary at levels, $I(0)$. The CIPS results account for cross-sectional dependence.

Table 4. Panel unit root test.

Variable	CIPS	IPS
GINI	$I(0)$	$I(0)$
FDI	$I(0)$	$I(0)$
CC	$I(0)$	$I(0)$
GE	$I(0)$	$I(0)$
PS	$I(0)$	$I(0)$
RQ	$I(0)$	$I(0)$
RL	$I(0)$	$I(0)$
VA	$I(0)$	$I(0)$
IQ	$I(0)$	$I(0)$
GDP	$I(0)$	$I(0)$
URB	$I(0)$	$I(0)$
INF	$I(0)$	$I(0)$

Note: $I(0)$ denotes stationarity at levels. CIPS test refers to the cross-sectionally augmented panel unit root test proposed by Pesaran (2007), which accounts for cross-sectional dependence.

Table 5 indicates that income inequality is negatively correlated with FDI, while institutional variables are generally positively associated with FDI and strongly correlated with urbanization; inflation, in turn, tends to be lower in more urbanized and institutionally stronger economies.

In Table 6, cross-sectional dependence was formally examined using the Friedman test (Friedman, 1937). The results, reported in Table 6, reject the null hypothesis of cross-sectional independence, indicating the presence of common shocks and spillovers across ASEAN-5 economies. The Pesaran (2004) CD test is not reported due to the very small cross-sectional dimension of the panel ($N = 5$), for which the Friedman test is more appropriate than asymptotic CD tests. This finding provides empirical justification for the use of Driscoll–Kraay standard errors, which are robust to cross-sectional dependence.

Table 5. Correlations.

	GINI	FDI	CC	GE	PS	RQ	RL	VA	IQ	GDP	URB	INF
GINI	1.000											
FDI	−0.383	1.000										
CC	−0.095	0.298	1.000									
GE	−0.033	0.155	0.916	1.000								
PS	−0.351	0.584	0.595	0.450	1.000							
RQ	0.194	0.003	0.811	0.887	0.210	1.000						
RL	−0.150	0.232	0.888	0.897	0.578	0.788	1.000					
VA	0.745	−0.499	0.080	0.170	−0.452	0.470	0.001	1.000				
IQ	−0.050	0.238	0.965	0.966	0.579	0.886	0.949	0.136	1.000			
GDP	−0.046	0.396	−0.131	−0.211	0.093	−0.261	−0.158	−0.130	−0.173	1.000		
URB	0.271	−0.168	0.717	0.795	0.189	0.820	0.678	0.488	0.770	−0.280	1.000	
INF	0.013	0.151	−0.465	−0.486	−0.056	−0.540	−0.489	−0.192	−0.492	0.250	−0.382	1.000

Note: Values represent pairwise Pearson correlation coefficients.

Table 6. Cross-sectional dependence test.

Variable	Statistics	Estimate
GINI	Friedman	42.495 ***
FDI	Friedman	16.627 ***
CC	Friedman	23.504 ***
GE	Friedman	21.892 ***
PS	Friedman	21.114 ***
RQ	Friedman	42.277 ***
RL	Friedman	37.980 ***
VA	Friedman	30.315 ***
IQ	Friedman	50.208 ***
GDP	Friedman	52.731 ***
URB	Friedman	97.525 ***
INF	Friedman	56.289 ***

Note: Cross-sectional dependence is assessed using the Friedman chi-square test. *** denotes statistical significance at the 1% level.

All pairwise correlation coefficients remain below commonly accepted thresholds, suggesting that multicollinearity is unlikely to pose a serious concern for the regression estimates.

Table 7 reports summary VIF diagnostics computed from the baseline regressor set (FDI, GDP, URB, INF, and the institutional variables). Across all specifications, VIF values remain low, with averages below 3 and a maximum value of 4.98.

Table 7. Variance inflation factor (VIF).

Variable	Mean VIF	Max VIF	Min VIF
CC	2.440	4.150	1.300
GE	2.520	4.440	1.310
PS	1.520	1.980	1.210
RQ	2.380	4.230	1.300
RL	1.970	3.010	1.300
VA	1.530	1.810	1.200
IQ	2.750	4.980	1.310

Note: Values below the conventional threshold of 5 indicate that multicollinearity is not a concern.

Table 8 reports that all institutional indicators exhibit a single statistically supported threshold, dividing the sample into two regimes corresponding to relatively low and

high levels of institutional quality. Because IQ is measured as a PC1 score, the estimated threshold (−1.517) represents a substantially below-average level of overall institutional quality in the ASEAN-5 sample.

Table 8. Institutional thresholds and regime distribution.

Institutional Variable	Threshold Value (γ)	Standard Error (γ)	No. of Regimes	p -Value (Test of Slope Change)	Low Regime Obs.	High Regime Obs.	% Low	% High
CC	−0.624	0.294	2	0.071 *	27	83	24.550	75.450
GE	−0.062	0.310	2	0.041 **	30	80	27.270	72.730
PS	−0.993	0.480	2	0.069 *	30	80	27.270	72.730
RQ	−0.216	0.430	2	0.095 *	34	76	30.910	69.090
RL	−0.426	0.699	2	0.083 *	39	71	35.450	64.550
VA	−0.717	0.456	2	0.021 **	31	79	28.180	71.820
IQ	−1.517	0.379	2	0.075 *	27	83	24.550	75.450

Note: Each variable exhibits a single threshold, dividing the sample into two regimes: below and above the estimated value. p -values correspond to tests of slope changes across regimes. Regime sizes indicate that both regimes retain a non-trivial share of observations (roughly 25–35% in the low regime across indicators), which helps support the feasibility of single-threshold estimation in this small- N panel. * $p < 0.10$; ** $p < 0.05$.

