IRJEMS International Research Journal of Economics and Management Studies
Published by Eternal Scientific Publications
ISSN: 2583 – 5238 / Volume 3 Issue 6 June 2024 / Pg. No: 99-111
Paper Id: IRJEMS-V3I6P112, Doi: 10.56472/25835238/IRJEMS-V3I6P112

Original Article

The Relationship between Trade Openness, FDI and Economic Growth: Evidence from China and India

[1]Provakar Das
[1]School of Economics, University of Hyderabad, Telangana, India.

Received Date: 16 May 2024 Revised Date: 24 May 2024 Accepted Date: 29 May 2024 Published Date: 10 June 2024

Abstract: *This paper aims to evaluate the relationship between economic growth, tradeopenness and foreign direct investment (FDI). The investigation adopts an econometric-time series approach, using the panel data from 1982 to 2022 for both India and China, to infer the impact of trade openness and FDI on the economic growth of both the respective countries. The paper also assesses and interprets the correlation between economic growth, trade openness and FDI. The variables considered for this purpose are per capita GDP, trade as % of GDP and net inflows (% of GDP) for FDI, and an econometric regression analysis is performed using Granger Causality, Co-integration, VAR and VECM model.*

Keywords: *Trade openness; Foreign direct investment; Economic growth; India and China.*

I. INTRODUCTION

International trade, as well as economic growth models have seen major changes in the last several decades, with trade openness and Foreign Direct Investment (FDI) emerging as key drivers of GDP growth for all countries. The interplay between FDI, trade openness (ratio of exports plus imports and GDP) and economic growth has captivated the attention of researchers, policymakers, and economists alike, illuminating intricate connections that shape the trajectories of diverse economies.

As of 2021, China and India have emerged as the world's second and fifth-largest nominal economies, respectively, after opening and liberalizing their economies just ten years apart. On a PPP basis, China is ranked top, followed by India in third. Together, they account for more than half of all of Asia's GDP, and both countries have significant FDI inflows and a large trade share in their GDP accounts. These factors provide an interesting framework for analyzing the roles that FDI and trade openness have played in each country's economic growth.

This paper endeavors to unravel the intricate relationship between FDI, trade openness, and economic growth, focusing particularly on the experiences of China and India. As two major players in the global economy, both nations have demonstrated varying approaches and degrees of openness to engaging with international trade and attracting foreign investment. This paper seeks to contribute to the existing body of knowledge by running econometric regressions on annual time series data from 1982-2022 for both China and India.

II. LITERATURE REVIEW

A) Theoretical Background

The theoretical literature on growth and trade suggests that trade between countries promotes long-term growth. The literature's main finding is that nations with a global footprint are often more productive than those that only fulfils their own domestic market. Trade also encourages resource allocation that is efficient and can result in stronger growth that can result in more factor accumulation. In the early twentieth century, many economically developed countries used free trade as the "engine of economic growth" in order to accelerate the course of development. Export growth in many Asian nations climbed by up to 10% annually. Further, exports tend to rise at the fastest rate in nations with more liberal trade policies, and these nations have had the fastest GDP development. Trade openness and Foreign Direct Investment (FDI) have, therefore, been shown to be important catalysts for the growth and development of the economy in emerging nations throughout the liberalization and globalization era.

Since the early 1990s, Foreign Direct Investment (FDI) has emerged as the most important source of foreign capital for Emerging Market Economies (EMEs). FDI is a major source of finance for domestic investment, which aids in the capital formation of the host nation. Like foreign direct investment (FDI), trade openness has played a major role in determining the economic growth stages of emerging economies over a long period of time. This is because trade openness makes it possible for these countries to adopt cutting-edge technology and know-how from other technologically advanced countries, which raises factor productivity overall. The 1980s endogenous growth theory states that through technology transfer and spillover, FDI and technological improvement would promote long-term economic growth in the host country. Therefore, Foreign Direct

Investment (FDI) and trade—especially export and import—increase market rivalry globally, which supports economic growth in a more globalised economy.

Conversely, trade is impacted by growth. While export expansion delivers higher economies of scale productivity and eliminates foreign exchange limits, Foreign Direct Investment (FDI) can enhance knowledge and technology transfer and generate job possibilities, hence promoting overall growth in the host nation.

B) Overview of Chinese Economy

Since 1949, China's international trade policies and economic positioning have transformed from reliance on the USSR to complete isolation and gradually to liberalization. Presently, China is a socialist market economy. Studies from The Conference Board in 1952 stated that China was the poorest of 110 countries in their report. In 2022, China became an upper middle-income country, ranking 71st out of 131 countries, and its aggregate GDP was the largest in the world. Being the world's manufacturing hub, it is the largest exporter and 2nd largest importer of goods and services. Its merchandise trade features a shift from low-technology to higher-technology manufacturing. However, it relies on imports for the most technology-intensive components. Beginning its reform and open door policy in 1978, China has liberalized and globalised its economy dramatically in the post-Mao period. The first phase of opening up, from 1978 to 1993, was marked by decentralization and management autonomy. International trade was greatly emphasized, advocating theories of specialization and comparative advantage. The 1980s and 1990s witnessed the diversification of trading rights, with the grant of authorization given to a multitude of companies to engage in foreign trade. Compared to 10-16 specialized foreign trade corporations that were granted exclusive trading rights during the pre-reform period, in 2001, more than 35,000 companies secured foreign-trade licenses. Significantly, state planning was no longer a factor in the majority of the newly licensed trading companies' transactions. The creation of tariffs and complex non-tariff barriers slowly replaced import substitution. Since the 1980s, tariffs were imposed on commodities to restrict the entry of foreign goods into domestic markets. In the next two decades, following several tariff cuts, the average tariff rate fell from 56% in 1982 to 15% in 2001 and from the 1980s to the late 1990s, the share of imports that were licensed reduced from 46% to only 8.45%, with a simultaneous abolishment of the import substitution system. This phase of reform also witnessed China introduce multiple international trade legislations including antidumping and countervailing duties to control trade. In 2001 China joined the WTO, committing to practice non-discriminatory treatment to all members. Removal of dual pricing norms and export subsidies and duties on agricultural products were promised. In 1990, small surpluses in trade started to appear in China. Trade surpluses rose till 2008 and increased again in 2015 and 2020, following which the COVID-19 virus led to the collapse of economic and trade activities. Tracking the growth of inward Foreign Direct Investment (IFDI), it rose gradually during the 1980s and rapidly from 1992–98, leading to an increase in stock foreign exchange and a rise in modern capital investment and new technologies. The period from 2004 to 2011 featured another spell of increase in IFDI. Shifting to a 'go out' policy, the Outward Foreign Direct Investment (OFDI) expanded from 2000 to 2008 and again in 2016. In the initial three decades of opening up, China attained high rates of GDP growth propelled by substantial levels of capital accumulation and fixed assets investments (40% of GDP since 1990). China's rapid export growth accounted for 4.5% of GDP in 2007. However, the country remains dependent on exports of inexpensive goods produced in bulk by low-wage, unskilled workers. The feasibility of this framework shrunk with rising relative wages and an ageing population. Simultaneously, China's export growth diminished and protectionist policies were adopted.

