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An ARDL Approach to Foreign Direct Investment Inflows, Economic Growth & Co2 Emissions in India

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Abstract

This research critically explores the correlation within the gas emissions, "foreign direct investment (FDI)" inflows, and economic growth in India. In order to achieve this, the study adopts the "Auto Regressive Distributed Lag (ARDL)" bound testing approach and Granger Causality test using time series data from 1990 to 2019. The observed outcomes demonstrate that the variables are co-integrated, demonstrating the presence of both long-term and short-term linkages among them. The study reveals that economic growth and FDI inflows positively contribute to CO2 emissions in both the persistent and temporary contexts in India. Additionally, FDI exerts a positive influence on the country's economic growth in both the long-run and short-run. The Granger causality test similarly approves the presence of one-way causality: FDI drives economic growth, FDI impacts CO2 emissions, and economic growth affects CO2 emissions.

Keywords: FDI, GDP per capita, CO2 Emissions

1. Introduction

There's an extensively held belief that FDI impacts positively on the profitable growth and productivity of the entering nation. The proposition suggests that FDI not only brings in capital backing but also leads to favorable issues through the relinquishment of foreign technology and moxie (Ibrahim, 2015). Since India enforced its new profitable policy, "Liberalisation, Privatisation, and Globalisation" (LPG) in 1991, its frugality has experienced significant changes. The Indian government has taken multitudinous measures to encourage both FDI and portfolio investment, with a particular emphasis on FDI. As a result, India has come a seductive destination for foreign investment in recent times (Roy et al. 2017). Foreign capital affluence provides substantial investment to fleetly develop less- developed host nations (Agrawal, 2005). It brings with it technological advancements that ensures the host country's development with profitability (Pradhan, 2002) and also imparts specialized moxie and business know- style, which are significant contributors to the host nation's profitable development (Balasubramanyam, 2002). Despite colorful measures, India has not entered the optimal position of foreign capital flux due to factors similar as shy structure, complex duty structure, restrictive labor laws, bureaucracy, and corruption (Bedi & Kharbanda, 2014).

Some experimenters argue that countries passing profitable growth, industrialization, and increased FDI may also see advanced carbon dioxide (CO2) discharge, which can be dangerous, especially to developing nations (WHO, 2013). Proponents of the neoliberal testament, still, argue that FDI can be salutary for the terrain. The environmental costs and benefits of FDI are a subject of evaluation by numerous economists and environmentalists, particularly in lower-developed nations (UNCTAD, 2017). Energy plays a pivotal part in achieving sustainable development, especially for developing husbandry (Muhammad, & Khan, 2019). As these husbandry grow fleetly, usability of the power rises due to profitable expansion, industrialization, and population growth (OECD, 2007). Several developing husbandry with liberal profitable programs have endured rapid-fire profitable growth, but some have faced challenges related to environmental norms. In order to attract FDI, some developing nations lower their environmental norms, leading to enterprises about environmental impacts (Acharyya, 2009).

Shortage of original technologies along with nonsupervisory capacity, FDI considers as the most effective way to spread stylish product practices (Merican et al. 2007). Still, there's a growing concern about the environmental consequences of nonstop profitable growth, particularly the inordinate reliance on fossil energies, leading to CO2 discharge and their

adverse goods on living organisms (UNEP, 2011). Energy sources are critical for development, especially in developing nations (Ibrahim, 2015). Climate change performing from global warming has come a significant global concern, with CO2 discharge considered a primary malefactor (Fordham & Zaghdoud, 2009). Understanding the causes of CO2 discharge in individual nations is essential to address the global challenge of reducing CO2 discharge (Jayanthakumaran, Verma & Liu, 2012). The positive goods of FDI on philanthropist husbandry include capital transfer, chops and technology relinquishment, request access, and import creation. This paper focuses on examining the two most significant benefits and costs of FDI inrushes in India's profitable growth and environmental impact.

2. Literature review

2.1 FDI and Economic Growth

FDI garners significant interest due to its perceived optimistic goods on profitable growth. There is a extensively accepted belief that FDI equally important as it directly contributes to capital conformation in the entering frugality and laterally fosters growth by promoting mortal value development, easing technology exchanging, and bolstering competition (Aitken et al, 1997). It can also be said that “FDI stimulates profitable growth through colorful channels, similar as technology transfer, spillover goods, efficiency earnings, and the preface of fresh procedures and directorial chops. Kumar and Misra (2020) have verified that FDI inrushes have a positive long- term impact on exports and wares trade.

