Cilt 27 • Sayı 1 • Nisan 2024
SS. 308-320 / Araştırma Makalesi

Do FDI And Trade Openness Affect Economic Growth Differently Across Income Groups? Case Studies From Asian Countries

DYY ve Ticari Açıklık Ekonomik Büyümeyi Ülkelerin Gelir Gruplarına Göre Farklı mı Etkiliyor? Asya Ülkeleri Üzerine Uygulamalar

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ABSTRACT

This study examines the nexus between foreign direct investment (FDI), trade openness (TRO) and economic growth for selected 11 high-income and 22 middle- and low-income Asian countries within a model using a more recent panel dataset over the period 2000–2021. The cointegration test has been applied in this study, which shows that whether there is a long-term interrelationship between FDI and economic growth, which we focus on in particular, and then the covariance matrix estimators that are developed by Driscoll and Kraay are used. Our findings indicate that there is a positive relationship between FDI and TRO, and economic growth for high-income countries, whereas the relationship between FDI and economic growth is negative for middle- and low-income countries. This study provides insights on why governments and policy makers in developing countries should focus on prioritizing domestic investment and production strategies for sustainable economic growth rather than simply emphasizing the attractiveness of FDI and the indispensability of import-oriented trade liberalization.

KEYWORDS

Foreign Direct Investment, Trade Openness, Economic Growth, Asian countries, Panel Data Analysis

ÖZ

Bu çalışma, doğrudan yabancı yatırım (DYY), ticari açıklık (TRO) ve ekonomik büyüme arasındaki ilişkiyi, 2000-2021 dönemi için bir model çerçevesinde seçilmiş 11 yüksek gelirli ve 22 orta ve düşük gelirli Asya ülkesi için güncel bir panel veri seti kullanarak incelemektedir. Bu çalışmada, özellikle odaklandığımız DYY ve ekonomik büyüme arasında uzun dönemli bir karşılıklı ilişki olup olmadığını gösteren eşbütünleşme testi uygulanmış ve ardından Driscoll ve Kraay tarafından geliştirilen kovaryans matrisi tahmincileri kullanılmıştır. Bulgularımız, yüksek gelirli ülkeler için DYY ve TRO ile ekonomik büyüme arasında pozitif bir ilişki olduğunu, orta ve düşük gelirli ülkeler için ise DYY ve ekonomik büyüme arasındaki ilişkinin negatif olduğunu göstermektedir. Bu çalışma, gelişmekte olan ülkelerdeki hükümetlerin ve politika yapıcıların neden sadece DYY'nin çekiciliğini ve ithalat odaklı ticari serbestleşmenin vazgeçilmezliğini vurgulamak yerine sürdürülebilir ekonomik büyüme için yerli yatırım ve üretim stratejilerine öncelik vermeye odaklanmaları gerektiği konusunda fikir vermektedir.

ANAHTAR KELİMELER

Doğrudan Yabancı Yatırım, Ticari Açıklık, Ekonomik Büyüme, Asya Ülkeleri, Panel Veri Analizi

Makale Geliş Tarihi / Submission Date 02.03.2024	*Makale Kabul Tarihi / Date of Acceptance* 17.03.2024
Atıf	Sugözü, İ. H. ve Dorbonova, İ. (2024). Do FDI And Trade Openness Affect Economic Growth Differently Across Income Groups? Case Studies From Asian Countries. *Selçuk Üniversitesi Sosyal Bilimler Meslek Yüksekokulu Dergisi*, 27 (1), 308-320.

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INTRODUCTION

In both theoretical and empirical studies, the relationship among FDI, trade openness, and economic growth has been extensively discussed and debated. FDI and trade openness are regarded as crucial factors contributing to the economic growth of any country. Furthermore, FDI and trade openness can serve as fundamental instruments in attaining macroeconomic objectives by fostering sustainable economic growth, as FDI is a crucial channel of technology transfer, knowledge, skills, and capital to host nations, leading to poverty reduction, improved availability of education and healthcare, as well as new jobs and management expertise, and promoting and maintaining sustained economic growth (Udemba, 2023; Suehrer, 2019; Baniak et al., 2005, Hussain and Haque, 2016). Therefore, numerous developing countries are adopting liberal economic policies to stimulate increased capital inflow from developed nations (Bengoa and Sanchez-Robles, 2003). Therefore, in order to better understand how FDI can contribute to sustainable development, it is essential to investigate the cause-and-effect relationship between FDI and economic growth, especially by income groups. Furthermore, nations are becoming more integrated for accelerated economic growth and are opening up for free trade due to the effects of globalization (Middleton, 2007). Economic and technological elements propel the expansion of global production, facilitated by the liberalization of trade policies and increased FDI inflows. In this context, trade openness provides an exceptional chance for developing nations to promote and attain economic growth through trade and investment (Arndt, 1999). Trade openness has a significant role in the flow of FDI, capital inputs, and the exchange of goods and services toward host countries. However, theoretical insights need to be substantiated by empirical analysis, especially in case some macroeconomic aggregates such as FDI and TRO may respond differently across country groups.