Thus, since China's opening up in 1978, its GDP growth has averaged over 9% per annum, and over 800 million people have come out of poverty. However, China's accelerated growth, supported by investment, inexpensive manufacturing and exports, is said to have peaked, according to the World Bank. Growth has slowed down in recent years due to structural restrictions, such as a falling workforce growth rate, decreased investment returns, and a slower pace of productivity growth in a debt-driven and investment-propelled growth model. Hence, the WB stated the requirement of structural reforms to adopt a balanced, high-quality growth path.

C) Overview of Indian Economy

The Indian economy grew steadily during three of the five decades (1950–1980) at a real rate of 3 ½ percent a year; the following two decades had annual growth rates of between 5 and 6 percent. The relatively slow rate of expansion, particularly between 1950 and 1980, was due to tight investment licensing. The government successfully eliminated internal competition, and through strict import licensing, it eliminated foreign competition. The government did not start to relax its restrictions on investment and import licensing until the latter half of the 1980s; this was followed by a more methodical and thorough opening up in the 1990s and later.

a. Ad Hoc Liberalization (1976-1990s):

The next phase of liberalization began in 1976 with the reinstatement of the Open General Licensing (OGL) list, which had been a component of the initial war regime but had been put on hold when controls were tightened following the 1966 devaluation. OGL imports increased to over 30% of total imports by April 1990. The OGL list items were granted

substantial reductions on tariff rates in the form of "exemptions," therefore, even if tariff rates were dramatically raised during this period, the licensing procedure remained relatively unrestrictive due to the tariffs. Additionally, the government implemented a number of export incentives, particularly after 1985, which partially offset the anti-trade bias of import regulations. Between 1985 and 1990, the rupee's nominal effective depreciation was a substantial 45 percent, resulting in a real depreciation of 30 percent. Thirty-one sectors were also exempt from industrial licensing by 1990. This policy also had a trade-liberalizing component because it exempted machineryimports in these industries from the requirement of industrial licensing approval. India's growth rate grew from the Hindu rate of about 3.5 percent between 1950 and 1980 to 5.6 percent between 1981 and 1991 as a result of the expansionary fiscal policy and deregulation. Notable was the rise in the average yearly growth rate, which peaked between 1988 and 1991 at 7.6 percent.

b. Deeper and Systematic Liberalization(1992 to Date)

Following the collapse of the Soviet Union, China's remarkable economic expansion following the adoption of policies aimed at opening up the global economy, and India's own experiences of thirty years of protectionist policies followed by liberalization in the 1980s, pro-market and pro-free trade economists, led by Jagdish Bhagwati, finally convinced policymakers of the merits of the approach to policy. There was a noticeable change in support of a market-based, export-driven economy starting with the July 1991 budget. Although the speed of the trade liberalization program remained gradual and there were occasional glitches, it was extensive and was first introduced in the 1991 budget. FDI has been a major factor in the investment process in India. The liberalization of international investment regulations in 1991 made it possible for foreign investors to automatically be approved for up to 51% ownership in 34 industries. As a result, worldwide FDI from abroad increased from $13.26 billion in 1970 to $153.89 billion in 1991, with a compound annual growth rate of 11.80%. The largest FDI inflow into India between 1991- 92 and 1995-96 was $2144 million, whilst the highest annual growth rate of 144% was observed in 1992-93. The extended list of companies or sectors that were made available for foreign equity involvement was largely responsible for the increase. A number of FDI policy efforts were implemented in the years 1999 to 2000 to help India receive more FDI. The foreign investment implementation authority (FHA) was established in August 1999 to facilitate swift approvals that would increase real flows. FDI inflows to India climbed to $6130 million in the fiscal year 2001-2002, a growth rate of 52% over the year before. India's trade policies from 2015 to 2022 emphasized bolstering exports through initiatives like "Make in India" and "Digital India." Additionally, the country sought to improve trade relations through regional agreements like RCEP while also implementing measures to curb imports and promote domestic industries. Overall, there was a focus on balancing trade, enhancing competitiveness, and advancing economic engagement on the global stage.

c. Review of Studies

In addition to assisting us in determining research gaps and research hypotheses for future study endeavors, this literature evaluation provides us with information regarding the primary issues, continuing discussions, findings, and limits of earlier investigations.

Naveed and Shabbir(2010), in their panel study from 1971-2000, access the effects of FDI and trade openness on the rise of per capita GDP growth, for 23 OECD countries. They estimate a Barro-type equation using a fixed effect approach and a set of control variables. In the fixed effect regression, the log of real GDP per capita lag, openness ratio (ratio of exports plus imports to GDP) and FDI ratio (ratio of FDI to GDP) are the independent variables, and the growth rate of real per capita GDP is the dependent variable. The results of both types of approaches showed that openness has a major and positive impact on GDP per capita growth, while FDI has an insignificant effect, suggesting that other variables are at work. According to the Granger causality, GDP per capita growth is only caused by openness and is a unidirectional causal relationship.

