CHAPTER 5: DETERMINANTS OF INWARD FOREIGN DIRECT INVESTMENT IN INDIA AND CHINA

Chapter Overview

The determinants of FDI influence the decisions of MNCs while making investment decisions. The issues related to the determinants are multifaceted and need more focused studies on many areas including sustainability dimensions, unequal distributions etc. Accordingly, this chapter sets three sub-objectives and related research questions. First, the key economic factors influencing inward FDI in both India and China are identified. Second, the sustainability determinants affecting inward FDI in India and China are explored. Third, the impact of inward FDI on sustainability factors in India and China is assessed. The methodology employed in the chapter is two-fold. For the first sub-objective, the influence of macroeconomic factors, such as trade openness, exchange rates, economic growth, market size, inflation, and GFCF in attracting FDI is examined. This is incorporated using VAR with OLS technique. For the second sub-objective, the study delves into the influence of sustainability determinants related to SDG indicators like carbon emission, tax revenue, natural resources, access to electricity, and mobile subscription in attracting inward FDI in India. like carbon emission, tax revenue, natural resources, access to electricity, and internet users in attracting inward FDI in China. This is done through multiple regression analysis. For the third sub-objective, the chapter assess the influence of inward FDI on sustainability indicators. This is done by analysing the role of inward FDI in achieving SDG. The chapter analyses the impact on carbon emission and exports in India and China. This is done through Johansen Cointegration Technique and Granger Causality test.

In terms of results, the chapter finds that both economic and sustainability factors significantly impact inward FDI in India and China. The study concludes that inward FDI and carbon emission are cointegrated in India. However, there is no causality among the variables. Additionally, exports and inward FDI are cointegrated in India. Inward FDI cause exports from India. In China, carbon emission and inward FDI are cointegrated and inward FDI causes carbon emission. Exports and inward FDI are cointegrated and there is a bidirectional causality among the variables.

5.1 Introduction

5.1.1 Determinants of Inward FDI

Determinants, in the context of economics, refer to the factors or variables that influence the outcome, behaviour, or characteristics of a particular phenomenon.

Determinants of inward FDI are the various factors that influence an investors decision of investing in India and China. Understanding the determinants involves analysing and recognising the drivers that influence investors to invest in a particular location. The review of literature identifies following variables relevant to the study:

i. ***Economic FDI Determinants:*** Economic determinants includes broader economic factors and conditions, both at the macroeconomic and microeconomic level, that impact the inward FDI.

ii. ***Social FDI Determinants:*** Social determinants encompasses various social elements such as health, education, male-female employment ratio that highlights the social infrastructure of the economy. The various social FDI determinants are sub-set of sustainability determinants and hence, influence inward FDI.

iii. ***Environmental FDI Determinants:*** Environmental determinants involve the natural environment that influence inward FDI. This phenomenon is gaining prominence as investors are increasingly adapting risk-averse strategies. Therefore, the investors tend to favour economies that prioritize environmental considerations. Furthermore, investors show a growing preference for investing in renewable energy initiatives.

The present chapter identifies social and economic determinants as sustainability determinants.

5.1.2 Motives of Inward FDI

a) ***Import Substituting FDI:*** Economies invite multinationals to reduce their imports, following a Balance of Payments deficit. Higher imports results in exchange rate depreciation for domestic economy. Consequently, this influences macroeconomic parameters resulting in inflation. Hence, reducing imports and setting up manufacturing in the home country is the solution that can be facilitated by bringing FDI into the country. This type of FDI comes based on market size, transportation cost, and trade barriers in the host economy.

b) ***Export Oriented FDI:*** An investor engages in export oriented FDI to use the manufacturing capabilities of the host economy. For example, the USA, undertakes 75 percent of semiconductor chip production in East Asia. It is used in manufacturing smartphones, computers, and fighter jets. From East Asia, 90 percent of the most advanced chips are produced in Taiwan and are exported back to the USA (Barnes, 2022). This type of FDI can be attracted by providing proper manufacturing infrastructure and reducing trade barriers in the economy.

c) ***Expansionary FDI:*** Expansionary FDI in the economy is attracted to exploit firm-specific advantages like corporate culture, marketing skills, innovative skills, etc. Sales growth is the main determinant of such expansionary inward FDI. (Ying-Hua, 2000)

d) ***Defensive FDI:*** Defensive FDI is supported by the foreign investor to reduce the cost of production. The availability of low-cost labour is a major determinant in attracting such FDI. (Ying-Hua, 2000)

Source: Adapted from (Moosa, 2002)

5.1.3 Significance of the Study

Understanding determinants of inward FDI serves following purposes:

i. ***Policy Formulation:*** Identifying determinants assists in shaping policies that attract investment or influence economic, social, and environmental factors.

ii. ***Forecasting and Planning:*** Understanding determinants aids in predicting trends, enabling proactive planning for future influencing a situation or outcome.

iii. ***Enhancing Competitiveness:*** Recognising determinants can highlight strengths and weakness, helping entities to improve their competitive edge.

iv. ***Economic Development:*** Utilising these determinants can enable economic growth and development by focusing efforts on influential factors.

v. ***Social and Environmental Impact:*** Understanding the determinants will highlight the scenario of sustainable indicators in India and China, fostering sustainable development.

5.2 Review of Literature

Research conducted by Bandekar et al. (2014) focused on identifying the factors influencing inward FDI in India and Russia from 1991 to 2015. A stepwise OLS regression approach was employed to analyse the data. The primary variables considered in the analysis were the exchange rate, inflation rate, availability of natural resources, degree of trade openness, and export levels. The results indicated that the presence of natural resources and the level of trade openness were crucial factors in attracting FDI to India.

Continuing the exploration of FDI determinants in India, Maggon (2010) conducted another study revealing different influential factors. The research highlighted that higher levels of imports and prevailing lending interest rates in India acted as inducements for investors to channel their investments. To mitigate issues of multicollinearity, the study employed a step-wise multiple regression analysis, alongside the use of the Durbin-Watson test to identify potential autocorrelation. The research utilized a variety of variables to capture different aspects of the economy. These variables included exports and imports as a percentage of GDP, serving as a proxy to assess the economy's openness. Moreover, external debt was utilized as a proxy to understand the economic burden, with the study expecting a negative relationship. The exchange rate was considered to gauge the strength to repay foreign capital. Additionally, factors like lending interest rates, legal rights enforcement efficiency in India, marginal corporate tax rates, and GDP as a measure of market size were included in the study.

A compelling study conducted by Gupta (2017) delved into the factors attracting FDI to India during the period spanning from 1991 to 2015. Employing the OLS regression method, the research aimed to uncover the primary determinants influencing foreign direct investment in India. The regression model constructed was transformed into a logarithm model. Variables used in the study included electric consumption as an indicator of infrastructure, GDP as a representation of market size, inflation rate, real interest rate and trade openness. Notably, the study concluded that all these variables significantly contributed to attracting FDI into India.

A significant investigation conducted by Maryam et al. (2020) scrutinized the influential factors attracting inward FDI in the BRICS economies from 1994 to 2018. Using GDP to represent market size, electric power consumption as an indicator for infrastructure, gross capital formation as a percentage of GDP, trade openness, and REER as variables, the study examined

these elements. Remarkably, the study's findings highlighted the effectiveness of all these variables in the long-term within these economies.

Liu et al. (2020) undertook an econometric evaluation to assess the effects of inward FDI on economic development. Analysing time-series data from 1981 to 2018, a vector autoregressive (VAR) approach was applied. To verify the VAR model's stationarity, the augmented Dickey-Fuller test was conducted. The selection of the appropriate lag length for the VAR model was based on criteria such as the Akaike Information Criterion, Schwarz Information Criterion, and Hannan-Quinn Information Criterion, ultimately deciding on a lag of three. Additionally, tests including the Jarque-Bera for normality and the White test for heteroskedasticity were performed to ensure the reliability of error terms. The findings of the analysis indicated a significant and lasting correlation between FDI and economic growth, observable in both short-term and long-term perspectives.

Bandekar's (2021) research involved a quantitative analysis to explore the elements influencing FDI inflow in India and China. Covering the period from 1991 to 2012, the study utilized secondary data sources. The analysis focused on inward FDI as the response variable, with several predictors such as exchange rate, GDP, external debt, export and import levels, inflation rate, real interest rate, and electric power consumption. Stepwise multiple regression was the chosen method for the investigation. The results highlighted that in India, the key determinants of FDI inflows were GDP, exports, and the exchange rate. In contrast, in China, the significant factors were GDP, electric power consumption, and the level of trade openness. The study also found that the inflation rate adversely affected FDI inflow in both countries.

A recent study by Alam et al. (2022), evaluated the impact of FDI, exchange rate, and inflation on real GDP in India between 1991 and 2020. The study concluded that only FDI positively impacts real GDP while exchange rate and inflation hurt it. The study further recommended easing the licensing and documentation procedure for foreign investors. India needs to make more alliances in terms of eliminating double taxation and engaging in trade agreements with the South Asian economies.

5.2.1 Research Gap

Based on the comprehensive review of the existing literature and the extensive analysis provided in Chapter 2, it is evident that the current body of literature primarily examines the economic determinants of inward FDI in India and China. The chapter aims to bridge existing research gaps while identifying the factors influencing inward FDI in both India and China. The identified research gaps are as follows:

i. ***Agglomeration effects***: The existing literature has focused on various crucial determinants of inward FDI. However, there is need to analyze agglomeration effect in India and China. This means analyzing the effects of already existing inward FDI in attracting additionally FDI. Since agglomeration can facilitate the sharing of knowledge and agglomerated areas offer larger pool of skilled labor, and better infrastructure. Foreign investors are expected to be attracted by agglomerated areas. Hence, the present study attempts to address this issue and analyze the analyzed the economic determinants of inward FDI

ii. ***Analyzing the sustainability pull factors***: The past literature attempts to identify the economic determinants of inward FDI in India and China. However, based on review of literature, it is identified that the new age investors are pulled by sustainability performance. Hence, there is a need to analyze the sustainability determinants that influence inward FDI in India and China.

iii. ***Gap in Effective FDI Research***: Existing studies mainly focus on the quantitative aspects of FDI in India, with minimal exploration into effective aspects. The present study highlights this gap by exploring sustainable FDI in India and China. To assess sustainable FDI, the study analyses the impact of inward FDI on sustainability factors.

5.2.2 Research Questions

Based on the identified research gaps, the following research questions have been formulated:

a) What are the key economic factors influencing inward FDI in India and China?
b) What are the sustainability determinants affecting inward FDI in India and China?
c) What is the impact of inward FDI in the achievement of SDG indicators in India and China?

