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Prerequisites for effective international financial integration in Asian economies: A panel threshold approach

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ABSTRACT

Financial integration is expected to provide participating economies and stakeholders with significant opportunities in terms of capital and human resources, risk diversification, technological innovation, and fair economic treatment, ultimately contributing to national prosperity. However, the potential risks associated with integration have raised concerns about the prerequisite preparation for an efficient integration process. This paper focuses on scrutinizing the conditions required to enhance the positive impact of financial integration on economic growth among selected Asian countries (India, Indonesia, Malaysia, Japan, the Philippines, Singapore, Thailand, China, and Vietnam) during the 1996 to 2019 period. Using a panel threshold approach with parametric ordinary least squares regression and bootstrap replications, the study finds a non-linear impact of financial integration on the economic development of the examined countries, suggesting that different stages of financial integration contribute differently to economic growth. Our empirical results confirm the existence of two financial integration thresholds that maximize the benefits of the integration process. Furthermore, the findings highlight the importance of prerequisite conditions such as financial depth and trade openness for effective and positive financial liberalization in the studied countries. This suggests that countries should strengthen their internal financial systems before engaging in international integration to derive the maximum benefits from this process.

Contribution/ Originality: This study uniquely examines the threshold effects of financial integration on economic growth in selected Asian countries using a panel threshold approach. The findings highlight the importance of financial depth and trade openness, providing policymakers with new insights on maximizing the benefits of international financial integration while mitigating potential risks.

1. INTRODUCTION

Financial integration is a concept that has been discussed for several decades and was officially initiated in Europe in 1957 with the Treaty of Rome, which established the basic principles for creating a common financial market in the Euro area (Liebscher, 2006). Accordingly, the term 'financial integration' is understood as the removal of barriers between countries, aiming to create favorable conditions for market participants to access capital resources at lower capital mobilization costs, ultimately facilitating the adoption of a common currency within the region. Subsequent research papers have provided different perspectives on financial integration, among which the definition by Baele, Ferrando, Hördahl, Krylova, and Monnet (2004) gained the most consensus.

Their study described financial integration as the process of establishing a common financial market where all market participants have equal opportunities in accessing and utilizing financial tools and services under fair and equal conditions.

The motivation for countries to participate in the financial integration process has been studied by many scholars in recent years. De Nicolò and Ivaschenko (2008) proved that financial integration creates opportunities for financial institutions to scale up operations and facilitates capital financing for national infrastructure projects, contributing to hunger eradication and poverty alleviation. Moreover, integration enhances financial infrastructure, improves operational efficiency, and promotes cooperation between banks and non-bank financial intermediaries.

However, the costs of the process of financial integration are also important.Edison, Levine, Ricci, and Sløk (2002); Agénor (2003); Baele et al. (2004) and the ECB (2010) pointed out major costs of financial integration: (i) high degree of concentration of capital flows and difficulty in accessing to financing for small countries; (ii) loss of macroeconomic stability due to uncontrolled capital flows in the economy; (iii) high degree of volatility of capital flows due to speculation and contagion effects and (iv) risks related to the penetration of foreign bank, foreign investment funds, etc.

Arteta, Eichengreen, and Wyplosz (2001) argued that financial integration is the trade-off between benefits and costs for each country. The problem is not whether there is integration or not, but rather determining the optimal level of integration of each country to maximize benefits while mitigating potential risks.

Theoretically, financial market integration facilitates efficient capital allocation, risk sharing, and economic growth. However, its benefits manifest differently across economies depending on their specific characteristics. For example, in many developing countries, where labor resources are abundant but capital is scarce, financial market integration is considered an opportunity to solve the problem of investment capital shortages and leverage human resources effectively.

Kose, Prasad, Rogoff, and Wei (2009) and Kose, Prasad, and Taylor (2011) argued that the impact of financial market integration on economic growth or national financial security is not simply a linear relationship. Instead, it is influenced by internal economic factors. Only when these factors reach specific thresholds can financial market integration positively impact a country's economy by promoting growth, reducing crisis risks, and enabling other beneficial effects.

Despite an extensive literature on the nexus between international financial integration and economic growth, to the best of our knowledge, studies examining how different internal economic conditions contribute to the integration process in Asian economies remain limited.

By addressing this research gap, a new and crucial economic condition being investigated, potential thresholds of internal economic traits, our study explores the potential thresholds of internal economic factors in different Asian countries, offering valuable insights into the field. Furthermore, our findings provide a solid foundation for policy recommendations to help Asian nations integrate effectively into regional and global financial systems. To achieve those contributions, we will address two research questions in this paper:

(1) Does financial integration always benefit a specific nation's economic growth?

(2) What financial and economic conditions serve as prerequisites for a country to enjoy the benefits of international financial integration while mitigating potential risks?