Zaheer and Basheer(2015) analyzed the causal relationship between FDI, trade openness, and economic growth in Pakistan and Malaysia from 1980 to 2010. The findings indicate that, in the long term, trade openness has a positive impact on economic growth in both countries, contrary to neoclassical growth models. Granger causality revealed that all variables stimulate growth in Malaysia, except for FDI, which exhibits an inverse causal relationship with GDP, where GDP influences FDI. In Pakistan, Granger causality demonstrated that trade openness fosters economic growth, while other variables do not significantly impact GDP growth. They claim that trade openness boosts economic growth by allowing economies of scale to be used, lowering barriers to capital and intermediate goods imports, increasing competition, improving efficiency, and encouraging the dissemination of knowledge through learning by action.

Agarwal and Hemant(2023), in their empirical study of India, analyse the impact of FDI and trade openness on economic growth using time–series data from 1980 to 2021. The variance decomposition method (VDM) and Granger Causality were employed to evaluate the causal relationship among the variables. GDP per capita was the dependent variable, and FDI, net inflows, trade openness (total export plus total import), consumer price inflation, and official

exchange rate were the independent variables in their multiple regression model. The presence of a long-term link between the variables was demonstrated via the ARDL bounds test. The Wald test projected that separately and in combination, trade openness, exchange rates, and foreign direct investment would contribute to economic growth in a short time. According to the study's findings, trade openness significantly and favorably affects economic growth over the long run, while foreign direct investment has a negligible and adverse impact.

Kong et al.(2021) undertook an empirical investigation to study the relationship between trade openness and economic growth quality in China, under the exchange rate fluctuation from 1994 to 2018, using an ARDL model and a threshold model. They proved that there is a steady, long-term connection between the level of trade openness and the quality of economic growth. Furthermore, trade openness improves the quality of economic growth in the short and long terms by a large margin. They found a "N-type" association between the quality of economic growth and trade openness.

Fatehi et al. examine how trade openness affected the rise of GDP per capita in South East European (SEE) nations. Several trade openness parameters, along with regional disparities of the SEE nations, were looked into. They discover a positive and statistically significant growth effect of trade openness using the system GMM technique, which lowers bias in dynamic panel estimates and uses internal instruments for the endogenous explanatory variables. Trade openness promotes economic development in richer countries with greater GDP per capita. Overall, empirical results imply that countries with more FDI and gross fixed capital formation will likely benefit from trade openness.

D) Research Questions

Distinct from the literature available on the topic of study, this paper aims to perform its investigation using a different methodology, in terms of econometric regressions and time series analysis, to answer the following research questions for both China and India:

a) Is there any impact of FDI and Trade openness on economic growth?
b) Is there any correlation between economic growth, FDI and trade openness?

E) Data Sources

As our quantitative research, we need to use different data sources to conduct the research. The research consists of only secondary data. The main data sources of the research are derived from the World Bank Database. However, this research chooses this time span (40 Years) because it has experienced both upward and downward movements of economic growth, FDI and trade over time.

F) Research Methodology

This research paper examines the issues and tries to bring out the key factors that explain the connection between trade liberalization, foreign direct investment, and economic prosperity. The variables considered for this purpose are per capita GDP(current US dollar), trade of GDP(%) and foreign direct investment, net inflows(% of GDP). For this purpose, we use time series data for India and China. In the following section, we present different arguments explaining the links among these variables. Two sets of exercises have been worked out (i) time series analysis for examining the relationship between economic growth, FDI and trade openness for China. The years considered are 1982-83, 1983-84, , 2020-21, and 2021-22.

This time series analysis examines the association between FDI, trade openness and economic growth in China. (ii) Time series analysis for examining the relationship between economic growth, FDI and trade openness for India. The years considered are 1982-83, 1983- 84,…..……, 2020-21, 2021-22. This time series analysis examines the association between FDI, trade openness and economic growth in India.

If the time series for India and China are integrated in the exact same order, and the subsequent co-integration regressions' assessment has been shown:

$$LY_t = \alpha_0 + \alpha_1 \, LFDI_t + \alpha_2 \, LTO_t + \in_t$$
$$LFDI_t = \beta_0 + \beta_1 \, LY_t + \beta_2 \, LTO_t + \mu_t$$
$$LTO_t = \gamma_0 + \gamma_1 \, LY_t + \gamma_2 \, LFDI_t + \delta_t$$

Here,

LY_t denotes the log of the GDP per capita (US Dollar) at the time t.
$LFDI_t$ denotes the log of the FDI, net inflows (% of GDP) at the time t.
LTO_t denotes the log of the Trade openness (% of GDP) at the time t.
α_0 , β_0 and γ_0 denote the intercept of the respective equation.
α_1, β_1 and γ_1 denote the slope of the respective equation.
$\in_t$, μ_t and δ_t denote the disturbance term at the time.

The hypothesis is to be studied:

H_{01} : There exists a relationship among economic growth, FDI and trade openness.

H_{11} : There does not exist any relationship among economic growth, FDI and trade openness.

III. RESULTS AND DISCUSSION

A) Analysis focused on China:

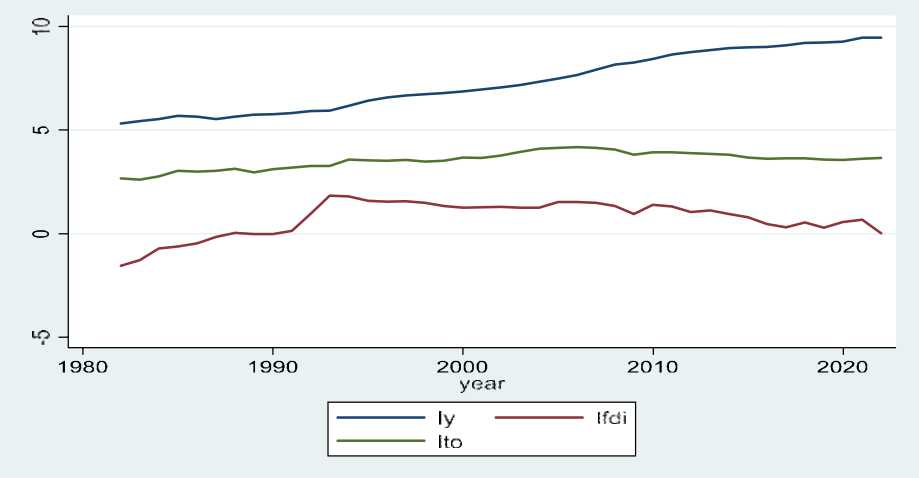
Table 1 shows the correlation between the three variables in China. We can see from the table that the GDP and trade variable has a correlation of 0.69 and the GDPand FDI variables have a correlation of 0.31. There is also a correlation of 0.78 between FDI and trade variables.