Hsiao and Shen (2003) have stressed that profitable growth plays a pivotal part in attracting FDI in developing countries. Ibrahim (2015) stated the connection concerning renewable FDI, profitable growth, and electricity consumption in Egypt, concluding that FDI has a positive long- run effect on profitable growth. Muhammad and Khan (2019) conducted a study on the connection between bilateral FDI, usability of the power, CO2 discharge, capital inflow, and profitable growth in Asian countries, chancing that usability of the power, FDI inrushes and exoduses, CO2 discharge, and capital all play important places in Asia's profitable growth. Similarly, Long (2018) evaluated the association between FDI, profitable growth, and electricity consumption in Vietnam from 1990 to 2015. Using the Toda- Yamamoto approach and autoregressive distributed pause approach, the study set up that electricity consumption and FDI appreciatively impact Vietnam's profitable growth in both the shorter and longer terms.

2.2 FDI and CO2 Emissions

Lee (2013) examined how the association between FDI and CO2 emissions varies between developing and developed nations. The results were inconclusive, revealing divergent outcomes in different countries. This suggests that the impact of FDI on CO2 emissions is context-specific and dependent on the economic and environmental conditions of each nation. Contradicting Lee's findings, Acharyya's (2009) study on FDI in India emphasized profitable growth and environmental decline. The research indicated a significant positive long-term effect of FDI on profitable growth in India, as well as a notable long-run influence of FDI inflows on CO2 emissions. This implies that in certain contexts, FDI can be instrumental in driving economic growth while concurrently contributing to environmental degradation. Merican et al. (2007) explored the effect of FDI on CO2 emissions in several Southeast Asian countries. The study found varying impacts of FDI on pollution growth, with positive associations observed in Malaysia, Thailand, and the Philippines. In contrast, FDI was found to be inversely related to pollution in Indonesia, while having an insignificant association with CO2 emissions in Singapore. This reveals the diversity of environmental consequences of FDI within a single region.

Nasir et al.'s (2019) study focused on the ASEAN-5 countries and examined the ecological consequences of FDI, profitable growth, and financial development. The findings indicated a statistically significant long-run cointegrating association between financial development, profitable growth, FDI, and CO2 emissions. This suggests that a comprehensive approach that considers economic and financial factors is essential in understanding the environmental impact of FDI. Munir and Ameer (2020) analyzed the long-run and short-run effects of FDI, profitable growth, and industrialization on CO2 emissions in Pakistan. The study identified that an increase in FDI had a favorable and significant impact on CO2 emissions in the long run. However, a decrease in FDI had a negative, yet insignificant, effect. The results underscore the importance of stable and sustained FDI inflows to support environmental efforts. Linh and Lin (2014) investigated the dynamic association among CO2 emissions, power usability, profitable growth, and FDI in Vietnam. The study revealed bidirectional relationships between FDI inflows and power usability, indicating mutual influence between these factors. Additionally, a unidirectional relationship was found from CO2 emissions towards FDI inflows. This suggests that FDI can play a role in shaping energy consumption patterns and environmental outcomes.

Ren et al. (2014) examined the association between environmental decline and trade in China. The study suggested that China's growing trade was a major factor contributing to the rapid rise in CO2 emissions, and large FDI inflows further

exacerbated the issue. This highlights the need for sustainable growth strategies and investment in green technologies to mitigate environmental impacts. Abdouli and Hammami (2018) explored the association between FDI inflows, profitable growth, and environmental decline in the Middle Eastern and North African countries. The study found bidirectional unproductive connections among FDI inflows and profitable growth, CO2 emissions and profitable growth, and FDI inflows and CO2 emissions. These findings underscore the need for comprehensive policies that address economic growth and environmental concerns simultaneously. Jalil and Mahmud (2009) investigated the association between FDI inflows, profitable growth, and CO2 emissions in the Middle Eastern and North African countries. The study found bidirectional unproductive connections between these variables for the global panel and the Middle East. These results emphasize the complexity of the relationship between FDI, profitable growth, and CO2 emissions across different regions.

Chang and Li (2019) analyzed the influences on CO2 emissions using the Environmental Kuznets Curve (EKC) thesis. The study found a double-threshold effect on CO2 emissions across different population administrations. The results also revealed an inverted U-shaped EKC association between CO2 emissions and profitable growth, suggesting the need for targeted policies based on a country's development stage. The case studies examined in this analysis provide valuable insights into the intricate relationship between FDI, profitable growth, and CO2 emissions. The findings highlight the diversity of impacts across countries and regions and underscore the importance of context-specific and comprehensive policies to achieve sustainable economic growth while mitigating environmental degradation. As the global community faces environmental challenges, it is crucial for policymakers to take into account the complex interactions between economic development and environmental sustainability for a more resilient and prosperous future.