In alignment with these research questions, the chapter is structured as follows:

5.3.1 : To Determine the Economic Pull Factors of Inward Foreign Direct Investment in India and China

5.3.2 : To Determine the Sustainability Determinants of Inward Foreign Direct Investment in India and China

5.3.3 : To Identify the impact of Inward Foreign Direct Investment on Sustainability Indicators in India and China

5.4: Findings

5.3 Research Methodology and Data Analysis

5.3.1 To Determine the Economic Pull Factors of Inward Foreign Direct Investment in India and China

a) ***Selection of Variables***

i. ***Trade Openness:*** Trade openness is measured as percentage of exports and imports relative to the GDP. It reflects an economy's openness in engaging with other nations. Higher trade openness, demonstrated by increased exports and imports, signifies liberal trade policies. It allows foreign investors to procure raw materials and capital for production within the host country. Consequently, increased trade openness serve as incentives for multinationals to invest in host economies. Previous studies such as Dar (2014), Hooda et al. (2011), Muthoga (2003), and Bandekar (2021) found a positive impact of trade openness on inward FDI.

ii. ***Exchange Rate:*** The impact of exchange rate fluctuations on inward FDI is anticipated to be significant. When the domestic currency devalues, it generally reduces investment costs for international investors within the host country. This scenario is expected to positively influence inward FDI. Studies such as those by Hans (2019) have demonstrated a positive and significant correlation between exchange rate movements and inward FDI in nations like India and China. Furthermore, research by Aliber (1970, 1971) and Boddeyn (1985) suggest that a depreciation in the domestic currency makes local investments more cost-effective for foreign investors, thereby establishing a positive association between the exchange rate and inward FDI.

iii. ***Economic Growth:*** This is measured as the percentage change in the GDP of an economy. Higher GDP growth signifies elevated production capabilities. This attracts foreign investors seeking economies with stronger economic growth. A better GDP reflects a healthier economic state of a nation. Studies such as Ferrer (2019), Muthoga (2003) presume a positive influence of economic growth on inward FDI.

iv. ***Gross Fixed Capital Formation:*** This encompasses the development of essential infrastructure, such as schools, roadways, railways, hospitals, and industrial buildings. A well-developed infrastructure aids FDI by facilitating convenient production activities for foreign investors. For example, importing raw materials and ensuring efficient transportation facilities. Popovici & Calin (2014), Lipsey (2004) finds a positive and significant impact of infrastructure on attracting inward FDI.

v. ***Political Stability:*** Foreign investors are disinclined to invest in countries with political instability or uncertain regulations. The stability of an economy can be gauged through fiscal and monetary policies, including tax rates and lending rates (Lipsey,2004).

vi. ***Inflation:*** A lower inflation rate reflects economic stability and cheaper labour costs. This is a pivotal consideration for investors while evaluating an economy for investment. Higher inflation rates can demotivate investors due to increased production costs (Mostafa 2020). Singhania et al. (2011) finds that inflation rates influence FDI inflows in India.

vii. ***Foreign Reserves:*** An elevation in foreign reserves is expected to have a positive impact on inward FDI, as it stabilizes an economy's currency and Balance of Payments. Foreign investors are drawn to economies with higher foreign reserves due to the financial strength they denote. A review paper by Islam et al. (2023) and Awan et al. (2011) finds that foreign reserves have a positive and significant impact on inward FDI in Bangladesh.

viii. ***Market Size:*** A crucial determinant for selecting an economy is a larger market. This implies greater sales and profits for multinationals. This attracts domestic economies seeking to expand operations (Faeth, 2009). Nyamulinda et al. (2010) finds a positive influence of population size (proxy for market size) on attracting inward FDI.

ix. ***External Debt:*** Higher external debt makes an economy less attractive to foreign investors as it exposes them to external risks and potentially jeopardizing national assets. Panigrahi et al. (2012) finds that external debt influences inward FDI in India.

x. ***Inward Foreign Direct Investment:*** A significant presence of FDI in an economy tends to attract further FDI. This is due to positive spill-overs or existing investors' positive opinions about the economy. It is anticipated to have a positive influence on future FDI. Lim (2001) finds that the available stock of inward FDI attracts foreign investors.

Other than the variables discussed above, the literature identifies certain variables such as political stability (Nyamulinda et. al ,2010), transportation cost (Deardorff ,2001). Additionally, literacy rate (Wilhems ,1998) is identified as a potential variable influencing inward FDI. However, the variable selection is done on primarily three conditions. First, the variables relevant in attracting inward FDI for India and China are identified. Second, the variables available in common measurement for India and China. Third, the variables that satisfy the standard assumptions set by the methodology are used for the study.

b) **Research Methodology**

The economic determinants of inward FDI are analysed with the help of empirical analysis. Several variables that influence inward FDI in India and China are discussed in the previous section. The study has selected relevant variables based on their comparability[66] and the ones that fit the model. The time selected for the analysis is from 1995 to 2019. The data is collected from UNCTAD, World Bank Indicators (The World Bank Group), and IMF.

Though India implemented its economic reforms in 1991 still foreign investments were discouraged on the grounds on domestic employment issues. India joined WTO on 1st January 1995 and its foreign investment policies were largely influenced by Uruguay Round agreements. Consequently, foreign firms were not discouraged or treated less favourable. Moreover, during 1995 the dual route system i.e., RBI automatic route and government route were introduced. Under this, NRIs and multinationals were allowed to invest up to 100 percent. Additionally, automatic permission to industries in high priority sector with technology agreements were granted (EXIM Bank, 2018). During 1995, China had demonstrated significant economic growth and created a conducive environment for foreign investors. Hence the study considered 1995 as crucial in the realm of inward FDI for India and China.

[66] The study has selected variables that have common unit of measure for India and China

Consequently, the time period of 1995-2019 has been selected. The years post 2019 have been excluded considering them non-normal years due to Covid-19.

To understand the pull factors, the study has used Vector Autoregressive model with OLS. "The structure of VAR models enables one to explain the values of endogenous variables from their past observed values" (Kotze). The model was introduced by Sims (1980) on the grounds that if there is true simultaneity among a set of variables, they should all be treated at par without any prior distinction of exogenous and endogenous variables. The term autoregressive refers to the inclusion of lagged values of the dependent variable on the right side of the equation. Vector indicates that the equation involves two or more variables (Gujarati, 2012).

For example, if each equation contains K lag values of *FDI (Foreign Direct Investment)* and *EG (Economic Growth)*. It can be estimated equation by equation using ordinary least square estimates.

$$FDI_{1t} = \alpha + \sum^{k}_{j=1}\beta_j M_{t-j} + \sum^{k}_{j=1} Y_j R_{t-j} + \mu_{1t} \quad \text{(i)}$$

$$EG_t = \alpha' + \sum^{k}_{j=1}\theta_j M_{t-j} + \sum^{k}_{j=1} Y_j R_{t-j} + \mu_{2t} \quad \text{(ii)}$$

The equation (i) can be interpreted as follows:

Where, α= intercept term, represents value of FDI_{1t} when all other variables are zero.

$\sum^{k}_{j=1}\beta_j M_{t-j}$= summation term. Represents that FDI_{1t} is influenced by lagged value of a variable M. β_j is a coefficient which measures the impact of these lagged values. M_{t-j} represents the value of M that is j periods before time t. Summation form, $\sum^{k}_{j=1}$ indicates that multiple lagged periods up to k periods aback are considered.
$\sum^{k}_{j=1} Y_j R_{t-j}$= Summation term. Represents the influence of lagged value of variable R on $FDI_{1t.}$ Y_j is the coefficient. R_{t-j} indicates the value of R that is j periods before time t.

μ_{1t}= Error term. It captures all other factors affecting FDI_{1t}, that are not included in the model.

VAR models also facilitate the Granger causality test. While OLS regression analysis is useful for understanding the impact of changes in an independent variable on a dependent variable, holding other variables constant, it does not inherently imply causation. VAR methodology,

incorporating the Granger causality test, aids in interpreting causal relationships. For instance, if variable A Granger-causes variable B, this means that lagged values of A provide information useful in predicting B's future values.

For effective results using VAR with OLS, adherence to OLS assumptions is crucial. Consequently, variable selection is based on their compliance with these assumptions. Variables failing to meet these criteria are excluded. The selection process involves ensuring variables adhere to the following assumptions:

i. ***Test of Stationarity:*** A stationary time series indicates a constant mean with time, constant variance over time. Presence of unit root or non-stationary time series may result in spurious regression. Hence the present chapter tests the stationarity with the help of Augmented Dicky Fuller test.

ii. ***Test of Multicollinearity:*** Multicollinearity arises when there is a significant correlation between two or more predictor variables in a regression model. This situation complicates the model's ability to distinguish the individual impact of each predictor on the outcome variable. In this study, the presence of multicollinearity is assessed using Variance Inflation Factor values.

iii. ***Test of Heteroskedasticity:*** The problem of heteroskedasticity arises when error terms across all the levels independent variables is not constant. In other words, the error terms are randomly scattered without any pattern. This problem can cause bias in the regression coefficient values. The present study measures heteroskedasticity with Breusch-Pagan Heteroskedasticity test.

iv. ***Test of Autocorrelation:*** This is also known as serial correlation. This problem arises when error terms of the variables are not independent of each other. This problem can conclude certain independent variables as significant. The present study measures autocorrelation using VAR residual serial correlation LM Test.

v. ***Normality Test:*** This examination tests the normal distribution of the data, a crucial aspect for the model's validity. The current research employs the Jarque-Bera normality test to evaluate the data distribution in the sample.

vi. ***Ramsey Reset Test:*** The test is conducted to ensure that there is no specification bias in the model. This includes testing for omitted variables, incorrect functional forms, and presence of non-linear relationship.

After conducting all the above-mentioned tests, the following variables have been selected to conduct the analysis.

c) **Data Analysis**

Table 5.1: Variables Selected for Inward FDI Analysis

Sr No.	Independent Variables	Proxy Variables	Expected Sign	Source
1.	Trade Openness	Trade (% of GDP)	+	WBI
2.	Economic Growth	GDP Growth Rate (%)	+	WBI
3.	Exchange Rate	Official Exchange Rate (LCU per US$, period average)	+	WBI
4.	Gross Fixed Capital Formation	Gross Fixed Capital Formation (% of GDP)	+	WBI
5.	Inflation	GDP Deflator (%)	-	WBI
6.	Market Size	Population Size (total population)[67]	+	WPP[68] (United Nations)

i. ***India***

To study the factors (Table 5.1) which are expected to influence the inflows of FDI in Indian economy following hypothesis have been formulated:

i. Hypothesis 1: Inward FDI is not significantly influenced by Trade Openness
ii. Hypothesis 2: Inward FDI is not significantly influenced by Economic Growth

[67] To conduct the analysis for China, total population change has been considered and for India population density per square km has been considered as a proxy variable for market size.
[68] WPP- World Population Prospects 2022

iii. Hypothesis 3: Inward FDI is not significantly influenced by Exchange Rate

iv. Hypothesis 4: Inward FDI is not significantly influenced by GFCF

v. Hypothesis 5: Inward FDI is not significantly influenced by Inflation

vi. Hypothesis 6: Inward FDI is not significantly influenced by Market Size

Results

Table 5.2: Augmented Dicky Fuller Unit Root Test

	Variables	**Difference**	**Value**	**Result**
With Trend and Intercept	Inward FDI	1st	0.0002	Stationary
	TO	1st	0.0062	Stationary
	EG	1st	0.0003	Stationary
	EXR	1st	0.0002	Stationary
	GFCF	1st	0.0007	Stationary
	INF	1st	0.0002	Stationary
	MS	1st	0.0001	Stationary

Source: Author's calculation based on EViews

The OLS assumptions necessitate stationarity in all variables. To verify this, the study implemented the ADF unit root test on the chosen variables. According to the findings presented in Table 5.2, all the variables were found to be stationary at the first difference.