Table 1: Results of Correlations

	LFDI	**LTO**	**LY**
LFDI	1	0.781	0.312
LTO	0.781	1	0.690
LY	0.312	0.690	1

Source: *Author's calculation using E-views*

Figure 1: Time series plot of the three variables



Source: *Author's calculation by using Stata*

The GDP per capita shows long-term growth in China. The trade and FDI do not exhibit any significant growth over time for China. We can see from the graph that the FDI is falling after a certain time.

We have to perform Augmented Dickey-Fuller and Phillips–Perron unit root tests to solve the problem of the non-stationary of the variables and select the order of the co-integration. The Augmented Dickey-Fuller and Phillips–Perron unit root test is conducted at the level and 1st difference.

Table 2: Results of ADF and PP Test

Variables	**At the Level**		**At the 1st Difference**	
	ADF	**PP**	**ADF**	**PP**
LY	-1.708 (0.7473)	-1.951 (0.6279)		
LFDI	-1.736 (0.7347)	-1.716 (0.7438)		
LTO	-1.171 (0.9163)	-1.141 (0.9291)		
ΔLY			-3.907 (0.0119)	-3.893 (0.0124)

ΔLFDI			-4.979 (0.0002)	-4.817 (0.0004)
ΔLTO			-6.715 (0.0000)	-6.705 (0.0000)

Source: *Author's calculation by using Stata*

Note: Δ symbol indicates that the variable is stationary at the first difference, and ( ) denotes the p-value.

We can see from the above table that the data are stationary at the 1st difference. We find similar results from the ADF and PP tests. The variable does not include a unit root, which is an alternate explanation to the null hypothesis that the parameter contains a unit root. In cases when the observed p-value is less than 0.05, we reject the null hypothesis. At the first difference, all three variables become stationary, meaning that all variables are integrated of order one, or I(1).

Table 3: Johansen tests for co-integration

Maximum rank	Params	LL	Eigenvalue	Trace statistic	Critical Value 5%
0	12	83.932967	.	27.3838*	29.68
1	17	92.249666	0.34721	10.7504	15.41
2	20	96.06464	0.17769	3.1205	3.76
3	21	97.624884	0.07690		
Maximum rank	**Params**	**LL**	**Eigenvalue**	**Maximum**	**Critical Value 5%**
0	12	83.932967	.	16.6334	20.97
1	17	92.249666	0.34721	7.6299	14.07
2	20	96.06464	0.17769	3.1205	3.76
3	21	97.624884	0.07690		

Source: *Author's Calculation by using Stata*

Since the trace statistics are smaller than the critical value, which implies that the null hypothesis is accepted, the preceding table demonstrates that there is no co-integration equation. Thus, there is no long-run relationship between the variables. Thus, we apply the VAR approach, and the AIC and SBIC criteria help us identify the ideal lags.

So, the model for China is developed as

$$LY_t = \alpha + \sum_{i=1}^{k} \alpha_i \, LLY_{t-i} + \sum_{j=1}^{k} \beta_j \, LFDI_{t-j} + \sum_{m=1}^{k} \gamma_{t-m} \, LTO_{t-m} + \in_t$$

$$LFDI_t = \beta + \sum_{i=1}^{k} \alpha_i \, LY_{t-i} + \sum_{j=1}^{k} \beta_j \, LFDI_{t-j} + \sum_{m=1}^{k} \gamma_{t-m} \, LTO_{t-m} + \mu_t$$

$$LTO_t = \gamma + \sum_{i=1}^{k} \alpha_i \, LY_{t-i} + \sum_{j=1}^{k} \beta_j \, LFDI_{t-j} + \sum_{m=1}^{k} \gamma_{t-m} \, LTO_{t-m} + \theta_t$$

All have their usual meanings. The dependent variable is a function of its lagged values and the lagged values of the other variables in the model.

Table 4: Results of the VAR model

Vector autoregression					
Sample: 1984 thru 2022 **Log likelihood = 83.93297** **FPE = 5.03e-06** **Det(Sigma_ml) = 2.71e-06**	**Number of obs = 39** **AIC = -3.68887** **HQIC = -3.505217** **SBIC = -3.177005**				
Equation	**Parms**	**RMSE**	**R-sq**	**chi2**	**P>chi2**
dy	4	.076042	0.1752	8.286284	0.0405
dfdi	4	.27722	0.1925	9.295815	0.0256
dto	4	.098938	0.2805	15.20215	0.0017

dy	dy L1.	.408382	.1545545	2.64	0.008	.1054607	.7113032
	dfdi L1.	.0512874	.0457311	1.12	0.262	-.038344	.1409188
	dto L1	.0133895	.1126378	0.12	0.905	-.2073766	.2341555
	_cons	.0569323	.0201756	2.82	0.005	.0173888	.0964757
dfdi	dy L1.	-1.290673	.5634438	2.29	0.022	-2.395003	-.1863436
	dfdi L1.	.2392938	.1667175	1.44	0.151	-.0874664	.5660541
	dto L1	.0824123	.4106324	0.20	0.841	-.7224124	.887237