2.3 Economic Growth and CO2 Emissions

Policy Formulation: The insights gleaned from the case studies provide a solid foundation for policymakers to craft effective and targeted strategies. Understanding the complex relationship between FDI, profitable growth, renewable energy usage, and CO2 emissions enables governments to design policies that encourage sustainable economic development while mitigating environmental impact. Policymakers can implement measures to promote renewable energy adoption, energy efficiency, and green technologies, fostering a greener and more resilient economy (Alam et al. 2018). The case studies shed light on the environmental consequences of economic activities, raising awareness about the importance of balancing economic growth with environmental sustainability. Highlighting the impact of industrialization and energy consumption on CO2 emissions, these studies motivate stakeholders to adopt eco-friendly practices and invest in clean energy alternatives (Hasnisah et al. 2019). Increased environmental awareness can drive collective action toward mitigating climate change and preserving natural resources.

Companies can leverage the findings from the case studies to develop sustainable business strategies. Understanding the relationship between renewable energy usage, CO2 emissions, and economic growth empowers businesses to make environmentally responsible decisions. Embracing green practices not only contributes to environmental protection but can also enhance a company's reputation, attract environmentally conscious customers, and boost market competitiveness (Ahmed et al. 2017). Case studies focusing on renewable energy usage underscore the potential benefits of transitioning from non-renewable energy sources to cleaner alternatives. Countries that invest in renewable energy infrastructure can improve their energy security by reducing their dependence on fossil fuels. This enhances resilience to fluctuations in global energy prices and supply disruptions, promoting stability and sustainability in the energy sector. The case studies demonstrate that profitable growth and environmental sustainability are not mutually exclusive goals. Incorporating environmental considerations into economic development plans, countries can achieve sustainable growth that is both economically viable and ecologically responsible. This long-term approach ensures that economic progress does not come at the expense of environmental degradation.

Several case studies examine the global implications of CO2 emissions, international trade, and investment. The findings from these studies foster a sense of global cooperation and encourage nations to work together to address climate change and environmental challenges. Collaborative efforts can lead to the exchange of best practices, technology transfer, and joint initiatives to reduce greenhouse gas emissions on a global scale (Dong et al. 2019). The case studies contribute significantly to the academic field by providing valuable empirical data and insights into the relationship between economic factors and CO2 emissions. Researchers can build upon these studies to explore further and propose innovative solutions to environmental issues. Academic advancements in this area have the potential to drive policy improvements and inform decision-making processes at various levels. The benefits of the case studies are extensive and multifaceted. Policymakers can make informed decisions, businesses can adopt sustainable practices, and countries can work collaboratively to address environmental challenges (Salahuddin et al. 2018). Moreover, these studies contribute to the

advancement of knowledge in the academic sphere, opening up new avenues for research and innovative solutions. Leveraging the insights from the case studies, we can foster a more sustainable and environmentally conscious future for our planet.

3. Econometric specification and methodology

3.1 Model specification and data

$$CO2=B_0+B_1FDI_t+B_2GDP_t+E_t$$

In this model, CO2 represents the CO2 discharge in metric tons per capita, FDI represents the net inrushes of FDI in current US bones, and GDP represents the "gross domestic product" per capita in current US bones. The data for these variables were attained from the World Development pointers database.

3.2 Econometric Methodology

The study observed the interplay within the gas discharge, FDI, and profitable growth using the ARDL approach developed. The ARDL model was chosen due to its advantages over other styles, particularly its capability to be applied anyhow of whether the time series variables are integrated of order 0 or order 1. The "ARDL model" began by conducting unit tests for the variable, and it was set up that all three variables, videlicet CO2, FDI, and profitable growth, were integrated at the first difference, satisfying the hypotheticals of the ARDL (bound test). Later, the pause value was named using the "Akaike Information Criterion (AIC)" through the ordinary least places (OLS) system. The study also checked for temporary and continuing reason using the "Vector Error Correction Model" and applied the Granger reason test to assess the directional reason among the variables. Equally, individual tests, including the recursive estimate co sum test to assess the stability of the ARDL model, the Breusch- Pagan- Godfrey test for heteroskedasticity, the Durbin- Watson test for periodical correlation, and the "Jarque- Bera test" for normalcy, were conducted to estimate the virtuousness of fit for the ARDL model.

3.3: Objective of Study

To evaluate the long-run & short-run connection between FDI, economic growth and CO2 emissions.

4. Results and Discussion

Prior to commencing the study, the experimenters examined the stationarity of the natural logarithmic variables, videlicet "LNCO2, LNFDI, and LNGDP". The variables were set up to be stationary at the first difference. The "optimal pause length was determined" using the "VAR fashion and AIC criterion", which redounded in opting a pause of 1. Later, the experimenters conducted the "Augmented Dickey Fuller (ADF) Test" to assess the stationarity parcels of each variable according to the series of the time.