The rest of this paper is organized as follows: Section Two provides a brief overview of the integration-growth nexus (i.e., the relationship between financial integration and economic growth) in the literature, along with the economic conditions that affect the integration process. Section Three discusses how the database was built and the empirical methods used to address the research questions. Section Four presents the research findings, which form the basis for the policy recommendations discussed in Section Five.

2. LITERATURE REVIEW

Financial integration has been incorporated into the national strategic roadmaps of various economies worldwide. However, its mix of benefits and significant consequences opens the door for in-depth discussions on the grounding conditions that countries must prepare before further integrating into the regional and international financial markets. These essential prerequisites are believed to enable a particular economy to reap the benefits of financial liberalization while simultaneously mitigating, or improving policy responses to, external shocks originating from international markets.

A range of threshold conditions identified in a plethora of prior studies includes domestic credit size, financial depth, institutional quality, ease of doing business, macroeconomic policies and trade openness (Bhattacharya & Ghosh, 2016; Cheng & Daway, 2018; Flynn, Saravia, Cenzon, Gupta, & Tezel, 2019; Garali & Othmani, 2015; Klein, 2005; Kose et al., 2009; Lane & Milesi-Ferretti, 2003; Trang, 2015; Vo & Daly, 2007). Nevertheless, empirical findings of research studies reveal different and sometimes contrasting threshold levels, varying significantly based on the financial integration measures used in assessment models.

The depth of the financial market is found to bend the promisingly positive influence of financial globalization on economic growth. A growing and robust financial market can amplify the benefits of financial integration, translating into stronger economic growth while also enhancing resilience to external risks. However, an economy with a highly integrated financial market could also expose a country to greater vulnerability in times of international financial chaos. Therefore, determining the state of financial development that marks the optimal starting point for integration and identifying when the trade-off of integration may become apparent becomes crucial.

Kose et al. (2009) identified an inverted U-shaped nexus between financial integration and economic growth, with upper and lower financial depth thresholds (71% and 137%, respectively), measured by the ratios of private credit to GDP. Specifically, they found that once financial depth surpasses 137%, the positive effect of financial openness on economic growth begins to diminish.

The varying contributions of different financial market phases to the ecnomic growth have been confirmed in previous studies, though the specific threshold values differ (Bekaert, Harvey, & Lundblad, 2011; Flynn et al., 2019). In addition, some studies have not explicitly examined financial integration (Hermes & Lensink, 2003). Although Hermes and Lensink (2003) have not directly addressed financial integration, they used foreign direct investment (FDI) as a proxy for financial openness. Their findings across 67 countries over the period from 1970 to 1995 indicated that the positive interaction between capital openness and the development of the domestic financial market in fostering economic growth occurs only when the domestic credit-to-GDP exceeds 12.9%. However, this effect turns negative when the ratio surpasses 14.6%. Similarly, Flynn et al. (2019) analyzing 80 economies from 1975 to 2014, confirmed the same relationship found by Hermes and Lensink (2003) and Kose et al. (2009) yet at different thresholds of 66% and 81%. Adams (2014) provided further evidence of the asymmetric relationship between financial integration and economic growth by demonstrating that developed financial systems experience diminishing growth benefits from increased financial globalization compared to developing ones.

On the other hand, some studies found relatively weak evidence supporting the parallel movement of economic growth with financial market expansion in an open economy. Arteta et al. (2001) examining the role of financial market attributes in driving economic growth within liberalized financial systems across 61 developed and developing countries, found no empirical evidence that financial market depth significantly influences the benefits of financial integration. The authors argued that eliminating tariff constraints and addressing macroeconomic imbalances may be more important prerequisites for opening a country's financial market than financial depth thresholds. Chen and Quang (2014) employing panel threshold models on an intensive database of 80 economies over the sample period of 1984 to 2008, revealed a strong interaction between increasing financial integration and economic growth in well-developed financial markets compared, but found no significant contribution of different financial market development stages to this relationship.

High institutional quality, ease-of-doing business environment, and sound macroeconomic policies together form a strong foundation for a stable, creditable, open, and attractive investment destination for foreign capital. These factors were found to significantly interact with financial integration in promoting economic growth. Flynn et al. (2019) argued that strong and transparent institutions enhance capital allocation efficiency, attract international capital inflows, and foster sustainable economic growth. Though their study did not determine specific institutional quality thresholds, it statistically confirmed that countries with higher institutional quality experience greater economic benefits from financial market liberalization.

Kose et al. (2009) cautioned that in highly liberalized financial markets, financial crises and subsequent structural reforms could trigger massive capital outflows, refrain from new capital inflows to the economy, and exacerbate economic turmoil, highlighting the risks associated with flawed institutions and poor governance.

The positive interaction between a strong institutional environment and the growth effects of financial integration was statistically and significantly confirmed across multiple studies in different economies over various time periods (Arteta et al., 2001; Chen & Quang, 2014).