	_cons	.1540661	.0735522	2.09	0.036	.0099065	.2982257
dto	dy L1.	-.5181289	.2010883	-2.58	0.010	-.9122547	-.1240032
	dfdi L1.	.1352954	.0595	2.27	0.023	.0186775	.2519133
	dto L1	-.0095514	.1465512	-0.07	0.948	-.2967864	.2776836
	_cons	.0738838	.0262501	2.81	0.005	.0224345	.1253332

Source: *Author's calculation using Stata*

The VAR for Dy, Dfdi and Dto consists of three equations: one in which Dy is the dependent variable, one in which Dfdi is the dependent variable and one in which Dto is the dependent variable. The regressors in the equations are lagged values of Dy, Dfdi and Dto. The R-square of the three variables is significant. The coefficient of Dy of lag 1 is positive and significant for Dy. The GDP is impacted by its own lagged values. The coefficient of the lagged value of Dy is negative and significant for Dfdi. So, the FDI is impacted by the lagged value of the GDP. The coefficient of lagged values of Dy and Dfdi is positive and negative, respectively, and both are significant. Trade openness is impacted by the GDP and FDI.

Table 5: Results of Granger Causality

Equation	Excluded	chi2		df Prob >chi2
dy	dfdi	1.2578	1	0.262
dy	dto	.01413	1	0.905
dy	ALL	1.5554	2	0.459
dfdi	dy	5.2472	1	0.022
dfdi	dto	.04028	1	0.841
dfdi	ALL	5.3788	2	0.068
dto	dy	6.639	1	0.010
dto	dfdi	5.1705	1	0.023
dto	ALL	15.155	2	0.001

Source: *Author's Calculation by using Stata*

The Granger causality test results for China are displayed in the above table. The GDP of China is not granger caused of trade or foreign direct investment. The trade and foreign direct investment variables have no significant effect on economic growth. The link between FDI and GDP is unidirectional. The causal relationship runs from GDP to FDI. Therefore, economic growth causes FDI in India. The trade openness has no effect on foreign direct investment (FDI) in China as trade openness does not granger cause the FDI in that country. Trade openness in China is impacted by GDP and FDI. The causal relationship goes from GDP and FDI to China's trade openness.

Table 6: Lagrange-multiplier Test

lag	chi2	df	Prob > chi2
1	**13.0146**	**9**	**0.16195**

Source: *Author's calculation by using Stata*

The null hypothesis is that there is no autocorrelation. If the p-value is greater than the critical value then we accept the null hypothesis. The above table shows that there is no serial correlation.

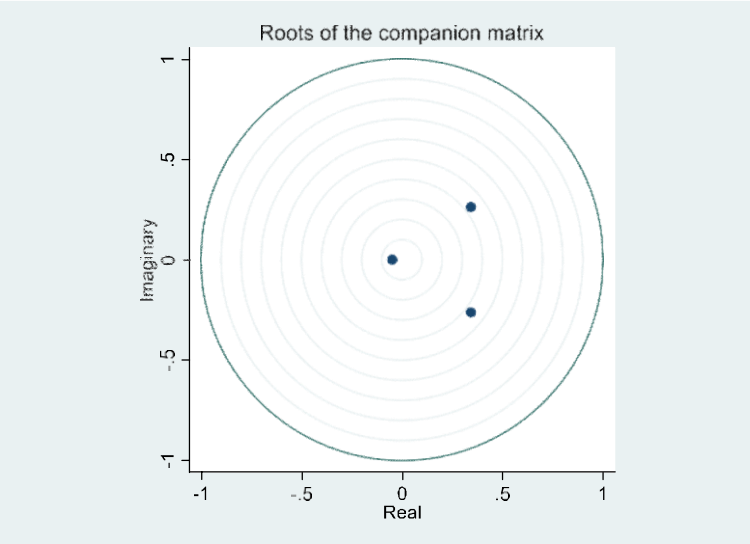
Table 7: Jarque-Bera Test

Equation	chi2	df	Prob > chi2
dy	1.117	2	0.57198
dfdi	4.652	2	0.09768
dto	0.443	2	0.80120
ALL	6.213	6	0.39978

Source: *Author's calculation by using Stata*

We check the normality of the residual with the Jarque-Bera test. We find from the above table that the residuals are normally distributed.

Figure 3: Stability Test



Source: *Author's calculation by using Stata*

All the eigenvalues lie inside the unit circle. VAR satisfies stability conditions. The stability result tests that the system is stable.

B) Analysis focused on India

Table 8: Correlation Results

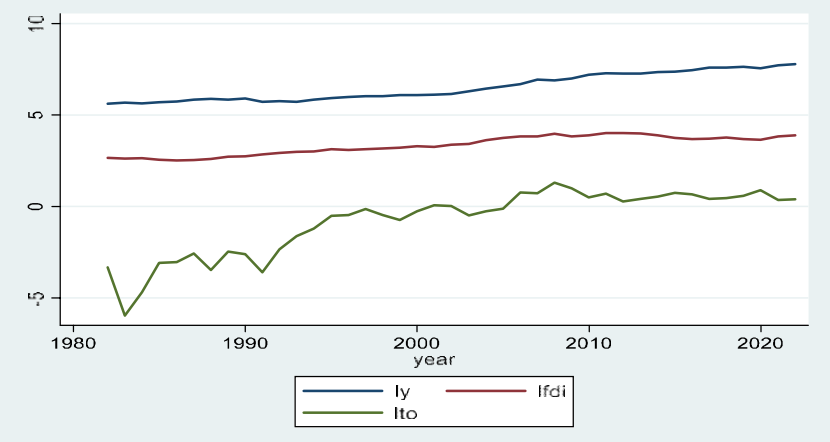
	LY	**LFDI**	**LTO**
LY	1	0.276	-0.536
LFDI	0.276	1	0.140
LTO	-0.536	0.140	1

Source: *Author's calculation by using Stata*

From Table 8, we see the correlation between the three variables for India. We can see from the table that the GDP and trade variable has a correlation of -0.53, and the GDP and FDI variables have a correlation of 0.27. There is also a correlation of 0.14 between FDI and trade variables.

The GDP per capita shows long-term growth. The trade and FDI do not show any significance over time. We can see from Figure 4 that the FDI remain almost constant over time, and trade variables are improving slowly over time as the GDP is growing.