Table: : Unit root test (Augmented Dickey Fuller Test) results.

	t-statistic	Test critical values at 5% level of Significance	Prob.*
Augmented Dickey-Fuller test statistic for D(FDI)	-6.482533	-2.971853	0.0000
Augmented Dickey-Fuller test statistic for D(GDP)	-5.795165	-2.971853	0.0000
Augmented Dickey-Fuller test statistic for D(CO2)	-4.615053	-2.971853	0.0010

Hence, the unit-root test was employed to examine the order of integration for all the variables. For this study, the ADF test was utilized to assess the stationarity properties of the variables.

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Table:				
Johansen Cointegration Test				
Series: LNCO2 LNFDI LNGDP				
Lags interval (in first differences): 1 to 1				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE (s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None*	0.653018	50.19077	29.79707	0.0001
At most 1	0.504897	20.55323	15.49471	0.0079
Trace statistics indicates 2 cointegration equation				
Unristricted cointegration Rank Test (Maximum Eigen)				
Hypothesized No. of CE (s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None*	0.653018	29.63754	21.13162	0.0025
At most 1	0.504897	19.68371	14.26460	0.0063
Max-eigenvalue test indicates 2 cointegration				

After vindicating the stationarity parcels of the variables, both the "Johansen cointegration test and ARDL bounds test" were employed to assess the long- run cointegration among the variables. The "Johansen cointegration" test revealed the actuality of 2 cointegrating equations. Both the trace statistics and the maximum- Eigen statistics indicated the presence of 2 cointegrating equations among the variables. These findings suggest that the series are connected and can be combined in a direct manner. Accordingly, indeed if there may be short- run shocks, the variables will ultimately meet in the long run and establish a long- term relationship. The P- values from the trace statistics for the two cointegration equations were set up to be 0.0001 and 0.0079", while the P- values from the maximum- Eigen statistics were 0.0025 and 0.0063, independently. These P- values signify two significant long- run connections between the variables.

Table: -Normalized cointegrating coefficients (standard error in brackets)			
Cointegration Equation (s):		Log likelihood	172.9755
LNCO2	LNFDI	LNGDP	
1.0000	-1.789571	2.596535	
	(0.32021)	(0.83307)	
	5.588741	3.116827	

Furthermore, the normalized cointegration test outcomes demonstrated that LNFDI exerts a positive and significant long-run influence on LNCO2, with a coefficient value of -1.789571 and a t-statistics value of 5.588741. However, LNGDP has a negative long-run impact on LNCO2, with a coefficient value of 2.596535 and t-test value of 3.116827.

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http://eelet.org.uk

Table: F-Bounds Test Null Hypothesis: No Levels relationsip				
Test Statistic	Value	Significant	I(0)	I(1)
		Asymptotic: n=1000		
F-Statistic	32.02617	10%	2.63	3.35
K	2	5%	3.1	3.87
		2.5%	3.55	4.38
		1%	4.13	5
Actual Sample Size	29	Finite Sample: n=35		

Table: ECM Regression				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-statistic	Prob.
CointEq(-1)*	-0.305839	0.025533	-11.97820	0.000

Table: ARDL Long-Run form and Bounds Test				
Dependent Variable: D(LNCO2)				
Selected Model: ARDL(1,0,0)				
Case 2: Restricted Constant and No Trend				
Sample: 1990 2019				
Included observation: 29				
Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-statistic	Prob.
C	-0.418398	0.085418	-4.898239	0.0000
LNCO2(-1)*	-0.305839	0.060715	-5.037297	0.0000
LNFDI**	-0.000227	0.005030	-0.045099	0.9644
LNGDP**	0.153420	0.032524	4.717084	0.0001

The ARDL bounds test was also employed to assess the long- run cointegrating connection among the variables. The reckoned F- statistics value of 32.03 exceeded both the critical values of the lower set (4.13 and3.1) and the upper set (5 and3.87) at the 1 and 5 significance situations, independently. This indicates that CO2 is co-integrated in the long run with FDI and GDP. The measure value of the co-integration equation (CointEq(- 1)) is-0.305839, signifying a negative and significant relationship. This measure value indicates that the speed of adaptation towards long- run equilibrium is30.58. Similarly, the value of32.02 for the speed of adaptation towards long- run equilibrium is supported by the t-statistics value of-11.98, which is also significant. Also, from the attained portions for LNGDP, the value of0.153420, significant at0.0001, suggests a positive long- run relationship among the related variables. This implies that a 1 increase in GDP will lead to a15.34 increase in CO2 discharge. Still, the measure value of-0.000227 with a probability value of0.9644 indicates a weak and insignificant relationship between FDI and CO2 discharge.

