Impact of Financial Liberalization and Trade Intensity on Economic Growth in South Asian Countries: A Panel ARDL Approach

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Abstract

This study investigates the impact of financial liberalization and trade intensity on economic growth in selected South Asian countries—Pakistan, India, Bangladesh, and Sri Lanka—using panel data from 2000 to 2019. The selection of these countries is due to the availability of reliable data from the World Development Indicators (WDI) Database. Trade intensity equals the ratio of total trade (imports and exports) to GDP, while financial liberalization is through interest rates. The analysis employed Kao co-integration, unit root tests, cross-sectional dependence, slope heterogeneity, causality and the ARDL model to evaluate short- and long-term relationships. GDP growth and financial liberalization are stationary at this level. The trade intensity is stationary at first difference. According to Dumitrescu-Hurlin, financial liberalization does cause trade intensity. The panel ARDL results suggest that financial liberalization and trade intensity negatively and positively influence economic growth.

Keywords: Economic Growth; Financial Liberalization; Trade Intensity; ARDL Model.

Introduction

South Asia faces significant trade and investment integration challenges, hindering its economic development and efforts to reduce poverty. Key issues include fostering regional economic growth while ensuring smaller economies can benefit from the expansion of larger ones. Much of the existing political and academic research has focused on enhancing competitiveness and driving economic development. Comprising countries such as Pakistan, Bangladesh, Sri Lanka, India, Iran, and Bhutan, South Asia was the world's second-fastest-growing region in 2016, with a real GDP growth rate of 7% (Jomo, 2017). Trade in services has been identified as a potential engine for development, with ASEAN's service trade growing significantly between 2010 and 2019. Although the COVID-19 pandemic disrupted global markets in 2020 and 2021, services trade rebounded 2022 as restrictions eased (Sermcheep, 2019).

Trade intensity, defined as the extent to which a country is involved in global trade relative to its total economic activity, has increased significantly over time, particularly with expanding global supply chains and integrating developing countries into the world economy (Elms & Low, 2013). Historically, trade intensity was low in pre-industrial times due to limited trade networks, but the Industrial Revolution marked a turning point, boosting trade through

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advancements in transportation and communication. As global trade has expanded, South Asia faces significant developmental challenges, with financial imbalances impeding regional progress. Since the 1980s, globalization, facilitated by reduced trade barriers, has transformed the structure of global trade, with intermediate products replacing final goods as the primary traded items (Gereffi et al., 2005).

Countries in the region are increasingly integrated into global value chains, which facilitate the adoption of new technologies, industrial restructuring, and productivity growth (Dent, 2017). Trade has been shown to contribute to productivity and growth by enhancing access to intermediate goods and facilitating the flow of technology and knowledge (Alcalá et al., 2002; Frankel & Romer, 2017). In parallel, financial liberalization, which promotes the free flow of capital and services, has fostered economic growth. Financial liberalization enhances risk-sharing and diversification by reducing credit controls, deregulating interest rates, and encouraging competition, leading to more efficient capital allocation (Karras, 2003; Tekin, 2012).

The financial systems in many emerging economies, particularly in Asia, were once characterized by heavy regulation and government controls (Adam, 2011). Financial liberalization, which involves reducing restrictions on capital flows and deregulating financial markets, has become a key policy tool to stimulate economic growth and attract international investment (Baele et al., 2007). While earlier research focused on the efficiency of financial markets, recent studies highlight the complexities of the relationship between financial development and economic growth, particularly in the wake of the 2007–2008 financial crisis, which revealed the nonlinear dynamics between financial system development and growth (Cecchetti & Kharroubi, 2019).

This study explores the relationship between trade intensity, financial liberalization, and economic growth in South Asia. Specifically, it seeks to answer the following research questions: (1) Does trade intensity influence the economic growth of South Asian countries? (2) Does financial liberalization positively impact economic growth in the region? (3) How do trade intensity and financial liberalization interact to influence economic growth? (4) Is there a significant relationship between financial liberalization and trade intensity?

The research objectives are to (a) assess the impact of financial liberalization on economic growth in South Asia, (b) examine the link between trade intensity and economic growth, and (c) explore the connection between trade intensity and financial openness. These inquiries address a critical gap in the literature on how these factors influence economic development in South Asian countries, which have distinct economic profiles and growth trajectories.