Figure 4: Time series plot of log transformation of the three variables



Source: *Author's calculation by using Stata*

We have to perform Augmented Dickey-Fuller and Phillips–Perron unit root tests to solve the problem of the non-stationary of the variables and select the order of the co-integration for India. The Augmented Dickey-Fuller and Phillips–Perron unit root test is conducted at the level and 1st difference.

Table 9: Results of Unit Roots Test For India

Variables	At the Level		At the 1st Difference	
	ADF	**PP**	**ADF**	**PP**
LY	-1.769 (0.7194)	-1.815 (0.6973)		
LFDI	-1.114 (0.9267)	-1.425 (0.8534)		
LTO	-2.389 (0.3856)	-2.283 (0.4415)		
∆LY			-6.324 (0.0000)	-6.224 (0.0000)
∆LFDI			-5.324 (0.0001)	5.334 (0.0000)
∆LTO			-9.925 (0.0000)	-10.474 (0.0000)

Source: *Author's calculation by using Stata*

We can see from the above table that the data are stationary at the 1st difference. We find similar results from the ADF and PP tests. The alternative hypothesis is that the variable was produced by a stationary process, and the null hypothesis is that the variable includes a unit root. In cases when the observed p-value is less than 0.05, we reject the null hypothesis. The three variables become stationary at the first difference, indicating that all variables are integrated of order one, or I(1).

Table 10: Johansen co-integration test results

Maximum rank	Params	LL	Eigenvalue	Trace statistic	Critical Value 5%
0	12	58.9506	.	38.6654	29.68
1	17	70.602892	0.44984	15.3608*	15.41
2	20	76.904089	0.27613	2.7584	3.76
3	21	78.283292	0.06829		
Maximum rank	**Params**	**LL**	**Eigenvalue**	**Maximum**	**Critical Value 5%**
0	12	58.9506	.	23.3046	20.97
1	17	70.602892	0.44984	12.6024	14.07
2	20	76.904089	0.27613	2.7584	3.76
3	21	78.283292	0.06829		

Source: *Author's calculation by using Stata*

The absence of co-integration is the null hypothesis for the row with rank 0. In the event that the trace statistics for this row exceed the critical threshold, the null hypothesis is implied to be rejected. We adopt the null hypothesis and investigate the claim that there is one cointegration with rank 1. The null hypothesis for the rank 2 row is that there are two co-integrations, and we find that in this row, the trace statistics are less than the critical value. Thus, we accept the null hypothesis. We find that there is one co-integration. Thus, the variables have a long-term association, or they are moving together in the long run. So, we shall run the VECM model with (k-1) lags.

So, the model for India is developed as

$$\Delta LY_t = \alpha + \sum_{i=1}^{k-1} \alpha_i \, \Delta LLY_{t-i} + \sum_{j=1}^{k-1} \beta_j \, \Delta LFDI_{t-j} + \sum_{m=1}^{k-1} \gamma_{t-m} \, \Delta LTO_{t-m} + \pi_1 ECT_{t-1} + \in_t$$

$$\Delta LFDI_t = \beta + \sum_{i=1}^{k-1} \alpha_i \, \Delta LY_{t-i} + \sum_{j=1}^{k-1} \beta_j \, \Delta LFDI_{t-j} + \sum_{m=1}^{k-1} \gamma_{t-m} \, \Delta LTO_{t-m} + \pi_2 ECT_{t-1} + \mu_t$$

$$\Delta LTO_t = \gamma + \sum_{i=1}^{k-1} \alpha_i \, \Delta LY_{t-i} + \sum_{j=1}^{k-1} \beta_j \, \Delta LFDI_{t-j} + \sum_{m=1}^{k-1} \gamma_{t-m} \, \Delta LTO_{t-m} + \pi_3 ECT_{t-1} + \theta_t$$

π_i denote the speed of adjustment parameter with a negative sign.

ECT_{t-1} denote the error correction term is the lagged values of the residual obtained from the cointegration regression of the dependent variable on the regressor. It contains long-run information derived from long-run relationships. All other variables have usual meanings.

Table 10: VECM results

Sample: **1984** thru **2022** Number of obs = **39**

AIC = **-2.748866**

Log-likelihood = **70.60289** HQIC = **-2.488691**

Det(Sigma_ml) = **5.37e-06** SBIC = **-2.023724**

Equation	Parms	RMSE	R-sq	chi2	P>chi2
D_ly	5	.08228	0.3590	19.04408	0.0019
D_lfdi	**5**	**.078441**	**0.3408**	**17.57682**	**0.0035**
D_lto	5	.446949	0.4845	31.95189	0.0000

		Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
D_ly	_ce1L1.	.0074805	.0092351	0.81	0.418	-.0106199	.0255809
	lyLD.	.0005831	.1707856	0.00	0.997	-.3341506	.3353167
	lfdiLD.	.0749358	.1601382	0.47	0.640	-.2389294	.3888009
	ltoLD.	.0160284	.0205131	0.78	0.435	-.0241766	.0562334
	_cons	.0552847	.0186024	2.97	0.003	.0188247	.0917447
D_lfdi	_ce1L1.	.012183	.0088041	1.38	0.166	-.0050727	.0294387
	lyLD.	.275382	.1628155	1.69	0.091	-.0437305	.5944945
	lfdiLD.	.1806291	.152665	1.18	0.237	-.1185887	.4798469
	ltoLD.	-.0428137	.0195558	-2.19	0.029	-.0811425	-.004485
	_cons	.0252418	.0177342	1.42	0.155	-.0095166	.0600003
D_lto	_ce1L1.	-.2391149	.050165	-4.77	0.000	-.3374365	-.1407932
	lyLD.	-.0189145	.92771	-0.02	0.984	-1.837193	1.799364
	lfdiLD.	-.3753874	.8698732	-0.43	0.666	-2.080307	1.329533
	ltoLD.	.0454381	.1114277	0.41	0.683	-.1729561	.2638324
	_cons	.0030156	.1010484	0.03	0.976	-.1950356	.2010668

Source: *Author's calculation by using Stata*

D_ly, D_lfdi, and D_lto are the three variables that are represented by VECM, which takes the first difference. Additionally, all three variables have R-square values that are sufficient to support their causality, and their p values are near to zero, indicating significance. In the first scenario Regression equations use 'D_ly' as the dependent variable and lag values for lto and lfdi as the independent variables. The cointegrating equation is represented by "ce1".

