ANALYSING TRADE BETWEEN INDIA AND THE EUROPEAN UNION
(WITH SPECIAL REFERENCE TO GERMANY)

A THESIS

Submitted by

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APPROVAL SHEET

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CANDIDATE'S DECLARATION

I, **Subodh Kumar Agarwal**, declare that the work in the thesis titled **"Analysing Trade between India and the European Union (With Special Reference to Germany)"** was carried out by me in the Department of Economics, School of Liberal Education, Galgotias University, India. The informations used for my literature review was fully acknowledged in the text and references. This thesis has not been presented in any scientific gathering nor has it been presented for another degree at any University.

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ABSTRACT

Trade Relations between India and the European Union (EU) have been marked with roadblocks and obstacles, with the result that the volume of economic interaction remains way below its potential. A deeper analysis reveals that these roadblocks are due to the high tariff barriers as well as non-tariff barriers, which have continued to play an influencing role in the discussions on the India-EU Free Trade Agreement (FTA). High tariff barriers are essentially aimed to protect the home industry, whereby the non-tariff barriers are largely based on the perceptions about each other. These perceptions translating into a lack of trust have a greater impact on the trade-relations between the two trading partners. Lack of consensus and absence of a clear vision have also influenced the discussions regarding the quick implementation of the India-EU FTA. The paper analyses the potential between the two trading partners and the accrued benefits which outweigh the costs for both sides. Proponents of liberal thought have argued in favour of eliminating trade barriers. They claim that trade results in a win-win situation and is not to be seen as a zero-sum game. The external factors continue to play an important role in shaping relations between India and the EU. The dynamics of global politics and the rapidly shifting of alliances, India has to manoeuvre its relationship with the EU in a tactful manner safe-guarding its self-interests at the same time. This paper evaluates the qualitative and quantitative relationship between India and the European Union.

A special section discusses the bi-lateral trading relations between India and Germany and what lessons can this relationship bring for the European Union as a multi-lateral trading bloc. India and Germany are two economic powerhouses in their own respective regions. Whereby, India is a strong economy of South Asia, Germany remains a dominant country of continental Europe. Both countries are also characterised by their shared values of being a pluralist society, their respect for human rights and their shared commitment towards sustainable development. Germany's economic recovery was extraordinary after the second world war, whereas, the Indian economy stagnated for more than four decades after independence. The second major milestone in the history of both countries was the fall of the Berlin wall followed by the consequent unification of Germany and the liberalisation

reforms of 1991 in India. Both these developments changed the contours of the Indo-German relationship to transform their relationship into a strategic partnership. In the recent years, COVID-19 had its own impact on this relationship. The foreign policy of India and Germany has largely hinged on all these factors. The economic and the geo-political consequences of this relationship can weigh heavily in the new global order. This paper looks at the dynamics of Indo-German relationship at a qualitative level and also discusses the quantitative relationship and the impact of India's trade with Germany on its GDP through the empirical analysis. The qualitative analysis deals with the evolution of relations between India and Germany, the perceptions of each other and the importance of these relations in defining their foreign policy. India's trade with Germany and its impact on Indian GDP also gives a basis for deepening relations between the two countries at a bi-lateral level.

The bi-lateral relationships are important as seen in the special section on India and Germany. Whether these bi-lateral relationships can serve to guide India's relations at a multi-lateral entity namely the European Union is also discussed. Analysing trade relationships with major trading partners of India within the EU, and comparing these with the collective European Union, gives a sound understanding of India-EU relations.

This paper concludes that the potential to increase trade between the two partners is significant. With the changing global landscape, the two partners need to take decisions on issues where they are willing to make concessions. This will inject confidence and enthusiasm and open doors for further negotiations on sensitive issues. Trade agreements also need to be complimented with decisions in other sectors like defence and security, space-research, R&D etc.

The decisions taken by India and the EU in the next few years and how they strengthen their relationship will be crucial for them as well as for the world for a long-time to come.

DEDICATION

TO MY PARENTS

SH. RAJENDRA NATH AGARWAL

&

SMT. PREM LATA AGGARWAL

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- "Indo-German relationship: Expanding India's Influence at the Global Stage", *Journal of Informatics Education and Research*, Volume 3, Issue 2, 2023, pp. 808-823. http://jier.org/index.php/journal/article/view/180 https://doi.org/10.52783/jier.v3i2.180

ABBREVIATIONS

2SLS	:	2 Stage Least Squares
3SLS	:	3 Stage Least Squares
ARDL	:	Autoregressive Distributed Lag
BMW	:	Bayerische Motoren Werke Aktiengesellschaft
BTIA	:	Broad-based Bilateral Trade and Investment Agreement
CAA	:	Citizenship Amendment Act
CBT	:	Calculus based Trust
CDU	:	Christian Democratic Union/Christlich Demokratische Union
COVID-19	:	Coronavirus Disease of 2019
DG	:	Directorate General
EC	:	European Community
ECJ	:	European Court of Justice
ECSC	:	European Coal and Steel Community
EEC	:	European Economic Community
ELG	:	Export Led Growth
ELI	:	Export Led Imports
EPC	:	European Political Cooperation
ESS	:	European Security Strategy
EU5	:	European Union 5Member States
EU	:	European Union
EUGS	:	European Union Global Strategy
EUIS	:	European Union India Strategy
FCRA	:	Foreign Contribution Regulation Act
FDI	:	Foreign Direct Investment
FDP	:	Free Democratic Party/Freie Demokratische Partei
FEMA	:	Foreign Exchange Management Act
FES	:	Friedrich Ebert Stiftung
FNF	:	Friedrich Naumann Stiftung für die Freiheit
FRG	:	Federal Republic of Germany
FTA	:	Free Trade Agreement
GATT	:	Gerneral Agreement of Tariffs and Trade
GDP	:	Gross Domestic Product
GDR	:	German Democratic Republic
GIZ	:	Gesellschaft für deutsche Zusammenarbeit/German Development Organisation
GLE	:	Growth Led Exports
GLI	:	Growth Led Imports

GMF	:	German Marshall Fund
GSP	:	Generalised System of Preferences
HBS	:	Heinrich Böll Stfitung
HLTG	:	High Level Trade Group
HSS	:	Hans Seidel Stiftung
IBT	:	Indentification based Trust
ILE	:	Import Led Exports
ILG	:	Import Led Growth
IMF	:	International Monetary Fund
JAP	:	Joint Action Plan
JJ	:	Johansen-Juselius
KAS	:	Konrad Adenauer Stiftung
KfW	:	Credit Institute for Reconstruction/Kreditanstalt für Wiederaufbau
NAM	:	Non-Aligned Movement
NATO	:	North Atlantic Treaty Organisation
NGO	:	Non Government Organisation
OLS	:	Ordinary Least Squares
ORF	:	Observer Research Foundation
PPP	:	Purchasing Power Parity
QUAD	:	Quadrilateral Security Dialogue
R & D	:	Research and Development
SEA	:	Single European Act
SOE	:	State Owned Enterprises
SITC	:	Standard International Trade Classification
SPD	:	Social Democratic Party/Sozialdemokratische Partei
UAE	:	United Arab Emirates
UK	:	United Kingdom
US	:	United States of America
USSR	:	Union of Soviet Socialist Republics
VAR	:	Vector Autoregressive
VECM	:	Vector Error Correction Model
WHO	:	Word Health Organisation
WTO	:	World Trade Organisation
WW	:	World War

CHAPTER 1

INDIA AND THE EUROPEAN UNION – AN OVERVIEW

CHAPTER 1
INDIA AND THE EUROPEAN UNION – AN OVERVIEW

1.1 Introduction

India and the European Union (EU) are two significant entities at the world stage. With India gaining prominence both as an emerging market and politically, the spotlight shines on India due to its consistently high economic growth in the last two decades. The economic resilience shown by India even during the period of Great Recession and economic depression of 2007-2009, have boosted confidence in the Indian economy. Even politically, India carries weight and has shown its maturity on tackling complex and seemingly intertwining political issues. Such maturity was on display especially as it handled the Covid-19 situation with relatively low mortality and tough decisions, when compared with many developed countries around the globe. Recently, the successful conclusion of India's G-20 Presidency and the mere fact that India was able to forge a consensus amongst the members despite the sensitive and divisive issue of Russia-Ukraine war displayed its ability to navigate through rough waters. Its invitation to Africa Union to the G-20, reinforced India's belief in an inclusive world.

The world has witnessed a change towards authoritarian regimes, the national agenda is becoming supreme, moving towards the dilution of multilateralism (Gieg et al., 2021). Given the current transformation in international relations, the India-EU relations acquire a new and significant dimension. India, with its democratic institutions, a strong advantage over the software industry and a hungry manufacturing sector, continues to shine as a beacon of stability and growth. With its soft power and hard decision-making, India has been able to prove to the world that its ambitions are to be in the club of relevant nations. India has worked hard to disband its image of "the land of the holy cow" and transform itself into a country with technological prowess. A diverse nation, with a growing middle class, the aspirations of Indians are also changing. Emulating the western standards, Indians are not shy in spending money as India continues to be ranked number 3 in Purchasing Power Parity (PPP)[1]. Observing the upswing of Indian transformation, the European Union recognises India as a natural partner with untapped potential.

[1]World Economic Outlook Database, April 2023 Edition. (https://www.imf.org)

However, trade relations between India and the European Union have been marked with roadblocks and obstacles, with the result that the volume of economic interaction remains way below its potential. A deeper analysis reveals that these roadblocks are due to the high tariff barriers as well as non-tariff barriers, which have continued to play an influencing role in the discussions on the India-EU Free Trade Agreement (FTA). High tariff barriers are essentially aimed to protect the home industry, whereby the non-tariff barriers are largely based on the perceptions about each other. These perceptions translating into a lack of trust have a greater impact on the trade-relations between the two trading partners. Lack of consensus and absence of a clear roadmap to achieve the ambitious target of an India-EU FTA have delayed the fast execution of the agreement. In addition, both sides are yet to find a compromising solution to the stalemate that exists within the India-EU FTA in order to quick-start the process.

This study deals with the important issue of India-EU relations in a holistic manner. The importance of economic potential cannot be undermined. Trade is not a zero-sum game. And therefore, the research analyses the trade interaction between the two partners. This research evaluates if the two partners stand to gain more through increased economic interaction as trading partners and whether the trade has a positive effect on their economic growth.

1.2 Relevance Of India-EU Relations

Economics and politics are very closely intertwined. As politics drives economics, economics also drives politics. Political and social factors influence trading relations of international partners. Some political decisions may not be economically advantageous but countries may be forced to implement such decisions for a greater cause. Moreover, some incidents occurring in one geographical area of the world have global repercussions.

The outbreak of COVID-19 shut down the world and ignited the re-shuffling of partnerships, alliances and friendships. COVID-19 exposed the weaknesses of dependence on a single entity. It has spurred an urgency of dispersing manufacturing activities across the world, even if the optimum economic benefit is not realised. Countries are in pursuit for new investment destinations, which will change the inter-country relations in the coming years.

The Russian invasion of Ukraine has also disturbed the status-quo of Europe. This is the first aggression of this magnitude after the second world war playing out in Europe. The conflict has shaken Europe, which in the last seven decades was a symbol of peaceful existence. With western sanctions on Russia and the shortages of energy/gas and food-grains, an assured supply of basic needs has been affected.

These incidents coupled with aggressive posturing by some nations are forcing countries to form associations with like-minded countries and to come together in order to defend their own interests. Under the new global order, it becomes imperative for India to safeguard its political interests along with its economic interests.

A quantitative assessment of India's trade with the EU (and major trading countries within the EU) and its influence on Indian economic growth will help in forecasting the future trade patterns. The quantitative results have a direct bearing on the qualitative aspect within a relationship. The empirical results will provide evidence-based arguments to be used in further negotiations. The outcome of negotiations will help in strengthening of relations between India and the EU economically, politically and socially.

A stronger and meaningful partnership with the European Union would be in India's interests as well as favourable for the EU. In addition to economic gains, India needs to cultivate Europe in order to be an influencing voice at the world stage. India's ambitions of being a global power can only be fulfilled, when it has the right friends on its side. The same goes for EU too.

1.3 EU As A Regional Bloc

Various researchers and academicians have looked into the advantages and disadvantages of regional agreements. Baldwin (1993) has explained the urgency to join a regional block through the 'Domino Theory'. Domino Theory also called the Domino Effect was adopted in the US foreign policy after the second world war. The theory which was

introduced by Harry S Truman[2], the 33rd President of the United States but was propagated by the 34th Presient of the United States, Dwight D Eisenhower. Domino Theory was a geopolitical concept that gained prominence during the cold war period, especially relating to the United States' policy towards communism. The theory was simple in that it said that if one country fell to communism, it would unleash a chain reaction, whereby, the neighbouring countries would also adopt communism, like a row of falling dominoes. In the same way, Baldwin (1995) projected that if one country would join a regional bloc, it would unleash a multiplier effect and the neighbouring countries would also rush to join. This lowers bilateral import barriers 'like a row of dominoe's to avoid losses from the trade diversion effect if they remain outside (Baldwin, 1993, 1995); Bhagwati, Panagriya and Srinivasan (1998) opine that the regional trading agreements are welfare reducing since they are a potential 'stumbling block' that detracts partner countries' efforts to liberalise at the multilateral level (Bhagwati & Krueger, 1995; Bhagwati & Panagriya, 1996; Srinivasan, 1998).

The extensive work on regional agreements lays forth a mixed reaction to the existing regional agreements and their advantages. While some studies have shown the benefits of regional agreements for both, others have shown that agreements are not likely to bring gain for the developing economies when negotiating with developed economies.

Assuming that gains for developing economies outweigh those for developed economies, the failure of India-EU FTA opens a floodgate of unanswered questions. The primary argument in favour of regional agreements has been the success of abolishing tariffs for member countries. Greater market access becomes an attractive proposition for countries outside the bloc, considering their desire for expansion of exports. Under a regional FTA, third countries may find it easier to negotiate with one entity giving access to a number of countries rather than negotiating with each country on a bi-lateral level. In the case of India and the EU, India needs to negotiate with EU, in order to gain a market of 27 member countries.