This study is structured as follows: the next section provides a literature review and theoretical framework, followed by the research methodology, which outlines data collection and analytical techniques. The results of the analysis are presented in the subsequent section, and the study concludes with findings, policy implications, and a summary of contributions to the field.

Literature Review

Financial liberalization and trade openness are critical elements for achieving GDP growth in the modern period. This literature review examines studies across three themes: (1) the relationship between trade openness and economic growth, (2) the link between trade openness and financial liberalization, and (3) how financial liberalization influences economic growth.

Economic Growth and Trade Openness

The interaction between financial stability and economic growth has been widely discussed since the 19th century, with numerous studies exploring the relationship between financial openness and economic development. Turan et al. (2007) analyzed data from 1965 to 2004 in

India, finding that real income growth leads to increased exports and imports, demonstrating a unidirectional causality between trade and income. Similarly, Hassan et al. (2011) used panel data from 1980 to 2007, showing that financial development fosters economic growth in developing countries. Siddikee and Rahman (2021) found that capital formation negatively impacts GDP in the short term but contributes positively in the long term, suggesting inefficiencies in capital management. Tripathy and Mishra (2023) confirmed a long-term relationship between financial growth and economic development, supporting the supply-leading hypothesis.

Asteriou and Spanos (2019) examined 26 EU countries between 1990 and 2016, concluding that while financial development historically boosted economic growth, it reduced growth during financial crises. Katircioglu et al. (2023) observed significant changes in South Africa's domestic credit as trade and growth fluctuated, but the effects were statistically insignificant. Mustafa (2023) used the VECM method to show that trade openness and financial liberalization significantly contribute to economic growth in India and Pakistan. Similarly, Muhammad et al. (2013) found a positive short-term relationship between economic growth and financial liberalization through the ARDL method. Baumann et al. (2013), in a meta-analysis of 60 studies, reported that financial liberalization generally promotes economic growth, though the effect is minimal. Shaharuddin et al. (2020) found no immediate impact of financial liberalization on GDP, except in South Korea, where bi-directional causality was present. Rehman et al. (2015) highlighted a single causal relationship, with trade liberalization positively affecting Saudi Arabia's growth. Adam (2020) found that while financial liberalization positively impacted MENA countries, its effect was minor in Sub-Saharan African nations.

Bowale et al. (2019) emphasized that trade openness and financial development policies are crucial for Nigeria's economic development. Koirala et al. (2024) suggested that financial development harms policy performance in developed countries more than in developing ones. Maimbika et al. (2016) demonstrated a long-run co-integration between financial liberalization and economic growth.

Financial Liberalization and Economic Growth

The relationship between financial liberalization and economic growth has been explored extensively. Turan et al. (2007) found that financial development in India led to increased exports and economic growth. Hassan et al. (2011) demonstrated that financial development is essential for boosting economic growth in developing nations. Similarly, Siddikee and Rahman (2021) observed that capital formation negatively impacted GDP in the short term but had a positive long-term effect. Tripathy and Mishra (2024) confirmed the long-term positive impact of financial development on economic growth, aligning with the supply-leading hypothesis.

Asteriou and Spanos (2019) noted that financial development initially increased growth but reduced it during economic crises in the EU. Katircioglu et al. (2023b) found no significant co-integration between domestic credit, trade, and growth in South Africa but highlighted the role of money supply in influencing output. Mustafa (2023) showed that trade openness and financial liberalization are key drivers of growth in India and Pakistan. Baumann et al. (2013) concluded from their meta-analysis that while financial liberalization contributes to growth, its effect is modest. Shaharuddin et al. (2020) found no immediate impact of economic liberalization on GDP except in South Korea, where bi-directional causality was present. Rehman et al. (2015) established that trade liberalization positively impacted Saudi Arabia's growth, with financial development also playing a significant role. Adam (2020) found that financial liberalization favorably affected economic growth in MENA countries but had a more negligible impact in Sub-Saharan Africa.