Regarding trade openness as a prerequisite for efficient financial integration, past studies provided mixed findings. In most cases, trade openness was observed to contribute positively to financial integration by facilitating cross-border financial transactions and stimulating domestic financial development through increased demand for bank credit, export insurance policies, and other financial services (Bhattacharya & Ghosh, 2016; Kose et al., 2009; Lane & Milesi-Ferretti, 2003). However, some studies found no significant evidence linking trade openness and financial integration to economic growth (Flynn et al., 2019).

Among the relatively few studies focusing on financial integration in Asian economies, Bong and Premaratne (2019) examined Southeast Asian countries between 1993 to 2013. Their findings highlighted key economic factors—such as increasing financial development, enhancing trade openness, and reducing corruption—that needed improvement to achieve higher degrees and benefits of financial integration. However, they have not considered potential turning points where financial integration's impact on economic growth could diminish or become negative.

In most of the aforementioned literature, the domestic private credit market was utilized as a primary proxy for financial system depth, leaving the other increasingly important segment of the system, *the capital market*, unnoticed. Only a few studies Garali and Othmani (2015) and Cheng and Daway (2018) scrutinized the captial market's role in reinforcing the postive effect of financial integration on economic growth.

In summary, while proactive financial integration is essential for enhancing market competitiveness and strengthening a country's global position, it is equally important to identify the financial conditions under which its benefits may weaken or even become harmful. Our paper aims to fill this gap by providing a well-designed integration strategy that not only promotes economic growth but also ensures financial stability and sustainable development.

3. METHODOLOGY AND DATA COLLECTION

3.1. Methodology

We model the relationship between financial integration and growth using a basic panel regression, which is given by:

$$Y_{it} = \mu_i + \beta FO_{it} + \theta X'_{it} + u_i + \varepsilon_{it} \quad (1)$$

Where Y_{it} represents the economic growth for country i and at time t; FO_{it} is the financial openness of country i at time t; X_{it} is a set of control variables that has been proved in previous studies, including financial depth, institutional quality, trade openness, inflation, and investments; u_i represent country specific effects and assumed to be unchanged over the time, such as country's culture, geographic location, etc.; and the observation error ε_{it}.

While basic panel regression models can demonstrate the relationship between financial integration (reflected via the financial openness proxy- FO) and economic growth, they do not capture how this relationship changes when varying levels of financial openness and different stages of other economic and financial indicators. To address this

limitation, we apply a fixed-effect threshold panel model, as developed by Hansen (1999) which allows us to assess potential shifts in the impact of FO on economic growth based on the presence of threshold variables. The fixed-effect method is particularly advantageous, as it effectively addresses unobserved country heterogeneity and omitted variable bias (Mengistus & Adams, 2007).

Based on the work by Hansen (1999); Hansen (2000) and Wang (2015) we propose the regression model, which is defined by the following equation:

$$Y_{it} = \{\mu_i + \beta_1 FO_{it} + \theta X'_{it}\}\, d[TH_{it} \le \gamma_1] + \{\mu_i + \beta_2 FO_{it} + \theta X'_{it}\}\, d[\gamma_1 < TH_{it} \le \gamma_2] + \{\mu_i + \beta_3 FO_{it} + \theta X'_{it}\}\, d[TH_{it} > \gamma_2] + u_i + \varepsilon_{it} \quad (2)$$

where:

TH_{it} *is a* threshold variable.

γ_1, γ_2 denote for 2 distinct thresholds at which the residual sums of squares are minimised (Hansen, 1997). If the model contains 2 thresholds, the sample could be divided into three regimes accordingly.

$\hat{\gamma} = arg \min S_1(\gamma)$.

$\gamma \in (\gamma, \bar{\gamma})$.

d[ ] denotes the indicator function which assumes a value of 1 or 0 based on the specified condition. The regimes are characterised by coefficients $\beta_1, \beta_2, \beta_3$.

To identify different threshold conditions in the integration-growth nexus, we included a range of threshold variables in the model, such as financial depth, financial integration, trade openness, and institutional quality.

First, we will investigate the existence of a single threshold in the model (Equation 2), we perform a statistical hypothesis test:

Null hypothesis H_0*: No threshold exists* ($\beta_1 = \beta_2 = \beta_3$)

Alternative hypothesis H_1*: There is at least one threshold in the model.*

At a given significance level, if the null hypothesis is rejected, further hypothesis testing with similarly constructed null and alternative hypotheses is needed to determine whether any other potential thresholds exist. This process continues until we fail to reject the null hypothesis (i.e. no threshold exists). Specifically, if the model contains two thresholds, we test the null hypothesis of a single threshold against the alternative hypothesis of at least two thresholds.

For each hypothesis pair mentioned above, we apply the likelihood ratio (LR) test with a bootstrap approach to determine whether to reject the null hypothesis. This step's results additionally reveal the inference of estimators. Specifically, since the nuisance parameter problem results in the non-standard distribution of threshold estimates, it is necessary to test for the hypothesis $\gamma = \gamma_0$ (in which, γ_0 is the true value of γ).