[2] President Truman's Message to Congress; March 12, 1947; Document 171; 80th Congress, 1st Session; Records of the United States House of Representatives; Record Group 233; National Archives

The advantages of a regional grouping such as the European Union may work in favour of India. India has been negotiating with European countries at a bi-lateral level due to the slow decision-making and lack of consensus at the regional level within the EU. The external factors also influence greatly when taking decisions for a larger group. Therefore, as attractive as it may sound, the complexities of international environment as well the consensus building in a large regional bloc as the EU, are not easy to navigate while negotiating an India-EU FTA.

1.4 Existing Literature on Trade-Growth Hypothesis

Proponents of the classical and the neoclassical theory have shown through their vast extant of studies and literature that by reducing barriers to trade, both sides tend to make economic gains while transacting with each other (Viner, 1950). A two-way relationship between economic growth and international trade was promulgated. Firstly, foreign trade would lead to the optimal distribution of resources and productivity and secondly, it would also be able to import goods it could not produce optimally. Adam Smith is known for his work on 'wealth of nations' propagating the role of markets to bring in prosperity and gain. Similarly, the theory of comparative advantage by David Ricardo, proposed that countries specialise in producing goods, where they have an edge over other countries and the surplus thus produced can be traded for products that are not available in that country. He brought in a strong argument for specialisation, which optimises the cost of production to a level where none or few can compete with. Advancing on Ricardo's theory of specialisation, Samuelson and Nordhaus (2009) have convincingly written about the benefits of free trade. Free and open trade allows nations to expand their production and consumption possibilities raising the world's living standards (Samuelson & Nordhaus, 2009).

The view of the economists is that exports eventually drive economic growth. This is derived from their work showing that increased exports would lead to greater economies of scale, specialisation in production, which ultimately bring down costs and also bring in technological progress that would directly contribute to economic growth (Helpman, Elhanan, Krugman, Paul, 1985).

As economies grow, it would stimulate skill formation as well as dissemination of technical knowledge (Bhagwati, 1988). To achieve greater exports, the countries invest in expanding their manufacturing capabilities and with the boost in manufacturing, exports provide market access to offload their products (Easterly, 2007). To be competitive in the world market, and to bring down costs, economies of scale ensure greater economic efficiency and are thus an important contributor towards economic growth. The growth of China has been primarily due to the low-cost manufacturing leading to economies of scale and greater economic growth. To a certain extent, India has seen similar trajectories, though it has an edge over the services sector, when compared with the goods and manufacturing sector (Stiglitz, 2007).

Available literature and vast expanse of empirical analysis can be identified by their unique characteristics in order to understand the Export Led Growth of Trade Growth Hypothesis. There are studies to explore the relationship between exports and economic growth of China were conducted which showed that exports having a causal relationship with economic growth (Kwan & Cotsomitis, 1991; Kwan & Kwok, 1996).

Investigating the causal relationship that economic growth has on exports, Ghartey (1993) analysed three countries namely United States, Taiwan and Japan using cross-section data. For United States, his study shows that economic growth does cause exports, but in the case of Japan, there was a bi-directional relationship between economic growth and exports. However, in the case of Taiwan, exports caused economic growth.

There has been evidence whereby no causal relationship between Export Led Growth was found in empirical analysis done on 37 developing countries except for four countries namely Indonesia, Egypt, Ecuador and Costa Rica. (Jung & Marshall, 1985). Studies by Pradurnna (1986), Tyler (1981), Porter (1978), Kravis (1970) Maisels (1963) have used cross country data and correlation method to test this hypothesis (Heller & Porter, 1978; Kravis, 1970; Maizels, 1963; Pradurnna, 1986; Tyler, 1981).

A few studies have used the cross-country data with regression techniques eg. OLS, 2SLS,3SLS models, and panel data methods (Alam, 1991; Amirkhalkhali & Dar, 1995; Balassa, 1985; Coppin, 1994; De Gregorio, 1992,). And then few researchers have used the time-series technique to examine the trade growth nexus. For example, a bi-directional

causality was found between exports growth and economic growth while studying the export led growth hypothesis for China using monthly data and a similar bi-directional relationship between Exports Led Growth and Growth led Exports was found for Australia while studying the causal relationship between economic growth and exports using ADF single test and Granger Causality tests (Shan & Sun, 1998). The export, import and GDP growth for Portugal was studied by Ramos using multivariate Johansen-Juselius (JJ) approach by Ramos (2001), who found a bi-directional causality between GDP and exports, GDP and imports and imports and exports growth (Ramos, 2001).
By testing the autoregressive distributed lag (ARDL) model, Mah (2005) found a long-run relationship and bi-directional causality between real GDP growth and export growth (Mah, 2005). Similarly, Awokuse (2005) used change in capital and foreign output shocks to Korean quarterly data. He used vector error correction model (VECM) and the augmented vector autoregressive (VAR) procedures to test causality. The ELG and GLE hypothesis were proven. As the results showed that capital, terms of trade and foreign output shocks influence economic growth (Awokuse, 2005).

Applying ARDL and the JJ approach, Tang (2006) failed to find cointegration between exports, economic growth and imports for China using the ELG hypothesis. For Bulgaria, there exists a bi-directional relationship between exports and economic growth but for the Czech Republic, there is unidirectional relationship between exports and economic growth and imports and economic growth. In contrast, results for Poland also show a unidirectional relationship, however, between imports and economic growth (Awokuse, 2007).

In 2009, the relationship between imports, investments, output and productivity were analysed for China showing in the long run both imports and investment stimulate output and labour productivity, but do not find causality between investment and imports (Herrerias & Orts, 2009). A relationship between trade and economic growth for pacific island nations, Fiji Islands, Papua New Guinea and Solomon Islands using the ARDL approach showed that real income causes exports in Fiji, but the export led growth and import led growth showed no relations for Fiji and Pacific region (Katircioglu, et.al., 2010).

Closer in South Asia, while examining the Export Led Growth (ELG) and Growth Led Exports (GLE) as well as Import Led Growth (ILG) and Growth Led Imports (GLI) for Pakistan, had a bi-directional causality in the short run (Lee, 2010).

Similar analysis to understand the Export Led Growth (ELG) for India have been undertaken by researchers and academics. Chandra and Love (2005) employed cointegration and error-correction modelling and showed that India's exports contributed to the economic growth of the country.

Nain et al (2010) re-examined the Export Led Growth (ELG) Hypothesis in India using quarterly data for the period 1996-2009. Applying the Granger causality test and forecast error variance decomposition (within VAR framework) to analyse the relationship between exports, imports, exchange rate and economic growth in the short run as well as in the long run. Their results rejected the ELG for India but found a causality in the GLE in the Indian context (Nain & Ahmad, 2010).

Dar (2013) shows a positive relationship between exports and GDP using the wavelets-based correlation and cross correlation. This positive relationship between exports and GDP further increases as the time horizon expands, and at higher time scales the relationship further becomes bidirectional.

Devkota (2019) analysed the relationship between Indian exports, imports and GDP using cointegration and vector error correction model and showed a causal relationship between GDP and imports for India.

1.5 Addressing the Gap in Existing Literature

The mixed results obtained from the existing literature reviewed recommends the need for a re-examination of interantional trade and economic growth. At the same time, the results for this study will be extremely relevant if these variables are also examined in light of the trading partner and their variables. Hence, taking into account export and import parameters of the EU (collectively) as a whole and major trading partners of India in the EU (at a bi-lateral level) will add a fresh dimension to the research. Addressing the gap that exists in the current literature might provide useful insights for policy suggestions.

India and the EU represent two very different dimensions of development. Whereby, India is still a developing country, the EU is a developed entity. Under these circumstances, the capabilities and attributes of India and the EU vary greatly. While EU has capital and technology, India is rich in natural resources and labour. Due to these factors, the trade patterns of India and the EU differ from each other. The Indian export basket consist of low value-added products while its imports constitute high tech products.

Under these assumptions, whether the Indian exports have any causal relationship on its economic growth needs to be investigated. Exports leading to economic growth is a widely accepted principle. In various studies conducted earlier, some of the results show that exports may not always contribute to economic growth (Ghartey, 1993). Therefore, an empirical analysis of the Export Led Growth or a Growth Led Exports for India will only add credibility to this principle.

Needless to say, the imports encourage domestic producers to improve their quality at a reasonable cost while upgrading their industrial infrastructure thereby bringing in efficiency in production. This underlines the importance of empirical research on imports and economic growth for India. An Import Led Growth or a Growth Led Imports Hypothesis will explain if this is true for India.

A relationship between Exports and Imports also needs to be re-examined as exports and imports can have a unidirectional relationship or a bi-directional relationship with each other. Either of them could be a cause for the other and at the same time may be causing the other to happen. A closer investigation of Indian exports and imports in relation to different members in the EU needs to be analysed. This will give a true picture of whether a unidirectional, bidirectional or neither exists between Indian trade with the EU members being examined.

On reviewing available literature for Trade Growth Hypothesis, a gap was found in the analysis for India and the EU. This study aims to fill this gap in research. This is all the more important as India and EU are at the crux of strengthening their relationship and have not achieved any significant success as ‘strategic partners’. The negotiations on the

India-EU FTA have also been inconclusive with both sides adopting a non-compromising attitude.

Using econometric methods to examine and analyse the relationship between international trade and economic growth between India and the EU will add to the existing literature with the aim of providing substantial evidence-based results. This will enrich the field of economics.

Taking international trade, exports and imports as independent variables and analysing their impact on each other i.e., the influence of independent variables on the dependent variable in order to understand the causal relationship quanitatively between the parameters of different entities will form the basis to define the foreign policy of India.

The EU is the most successful example of regionalism across the world. It is also a conglomerate of countries with different economic growth levels and different challenges. Therefore, the member states within the EU, when taken collectively may not show the conventional and consensual output in decision-making at the regional level.

1.6 Objectives of the Study

This research, adopts a two-thronged approach. It addresses the quantitative aspect by conducting an empirical analysis of international trade between India and EU (and significant trading partners of India within the EU) as well as it delves into the evolution of Indian relationship with the EU and looks into the challenges and opportunities of a strong qualitative partnership between the two partners.

The study also incorporates a case study of India' relations with Germany. Germany is one of the strong members of the EU (both politically and economically) and has been in the top three trading partners in the EU for India over a long period. In the year 2022, it has slipped to the second position behind the Netherlands to be the second largest trading partner of India in the EU. India's relationship with Germany defines the evolution, significance and the challenges of a bi-lateral relationship. The case study with Germany reflects on how Indo-German relations have transformed in the last seven decades from insignificance to strategic partners. The empirical analysis with Germany helps to not only compliment the collective EU analysis but also provides a deeper understanding of

bilateral economic relations between individual member states under consideration in the study. The study concludes with policy suggestions to strengthen and deepen its relationship with Germany.

1.6.1 Overall Objective

The overall objective of the study is to find out the relationship between Indian Trade-Led Growth and Growth-Led Trade with respect to EU (including major trading partners of India in the EU namely Belgium, France, Germany, Italy and Netherlands. It will examine if a unidirectional or bidirectional relationship exists between international trade and economic growth between India and EU (including major trading partners of India in the EU), or the absence of any cause-effect relationship between international trade and economic growth between India and the EU (including major trading partners of India in the EU. It will also assess the existence of a relationship (or absence thereof) between exports and imports from EU countries to/from India. The intra-trade relationship can also reveal important aspects of India's trade with EU.

To achieve these objectives, the study recognises Exports and Imports to be important parameters representing international trade. The effect of exports and imports individually will be analysed with respect to Indian economic growth referred to as GDP (Gross Domestic Product).

1.6.2 Specific Objectives

a) To examine the Export Led Growth (ELG) and Growth Led Exports (GLE) of India vis-à-vis the EU (including major trading partners of India in the EU).

b) To examine the Import Led Growth (ILG) and Growth Led Imports (GLI) of India vis-à-vis the EU (including major trading partners of India in the EU).

c) To examine the relationship between Export-Led Imports (ELI) and Import-Led Exports (ILE) of India vis-à-vis the EU (including major trading partners of India in the EU).

d) To understand the bi-lateral relationship of India and its trade with selected EU member states and compare it with the multi-lateral relationship of EU based on quantitative assessment and recommend strategies for the future.

e) To highlight the significance of a deeper India-EU partnership in a multi-polar world.

Addressing the above-mentioned specific objectives lead to the conclusions based on quantitative as well as qualitative analysis between India and the EU.

1.7 Hypothesis of the Study

In light of the objectives, the study has developed six main hypotheses to achieve its objectives. The study will match the hypothesis which are fulfilled through the empirical analysis undertaken for each of the cases. The hypotheses are formulated below and can be summarised as

Table 1.7.1: Hypothesis Formulation for the current study

Hypothesis	Null Hypothesis	Alternate Hypothesis
1. Growth Led Exports (GLE)	H_0: GDP does not cause exports	H_1: GDP does cause exports
2.Exports Led Growth (ELG)	H_0: Exports does not cause GDP	H_1: Exports does cause GDP
3.Growth Led Imports (GLI)	H_0: GDP does not cause imports	H_1: GDP does cause imports
4.Imports Led Growth (ILG)	H_0: Imports does not cause GDP	H_1: Imports does cause GDP
5.Exports Led Imports (ELI)	H_0: Exports does not cause imports	H_1: Exports does cuase imports
6.Imports Led Exports (ILE)	H_0: Imports does not cause exports	H_1: Imports does cause exports

The quantitative assessment in the study will apply the above Hypotheses in order to come to a conclusion if the same has been accepted or rejected.

1.8 Research Methodology

The current study draws inspiration from the "Trade Led Growth Hypothesis: An Empirical Analysis of South Asian Countries" by Qazi Mohammad Adnan Hye, Shahida Wizarat and Wee-Yeap Lau (2013). The study uses the annual data from 1972 to 2021, for both India and the EU. Based on secondary data, which has been taken from the World Bank database[3] the study will empirically test the premise of a relationship amongst the variables Indian GDP and Exports of India to EU and Imports from EU to India. The three variables will be checked against each other taking all three variables as dependent variable and the relationship the other two independent variables have on the dependent variable. In this way, the cause-effect relationship between the dependent variables and the other two independent variables will by analysed.