The empirical results reported in Tables 9–15 provide evidence in support of the proposed hypotheses. Estimation is conducted using the FE-DK estimator as the base-line model, with FD-GMM and CCE-MG employed as robustness checks. Because the hybrid threshold-interaction specification includes both regime-specific FDI coefficients and regime-specific interaction terms, the effect of FDI on income inequality must be interpreted jointly. Specifically, within each institutional regime, the sign and magnitude of the FDI coefficient indicate the baseline association between FDI and inequality, while the interaction term captures whether this association is amplified or dampened as institutional quality improves within that regime. Accordingly, the discussion emphasizes the combined regime-specific coefficients (FDI and FDI $\times$ institutional variables) and their implications over the within-regime range of institutional quality, rather than reporting marginal-effect plots at selected institutional values. Consistent with H1, the impact of FDI on income inequality exhibits clear nonlinearities across institutional thresholds, with the direction and magnitude of the effect varying between low- and high-institutional regimes, particularly for government effectiveness. In line with H2, the results further indicate that the distributional effects of FDI are conditioned by institutional quality in a regime-dependent and dimension-specific manner, as reflected in the heterogeneous interaction effects across different governance indicators. In particular, the results for government effectiveness are consistent with Figini and Görg (2011), who argue that institutional capacity determines whether FDI spillovers are broad-based or skill-biased.

The finding that institutional improvements in the low regime (notably for GE and, more broadly, the composite IQ index) are sometimes associated with higher inequality is consistent with a transitional institutional inequality mechanism: early-stage reforms may initially raise returns to formal, capital- and skill-intensive activities by improving contract reliability and regulatory predictability, while labor-market upgrading, SME linkages, enforcement capacity, and redistributive channels adjust more slowly. As governance deepens and moves into the higher regime for key dimensions such as government effectiveness, the FDI–inequality association becomes less inequality-increasing and can turn inequality-reducing, consistent with broader diffusion of spillovers. Heterogeneity across governance dimensions is also expected: GE directly affects public-service delivery, implementation, and the economy-wide ability to translate FDI into broad-based jobs and supplier linkages,

whereas PS primarily reflects the security/political-risk environment and may attract FDI into enclave or capital-intensive sectors without necessarily strengthening redistribution or implementation capacity; similarly, RL and VA can have distributionally ambiguous effects if legal and accountability gains initially benefit formal firms and organized interests more than informal workers. To structure the discussion, we first highlight the two benchmark cases, government effectiveness (GE, Table 10) and the composite institutional index (IQ, Table 15), because they exhibit the clearest regime shifts; we discuss the remaining governance dimensions (CC, PS, RQ, RL, VA) relative to these benchmark patterns.

Table 9. FE-DK estimates and robustness checks using FD-GMM and CCE-MG for the FDI–Gini relationship (CC).

Variable	FE-DK	FD-GMM	CCE-MG
Lagged GINI (L.gini)		0.936 *** (0.162)	
CC (Low Regime)	5.912 *** (1.538)	0.192 ** (0.085)	0.886 (2.485)
CC (High Regime)	6.819 *** (2.155)	0.140 (0.105)	2.268 (4.509)
FDI (Low Regime)	1.204 (3.023)	0.078 * (0.043)	0.789 (2.223)
FDI (High Regime)	−0.643 (0.438)	−0.016 (0.023)	−0.654 (2.198)
FDI × CC (Low Regime)	0.163 (4.410)	0.156 ** (0.062)	0.147 (2.572)
FDI × CC (High Regime)	−2.304 * (1.270)	−0.189 * (0.096)	−2.316 (3.974)
GDP	0.001 (0.058)	0.001 (0.001)	0.001 (0.021)
URB	−0.174 *** (0.018)	−0.014 (0.028)	−0.376 (0.251)
INF	−0.028 (0.041)	−0.009 (0.007)	−0.003 (0.036)
Constant	51.310 *** (1.079)	3.151 (7.804)	
AR(1)		0.102	
AR(2)		0.253	
Number of obs	110	100	110
Number of groups	5	5	5
F-statistic	58.060		15.200
Within R^2	0.391		
R^2 (MG)			0.880
Root MSE			0.510
CD statistic			−0.560

Note: Standard errors in parentheses. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. FE-DK is the baseline fixed-effects estimator with Driscoll–Kraay standard errors. FD-GMM refers to the one-step first-difference GMM estimator (Arellano & Bond, 1991), while CCE-MG denotes the common correlated effects mean group estimator (Pesaran, 2006); both are employed as robustness checks. AR(1) and AR(2) report the Arellano–Bond serial correlation tests; failure to reject AR(2) supports instrument validity. Lagged GINI appears only in the FD-GMM specification, which is estimated as a dynamic robustness check; the baseline FE-DK and CCE-MG specifications are static.

In Table 9, based on the FE-DK estimates, improvements in CC are positively associated with income inequality in both low- and high-regime settings, with a somewhat larger direct CC coefficient in the high-regime case. While the direct effect of FDI is generally weak and statistically insignificant across regimes, the FE-DK estimates suggest limited evidence of an interaction effect, although a negative and weakly significant interaction between

FDI and corruption control emerges in the high-regime case. Urbanization is negatively associated with income inequality in the baseline FE-DK estimates, highlighting the role of structural transformation in promoting broader income sharing. The FD-GMM and CCE-MG estimates do not overturn the baseline FE-DK evidence that corruption control conditions the FDI–inequality relationship. Under stronger corruption control, there is modest evidence that CC dampens the inequality-increasing association of FDI (the high-regime interaction is negative), while the direct FDI effect remains imprecisely estimated.

Table 10. FE-DK estimates and robustness checks using FD-GMM and CCE-MG for the FDI–Gini relationship (GE).