Financial Liberalization and Trade Openness

The relationship between financial liberalization and trade openness is central to global economic performance. Sghaier (2023) demonstrated a strong relationship between trade and development in North Africa from 1991 to 2015 using panel data and GMM methods. Wai et al. (2024a) emphasized the role of interest rates in ensuring the interdependence of financial and trade openness. Bos et al. (2020) found that trade openness correlates with industrial specialization in countries with less intra-industry trade and financial transparency in more advanced economies. Ahmed and Suard (2009) suggested that increased financial openness reduces growth in output and consumption in Africa. Kim et al. (2010) examined the relationship between trade openness and financial development in 88 countries from 1960 to 2005, finding a positive long-run relationship but a negative short-run effect, particularly in low-income or high-inflation countries. Ibrahim and Sare (2018) found that while human capital impacts financial development, trade openness is more significant for private credit than domestic credit in Africa. Hurlin and Venet (2001) concluded that trade openness positively impacts economic development, emphasizing the need for effective government policies to enhance international trade.

Goh et al. (2019) showed bi-directional causality between economic and trade openness across high and low-income countries, except in underdeveloped nations, where trade openness influenced financial transparency. Nzama et al. (2023) found that countries with higher governmental effectiveness, such as those with strong bureaucracies, promote international cooperation through trade and financial openness. Anutechia (2010) identified a mutually causal relationship between trade and economic openness but found no significant effect of capital and trade openness on financial development. The interaction between trade openness, financial liberalization, and economic growth has been extensively studied. The evidence suggests that while financial liberalization and trade openness contribute to economic growth, the effects vary across regions and time periods. The relationship between these variables is complex and often influenced by financial crises, government policies, and economic development.

Research Framework

This model helps present the relationships between the changes in trade intensity and the financial liberalization on growth since it gives directions and the nature of the relationships. According to this study, the subsequent hypotheses are developed

H1: Trade intensity has a significantly positive impact on economic growth.

H2: Financial liberalization positively influences Economic growth.

Data and Variables

The study observes the relationship between South Asian countries' trade intensity, financial liberalization, and economic growth. This research covers four South Asian countries, Pakistan, India, Siri Lanka, and Bangladesh, and it involved 19 years of statistics from 2001 to 2019. The accessibility of legitimate statistics during the period played a significant role in determining which countries were chosen for this investigation. For this purpose, the World Development Indicators Database provided the data. GDP growth rate per capita at 2017 USD prices is utilized as an intermediary for the regressed economic growth. Trade intensity and financial liberalization, the other two primary variables, are considered; adding up all the imported and exported quantities of goods and services (in current USD) and dividing the result by GDP (also in current USD), we can get the trade intensity. The GDP growth rate is measured as a percentage yearly using the same currency in the country and market prices. Amounts are given in US dollars and are predicated on 2015 constant prices. Table 1 contains all of the variables used in this position.

Table 1: Data Description		
Variables	**Description**	**Source**
TRADEINTENS	Based on the annual market price in constant local currency and represented as a percentage figure. The aggregates provided in US dollars are based on persistent prices from 2015.	(WDI) database World Bank https://databank.worldbank.org/source/world-development-indicators
FL	This lending interest rate is arrived at by using the GDP deflator and adjusting for the inflation rate to arrive at the real interest rate. This variable is what we employed to proxy financial liberalization.	
GDPGR	Based on the annual market price in constant local currency and represented as a percentage figure. The aggregates provided in US dollars are based on persistent prices from 2015.	

Table 2 constitutes descriptive statistics for three crucial economic factors: financial liberalization, trade intensity, and economic growth across all these countries, including Pakistan, India, Siri Lanka and Bangladesh, and overall averages ("All") for each variable. The means, median, maximum, minimums, skewness, and kurtosis of each series are displayed in the summary statistics of Ali et al. (2022).

Table 2: Descriptive Statistics						
Financial Liberalization						
Country	**Mean**	**Max**	**Min**	**SD**	**Skewness**	**Kurtosis**
Bangladesh	4.76	9.26	-13.64	4.64	-3.47	14.56
India	4.96	8.59	-1.98	2.57	-0.98	3.90
Pakistan	3.19	7.76	-1.71	2.23	-0.28	3.39
Sri Lanka	3.04	9.25	-13.17	4.67	-2.17	8.78
All	4.02	9.26	-13.64	3.78	-2.69	13.15
Trade Intensity						
Bangladesh	0.39	0.50	0.29	0.07	0.22	1.63
India	0.43	0.57	0.27	0.09	-0.19	2.28
Pakistan	0.30	0.36	0.23	0.04	-0.09	2.00
Sri Lanka	0.59	0.84	0.45	0.14	0.52	1.59
All	0.43	0.84	0.23	0.14	1.06	3.79
Economic growth						
Bangladesh	6.12	7.88	3.83	1.00	-0.47	2.79
India	6.60	8.50	3.09	1.71	-0.76	2.21
Pakistan	4.34	7.83	1.50	1.80	0.38	2.18
Sri Lanka	5.13	8.67	-1.55	2.74	-0.95	3.44
All	5.55	8.67	-1.55	2.08	-0.86	3.84