The European Union (EU) currently has 27 members. However, majority of the trading share with the EU is with the five founding member states in the EU. These are Belgium, France, Germany, Italy and the Netherlands. The export and import of India with these five EU member states comprises of 70-80 per cent of total trade of India with the EU. Hence, the study takes into account Indian trade with these five EU members states and refers to them collectively as EU5. The EU5 are representative of EU for the current analysis and to understand the relationship between Exports, Imports and Indian Gross Domestic Product (GDP) (represented through economic growth of India) between India and the EU.

The EU5 have been analysed collectively as well as at a bilateral level. Hence, trade-growth relationship of India with the EU5 and with each of the five member states of EU as individual trading partners, highlights the nature of relationship and allows for an accurate and reliable assessment. These results then add credibility to the policy implications and the recommendations put forth in the study.

[3] (http://data.worldbank.org/data-catalog/world-development-indicators)

The variables used in the study are Indian Gross Domestic Product (GDP) alongwith the Exports of India to EU5. Exports of India to individual member states of EU namely Exports to Belgium, Exports to France, Exports to Germany, Exports to Italy and Exports to the Netherlands. The imports from EU5 to India as well as Imports from individual member states of EU5 namely Imports from Belgium, Imports from France, Imports from Germany, Imports from Italy and Imports from the Netherlands are considered in the current study.

The variables have been converted from nominal to real (constant) using the GDP deflator of the World Bank. The variables used in the study are real exports, real imports and real GDP. These real variables are expressed in natual logarithms. The transformation into natural logarithms is the most commonly used variance stabilising tool for variables that have a wide range. Hence, the natural logarithms of exports, imports and GDP is taken in order to minimise the fluctuations occurring in the data.

The study looks at the relationship of these variables with each other. Each of the variable is taken as a dependent variable and the other two are then the regressors to create a model.

The relationship amongst the variables is then analysed. The study has taken into account the merchandise trade and not included services as the importance of merchandise trade is important for India and the study focusses on highlighting the potential of merchandise trade with the EU.

The total merchandise exports of the India were looked into with the GDP of the India in order to work on the Export Led Growth (ELG) hypothesis and the Growth Led Exports (GLE) hypothesis. It examines the ELG and GLE hypotheses using causal link between economic growth (GDP-denoted by Y) and merchandise exports (Exports denoted by X).

$$Y_t = \alpha_0 + \alpha_1 X_t + e_t \qquad \text{[Eq. 1.1]}$$

$$X_t = \beta_0 + \beta_1 Y_t + e_t \qquad \text{[Eq. 1.2]}$$

The total merchandise imports of the India were looked into with the GDP of the India in order to work on the Import Led Growth (ILG) hypothesis and the Growth Led Imports (GLI) hypothesis. It examines the ILG and GLI hypotheses using causal link between economic growth (GDP-denoted by Y) and merchandise imports (denoted by M).

$$Y_t = \alpha_0 + \alpha_1 M_t + e_t \qquad \text{[Eq. 1.3]}$$

$$M_t = \beta_0 + \beta_1 Y_t + e_t \qquad \text{[Eq. 1.4]}$$

The total merchandise Exports of the India were looked into with the Imports of India with each of the 5 EU member states in order to work on the Export Led Import (ELI) hypothesis and the Import Led Export (ILE) hypothesis. It examines the ELI and ILE hypotheses using causal link between Exports (denoted by X) and merchandise imports (denoted by M).

$$X_t = \alpha_0 + \alpha_1 M_t + e_t \qquad \text{[Eq. 1.5]}$$

$$M_t = \beta_0 + \beta_1 X_t + e_t \qquad \text{[Eq. 1.6]}$$

The data has been analysed using Eviews-12, a software which has features for data handling, statistical and econometric analysis and is extremely useful to run regression analysis.

Figure 1.8.1 outlines the procedure for selection of the right method to conduct a time-series data analysis for best results.

The first step in order to determine a relationship amongst variables is to check for stationarity. If variables are stationary at level, indicated by I(0) in the below figure, then Ordinary Least Square Method (OLS) or Vector AutoRegressive (VAR) model is applied. If variables are stationary at first difference, indicated by I(1), then, the series is checked for cointegration using Engle Granger or Juselius Johansen cointegration method. If the series are not cointegrated, then OLS/VAR method is applied, otherwise, OLS/VECM (Vector Error Correction Model) is applied.

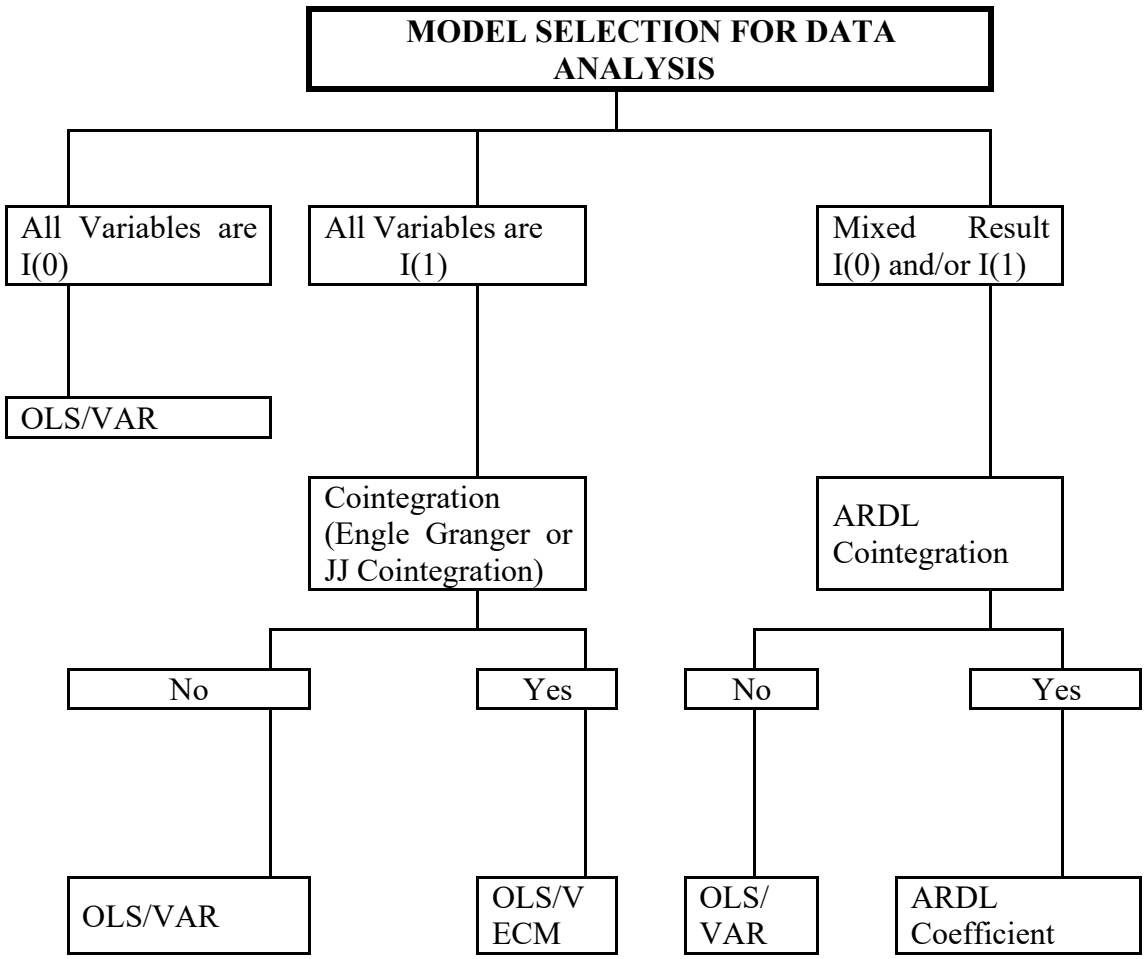


Figure 1.8.1: Criteria for Model Selection for Empirical Analysis

If the series are stationary at level I(0) and at first difference I(1), the Autoregressive Distributed Lag (ARDL) method of cointegration is applied. If the series are not cointegrated, then OLS/VAR is applied.

The methodology of the current study is based on Autoregressive Distributed Lag (ARDL) tests, which have been undertaken to examine the trade-growth relationship. The ARDL model contains the lagged values of the dependent variable, the current and lagged values of regressors as explanatory variables. It is a combination of endogeneous and exogeneous variables.

To test for stationarity of the series, Augmented Dicky Fuller (ADF) has been applied. The ARDL model can be specified only if the variables are integrated of order one i.e. stationary at first difference or if the variables are integrated of different orders i.e. model having a combination of variables with *I(0)* and/or *I(1)* order of integration.

From the bound test results, if the variables are co-integrated, it shows both the short-run (ARDL) and long-run (VECM/ECM) models. And if the variables are not co-integrated then it implies the presence of only short-run ARDL model.

ARDL is most efficient for small and finite sample data size. At the same time, ARDL technique also helps in obtaining unbiased long-run estimates.

The generalised ARDL (*p, q*) model is specified as:

$$Y_t = \Upsilon_{0n} + \sum_{n=1}^{p} \delta_n Y_{t-1} + \sum_{n=0}^{q} \beta'_n X_{t-1} + \varepsilon_{nt} \quad \text{[Eq. 1.7]}$$

Where Y'_t is a vector and the variables in X'_t are allowed to be purely *I(0)* or *I(1)* or co-integrated; β and δ are coefficients and γ is the constant; n=1,….*k*; p, q are optimal lag orders; ε_{nt} is the vector of error terms.

The dependent variable is a function of its lagged values, the current and lagged values of other exogeneous variables in the model. The lag lengths for *p, q* may not necessarily be the same as p lags are used for the dependent variable and q lags are used for exogeneous variables.

The equations for conditional ARDL model, showing both the long run and short run relationships amongst the variables is shown below. The natural logarithm of GDP, expors and imports is shown in all the equations and is shown by LnY, LnX and LnM. The Eqs. 1.8, 1.9 and 1.10 all show the conditional ARDL model, whereby each of the variables are taken as a dependent variable keeping the other two as regressors in the equation.

In Eq. 1.8, GDP is taken as a dependent variable and exports and imports are the independent variables. The equation shows both the long run and the short run relationships.

$$\Delta \mathrm{LnY}_t = a_{01} + b_{11} LnY_{(t-n)} + b_{21} LnX_{(t-n)} + b_{31} LnM_{(t-n)} + \sum_{n=1}^{p} a_{1n} \Delta LnY_{(t-n)} + \sum_{n=1}^{q} a_{2n} \Delta LnX_{(t-n)} + \sum_{n=1}^{q} a_{3n} \Delta LnM_{(t-n)} + e_{1t} \quad \text{[Eq. 1.8]}$$

In Eq 1.8, the GDP denoted by ‘Y’ is the dependent variable, while varibles ‘X’ and ‘M’ represent the exports and imports. ‘b_{11}’, b_{21}’, ‘b_{31}’ denotes the coefficients of regressors

in the long run, while 'a_{1n}', 'a_{2n}', 'a_{3n}' are the coefficients of the regressors in the short run.

The small 't' denotes the time and small 'n' denotes the number of lag periods. The constant is denoted by a_{01} and e_{1t} is the residual term.

Eq. 1.9, shows the equation of the conditional ARDL model whereby Exports are the dependent variable, whereas GDP and imports are the independent variables.

$$\Delta \mathrm{LnX}_t = a_{02} + b_{12}LnY_{(t-n)} + b_{22}LnX_{(t-n)} + b_{32}LnM_{(t-n)} + \sum_{n=1}^{p} a_{1n}\Delta LnX_{(t-n)} + \sum_{n=1}^{q} a_{2n}\Delta LnY_{(t-n)} + \sum_{n=1}^{q} a_{3n}\Delta LnM_{(t-n)} + e_{2t} \quad \text{[Eq. 1.9]}$$

The coefficients of the regressors in the short run as well as in the long run remain the same which is 'b_{12}', b_{22}', 'b_{32}' denotes the coefficients of the variables in the long run, while 'a_{1n}', 'a_{2n}', 'a_{3n}' are the coefficients of the variables in the short run.

Eq. 1.10 shows the conditional ARDL model, where the dependent variable is imports (denoted by 'M'). The independent variables are exports (denoted by 'X') and GDP (denoted by ('Y'). The coefficients of the regressors in the short run are denoted by 'a_{1n}', a_{2n}, a_{3n} and the coefficients of the regressors in the long run are denoted by 'b_{11}', b_{21}', 'b_{31}'.

$$\Delta \mathrm{LnM}_t = a_{03} + b_{13}LnY_{(t-n)} + b_{23}LnX_{(t-n)} + b_{33}LnM_{(t-n)} + \sum_{n=1}^{p} a_{1n}\Delta LnM_{(t-n)} + \sum_{n=1}^{q} a_{2n}\Delta LnY_{(t-n)} + \sum_{n=1}^{q} a_{3n}\Delta LnX_{(t-n)} + e_{3t} \quad \text{[Eq. 1.10]}$$

The Eqs. 1.11, 1.12 and 1.13 show the equations of the ARDL model, in the case there is no cointegration amongst the variables. In each of the equations, each variable is taken as a dependent variable, while the other variables are the regressors.

In Eq. 1.11, the GDP is the dependent variable, while X and M denote the regressors. The coefficeints of the variables are 'a_{1n}', 'a_{2n}', 'a_{3n}'.

$$\Delta \mathrm{LnY}_t = a_{01} + \sum_{n=1}^{p} a_{1n}\Delta LnY_{(t-n)} + \sum_{n=1}^{q} a_{2n}\Delta LnX_{(t-n)} + \sum_{n=1}^{q} a_{3n}\Delta LnM_{(t-n)} + e_{1t} \quad \text{[Eq. 1.11]}$$

Similarly, the Eq. 1.12 shows the relationship amongst the variables in the short run, where exports is taken as a dependent variable and the GDP and imports are the regressors.

$$\Delta \mathrm{LnX}_t = a_{02} + \sum_{n=1}^{p} a_{1n} \Delta LnX_{(t-n)} + \sum_{n=1}^{q} a_{2n} \Delta LnY_{(t-n)} + \sum_{n=1}^{q} a_{3n} \Delta LnM_{(t-n)} + e_{2t} \quad \text{[Eq.1.12]}$$

The coefficients are determined by are 'a_{1n}', 'a_{2n}', 'a_{3n}' and a_{02} is the constant in the equation.