Variable	FE-DK	FD-GMM	CCE-MG
Lagged GINI (L.gini)		0.940 *** (0.166)	
GE (Low Regime)	12.201 *** (1.344)	0.113 (0.385)	0.046 (0.727)
GE (High Regime)	0.014 (1.219)	0.113 (0.125)	1.432 (5.604)
FDI (Low Regime)	0.999 ** (0.402)	0.020 (0.014)	0.063 (0.449)
FDI (High Regime)	−0.990 ** (0.408)	−0.030 (0.033)	−0.292 (0.313)
FDI × GE (Low Regime)	−0.548 (1.525)	−0.176 * (0.090)	−1.756 (2.240)
FDI × GE (High Regime)	1.064 * (0.553)	0.065 (0.041)	1.204 (3.618)
GDP	0.041 (0.041)	0.001 (0.002)	0.002 (0.014)
URB	−0.246 *** (0.019)	−0.022 (0.026)	−0.295 (0.311)
INF	−0.093 ** (0.036)	−0.005 (0.006)	−0.016 (0.012)
Constant	53.737 *** (1.060)	3.384 (7.799)	
AR(1)		0.089	
AR(2)		0.223	
Number of obs	110	100	110
Number of groups	5	5	5
F-statistic	86.030		47.720
Within R^2	0.604		
R^2 (MG)			0.960
Root MSE			0.290
CD Statistic			−0.500

Note: Standard errors in parentheses. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. FE-DK is the baseline fixed-effects estimator with Driscoll–Kraay standard errors. FD-GMM refers to the one-step first-difference GMM estimator (Arellano & Bond, 1991), while CCE-MG denotes the common correlated effects mean group estimator (Pesaran, 2006); both are employed as robustness checks. AR(1) and AR(2) report the Arellano–Bond serial correlation tests; failure to reject AR(2) supports instrument validity. Lagged GINI appears only in the FD-GMM specification, which is estimated as a dynamic robustness check; the baseline FE-DK and CCE-MG specifications are static.

Table 10 summarizes the results for the relationship between FDI and income inequality under varying levels of GE. The FE-DK estimates show that GE is positively and significantly related to income inequality in the low-regime setting, while its effect becomes insignificant in the high-regime setting, suggesting that early institutional improvements may disproportionately benefit higher-income groups. FDI is positively and significantly associated with income inequality in the low-government-effectiveness regime, while it

becomes negative and significant under stronger governance, suggesting that effective public institutions enable foreign investment to generate broader labor-market spillovers and more inclusive income gains. To gauge economic magnitude, FDI is measured as a logarithmic transformation of FDI inflows relative to GDP; therefore, a 10% proportional increase in FDI implies an approximate change of 0.10 in the transformed variable. In the high-GE regime, the FE-DK coefficient on FDI is -0.990 (Table 10), implying that such an increase is associated with about a -0.099 point change in the net Gini index, holding other covariates constant. The interaction effects suggest that GE conditions the impact of FDI, with a positive and weakly significant interaction emerging in the high-regime case. Urbanization remains negatively associated with income inequality. Results from the FD-GMM and CCE-MG estimations point to broadly similar directional patterns to the baseline results. Once GE is above its threshold, FDI shifts from inequality-increasing to inequality-reducing, making GE the clearest enabling condition for more inclusive FDI.

Table 11. FE-DK estimates and robustness checks using FD-GMM and CCE-MG for the FDI–Gini relationship (PS).

Variable	FE-DK	FD-GMM	CCE-MG
Lagged GINI (L.gini)		0.920 *** (0.230)	
PS (Low Regime)	1.560 *** (0.503)	0.029 (0.118)	0.373 (0.510)
PS (High Regime)	2.810 * (1.365)	0.026 (0.227)	1.240 (0.907)
FDI (Low Regime)	-1.931 (2.241)	-0.212 * (0.124)	-0.604 ** (0.291)
FDI (High Regime)	0.581 (0.448)	0.013 (0.047)	0.430 * (0.257)
FDI $\times$ PS (Low Regime)	-2.292 (1.917)	-0.212 *** (0.042)	-0.336 ** (0.156)
FDI $\times$ PS (High Regime)	-0.651 (0.954)	-0.001 (0.124)	-0.380 (0.366)
GDP	-0.026 (0.061)	-0.001 (0.001)	-0.006 (0.012)
URB	-0.138 *** (0.021)	-0.020 (0.037)	-0.437 (0.292)
INF	-0.062 (0.053)	-0.005 (0.007)	-0.011 (0.020)
Constant	47.475 *** (1.113)	4.137 (10.900)	
AR(1)		0.556	
AR(2)		0.302	
Number of obs	110	100	110
Number of groups	5	5	5
F-statistic	102.110		20.470
Within R^2	0.322		
R^2 (MG)			0.910
Root MSE			0.440
CD Statistic			0.710

Note: Standard errors in parentheses. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. FE-DK is the baseline fixed-effects estimator with Driscoll–Kraay standard errors. FD-GMM refers to the one-step first-difference GMM estimator (Arellano & Bond, 1991), while CCE-MG denotes the common correlated effects mean group estimator (Pesaran, 2006); both are employed as robustness checks. AR(1) and AR(2) report the Arellano–Bond serial correlation tests; failure to reject AR(2) supports instrument validity. Lagged GINI appears only in the FD-GMM specification, which is estimated as a dynamic robustness check; the baseline FE-DK and CCE-MG specifications are static.