Source: Author's calculation

Financial liberalization shows a mean of 4.02, with Bangladesh exhibiting the highest variability (SD = 4.64). Trade intensity averages 0.43, with Sri Lanka leading at 0.59. Economic growth has a mean of 5.55, with India showing the highest average (6.60). Overall, the data indicate considerable variation in financial liberalization and trade intensity among the countries, while economic growth remains relatively stable.

Methodology

The equation will be applied to study the link between trade intensity, financial liberalization, and economic growth in light of the above discussion.

$Y_{it} = \alpha + \beta_1 Fl_{it} + \beta 2\ TI_{it} + \varepsilon$

In this model:

Y_{it} denotes the economic growth for country i at time t.

Fl_{it} represents the level of financial liberalization in country i at time t.

TI_{it} indicates the trade intensity in country i at time t.

ε represents the error term.

The interaction in this model focuses on the impact of trade intensity and financial liberalization as two independent variables that influence South Asian countries. To determine the deltas in value added per worker, it evaluates if higher financial openness increases trade activity, and in delivering this evaluation, it determines the deltas of the combined impacts of those above on regional development.

Results and Discussion

To study the effect of financial liberalization and trade intensity on the economic growth of South Asian countries, various statistical measures are used to have appropriate results.

Cross-Section Dependence Test

The cross-section dependence test in panel data analysis checks whether or not the residual of a regression model depends on the cross-section, that is, characteristics such as country or firm, in any given period. This type of correlation can sometimes pose a problem to the overall validity of the statistical tests and models if it needs to be implemented more effectively Maddala & Wu (1999). The table above shows three tests are employed to check the H0 of cross-section dependence in the residuals.

Table 3: Cross-Section Dependent Test

Periods included: 19		
Cross sections involved: 4		
Total panel observations: 69 (Degrees of freedom: 6)		
H0: No Correlation in residuals		
Test	Statistic	Prob.
Breusch-Pagan LM	17.64***	0.0072
Pesaran scaled LM	2.21**	0.0274
Pesaran CD	2.49**	0.0129
** And *** represents the H0 rejection at 5% and 1% significance level.		
Source: Author's calculation		

The result obtained from the Breusch-Pagan LM test is 17.64 and suggested that when the value is more excellent than 0.05, the H0 should be refused, and when the value is lower than 0.05, the H0 should be retained. Likewise, the Pesaran scaled LM test yields a value of 2—dengue case notification21, with a p-value of 0. 0274. Although the p-value is lower than 0. 05, the H0 is rejected at a 5% significance level. This result also suggests that the cross-section is dependent on this econometric model. The Pesaran CD test yields a statistic with 2.49 and a p-value of 0. 0129. That p-value has been calculated to be lower than 0.05; consequently, the H0 is also not accepted at a 5% significance level. Since all three tests on their part produce a 'no' to the H0, it is concluded that there is strong evidence of cross-section dependency in the residuals. From the finding, it can be resolved that the residuals are auto-correlated across the different cross-sections, indicating that the model's expectations for the residuals are independent and incorrect.

Slope Heterogeneity test

Slope heterogeneity tests have been developed to test the hypothesis that the slope coefficients about independent variables for a dependent variable are the same for cross-sections or groups in the data set. Thus, while analyzing this relationship, financial liberalization and trade intensity are the regressor, and economic growth is the regressor.

Table 4: Testing for slope heterogeneity		
H0: Slop coefficient exhibits homogeneity		
(Pesaran, Yamagata. 2008. Journal of Econometrics)		
	Delta	p-value
	-0.24	0.8090
adj.	-0.27	0.7850
(Blomquist, Westerlund. 2013. Economic Letters)		
	Delta	p-value
	0.21	0.8360
adj.	0.23	0.8150
HAC Kernel: Bartlett with an average bandwidth of 1.75		
*** represents the H0 rejection at a 1% level of significance.		
Variables partialled out: Constant		

The Pesaran and Yamagata and Blomquist and Westerlund tests provide empirical evidence that the slope coefficients for the link within financial liberalization, trade intensity and economic growth are homogeneous. This means that coefficients of financial liberalization and trade intensity are high in all the groups we have analyzed above because the p-values are high. H0 cannot be rejected.