Eq. 1.13 below, gives the equation whereby imports are the dependent variable and the regressors are GDP and exports. The coefficients of the variables are denoted by 'a_{1n}', 'a_{2n}', 'a_{3n}'. Constant is a_{03}.

$$\Delta \mathrm{LnM}_t = a_{03} + \sum_{n=1}^{p} a_{1n} \Delta LnM_{(t-n)} + \sum_{n=1}^{q} a_{2n} \Delta LnY_{(t-n)} + \sum_{n=1}^{q} a_{3n} \Delta LnX_{(t-n)} + e_{3t} \quad \text{[Eq. 1.13]}$$

The equations 1.11, 1.12, 1.13 are all instances where there is only a short run relationship and there is no cointegration seen among the variables. Therefore, these equations do not show any long run relationship among the variables.

However, if there is cointegration, then the error correction model (ECM) is specified and th resulting equations are shown in equations 1.14, 1.15, 1.16 for each variable taken as a dependent variable.

Whereas Eq. 1.14 takes GDP as the dependent variable, and regressors are exports and imports. ECT is the error correction term and e represents the residual.

$$\Delta \mathrm{LnY}_t = a_{01} + \sum_{n=1}^{p} a_{1n} \Delta LnY_{(t-n)} + \sum_{n=1}^{q} a_{2n} \Delta LnX_{(t-n)} + \sum_{n=1}^{q} a_{3n} \Delta LnM_{(t-n)} + \lambda ECT_{(t-1)} + e_{1t} \quad \text{[Eq. 1.14]}$$

Whereas Eq. 1.15 takes exports as the dependent variable, and regressors are GDP and imports. ECT is the error correction term and e represents the residual.

$$\Delta \mathrm{LnX}_t = a_{02} + \sum_{n=1}^{p} a_{1n} \Delta LnX_{(t-n)} + \sum_{n=1}^{q} a_{2n} \Delta LnY_{(t-n)} + \sum_{n=1}^{q} a_{3n} \Delta LnM_{(t-n)} + \lambda ECT_{(t-1)} + e_{2t} \quad \text{[Eq. 1.15]}$$

And finally, Eq. 1.16 shows the equation with imports as the dependent variable and GDP and exports as the independent variables.

$$\Delta \mathrm{LnM}_t = a_{03} + \sum_{n=1}^{p} a_{1n} \Delta LnM_{(t-n)} + \sum_{n=1}^{q} a_{2n} \Delta LnY_{(t-n)} + \sum_{n=1}^{q} a_{3n} \Delta LnX_{(t-n)} + \lambda ECT_{(t-1)} + e_{3t} \quad \text{[Eq. 1.16]}$$

where:

Natural logarithm of GDP, exports and imports is denoted by LnY, LnX and LnM respectively. t denotes the time period and its lag is denoted by n. b is the coefficient of the variables. a_{01}, a_{02}, and a_{03} represents the constants of the respective equations.

λ = Speed of Adjustment parameter with a negative sign (If, λ has a positive sign, it means the model is explosive and there is no convergence to equilibrium)

ECT $_{(t-1)}$= is the lagged value of the residuals obtained from the cointegrating equation of the dependent variable on the regressors.

'a_{1n}', 'a_{2n}', 'a_{3n}' are the short-run dynamic coefficients of the model adjusting towards long-run equilibrium.

The specification of a VECM, ECM or ARDL model is based on the outcome of the bounds test. And if there is cointegration from the three equations, then the VECM model is specified (Gujarati & Porter, 2009).

In the case, where the regressors in a model are significant (based on the t-statistic or the p-value), it is implied that the model has a **short run causal relationship** amongst the variables. Whenever the error correction term (ECT) is significant, a **long-run causal relationship** is indicated. And in models where there is the presence of both short-run and long-run relationship, a **stong causal relationship** among the variables is witnessed. The variables are said to be **independent** of each other, when there is absence of either short-run causal relationship or long-run causal relationship.

1.8.1 Data Collection and Period:

Time-Series data from secondary sources has been used in conducting the tests. These were taken from UN Comtrade, World Bank, and UNCTAD. The data taken is for the period 1995-2022.

Difficulties in obtaining data were faced. Data prior to 1995 was not available due to change in the Standard International Trade Classification (SITC). While the World Bank does not provide bilateral country data and gives only aggregate data. The country data was taken from UNComtrade.

In order to run regression analysis, E-views 12 software has been used. The software provides easy handling of data with reliable statistical and econometric analysis and is extremely useful for working on regression techniques.

1.9 Chapter Scheme

The study comprises of five chapters in all. Due to the holistic approach of the study, the study has both qualitative and quantitative elements. The ratio between the qualitative research and quantitative research is more or less equally divided. The first half of the study is primarily the qualitative research. This contributes in understanding the policy issues based on India-EU relations and their constant evolution. The perceptions have played a vital role in developing these relations. An evolution of the India-EU relations starting from the second world war until recent times is important to fully comprehend the journey of India-EU relations. The milestones achieved and their impact on these relations have all been addressed at relevant places. Similarly, the Indo-German relations and the impact on Indo-German ties have also been discussed in order to understand the development, the strengths and challenges of maintaining these relations. The impact of external issues and their implications on India-EU and Indo-German issues also reveal the fragilities and the sensitivities in handling relations through diplomatic and political astuteness. The change in relationship after the economic reforms of India in 1991, marked a significant shift in India's economic relations with the EU and Germany. The following years have changed the perceptions of EU about India and India's growing

aspirations have had an important role to play in shaping its foreign policy. A brief chapter outline is given below:

Chapter 1: India and the European Union – An Overview

The chapter gives an introduction of the relations between India and the European Union and then goes on to enumerate the overall objective and the specific objectives of the study. A section deals with the research methodology and how the empirical analysis has been carried out. Further, it also explains the importance of quantitative analysis to interpret the qualitative aspect of India-EU relationship. The significance of the study by addressing the gap in existing literature have also been identified in this chapter. The chapter also gives a brief overview of the entailed chapters in the study.

Chapter 2: India and the European Union: Strengthening Relations in a Multi-Polar World

This chapter discusses the relationship between India and the EU since India's independence. It also maps the evolution of EU as a regional body since its nascent beginning in the early 1950's. The chapter looks at the relationship of India with the EU after its economic reforms of 1991 and how this relationship has further strengthened. The relationship has also been impacted due to the British colonial rule of India until 1947. However, the last three decades have been defining for India-EU relations. The importance of deepening India's relations with the EU are also key to this chapter. The compositon of India-EU relations would not be complete without the economic aspect of the relationship. Therefore, in addition to the political and social attributes, the overall trade has also been mentioned in this chapter. Though, the empirical analsyis is dealt in detail in chapter 4.

Chapter 3: India and Germany: Potential for Deeper Cooperation

This chapter focusses on the bilateral relationship between India and Germany. Germany has been in the top three largest trading partners of India in the EU and the largest exporter amongst all EU countries. The relationship between India and Germany has oscillated from being indifferent to that of a strategic partner. Germany recognizes India's

significance in the Indo-Pacific region, particularly given the current political and economic tensions in the region. Despite the fact that the India-Germany strategic relationship is limited by the insignificance of German geopolitical influence in Asian affairs, the two countries have cultural and educational cooperation, and Germany has supported education and cultural programmes in India.

Chapter 4: Analysis of Growth-Trade Relationship between India and the European Union

In this chapter, the relationship between the economic growth and trade is analysed. The chapter will look at the Indian exports and imports and its relationship with GDP and the relationship of exports and imports with each other. Similar, analysis will be done for the five major trading partners of India in the EU namely Belgium, Netherlands, Germany, France, and Italy. A European perspective will be analysed by looking at the relationship of trade with the EU5 and its effect on Indian GDP.

Chapter 5: Conclusion - Recommendations, Limitations and Suggestions for Future Research

The final chapter will conclude by taking into account the assessment of the quantitative results. It will summarise the interpretation based on the empirical work done in the previous section to highlight the main outcomes of the analysis done. Further, in light of the existence of the India-EU relationship and the scanning of the external environment, the chapter will also suggest improvements in relations between India and the EU.

CHAPTER 2

INDIA AND THE EUROPEAN UNION: STRENGTHENING RELATIONS IN A MULTI-POLAR WORLD

CHAPTER 2
INDIA AND THE EUROPEAN UNION: STRENGTHENING RELATIONS IN A MULTI-POLAR WORLD

2.1 Introduction

Historically, Portugal was the first European country to trade with India. Vasco de Gama, who came to India in the 15th century, through the Cape of Hope, traded mostly in Indian spices, which he took from India and sold in the European markets. With this, he opened the floodgates for other traders, who would eventually establish trading relations with India.

The Dutch, the Danish and the French also travelled to India and traded in Indian goods. Indian products like textiles, spices and semi-precious stones were in great demand in Europe. It was only in the 16th and 17th century that the British traders came to India and eventually established their political rule. For the next 200 years, India remained a colony under the British empire, before the departure of the British in the yea 1947. India was a source of raw material for the industries in England and in Europe. A wealthy nation, India was exploited of its natural products and when the Britishers left, India found itself to be in an impoverished condition. With a rule of 200 years and a strong-hold of the British, even after independence, India was considered by a majority of the European countries as a monopoly of the British empire. The independence of India in 1947 was preceded by the end of the second world war in 1945.

After the second world war, the world was divided into two super-powers. The capitalist United States and the socialist Soviet Union. India decided to remain neutral and remained Non-Aligned with leanings to the Soviet Union. However, for India, the immediate and pressing concern before its leaders was the mammoth task of nation-building.

Indian leaders had inherited a poor country. Leaders had no experience of running a big and diverse country like India. The infrastructure was not developed and very few industries existed in the country. The people were poor, it lacked resources to even provide for basic amenities to its people. In Europe, experts and leaders were convinced

that India will not be able to manage the country and it will eventually slip into a civil war. However, the leaders showed alacrity in judgement and put in great efforts to build the country step-by-step. Fully aware that economic growth would play an important role in nation-building, the Indian leadership focussed on economic issues too. It was not just domestic economy that needed to be upgraded, it had to be integrated into the world economy as well. Therefore, India remained open to trade since its independence and was one of the 23 signatories to GATT (General Agreement on Tariffs and Trade) (Krishna, 2019). However, the subsequent years and decades changed the Indian course of economic development as certain decisions taken by the then leadership reversed the benefits of open markets. The Indian leaders wanted India to be a self-reliant country and focussed on building indigenous industry. The Industrial Policy Resolution of 1956 focussed on domestic production of capital goods. This was a deviation from the traditional labour-intensive products like textiles, in which India still had an advantage. The industrial policy followed the Soviet Union's example of being socialist in nature. Capital intensive industries and sectors were largely state owned with little room for private players. Many such initiatives were introduced which also mirrored India's close proximity to the Soviet Union, while explicitly India continued to remain Non-Aligned.

Another factor was the growing nationalisation of indigenous industry in the UK after the second world war. The economic activity was carefully guarded in order to prevent exploitation of the people. The expectations from the industrial policy were not achieved as Indian industries hardly made a dent in the economic growth story of India.

The Indian economic growth story tugged along after independence at a snail's pace. There was nothing spectacular or comparable to countries like Germany and Japan, which also reconstructed their economies after a complete rout in the second world war. The first Prime Minister of India, Jawaharlal Nehru, wanted India to play a relevant role in the world politics, but the proximity India had with the UK, due to historical and colonial reasons, could not find the same affinity with the countries of continental Europe. India continued to maintain relations with the European countries but they remained lukewarm. With long association with the British, India sustained its relations with UK and made persistent efforts to deepen the bilateral relations with its erstwhile colonial ruler.

The immediate aftermath of the second world war lingered in the minds of the Indian leadership as well as other leaders across the world. Europe was not seen as a unified region having problems of trust and reliability. This notion withered the confidence that Europe could become an economically successful region. Even the countries within Europe were gathering themselves after the disastrous effects of the second world war. This perception played an important role in India's neglect of strengthening relations with Europe. Thus, India's attention towards Europe was limited and India ignored the significance of a stronger relationship with Europe in the early days.

As the world continued to be divided between the two super-powers and it was not just economics that governed the geo-political relationships during the cold war. The ideological differences had an equally important bearing on building alliances at the global level. The Indian affinity to the Soviet Union, especially during the leadership of Indira Gandhi, was in some ways a response to the US support for Pakistan and China. This prompted India to further move towards a planned economy. Nationalisation of commercial banks in 1969 had immense economic consequences for India. While the countries that adopted the capitalist model, made significant progress economically, India on the other hand, had to pay for its economic stagnation in order to preserve its strategic autonomy. The period of the cold war was when the two super-powers, with different ideologies, maintained the global balance of political power (Poitiers, Bery, Chowdhry, & García-Herrero, 2021).

2.2 Literature Review

India EU relations have been consistent and stable since the second world war. Though the relations have evolved overtime, the upward trajectory has been gradual. The India-EU relations during the cold war period have clearly followed a moderate relationship (Poitiers, Bery, Chowdhry & García-Herrero, 2021) but the period after economic reforms of 1991, changed the perception about India globally. EU was not a major global leader and during the cold war period was dominated by the United States of America (US) and the Union of Soviet Socialist Republic (USSR). With the memory of the second world war still fresh in the minds of the people, Europe was considered to be an instable region. This made Europe to be considered at best as a 'third option' (Ram, 2002). However, during the period of the 1980's, as EU began to become economically strong

and the evolution of a successful regional bloc started showing considerable successful results, the world also started noticing Europe. India too, noticed the changes in Europe, with a strong economy and a global leader (Jain, 2005) and (Yoo &Venkatchalam, 2005) and India-EU dialogues began to take place as early as 1980's in some form or the other.