The estimates reported in Table 11 examine how PS conditions the relationship between FDI and income inequality. The FE-DK results indicate that PS is positively and significantly associated with income inequality in both institutional regimes, with a larger effect observed in more politically stable environments. Political stability primarily reduces uncertainty and investment risk, but it does not necessarily strengthen state capacity for implementation, compliance, or redistribution. In the baseline FE-DK estimates, the direct effect of FDI is statistically insignificant across regimes, and the interaction terms between FDI and PS are negative but statistically insignificant across regimes. Urbanization continues to display a negative and significant association with income inequality. Evidence from the FD-GMM and CCE-MG estimations does not contradict the baseline findings and displays similar coefficient directions, pointing to a moderating influence of political stability on the FDI–inequality nexus. Political stability is positively associated with inequality in both regimes, and it does not consistently generate an inequality-reducing FDI channel.

Table 12. FE-DK estimates and robustness checks using FD-GMM and CCE-MG for the FDI–Gini relationship (RQ).

Variable	FE-DK	FD-GMM	CCE-MG
Lagged GINI (L.gini)		0.901 *** (0.191)	
RQ (Low Regime)	9.725 *** (1.058)	0.003 (0.262)	4.081 (4.172)
RQ (High Regime)	−2.627 ** (0.942)	−0.030 (0.268)	−0.216 (1.583)
FDI (Low Regime)	−1.576 ** (0.710)	−0.200 (0.170)	−0.867 (1.217)
FDI (High Regime)	−0.655 (0.402)	−0.019 (0.013)	−0.084 (0.240)
FDI × RQ (Low Regime)	−3.505 *** (1.097)	−0.044 (0.182)	−1.864 (2.434)
FDI × RQ (High Regime)	1.773 ** (0.781)	0.095 (0.088)	1.703 (1.866)
GDP	0.019 (0.038)	0.001 (0.003)	0.006 (0.014)
URB	−0.259 *** (0.017)	−0.025 (0.036)	−0.263 (0.173)
INF	−0.011 (0.018)	−0.007 (0.007)	−0.013 (0.025)
Constant	55.023 *** (0.979)	5.066 (9.237)	
AR(1)		0.110	
AR(2)		0.365	
Number of obs	110	100	110
Number of groups	5	5	5
F-statistic	186.500		29.070
Within R ²	0.653		
R ² (MG)			0.940
Root MSE			0.370
CD Statistic			0.220

Note: Standard errors in parentheses. ** $p < 0.05$; *** $p < 0.01$. FE-DK is the baseline fixed-effects estimator with Driscoll–Kraay standard errors. FD-GMM refers to the one-step first-difference GMM estimator (Arellano & Bond, 1991), while CCE-MG denotes the common correlated effects mean group estimator (Pesaran, 2006); both are employed as robustness checks. AR(1) and AR(2) report the Arellano–Bond serial correlation tests; failure to reject AR(2) supports instrument validity. Lagged GINI appears only in the FD-GMM specification, which is estimated as a dynamic robustness check; the baseline FE-DK and CCE-MG specifications are static.

Table 12 presents the estimation results for the FDI–inequality relationship across different levels of RQ. The FE-DK estimates indicate that RQ is associated with higher income inequality in the low-regime setting but with lower inequality in the high-regime setting, suggesting that regulatory improvements reduce inequality only after surpassing a certain institutional threshold. FDI exerts a negative and statistically significant effect on income inequality in the low-regulatory-quality regime. In contrast, its effect becomes statistically insignificant under stronger regulatory conditions. FDI may operate through sectors or arrangements that generate short-run employment gains. However, these effects can change once regulatory quality surpasses the threshold. The interaction effects indicate that RQ conditions the impact of FDI, with a negative interaction in the low-regime case and a positive interaction in the high-regime case. Urbanization remains negatively and significantly related to income inequality. FD-GMM and CCE-MG estimates yield qualitatively similar directions to the baseline results, suggesting that RQ plays a role in shaping the distributional effects of FDI. RQ is inequality-increasing below the threshold but inequality-reducing above it; the inequality-reducing association of FDI is concentrated in the low-RQ regime and becomes statistically weaker in the high-RQ regime.

Table 13. FE-DK estimates and robustness checks using FD-GMM and CCE-MG for the FDI–Gini relationship (RL).

Variable	FE-DK	FD-GMM	CCE-MG
Lagged GINI (L.gini)		0.982 *** (0.143)	
RL (Low Regime)	6.080 *** (1.134)	0.012 (0.061)	4.954 (7.777)
RL (High Regime)	−0.752 (1.002)	−0.416 *** (0.078)	−10.914 (12.688)
FDI (Low Regime)	3.356 ** (1.349)	0.083 (0.101)	0.843 (2.921)
FDI (High Regime)	−0.288 (0.259)	−0.055 (0.034)	−1.174 (3.262)
FDI × RL (Low Regime)	4.041 (2.593)	0.204 (0.138)	0.015 (5.330)
FDI × RL (High Regime)	1.161 ** (0.468)	0.257 *** (0.079)	2.711 (8.130)
GDP	−0.023 (0.038)	−0.001 (0.001)	−0.014 (0.016)
URB	−0.252 *** (0.017)	−0.015 (0.024)	−0.401 * (0.232)
INF	−0.045 (0.038)	−0.004 (0.007)	−0.013 (0.017)
Constant	54.053 *** (0.926)	1.335 (6.769)	
AR(1)		0.158	
AR(2)		0.310	
Number of obs	110	100	110
Number of groups	5	5	5
F-statistic	89.970		30.050
Within R^2	0.560		
R^2 (MG)			0.940
Root MSE			0.370
CD Statistic			0.910

Note: Standard errors in parentheses. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. FE-DK is the baseline fixed-effects estimator with Driscoll–Kraay standard errors. FD-GMM refers to the one-step first-difference GMM estimator (Arellano & Bond, 1991), while CCE-MG denotes the common correlated effects mean group estimator (Pesaran, 2006); both are employed as robustness checks. AR(1) and AR(2) report the Arellano–Bond serial correlation tests; failure to reject AR(2) supports instrument validity. Lagged GINI appears only in the FD-GMM specification, which is estimated as a dynamic robustness check; the baseline FE-DK and CCE-MG specifications are static.