We construct a critical region in the LR test at a chosen significance level. If the estimated LR in (Equation 3) lies outside the critical region, we fail to reject the null hypothesis at a significance level.

$$LR_1(\gamma_0) = \frac{S(\gamma_0) - S(\hat{\gamma})}{\hat{\sigma}^2} \quad (E3)$$

For F-test, the F statistics under a null hypothesis of no existing threshold ($\beta_1 = \beta_2$) is defined by:

$$F_1 = \frac{S_0 - S_1}{\hat{\sigma}^2} \quad (4)$$

Given a non-standard distribution of F1, a bootstrap approach is adopted to model the asymptotic distribution of the likelihood ratio test (Hansen, 1999). Since a F-test is a right-tailed test, if the F1 is smaller than its critical value, we fail to reject the null hypothesis, confirming the absence of threshold effect.

This threshold testing procedure is repeatedly performed to diagnose the potential presence of any threshold regimes within the impact of each of the following variables - financial integration, financial depth, institutional quality, and trade openness - on economic growth.

3.2. Variables and Data Description

The selection of variables in this study primarily follows the approaches of Kose et al. (2011) and Sum (2012). To minimize the effects of the business cycle and short-term fluctuations of macroeconomic variables while focusing on long-term economic growth, the research uses 5-year averages for all variables in regression models. In addition, to avoid the existence of outliers that adversely affect the research results, the variables are also winsorized or trimmed at 1% and 99%.

The economic growth rate is used in the research as a dependent variable. The level of economic growth is measured alternatively by GDP growth (GGDP) and GDP per capita growth (GDPPC).

Regarding the variable of financial market integration, the study uses several alternatives: (i) KAPOPEN; (ii) TOTAL; (iii) KOSE.

KAOPEN index, created by Chinn and Ito (2008) represents financial openness, especially the openness in terms of legal policies and regulations. In order to achieve financial market integration, a country must first have a certain degree of "openness." For that reason, KAOPEN is considered the initial "openness" condition. This study uses the latest updated database of KAOPEN by August 2021 with the data being updated for 2019 (Chinn & Ito, 2021).

The TOTAL index by Lane and Milesi-Ferretti (2003) and Lane and Milesi-Ferretti (2006) estimates the separate integration components of the financial market by taking into account total foreign assets and liabilities as a share of GDP. In fact, we created two versions of TOTAL. The original TOTAL index is estimated as a sum of two capital net inflow statistics - net inflows of foreign direct investment (FDINET) and net inflows of portfolio investment (PINET) - divided by GDP in current US dollars. Another version, the TOTAL_EMG index, was specifically designed for emerging countries, distinguishing between FDINET and PINET. While KAOPEN is a de jure measure, reflecting policy and regulatory conditions, TOTAL and TOTAL_EMG are de facto measures that directly capture the actual level of financial market integration.

Another simplified De facto version of financial market integration variable was used in the study of Kose et al. (2011) KOSE. This index mainly measures the degree of integration according to the degree of financial dependence of a country on other countries by incorporating total foreign liabilities to GDP, total foreign direct and indirect investment capital to GDP, and total foreign debt to GDP.

Since the study attempts to estimate threshold effects in the relationship between international financial integration and economic growth, beside financial integration variables, we incorporate additional variables representing internal economic conditions that may serve as threshold variables. We used total domestic credit to private sector per GDP (denoted FDC) as the proxy for the depth of the financial market, implying the level of financial market development.

To further study other conditions, we used different indicators that are available as conditions required for financial integration as possible threshold variables in the model, such as the level of trade integration (TO - Trade Openness) and institutional quality (IQ - Institutional Quality).

Trade openness represents the extent of economic integration with global markets, which can determine how financial flows influence economic growth, whereas institutional quality indicates how effective financial policies and regulatory frameworks support integration. By including these indicators as threshold variables, the model can identify critical levels of trade openness and institutional quality at which financial integration transitions from being beneficial to potentially detrimental.

In addition to the variables mentioned above, following the studies of Kose et al. (2011) and Sum (2012) we included control variables in the regression model such as investment-gross fixed capital formation (GFCF); inflation rate (CPI); and population growth rate (POPU_GROWTH).

Table 1. Summary table of the dataset.