The frustration even after the reforms of 1991 with India has not been about the reforms per se, but about the gradual process of implementation. Ahluwalia, (2002) has addressed the issue of gradual implementation process of Indian liberalisation, especially when it took courage to introduce them in light of the fear of opposition from within the ruling party as well as from the opposition parties in India.

In the initial years soon after independence, Krishna, (2019) argues that though India has always been a signatory to the GATT agreement, its trade policy in initial years was that of protecting its own industry and India had imposed high tariffs on most tradeable goods. This hampered Indian industry to take off and also did not strengthen relations with most western countries including the EU. Poitiers et.al. (2021) have studied the new energy that have been brought into the India-EU relations after a breakdown of negotiation. In the meantime, the changes brought about in the global landscape and EU's intention to reduce its reliance on China, may open opportunities for India. Mohan (2020) also recognises the re-start of the India-EU Summits as an opportunity for both India and the EU to find workable solutions.

The India-EU Summits and the recognition of India and EU as strategic partners had injected a lot of optimism in the relations between the two partners and it was hailed as a significant milestone in the strengthening the relations between India and the EU. Academe have looked into the role and objectives of Strategic Partnerships (Kay, 2000; Gedemont, 2006; Nadkarni, 2011; Envall & Hall, 2016)**.** The optimism soon turned into disillusionment as the India-EU Summits and the significance of Strategic Partnership failed to make any meaningful positive change to the relations between the two. The academic circles were afloat with research papers on the ineffectiveness of the relationship. Researchers referred to the strategic partnership as a mere 'charade' Jaffrelot (2006), others have called the strategic partnership between India and the EU as neither very strategic nor much of a partnership (Kavalski, 2016). Muenchow-Pohl (2012) has reflected on the focus of the relationship, which was more on discussions

rather than outcomes and the predominantly the absence of any actionable plan (Keukeleire & Bruyninckx, 2011**).** Whether the EU and India realised the ineffectiveness of the Strategic Partnership without any advantageous outcomes for either of them or the shift in the geo-politics, the EU introduced the European Union India Strategy 2018 (EUIS). This is called a game-changer in India-EU relations (Mohan, 2019). Analysing the EUIS Aspengren & Nordenstam (2021) have found a distinct departure of the EU from its earlier normative stance towards a cohesion of EU foreign policy goals and its convergence with India's foreign policy preferences.

The Broad-Based Trade and Investment Agreement (BTIA) remains elusive for both India and the EU, despite the initial enthusiasm expressed by both the partners. The ambitious BTIA agreement included Services in its discussion, which for India would have been one of the largest trading agreements had it come into place and for the EU, it would have been the first agreement with an emerging economy (Mukherjee & Goswami, 2011). This would have opened up further opportunities for trade and services especially under the WTO norms, benefitting both India and the EU (Singh, 2012). The two parties were not able to come to an understanding on many issues (Khullar, 2020) and the talks were suspended in 2013 (Busvine, 2015).

Trust is an important component while building a strong and deep relationship/ This trust is either calculus based trust (CBT) or identification based trust (IBT) (Lewicki & Bunker 1995). While the negotiations have re-started, it is largely due to the vision and a vital role played by the leaders of both India and the EU that the renewed optimism in talks is again revived (Kartak & Devos, 2021). This will help in taking the vision of the leaders to a result oriented future.

External factors like COVID-19 and Russia Ukraine war have had their spill over effects on most nations around the world and there is hardly any country which has remained isolated with these global events. The effect of such events also weighs heavily on the relationship between countries. The alliances are being re-written and global status-quo of a uni-polar world is again under a transformation. The Russia Ukraine war, which takes place in the backyard of the EU, has upset the coalition of friends for the EU. The EU wants India to condemn Russia for the unprovoked war it has raged on Ukraine. India has abstained from condemning Russia and continued to call for peace. This is because

Russia is an all-weather friend of India and has supported India on the issue of Kashmir (Warren & Ganguly, 2022). The war has prompted an inflow of refugees into the EU and the trade patterns have been disturbed (Mohammed, 2022). India, already surrounded by untrustworthy neighbours like China and Pakistan, is also concerned that the condemnation of Russia may force Russia to get closer to these two arch-rivals of India (Javed, 2022; Sukhankin, 2021; Tsafos, 2022). This would be detrimental to Indian interests (Kumar, Singhania, Singh, Mishra & Sinha, 2023).

With a changing world, it is imperative that the partnership agreements are to be concluded for the benefit of the people and the society at large. The EU needs to understand that it would no longer be in a position to preach the world and its own position has been under threat. With an aggressive China, an autocratic Russia and a disturbed middle east, it needs to take cognisance of the events around the world and start divesting its relationship in order to spread its dependence on one country. India must seize this opportunity and work with the EU to strengthen its economic ties, which will also help in building a robust political relationship.

2.3 Integration of the European Union after WWII

The second world war had a devastating impact on Europe. The expansionist ambitions of Germany brought havoc to large parts of Europe. More and more countries were engulfed in the six-year war from 1939-1945. At the end of the second world war, the allies came together and divided Germany into four parts – each ally was given one part of Germany to control. The four allies i.e. the United States, France, the British and USSR, came to administer their regions in Germany. Berlin, the capital was again divided into four units each under the control of one allied force.

USSR, one of the allies, started to secure its territories including eastern Europe by restricting travel and blocking communication for its people within its territory with the west. With this move the landscape of Europe took an unprecedented turn. The Soviets started erecting the Berlin wall, thus isolating the soviet empire from the western influence. An isolated socialist empire was in the making, which would last for almost three decades.

After the second world war, the Soviet Union, following a socialist ideology. In contrast to the other allies, Britain, France and the United States, who were pursuing a capitalist approach of *laissez faire*. These capitalist nations known as the West included Western Europe and forged ties to strengthen themselves economically, socially and militarily. With economic growth, they also realised that the military security would be of prime concern for a peaceful Europe. The friction between Germany and France had to be offset so that Western Europe was not threatened by an impending danger of war.

To achieve this, in 1951, six European countries – namely, Belgium, France, Italy, the Netherlands, Luxembourg and West Germany – signed the Treaty of Paris, which laid the foundation of the European Coal and Steel Community (ECSC) in 1952. The ECSC aimed to create a free trade area amongst the members in order to strengthen economic and military cooperation. Coal, coke, steel, scrap and iron-ore were the main commodities that were of prime concern at that time.

In order to implement the objectives of ECSC, four supranational bodies were created. These were the High Authority, which was responsible for the administration of the ECSC. The Council of Ministers, which was given the responsibility of legislation, the Common Assembly, which would be in charge of policy formulation and a Court, whose primary task was to interpret the treaty and resolve disputes. The figure below gives an overview of the ECSC and its four verticals.

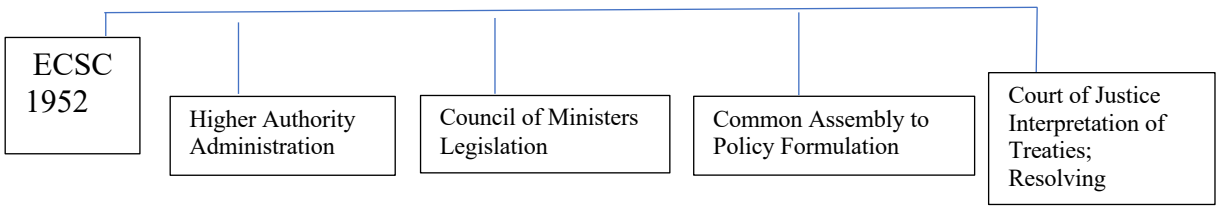


Figure 2.1: ECSC and its Verticals

In 1957, the ECSC members signed the Treaties of Rome, which established the European Atomic Energy Community (Euratom) and the European Economic Community (EEC) as shown in Figure 2.2 and Figure 2.3 below.

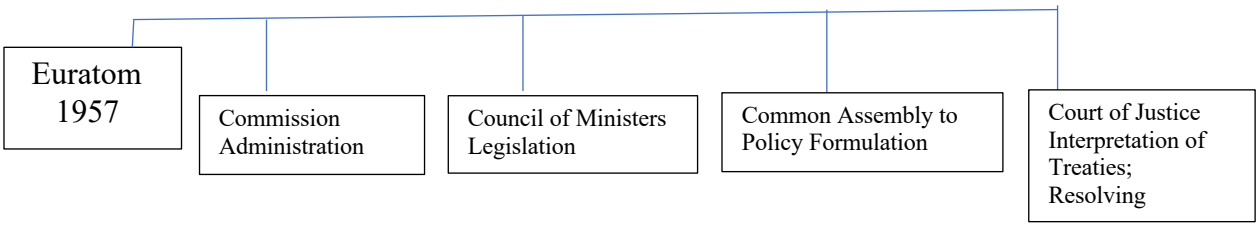


Figure 2.2: Euratom and its Verticals

While the Euratom facilitated cooperation i.e. R & D and use in atomic energy, the EEC created a common market. The common market removed barriers to movement of goods and services, capital, labour, while revoking all rules and procedures as well as policies that would impede market competition.

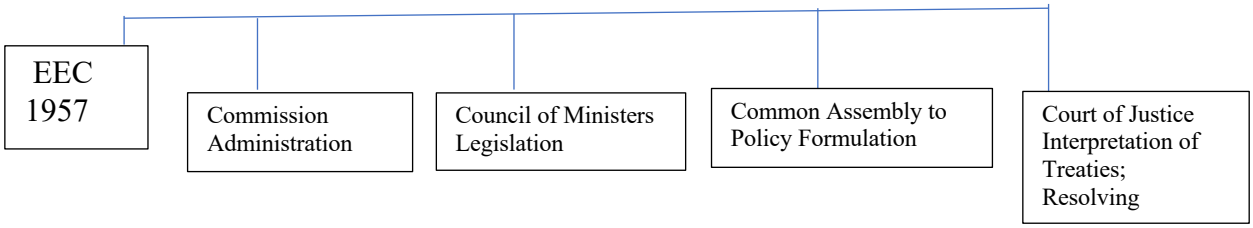


Figure 2.3: EEC and its Verticals

The members of EEC agreed to eliminate tariff barriers and do away with the protection of domestic industries, both within the EEC as well as to enhance international trade. Regulatory standards and common rules were framed in order to strengthen economic integration. Like the ECSC, the EEC also established four major governing institutions – a commission (equivalent to the High Authority of ECSC), a council of ministers, an assembly and a court.

Agriculture remained outside the ambit of common market reforms and continued to be a controversial element of the EEC and even the EU. The member states could intervene to promote agricultural self-sufficiency, and ensure supply of agricultural products at a reasonable cost while protecting the income of the farmers.

The Brussels Treaty in 1965 merged the commissions of the EEC, the Euratom and the ECSC into a single commission. The treaty also combined the councils of the three organisations into a common Council of Ministers.

The Commission, which is officially known as the European Commission, has 27 Commissioners, known as “the college”. These are representatives from each member state and have a term of five years. The Commission formulates community strategies and policies and propose EU laws. It also drafts funding projects and prepares the annual budget. The recommendations of the European Commission are presented to the Council of the European Union and the European Parliament for adoption. The Commission is headed by a President, who is selected by the heads of state or heads of government of the members. The President in turn appoints the heads of the Directorate-Generals (DG’s), who are responsible for drafting policies for specific sectors such as agriculture, competition, regional policy etc.

The Council of the European Union is also led by a President from an EU member country and has a 6-month term. The Presidency rotates among the member countries. The Presidency is not an individual but the position is held by a national government. Hence, the head of the state or the national government is the President of the Council of the European Union for a period of six months. The Council of the European Union has government ministers from each EU country representing the specific sector. The government ministers meet and discuss, amend and adopt laws and coordinate policies. The ministers have the authority to commit their governments to the actions agreed on in the meetings.

The Council of EU is the main decision-making body of the EU together with the European Parliament. It receives proposals from the European Commission and negotiates and adopts EU laws. It is further entrusted to coordinate policies of EU member states. The Council of EU also develops the EU’s foreign and security policy and negotiates and enters into agreements on behalf of the member states with other international bodies including other countries.

The European Council on the other hand, meets quarterly, and is a platform for EU leaders to meet and set the broad direction of the EU policy making. It sets the general political direction and priorities of the European Union, thereby defining a long-term agenda for European political and economic integration. The European Council does not negotiate or adopt EU laws.

The members of the European Council are heads of state or government of the 27 member states, the European Council President and the President of the European Commission. Established in 1974, the European Council had a rotating President but with the Treaty of Lisbon in 2009, the Presidency was made permanent. Further, the Treaty of Lisbon separated the Council of the European Union from the European Council. The Treaty of Lisbon also created the position of High Representative of the Union for Foreign Affairs and Security Policy. The High Representative of the Union for Foreign Affairs and Security Policy participates in the working of the European Council but is not a member. The European Council sets the strategic agenda for the European Union.

The Common Assembly was renamed as the European Parliament in 1962. The size of the members delegations would depend on the population of the member state. The Parliament is organised into transnational party groups based on political ideology – the Party of European Socialists, European Peoples Party, European Federation of Green Parties and the European Liberal, Democrat and Reform Party.

The European Court of Justice (ECJ) interprets community law, mediates conflicts especially within the EU institutions and has the responsibility of safeguarding the treaty obligations by members. The ECJ enforced the European law – which makes the provisions of the treaties and legislation as directly binding on the individual citizens, irrespective of the national governments having modified their national laws or not. Moreover, the community law has supremacy over the national law. The ECJ thus acquired a supranational legal authority.

The EEC continued to expand during the 1970-80's expanding its membership. In 1973, the UK (which had earlier applied for membership in 1963 and again in 1966 but was vetoed by the French), Denmark and Ireland. There was a lot of discussion on including Greece as a member, but was finally granted membership in 1981 followed by Spain and Portugal in 1986. As a regional bloc and having the same objectives, it was decided to work towards a common external trade policy as well as to create common development policies. The European Political Cooperation (EPC) was created which invited the foreign ministers of the members to coordinate the foreign policy. A European Regional Development Fund was also created which provided additional resources for

development of Europe and development packages including preferential trade agreements with African, Caribbean and Pacific countries were concluded.