Results from Table 13 indicate that the relationship between FDI and income inequality varies across RL regimes. The FE-DK estimates show that weaker RL environments are associated with higher income inequality, while this effect becomes statistically insignificant under stronger legal institutions. FDI significantly increases income inequality in low-RL settings, whereas its direct effect is insignificant in high-RL regimes. However, the positive and statistically significant interaction between FDI and the rule of law in the high-regime case indicates that the distributional impact of FDI may intensify as legal institutions strengthen; this pattern may reflect, albeit tentatively, the possibility that stronger legal frameworks disproportionately protect capital owners or facilitate skill- and capital-biased returns from foreign investment. Urbanization remains negatively and significantly associated with income inequality. Findings from the FD-GMM and CCE-MG estimations show broadly comparable coefficient directions to those in the baseline FE-DK specification. FDI is inequality-increasing when RL is weak; in the high-RL regime, the direct FDI effect is imprecise, but the positive interaction suggests FDI can become more inequality-increasing as RL strengthens within that regime.

Table 14. FE-DK estimates and robustness checks using FD-GMM and CCE-MG for the FDI–Gini relationship (VA).

Variable	FE-DK	FD-GMM	CCE-MG
Lagged GINI (L.gini)		0.923 *** (0.204)	
VA (Low Regime)	4.923 *** (0.813)	0.270 ** (0.129)	1.553 (1.672)
VA (High Regime)	10.420 *** (3.649)	0.037 (0.358)	3.724 (3.027)
FDI (Low Regime)	−1.335 (1.221)	−0.068 (0.168)	−1.528 (1.728)
FDI (High Regime)	−0.937 * (0.517)	−0.052 (0.094)	−0.169 * (0.096)
FDI × VA (Low Regime)	−2.554 *** (0.901)	−0.088 (0.173)	−1.081 (1.308)
FDI × VA (High Regime)	−5.842 ** (2.488)	−0.080 (0.229)	−1.552 (2.599)
GDP	−0.050 (0.068)	−0.001 (0.002)	−0.007 (0.009)
URB	−0.148 *** (0.021)	−0.023 (0.036)	−0.452 (0.299)
INF	−0.057 * (0.033)	−0.007 (0.007)	−0.030 (0.052)
Constant	49.863 *** (1.403)	4.191 (9.904)	
AR(1)		0.087	
AR(2)		0.328	
Number of obs	110	100	110
Number of groups	5	5	5
F-statistic	116.590		19.710
Within R ²	0.460		
R ² (MG)			0.910
Root MSE			0.450
CD Statistic			0.820

Note: Standard errors in parentheses. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. FE-DK is the baseline fixed-effects estimator with Driscoll–Kraay standard errors. FD-GMM refers to the one-step first-difference GMM estimator (Arellano & Bond, 1991), while CCE-MG denotes the common correlated effects mean group estimator (Pesaran, 2006); both are employed as robustness checks. AR(1) and AR(2) report the Arellano–Bond serial correlation tests; failure to reject AR(2) supports instrument validity. Lagged GINI appears only in the FD-GMM specification, which is estimated as a dynamic robustness check; the baseline FE-DK and CCE-MG specifications are static.

Table 14 examines the role of VA in shaping the FDI–inequality relationship. The FE-DK estimates indicate that higher levels of VA are associated with greater income inequality, particularly in the high-regime setting. FDI exhibits a negative and weakly significant association with income inequality only in the high VA regime. The interaction effects indicate that VA conditions the impact of FDI, with negative and statistically significant interactions in both regimes. Urbanization remains negatively and significantly related to income inequality. Results from robustness checks point to a similar directional pattern as the baseline findings. VA is positively associated with inequality, but higher VA systematically dampens the inequality-increasing impact of FDI (negative FDI $\times$ VA interactions), making FDI more inequality-reducing as VA improves.

Table 15. FE-DK estimates and robustness checks using FD-GMM and CCE-MG for the FDI–Gini relationship (IQ).

Variable	FE-DK	FD-GMM	CCE-MG
Lagged GINI (L.gini)		0.915 *** (0.171)	
IQ (Low Regime)	1.409 *** (0.190)	0.022 (0.037)	0.413 (0.624)
IQ (High Regime)	0.307 (0.217)	0.017 (0.027)	1.956 (1.715)
FDI (Low Regime)	2.977 *** (0.515)	0.113 (0.125)	0.103 (1.991)
FDI (High Regime)	−0.565 * (0.299)	−0.032 (0.025)	−0.327 (1.013)
FDI $\times$ IQ (Low Regime)	1.253 *** (0.292)	0.007 (0.042)	0.195 (0.957)
FDI $\times$ IQ (High Regime)	0.157 (0.132)	0.024 * (0.013)	0.879 (1.208)
GDP	0.022 (0.051)	0.001 (0.002)	0.002 (0.011)
URB	−0.232 *** (0.020)	−0.019 (0.029)	−0.319 (0.261)
INF	−0.037 (0.031)	−0.007 (0.006)	−0.011 (0.018)
Constant	52.618 *** (1.082)	4.197 (8.152)	
AR(1)		0.386	
AR(2)		0.198	
Number of obs	110	100	110
Number of groups	5	5	5
F-statistic	182.990		23.210
Within R^2	0.559		
R^2 (MG)			0.920
Root MSE			0.410
CD Statistic			0.800

Note: Standard errors in parentheses. * $p < 0.10$; *** $p < 0.01$. FE-DK is the baseline fixed-effects estimator with Driscoll–Kraay standard errors. FD-GMM refers to the one-step first-difference GMM estimator (Arellano & Bond, 1991), while CCE-MG denotes the common correlated effects mean group estimator (Pesaran, 2006); both are employed as robustness checks. AR(1) and AR(2) report the Arellano–Bond serial correlation tests; failure to reject AR(2) supports instrument validity. Lagged GINI appears only in the FD-GMM specification, which is estimated as a dynamic robustness check; the baseline FE-DK and CCE-MG specifications are static.