This study analyses the relationship between FDI, trade openness and economic growth in Asian countries between 2000 and 2021 by grouping countries according to their income. FDI and trade openness are factors that affect each other and we cannot consider one without the other. Therefore, this study investigates the impact of these two inseparable variables on economic growth in Asian countries. The fact that there is a limited number of studies on the relationship between FDI and TRO and growth focusing on Asian economies, addressing the recent period and conducting empirical analyses by income groups shows the importance and originality of the study. Because it is possible that both FDI and trade openness respond differently in different income groups. Therefore, the study contributes to the literature on the relationship between FDI and trade openness and economic growth and emphasizes the importance of the relationship between these three variables for countries in different income groups. According to the results of the research, it is proved that economic growth responds quite differently to these two variables across income groups. The findings suggest that policymakers in middle- and low-income countries, as opposed to high-income countries, should focus on prioritizing economic growth strategies rather than simply emphasizing the attractiveness of FDI and the importance of trade liberalization. This paper is structured as follows: A brief overview of recent developments of FDI in Asian countries, a review of the existing literature, the data and methodology of the study, a tabular presentation of the empirical results of the study and a concluding section with policy recommendations.

1. A SUMMARY OF RECENT DEVELOPMENTS IN FDI IN ASIAN COUNTRIES

According to the report by UNCTAD (2023), Asia is the largest recipient of FDI, representing half of the total global inflows of FDI. The inflow of FDI to developing Asia was recorded at 516 billion dollars in 2020, 662 billion dollars in 2021, and remained flat at $662 billion in 2022. The inflows were greatly concentrated, with nearly 80% of FDI in five economies, namely China, Singapore, Hong Kong (China), India, and the United Arab Emirates, respectively. In the East Asia region, FDI inflow was recorded at 334 billion of dollars in 2021 and decreased by 3 percent to $324 billion in 2022. The East Asia region includes China, Japan, Mongolia, North Korea, South Korea, and Taiwan. Hong Kong and Macau, two small coastal cities located in the south of China, are autonomous regions under Chinese sovereignty. FDI in China rose by 5 percent in 2022, the growth was primarily in manufacturing and high-tech industries, particularly electronics and communication equipment, and was predominantly driven by European Multinational Enterprises (MNEs). FDI inflows to Southeast Asia were calculated at 119 billion of dollars in 2020, 213 billion of dollars in 2022, and $223 billion, the highest level ever recorded. South-East Asia includes Brunei, Cambodia, East Timor, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam. Singapore is the major recipient of FDI among Southeast Asian countries. It's FDI inflow reached $141 billion, which represents nearly two-thirds of the total flows to the Association of Southeast Asian Nations (ASEAN). There was a 39 percent increase in inflows to Malaysia, reaching a new record of $17 billion for the nation in 2022. Moreover, inflows to Vietnam increased by 14 percent to $18 billion, while those to Indonesia grew by 4 percent, reaching $22 billion. In contrast, FDI in the Philippines decreased by 23% due to several divestments.

In South Asia, the inflow of FDI registered at 71 billion of dollars, 53 billion of dollars, and 57 billion of dollars for 2020, 2021, and 2022, respectively. South Asia includes countries namely, Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka. FDI inflows to India increased by 10%, reaching $49 billion, as the country emerged as the third-largest host for greenfield project announcements and the second largest for international project finance deals. FDI in Bangladesh expanded by 20%, reaching $3.5 billion. In West Asia, inflow FDI was recorded at 35 billion of dollars in 2020, 56 billion of dollars in 2021, and FDI fell by 14 percent to $48 billion in 2022. West Asia includes Armenia, Azerbaijan, Bahrain, Cyprus, Georgia, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, Syria, Türkiye, the United Arab Emirates, and Yemen. Inflows to Saudi Arabia declined by 59 percent, reaching 7.9 billion and in United Arab Emirates rose by 10 percent, reaching $23 billion, marking the highest recorded amount in 2022. Finally, FDI inflows to Central Asia, comprising Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan, increased by 39 percent to $10 billion in 2022, compared to $7 billion in 2020 and 2021. Inflows to Kazakhstan nearly doubled, reaching $6.1 billion, primarily in extractive industries. FDI also increased in Uzbekistan by 11%, reaching $3 billion.

2. LITERATURE REVIEW

In recent years, many researchers have aimed to explain the link between FDI, trade openness and economic growth, so the relationship between FDI, trade openness and economic growth has been the subject of many empirical studies. The empirical analysis of the relationship among economic growth, trade openness, and foreign direct investment yields varied outcomes in emerging and developing nations. There is no consensus on whether foreign direct investment leads to economic growth or if trade openness is the driving factors for economic growth. This matter holds significant importance for governments and policymakers in formulating appropriate strategies for the economic advancement of nations.

Hossain and Hossain (2023) examined the causal relationship between economic growth and FDI in China over a 40-year period, from 1981 to 2020. The research determined that the growth of the economy prompts the influx of FDI. Similar results were found by Gunby et al. (2017) in the case of China, Nguyen (2020) for Vietnam, and Ali and Hussain (2017) in the case of Pakistan. Likewise, Sarker and Khan (2020) explored the direction of causality between FDI and Gross Domestic Product (GDP) in Bangladesh. The empirical findings reveal the presence of a long-run relationship between FDI and GDP. In addition, the results indicated the existence of a unidirectional causality running from GDP to FDI. Similarly, Mustafa (2019) examined the impact of FDI and tourism receipts on the GDP of Sri Lanka. The results indicate that there is a positive and statistically significant relationship between FDI, tourism receipts and the GDP in the long run. Moreover, the outcomes of the Granger causality test indicate that there is a bidirectional causality that supports the economic growth of Sri Lanka.