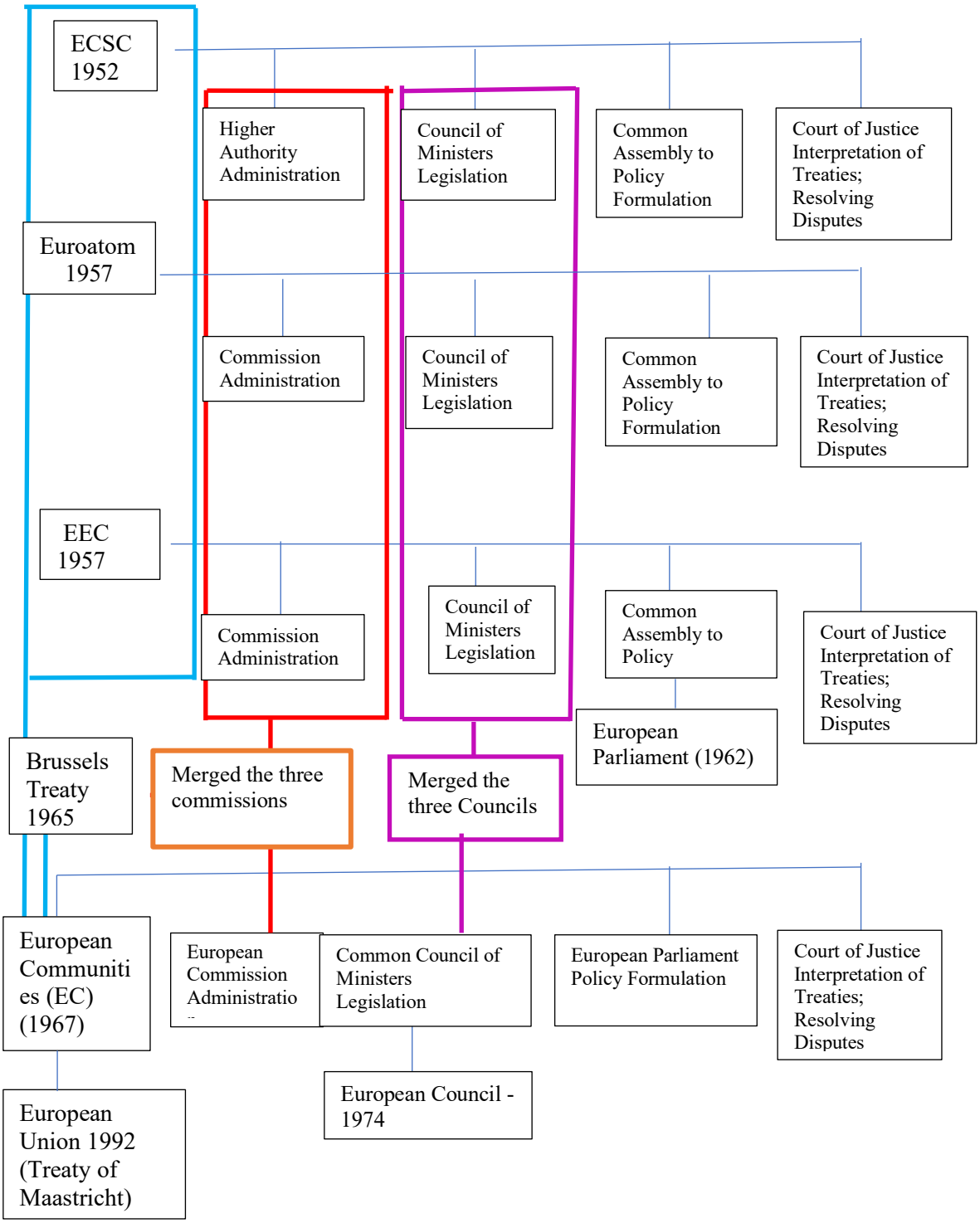


Figure 2.4: Evolution of European Union

2.4 The Maastricht Treaty:

Under the Treaty of Maastricht, which was implemented from Nov 1, 1993, the members resolved to strengthen the economic integration and establish an economic and monetary union by having a stable and common currency. They further resolved to implement a common foreign and security policy, and common citizenship rights and by advancing cooperation in the areas of immigration, asylum, and judicial affairs. The Maastricht Treaty was essentially the one that created the European Union and is formally called the Treaty on European Union.

The Treaty had three main verticals: the European Communities, a common foreign and security policy and enhanced cooperation in domestic affairs and justice. Under this treaty, the European Economic Community became European Community (EC). The European Community became the primary component of European Union. This empowered the EC to decide on community policies on development, education, health, consumer protection, environment protection, social and economic development and technological research. It also established the right of EU citizens to vote and run for office in local and European Parliament elections in their country of residence.

The Maastricht Treaty also laid down the monetary policy into the EC replacing national currencies with a common currency. It also laid down the criteria necessary to qualify for becoming a participant to the common currency. There were four essential criteria: (a) members required to have annual budget not exceeding 3 percent of gross domestic product (GDP), (b) the public debt should be under 60 percent of GDP and (c) inflation rates within 1.5 percent of three lowest inflation rates in the EU and (d) exchange-rate stability.

This required the establishment of a permanent exchange rate and would then transition to a common currency called Euro. Although, several countries failed to meet the criteria, the Commission admitted nearly all members for monetary union and on 1st January 1999, 11 countries adopted the Euro and relinquished control over the exchange rate. These member states were: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain. Greece failed to qualify, though was later admitted to the Euro beginning 2001. Countries like Denmark, Sweden and the UK did not apply for membership. After a three-year period starting from 1st January 1999, the Euro became the common currency on 1st January 2002 across the 11 member states.

The Maastricht Treaty played a significant and valuable role in changing the dynamics of the European Institutions. The modifications impacted on the EEC's institutions and the decision-making processes. The accountability of the Commission to the Parliament was increased. The ECJ could levy fines on members for non-compliance. New institutions like the European Central Bank, the European Monetary Institute were created.

In a significant move, the legislative process was radically changed. The security and foreign policies including defence policies were strengthened and adopted. Free movement of people was enforced through abolition of border controls. This required to re-structure Europe-wide policies and to apply national civil codes uniformly.

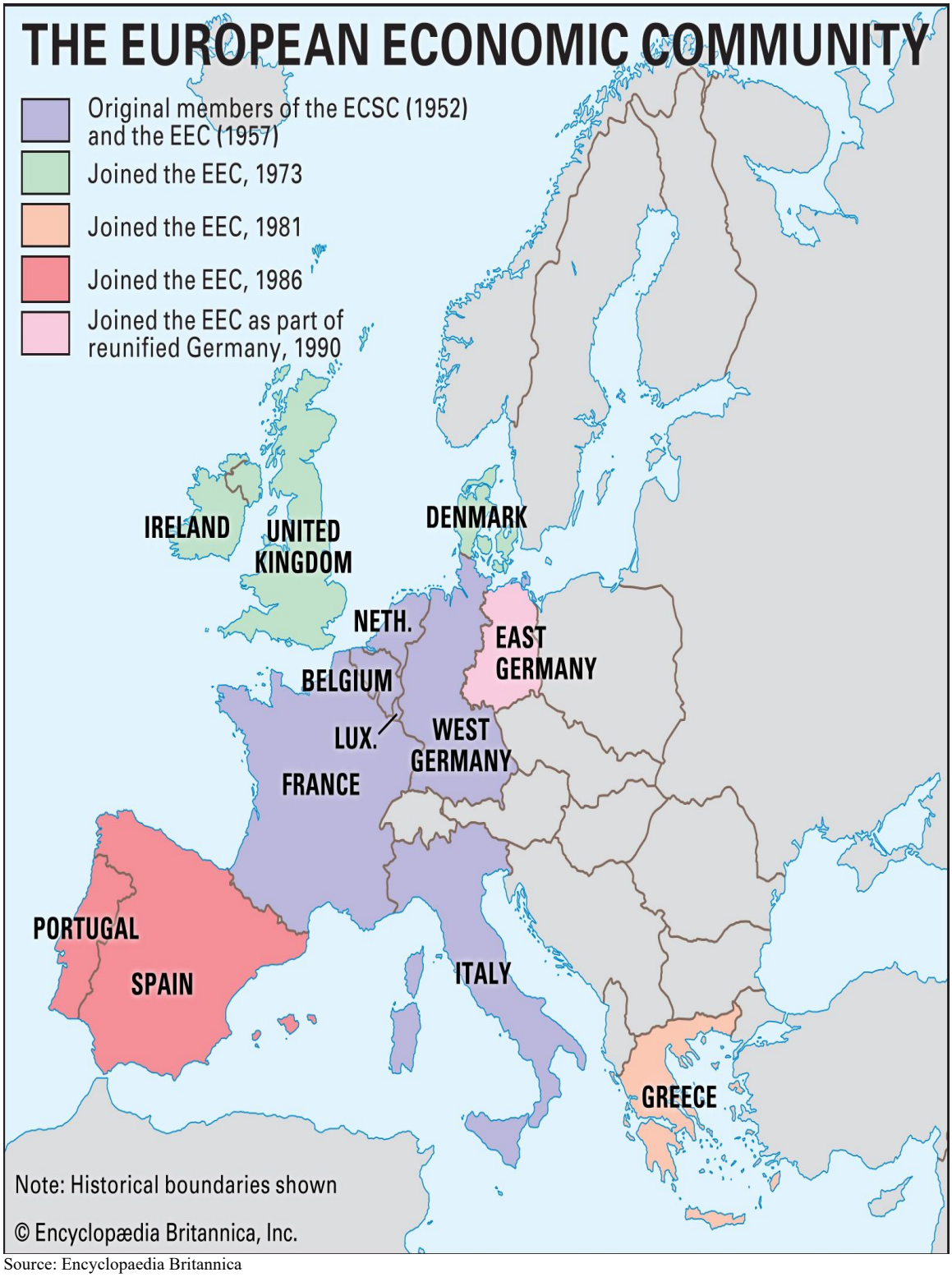
2.5 The Membership of the European Union (EU)

Currently, as of 2023, there are 27 members to the EU, with Croatia being the latest addition to the membership. Beginning with six member states – Belgium, the Netherlands, Luxembourg, France Germany and Italy – the EU has expanded to include all west European countries and added members from the central and eastern Europe. In 1973, the United Kingdom, Ireland and Denmark joined the European Community. Greece joined in 1981 and in 1986, Portugal and Spain became members. Austria, Finland and Sweden joined the EU in 1995.

The central and east European countries were admitted as members in 2004. These included Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, the Czech Republic, Slovakia and Slovenia followed by Romania and Bulgaria soon thereafter. Croatia, the latest member to be included, was admitted in 2013.

The notable feature is that there are various combinations, which have been applied to Europe and not all countries have adopted all the rights of being member nations of EU. Four countries namely Iceland, Norway, Switzerland and Liechtenstein are not members of the European Union though, they are part of the Schengen area. Three territories are part of the Schengen Area and are special members of the EU. These are the Azores,

Madeira and the Canary Islands. Monaco, San Marino and Vatican City are non-EU countries but have open borders with the Schengen Area.



Source: Encyclopaedia Britannica

Figure 2.5: The Expansion of the European Economic Community

The current membership of the European Union stands as given below:

Table 2.1: Membership Status of the European Union

S. No.	Member State	Member Since (Year)
1.	Austria	1994
2.	Belgium	1951
3.	Bulgaria	2005
4.	Croatia	2012
5.	Cyprus	2003
6.	The Czech Republic	2003
7.	Denmark	1973
8.	Estonia	2003
9.	Finland	1994
10.	France	1951
11.	Germany	1951
12.	Greece	1981
13.	Hungary	2003
14.	Ireland	1973
15.	Italy	1951
16.	Latvia	2003
17.	Lithuania	2003
18.	Luxembourg	1951
19.	Malta	2003
20.	The Netherlands	1951
21.	Poland	2003
22.	Portugal	1986
23.	Romania	2005
24.	Slovakia	2003
25.	Slovenia	2003
26.	Spain	1986
27.	Sweden	1994

Brexit witnessed the United Kingdom moving out of the EU in 2020. UK took the decision to withdraw its membership from the EU in 2016 and in 2020, the separation from the European Union was completed.

Source: https://www.nationsonline.org/oneworld/europe_map.htm

Figure 2.6: The composition of Europe Union

The European Union is regarded as the most successful regional grouping in the world. From being at the centre-stage of second world war, conflicts with neighbours, lack of trust, the enmity between Germany and France, Europe has achieved an unprecedented level of integration and co-operation. Building on the limited economic and political goals of the ECSC, the countries of western Europe have achieved a high degree of legal integration, supranational political authority, and economic integration in the EU, greatly surpassing that of other international organizations. Indeed, although the EU has not replaced the nation-state, its institutions have increasingly resembled a parliamentary democratic political system at the supranational level.

2.6 India's Outlook to EU after Independence

India found the formation of the European Economic Community (EEC) in 1957, as 'disturbing and undesirable'[1]. Indian viewpoint on the EEC was that it underlined the desire of the EEC members to forge an alliance for economic gains and thus to become not only economically strong but also have a significant dominance as a united political voice.

The Indian response to the formation of the EEC was that of indifference and neglect. The European stance vis-à-vis was similar to that of India. This resulted in negligible Indian trade with the EEC countries. However, India did realise the importance of trade with their European counterparts and thus recognised and established diplomatic relations with the EEC as early as 1962. The decision by the United Kingdom to join the EEC also prompted India to recognising the EEC. India was largely concerned that its own exports to the UK could possibly be substituted by products from the EEC, either directly or indirectly. Another key concern for India was its mounting trade deficit and depleting foreign exchange reserves. The entry of UK to the EEC may have influenced India's decision to recognise the EEC and establish diplomatic ties with it at an early stage.