Data	Notation	Sample	Sources	References
Economic growth	GGDP/GDPPC	1996-2019	WDI	Kose et al. (2011) and Sum (2012)
Financial integration	KAOPEN TOTAL KOSE	1996-2019	WDI	Chinn and Ito (2021); Lane and Milesi-Ferretti (2003); Lane and Milesi-Ferretti (2006) and Kose et al. (2011)
Financial depth	FDC	1996-2019	WDI	Kose et al. (2011) and Sum (2012)
Trade integration	TO	1996-2019	WDI	Kose et al. (2011) and Sum (2012)
Institutional quality	IQ	1996-2019	WGI	Kose et al. (2011) and Sum (2012)
Investment	GFCF	1996-2019	WDI	Kose et al. (2011) and Sum (2012)
Inflation rate	CPI	1996-2019	WDI	Kose et al. (2011) and Sum (2012)
Population growth rate	POPU_GROWTH	1996-2019	WDI	Kose et al. (2011) and Sum (2012)

As for the research sample, our first intention is to investigate the relationship between international financial integration and economic growth in Asian economies. We started with a dataset of 10 Asian countries from 1970 to 2020, collected from the global database of the World Bank - World Development Indicators (WDI) and the Worldwide Governance Indicators (WGI). However, due to the fact that the panel threshold regression model (PTR) requires data to be strongly balanced and have no missing values, we had to drop all missing values. Only a few combinations of the dataset satisfy the requirements of the PTR model. Based on the availability of data, we finally selected 8 developed and developing countries, mainly in East Asia and Southeast Asia (China, India, Japan, Korea, Malaysia, the Philippines, Singapore, and Vietnam) during the period from 1996 to 2019. We established a panel data set with about 192 observations by country and year.

Table 2 presents the descriptive statistics of the research sample.

Table 2. Descriptive statistics.

Variables	Number of observations	Mean	Standard deviation	Max.	Min.
Dependent variables					
GDP-GROWTH	192	5.28	3.31	-7.36	14.53
GDPPC	192	4.05	3.28	-9.67	13.64
Financial integration					
TOTAL	192	-0.28	5.65	-16.48	28.82
TOTAL_EMG	192	4.02	5.78	-2.12	36.14
KAOPEN	192	0.18	1.41	-1.22	2.33
KOSE	183	1.73	6.36	-8.06	28.61
Threshold variables					
FDC (Financial depth)	192	99.75	48.85	18.67	221.29
IQ (Institutional quality)	192	0.30	0.76	-0.60	1.64
TO (Trade openness)	192	117.72	106.00	18.35	437.33
Control variables					
CPI (Inflation)	192	3.26	3.37	-1.71	23.12
GFCF (Investment)	192	28.42	6.29	18.18	44.52
POPU-GROWTH	192	1.18	0.89	-1.47	5.32

4. EMPIRICAL RESULTS

This section is divided into two parts: the first part examines the existence of financial integration thresholds, while the second part discusses the significance of any threshold conditions in the progress of international financial integration.

We tested multiple model specifications built from a set of 2 dependent variables, 4 financial integration representatives, and 3 expected prerequisite conditions for positive financial integration. Among these, only 8 models exhibited statistically significant thresholds. The detailed results are discussed in the sections below.

The entire empirical research is conducted with the dependent variable, GDP Growth, and the robustness check is implemented with its alternative proxy (GDP per Capita). The estimated results remain consistent across the

proxies; hence, the following sections will present and discuss the research findings extracted from the baseline model with GDP Growth.

4.1. Financial Integration Thresholds

We first use TOTAL_EMG as a threshold variable to test for the existence of financial integration thresholds. As discussed earlier, to determine whether the financial integration threshold exists, we test the hypothesis pair H0: $\beta 1 = \beta 2 = \beta 3$ (no threshold effect) and H1 (at least one β differs from the others). Then, we sequentially fit the model with a different number of thresholds for further research on the number of thresholds in the model.

Using 300 bootstrap replications, the result (p-value of 0.037) supports the rejection of the null hypothesis and confirms the existence of a financial integration threshold. A similar bootstrap approach is applied with 300 replications for double and triple thresholds. The F2 statistic in the test for double thresholds, with a bootstrap p-value of 0.083, favors the hypothesis of two thresholds. Meanwhile, the F3 statistic of the triple threshold model is statistically insignificant, with a bootstrap p-value of 0.398 (Table 3). In other words, the hypothesis of three thresholds is rejected, leaving a double threshold condition sustained.

Table 3. Results of threshold effects with TOTAL_EMG as the threshold variable.

Threshold variable: TOTAL_EMG	Single threshold	Double thresholds	Triple thresholds
Number of obs.	192	192	192
R^2 overall	0.325	0.410	0.419
R^2 within	0.245	0.272	0.274
R^2 between	0.436	0.610	0.626
Prob > 0	0.000	0.000	0.000
F test that all $u_i = 0$	8.21	5.12	5.06
Threshold-1	3.577	3.577	3.577
Threshold-2	N/A	7.199	7.199
Threshold-3	N/A	N/A	8.119
RSS	908.726	869.585	841.449
MSE	5.409	5.176	5.009
F-stat	10.570	7.560	5.62
p-value	0.037	0.083	0.398

We found double thresholds of TOTAL_EMG at 3.577 and 7.199 (Table 3). The fixed effect model is once again confirmed to be appropriate, as the F-statistic is 5.12 at the 1% level of significance with the null hypothesis that all ui=0.