The "ce1" must have a negative coefficient and a significant p-value in order to establish the long-term causal relationship between GDP and trade and FDI. The p-value is not significant, and the "ce1" equation does not contain a negative coefficient. This VECM does not demonstrate any long-term causal relationship between GDP per capita and the other two variables, trade openness and FDI, because both conditions are absent. We will look at each independent variable's specific lag coefficient and p-value in order to ascertain the short-term causality between the variables. Consequently, the lagged values of trade and FDI for GDP are explained in this section. It is evident that there is no significant p-value for the lagged trade and FDI values. Thus, there is no short-run causality in the lagged value of trade openness and, FDI and GDP.

The regression equations in the second scenario use the lagged values of lto and ly as independent variables and "D_fdi" as the dependent variable. The cointegrating equation is represented by "ce1". The "ce1" has to have a negative coefficient and a significant p-value in order to establish the long-term causal relationship between GDP and trade and FDI. The p-value is not significant, and the "ce1" equation does not contain a negative coefficient. This VECM does not demonstrate any long-term causal relationship between FDI and the other two variables, trade openness and GDP per capita because both conditions are lacking. We will look at the p values and individual lag coefficients for each independent variable to ascertain the short-term causation between the variables. Consequently, this section discusses the lagged values of GDP and trade openness for FDI. It is evident that the lagged value of GDP and trade openness is significant. There exists a short-term causal relationship between FDI and the lagged values of GDP and trade openness.

Regression equations in the third scenario use 'D_lto' as the dependent variable and lag values of ly and lfdi as the independent variables. The cointegrating equation is represented by "ce1". The "ce1" must have a negative coefficient and a significant p-value in order to establish the long-term causal relationship between GDP, FDI, and trade openness. The p-value for the "ce1" equation is significant, and it has a negative coefficient. This VECM demonstrates a long-term causal relationship between trade openness and the other two variables, trade openness and FDI, since both requirements are met. We will look at the p values and individual lag coefficients for each independent variable to ascertain the short-term causation between the variables. Consequently, the lagged values of GDP and FDI for trade are explained in this section. As we can see, there is no significant p-value for the lagged value of trade and FDI. Thus, there is no short-term causal relationship between trade and the lags of FDI and GDP.

Table 11: Cointegrating equations

Cointegrating equations

Equation	Parms	chi2	P>chi2
_ce1	**2**	**25.08362**	**0.0000**

beta	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
_ce1						
ly	**1**	.	.	.	.	.
lfdi	**-6.253524**	**1.313076**	**-4.76**	**0.000**	**-8.827106**	**-3.679943**
lto	**1.899306**	**.3827574**	**4.96**	**0.000**	**1.149116**	**2.649497**
_cons	**15.15859**	.	.	.	.	.

Source: *Author's calculation by using Stata*

The aforementioned further demonstrates the significance of error correction while applying the normalization restriction. We may observe that the error correction term is significant based on the chi-square statistic. Additionally, it specifies that the term has two parameters. The independent variables in the model are represented by the parameters. When the variables are converted to the natural logarithm form, the coefficients work at elasticities, and the coefficient of FDI has a positive impact on GDP. Therefore, if all other factors remain constant, a 1% increase in FDI is expected to result in a 6.25 percent rise in GDP at a long-run equilibrium. The aforementioned table also shows that, in the Johansen normalization restrictions imposed model, the coefficient for trade openness is positive, indicating that trade openness has a negative impact on the long-term relationship with the GDP. Therefore, it is anticipated that a 1

percentage point increase in trade will result in a 1.89% long-term decline in GDP until it converges to its new long-run equilibrium ceteris paribus or when all other factors remain constant.

Table 12: Lagrange multiplier Test results

lag	chi2	df	Prob > chi2
1	**2.7996**	**9**	**0.97171**
2	**8.9322**	**9**	**0.44356**

Source: *Author's calculation by using Stata*

The fact that there is no autocorrelation is the null hypothesis. The null hypothesis is accepted if the p-value is higher than the crucial value. The table above demonstrates that this model does not include serial correlation.

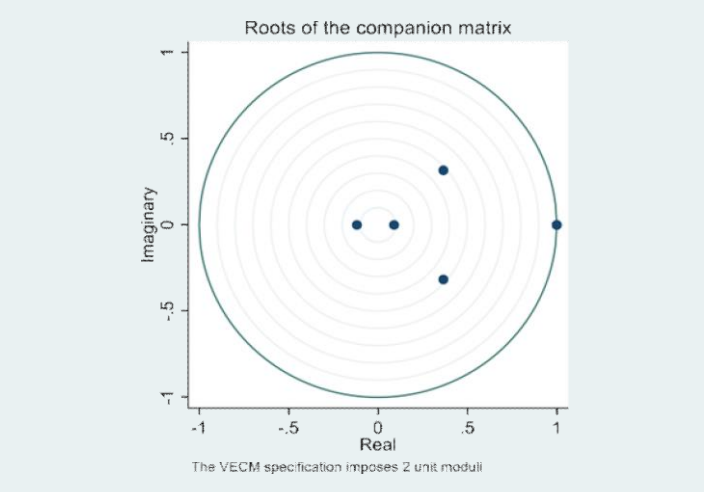
Table 13: Jarque-Bera Test results

Equation	chi2	df	Prob > chi2
D_ly	**3.774**	**2**	**0.15150**
D_lfdi	**0.121**	**2**	**0.94111**
D_lto	**3.765**	**2**	**0.15221**
ALL	**7.661**	**6**	**0.26403**

Source: *Author's calculation by using Stata*

We check the normality of the residual with the Jarque-Bera test. We find from the above table that the residuals are normally distributed.