Table 5.3: Lag Selection Criteria

Lag	**AIC**	**SC**	**HQ**
0	51.56	51.91	51.66
1	43.40*	46.15*	44.13*

Source: Author's calculation based on EViews

**Indicates lag length selected by criterion*

An autoregressive model is sensitive to the selection of appropriate lag length. The above Table 5.3 includes statistical tools such as AIC, SC, HQ used to determine the optimal number of lags

in a time series model. The degrees of freedom will be lost if we will too many lagged terms in the equation. This leads to the problem of multicollinearity and including too few lags will lead to specification errors. Therefore, the present study decides the appropriate lag length based on Akaike Information Criteria. Hence, choose the model which gives lowest value of these criteria. In practice, the one with the lowest AIC, SC, and HQ value is typically chosen as the best model. Based on the results of Table 5.3, lag 1 is chosen as optimal lag. Hence, the model the VAR model with OLS is constructed with lag 1.

Table 5.4: Regression Results

Variables	**T Statistics**	**P-value**	**Collinearity Statistics**
			VIF
Inward FDI	1.10	0.28	3.25
TO	0.21	0.83	1.98
Economic growth	0.40	0.69	1.50
Exchange rate	3.71	0.00	3.30
GFCF	3.45	0.00	4.62
INF	-0.78	0.44	2.02
MS	2.31	0.03	1.49

Source: Author's calculation based on EViews

Regression Model (Table 5.4)

*Inward FDI = C (1) 0.20*FDI + C (2) 63.28*Trade openness + C (3) 312.02*Economic growth + C (4) 1285.51**Exchange Rate + C (5) 2436.33**GFCF - C (6) 528.67*Inflation + C (7) 167.24**Market Size + C (8)*

*** indicates significant at 0.05 percent level*

The OLS assumptions require OLS regression model with no multicollinearity. The analysis measures multicollinearity using VIF values. The variables with less than 10 VIF value can be accepted for analysis. From Table 5.4, it can be observed that the VIF values of the variables is less than 10 (Gujarati, 2012). Additionally, Ferre (2009), suggests that VIF values higher 10 highlights serious multicollinearity issues.

Additionally, if the p-value is less than 0.05 (or 5 %), it indicates that the evidence against the null hypothesis is strong. In other words, with a p-value less than 0.05 the null hypothesis can be rejected and alternate hypothesis can be accepted.

Based on Table 5.4, the results can be interpretated as follows:

Inward FDI:

a) T Statistic: 1.10 indicates a positive relationship with the dependent variable.

b) P-value: 0.28 suggests that this relationship is statistically insignificant (5% level or lower).

TO:

a) T Statistic: 0.21 implies a positive relationship with the dependent variable.

b) P-value: 0.83 indicates that this relationship is statistically insignificant (5% level or lower).

Economic Growth:

a) T Statistic: 0.40 shows a positive relationship with the dependent variable.

b) P-value: 0.69 means the relationship is statistically insignificant (5% level or lower).

Exchange Rate:

a) T Statistic: 3.71 suggests a positive relationship with the dependent variable.

b) P-value: 0.00 indicates that this relationship is statistically significant (5% level or lower).

GFCF:

a) T Statistic: 3.45 suggests a positive relationship with the dependent variable.

b) P-value: 0.00 indicates that this relationship is statistically significant (5% level or lower).

Inflation:

a) T Statistic: -0.78 implies a negative relationship with the dependent variable.

b) P-value: 0.44 means this relationship is statistically insignificant (5% level or lower).

Market Size:

a) T Statistic: 2.31 shows a positive relationship with the dependent variable.

b) P-value: 0.03 suggests that this relationship is statistically significant (5% level or lower).

a) ***Granger Causality Test***

To study the factors which are expected to granger cause inward FDI in Indian economy:

i. Hypothesis 1: Inward FDI does not granger cause Trade Openness
ii. Hypothesis 2: Inward FDI does not granger cause Economic Growth
iii. Hypothesis 3: Inward FDI does not granger cause Exchange Rate
iv. Hypothesis 4: Inward FDI does not granger cause GFCF
v. Hypothesis 5: Inward FDI does not granger cause Inflation
vi. Hypothesis 6: Inward FDI does not granger cause Market Size

Table 5.5: VAR Granger Causality Test

Independent Variables	**Chi-square**	**Df.**	**Probability**
TO	0.03	1	0.84
Economic growth	0.16	1	0.68
Exchange rate	9.34	1	0.00
GFCF	12.99	1	0.00
INF	0.62	1	0.42
MS	9.34	1	0.00

Source: Author's calculation based on Eviews

Overall, the model shows that Exchange Rate, GFCF, and Market Size have significant and positive relationships with the dependent variable. Along with this Table 5.5 shows that the p-value of all these three variables is less than 0.05 (5 % level or lower). Hence, it can be concluded that Exchange Rate, GFCF, and Market Size granger cause inward FDI in India. Trade Openness, Economic Growth, and Inflation do not show statistically significant relationships.

If an OLS model satisfies its assumptions, it can be considered a valid model to estimate the relationship between the variables. Hence to assess the validity of the model following tests are conducted:

Table 5.6: Breusch-Pagan-Godfrey's Heteroscedasticity Test

Null Hypothesis: Homoskedasticity	
Prob. F (7,16)	0.72
Prob. Chi square (7)	0.64

Source: Author's calculation based on EViews

Null Hypothesis: There is homoskedasticity (constant variance of the error)
Alternate Hypothesis: There is heteroskedasticity (non-constant variance)
In the above Table 5.6, the p-value from the test is greater than significance level (0.05), and hence the test fails to reject H0, suggesting no evidence of heteroskedasticity.

Table 5.7: VAR Residual Serial Correlation LM Test

Null Hypothesis: No serial correlation			
Lag	**LRE*stat**	**Df**	**Prob.**
1	67.56	49	0.15

Source: Author's calculation based on EViews

Null Hypothesis: There is no serial correlation
Alternate Hypothesis: There is serial correlation
In the above Table 5.7, the p-value from the test is greater than significance level (0.05), and hence the test fails to reject H0, suggesting there is no serial correlation.

Table 5.8: Normality Test

Null Hypothesis: Variables are distributed normally	
Jarque- Bera Value	0.92
Probability	0.62

Source: Author's calculation based on EViews

Null hypothesis: Residuals are normally distributed
Alternative hypothesis: Residuals are not normally distributed.
In the above Table 5.8, the value of Jarque-Bera probability is greater than the value of significance (0.05) and hence the null hypothesis cannot be rejected, reflecting that the residuals are normally distributed.

Table 5.9: Ramsey Reset Test

Tests	**Value**	**Df.**	**Probability**
T statistics	0.60	17	0.56
F statistics	0.35	(1,17)	0.56
Likely hood ratio	0.48	1	0.48

Source: Author's calculation based on EViews

Null Hypothesis: No specification biases
Alternate Hypothesis: There exist specification biases

In the above Table 5.9, the p-value of the T statistics, F statistics, and Likely hood ratio is greater than the significance level (0.05), and hence there is no evidence to reject the null hypothesis which suggest that there is no specification error.

ii ***China***

To study the factors (Table 5.1) that influence inward FDI in Chinese economy following hypothesis have been formulated:

i. Hypothesis 1: The Inward FDI have not been significantly influenced by Trade Openness
ii. Hypothesis 2: The Inward FDI have not been significantly influenced by Economic Growth
iii. Hypothesis 3: The Inward FDI have not been significantly influenced by Exchange Rates
iv. Hypothesis 4: The Inward FDI have not been significantly influenced by GFCF.
v. Hypothesis 5: The Inward FDI have not been significantly influenced by Inflation.
vi. Hypothesis 6: The Inward FDI have not been significantly influenced by Market Size

Results

Table 5.10: Augmented Dicky Fuller Unit Root Test

	Variable	**Difference**	**Value**	**Result**
With Trend and Intercept	Inward FDI	1st	0.00	Stationary
	TO	1st	0.04	Stationary
	EG	1st	0.02	Stationary
	EXR	1st	0.04	Stationary
	GFCF	1st	0.02	Stationary
	INF	1st	0.00	Stationary
	LF	1st	0.00	Stationary

Source: Author's calculation based on EViews

The OLS assumptions necessitate stationarity in all variables. To verify this, the study implemented the ADF unit root test on the chosen variables. According to the findings presented in Table 5.10, all the variables were found to be stationary at the first difference.

Table 5.11: Lag Selection Criteria

Lag	**AIC**	**SC**	**HQ**
0	69.78	70.12	69.87
1	62.66*	65.43*	63.36*

Source: Author's calculation based on EViews

An autoregressive model is sensitive to the selection of appropriate lag length. The above Table 5.11 includes statistical tools such as AIC, SC, HQ used to determine the optimal number of lags in a time series model. In practice, the one with the lowest AIC, SC, and HQ value is typically chosen as the best model. Based on the results of Table 5.11, lag 1 is chosen as optimal lag. Hence, the model the VAR model with OLS is constructed with lag 1.

Table 5.12: Regression Results

Variables	T Statistics	P-value	Collinearity Statistics
			VIF
Inward FDI	3.15	0.00	8.98
TO	-3.63	0.00	6.38
EG	2.66	0.01	5.75
EXR	-1.71	0.25	8.41
GFCF	5.24	0.00	7.80
INF	-0.84	0.40	1.58
MS	2.61	0.01	1.26

Source: Author's calculation based on EViews

Regression Model (Table 5.12)

*Inward FDI = C (1) 0.50**FDI - C (2) 44006.61**Trade openness+ C (3) 162553.1**Economic growth- C (4) 174539.6*Exchange Rate+ C (5) 152735.2**GFCF- C (6) 26327.68*Inflation + C (7) 173.45**Market Size (-1) + C (8)*
*** indicates significant at 0.05 percent level*

The OLS assumptions require OLS regression model with no multicollinearity. The analysis measures multicollinearity using VIF values. The variables with less than 10 VIF value can be accepted for analysis. From Table 5.12, it can be observed that the VIF values of the variables is less than 10. (Gujarati, 2012)

Additionally, if the p-value is less than 0.05 (or 5 %), it indicates that the evidence against the null hypothesis is strong. In other words, with a p-value less than 0.05 the null hypothesis can be rejected and alternate hypothesis can be accepted.

Based on Table 5.12, the results can be interpretated as follows:

Inward FDI:

a) T-Statistic: 3.15 indicates a positive relationship with the dependent variable.

b) P-value: 0.00 suggests that this relationship is statistically significant at conventional levels (5% level or lower).

TO:

a) T Statistic: -3.63 implies a negative relationship with the dependent variable.

b) P-value: 0.00 indicates that this relationship is statistically significant (5% level or lower).