Table 4. Results of threshold effects with TOTAL as the threshold variable.

Threshold variable: TOTAL	Single thresholds	Double thresholds	Triple thresholds
Number of obs.	192	192	192
R^2 overall	0.278	0.301	0.305
R^2 within	0.088	0.120	0.127
R^2 between	0.539	0.552	0.552
Prob > 0	0.011	0.009	0.002
F test that all $u_i = 0$	5.680	5.620	5.740
Threshold-1	-5.426	-5.426	-5.426
Threshold-2	N/A	4.259	4.259
Threshold-3	N/A	N/A	-1.478
RSS	1097.436	1011.656	1003.810
MSE	6.532	6.022	5.975
F-stat	0.580	14.250	1.310
p-value	0.983	0.000	0.823

We repeat the procedure by replacing the threshold variable TOTAL_EMG with other financial integration variables: TOTAL and KAOPEN. The findings confirm the existence of financial integration thresholds only in the case where TOTAL is used as a threshold variable. We also find the existence of a double-threshold model with a p-value of 0.000. Table 4 presents the estimated results of the threshold models and reveals that the two values of the TOTAL thresholds are -5.426 and 4.259.

Providing different turning points of financial integration proxies (TOTAL and TOTAL_EMG), the non-linear relationship between financial integration and economic growth is examined and summarized in Table 5.

Table 5. Estimated results with available financial integration thresholds.

Regime independent variable Threshold variable	TOTAL_EMG	TOTAL
CONSTANT	5.330*** (3.86)	6.311*** (4.26)
POPU_GROWTH	-0.599** (-2.01)	-0.257 (-0.77)
CPI	-0.068 (-1.08)	-.071 (-1.01)
FDC	-0.024*** (-3.03)	-0.031*** (-3.68)
GFCF	0.108** (2.43)	0.089* (1.84)
Threshold		
0	-0.154 (-0.98)	-0.074 (-0.80)
1	0.468*** (4.63)	1.019*** (2.46)
2	0.216*** (5.31)	-0.066 (-1.14)
Number of obs.	192	192
R^2 overall	0.325	0.301
R^2 within	0.245	0.119
R^2 between	0.436	0.552
Number of thresholds	2	2
Threshold-1	3.577	-5.426
Threshold-2	7.199	4.259
RSS	869.585	1011.656
MSE	5.176	6.022
F-stat	7.560	14.250
p-value	0.083	0.000

Note: t-values are provided in parenthesis; ***, ** and * denotes level of significance at 1%, 5%, and 10% respectively.

With TOTAL_EMG as the threshold variable, a single threshold is confirmed, dividing the relationship into three distinct regimes.

- When TOTAL_EMG is less than 3.577, financial integration (TOTAL_EMG) has a negative impact on GDP growth, with a coefficient of -0.154% for each 1% increase in financial integration. However, this impact is statistically insignificant, with a p-value of 0.330.
- When TOTAL_EMG is in the range of 3.577 and 7.199, we found strong evidence that financial integration will significantly enhance economic growth. Each 1% increase in financial integration leads to a 0.4682% increase in GDP growth, with strong statistical support (p-value = 0.000).
- However, this positive impact is reduced when TOTAL_EMG exceeds 7.199. In this regime, the results show that the growth becomes slower at only 0.216% for each 1% increase in financial integration.

This non-linear relationship implies that for financial integration to support economic growth, a country's total net inflow of direct and indirect investment should be at least approximately 3.577% of GDP. Below this threshold,

financial integration could hinder national economic development. The positive impact of financial integration tends to decline once the indicator surpasses 7.2% of GDP. In countries that have outperformed others in economic development, such as China, South Korea, Singapore, and India, the ability to attract foreign capital becomes more limited (Figure 1). As a consequence, these sources of capital are no longer the main driver of economic growth. By contrast, in other developing economies, increasing financial integration within an optimal range can stimulate economic growth and domestic investment. In this context, Vietnam's financial integration, in terms of capital inflows, remains within the desirable stage of financial integration (Figure 1). This positioning suggests that Vietnam should proactively pursue further integration to maximize economic benefits.