India's suspicion of the EEC was an outcome of its own colonial past. It was wary of the fact that the EEC members, three of whom were colonial rulers (France, The Netherlands and Belgium), would continue to exploit the colonies by joining together. Emanating from its own experience, India adopted an extremely cautious approach in dealing with the EEC. While India did not confront the EEC members directly on the issue of colonial exploitation, it did confront Portugal directly, which still had its hold in the state of Goa. For India, it was disturbing that all members of the EEC were also part of NATO (North Atlantic Treaty Organisation). Nehru became critical of EEC, when NATO threatened to protect the interests of Portuguese colonial rule in Goa.
This led India to doubt the intentions of the EEC and NATO. While India wanted to build and maintain good relations with all countries including EEC members, Indian

[1] Remarks by Ambassador-designate K.B. Lall to the Community in a meeting at the Belgian Embassy in New Delhi attended by EEC Heads of Mission based in the country, 11 May 1973. Cited in FCO 37-1186, Minute of Sir Terence Garvey, British High Commissioner, New Delhi on meeting between Community Heads of Mission and K.B. Lall, 14 May 1973

sovereignty was of paramount importance. India could not go back to being a colony as it had fought hard for its independence.

As the Prime Minister of India during the time from 1947-1964, Jawaharlal Nehru, who had his higher education in England, wanted India to be self-reliant but at the same time to forge strong connections with Europe. He wanted to balance the Indian growth story. The pressing problems of acute poverty, could be resolved by empowering the Indian citizens. He was of the opinion that the capitalist society would in-turn exploit the poor people to their own advantage while, the majority of Indians would continue to live in penury. To that effect, the policy of adopting a model based on the principles of a 'mixed economy' was deemed most appropriate in the Indian circumstances.

The private sector, though small, needed to import raw materials as well as to export manufactured goods. This would have helped in bridging the trade deficit that India found itself. While India was primarily looking to develop its own resources, it simultaneously kept itself abreast with the developments happening around the world. It knew very well that the external developments could well impact its own course of rebuilding the country. And, whereas, it rejected the capitalist approach of the west, it realised that it did need to have amicable ties with capitalist west to trade its products.

The formation of EEC, according to India, could play an important intermediary role, as the world was divided into two super-powers. Moreover, for India, it opened up economic opportunities, though, India did realise that EEC might have more bargaining clout as a strong European grouping vis-à-vis the newly independent India. Despite the good and positive intentions of having good relations with Europe, India did not pursue the strengthening of its relations with Europe and the relations between the two remained inconsequential.

Similarly, the EEC, whose primary role was to boost economic growth for its members did little to enhance trade with the developing economies. The South Asian countries were not on their radar and the relations between India and the EEC continued to remain insignificant.

2.7 India's relations with Europe from 1970 to 1991

After Nehru, successive Prime Ministers in India made little attempt to deepen relations with Europe. India's little interest in Europe was that of a market for its products. These little economic interests hardly consolidated any partnership between the two. Exchanges relating to any other sector, be it political, social, academic or any other were , therefore, also limited. The Indian interests did not find much of a confluence within the EEC. Given the history of Europe, it was deemed to be a region, which would ignite unrest and may spill across the world. However, this image of Europe began to change in the 1980's with the world witnessing unprecedented economic growth in Europe. Indira Gandhi, the then Prime Minister of India, described EEC as a major economic force and a voice in the management of the world economy (Jain, 2005). It became increasingly clear by the late 1980s that the European Community was emerging as a political and economic power globally and the European integration was considered as a successful regional bloc that would be emulated by other regions across the globe. According to Yoo and Venkatchalam, the India-EU political dialogues were initiated as early as 1983 (Yoo & Venkatchalam, 2005).

However, India and the world continued to oscillate between the two super-powers during the cold war period. Europe was at best considered a "third option" after the United States and the Soviet Union (Ram, 2002). This claim has been rejected by various researchers, who argue that Europe was always a dependent of the United States and thus not an independent option. Therefore, strategically, it was not of much relevance to India.

2.8 India after Economic Liberalisation of 1991

The economic liberalisation of India in 1991 in India opened Indian markets and brought in a new and fresh impetus to economic growth for the country. The Indian economy had levied high import duties on a large number of products to protect its own industry. These duties were relaxed allowing a larger basket of foreign goods to compete in the Indian market. At the same time, India allowed foreign investments opening most of its sectors. Suddenly, the world had a new market place, and Indians had a large appetite for foreign goods. India, which had until now, had an insignificant global image, became a powerhouse of Asia (Ahulwalia, M.S., 2002).

India also benefitted under the Generalised Scheme of Preferences (GSP) of the EU. This enabled Indian exporters to reach out to EU markets. Post signing the Maastricht Treaty, the EU signed a Joint Political Statement with India in 1993. This was the first broad political dialogue between India and the EU. In 1994, India and the EU signed a Cooperation Agreement on Partnership and Development. The period after 1991, witnessed India making big strides in improving trade relations on a bilateral level with the member states of the EU. The share of trade with France, the Netherlands, Germany and others grew at a much faster pace and in 2020-21, the Netherlands was the fifth largest investor in India with FDI inflows of USD 2.8 billion and the volume of trade between India and the Netherlands touching almost USD 13 billion.

It was not just the economic landscape of India that changed after the end of the cold war and post Indian economic liberalisation. India also focussed on rebuilding relationships with the western countries, with which it had lukewarm relations during the cold war period. And as it opened itself to the world, Europe was an important destination both in terms of economic openness and India's foreign policy calculus. India was keen to strengthen its relations with Europe to attract foreign direct Investment, technology transfers as well as new markets.

2.9 The Role of India EU Summits

Like India, EU also realised the importance of India, politically and economically. With common objectives and aligning of interests, the India-EU Summits provide a forum for the two sides to discuss a wide range of issues including trade and investments, security, climate change and other global issues.

The first India-EU Summit was held in Lisbon in 2000. The Summit which was headed by the Prime Minister of Portugal, Antonio Guterres, in his capacity as President of the European Council and the Indian counterpart, Prime Minister, Atal Behari Vajpayee, in its declaration reaffirmed the intention to build a strategic partnership between the two partners[2]. It also marked the beginning of annual India-EU Summits to be held alternatively in India and the European Union. In this first India-EU Summit, the partners

[2] https://ec.europa.eu/commission/presscorner/detail/en/PRES_00_229

recognised that the volume of trade and investments between India and the EU were far below the potential. The two partners agreed to strengthen business links and increase the flow of goods and services between the EU and India. The two also agreed to enhance EU investments in India.

True to the resolution of the first India-EU Summit, the EU established a Strategic Partnership with India in 2004. Though the definition of a strategic partnership remains elusive, nevertheless, it signifies a group of countries which are closer to each other than others. The same was the case between India and the EU. As strategic partners, both India and the EU recognise the importance of each other, share common values and strive to work together on common objectives. It was also agreed to form a High-Level Trade Group, which would provide recommendations for enhanced trade and investments between India and the EU.

It was during the sixth India-EU Summit held in New Delhi that both sides adopted the Joint Action Plan (JAP), which set out the roadmap for a strategic partnership between the two. The Joint Action Plan marked another milestone in the relations between India and the EU. The two partners agreed to further strengthen the dialogue and consultative mechanisms. At the political level, the JAP agreed to intensify the political dialogue and cooperation while further boosting economic cooperation.

The seventh India-EU Summit at Helsinki was another significant milestone, where both India and EU accepted the recommendations of the High Level Trade Group (HLTG) to work on a Broad-based Bilateral Trade and Investment Agreement (BTIA).

The15th Annual India-EU Summit was held virtually in the wake of the pandemic signified the resumption of bilateral dialogue between India and the EU, which had been halted due to the disagreements on both sides. Under the India-EU Strategic Partnership, both India and the EU recognise that they are "unions of diversity"[3]. This acknowledgement itself has the power to change the discourse of negotiations.

During the Summit, it was recognised that both India and the EU share values of democracy, rule of law and human rights. India and the EU agreed to contribute towards

[3] https://www.drishtiias.com/daily-news-analysis/india-eu-virtual-summit

an effective multilateralism and a rule-based international order. Security concerns were addressed and the two partners agreed to help each other in concerns of security, prosperity and sustainable development. The Summit recognised the need for a comprehensive trade agreement that brings in strong rules, removes barriers to trade in goods and services and investments and opens up free markets.
The two sides also agreed to a common roadmap to guide and strengthen the joint action on "India-EU Strategic Partnership: A Roadmap to 2025".

Speaking at a webinar on Foreign Policy and Security Studies organised by Brookings India, Garima Mohan of Transatlantic Fellow at The German Marshall Fund (GMF) of the United States said that "there was now new room for compromise, as the current global economic crisis presented "an opportunity for both sides to shift their red lines a little bit"[4].

The India-EU Summits have not yet brought in any tangible desired results. The holding of Summits and some important aspects discussed in the Summits, itself is a big positive. A dialogue is always the first step towards a meaningful cooperation and dilution of prejudices.

2.10 India-EU Strategic Partnership

Strategic Partnerships are an important instrument of foreign policy. Historically, the strategic partnerships were concluded between like-minded partners. Given the undesirable transformation and the changes experienced in the global order, the role played by strategic partnerships, in a multipolar world, has been enhanced.

The concept of 'strategic partnership' is a relatively new term in the international context and is an instrument of cooperation of the post-cold-war period. The nomenclature of strategic partnership carries a misguided representation of the term. According to Kay, a strategic partnership "enhances or justifies a close relationship between two states that seek mutual gains but whose interests may be competitive rather than shared" (Kay,

[4] https://www.drishtiias.com/daily-updates/daily-news-analysis/india-eu-virtual-summit

2000). When a strategic partnership is forged between competitors or even rivals, then the partnership may take the form of either 'mutual benefit' or 'mutual management' (Envall and Hall 2016).

Strategic partnerships signify a regular and continued dialogue between the partner countries on common issues. Strategic partnerships are between two entities which cooperate on issues of mutual benefit at the same time pursuing different interests (Nadkarni, 2011). What distinguishes 'strategic' is the importance given to the absence of divisive issues rather than on a joint strategy, in the traditional sense (Gedemont, 2006).

The intention of the EU to engage with India as a strategic partner was clear in the first EU-India Summit held in Lisbon in the year 2000. Both India and the EU resolved to build a strategic partnership in the 21st century founded on shared values and aspirations. The two identified areas of cooperation and build a coalition of interests to meet the challenges of the 21st century thus laying down a framework for their strategic partnership.

Strategic partners played a key role in the European Security Strategy (ESS) of 2003. The EU started upgrading its partnerships with countries it deemed as more valuable than others by classifying them as 'strategic partners'. This represented a departure in the EU foreign policy. The ESS 2003 recognised the significance of the dissemination of European norms as an essential component of the EU's security strategy. It viewed the promotion of these norms as a means to enhance global security, foster cooperation and contribute to a more stable and rules-based international order. Canada, China, Japan and India were specifically mentioned as potential strategic partners. There was however, no one-size-fits-all model to develop strategic partnerships with these four key international players. The strategic partnership would be developed with each one of them differently. The EU did not limit its strategic partnerships to these countries only, but was open to enter into strategic partnerships with like-minded countries with similar values and countries open to act in support of EU.

India, on its part, has also been very active in forming strategic partnerships with various countries across the globe. Through strategic partnerships, India seeks to explore

development objectives in an open and understanding relationship for mutual gain, thereby enhancing the relationship to a mature level. Its objective(s) of strategic partnerships may not perfectly align with those of the EU.

An EU-India Strategic Partnership was introduced in 2004, which proposed a series of strategic policy dialogues and a series of strategic sector dialogues, in order to narrow down the nuances of the relationship. As strategic partners the relationship was upgraded from being 'good friends' to a strategic partnership between two international players (European Commission 2004).

The frustration on the very aim of strategic partnerships is due to the vague understanding of strategic partnerships within the EU establishment. This emerges from the absence of a clear definition of a strategic partnership in any EU document. Without a well-defined concept the partnership with different partners adopts a different dimension. The EU considers some partners more strategic than the others. Complications are aggravated when some of the partners ignore to treat the EU as a strategic partner at all. Fully mindful of this situation, Herman von Rompuy, the President of the European Council, admitted that "new players do not always share our interests and worldviews. We have strategic partners, now we need a strategy." (European Council 2010).

India's expectations from the India-EU strategic partnership differ from the aspirations and expectations of the EU. India and the EU face several challenges in strengthening their strategic partnership. They need to balance norms and realism, deepen their bilateral cooperation, address common security challenges, promote sustainable development, engage in constructive dialogue, and navigate geopolitical competition.

Despite the challenges, the optimism in strategic partnerships arises from their significant role in regular interactions at various levels. The strategic partnerships are important to maintain the momentum of engagement and communication between diplomatic channels, discussions on important global issues and identify common visions.

Both India and the EU came out with various resolutions on how to upgrade the overall framework of EU-India relations. They focussed on the assessment of the Joint Action Plans and worked on increasing more sectors to the discussion list. The discussions were

not on deliverables but abstract political objectives (Muenchow-Pohl, 2012), which led Keukeleire and Bruyninckx (2011) to question the relevance of strategic partnerships due to the indifference attributed to any actionable outcomes (Keukeleire & Bruyninckx, 2011).

Other researchers working on the India-EU Strategic Partnership have been unanimous in expressing their disillusionment on this relationship calling it 'neither very strategic nor much of a partnership' (Kavalski, 2016). The disappointment in strategic partnerships has prompted Jaffrelot to dismiss the India-EU relationship calling it a mere 'charade' (Jaffrelot, 2006). The fragility of the partnership was further exposed in 2013 when the negotiations on a Free Trade Agreement (FTA) between India and the EU were suspended. Though, the negotiations and Summit level meetings were re-started after a gap of four years, the nature and dynamics of the relationship changed, given the changes in the geopolitical environment.

The European Union, in line with the changes in the global environment and aligning itself with other partners re-evaluated the foreign policy instrument of strategic partnerships in general and its relations with India in particular. Such changes have been brought out by the European Union Global Strategy and under the EUGS, the EU India Strategy (EUIS) in particular.