Har et al. (2008) evaluated the relationship between FDI and economic growth in Malaysia using data from 1970 to 2005. The empirical results indicate that there is a significant and positive relationship between economic growth and foreign direct investment inflows in Malaysia. Moreover, it was found that FDI also directly contributes positively to gross national income. Similarly, Sokang (2018) investigated the impact of FDI on the economic growth of Cambodia by employing time series data for the period 2006–2016. He had implemented the correlation matrix, and multiple regression analysis techniques were used to find out the relationship between FDI and economic growth in Cambodian cases. The empirical findings of the study reveal that FDI has a positive effect on the economic growth of Cambodia. Likewise, Chakraborty and Basu (2002), explored the long-run and short-run relationships between FDI and the growth of the Indian economy by modeling FDI and its determinants. Annual data over the period 1974–1996 has been utilized for estimating the model. The findings reveal that GDP in India is not Granger caused by FDI; the causality runs more from GDP to FDI, trade liberalization policy of the Indian government had some positive short run impact on the FDI flow, and FDI tends to reduce the unit labor cost, indicating that FDI in India results in the displacement of labor. However, Carkovic and Levine (2005) found insufficient compelling evidence to indicate that FDI invariably contributes to economic growth in the host country. They have employed data on 72 countries from 1960 to 1995. Furthermore, it has been noted that as the average year of schooling increases, economic growth is not influenced by FDI, and the authors also indicate that special tax benefits and subsidies offered by host countries are not the cause of FDI inflow. On the other hand, Ali and Mingque (2018) revealed that in the short term, there is no evidence of a causal relationship between FDI and GDP or vice versa for the countries of Indonesia, India, Malaysia, and Bangladesh. In the long term, the results reveal a positive influence of FDI on GDP but are not significant. And there is a negative interrelationship between GDP and FDI that is significant. Yalçınkaya and Aydın (2017) examined the effects of FDI on economic growth in emerging market economies consisting of Brazil, China, India, Indonesia, Mexico, Nigeria, Russia, South Africa and Turkey for the period 1992-2015 within the scope of next generation panel data methodology. They find that the effects of FDI on economic growth in emerging market economies, which are capital importers, tend to vary according to some characteristics in the quantity or quality of the investment climate in the countries.

Mustafa (2023) studied the relationship between financial development, economic growth, foreign direct investment, and trade openness in four South Asian countries from 1990–2019. The empirical findings provide evidence in favor of the hypotheses of growth-driven financial development, growth-driven foreign direct investment, and growth-driven trade openness for India. The findings indicate that in the case of Pakistan, economic growth is associated with both financial development and increased foreign direct investment. For Sri Lanka, the outcomes indicate that growth is driven by foreign direct investment and trade openness. Furthermore, in the short term, there is no evidence to substantiate a causal relationship among the variables in the case of Bangladesh. Furthermore, Akadiri et al. (2019) have examined the linkage between FDI and economic growth in the case of 25 African countries within a model that also considers trade openness. The empirical analysis is based on the period 1990–2014. The empirical findings reveal the presence of a long-run equilibrium nexus between the variables and found bidirectional causality between foreign direct investment, trade openness, and economic growth.

Adam (2022) explored the relationship between FDI, financial development, trade openness, and sustainable economic growth in Sudan from 1990 to 2020. The research used co-integration, Granger causality, and VAR error correction methods to analyze the model. The results indicate the presence of a long-term relationship between FDI and other independent variables, but the short-term results suggest otherwise. The Granger causality test suggests that previous values of FDI do not significantly contribute to predicting sustainable economic growth. Additionally, the findings indicate the presence of causality between the nation's trade openness and the development of the financial sector. Sghaier (2023) examined the nexus between economic growth, financial development, and trade openness in Tunisia, Morocco, Algeria, and Egypt over the period 1991–2015 using the generalized method of moment (GMM) test method. The empirical estimation showed strong evidence of a positive link between trade openness and economic growth. Furthermore, it was discovered that trade openness seems to act as a supplement to financial development, and its impact is more noticeable when the financial development variable is present. Similarly, Kumari et al. (2023) investigated the long-term and causal relationship between FDI inflows, trade openness, and economic growth in India. They employed annual time series data from the period 1985–2018, and the Johansen cointegration and vector autoregression (VAR) model were utilized for the empirical research, and all results indicated that FDI causes economic growth and economic growth causes FDI, which confirms the bi-directional causality. On the other hand, it was found that there is no bi-directional causality between trade openness and economic growth. Additionally, Alam and Sumon (2020) investigated the causal relationship between economic growth and trade openness in 15 Asian countries from 1990 to 2017. They have utilized panel cointegration and causality methodologies to explore the long-run causal relationship between variables. The estimation outcomes reveal the presence of cointegration between variables, and trade openness is observed to have a positive effect on economic growth. On the other hand, Borensztein et al. (1998) examined the impact of FDI on economic growth, using data on FDI flows from developed countries to 69 developing countries over the past two decades. Research results indicate that FDI plays a crucial role in technology transfer, making a relatively more substantial contribution to growth compared to domestic investment. Yet, the increased effectiveness of FDI is observed only when the host country maintains a minimum level of human capital. So, FDI helps economic growth when the host economy can effectively absorb advanced technologies.