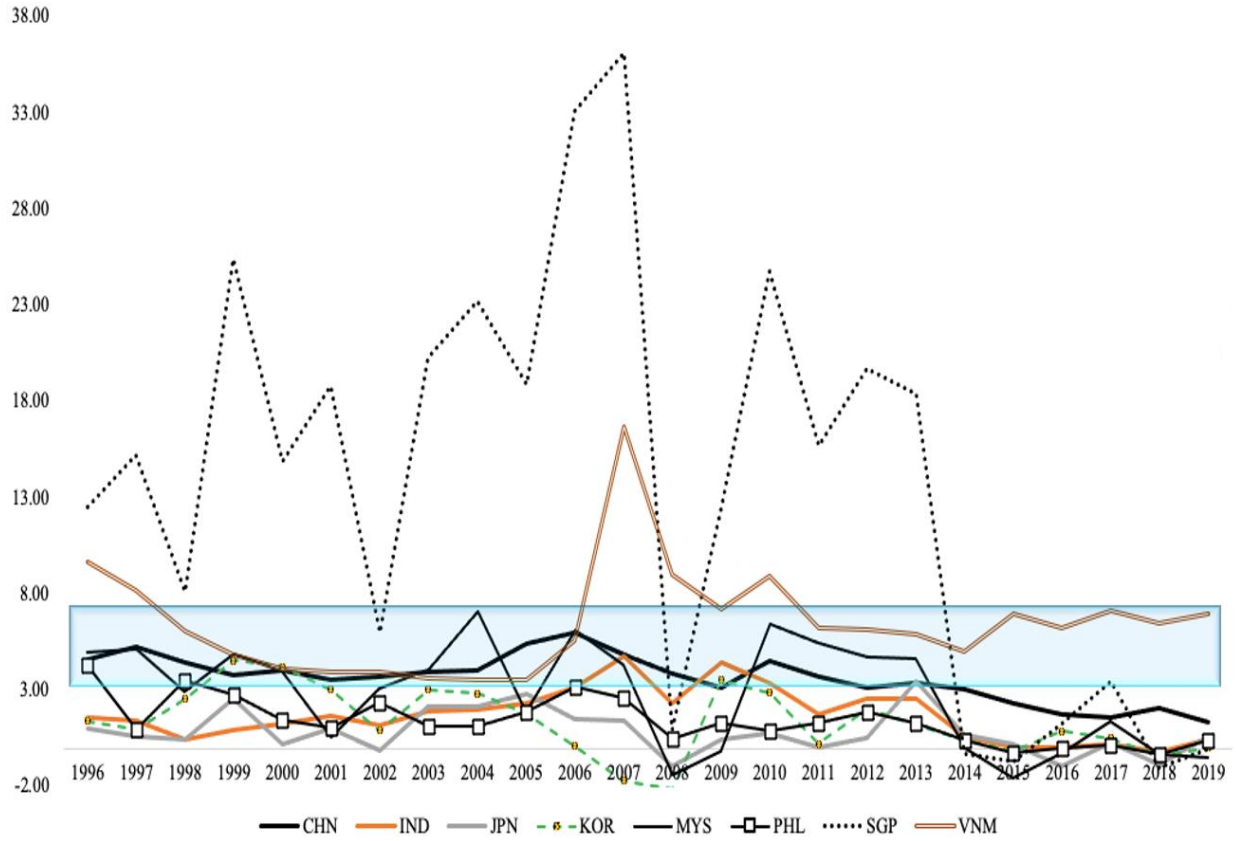

Figure 1. The development of TOTAL_EMG in reporting countries.

When replacing the financial integration threshold with TOTAL, we found two TOTAL thresholds:

- When TOTAL < -5.426 or > 4.259, the effect of financial integration on economic growth is negative. However, the impact is not close to being statistically significant.
- When the total value is in the range of -5.426 and 4.259, there is strong evidence of a possible financial integration impact on economic growth with a p-value of 0.015. Each 1% increase in financial integration may result in a 1.019% increase in GDP.

If the condition TOTAL_EMG considers only the inflow of foreign capital into a given economy, the TOTAL threshold refers to both the incoming and outgoing foreign capital. In this regard, the desirable range of TOTAL values indicates that in highly liberalized financial markets—whether through outbound investments in other countries and economic territories or by opening up to international capital inflows—the net capital flow should range from -5.426% to 4.259% of GDP.

4.2. Threshold Conditions

We also test for the existence of any threshold condition in the progression of financial integration. To do so, we sequentially replace the regime-independent variable with different financial integration indicators and fit various indicators of integration conditions as threshold variables. Table 6 presents the empirical results of expected thresholds of trade openness (TO), financial depth (FDC), and institutional quality (IQ) in model specifications of two different financial integration proxies – KAOPEN and TOTAL_EMG.

Table 6. Prerequisite conditions of TO, FDC, and IQ.