Economic Growth:

a) T Statistic: 2.66 shows a significant positive relationship with the dependent variable.

b) P-value: 0.01 means the relationship is statistically significant (5% level or lower).

Exchange Rate:

a) T Statistic: -1.71 suggests a negative relationship with the dependent variable.

b) P-value: 0.25 means this relationship is not statistically significant (5% level or lower).

GFCF:

a) T Statistic: 5.24 indicates positive relationship with the dependent variable.

b) P-value: 0.00 demonstrates that this relationship is statistically significant (5% level or lower).

Inflation:

a) T Statistic: -0.84 implies negative relationship with the dependent variable.

b) P-value: 0.40 suggests that this relationship is not statistically significant (5% level or lower).

Market Size:

a) T Statistic: 2.61 shows a positive relationship with the dependent variable.

b) P-value: 0.01 indicates that this relationship is statistically significant (5% level or lower).

b) ***Granger Causality Test***

To study the factors which are expected to granger cause inward FDI in Chinese economy:

i. Hypothesis 1: Inward FDI does not granger cause Trade Openness
ii. Hypothesis 2: Inward FDI does not granger cause Economic Growth
iii. Hypothesis 3: Inward FDI does not granger cause Exchange Rate
ii. Hypothesis 4: Inward FDI does not granger cause GFCF
iii. Hypothesis 5: Inward FDI does not granger cause Inflation
iv. Hypothesis 6: Inward FDI does not granger cause Market Size

Table 5.13: VAR Granger Causality Test

Independent Variables	**Chi-square**	**Df.**	**Probability**
TO	13.19	1	0.00
Economic growth	7.10	1	0.00
Exchange rate	1.37	1	0.24
GFCF	27.49	1	0.00
INF	0.71	1	0.39
MS	6.84	1	0.00

Source: Author's calculation based on EViews

Overall, the model shows that already available Inward FDI, Trade Openness, Economic Growth, GFCF, Market Size have significant and relationships with the dependent variable. Except trade openness all the significant variables positively influence inward FDI in China. Along with this Table 5.13 shows that the p-value all these variables is less than 0.05 (5 % level

or lower). This indicates that the null hypothesis can be rejected. Hence, it can be concluded that Trade openness, Economic growth, GFCF, and Market size granger cause inward FDI in China. Exchange rate and Inflation do not show statistically significant relationships.

If an OLS model satisfies its assumptions, it can be considered a valid model to estimate the relationship between the variables. Hence to assess the validity of the model following tests are conducted:

Table 5.14: Breusch-Pagan-Godfrey's Heteroscedasticity Test

Null Hypothesis: Homoskedasticity	
Prob. F (7,16)	0.50
Prob. Chi square (7)	0.42

Source: Author's calculation based on EViews

Null Hypothesis: There is homoskedasticity (constant variance of the error)
Alternate Hypothesis: There is heteroskedasticity (non-constant variance)
In the above Table 5.14, the p-value from the test is greater than significance level (0.05), and hence the test fails to reject H0, suggesting no evidence of heteroskedasticity.

Table 5.15: VAR Residual Serial Correlation LM Test

Null Hypothesis: No serial correlation			
Lag	**LRE*stat**	**Df.**	**Probability**
1	67.56	49	0.15

Source: Author's calculation based on EViews

Null Hypothesis: There is no serial correlation
Alternate Hypothesis: There is serial correlation

In the above Table 5.15, the p-value from the test is greater than significance level (0.05), and hence the test fails to reject H0, suggesting there is no serial correlation.

Table 5.16: Normality Test

Null Hypothesis: Variables are distributed normally	
Jarque- Bera Value	0.55
Probability	0.75

Source: Author's calculation based on EViews

Null hypothesis: Residuals are normally distributed
Alternative hypothesis: Residuals are not normally distributed.

In the above Table 5.16, the value of Jarque-Bera probability is greater than the value of significance (0.05) and hence the null hypothesis cannot be rejected, reflecting that the residuals are normally distributed.

Table 5.17: Ramsey Reset Test

Tests	**Value**	**DF.**	**Probability**
T statistics	0.63	17	0.53
F statistics	0.39	(1,17)	0.53
Likely hood ratio	0.51	1	0.47

Source: Author's calculation based on EViews

Null Hypothesis: No specification biases
Alternate Hypothesis: There exist specification biases

In the above Table 5.17, the p-value of the T statistics, F statistics, and Likely hood ratio is greater than the significance level (0.05), and hence there is no evidence to reject the null hypothesis which suggest that there is no specification error.

5.3.2. To Determine the Sustainability determinants of Inward Foreign Direct Investment in India and China.

a) ***Selection of Variables***

Role of Sustainable Development Goals in attracting Inward FDI:

i. ***Urban Population:*** The variable falls under SDG 11 (sustainable cities and communities). Foreign multinational usually targets urban cities for investments and the growth in urban population is possible with elevation in infrastructure or residential facilities. Increase in urban population is expected to increase to the labour force. Additionally, the infrastructure facilities are expected to pull inward FDI.

ii. ***Internet Users:*** The variable constitutes individuals using internet as a percentage of total population. Choi (2003) finds that with the increase in internet users of a country the inward FDI increases. In other words, number of internet users acts as a determinant to attract inward FDI as it can reduce the distance between the countries in terms of communication. As investors can contact the customers directly via internet reducing their entry level and inventory costs. To increase the number of internet users is also a part of SDG 17 (partnership for the goals).

iii. ***Ratio of Female to Male Representation:*** Studies such as Sharma (2020),Ouedraogo et al. (2018), and Helble et al. (2020) found that the impact of FDI on women empowerment in terms of reducing gender inequality at work places. However, Ouedraogo et al. (2018) finds that FDI has no impact on reducing gender inequality.

iv. ***Natural Resources:*** Foreign enterprises are inclined to invests in host economy to exploit their resources and natural resources are one of them. This falls under resource seeking investments. It is expected to have a positive impact on inward FDI. (Lipsey, 2004)

v. ***Renewable Energy:*** The world is moving towards sustainability practices and one of the major sustainable practices is using renewable sources to generate energy. As it is the need of the hour and upcoming prominent practices. The governments of the

economy have announced incentives to investors investing in renewable energy to motivate investors.

vi. ***Carbon Emission:*** Indian companies specifically are aspiring to be carbon neutral by 2030. Majority of the Indian FDI is attracted in service sector and majority of the service sector companies are aspiring to be carbon neutral by 2030. The present analysis expects a negative and positive influence of increase in carbon emission on inward FDI. As increase in carbon emission can reduce the number of inflows in an economy. Additionally, economies attracting higher manufacturing investments can witness higher in carbon emission with the increase in inflows.

vii. ***Access to Electricity:*** Efficient infrastructural facilities are very crucial to conduct manufacturing or production activities. Hence, better access to electricity attracts foreign investments. In India till 2010, 76.3 percent of the population had access to electricity, the remaining population was deprived of this basic facility till 2010. As of 2020, 99 percent of the population has access to electricity (World Bank Indicators).

viii. ***Tax Revenue:*** The present study views this indicator with two different perspectives. First, this parameter plays the most crucial role while determining host economy for investments. Stable tax revenue is a primary source for government expenditure. It includes public services like health, and education. Second, to promote trade and investments economies usually enter trade agreements. For example, India and Mauritius have signed an agreement DTAA to avoid double taxation. However, literature finds that investors to evade higher taxes reroute their investments via Mauritius. Hence, higher inward FDI due to higher tax revenue can be explained by two reasons.

ix. ***Research and Development Expenditure:*** Research and development frequently result in innovation and technological advancements. This enhances the appeal of a nation or area to international investors. These investors are drawn to economies with robust research capabilities. As this enables them to pursue innovative developments and integrate these advancements into their business operations.

b) **Research Methodology**

India and China are attracting high-quantity inward FDI. Hence, the concept of meaningful or effective FDI becomes important. This is because the achieving the goal of attracting sustainable inward FDI requires both India and China to prioritize not only economic factors but also sustainability determinants. Hence the objective attempts to probe into the sustainability determinants that influence foreign investors to invest in India and China.

The introduction of the SDG in 2015 led to the availability of data on potential indicators influencing FDI since 2000. Consequently, this study utilizes secondary data spanning from 2000 to 2019 for India and China and use multiple regression analysis. Incorporating all the variables in the regression analysis led to the problem of multicollinearity which leads to spurious regression analysis. As a multiple regression analysis requires satisfaction of assumptions of OLS model. The variables are selected after satisfying the assumptions.

Table 5.18: Variables Selected for Analysis

Sr No.	Sustainable Development Goals	SDG Indicators	Proxy Variable	Expected Sign	Source
1.	SDG-17 (Partnership for the Goals)	17.3	FDI (Inflows in terms of US$ million)	Dependent variable	UNCTAD
2.	SDG-7 (Affordable and Clean Energy)	7.1.1	Access to Electricity (% of population)	+	WBI
3.	SDG-17 (Partnership for the Goals)	17.1.1	Tax Revenue (US$ million)	-/+	RBI and MOFCOM
4.	SDG-9 (Industry, Innovation, and Infrastructure)	9.4.1	Carbon Emission (metrics ton per capita)[69]	-/+	WBI
5.	SDG-17 (Partnerships for the Goals)	17.8.1	Internet Users (Individuals using internet as % of total population)[70]	+	WBI
	SDG-9 (Industry, Innovation, and Infrastructure)	9.1	Mobile Cellular Subscription (per 100)		
6.	SDG-12 (Responsible Consumption and Production)	12.2	Natural Resources -Total natural resources rents (% of GDP)	+	WBI[71]

[69] To conduct analysis for China methane emission (kt Co2 equivalent) has been considered
[70] Due to the problem of multicollinearity, the study has used mobile cellular subscription (per 100) for India.
[71] WBI-World Bank Indicators

Following hypothesis is formulated based on the selected variables:

i. ***India*** (Table 5.18)

i. Hypothesis 1: Inward FDI is not significantly influenced by use of Natural Resources
ii. Hypothesis 2: Inward FDI is not significantly influenced by Access to Electricity
iii. Hypothesis 3: Inward FDI is not significantly influenced by Carbon Emission
iv. Hypothesis 4: Inward FDI is not significantly influenced by Tax Revenue
v. Hypothesis 5: Inward FDI is not significantly influenced by mobile cellular subscriptions

Results

Table 5.19: Regression Results

Variables	T-Statistics	P-value	Collinearity Statistics
			VIF
Natural Resources	1.62	0.12	5.89
Access to Electricity	0.70	0.49	1.26
Carbon Emission	-1.55	0.13	3.83
Tax revenue	10.94	0.00	2.34
Mobile cellular subscriptions	2.43	0.02	2.17

Source: Author's compilation based on Eviews

Regression Model (Table 5.19)

*Inward FDI= 1710.18*Natural resources +12383.98*Access to electricity-98252.15*Carbon emission +0.11**Tax Revenue+ 801.65**Mobile cellular subscriptions*

*** indicates significant at 0.05 percent level*

The Table 5.19 can be interpreted as follows:

Natural Resources:

a) T-Statistic: 1.62 indicates a positive relationship with the dependent variable.

b) P-value: 0.12 suggests that this relationship is not statistically significant (5% level or lower).