Kueh and Yong (2018) conducted a study to assess the validity of the FDI-led-growth hypothesis in Malaysia during the specified time period. It employs the Autoregressive Distributed Lag (ARDL) bounds test approach to analyze the impact of FDI inflows on Malaysia's growth using annual data from 1980 to 2016. The empirical findings suggest that the inflow of FDI has significant positive effect on economic growth. Furthermore, the study reveals a negative correlation between FDI inflows and economic growth during the 1997 Asian Financial Crisis, but a positive correlation during the 2008 Global Financial Crisis. Similarly, Tarai et al. (2023) examined the complex interplay among FDI, trade openness, and economic growth in India. In research article was utilized an extensive dataset spanning from 1990 to 2020. The research demonstrates that FDI inflows positively influence India's economic growth, and it also indicates a positive relationship between trade openness and economic growth. Udeagha and Ngepah (2021) employed newly developed Nonlinear Autoregressive Distributed Lags (NARDL) framework to assess the relationship between trade openness and economic growth in South Africa from 1960 to 2016. It emphasizes the asymmetric effects of trade openness using a novel proxy for trade openness. The NARDL estimation findings indicate that higher trade openness causes a decrease in economic growth in the long run, whereas lower trade openness induces an increase in economic growth in the long run. In general, the findings indicate that an increase in trade openness leads to a decline in economic growth, whereas a decrease in trade openness results in an increase in economic growth. Moreover, the impact of increasing trade openness on economic growth is significantly greater than the impact of decreasing trade openness. Likewise, Jaiblai and Shenai (2019) explore the determinants of FDI in ten sub-Saharan economies: Liberia, Sierra Leone, Ivory Coast, Ghana, Nigeria, Mali, Mauritania, Niger, Cameroun, and Senegal, using a set of cross-sectional data over the period 1990–2017. In the regression, FDI/GDP (the ratio of Foreign Direct Investment to Gross Domestic Product) is dependent variable, and inflation, exchange rate changes, openness, economy size (GDP), income levels (GNI/capita (Gross National Income) per capita), and infrastructure was employed as the independent variables. The findings indicate that, over the period, higher inflows of FDI in relation to GDP appear to be attracted to markets with better infrastructure, smaller size, and lower income levels. These markets also had higher openness and a depreciated exchange rate, however the coefficients of the last two variables are found to be insignificant. In a more recent study by Okoh (2024) was investigated how institutional quality and foreign direct investment (FDI) affect sustainable economic growth in emerging African economies. The research paper uses pooled data from eight African countries and employs panel data methodology for the period spanning from 1990 to 2020. The paper utilized the fixed effect regression model after conducting the Hausman test to estimate the impact of institutional quality, FDI inflows, and sustainable economic growth in emerging African economies. The model's variables included GDP per capita, FDI, domestic investment, corruption perception index, political stability, and exchange rate. The research, utilizing panel fixed effects, discovered and concluded that institutional quality and FDI both have a significant relationship with sustainable economic growth in emerging African economies.

In summary, many of the aforementioned studies confirmed the positive and unidirectional relationships between FDIs, trade openness, and economic growth in developed and developing countries; meanwhile, a weak relationship was noticed in a few studies. Numerous researchers have noted positive connections among these factors, although some have not found such links or, at most, have reported weak relationships. These substantial variations can arise from differences in the sample choices, methodologies, and analytical tools utilized in their research. Moreover, country-specific characteristics related to economic, technological, infrastructural, and institutional advancements are crucial in assessing empirical relationships. As such, despite the growing number of relevant studies, the analysis on the relationship amongst economic development, trade openness, and FDI in which captures whole Asian countries is still not quite enough.

3. DATASET, EXPLANATORY VARIABLES, MODEL AND METHODOLOGY

3.1. Methodology

The purpose of our study is to investigate the causal link between GDP, FDI, and other proposed variables. We utilized panel data for the sample of 11 high-income and 22 middle- and low-income Asian countries over the duration of 2000–2021, where we were able to obtain the most complete and up-to-date data for both countries and date range. We also paid attention to the geographical distribution of countries across central, west, east and south Asia. The high-income countries in our study are Bahrain, Brunei Darussalam, Cyprus, Hong Kong, Israel, Japan, Korea, Kuwait, Oman, Singapore, and the United Arab Emirates. The middle- and low-income countries in our study are Armenia, Azerbaijan, Bangladesh, China, Georgia, India, Indonesia, Iran Islamic Rep., Jordan, Kazakhstan, Kyrgyz Republic, Lebanon, Mongolia, Malaysia, Nepal, Pakistan, Philippines, Russia, Saudi Arabia, Türkiye, Uzbekistan, and Vietnam. The choice of countries was particularly limited by the availability of reliable data. The data has been accessed from the World Development Indicators (WDI) database, which is published by the World Bank. The series of all suitable variables for this study consists of GDP (as the proxy of economic growth), which is the dependent variable in this study, and the independent variables, FDI, Gross Fixed Capital Formation (GFCF) and Trade Openness (TRO) have been included in this study (see Table 1 for details).