Regime independent variables	**KAOPEN**			**TOTAL_EMG**		
Threshold variables	**TO**	**FDC**	**IQ**	**TO**	**FDC**	**IQ**
CONSTANT	6.576***	4.876***	4.188**	2.297	3.259*	3.500**
	(4.07)	(2.69)	(2.18)	(1.30)	(1.89)	(1.99)
POPU_GROWTH	-0.298	-1.007***	-0.839***	-0.719 **	-0.978***	-0.715**
	(-0.91)	(-3.11)	(-2.49)	(-2.25)	(-2.98)	(-2.19)
CPI	-0.056	-0.088	-0.089	-0.115*	-0.112*	-0.116*
	(-0.81)	(-1.35)	(-1.30)	(-1.77)	(-1.72)	(-1.74)
TO		0.022***	0.035***	0.017*	0.018*	0.015
		(2.42)	(3.76)	(1.77)	(1.84)	(1.54)
IQ	-0.452	1.514		2.758	1.261	1.973
	(-0.22)	(0.81)		(1.44)	(0.67)	(1.02)
FDC	-0.033***	-0.050***	-0.049***	-0.033***	-0.031***	-0.037***
	(-3.01)	(-4.72)	(-4.62)	(-3.2)	(-2.96)	(-3.54)
GFCF	0.083	0.155***	0.132***	0.119**	0.123**	0.114**
	(1.63)	(3.15)	(2.62)	(2.42)	(2.51)	(2.27)
Threshold						
0	-1.771**	1.303***	-0.254	0.791***	0.252***	0.318***
	(-2.06)	(2.70)	(-0.38)	(4.12)	(2.70)	(3.44)
1	-3.674	-0.783**	2.798***	0.178***	0.081	0.175***
	(-0.21)	(-1.93)	(2.73)	(3.89)	(1.41)	(3.65)
2	0.675		-0.899*			
	(1.40)		(-1.75)			
Number of obs.	192	192	192	192	192	192
R2 overall	0.360	0.138	0.191	0.017	0.047	0.032
R2 within	0.103	0.254	0.183	0.256	0.256	0.223
R2 between	0.727	0.136	0.306	0.001	0.008	0.004
Number of thresholds	2	1	2	1	1	1
Threshold-1	319.148	96.470	0.598	68.168	96.726	1.404
Threshold-2	68.325		0.421			
RSS	975.028	809.450	981.879	894.939	893.957	934.455
MSE	5.804	4.818	5.845	5.327	5.321	5.562
F-stat	16.33	31.57	7.07	9.81	10.01	2.29
p-value	0.083	0.000	0.093	0.063	0.040	0.723

Note: *t-values* are provided in parenthesis; ***, ** and * denotes level of significance at 1%, 5%, and 10% respectively.

4.2.1. Trade Openness (TO)

The findings showed that trade openness (TO) consistently serves as an important threshold condition, regardless of which financial integration proxy is used (KAOPEN or TOTAL_EMG).

With the regime independent variable of KAOPEN, we found two trade openness thresholds of 319.148 and 68.325, which divided the sample into three regimes. However, the effect of financial integration on economic growth is statistically significant and negative only in the first regime when TO < 68.3248. In the other regimes, the effect is statistically insignificant.

Conversely, when using TOTAL_EMG as the regime-independent variable, two trade openness thresholds are identified, and their impact is highly significant. The thresholds separate the sample into two regimes, where financial

integration positively influences economic growth in both cases. However, the effect is stronger when TO < 68.1684 compared to when TO > 68.168.

4.2.2. Financial Depth (FDC) and Institutional Quality (IQ)

In addition to trade openness, we examined other possible conditions and discovered the threshold effects of financial depth (FDC) and institutional quality (IQ). The findings indicate one threshold for FDC and two thresholds for IQ.

Similar to TO, we found strong evidence that this was a single threshold of FDC regardless of the financial integration proxy used. Using KAOPEN as the proxy for financial integration, we found the existence of a single FDC threshold of 96.4703, where the impact of financial integration on economic growth shifts from positive to negative once FDC surpasses this value. A similar single-threshold effect is observed when using TOTAL_EMG as the financial integration proxy.

However, the effect of financial integration on economic growth is only statistically and positively significant in the first regime when FDC is smaller than 96.726.

Regarding the IQ threshold variable, the findings also indicated the existence of double IQ thresholds. However, the results were only statistically significant when KAOPEN was used as the regime-independent variable. The two threshold values of IQ separate the sample into three regimes, and there will be a positive effect of financial integration on growth when the IQ value is in the range of [0.421; 0.598].

5. CONCLUSION

The paper employs a panel threshold approach with a bootstrap technique to explore the possibility of a non-linear relationship between different states of financial integration and the economic development of various Asian countries. Empirical results significantly reveal the existence of two turning points in the varying impact of de facto financial integration proxies on economic growth. The findings suggest that the studied countries benefit the most from the financial integration process when national financial openness reaches at least roughly 3.8% of GDP, and this positive impact tends to drop when financial liberalization exceeds 7.2% of GDP. This also implies that gradually opening up the financial system to the regional and global markets in the early stage (below 3.8% of GDP) could trigger increased competition, amplified sensitivity, and volatility in a fragile financial system. The research findings further highlight the importance of certain prerequisite conditions for effective and positive financial liberalization, particularly financial depth and trade openness. This suggests that individual countries need to strengthen their internal capacity before opening up their financial system and integrating deeply into regional and global markets. This approach would allow them to better absorb external shocks and take full advantage of the integration process.

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