Figure 5: Stability Test



Source: *Author's calculation by using Stata*

All the eigenvalues lie inside the unit circle. VAR satisfies stability conditions. The stability test result showed that the system was stable. Furthermore, the companion matrix's roots demonstrated the system's desirability.

IV. CONCLUSION

A) Conclusion

From the econometric analysis performed, both China and India revealed distinct dynamics in the relationship between trade, FDI, and GDP.

In China, it was found that trade and FDI do not directly affect China's GDP. For China, FDI is established as an outcome of economic growth, illustrating a unidirectional link between GDP and FDI. Contrarily, trade is not directly influencing FDI in China. The findings underscore that in the context of China, GDP and FDI jointly shape the degree of market openness.

On the other hand, India's analysis highlights that VECM does not demonstrate any long-term causal relationship between GDP per capita and the other two variables, trade openness and FDI. It is also evident that there is no significant p-value for the lagged trade and FDI values. Thus, there is no short-run causality in the lagged value of trade openness and FDI

and, GDP. The paper shows a long-term causal relationship between trade openness and the other two variables, trade openness and FDI. But, there is no short-term causal relationship between trade and the lags of FDI and GDP As we can see, there is no significant p-value for the lagged value of trade and FDI.

This paper also finds that there is no long-term causal relationship between FDI and the other two variables, trade openness and GDP per capita. However, there exists a short-term causal relationship between FDI and the lagged values of GDP and trade openness, as the lagged value of GDP and trade openness is significant. Ceteris paribus, it was anticipated that a 1% rise in FDI would result in an increase in GDP of 6.25%, bringing the economy to a long-run equilibrium in India. It was also inferred that trade openness has a negative impact on the long-term connection with GDP and that a 1 percentage point rise in trade will result in a 1.89% decline in GDP in India over the long run, bringing about its new long-term equilibrium.

Overall, these results offer insightful information to decision-makers, highlighting the significance of customized approaches in utilizing trade and foreign direct investment to boost economic growth while taking into account the unique circumstances and traits of every individual country. Comprehending these intricate relationships is crucial in devising efficacious policy frameworks that conform to the unique economic landscapes of China and India.

B) Limitations of Study

This study is not free from limitations. For instance, the VAR, VECM model and Granger causality applied may not fully capture the complex relationship between FDI, trade openness, and economic growth. However, this study has employed the latest techniques to analyze the link between the variables being studied. Much research is still required in this particular field because of the contradicting relationship among stated variables.

Interest Conflicts

The authors state that there is not any conflict of interest with this paper's publication.

V. REFERENCES

[1] Khalid, M. A. (2016). The impact of trade openness on economic growth in the case of Turkey. *Research Journal of Finance and Accounting*, *7*(10), 51-61.

[2] Hussain, M. E., & Haque, M. (2016). Foreign direct investment, trade, and economic growth: Anempirical analysis of Bangladesh. *Economies*, *4*(2), 7.

[3] Kakar, Z. K., & Khilji, B. A. (2011). Impact of FDI and trade openness on economic growth: A comparative study of Pakistan and Malaysia. *Theoretical and Applied Economics*, *11*(11), 53.

[4] Ijirshar, V. U. (2019). Impact of trade openness on economic growth among ECOWAS Countries: 1975-2017. *CBN Journal of Applied Statistics (JAS)*, *10*(1).

[5] Keho, Y. (2017). The impact of trade openness on economic growth: The case of Cote d'Ivoire. *Cogent Economics & Finance*, *5*(1), 1332820.

[6] Sakyi, D., Villaverde, J., & Maza, A. (2015). Trade openness, income levels, and economic growth: The case of developing countries, 1970–2009. *The Journal of International Trade & Economic Development*, *24*(6), 860-882.

[7] World Development Indicators | DataBank. *World Bank DataBank*, https://databank.worldbank.org/source/world-development-indicators.

[8] Ahmed, Y., Anoruo, E.(1999). Openness and Economic Growth: Evidence from SelectedASEAN Countries. *The Indian Economic Journal*

[9] Vehapi , Sadiku and Petkovoski (2015**).** Empirical Analysis of the Effects of Trade Openness on Economic Growth: An Evidence for South East European Countries. *Procedia economics and finance,* 19 (2015) 17 – 26

[10] Zaheer and Khilji (2011). Impact of FDI and Trade Openness on Economic Growth: AComparative Study of Pakistan and Malaysia , *Theoretical and applied economics* ,(506)

[11] Agarwal and Hemat (2023). Foreign Direct Investment, Trade Openness, and Economic Growth:An Empirical Investigation of India. *EPW*

[12] Wang, Jiangyu. (2008). The Evolution of China's International Trade Policy: Development Through Protection and Liberalisation, *Economic Development through World Trade*, pp. 191–213.

[13] World Bank (2023). China Overview: Development news, research, data. *World Bank*

[14] https://www.worldbank.org/en/country/china/overview#1

[15] Amjad and Shabbir (2006). TRADE OPENNESS, FDI AND ECONOMIC GROWTH: A Panel Study. *Pakistan Economic and Social Review*, vol. 44, no. Summer 2006, 2006, pp. 137-154

[16] Kong,Peng, Ni, Jiang and Wang (2021). Trade openness and economic growth quality of China: Empirical analysis using ARDL model. *Finance Research Letters*, Volume 38, 2021

[17] Dunford, Michael (2023). China's development path, 1949-2022. *Global Discourse*, pp. 1-31.

[18] Rai, Durgesh (2021). FDI Flows to India: Recent Trends, Challenges and way forward. *DPGPOLICY BRIEF*. Volume 6

[19] Das, Bipul (2020). FDI Inflows in India. *INTERNATIONAL JOURNAL OF SCIENTIFIC &TECHNOLOGY RESEARCH.* VOLUME 9

[20] Panjwani, Jain (2022). FDI INFLOWS IN INDIA: AN ANALYSIS FROM APRIL 2000 TO 2022. *The Research Repository of GIBS*, Volume 5.