Unit Root Test

A unit root test is employed to establish if the underlying data from the time series is stationary or non-stationary, which is useful when carrying out econometric models and forecasting. A unit root test checks whether it is possible or not that a given data has a unit root, which is a property of a non-stationary process. Because of the non-stationary characteristics, the statistical inference and the forecasting models can only be unreliable, thus the need for this test Choi (2001).

Table 5: Unit Root							
Null: Unit Root Process							
Cross-Sections: 4							
Method	**Statistic**	**Prob.****	**Obs.**	**Statistic**	**Prob.****	**Obs.**	**Order**
	Level			**1st Difference**			
Series: GDP Growth							
Im, Pesaran and Shin W-stat	-3.00	0.001	69				I(0)
ADF - Fisher Chi-square	22.59	0.004	69				
PP - Fisher Chi-square	17.83	0.023	72				
Series: Financial Liberalization							
Im, Pesaran and Shin W-stat	-4.36	0.00	69				I(0)
ADF - Fisher Chi-square	32.67	0.00	69				
PP - Fisher Chi-square	32.63	0.00	69				
Series: Trade Intensity							
Im, Pesaran and Shin W-stat	-0.71	0.239	72	-5.55	0.000	68	I(1)
ADF - Fisher Chi-square	8.90	0.351	72	40.82	0.000	68	
PP - Fisher Chi-square	9.10	0.334	72	40.46	0.000	68	
*** represents the H0 rejection at a 1% level of significance.							

The stationarity test findings indicate that GDP Growth and Financial Liberalization are stationary at the level, whereas Trade Intensity is stationary only after first differencing. This differentiation ensures that the data used in the subsequent analyses are reliable and accurate enough. Likewise, when testing for stationarity of Financial Liberalization, there is strong evidence of integrated series at level one. Therefore, Financial Liberalization is also non-stationary at level (I (0)), indicating that further differencing is unnecessary. The stationarity test findings indicate that GDP Growth and Financial Liberalization are stationary at the level, whereas Trade Intensity is stationary only after first differencing. This differentiation ensures that the data used in the subsequent analyses are reliable and accurate enough.

Kao Residual Co-integration Test

Indeed, the Kao Residual Co-integration Test is a testing procedure that applies to identify a long-term equilibrium link between several integrated factors in panel data. This test determines if these variables are individually non-stationary and have a co-integration relationship because they are all associated with the same stochastic trend Persyn & Westerlund (2008).

Table 6: Kao Co-integration Test

H0: No co-integration				
Trend assumption: No deterministic trend				
Newey-West automatic bandwidth selection and Bartlett kernel				
			t-Statistic	Prob.
ADF			-3.94***	0.000
Residual variance			3.44	
HAC variance			3.20	
Augmented Dickey-Fuller Test Equation				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID(-1)	-0.693***	0.12	-6.01	0.000
R-squared	0.38	Mean dependent var		-0.04
Adjusted R-squared	0.38	SD dependent var		1.98
SE of regression	1.57	Akaike info criterion		3.75
Sum squared resid	147.49	Schwarz criterion		3.79
Log-likelihood	-113.48	Hannan-Quinn criter.		3.77
Durbin-Watson stat	1.73			
** & *** represent the H0 rejection at 5% and 1% significance level.				

The table also presents a null hypothesis stating no co-integration among the selected factors. Notably, the Kao test includes estimating the residuals from the co-integration regression by their use and testing the theory of the stationarity of these residuals based on their lagged values. Such an approach allows us to determine if the variables have a long-run relationship of interest in the context of economic growth, trade intensity and financial liberalization. In summary, the Kao Residual Co-integration Test indicates a significant long-term equilibrium relationship among economic growth, trade intensity, and financial liberalization. This result implies that these variables fluctuate independently in the panel data analyzed and are linked by a common trend that maintains their relationship over time.