Evidence from Table 15 reveals pronounced regime-dependent heterogeneity in the distributional effects of foreign direct investment (FDI) conditioned by institutional quality (IQ). In the low-IQ regime, the estimated coefficient on $\ln(\text{FDI})$ is positive and statisti-

cally significant, indicating that FDI inflows are associated with higher income inequality when institutional quality remains below the estimated threshold. This finding implies that under weak governance conditions, FDI tends to disproportionately benefit capital owners or skilled workers, thereby widening the income distribution. Moreover, the interaction term between FDI and IQ in the low-IQ regime is also positive and statistically significant, suggesting that within this regime, incremental improvements in institutional quality initially reinforce the inequality-increasing effect of FDI. Economically, this pattern is consistent with a transitional phase in which early governance improvements facilitate capital-intensive or skill-biased foreign investment before inclusive institutional mechanisms become fully effective. By contrast, in the high-IQ regime, the coefficient on $\ln(FDI)$ becomes negative, although weaker in magnitude, implying that once institutional quality surpasses the threshold, FDI is no longer inequality-increasing and may instead contribute to reducing income inequality. The corresponding interaction term in the high-IQ regime is positive but statistically insignificant, indicating that further improvements in institutional quality above the threshold do not materially amplify inequality and instead stabilize the distributional impact of FDI.

To illustrate the economic magnitude of these effects, consider representative values of institutional quality corresponding to the 25th, 50th, and 75th percentiles within the low-IQ regime (for illustration, standardized IQ values of -1 , 0 , and 1 , respectively). Using the FE-DK estimates, the marginal effect of FDI on income inequality in the low-IQ regime is given by $\beta_{FDI,low} + \beta_{FDI \times IQ,low} \cdot IQ$. At the 25th percentile ($IQ = -1$), the marginal effect is approximately $2.977 - 1.253 = 1.724$, indicating a moderate inequality-increasing effect of FDI. At the median ($IQ = 0$), the marginal effect rises to 2.977 , while at the 75th percentile ($IQ = 1$) it increases further to approximately 4.230 , reflecting a stronger inequality-widening impact as institutional quality improves but remains below the threshold. Because FDI is measured in logarithmic form, a 10% increase in FDI inflows corresponds to a change of $\ln(1.10) \approx 0.095$, implying increases in the net Gini index of roughly 0.16 , 0.28 , and 0.40 points at the 25th, 50th, and 75th percentiles of IQ, respectively. Above the institutional threshold, the corresponding marginal effects are substantially smaller and may turn negative at sufficiently high levels of institutional quality, indicating that strong governance mitigates the inequality-enhancing channels of FDI and allows its productivity and employment benefits to be distributed more evenly. Overall, these results demonstrate that institutional quality governs not only the direction but also the intensity of the distributional effects of FDI, with inequality initially rising during early stages of institutional development before declining once governance capacity becomes sufficiently strong.

5. Conclusions and Policy Recommendations

This study examined whether these two trends are linked through a nonlinear institutional channel, using a fixed-effects panel threshold framework with Driscoll–Kraay inference for the period 2002–2023, complemented by robustness checks using FD-GMM and CCE-MG.

Across both individual institutional dimensions and the composite governance index, the results point to clear regime dependence. In higher-governance regimes, foreign investment is more likely to be associated with stable or inequality-reducing outcomes, consistent with stronger implementation capacity, more credible rules, and wider diffusion of spillovers through labor markets and domestic linkages. However, the direction and strength of the conditioning effect vary by governance dimension; the inequality response to FDI is most consistently favorable under higher government effectiveness and overall institutional quality, while other dimensions display weaker or mixed patterns. In lower-

governance regimes, by contrast, FDI is more likely to coincide with inequality-increasing dynamics, reflecting patterns consistent with regulatory capture, uneven bargaining power, and the concentration of foreign-investment gains among capital owners and skilled groups. Importantly, the interaction effects imply that incremental improvements in institutions do not automatically translate into more inclusive outcomes; rather, the distributional role of FDI evolves nonlinearly as governance shifts from one regime to another.

The estimated institutional thresholds provide concrete benchmarks for policy prioritization. The results indicate that once government effectiveness exceeds its estimated threshold (approximately -0.06 in the ASEAN-5 sample), the estimated effect of FDI on income inequality shifts toward more inclusive outcomes. This suggests that policies aimed at strengthening implementation capacity, regulatory enforcement, and public service delivery are not merely complementary to FDI attraction but appear to be prerequisites for ensuring that foreign investment contributes to a more inclusive income distribution. Below this threshold, efforts to attract additional FDI without parallel institutional strengthening are unlikely to yield equitable outcomes. In lower-institutional-quality environments, the priority is not simply attracting additional FDI but improving the conditions under which its benefits diffuse beyond narrow segments. Reducing discretionary regulation through the digitalization of business license approvals, the publication of clear eligibility criteria for investment incentives, and the use of standardized timelines for regulatory decisions can help limit rent extraction and foster more competitive outcomes. At the same time, policies that raise absorptive capacity, including workforce training, technical education, and supplier-development programs for domestic firms, are essential for translating foreign investment into broader wage growth rather than higher skill premiums alone.