Access to Electricity:

a) T-Statistic: 0.70 indicates a positive relationship with the dependent variable.

b) P-value: 0.49 suggests that this relationship is not statistically significant (5% level or lower).

Carbon Emission:

a) T-Statistic: -1.55 indicates a negative relationship with the dependent variable.

b) P-value: 0.13 suggests that this relationship is not statistically significant (5% level or lower).

Tax Revenue:

a) T-Statistic: 10.94 indicates a strong positive relationship with the dependent variable.

b) P-value: 0.00 suggests that this relationship is statistically significant (5% level or lower).

Mobile cellular subscriptions:

a) T-Statistic: 2.43 indicates a positive relationship with the dependent variable.

b) P-value: 0.02 suggests that this relationship is statistically significant (5% level or lower).

Overall, the model shows that Tax Revenue and Mobile cellular subscriptions have significant and positive relationships with the dependent variable in India.

If an OLS model satisfies its assumptions, it can be considered a valid model to estimate the relationship between the variables. Hence to assess the validity of the model following tests are conducted:

Table 5.20: Model Summary (Regression model for India)

R-squared	0.86
Adjusted R-squared	0.82
Normality test (Jarque-Bera Probability) Null Hypothesis: The population is normally distributed	0.55
Breusch-Godfrey Serial Correlation LM test Null Hypothesis: No serial correlation among the residuals	Prob. F (1,14)- 0.07
Harvey Heteroskedasticity test Null Hypothesis: Homoskedasticity	Prob. F (5,14)-0.13
Ramsey Reset Test Null Hypothesis: No specification bias	T statistics-0.78 F statistics-0.78 Likelihood ratio-0.73

Source: Author's calculation Using E views

a) ***Multicollinearity Test***

The analysis in the Table 5.20, includes VIF values. It is used to measure multicollinearity among the variables. The results shows that the VIF values are within the acceptable limits.

b) ***Heteroskedasticity Test***

Null Hypothesis: There is homoskedasticity (constant variance of the error)
Alternate Hypothesis: There is heteroskedasticity (non-constant variance)

In the above Table 5.20, the p-value from the test is greater than significance level (0.05), and hence the test fails to reject H0, suggesting no evidence of heteroskedasticity.

c) ***Serial Correlation LM Test***

Null Hypothesis: There is no serial correlation
Alternate Hypothesis: There is serial correlation

In the above Table 5.20, the p-value from the test is greater than significance level (0.05), and hence the test fails to reject H0, suggesting there is no serial correlation.

d) ***Normality Test***

Null hypothesis: Residuals are normally distributed
Alternative hypothesis: Residuals are not normally distributed.

In the above Table 5.20, the value of Jarque-Bera probability is greater than the value of significance (0.05) and hence the null hypothesis cannot be rejected, reflecting that the residuals are normally distributed.

e) ***Ramsey Reset Test***

Null Hypothesis: No specification biases
Alternate Hypothesis: There exist specification biases

In the above Table 5.20, the p-value of the T statistics, F statistics, and Likely hood ratio is greater than the significance level (0.05), and hence there is no evidence to reject the null hypothesis which suggest that there is no specification error.

Following hypothesis is formulated based on the selected variables:

ii. ***China*** (Table 5.18)

i. Hypothesis 1: Inward FDI is not significantly influenced by Access to Electricity
ii. Hypothesis 2: Inward FDI is not significantly influenced by Tax Revenue
iii. Hypothesis 3: Inward FDI is not significantly influenced by Methane Emission[72]

[72] The analysis has considered methane emission as including carbon emission exhibited high multicollinearity among the variables. This could lead to spurious regression results.

iv. Hypothesis 4: Inward FDI is not significantly influenced by Internet Users

v. Hypothesis 5: Inward FDI is not significantly influenced by Natural Resources

Results

Table 5.21: Regression Results

Variables	T Statistics	P-value	Collinearity Statistics
			VIF
Natural resources	5.66	0.01	7.12
Access to electricity	13.87	0.00	9.20
Carbon emission	-0.15	0.15	2.85
Tax revenue	0.63	0.53	7.95
Internet users	24.23	0.00	7.23

Source: Author's Calculation Using E views

Regression Model (Table 5.21)

*Inward FDI= 397.03** Access to electricity +1.70* Tax revenue -78231.65 Carbon emission + 1627.54**Internet users +3164.81**Natural resources*

*** indicates significant at 0.05 percent level*

Based on Table 5.21, the table can be interpreted as follows:

Natural Resources:

a) T-Statistic: 5.66 indicates a positive relationship with the dependent variable.

b) P-value: 0.01 suggests that this relationship is statistically significant (5% or lower).

Access to Electricity:

a) T-Statistic: 13.87 indicates a positive relationship with the dependent variable.

b) P-value: 0.00 suggests that this relationship is statistically significant (5% or lower).

Carbon Emission:

a) T-Statistic: -0.15 indicates a negative relationship with the dependent variable.
b) P-value: 0.15 suggests that this relationship is not statistically significant (5% or lower).

Tax Revenue:

a) T-Statistic: 0.63 indicates a positive relationship with the dependent variable.
b) P-value: 0.53 suggests that this relationship is not statistically significant.

Internet Users:

a) T-Statistic: 24.23 indicates a strong positive relationship with the dependent variable.
b) P-value: 0.00 suggests that this relationship is statistically significant (5% or lower).

Overall, the model shows that Natural Resources, Access to Electricity, and Internet Users have significant and positive relationships with the dependent variable in China.

If an OLS model satisfies its assumptions, it can be considered a valid model to estimate the relationship between the variables. Hence to assess the validity of the model following tests are conducted:

Table 5.22: Model Summary (Regression model for China)

R-squared	0.98
Adjusted R-squared	0.98
Normality test (Jarque-Bera Probability) Null Hypothesis: The population is normally distributed	0.35
Breusch-Godfrey Serial Correlation LM test Null Hypothesis: No serial correlation among the residuals	Prob. F (1,13)-0.52
Heteroskedasticity test Null Hypothesis: Homoskedasticity	Prob. F (5,13)-0.71
Ramsey Reset test Null Hypothesis: No specification bias	T statistics-0.10 F statistics-0.10 Likelihood ratio-0.50

Source: Author's Calculation Using E views

a) ***Multicollinearity Test***

The analysis in the Table 5.22, includes VIF values. It is used to measure multicollinearity among the variables. The results shows that the VIF values are within the acceptable limits.

b) ***Heteroskedasticity Test***

Null Hypothesis: There is homoskedasticity (constant variance of the error)
Alternate Hypothesis: There is heteroskedasticity (non-constant variance)

In the above Table 5.22, the p-value from the test is greater than significance level (0.05), and hence the test fails to reject H0, suggesting no evidence of heteroskedasticity.

c) ***Serial Correlation LM Test***

Null Hypothesis: There is no serial correlation
Alternate Hypothesis: There is serial correlation

In the above Table 5.22, the p-value from the test is greater than significance level (0.05), and hence the test fails to reject H0, suggesting there is no serial correlation.

d) ***Normality Test***

Null hypothesis: Residuals are normally distributed
Alternative hypothesis: Residuals are not normally distributed.

In the above Table 5.22, the value of Jarque-Bera probability is greater than the value of significance (0.05) and hence the null hypothesis cannot be rejected, reflecting that the residuals are normally distributed.

e) ***Ramsey Reset Test***

Null Hypothesis: No specification biases
Alternate Hypothesis: There exist specification biases
In the above Table 5.22, the p-value of the T statistics, F statistics, and Likely hood ratio is greater than the significance level (0.05), and hence there is no evidence to reject the null hypothesis which suggest that there is no specification error.

5.3.3 To Identify the impact of Inward Foreign Direct Investment on Sustainability indicators in India and China

a) ***Selection of Variables***

The United Nations has long been engaged in addressing climate imbalances. It has established several initiatives, including the Millennium Development Goals, the signing of the Paris Agreement, and the introduction of the Sustainable Development Goals agenda for 2030.

i. ***Sustainable FDI***

Sustainable FDI is characterized as investment that not only ensures enduring positive returns in an economy but also aids in accomplishing its social and environmental goals. In other words, FDI that positively impacts an economy's economic, social, and environmental objectives can be called as sustainable FDI. FDI is considered sustainable when it enhances economic, social, environmental, and governance dimensions (Table 5.23).

Table 5.23: Four Dimensions to Sustainable FDI

Dimensions	**Impact on Economy**
Economic Dimensions	Increase employment Industry, innovation, and infrastructure GDP growth Increase in national income Increase in exports
Social Dimensions	Skills enhancement Women empowerment Fair wages Health and safety Sustainable cities and communities
Environmental Dimensions	Low carbon emission Clean water and sanitisation Affordable and clean energy
Governance Dimensions	Transparency Consumer protection Corporate governance Stakeholder engagement

Source: Adapted from (Sauvant et al., 2021)

Based on the review of literature, the study identifies two crucial sustainability parameters relevant with inward FDI. First, exports (SDG 17.11) as India aims at enhancing its exports primarily because it elevates GDP of the economy. Hence, comparative evaluation is expected

to highlight inward FDI's contribution towards exports of both the economy. Second, carbon emission (9.4.1) as the study identifies the need for meaningful or effective FDI. The rising environmental concerns such as air pollution and biodiversity loss demand effective inward FDI. The FDI that does not lead to carbon emission.

b) ***Research Methodology***

The impact is analysed through long run association among the variable with the help of Johansen cointegration technique between 1990 to 2019. The investigation uses secondary data published by UNCTAD, MOFCOM, World Bank Database, and RBI. The time frame from 1990-2019 has been selected which is in line with sample size requirements.

The methodology requires following steps:

i. ***Unit Root Test:*** The study first estimates unit root test to check the unit root property of the variables with the help of augmented dicky fuller test. To estimate the long run relationship, the stationarity of the data is prerequisite. This is to obtain meaningful results as non-stationarity in the time series might result in spurious result (Gujarati, 2013). In a random walk model:

$$Y_t = pY_{t-1} + u_t \ldots\ldots (1) \qquad -1 \leq p \leq 1 \ldots. (iii)$$

Where value of Y at the time t is equal to its value at time (t-1) plus a random shock. Here if p=1 it becomes random walk model without drift. It can be said that the variable possesses unit root or stochastic trend or non-stationarity. If the value of p is less than 1, the time series is stationary. A random walk model may have drift, may not have a drift, or may have both stochastic or a deterministic trend. The augmented DF uses the following equation to test the stationarity of the time series (Gujarati, 2013)

$$\Delta Y_t = \beta 1 + \beta_{2t} + \delta Y_{t-1} + \sum \alpha_i \Delta Y_{t-1} + \varepsilon_t \ldots\ldots (iv)$$

Where, ΔY_t is the lagged dependent variable, $\Delta Y_{t-1} = (Y_{t-1} - Y_{t-2})$, ε_t is the error term.