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Depedent Variable: D(LNCO2)				
Method: Least Squares (Gauss-Newton/Marquardt steps)				
D(LNCO2) = C(1)*(LNCO2(-1) - 0.492482512258*LNGDP(-1) + 1.3840023371) + C(2)*(LNFDI(-1) - 1.72612146179*LNGDP(-1) - 4.9102914541) + C(3)*D(LNCO2(-1)) + C(4)*D(LNFDI(-1)) + C(5)*D(LNGDP(-1)) + C(6)				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.475047	0.099494	-4.774649	0.0001
C(2)	0.011572	0.005012	2.308918	0.0307
R-square value	0.572197	Durbin Watson Statistics		2.241968
Adjusted R-square value	0.474969			
F-statistic	5.885098			
Prob. (F-statistic)	0.001343			

The VECM fashion was employed to examine the reason among the variables. The error correction portions give perceptivity into the speed of adaptations within which the model will restore its equilibrium following any disturbance. The long- run measure, also known as the ECT, with the dependent variable LNCO2 and the variables LNGDP and LNFDI, is set up to be-0.475047, displaying a negative and statistically significant relationship, as the measure is negative and the t- statistics is-5.56338. This indicates that single change in the explicatory variables will lead to a0.41 change in the dependent variable in the long run. Accordingly, the negative and significant long- run measure (C(1)) suggests a significant long- run reason between LNFDI and LNGDP towards LNCO2. The positive sign in the measure implies a movement down from the equilibrium, while the negative sign indicates a movement towards the equilibrium. The measure value C (2) indicates the short- run positive impact of LNFDI on the dependent variable LNCO2. The measure value of 0.011572, with a t- statistic of 2.308918 and a p- value of 0.0307, signifies the actuality of a short- run positive effect of FDI on CO2 discharge. This implies that a 1 change in the value of FDI will lead to a0.01 increase in the value of CO2.

Table: :Wald Test			
Dependent Variable: LNCO2, Explanatory Variable: LNGDP			
Test Statistic	Value	df	Probability
t-statistics	13.14466	27	0.0000
F-statistics	172.7822	(1.27)	0.0000
Chi-square	172.7822	1	0.0000

The findings from the Wald statistics indicate a relationship between LNGDP and LNCO2 in the short run. The t-statistics value of 13.14466 with a p-value of 0.0000, along with an F-statistics value of 172.7822 and its corresponding p-value of 0.0000, provide evidence of the significance of LNGDP's impact on the other variable.

Table: :Wald Test			
Dependent Variable: LNCO2, Explanatory Variable: LNFDI,LNGDP.			
Test Statistic	Value	df	Probability
F-statistics	561.0019	(2.27)	0.0000
Chi-square	1122.004	2	0.0000

The Wald test, with the F-statistics value of 561.0019 and its associated p-value of 0.0000, along with the chi-square value of 1122.004 and its corresponding p-value of 0.0000, indicates a influence of LNGDP on LNCO2.

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Table: :Wald Test			
Dependent Variable: LNCO2, Explanatory Variable: LNFDI			
Test Statistic	Value	df	Probability
t-statistics	11.53412	28	0.0000
F-statistics	133.0359	(1.28)	0.0000
Chi-square	133.0359	1	0.0000

The Wald statistics, with a t-statistics value of 11.14466 and a p-value of 0.0000, along with an F-statistics value of 133.0359 and its associated p-value of 0.0000, demonstrate that LNGDP exerts a significant impact on LNCO2 in the short run.