In higher-institutional-quality regimes, the policy focus shifts toward upgrading and distribution. Governments can leverage FDI for inclusive growth by promoting higher-value activities, enforcing competition policy, and ensuring that labor-market institutions and social protection systems translate productivity gains into broad-based income improvements. Fiscal capacity and redistributive instruments, including targeted transfers, progressive taxation, and universal access to quality education, become especially important complements, preventing FDI-driven growth from disproportionately rewarding capital and high-skilled labor even when governance is strong.

Given the integrated nature of production networks in Southeast Asia, ASEAN-level coordination can reinforce national efforts. Harmonizing investment facilitation standards, strengthening cross-border infrastructure and logistics, and expanding regional supplier networks can increase spillovers and reduce the risk that benefits remain concentrated in a limited set of locations or sectors. Regional cooperation on transparency norms and responsible investment practices can further support credibility while limiting a race to the bottom in incentives that weaken public revenue and redistributive capacity.

Country-specific implications emerge clearly from the governance dimensions identified in the empirical analysis. In Indonesia and Vietnam, where FDI has tended to reinforce skill-biased wage dispersion, policies that expand technical and vocational training, strengthen domestic supplier-development programs, and incentivize foreign firms to integrate local SMEs into production networks can help diffuse productivity gains more broadly. In the Philippines, where lower scores in government effectiveness and regulatory quality constrain spillovers, priority should be given to digitalizing investment approval processes, enforcing transparent and rule-based incentive schemes, and expanding social protection coverage for informal workers to mitigate inequality-enhancing effects of FDI. Malaysia and Thailand, operating closer to or above the estimated governance thresholds, are well positioned to focus on economic upgrading, stricter competition enforcement, and

labor-market institutions that ensure FDI-driven productivity gains translate into sustained and broad-based wage growth.

Despite employing multiple complementary empirical approaches, the analysis remains subject to several limitations that should be considered when interpreting the results. First, income inequality is measured using the SWIID net Gini index, which enhances cross-country comparability but may smooth short-term variation due to harmonization procedures. Institutional quality is proxied by the Worldwide Governance Indicators, which are perception-based and may not fully capture the timing, depth, or uneven implementation of institutional reforms. As perceptions often adjust slowly to policy changes, the estimated institutional thresholds should be interpreted as thresholds in perceived governance quality rather than precise policy cutoffs. Second, the analysis relies on aggregate national data for the ASEAN-5, which limits the ability to observe within-country heterogeneity in inequality dynamics, governance capacity, and the spatial concentration of FDI. In addition, the small cross-sectional dimension of the sample ($N = 5$) constrains statistical power and limits the precision of dynamic panel estimators. Accordingly, the FD-GMM results are interpreted strictly as sensitivity checks rather than as a basis for primary inference.

Future research could address these limitations by employing subnational or micro-level data to capture local inequality patterns and institutional variation more accurately, allowing explicit analysis of spatial spillovers of FDI within countries. Distinguishing among different types and sectors of FDI, as well as applying alternative nonlinear modeling approaches and incorporating regional spillovers within ASEAN, would further enhance understanding of how institutional quality conditions the inclusiveness of FDI-driven development.

Author Contributions: Conceptualization, T.M.M.T. and P.M.; methodology, T.M.M.T. and P.M.; software, T.M.M.T.; validation, T.M.M.T.; formal analysis, T.M.M.T.; investigation, T.M.M.T.; resources, T.M.M.T.; data curation, T.M.M.T.; writing—original draft preparation, T.M.M.T.; writing—review and editing, T.M.M.T. and P.M.; supervision, P.M. and S.S.; project administration, P.M. All authors have read and agreed to the published version of the manuscript.

Funding: This research was supported by the Center of Excellence in Econometrics, Faculty of Economics, Chiang Mai University, and was conducted as part of the Ph.D. Degree Program in Economics, Faculty of Economics, Chiang Mai University, with financial support from Chiang Mai University (CMU) under the CMU Presidential Scholarship.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data used in this study are derived from public domain resources (SWIID, <https://fsolt.org/swiid/> (accessed on 5 December 2025); World Development Indicators, <https://databank.worldbank.org/source/world-development-indicators> (accessed on 5 December 2025); Worldwide Governance Indicators, <https://www.worldbank.org/en/publication/worldwide-governance-indicators> (accessed on 5 December 2025)). The constructed dataset and replication materials are available from the corresponding author upon reasonable request.

Conflicts of Interest: The authors declare no conflicts of interest.

References

- Acemoglu, D., & Robinson, J. A. (2012). *Why nations fail: The origins of power, prosperity, and poverty*. Crown Publishing Group.
- Alfaro, L., & Chauvin, J. (2016). *Foreign direct investment, finance, and economic development*. *Encyclopedia of international economics and global trade*. [Preprint]. Available online: <https://ssrn.com/abstract=2908440> (accessed on 5 December 2025).
- Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, 58(2), 277–297. [CrossRef]