The general form of the empirical model illustrates the interrelationship between economic growth, foreign direct investment, and other variables and is demonstrated as follows:

$$GDP_{it} = f(\mathrm{FDI}_{it}, TRO_{it}, GFCG_{it}) \quad (1)$$

We transformed the suggested variables into natural logarithms:

$$GDP_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2 TRO_{it} + \beta_3 GFCF_{it} + \mu_{it} \quad (2)$$

Where β_0 is the constant term of the model; β_1 to β_3 are the coefficient values of all the explanatory indicators in the model; μ_t is the error white noise term, and t is the time period.

In this study, we are going to apply Fixed-Effects Models with Driscoll-Kraay (1998) Standard Errors for the regression to examine the interrelationship between GDP and FDI in high-income and other-income Asian countries. However, before proceeding with these estimations, the initial step involves verifying the stationarity of all variables in the series. Before conducting the cointegration test, the econometric methodology requires that all variables proposed in the model be integrated at order I(1).

The following steps are followed: First, the CADF panel unit root tests are applied to check the order integration of the modeled variables, which is one of the second-generation unit root tests for cross-section dependence. Secondly, the Hausman Test and Wooldridge (2010) Test are applied to test the groupwise heteroscedasticity and autocorrelation, respectively. Third, Westerlund ECM Panel Cointegration analysis was performed to test the existence of a long-term relationship between variables. Finally, the Driscoll-Kraay test was applied, which is used in the case of cross-section dependence between variables and offers predictors resistant to autocorrelation and heteroskedasticity problems.

Table 1. Summary of Variables

Variables	**Description**	**Measurement**	**Source**
GDP	Gross Domestic Product	Constant, Log., US$	World Bank-World Development Indicators
FDI	Foreign Direct Investment	Net inflows, % of GDP	
GFCF	Gross Capital Formation	Constant, Log., US$	
TRO	Trade Openness	Ratio of foreign trade to GDP	
HIC	High Income Countries Bahrain, Brunei Darussalam, Cyprus, Hong Kong, Israel, Japan, Korea, Kuwait, Oman, Singapore, United Arab Emirates		
MLC	Middle- and Low-Income Countries Armenia, Azerbaijan, Bangladesh, China, Georgia, India, Indonesia, Iran Islamic Rep., Jordan, Kazakhstan, Kyrgyz Republic, Lebanon, Mongolia, Malaysia, Nepal, Pakistan, Philippines, Russia, Saudi Arabia, Türkiye, Uzbekistan, Vietnam		

3.1.1. Panel Unit Root

In the panel unit root-testing framework, there exist two generations of tests. The first generation of tests operates under the assumption that cross-section units are cross-sectionally independent, while the second generation of panel unit root tests allows for cross-sectional dependence (Tugcu, 2018). The existence of interdependence across the cross-sections requires the utilization of second-generation panel techniques for a robust and reliable empirical estimations and policy suggestions. Statistical methods used to assess the stationarity of a series involve conducting unit root tests. There are several second-generation tests of unit root that can be applied for a panel data analysis, including the Fisher-type test by Maddala and Wu (1999) and the test by Pesaran (2007), both of which accommodate cross-sectional dependence (CSD). These tests were designed to effectively eliminate the issue of cross-dependence in the series as the sample size approaches infinity. Pesaran proposed the Cointegrated Augmented Dickey–Fuller test, which is robust to heterogeneity when the null hypothesis of non-stationarity is considered. To determine the level of integration, second-generation panel unit root tests were conducted. If the chosen series demonstrates stationarity at the same level, the Cointegration test will be employed to identify the long-term relationship among the suggested variables.

The stationarity test for each individual variable is conducted following Pesaran's method. It examines the null hypothesis of non-stationarity versus the alternative hypothesis of stationarity among panel series and across cross-sections. If the calculated t-bar statistic is greater than the critical values at significance levels of p <0.01, p <0.05, and p <0.10, then we reject the null hypothesis, indicating that the series is stationary. Conversely, if it does not exceed these critical values, we fail to reject the null hypothesis, suggesting that the series is non-stationary.

In a panel with T time and N cross-sectional units, T > N and N > T, the simple dynamic linear heterogeneous panel data model is as follows (Pesaran, 2007):

$$y_{it} = (1-\varphi_i)\mu_i + \varphi_i y_{i,t-1} + u_{it} \qquad i = 1, \dots, N \; and \; t = 1, \dots, T \tag{3}$$

$$u_{it} = y_i f_t + \varepsilon_{it} \tag{4}$$

In which y_{it} is the observation on the ith cross-section unit at time, f_t is the unobserved common effect, and ε_{it} is the individual-specific error.