Null hypothesis: The time series is non-stationary.
Alternative hypothesis: The time series is stationary.

ii. ***Lag Length Selection:*** The study employs Johansen cointegration technique which is sensitive to selection of appropriate lag length. The study uses Akaike information criteria to determine appropriate lag length. As per Gujarati (2013) if we employ fewer lags we might miss on some relevant variables and if we employ more than required variable it might lead to inclusion of irrelevant variable.

iii. ***Johansen Cointegration Test:*** Two variables in the model will be cointegrated if they have long term relationship between them. In other words, it is a technique that identifies a potential correlation between several parameters in long term. The present study uses vector-autoregressive model-based approach to find out long run relationship between variables developed by Johnsen (1988). The statistics of trace and maximum eigen value test is used to interpret the long-term association between variables. The test is based on the following VAR auto regressive model:

$$Y_t=u+A_1Y_{t-1}+A2Y_{t-2}+A3Y_{t-3}+\ldots\ldots+A_p\,Y_{t-p}+\mu_t \ldots\ldots\ldots\ldots (v)$$

"Where, Y_t is equal to nx1 vector of variables which are integration at *I (1),* u is equal to nx1 vector of constants. A_p is a nxn vector of constants, p is equal to maximum lag included in the model, u_t is the nx1 vector of error terms"(Jana et al., 2019).

iv. ***Granger Causality Test:*** According to Granger causality test, 'future cannot predict the past'. For example, if inward FDI is causing economic growth to change then changes in inward FDI should precede changes in economic growth.

$$\text{Economic Growth}_t: \Sigma\alpha_i\text{Inward FDI}_{t-i}+\Sigma\,\beta_j\text{Economic Growth}_{t-j} + \mu_{1t} \ldots\ldots \text{(vi)}$$

$$\text{Inward FDI}_t: \Sigma\lambda_i\,\text{Inward FDI}_{t-i}+\Sigma\delta_j\text{Economic Growth}_{t-j} + \mu_{2t} \ldots\ldots \text{(vii)}$$

It is assumed that the error terms are uncorrelated. After running the test there can be four cases:

a) ***Unilateral Causality from Economic Growth to Inward FDI:*** If the estimated coefficients on the lagged inward FDI in the equation (vi) are statistically significant then the estimated coefficients on the lagged economic growth are not statistically significant. Hence, economic growth is causing inward FDI, but inward FDI is not causing economic growth.

b) ***Unilateral Causality from Inward FDI to Economic Growth:*** If the estimated coefficients on the lagged inward FDI in the equation (vii) are not statistically significant, then the estimated coefficients on the lagged economic growth are statistically significant. Hence, inward FDI are causing economic growth but economic growth is not causing inward FDI.

c) ***Bilateral Causality:*** Both economic growth and Inward FDI are causing each other.

d) ***Independence:*** Both the variables are not causing each other. (Gujarati, 2013)

Hence, long run analysis for the objective is conducted using Johansen's cointegration test. This primarily includes three steps; First, to investigate whether all the variables are integrated in the same order. This can be established by unit root test. Second, to determine optimal lag length for the VAR model. Third, evaluate the VAR model to construct the cointegrating relationship. This can be established by trace and maximum eigen value.

Results

i. ***India: Carbon Emission and Inward FDI***[73]

a) ***Results of Unit Root Test***

Table 5.24: Augmented Dicky Fuller Unit Root Test

Variables	**Level**		**First Difference**		**Results**
	Intercept	**Trend with Intercept**	**Intercept**	**Trend with Intercept**	
Inward Foreign Direct Investment	-0.48 (0.89)	-2.44 (0.35)	-5.34 (0.00)	-5.24 (0.00)	*I(1)*
Carbon Emission	0.83 (0.99)	-1.56 (0.78)	-4.52 (0.00)	-4.71 (0.00)	*I(1)*

Notes: () MacKinnon (1996) one sided p-values; I(1) stationary after first difference

[73] The data for carbon emission (metric tons per capita) has been collected from WBI. The data for inward FDI (US$ million) has been collected from UNCTAD.

Source: Author's Calculation Using E views

As mentioned in the previous section, stationarity of a data series is prerequisite to draw meaningful inferences in a time series analysis. The unit root test is conducted with intercept and trend with intercept for all the variables in their levels and then first difference. Table 5.24 presents unit root test of the variables in their levels and first difference. The results shown concludes that null hypothesis cannot be rejected at their levels as the p-value is greater than significance level, that is 0.05. Therefore, the unit root test concludes that times series is non stationary in level. Based on Table 5.24, it is evident that applying first differences to the same shows all the variables are stationary. As the null hypothesis can be rejected at first difference as the p-value is less than 0.05. Hence, it can be concludes that values of inward FDI and carbon emission are stationary at their first difference *I(1)*.

b) ***Optimum Lag Selection***

Table 5.25: VAR Lag Order Selection Criteria

Lag Length	AIC	SIC	HQC
0	8.68	8.77	8.71
1	3.12*	3.41*	3.21*
2	3.25	3.72	3.39

Source: Author's Calculation Using E views

Indicates optimum lag order selected by the criterion

To run a cointegration analysis using Johansen, another criterion is to select appropriate lag length. A VAR model is sensitive to selection of appropriate lag length. The optimum lag length is selected by the based on the values of AIC, SIC, and HQC. Based on Table 5.25, it can be interpreted that lag 1 is selected as appropriate lag by all selection criterion, that is AIC, SIC, and HQC.

c) ***Results of Johansen Cointegration Test for Carbon Emission and Inward FDI***

Table 5.26: Results for Johansen Cointegration Test

H_0	H_1	Trace Statistics	Maximum Eigen Statistics
r = 0	r = 1	14.77 (0.06)	14.74 (0.04)
r ≤ = 1	r = 2	0.02 (0.86)	0.02 (0.86)

Notes: () MacKinnon-Haug-Michelis (1999) p-values

*Trace and maximum eigen value indicate 1 cointegrating equation at 0.05 level

Source: Author's calculation Using E views

The null hypothesis, r = 0 means that there is no cointegration among the variables at 0.05 level. The alternative hypothesis, r ≤ = 1 means that there is cointegration among the variables at 0.05 level. Table 5.26 presents results of Johansen Cointegration Test based on Trace statistics and Maximum Eigen value. The value of Trace statistics when r = 0 (no cointegration) is 14.77. The null hypothesis of no cointegration cannot be rejected at 0.05 level of significance. As the Trace statistics is less than Mac Kinnon-Haug-Michelis (1999). Hence as per Trace statistics, carbon emission and inward FDI are not cointegrated in India.

The value of Maximum Eigen vale when r = 0 (no cointegration) is 14.74. The null hypothesis of no cointegration can be rejected at 0.05 level of significance. As the Max Eigen value is higher than Mac Kinnon-Haug-Michelis (1999). Hence as per Max Eigen value, carbon emission and inward FDI are cointegrated in India. As per a renowned study by Lütkepohl et al. (2000), the results of Trace statistics are more robust than Maximum Eigen value. Hence, based on the results of Trace statistics, it can be concluded that carbon emission and inward FDI are not cointegrated in India.

The variables are cointegrated however, there is no causality among the variables. Carbon emission does not cause inward FDI in India. Neither inward FDI cause carbon emission in India.

d) ***Diagnostic Test Results***

Table 5.27: VAR Residual Diagnostic Test Results

VAR Residuals	P-value
Serial correlation LM tests[74]	0.08
Jarque-Bera normality test	0.18
Heteroskedasticity test	0.46

Source: Author's calculation Using E views

The study to estimate the robustness of the results conducted diagnostic test such as serial correlation test. This is to detect serial autocorrelation in the time series data. As per the results of Table 5.27, the null hypothesis of no serial correlation at lag 1 in the time series for carbon emission and inward FDI is accepted.

Further, the study conducts the normality test for the variables based on Jarque-Bera. Based on the results of Table 5.27, the p-value fails to reject the null hypothesis of residuals are multivariate normal for carbon emission and inward FDI. This suggests normality among the residuals.

Additionally, the study conducts heteroscedasticity test to diagnose whether the variance of the error term is constant or not. Based on the results of Table 5.27, the p-value fails to reject the null hypothesis of homoscedasticity which means that variance of the error term is constant.

[74] Serial correlation test at lag 1

ii. ***India: Exports and Inward FDI***[75]

a) ***Results of Unit Root Test***

Table 5.28: Augmented Dicky Fuller Unit Root Test

Variables	**Level**		**First Difference**		**Results**
	Intercept	**Trend with Intercept**	**Intercept**	**Trend with Intercept**	
Inward Foreign Direct Investment	-0.48 (0.89)	-2.44 (0.35)	-5.34 (0.00)	-5.24 (0.00)	*I(1)*
Exports	-1.07 (0.71)	-0.64 (0.96)	-4.07 (0.00)	-4.23 (0.00)	*I(1)*

Notes: () MacKinnon (1996) one sided p-values; I(1) stationary after first difference

Source: Author's Calculation Using E views

Stationarity of a data series is prerequisite to draw meaningful inferences in a time series analysis. The unit root test is conducted with intercept and trend with intercept for all the variables in their levels and then first difference. Table 5.28 presents unit root test of the variables in their levels and first difference. The results shown concludes that null hypothesis cannot be rejected at their levels as the p-value is greater than significance level, that is 0.05. Therefore, the unit root test concludes that times series is non stationary in level. Based on Table 5.28, it is evident that applying first differences to the same shows all the variables are stationary. As the null hypothesis can be rejected at first difference as the p-value is less than 0.05. Hence, it can be concludes that values of exports and inward FDI are stationary at their first difference *I(1).*

[75] The data for inward FDI has been collected from UNCTAD in terms of US$ million. The data for exports has been collected from RBI in terms US$ million. The data has been converted into log form to ensure normal distribution of the time series data.

b) ***Optimum Lag Selection***

Table 5.29: VAR Lag Order Selection Criteria

Lag Length	AIC	SIC	HQC
0	0.54	0.63	0.57
1	-4.53*	-4.24*	-4.44*
2	-4.37	-3.90	-4.23

Source: Author's Calculation Using E views

Indicates optimum lag order selected by the criterion

To run a cointegration analysis using Johansen, another criterion is to select appropriate lag length. A VAR model is sensitive to selection of appropriate lag length. The optimum lag length is selected by the based on the values of AIC, SIC, and HQC. Based on Table 5.29, it can be interpreted that lag 1 is selected as appropriate lag by all selection criterion, that is AIC, SIC, and HQC.

c) ***Results of Johansen Cointegration Test for Exports and Inward FDI***

Table 5.30: Results for Johansen Cointegration Test

H_0	H_1	Trace Statistics	Maximum Eigen Statistics
r = 0	r = 1	27.72 (0.00)*	24.70 (0.00)*
r $\leq$ = 1	r = 2	3.01 (0.08)	3.01 (0.08)

Notes: () MacKinnon-Haug-Michelis (1999) p-values

*Trace and maximum eigen value indicate 1 cointegrating equation at 0.05 level

Source: Author's calculation Using E views

The null hypothesis, r = 0 means that there is no cointegration among the variables at 0.05 level. The alternative hypothesis, r $\leq$ = 1 means that there is cointegration among the variables

at 0.05 level. Table 5.30 presents results of Johansen Cointegration Test based on Trace statistics and Maximum Eigen value. The value of Trace statistics when r = 0 (no cointegration) is 27.72. The null hypothesis of no cointegration can be rejected at 0.05 level of significance. As the Trace statistics is higher than Mac Kinnon-Haug-Michelis (1999). Hence as per Trace statistics, exports and inward FDI cointegrated in India.