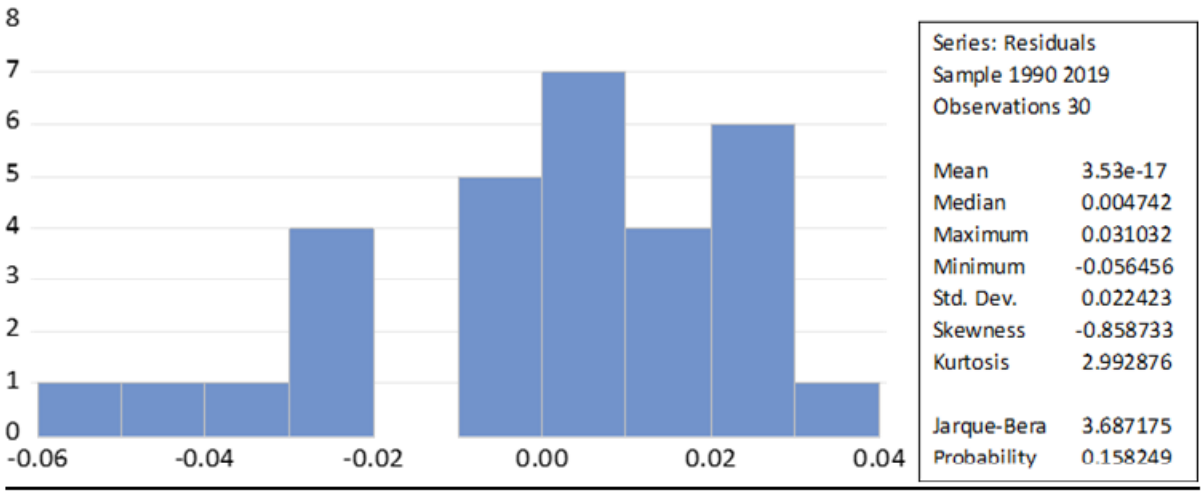
Table: Pairwise Granger Causality Tests			
Sample: 1990 2019			
Lags: 1			
Null Hypothesis:	Obs	F-Statistic	Prob.
LNFDI does not Granger Cause LNCO2	29	4.57999	0.0419
LNCO2 does not Granger Cause LNFDI		0.89298	0.3534
LNGDP does not Granger Cause LNCO2	29	16.4729	0.0004
LNCO2 does not Granger Cause LNGDP		1.66912	0.2077
LNGDP does not Granger Cause LNFDI	29	0.29950	0.5889
LNFDI does not Granger Cause LNGDP		7.46584	0.0112

After checking the cointegration and reason between the variables, the directional reason was also examined. The findings revealed that FDI granger causes CO2 discharge. The significance of this relationship is supported by the p- value of 0.0419, which is lower than 0.05, and the F- statistic value of 4.57999. Still, CO2 discharge do not beget FDI, as indicated by the p- value of 0.3534 and the F- statistic value of 0.89298, which are both lesser than0.05. This implies the actuality of a unidirectional relationship from FDI towards CO2 discharge. also, the relationship between profitable growth and CO2 discharge showed that profitable growth causes CO2 discharge, with a p- value of 0.0004 (lower than0.05) and an F- statistic value of 16.4729" (indicating significance).

On the other hand, CO2 discharge do not produce profitable growth, as indicated by the p- value of 0.2077 (lesser than0.05) and the F- statistic value of 1.66912 (indicating nullity). Therefore, a unidirectional relationship runs from profitable growth towards CO2 discharge. Also, the findings revealed that FDI granger causes profitable growth, with a p- value of 0.0112 (lower than 0.05) and an F- statistic value of 7.46584 (indicating significance). Still, CO2 discharge do not beget FDI, with a p- value of 0.3534 (lesser than 0.05) and an F- statistic value of 0.89298 (indicating nullity). This indicates a unidirectional connection from FDI investment towards profitable growth. The model used in the study was significant, as indicated by the value of R- squared at 0.976501 and acclimated R- forecourt at 0.974761, along with the p- value of the F- statistic at0.0000. Similarly, the Durbin-Watson statistic value of 0.711034 suggested the absence of periodical correlation, which is a positive index for the model used in the study.

Table : Heteroskedasticity Test: Breusch-Pagan-Godfrey			
Null hypothesis: Homoscedasticity exists			
F-statistic	0.212358	Prob. F(1,25)	0.6489
Obs*R-squared	0.227415	Prob. Chi-Square(1)	0.6334

The "Breusch-Pagan-Godfrey test" of Heteroskedasticity indicated that the model is well-suited to explain the dependent variable, as no evidence of heteroskedasticity was detected, and the residuals were found to be homoscedastic. The p-value of 0.7744, which is greater than 0.05, led to the acceptance of the null hypothesis, suggesting that the model is homoscedastic and does not exhibit any heteroskedasticity in the data.



Test of Normality: The "Jarque-Bera test of normality" was employed to examine the normality of the residuals. With a p-value of 0.158249, which is greater than 0.05, the null hypothesis" (H0) of normally distributed residuals was accepted. This led to the conclusion that the residuals are normally distributed, which serves as a positive indicator that the regression model used in the study is meaningful in explaining the relationship between variables. The value of the Durbin-Watson test indicated the absence of serial correlation, further suggesting that the regressors are significant in explaining the relationship between the variables.

Conclusion & Policy Implications

The focus of the study is to evaluate the connection within the gas discharge and FDI inflows, and profitable growth. The cointegration tests indicated that the concerted influences and profitable growth has a significant effect on CO2 discharge in the long- run. The profitability and the emission rate has also been discussed in this study to create a clear route map. Likewise, the analysis revealed that FDI has a substantial impact on profitable growth in and gross domestic product GDP has a positive impact on FDI in all the aspects. The findings suggest that both profitable growth and FDI inclusively contribute to environmental declination by adding CO2 discharge in India.