The equation (3) and (4) we can rewrite as:

$$\Delta y_{it} = \alpha_i + \beta_i y_{i,t-1} + \gamma_i f_t + \varepsilon_{it} \quad (5)$$

Where $\alpha_i = (1-\varphi_i)\mu_i,\ \ \beta_i = -(1-\varphi_i)\ and\ \Delta y_{it} = y_{it} - y_{i,t-1}$

The unit root null and alternative hypotheses can be expressed as:

$H_0: \beta_i = 0$ for all i

$H_1: \beta_i < 0, i = 1,2,\ldots,N, i = N_1+1, N_1+2,\ldots,N$

A statistical CIPS (Cross-Sectionally Augmented IPS) approach involves incorporating additional information into the regression analysis. Specifically, it includes the cross-sectional averages of lagged levels and first-differences of the individual series within the panel (Pesaran, 2007). This modification enhances the reliability of the regression results by accounting for cross-sectional interdependencies among observations in panel data.

$$CIPS\ (N,T) = t - bar = N^{-1}\sum_{i=1}^{N} t_i\ (N,T) \quad (6)$$

Where $t_i(N,T)$ is the cross-sectionally augmented Dickey-Fuller statistic for the ith cross-section unit given the t-ratio of the coefficient of $y_{i,t-1}$ in the CADF regression.

3.1.2. Hausman Test

A Hausman test was conducted to ascertain whether the model is a fixed effects model or a random effects model. The null hypothesis posits that there is no correlation between the individual effects and the $X'it$s. Hausman's test statistic is based on $m = q'\{var(\hat{q})\}^{-1}\hat{q}$ and is asymptotically distributed as a Chi-square distribution with k degrees of freedom (χ_K^2)under the null hypothesis. The hypotheses of the Hausman Test are as follows:

H_0: The difference between coefficients is not systematic (Random Effects Model).

H_1: The difference between coefficients is systematic (Fixed Effects Model).

Thus, if the Hausman test statistic is significant, then the null hypothesis is rejected. In this case, the fixed effect model is consistent and is employed in the analysis. If the test statistic is insignificant, the null hypothesis cannot be rejected, and the random effects estimators should be used (Baltagi and Lui 2014).

3.1.3. Testing For Heteroscedasticity and Autocorrelation

Panel data models may provide biased results in the case of autocorrelation in the errors and heteroscedasticity within the cross-sections. In such cases, modeling approaches may be necessary to obtain more valid and efficient estimates. This research employed the Modified Wald Test to check the groupwise heteroscedasticity, as proposed by Baum in 2001. For the heteroscedasticity test, the null and alternative hypotheses are stated as:

H_0: errors are homoscedastic (no heteroscedasticity).

H_1: errors are heteroscedastic.

Additionally, autocorrelation tests were conducted using the Durbin-Watson autocorrelation test by Bhargava, Franzini, and Narendranathan (1982) and the LBI test developed by Baltagi and Wu (1999). For the heteroscedasticity test, the null and alternative hypotheses are stated as:

H_0: No autocorrelation of errors;

H_1: Autocorrelation of errors.

3.1.4. Panel Cointegration Test

There has been increasing attention in empirical research towards employing panel cointegration methods to investigate the presence of long-term cointegration relationships among integrated variables, considering both cross-sectional and time dimensions. Westerlund and Edgerton (2007) have developed and introduced four new panel cointegration tests. The idea behind these tests is to examine the null hypothesis of no cointegration by assuming that the error correction term in a conditional panel error correction model is equal to zero. The first two tests are developed (Ga and Gt) to test the alternative hypothesis that at least one unit among the paneled countries is cointegrated, whereas the other two (Pa and Pt) test the alternative hypothesis that the whole panel countries are cointegrated. This is given in Equation (1).

$$\Delta y_{it} = C_i + a_{0i}\left(y_{i,t-1} - b_i' x_{it-1}\right) + \sum_{j=1}^{k_{i1}} a_{11j}\Delta y_{i,t-j} + \sum_{j=-k_{2i}}^{k_{3i}} a_{2ij}\Delta x_{it-j} + \mu_{it} \quad (7)$$

Where a_{0i} is the speed of adjustment term (error term).

4. EMPIRICAL OUTCOMES

4.1. Unit Root Results

In this chapter, empirical results are provided and discussed from theoretical perspective. In this study, we applied the Augmented Dickey-Fuller (ADF) test by Dickey and Fuller (1979) to test the stationarity and identify the integration order of all variables in the model.

Table 2 is related to the unit root estimation results. Due to the cross-section dependence resulting from the tests carried out, we proceed by conducting a second generation test, the Cross-sectional Augmented Dickey-Fuller (CADF) unit root test developed by Pesaran (2007).

Table2. Results of CADF Unit Root Test for Fixed Effects Model

Variables	Level			First Difference	
	Country Groups	**Lag**	**CIPS Statistics**	**Lag**	**CIPS Statistics**
GDP	*HIC*	3	-2.079	3	-2.995***
	MLC	4	-1.940	2	-2.588***
FDI	*HIC*	4	-2.709	4	-4.903***
	MLC	5	-1.818	5	-3.068***
TRO	*HIC*	3	-1.359	3	-2.611***
	MLC	2	-1.797	2	-3.638***
GFCF	*HIC*	3	-1.950	3	-3.687***
	MLC	2	-1.940	2	-3.089***

Critical values of individual cross-sectionally augmented Dickey–Fuller distribution:

Intercept (0)		**%1**	**%5**	**%10**
HIC	**N:11 T:22**	-2.60	-2.34	-2.21
MLC	**N:22 T:22**	-2.40	-2.21	-2.10

The optimal lag lengths are determined according to the Akaike information criteria.