- ASEAN Secretariat & UNCTAD. (2025). *ASEAN investment report 2025: Foreign direct investment and supply chain development*. ASEAN Secretariat. Available online: <https://www.asean.org> (accessed on 5 December 2025).
- Athukorala, P.-C., & Kohpaiboon, A. (2014). Global production sharing, trade patterns, and industrialization in Southeast Asia. In *Routledge handbook of Southeast Asian economics* (pp. 139–161). Routledge.
- Ayyash, M., Sek, S. K., & Kole, A. (2025). Income inequality dynamics in ASEAN-5: A panel data approach using CS-ARDL to examine macroeconomic factors. *Discover Sustainability*, 6(1), 465. [CrossRef]
- Belsley, D. A., Kuh, E., & Welsch, R. E. (1980). *Regression diagnostics: Identifying influential data and sources of collinearity*. John Wiley & Sons. [CrossRef]
- Borensztein, E., De Gregorio, J., & Lee, J.-W. (1998). How does foreign direct investment affect economic growth? *Journal of International Economics*, 45(1), 115–135. [CrossRef]
- Driscoll, J. C., & Kraay, A. C. (1998). Consistent covariance matrix estimation with spatially dependent panel data. *The Review of Economics and Statistics*, 80(4), 549–560. [CrossRef]
- Figini, P., & Görg, H. (2011). Does foreign direct investment affect wage inequality? An empirical investigation. *The World Economy*, 34(9), 1455–1475. [CrossRef]
- Friedman, M. (1937). The use of ranks to avoid the assumption of normality implicit in the analysis of variance. *Journal of the American Statistical Association*, 32(200), 675–701. [CrossRef]
- Guenichi, H., & Omri, N. A.-E. (2025). Threshold effects of institutional quality on FDI–economic growth nexus: A panel smooth transition regression (PSTR) model. *Environment, Development and Sustainability*, 27(8), 19097–19119. [CrossRef]
- Hansen, B. E. (1999). Threshold effects in non-dynamic panels: Estimation, testing, and inference. *Journal of Econometrics*, 93(2), 345–368. [CrossRef]
- Herzer, D., & Nunnenkamp, P. (2013). Inward and outward FDI and income inequality: Evidence from Europe. *Review of World Economics*, 149(2), 395–422. [CrossRef]
- Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of Econometrics*, 115(1), 53–74. [CrossRef]
- IMF. (2021). *World economic outlook: Recovery during a pandemic*. International Monetary Fund. Available online: <https://www.imf.org/en/Publications/WEO/Issues/2021/10/12/world-economic-outlook-october-2021> (accessed on 5 December 2025).
- Javorcik, B. S. (2004). Does foreign direct investment increase the productivity of domestic firms? In search of spillovers through backward linkages. *American Economic Review*, 94(3), 605–627. [CrossRef]
- Kremer, S., Bick, A., & Nautz, D. (2013). Inflation and growth: New evidence from a dynamic panel threshold analysis. *Empirical Economics*, 44(2), 861–878. [CrossRef]
- Kurul, Z. (2017). Nonlinear relationship between institutional factors and FDI flows: Dynamic panel threshold analysis. *International Review of Economics & Finance*, 48, 148–160. [CrossRef]
- Le, Q. H., Do, Q. A., Pham, H. C., & Nguyen, T. D. (2021). The impact of foreign direct investment on income inequality in Vietnam. *Economics*, 9(1), 27. [CrossRef]
- Lee, J.-W., & Wie, D. (2015). Technological change, skill demand, and wage inequality: Evidence from Indonesia. *World Development*, 67, 238–250. [CrossRef]
- Milanovic, B. (2016). *Global inequality: A new approach for the age of globalization*. Harvard University Press.
- North, D. C. (1990). *Institutions, institutional change and economic performance*. Cambridge University Press.
- Opperman, P., & Tita, A. F. (2025). The heterogeneous effects of financial openness on income inequality in sub-Saharan Africa. *South African Journal of Economic and Management Sciences*, 28(1), 6037. [CrossRef]
- Pesaran, M. H. (2004). *General diagnostic tests for cross section dependence in panels* (Cambridge working papers in Economics, No. 1240). Faculty of Economics, University of Cambridge.
- Pesaran, M. H. (2006). Estimation and inference in large heterogeneous panels with a multifactor error structure. *Econometrica*, 74(4), 967–1012. [CrossRef]
- Pesaran, M. H. (2007). A simple panel unit root test in the presence of cross-section dependence. *Journal of Applied Econometrics*, 22(2), 265–312. [CrossRef]
- Piketty, T. (2020). *Capital and ideology*. Harvard University Press.
- Rodrik, D., Subramanian, A., & Trebbi, F. (2004). Institutions rule: The primacy of institutions over geography and integration in economic development. *Journal of Economic Growth*, 9(2), 131–165. [CrossRef]
- Seo, M. H., Kim, S., & Kim, Y.-J. (2019). Estimation of dynamic panel threshold model using Stata. *The Stata Journal*, 19(3), 685–697. [CrossRef]
- Shi, J., & Murakami, Y. (2025). *The impact of foreign direct investment on income inequality: Evidence from new instruments* (Discussion paper No. DP2025-18). Research Institute for Economics and Business Administration (RIEB), Kobe University. Available online: <https://ideas.repec.org/p/kob/dpaper/dp2025-18.html> (accessed on 5 December 2025).

- Solt, F. (2020). Measuring income inequality across countries and over time: The standardized world income inequality database. *Social Science Quarterly*, 101(3), 1183–1199. [CrossRef]
- UNCTAD. (2023). *World investment report 2023: Investing in sustainable energy for all* (UNCTAD/WIR/2023). United Nations. Available online: <https://unctad.org/publication/world-investment-report-2023> (accessed on 5 December 2025).
- UNDP. (2019). *Human development report 2019: Beyond income, beyond averages, beyond today*. United Nations Development Programme. Available online: <https://hdr.undp.org/system/files/documents/hdr2019.pdf> (accessed on 5 December 2025).
- World Bank. (2022). *Poverty and shared prosperity 2022: Correcting course*. Available online: <http://documents.worldbank.org/curated/en/099750110062235316> (accessed on 5 December 2025).
- World Bank. (2023). *World development indicators*. Available online: <https://data.worldbank.org> (accessed on 5 December 2025).
- Yuldashev, M., Khalikov, U., Nasriddinov, F., Ismailova, N., Kuldasheva, Z., & Ahmad, M. (2023). Impact of foreign direct investment on income inequality: Evidence from selected Asian economies. *PLoS ONE*, 18(2), e0281870. [CrossRef] [PubMed]

Disclaimer/Publisher’s Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.