The counter accusations of the findings punctuate the critical part of FDI in sustaining profitable growth and meeting the energy demands for the development. In developing nations, a substantial portion of energy sources comes from the burning of fossil energies. The strong association between FDI, profitable growth, and CO2 discharge underscores the impact of these factors on CO2 discharge. Managing environmental enterprises, the government should prioritize the relinquishment of advanced technologies for low carbon discharge and promote the use of renewable energy sources rather than carbon- emitting ones. Perfecting energy effectiveness, developing renewable energy coffers, and enforcing low carbon emigration technologies will bear wide development sweats. Policy changes and practices should be targeted towards emigration reductions. Substantiation suggests that combined sweats by policymakers to attract FDI through well- designed juggernauts can profit both the frugality and the terrain.

References

1. Abdouli, M., & Hammami, S. (2018). The dynamic links between environmental quality, foreign direct investment, and economic growth in the Middle Eastern and North African countries (MENA region). Journal of the Knowledge Economy, 9(3), 833-853.
2. Acharyya, J. (2009). FDI, growth and the environment: Evidence from India on CO2 emission during the last two decades. Journal of economic development, 34(1), 43.

3. Ahmed, K., Bhattacharya, M., Shaikh, Z., Ramzan, M., & Ozturk, I. (2017). Emission intensive growth and trade in the era of the Association of Southeast Asian Nations (ASEAN) integration: An empirical investigation from ASEAN-8. Journal of Cleaner Production, 154, 530-540.
4. Aitken, B., Hanson, G. H., & Harrison, A. E. (1997). Spillovers, foreign investment, and export behavior. Journal of International economics, 43(1-2), 103-132.
5. Batten, J. A., & Vo, X. V. (2009). An analysis of the relationship between foreign direct investment and economic growth. Applied Economics, 41(13), 1621-1641.
6. Chandran, V.G. and Tang, C.F. (2013), "The impacts of transport usability of the power, foreign direct investment and income on CO2 emissions in ASEAN-5 economies", Renewable and Sustainable Energy Reviews, Vol. 24, pp. 445-453.
7. Chang, S. C., & Li, M. H. (2019). Impacts of foreign direct investment and economic development on carbon dioxide emissions across different population regimes. Environmental and Resource Economics, 72(2), 583-607.
8. Dogan, E. and Turkekul, B. (2016), "CO2 emissions, real output, usability of the power, trade, urbanization and financial development: testing the EKC hypothesis for the USA", Environmental Science and Pollution Research, Vol. 23 No. 2, pp. 1203-1213.
9. Dong, K., Dong, X., & Dong, C. (2019). Determinants of the global and regional CO2 emissions: what causes what and where?. Applied Economics, 51(46), 5031-5044.
10. Fernandes, A. M., & Paunov, C. (2012). Foreign direct investment in services and manufacturing productivity: Evidence for Chile. Journal of Development Economics, 97(2), 305-321.
11. Fodha, M., & Zaghdoud, O. (2010). Economic growth and pollutant emissions in Tunisia: an empirical analysis of the environmental Kuznets curve. Energy policy, 38(2), 1150-1156.
12. Goldenman, G. (1998) The environmental implication of foreign direct investment: Policy and institutional issues. OECD Paper. CCNM/EMEF/EPOC/CIME(98)3.
13. Hasnisah, A., Azlina, A. A., & Taib, C. M. I. C. (2019). The impact of renewable usability of the power on carbon dioxide emissions: Empirical evidence from developing countries in Asia. International Journal of Energy Economics and Policy, 9(3), 135.
14. Hermes, N., & Lensink, R. (2003). Foreign direct investment, financial development and economic growth. The journal of development studies, 40(1), 142-163.
15. Hsiao, C., & Shen, Y. (2003). Foreign direct investment and economic growth: the importance of institutions and urbanization. Economic development and Cultural change, 51(4), 883-896.
16. Ibrahiem, D. M. (2015). Renewable electricity consumption, foreign direct investment and economic growth in Egypt: An ARDL approach. Procedia Economics and Finance, 30, 313-323.
17. Jalil, A., & Mahmud, S. F. (2009). Environment Kuznets curve for CO2 emissions: a cointegration analysis for China. Energy policy, 37(12), 5167-5172.
18. Jayanthakumaran, K., Verma, R., & Liu, Y. (2012). CO2 emissions, usability of the power, trade and income: a comparative analysis of China and India. Energy Policy, 42, 450-460.
19. Jorgenson, A.K. (2007), "Does Foreign Investment harm the air we breathe and the water we drink? A cross-national study of carbon dioxide emissions and organic water pollution in less-developed countries, 1975 to 2000", Organization and Enviornment, Vol. 20 No. 2, pp. 137-156.
20. Khalil, S., & Inam, Z. (2006). Is trade good for environment? A unit root cointegration analysis. The Pakistan Development Review, 1187-1196.
21. Kivyiro, P. and Arminen, H. (2014), "Carbon dioxide emissions, usability of the power, economic growth, and foreign direct investment: causality analysis for Sub-Saharan Africa", Energy, Vol. 74 No. 1, pp. 595-606.
22. Kneller, R., & Pisu, M. (2007). Industrial linkages and export spillovers from FDI. World Economy, 30(1), 105-134.
23. Kumar, P., & Misra, K. K. (2020). INFLUENCES INFLOW ON MERCHANDISE EXPORT IN INDIA: A TIME SERIES STUDY.
24. Lau, L. S., Choong, C. K., & Eng, Y. K. (2014). Investigation of the environmental Kuznets curve for carbon emissions in Malaysia: do foreign direct investment and trade matter?. Energy policy, 68, 490-497.
25. Lee, J. W. (2013). The contribution of foreign direct investment to clean energy use, carbon emissions and economic growth. Energy policy, 55, 483-489.