The value of Maximum Eigen vale when r = 0 (no cointegration) is 24.70. The null hypothesis of no cointegration can be rejected at 0.05 level of significance. As the Max Eigen value is higher than Mac Kinnon-Haug-Michelis (1999). Hence as per Max Eigen value, exports and inward FDI are cointegrated in India. Hence, it can be concluded that exports and inward FDI have long run association (cointegration) in India.

Table 5.31: VAR Granger Causality Test

Dependent Variable	**Independent Variable**	**Chi-Square Value**	**P-value**	**Implication**
Exports	Inward FDI	0.74	0.68	No causality
Inward FDI	Exports	12.24	0.00	Causality

Source: Author's calculation Using E views

The results based of Johansen cointegration test stimulates Granger causality test. Table 5.31 investigates bidirectional causality among the variables. The result suggests there is a unidirectional causality from exports to inward FDI. Exports cause inward FDI in India. However, inward FDI does not cause exports in India.

d) ***Diagnostic Test Results***

Table 5.32: VAR Residual Diagnostic Test Results

VAR Residuals	**P-value**

Serial correlation LM tests[76]	0.84
Jarque-Bera normality test	0.97
Heteroskedasticity test	0.54

Source: Author's calculation Using E views

The study to estimate the robustness of the results conducted diagnostic test such as serial correlation test. This is to detect serial autocorrelation in the time series data. As per the results of Table 5.32, the null hypothesis of no serial correlation at lag h in the time series for exports and inward FDI is accepted.

Further, the study conducts the normality test for the variables based on Jarque-Bera. Based on the results of Table 5.32, the p-value fails to reject the null hypothesis of residuals are multivariate normal for exports and inward FDI. This suggests normality among the residuals.

Additionally, the study conducts heteroscedasticity test to diagnose whether the variance of the error term is constant or not. Based on the results of Table 5.32, the p-value fails to reject the null hypothesis of homoscedasticity which means that variance of the error term is constant.

iii. ***China: Carbon emission and Inward FDI***[77]

a) ***Results of Unit Root Test***

Table 5.33: Augmented Dicky Fuller Unit Root Test

Variables	**Level**		**First Difference**		**Results**
	Intercept	**Trend with Intercept**	**Intercept**	**Trend with Intercept**	
Inward Foreign Direct Investment	-0.72 (0.82)	-4.37 (0.01)	-6.77 (0.00)	-6.77 (0.00)	*I(1)*
Carbon Emission	-0.44	-2.77	-3.14	-3.68	*I(1)*

[76] Serial correlation test at lag 1

[77] The data for carbon emission (carbon emission kt) has been collected from WBI. The data for inward FDI (US$ million) has been collected from UNCTAD.

	(0.88)	(0.21)	(0.03)	(0.00)	

Notes: () MacKinnon (1996) one sided p-values; I(1) stationary after first difference

Source: Author's Calculation Using E views

Stationarity of a data series is prerequisite to draw meaningful inferences in a time series analysis. The unit root test is conducted with intercept and trend with intercept for all the variables in their levels and then first difference. Table 5.33 presents unit root test of the variables in their levels and first difference. The results shown concludes that null hypothesis cannot be rejected at their levels as the p-value is greater than significance level, that is 0.05. Therefore, the unit root test concludes that times series is non stationary in level. Based on Table 5.33, it is evident that applying first differences to the same shows all the variables are stationary. As the null hypothesis can be rejected at first difference as the p-value is less than 0.05. Hence, it can be concludes that values of carbon emission and inward FDI are stationary at their first difference *I(1).*

b) ***Optimum Lag Selection***

Table 5.34: VAR Lag Order Selection Criteria

Lag Length	AIC	SIC	HQC
0	20.06	20.16	20.09
1	15.73	16.02	15.81
2	15.71*	16.19*	15.85*

Source: Author's Calculation Using E views

*******Indicates optimum lag order selected by the criterion*

A VAR model is sensitive to selection of appropriate lag length. The optimum lag length is selected by the based on the values of AIC, SIC, and HQC. Based on Table 5.34, it can be interpreted that lag 2 is selected as appropriate lag selection criterion as per AIC, SIC and HQC. Hence, the study has selected lag 2 for the analysis.

c) ***Results of Johansen Cointegration Test for Carbon Emission and Inward FDI***

Table 5.35: Results for Johansen Cointegration Test

H_0	H_1	Trace Statistics	Maximum Eigen Statistics
r = 0	r = 1	20.98 (0.00)*	20.12 (0.00)*
r ≤ = 1	r = 2	0.85 (0.35)	0.85 (0.35)

Notes: () MacKinnon-Haug-Michelis (1999) p-values

*Trace and maximum eigen value indicate 1 cointegrating equation at 0.05 level

Source: Author's calculation Using E views

The null hypothesis, r = 0 means that there is no cointegration among the variables at 0.05 level. The alternative hypothesis, r ≤ = 1 means that there is cointegration among the variables at 0.05 level. Table 5.35 presents results of Johansen Cointegration Test based on Trace statistics and Maximum Eigen value. The value of Trace statistics when r = 0 (no cointegration) is 20.98. The null hypothesis of no cointegration can be rejected at 0.05 level of significance. As the Trace statistics is higher than Mac Kinnon-Haug-Michelis (1999). Hence as per Trace statistics, carbon emission and inward FDI cointegrated in China.

The value of Maximum Eigen vale when r = 0 (no cointegration) is 20.12. The null hypothesis of no cointegration can be rejected at 0.05 level of significance. As the Max Eigen value is higher than Mac Kinnon-Haug-Michelis (1999). Hence as per Max Eigen value, carbon emission and inward FDI are cointegrated in China. Hence, it can be concluded that carbon emission and inward FDI have long run association (cointegration) in China.

Table 5.36: VAR Granger Causality Test

Dependent Variable	Independent Variable	Chi-Square Value	P-value	Implication
Carbon emission	Inward FDI	12.04	0.01	Causality
Inward FDI	Carbon emission	1.55	0.81	No causality

Source: Author's calculation Using E views

The results based of Johansen cointegration test stimulates granger causality test. Table 5.36 investigates bidirectional causality among the variables. The results suggest there is a unidirectional causality from inward FDI to carbon emission in China. The results suggests that carbon emission do not cause inward FDI in China. However, inward FDI cause carbon emission in China.

d) ***Diagnostic Test Results***

Table 5.37: VAR Residual Diagnostic Test Results

VAR Residuals	P-value
Serial correlation LM tests[78]	0.66
Jarque-Bera normality test	0.64
Heteroskedasticity test	0.76

Source: Author's calculation Using E views

The study to estimate the robustness of the results conducted diagnostic test such as serial correlation test. This is to detect serial autocorrelation in the time series data. As per the results of Table 5.37, the null hypothesis of no serial correlation at lag h in the time series for carbon emission and inward FDI is accepted.

Further, the study conducts the normality test for the variables based on Jarque-Bera. Based on the results of Table 5.37, the p-value fails to reject the null hypothesis of residuals are

[78] Serial correlation test at lag 2

multivariate normal for carbon emission and inward FDI. This suggests normality among the residuals.

Additionally, the study conducts heteroscedasticity test to diagnose whether the variance of the error term is constant or not. Based on the results of Table 5.37, the p-value fails to reject the null hypothesis of homoscedasticity which means that variance of the error term is constant.

iv. ***China: Exports and Inward FDI***[79]

a) ***Results of Unit Root Test***

Table 5.38: Augmented Dicky Fuller Unit Root Test

Variables	**Level**		**First Difference**		**Results**
	Intercept	**Trend with Intercept**	**Intercept**	**Trend with Intercept**	
Inward Foreign Direct Investment	-0.72 (0.82)	-4.37 (0.01)	-6.77 (0.00)	-6.77 (0.00)	*I(1)*
Exports	-0.17 (0.93)	-1.61 (0.76)	-4.29 (0.00)	-4.16 (0.01)	*I(1)*

Notes: () MacKinnon (1996) one sided p-values; I(1) stationary after first difference

Source: Author's Calculation Using E views

Stationarity of a data series is prerequisite to draw meaningful inferences in a time series analysis. The unit root test is conducted with intercept and trend with intercept for all the variables in their levels and then first difference. Table 5.38 presents unit root test of the variables in their levels and first difference. The results shown concludes that null hypothesis cannot be rejected at their levels as the p-value is greater than significance level, that is 0.05. Therefore, the unit root test concludes that times series is non stationary in level. Based on Table 5.38, it is evident that applying first differences to the same shows all the variables are

[79] The data for exports (total exports in terms of US$ 100 million) has been collected from statistical yearbook of China (MOFCOM). The data for inward FDI (US$ million) has been collected from UNCTAD.

stationary. As the null hypothesis can be rejected at first difference as the p-value is less than 0.05. Hence, it can be concludes that values of exports and inward FDI are stationary at their first difference *I(1).*

b) ***Optimum Lag Selection***

Table 5.39: VAR Lag Order Selection Criteria

Lag Length	AIC	SIC	HQC
0	31.02	31.12	31.05
1	26.55	26.84*	26.64*
2	26.51*	26.98	26.65

Source: Author's Calculation Using E views

Indicates optimum lag order selected by the criterion

A VAR model is sensitive to selection of appropriate lag length. The optimum lag length is selected by the based on the values of AIC, SIC, and HQC. Based on Table 5.39, it can be interpreted that lag 2 is selected as appropriate lag selection criterion as per AIC. Whereas, lag 1 has been selected as appropriate lag as per SIC and HQC. Based on the results of Liew (2004) and Gutierrez et al. (2009), AIC is superior is selected appropriate. Hence, the present study considers lag 2.

c) ***Results of Johansen Cointegration Test for Exports and Inward FDI***

Table 5.40: Results for Johansen Cointegration Test

H_0	H_1	Trace Statistics	Maximum Eigen Statistics
r = 0	r = 1	21.99 (0.00)*	21.64 (0.00)*
r $\leq$ = 1	r = 2	0.34 (0.55)	0.34 (0.55)

Notes: () MacKinnon-Haug-Michelis (1999) p-values

**Trace and maximum eigen value indicate 1 cointegrating equation at 0.05 level*
Source: Author's calculation Using E views

The null hypothesis, r = 0 means that there is no cointegration among the variables at 0.05 level. The alternative hypothesis, r ≤ = 1 means that there is cointegration among the variables at 0.05 level. Table 5.40 presents results of Johansen Cointegration Test based on Trace statistics and Maximum Eigen value. The value of Trace statistics when r = 0 (no cointegration) is 21.99. The null hypothesis of no cointegration can be rejected at 0.05 level of significance. As the Trace statistics is higher than Mac Kinnon-Haug-Michelis (1999). Hence as per Trace statistics, exports and inward FDI cointegrated in China.