The CIPS Statistics show panel unit root test findings with constant

The symbols ***, **, * show that the statistical values are significant at 1%, 5% and 10% respectively

According to the empirical findings, all variables are non-stationary in their level form, but the test statistics and their corresponding p-values indicate that all the series are stationary at the first difference at the 1% significance level. Thus, we reject the null hypothesis of non-stationary at the 1% level of significance and conclude that all series are integrated of order I (1) in the panel of high income, and middle- and low-income Asian countries.

4.2. Heteroscedasticity and Autocorrelation Test Results

This research employed the Modified Wald Test to check the groupwise heteroscedasticity, as proposed by Baum in 2001. For the heteroscedasticity test, the null and alternative hypotheses are stated as:

H_0: errors are homoscedastic (no heteroscedasticity);

H_1: errors are heteroscedastic

Table 3. Results of Heteroscedasticity Test

H0: sigma(i)^2 = sigma^2 for all i		
HIC	**chi2 (11)**	869.77
	Prob>chi2	0.0000
MLC	**chi2 (22)**	9699.44
	Prob>chi2	0.0000

Modified Wald Test for Group Heteroscedasticity in Fixed Effect Regression Model

Table 3 shows the results of the heteroscedasticity test. The interpretation of the results is based on the value of the prob > chi2 statistics. According to the chi2 statistics of the modified Wald test for group heteroscedasticity in the fixed effect regression model, the null hypothesis of no heteroscedasticity is rejected for both developing and developed Asian countries; indicating that there is heteroscedasticity in the models.

Furthermore, autocorrelation tests were conducted using the Durbin-Watson autocorrelation test by Bhargava, Franzini, and Narendranathan (1982), and the LBI test developed by Baltagi and Wu (1999). For the heteroscedasticity test, the null and alternative hypotheses are stated as:

H_0: No autocorrelation of errors;
H_1: Autocorrelation of errors.

Table 4. Autocorrelation Test Results in Fixed Effects Model

H0: sigma(i)^2 = sigma^2 for all i		
HIC	**F test that all u_i=0: F(10,4217)**	44.57
	Prob > F	0.0000
	Modified Bhargava et al. Durbin-Watson	0.22774276
	Baltagi-Wu LBI	0.42718245
MLC	**F test that all u_i=0: F(5,443)**	28.39
	Prob > F	0.0000
	Modified Bhargava et al. Durbin-Watson	0.37240544
	Baltagi-Wu LBI	0.65294952

Table 4 indicates the results of the autocorrelation test in the fixed effects model employed to determine the presence of the autocorrelation problem in the model. Based on empirical findings, the null hypothesis of no autocorrelation of errors is rejected for both developed and developing Asian countries; indicating that there is an autocorrelation of errors in the models.

4.3. Hausman Test Results

A Hausman test was conducted to ascertain whether the model is a fixed effects model or a random effects model. The hypotheses of the Hausman Test are as follows:
H_0: The difference between coefficients is not systematic (Random Effects Model).
H_1: The difference between coefficients is systematic (Fixed Effects Model).

Table 5. Hausman Test Result

	Coefficient		**(b-B) Difference**	**sqrt(diag(V_b-V_B)) S.E.**
	(b) fe	**(B) re**		
FDI	-0.0064704	-0.0068250	0.0003546	.
TRO	-0.0064588	-0.0100648	0.0036061	.
GFCF	0.6849774	0.7498256	-0.0648481	0.0045226
chi2(3)			(b-B)'[(V_b-V_B)^(-1)](b-B)	
			199.13	
Prob>chi2			0.0000	

Ho: difference in coefficients not systematic

Table 5 presents the results of the Hausman test statistics. The chi2 and probability value of the test statistic is significant, indicating that the null hypothesis is rejected for the models. In this case, the fixed effect model is consistent.

4.4. Westerlund Cointegration Test Results

We conducted long-term cointegration analysis using the panel bootstrap cointegration methods of Westerlund (2007) as the next stage of verifying the stationarity of the panel series.

Table 6. Results of Westerlund (2007) Bootstrap Panel-ECM Cointegration Test

	Statistics		**asym p-val**		**bootstrap p-val**	
gdp	*HIC*	*MLC*	*HIC*	*MLC*	*HIC*	*MLC*
g_tau	0.096	3.730	0.538	1.000	0.818	0.996
g_alpha	0.932	-15.856	0.824	0.000	0.887	0.075
p_tau	-0.217	2.649	0.414	0.996	0.000	0.908
p_alpha	-1.642	-25.492	0.050	0.000	0.050	0.015

Bootstrap probability values are obtained from 1000 iterations.
Constant, lag and premise levels are taken as 3 and 1.

Table 6 indicates the results of the Westerlund bootstrap panel-ECM cointegration test obtained from the bootstrap cointegration method. In the case of cross-dependence, we must consider bootstrap p-value results in the cointegration test. Gt and Ga test the cointegration for each country group, whereas Pa and Pt test the cointegration of the panel. Upon evaluation of the results, the null hypothesis H_0, asserting the absence of a cointegration relationship, is rejected. These findings further confirm that there is a significant long-run association, which means that they tend to move together towards a long-run equilibrium. Thus, we can conclude that, in the long run, economic growth will be affected by any changes in foreign direct investment, gross fixed capital formation, and trade openness, both in high-income countries and in middle- and low-income countries.