26. Linh, D. H., & Lin, S. M. (2014). CO 2 Emissions, Usability of the power, Economic Growth and FDI in Vietnam. Managing Global Transitions: International Research Journal, 12(3).
27. Long, P. D. (2018). The relationship between foreign direct investment, electricity consumption and economic growth in Vietnam. In The relationship between foreign direct investment, electricity consumption and economic growth in Vietnam: Pham Dinh Long.
28. Merican, Y., Yusop, Z., Noor, Z. M., & Hook, L. S. (2007). Foreign direct investment and the pollution in five ASEAN nations. International Journal of Economics and Management, 1(2), 245-261.
29. Muhammad, B., & Khan, S. (2019). Effect of bilateral FDI, usability of the power, CO2 emission and capital on economic growth of Asia countries. Energy Reports, 5, 1305-1315.
30. Munir, K., & Ameer, A. (2020). Nonlinear effect of FDI, economic growth, and industrialization on environmental quality: evidence from Pakistan. Management of Environmental Quality: An International Journal, 31(1), 223-234.
31. Nasir, M. A., Huynh, T. L. D., & Tram, H. T. X. (2019). Role of financial development, economic growth & foreign direct investment in driving climate change: A case of emerging ASEAN. Journal of environmental management, 242, 131-141.
32. Omri, A., Nguyen, D.K. and Rault, C. (2014), "Causal interactions within the gas emissions, FDI, and economic growth: evidence from dynamic simultaneous-equation models", Economic Modelling, Vol. 42, pp. 382-389.
33. Organisation for Economic Co-operation and Development (OECD), 2007, OECD contribution to the United Nations Commission on Sustainable Development 15, Energy for sustainable development.
34. Pesaran, M. H., Shin, Y., Smith, R. J., (2001), Bounds testing approaches to the analysis of level relationships, Journal of Applied Econometrics 16, 289-326.
35. Pesaran, M. H., Smith, R.P., (1998), Structural analysis of cointegrating VARs. Journal of Economic Surveys, 12 (5), 471–505.
36. Ren, S., Yuan, B., Ma, X., & Chen, X. (2014). International trade, FDI (foreign direct investment) and embodied CO2 emissions: A case study of Chinas industrial sectors. China Economic Review, 28, 123-134.
37. Saidi, K., & Hammami, S. (2015). The impact of CO2 emissions and economic growth on usability of the power in 58 countries. Energy Reports, 1, 62-70.
38. Salahuddin, M., & Gow, J. (2014). Economic growth, usability of the power and CO2 emissions in Gulf Cooperation Council countries. Energy, 73, 44-58.
39. Salahuddin, M., Alam, K., Ozturk, I., & Sohag, K. (2018). The effects of electricity consumption, economic growth, financial development and foreign direct investment on CO2 emissions in Kuwait. Renewable and sustainable energy reviews, 81, 2002-2010.
40. United Nations Environment Programme (UNEP), 2011, Renewable energy, Investing in energy and resource efficiency.
41. WHO (2013), "The World Heath Report 2013", World Health Organization, Geneva.
42. Zarsky, L. (1999). Havens, halos and spaghetti: untangling the evidence about foreign direct investment and the environment. Foreign direct Investment and the Environment, 13(8), 47-74.