The value of Maximum Eigen vale when r = 0 (no cointegration) is 21.64. The null hypothesis of no cointegration can be rejected at 0.05 level of significance. As the Max Eigen value is higher than Mac Kinnon-Haug-Michelis (1999). Hence as per Max Eigen value, exports and inward FDI are cointegrated in China. Hence, it can be concluded that carbon emission and inward FDI have long run association (cointegration) in China.

Table 5.41: VAR Granger Causality Test

Dependent Variable	**Independent Variable**	**Chi-Square Value**	**P-value**	**Implication**
Exports	Inward FDI	6.33	0.04	Causality
Inward FDI	Exports	11.53	0.00	Causality

Source: Author's calculation Using E views

The results based on Johansen cointegration test stimulates Granger causality test. Table 5.41 investigates bidirectional causality among the variables. The p-values of variables less than significance level, that is 0.05 suggests bidirectional causality. The results suggests that exports cause inward FDI in China. Additionally, inward FDI cause exports in China.

d) ***Diagnostic Test Results***

Table 5.42: VAR Residual Diagnostic Test Results

VAR Residuals	P-value
Serial correlation LM tests[80]	0.30
Jarque-Bera normality test	0.93
Heteroskedasticity test	0.22

Source: Author's calculation Using E views

The study to estimate the robustness of the results conducted several diagnostic tests such as Lagrange multiplier test (VAR residual correlation LM test). This is to detect serial autocorrelation in the time series data. As per the results of Table 5.42, the null hypothesis of no serial correlation at lag h in the time series for exports and inward FDI is accepted.

Further, the study conducts the normality test for the variables based on Jarque-Bera. Based on the results of Table 5.42, the p-value fails to reject the null hypothesis of residuals are multivariate normal for exports and inward FDI. This suggests normality among the residuals.

Additionally, the study conducts heteroscedasticity test to diagnose whether the variance of the error term is constant or not. Based on the results of Table 5.42, the p-value fails to reject the null hypothesis of homoscedasticity which means that variance of the error term is constant.

[80] Serial correlation test at lag 2

5.4 Findings

a) ***To Determine the Economic Pull Factors of Inward Foreign Direct Investment in India and China:***

i. ***India***

For India, the chapter's findings reveal that key economic factors such as exchange rate, GFCF, and market size positively and significantly attract inward FDI. In India, exchange rate, GFCF, and market size granger cause inward FDI.

The findings are in line with several findings. Amilan (2005), Hooda et al. (2011), Catherine (2013) finds that exchange rate positively and significantly influences inward FDI. Catherine (2013), and Akpan et al. (2014) finds that GFCF (infrastructure) positively and significantly impact inward FDI. Amilan (2005), Kumari et al. (2017), and Shrivastav (2017) finds that market size positively and significantly influences inward FDI in India. In India, the positive and significant relationship between the exchange rate and inward FDI suggests that the devaluation of the Indian currency since 2012 has made investments more financially attractive to foreign investors, as it lowers the cost of funding in the local currency (World Bank Indicators).

ii. ***China***

In the case of China, the research similarly indicates that lagged inward FDI, economic growth, GFCF, and market size positively and significantly attract inward FDI, and trade openness negatively and significantly attract inward FDI. In China, economic growth, GFCF, market size, and trade openness granger cause inward FDI.

The findings are in line with several findings. Gosh et al. (2011), Liu et al. (2020), and Kumari et al. (2017) finds that economic growth positively and significantly influences inward FDI. Tseng et al. (2002), Panigrahi et. al (2012), Iqbal (2013) finds that GFCF (infrastructure) positively and significantly influences inward FDI. Ali et al. (2005), Sahoo et al. (2006), and Akpan et al. (2014) finds that trade openness significantly influences inward FDI. Sahoo et al. (2006), Parashar (2015), and Kaliranjan et al. (2012) finds that market size positively and

significantly influences inward FDI in China. A significant finding in the area is that trade openness negatively and significantly influences inward FDI in China during 1995-2019. Trade openness is share of imports and exports as a percentage share of GDP. China's exports as a percentage of GDP have decreased to 18.40 percent in 2019 from 36.03 percent in 2006. Additionally, China's import as a percentage of GDP have decreased to 17.48 percent from 28.44 percent in 2006. However, a per UNCTAD database, since 2009 China has the largest share of exports of goods in the world. This indicates that China in terms of exporting goods is excelling. This performance attracts inward FDI in China. A recent study by Miura (2022) addressed this issue. The study explained that China's decline in trade dependence means that its trade has declined relative to its GDP. Its trade dependence increased along with its share of world trade but declined after 2005 as its GDP expanded at a faster pace than trade. The study mentions that decline in trade dependence in China is due to its decreasing mutual dependence on foreign countries. The decline in exports is due to companies becoming inclined towards domestic market. Further, the decline in imports is due to decreasing reliance of overseas suppliers and shifting towards internal manufacturing. However, as per UNCTAD (2020), China, Russia, and Germany maintained largest surplus in the world.

Hence, the chapter concludes that economic factors remain key in driving inward FDI into both India and China. However, it is noted that India could potentially boost its inward FDI by increasing its trade openness, and economic growth. In contrast, China's robust economic growth has positively impacted its inward FDI, suggesting that investors are more likely to invest in economies exhibiting higher growth rates. This trend is attributed to indicators of a stable economic environment, a well-developed workforce, and a growing demand for goods and services.

b) ***To Determine the Sustainability, Pull Factors of Inward Foreign Direct Investment in India, and China:***

i. ***India***

In India, the tax revenue and mobile cellular subscription plays a crucial role in attracting inward FDI. The significance of tax revenue highlights important characteristics of results such that higher tax revenue indicates financial stability of the government. Hooda et al (2011) and Dar (2014) finds financial stability significant in attracting inward FDI in India. Hence, it

motivates the investors to invest in economies with higher funds. This assures the investors that in case of any uncertainty government will interfere and investors funds are secured. However, there is a different perspective to this. Increased tax revenue influences investors to take advantage of tax avoidance treaties with other economies like Mauritius and Singapore. Hence, they re-route their investments via these economies. Hence both the perspectives are expected to have influence on the findings.

Regarding mobile cellular subscription, this can be justified by the development of telecommunication sector in India. This variable represents the prepaid and post subscription. This can be related by the findings of trends and patterns of inward FDI. India acquires majority of its inward FDI in service and specifically, in business process outsourcing sector. India is one of the world's leading destinations for this sector. Hence, increased number of mobile cellular subscription implies better connectivity, and a more widespread use of digital technology in India. The increase in mobile users, there is a significant increase in data generation. The enhanced connectivity makes it easier for firms to reach and serve global clientele and operate with flexibility.

ii. ***China***

In China, factors such as access to electricity, availability of natural resources, and the prevalence of internet users significantly contribute to attracting inward FDI. This is largely because China has become a major hub for manufacturing investments. This depends heavily on a reliable supply of raw materials, thus creating a consistent demand for natural resources. The country's well-established infrastructure and supply chain further facilitate the transportation of these resources. This enhances the appeal of investing in resource-dependent industries. The role of electricity access is also pivotal in China. As the proportion of the population with access to electricity has been growing steadily since 2000, reaching universal access. This widespread availability of electricity is crucial for the efficient operation of businesses. This result is in line with the findings by Zheng (2021). Additionally, the widespread adoption of internet access in China plays a vital role in ensuring the smooth functioning of business operations, further boosting the attractiveness of inward FDI in the country. This result are in line with the findings by Choi (2003).

c) ***To Identify the impact of Inward Foreign Direct Investment on Sustainability indicators in India and China***

i. ***India***

Inward FDI and carbon emissions do not have unidirectional or bidirectional causation in India. This can be explained by sectoral investments in India. India receives higher investments in service sector. An in-depth analysis into the service sector reveals that, India receives higher investments in financial services. Subsequently, in sub sectors such as computer software and hardware, and telecommunication. This sector emits considerably less carbon as compared to manufacturing sector.

Exports and inward FDI in India have long run association. This means in India exports and inward FDI have a consistent relationship in long run. Exports cause inward FDI in India. However, inward FDI do not cause exports in India. India receives higher inward FDI in service sector. The service sector exports have observed higher growth rate as compared to goods exports in India (World Bank Indicators Database). The findings are line with results of Goswani et al. (2012) and Abraham (2018).

ii. ***China***

Inward FDI and carbon emission in China have a long run association. This means that in China carbon emission and inward FDI have a consistent relationship. Additionally, the causality test suggests that inward FDI cause carbon emission in China. This can be explained by China's massive investments in manufacturing sector. The results are in line with findings by Liu (2021), Zhang (2023), and Yi (2023).

Inward FDI and exports in China have a long run association. This means that in China, exports and inward FDI have a consistent relationship. Additionally, the causality test suggests that inward FDI cause exports in China and exports cause inward FDI in China. This is reflected in China's economic scenario. China is among the top receiver of inward FDI in the world. Along with this China is the among the top exporting countries in the world (UNCTAD Database). China attracts highest inward FDI in manufacturing (MOFCOM Database). Multinationals are attracted in China due to its manufacturing efficiency. The investments in manufacturing are

with the intention of exports from China. The results are in line with the results of Tseng et al. (2003) Lakshani et al. (2023), and Sheng (n.d.)

India needs to enhance its manufacturing productivity to higher FDI. As its enhancement will attract resource seeking in India. This can increase exports and exports earnings for India.

To increase exports, India needs inward FDI in manufacturing sector as well. This strategy is warranted as India currently does not see substantial investment in manufacturing, particularly in its top states for inward FDI. Boosting manufacturing activities could lead to increased inward FDI in this sector.

Table 5.43: Share of Manufacturing Sector in Inward FDI in Selected Indian States (Percentage), 2000-2019

State	**Investments in Manufacturing Sector**	**Sub- Sector**
Maharashtra	17.28%	Allopathic Pharmaceutical Preparations
		Semi-Finished Iron & Steel Products
		Aluminium Artware
Delhi	11.19%	Electrical Equipment
		Electrical Equipment
Karnataka	25.19%	Wholesale of textiles, fabrics, yarn, household linen, articles of clothing, floor coverings, and tapestry
		Wholesale of telephone mobile phone and communications equipment and parts
		Distilling, rectifying, and blending of spirits, ethyl

		alcohol production from fermented materials
Tamil Nadu	32.11%	Motor Cars & Other Motor Vehicles
		Commercial Vehicles
		Drugs, Medicines & Allied Products
Gujarat	46.75%	Manufacture of clinkers and cement
		Manufacture of insecticides, rodenticides, fungicides, herbicides
		Manufacture of passenger cars

Source: SIA newsletters, Reserve Bank India Database

According to Table 5.43, Gujarat is the only top state in India attracting a significant share of investments in manufacturing. This data supports the observation that inward FDI have not significantly boosted India's manufacturing sector. The boost in these sectors can enhance exports. India needs resource seeking inward FDI. Improving manufacturing infrastructure would not only demonstrate economic efficiency and stability but can lead to a bidirectional causality effect between inward FDI and exports, further bolstering the economy.

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