4.5. Results of Fixed-Effects Models with Driscoll-Kraay Standard Errors

Table 7 represents the test results of fixed-effects models with Driscoll-Kraay standard errors for the regression. The regression examines the relationship between gross domestic product, foreign direct investment and trade openness for high-income and, middle- and low-income Asian countries.

The Driscoll-Kraay Standard Errors estimation analysis depicts that FDI, TRO, and GFCF have a positive and significant relationship with GDP for all developed Asian countries, indicating that foreign direct investment, trade openness, and gross fixed capital formation have a positive contribution to economic growth. On the other hand, an inverse and significant relationship was found between GDP and FDI for developing Asian countries. TRO variable also has a negative but not significant effect on economic growth, whereas GFCF has a positive and significant effect on economic growth in developing Asian countries.

Table 7. Results of Fixed-Effects Models with Driscoll-Kraay Standard Errors for the Regression

Method: Fixed Effects Regression Model							
GDP		**Coefficient**	**Drisc/Kraay Stand. Error**	**t value**	**P>|t|**	**[95% Confidence Interval]**	
HIC	**FDI**	0.0002283	0.0001144	2.00	0.074	-0.0000267	0.0004832
	TRO	0.0404134	0.2183710	1.85	0.094	-0.0082427	0.0890695
	GFCF	0.5603931	0.0406862	13.77	0.000	0.4697387	0.6510475
	_cons	5.166325	0.4145000	12.46	0.000	4.2427620	6.0898890
MLC	**FDI**	-0.0064704	0.0008327	-7.77	0.000	-0.0082021	-0.0047388
	TRO	-0.0064588	0.0167335	-0.39	0.703	-0.0412580	0.0283405
	GFCF	0.6849774	0.0349236	19.61	0.000	0.6123499	0.7576050
	_cons	3.9517060	0.3818522	10.35	0.000	3.1576010	4.7458110

When the results in Table 7 are analyzed in more detail, it is seen that the positive impact of FDI in high-income countries in Asia is partially limited, but it would be wrong to underestimate the contribution of these investments. In middle- and low-income countries, the negative impact of FDI on GDP may not have had the expected effect due to the low amounts of FDI and the fact that FDI is more service sector-oriented. Trade openness, on the other hand, makes a significant positive contribution. The most important reason for this is that the share of exports in total foreign trade, which makes the most important contribution to GDP, is higher in high-income countries than in low-income countries. As expected, GFCF makes a positive contribution to GDP in both country classifications.

Based on the outcomes derived from the findings of the Driscoll-Kraay test, the relevant model can be written as follows:

Model 1: *(High-Income Asian countries)*

$$\mathrm{GDP}_{it} = 5.166325 + 0.0002283\ \mathrm{FDI}_{it} + 0.0404134\ \mathrm{TRO}_{it} + 0.5603931\ \mathrm{GFCF}_{it} + \mu_{it} \quad (8)$$

Model 2: *(Middle- and Low-Income Asian countries)*

$$\mathrm{GDP}_{it} = 3.951706 - 0.0064704\ \mathrm{FDI}_{it} - 0.0064588\ \mathrm{TRO}_{it} + 0.6849774\ \mathrm{GFCF}_{it} + \mu_{it} \quad (9)$$

CONCLUSION

Through the empirical results, the analysis shows that there is a positive relationship between FDI, TRO and GFCF, and economic growth, which is found to be significant for high-income Asian countries. Thus, our results are supported by most of the previous research by Mustafa (2019), Har et al. (2008), Sokang (2018), and Kumari et al. (2023). These findings have important policy implications, and the government should concern about the importance of foreign direct investment, trade openness, and gross fixed capital formation in contributing to economic growth. Based on the findings of the study, it can be recommended to promote the expansion of FDI through trade liberations to foster the growth of gross domestic product in developed Asian countries. On the other hand, the estimation results indicate that there is a negative and significant relationship between FDI and economic growth in middle- and low-income Asian countries. Although the expansion of FDI through trade liberations has been reported to play a significant role in economic development in developed countries, it was not supported by our research for developing Asian countries. Thus, policymakers should focus on prioritizing strategies for economic growth rather than exclusively emphasizing the attraction of FDI in middle- and low-income Asian countries.

The impact of FDI on economic growth is not always positive, as we have revealed in our analysis for middle- and low-income Asian countries. Thereby, for FDI to have a significant long-term impact on the growth of developing Asian countries, governments should seek ways to improve the quality of human resources and labor skills. Since FDI is a crucial channel of technology transfer, it's essential to have a highly skilled workforce capable of effectively utilizing this new technology and fostering a positive diffusion of technology. To put it more explicitly, with the realization of the above recommendations, it may be more appropriate to prioritize domestic investment and production and to focus on foreign investment after a certain stage of economic growth has passed.

In today's world, where information technology and international trade are developing rapidly, the exports of labor-intensive goods with low value-added appear to be an extremely inadequate situation for developing countries that aspire to assume a leading role at the global level. In this context, in order to increase their export performance and competitiveness in global markets and to play an effective role in international markets with sustainable economic growth, it is obvious that developing countries should concentrate on the production and export of R&D goods with high added value, information, and technology intensity and have a comparative advantage in the foreign trade of these goods.

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