Pairwise Dumitrescu-Hurlin Panel

This test is a statistical technique that establishes causality between two variables by considering a panel data structure and cross-sectional and time series characteristics. This test generalizes the concept of Granger causality to panel data analysis, which helps determine whether a variable Granger causes another variable in a specified panel Hurlin et al. (2011).

Table 7: Pairwise Dumitrescu-Hurlin Panel Causality Tests

Null Hypothesis	W-Stat.	Zbar-Stat.	Prob.
TRADEINTENS does not homogeneously cause GDPGR	0.44	-0.78	.436
GDPGR does not homogeneously cause TRADEINTENS	1.74	0.64	.523
FL does not homogeneously cause GDPGR	.39	-0.82	.410
GDPGR does not homogeneously cause FL	.72	-0.48	.634
FL does not homogeneously cause TRADEINTENS	.18	2.15	.032*
TRADEINTENS does not homogeneously cause FL	.91	0.79	.427

In this context, the table examines the causal relationships among three variables: These are Gross Domestic Product Growth Rate (GDPGR), Financial Liberalization (FL) and Trade Intensity (TRADEINTENS). The H0 associated with each P value tested in the table postulates that one variable causally influences another on average and for none of the countries. Therefore, based on these tests, results show that only financial liberalization has a causal influence on trade intensity among the tested variables. The other pairs, Trade Intensity and GDP Growth Rate, Financial Liberalization and GDP Growth Rate and GDP Growth Rate and Financial Liberalization, do not show any patterns of causality in the panel. These findings are essential for comprehending the relationships between these economic indicators and indicate that while Financial Liberalization affects Trade Intensity, the other cross-causality between the variables is still uncertain.

Panel Autoregressive Distributed Lag Model

ARDL is a widely applicable econometric model that estimates one regressed and one or more regressor in the short and long run (Ozturk & Acaravci, 2011a). This model is particularly significant when the variables in question are I (0), I (1) or of other distinct orders or when tracking changes in their time series is imperative. The approach is called the ARDL to estimate the short-term and long-term relationships; it uses lagged values of the regressor and the regressed (Ozturk & Acaravci, 2011).

Table 8: Panel Autoregressive Distributed Lag Model

Variable	Coefficient	Std. Error	t-Statistic	p-value
Long Run Equation				
FL	-0.58*	0.31	-1.85	0.069
TRADEINTENS	12.37***	1.99	6.23	0.000
Short Run Equation				
COINTEQ01	-0.16**	0.12	-1.34	0.026
D(FL)	0.00	0.10	0.03	0.975
D(TRADEINTENS)	-12.44	9.14	-1.36	0.179
Mean dependent var	-0.03	SD dependent var		1.96
SE of regression	1.46	Akaike info criterion		3.43
Sum squared resid	125.14	Schwarz criterion		3.87
Log likelihood	-111.21	Hannan-Quinn criter.		3.61

In the long run, positive influences regarding the trade intensity and the adverse effects of financial liberalization on economic growth are detected. However, in the short-run analysis, no such influences are observed.

Conclusion

The primary objective of this research is to observe how trade intensity and financial liberalization influenced economic growth in South Asian countries, including Pakistan, Bangladesh, India, and Sri Lanka, by employing data from the panel spanning the years 2000 to 2019. Financial Liberalization is determined by real interest rate, while trade intensity is measured by import plus export over GDP. Our study applied the unit root test to check stationarity, the cross-section dependent test, and the ARDL model to investigate the short and long-run relationship between financial liberalization, trade intensity, and economic growth. Our findings illustrate that trade intensity positively influences economic growth, while financial liberalization hurts South Asian economies. The following suggestions are given in light of the conclusions: Governments and policymakers must prioritize reducing tariffs and trade barriers, enhancing infrastructure, and supporting small and medium-sized enterprises to stimulate economic growth. By fostering innovation and technology, they can attract investment and increase consumer demand, promoting greater economic integration and a robust financial market across Asia.

Thus, they can use the results of this study in designing and assessing policies concerning trade and financial reforms to gain the highest economic efficiency and stability. It thus fills the gap between theory and empirical practice for policy decision-making for economic development. The study's limited period constraints data analysis, while excluding certain South Asian countries restricts generalizability. More statistical tools may help variable estimation, and a narrow selection of variables overlooks critical factors. Regarding future recommendations, expanding the timeframe, geographic scope, statistical methods, and variable range is essential for a more comprehensive analysis.

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