2.11 EU Global Strategy (EUGS) 2016

The EU Global Strategy "Shared Vision, Common Action: A Stronger Europe" (EUGS) of 2016, represents a departure from the ESS in its broader scope, holistic approach, emphasis on resilience and engagement, and explicit integration of European values and norms. The EUGS reflects the EUs recognition of the changing global context and the need to address a wide range of interconnected challenges in a more proactive and comprehensive manner. At the same time, the EUGS lists down concrete actions that flow out of strategic priorities. It recognised the emergence of new actors and the shifting balance of power in the international arena.

At the time of drafting the EUGS, the global architecture was not as vicious as in recent times, although a few incidents like the Arab Spring, the Russian aggression in the

Ukraine and the China's grasp for power were indications of a changing world. The EUGS, therefore, while recognising Japan and India as strategic partners, does not confer the same status to China.

The unforeseeable 'America-first' policy introduced by Donald Trump had the EU thinking on revising its foreign policy. In reviewing its foreign policy, keeping in mind the changing world architecture, the EU-India Strategic Partnership plays an important role. Following the EUGS and recognising the importance of India as a balancer in Asia, the EU-India Strategy was announced in 2018, ahead of EU-China Strategy, which was introduced in 2019. The two strategies differed substantially in their objectives and EU's perception of India and China.

Whereas, the "Council underlines the importance of the Strategic Partnership between the European Union and India, based on shared values of democracy, rule of law, respect for human rights, commitment to rules-based global order and effective multilateralism, sustainable development and a common interest to further develop bilateral cooperation in every respect" (Council of European Union 2018), the EU-China Strategy of 2019 calls China "a negotiating partner with whom the EU needs to find a balance of interests, an economic competitor in the pursuit of technological leadership, and a systemic rival promoting alternative models of governance" (EUC/HV 2019).

2.12 European Union India Strategy (EUIS) 2018

The relations have received a new lifeline with the EU India Strategy (EUIS) introduced by the EU in November 2018. The EUIS is a country specific strategy, which entails a broad scope of India-EU relationship. EUIS is an important departure from EU's earlier perception of India. The introduction of EUIS has been triggered by a few global factors which have influenced the EU to reformulate its strategy with India. The growing importance of Asia as a whole and the increasing global footprint of China is a significant development which instigates EU to reconsider its existing partnership with India. Moreover, the acknowledgement of a multipolar world and the shifting of power centres to Asia, necessitate the important role that India as an emerging player can play in Asia. The US policy priorities in Asia and its growing partnership with India has also prompted

the EU to engage with India at a more strategic level, coupled with the desire to be a relevant global player.

In EUIS 2018, the EU concedes on the importance of India in Asia and a strong partnership with India will be 'key to a balanced EU policy towards Asia as a whole' (European Commission 2018). Apart from the traditional strengthening of trade, investment and economic relationship, the EUIS also stresses the need for an enhanced defence and security cooperation. This is towing the US-India partnership, which has more elements of a security and defence partnership than the traditional economic aspect.

This strategy is a 'Game-Changer' in India EU relations (Mohan, 2019) and directs its response to contain the increasing role of China in the international sphere. The global changes and India's perceived role in balancing the assertiveness of China have impelled the EU to reconsider its current relationship with India.

Aspengren and Nordenstam (2021) have analysed the EU India Strategy by looking at the conditions for formulating strategy. They have looked at the cohesion with the EU global foreign policy goals and the convergence with India's foreign policy preferences (Aspengren & Nordenstam, 2021). Their findings show that the EUIS is more aligned to the EUGS, which is a positive development in fulfilling EU's strategic objectives and the EUIS is formulated closely to India's professed preferences, which means that the strategy does not influence India's fundamental policy preferences, in stark contrast to the India-EU Strategic Partnership. The EUIS recognises India as a regional power and a partner in a multipolar Asia and Europe offers to actively contribute to the modernisation of India.

With the changes in the outlook and perceptions of each other, especially the EU, the partnership has received a positive boost and acceptance from the Indian side. The buoyant mood and personal involvement of the leadership is adding new dynamics to the stale partnership between India and the EU. Only time will tell now, how the ambitious plans on paper will translate into action on the ground to make a consequential change in the relations of India and the EU. The decisions taken during the next few years are crucial to shape the destiny of not just the EU and India but also to shape the destiny of a rules based order in a multi-polar world with various power centres.

2.13 Broad-Based Trade and Investment Agreement (BTIA)

Based on the recommendation from the High-Level Trade Group, in June 2007, India and the EU commenced their negotiations on a Broad-based Trade and Investment Agreement (BTIA), which would cover goods, services, investment, public procurement, intellectual property rights, sustainable development and labour standards, competition policy among others. The BTIA was a comprehensive trade and investment agreement between India and the European Union with the aim of enhancing bilateral trade and investment between the wo parties. This was a unique model, whereby India would for the first time enter into a bilateral agreement (especially on services) with a large trading partner and the EU would for the first time enter into a bilateral agreement with an emerging economy (Mukherjee & Goswami, 2011).

Negotiating a Free Trade Agreement, which conforms to the WTO rules, barriers to trade would open up creating expanded opportunities for goods and services leading to increased business opportunities (Singh, 2012).

In spite of the fact that both the partners committed to a speedy agreement on the provisions of BTIA by achieving a balanced outcome, the BTIA negotiations did not bring any tangible result. Many issues concerning the liberalisation of goods and services, dispute resolution and investment clauses and the nature of agreement affected the negotiations (Khullar, 2020). External factors beyond the control of either the EU or India impacted the negotiations negatively. The case in point being the *Enrica Lexie* case. In this case, two Italian mariners were allegedly involved in a murderous crime under the Indian Penal Code. This put shutters on the India-EU Summits and put the BTIA negotiations in cold storage in 2013. (Busvine, 2015). The Summits did however, resume in 2016, but talks on the BTIA were very slow.

In 2019, the President of the European Commission, Ursula Von der Leyen invited the Indian Prime Minister to Brussels for another round of India-EU Summit. Originally, scheduled to be held in March 2020, the 15th India-EU Summit had to be postponed in wake of the Covid-19 outbreak and was eventually held virtually, on 15th July 2020. The Summit was also attended by Charles Michel, President of the European Council (Government of India; Ministry of External Affairs, 2020). Even though the pandemic

was the focus of discussion, both India and the EU decided to reinforce foreign policy, increase partnership, promote multilateralism, and enhance shared values. The platform provided the Indian Prime Minister to rationalise decisions taken by India with respect to Citizenship Amendment Act (CAA), for which the EU had expressed great concern (Mohan, 2020). Safeguarding human rights was another notable outcome of the Summit.

An invitation from the President of the European Commission, reinforces the importance of India within the higher echelons of the European Union. The intentions, actions and the decisions of leaders determine the course the country/regional grouping is going to take. The vision of the leaders also trickles down to level 2, level 3 of the working groups and they align their work to meet the goals of the leaders. This has also been witnessed between India and the EU. The intent to build a strategic partnership and a deeper bond, eventually impacts the BTIA negotiations as well. During the 16th India-EU Summit, it was agreed to resume talks on the BTIA. The representatives agreed to set up an EU-India Senior Officials' Dialogue to strengthen cooperation on trade issues, specifically related to WTO (Government of India: Ministry of External Affairs, 2021).

The authors Malcom Katrak and Blanche Devos in their research article "Examining the Role of Trust and Ideological Disparities in India-EU Negotiations: The Case of the Bilateral Trade and Investment Agreement (BTIA)" have used the Lewicki and Bunker's (1995) stage models of trust to posit that trust changes as the relationship develops and looked at the role of trust specifically in BTIA negotiations. They argue that during the beginning of the negotiations, the partners had a specific type of trust i.e. calculus-based trust (CBT) wherein the parties evaluate the benefits and cost of trusting the other party (Lewicki, & Bunker, 1995). The CBT is based on reciprocity and is hence extremely fragile. Between India and the EU, the *Enrica Lexie* case resulted in the breakdown of the negotiations. On the contrary, the Identification-Based Trust (IBT), wherein one party comes to believes that the others values and interests are aligned with their own.

Katrak and Devos conclude by reiterating that the leaders of India and the EU have played a vital role by rebuilding trust. Taking the initiative and reciprocating by the two parties have helped in re-starting the BTIA negotiations, among others. The integrative bargaining approach, which is mostly used by parties of equal stature are better than the

distributive bargaining techniques, where one party is able to bully the other into taking decisions on their terms.

Once the leadership is committed, the state institutions and agencies and representatives also align their actions to the visions of their leaders. Open and transparent interactions go a long way in building trust. The challenge is building trust at the societal level. Hence, the social exchanges should always compliment the discussions at the top level. Media, NGOs, the academics and the civil society interactions will strengthen in trust building, which eventually will have a positive impact the negotiations on BTIA (Katrak, & Devos, 2021).

2.14 Russia-Ukraine War and its impact on India-EU relations

Contradicting all notions that Europe is unlikely to see another war in the near future, Russia attacked Ukraine in Feb 2022. Europe termed it as an act of aggression, as there was no provocation from Ukraine to justify Russian attack. This is the largest military deployment seen in Europe after WWII, the war has prompted an exodus of refugees from Ukraine spilling across Europe. The impact of the war is set to affect the global economy adversely and increase inflation. The prices of commodities especially wheat and edible oil have escalated as the war has disrupted supply. The increase in prices of commodities is likely to be complemented with the disruption of trade especially amongst the neighbouring countries, with a surge in refugee inflows as well as tightening financial conditions of the countries (Mohammed, 2022).

The immediate response from the Indian leadership to the fury unleashed on Ukraine by Russia was carefully worded. The Indian Prime Minister, Narendra Modi addressing a speech to Russian President Vladimir Putin said that the intensity of the onslaught must decrease. India has not condemned the Russian offensive against Ukraine till date.

India has had a good relationship with Russia through the cold war period. Even after the cold war and India's increasing ties with the western countries predominantly the United States, India maintained its relations with Russia. Russia has been a critical partner for India and a major supplier of defence equipment for India. Russia supported India on its Kashmir stand (Warren & Ganguly, 2022).

As the war has progressed, Indian finds itself in a very complex situation, as it has allies on both sides of the argument. The balancing of relationships would require thoughtful decisions as Indian foreign policy and security are being tested. It is not an easy decision as the global alliances are being re-written. In its desperation to sell oil, Russia is also scouting for new buyers. This may drive Russia to shift closer to countries like China and Pakistan. In such a case, Indian equation with Russia may also get altered and India risks of being excluded from the Russian friendship (Javed, 2022; Sukhanknin, 2021; Tsafos, 2022). At the same time, India cannot take a decision that benefits China and/or hurts the US, as this would be detrimental to Indian interests (Kumar, Singhania, Singh, Mishra, & Sinha, 2023). US has been increasing its sphere of friends in Asia. Currently, the Russian closeness to the Chinese is not just economic but also has a geopolitical dimension. This relationship is to counter the common enemy of Russia and China namely the United States.

The Russia-Ukraine war has exposed the changing power equations, which have been simmering in the background since the last few years. China's rise and its comprehensive support – politically, economically and financially – to Russia is to counter the US superiority. Russia's actions clearly indicate its intention to establish its influence in eastern Europe. Facing severe sanctions from the west and EU in particular, Russia is looking for new markets for its natural resources. This forces Russia to divert its focus from purely Europe-centric to other regions including South Asia (India, Pakistan and Afghanistan) as well as the Indo-Pacific.

In the great power rivalry between China and the United States, Russia is drawing its own benefits of being a global power. The 'limitless friendship' between China and Russia seems to be a marriage of convenience for both. Neither Russia nor China would publicly oppose each other but there is also a clear red-line that none of them would want the other to cross. These developments are posing a serious challenge for India.

Another challenge before India is whether it can continue to see Central Europe from the looking glass of Russia. In doing so, India is likely to alter its relationship with friends in western Europe. Currently, India needs friends in western Europe as it not only looks at increasing economic ties with the EU, but also needs to go shopping for defence

equipment, something that until now it relied heavily on Russia. “The war in Ukraine has made both sides realise the need to explore opportunities and partnerships outside their traditional comfort zones and friends.” were the remarks made by Swasti Rao while talking to Bloomberg, an associate fellow at the Europe and EUAsia Center at the Manohar Parrkiar Institute for Defense Studies and Analysis[5].

The European Union (EU) has expressed its discomfort with India's neutrality on the Ukraine conflict, but it has also shown a willingness to maintain mutual ties despite the differences[6]. The EU has been frustrated and disappointed with India's abstention and non-cooperation against Russia, as it expected India to denounce Russia's actions[7]. There has been pressure on India from the EU and its allies to speak up and back Western viewpoints on Ukraine. However, instead of antagonizing India, the EU has agreed to disagree. India's neutral position has caught the EU off-guard, but it has not resulted in a cooling of mutual ties.

It is important to note that India's stance on the Ukraine conflict is driven by its strategic interests, including concerns about a more assertive China and its dependence on Russia for defence equipment. India has carefully maintained its declining relationship with Russia and has positioned itself as an impartial party to the war. India's neutral position has been appreciated by Russia, as India has not been included in the list of "unfriendly countries" drawn by the Kremlin following sanctions imposed by the EU, the US, and the UK.

Overall, while the EU has expressed its frustration with India's neutrality on the Ukraine conflict, it has not allowed it to significantly impact the mutual ties between India and the EU. Both sides have agreed to disagree and maintain their relationship, recognizing the strategic interests and complexities involved.

India has reiterated for peace but not taken any political position regarding the Russia-Ukraine war. The EU would like India to play an important role to ebb the conflict at a

[5] https://www.livemint.com/news/india/olaf-scholz-arrives-in-india-may-ask-pm-modi-to-mediate-on-russia-ukraine-war-11677299746435.html
[6] https://www.unav.edu/web/global-affairs/india-s-balancing-act-in-the-ukraine-war-implications-for-eu-india-relations
[7] https://www.aljazeera.com/news/2022/3/9/what-india-position-russia-ukraine-war-means-european-union-ties

later stage. Appreciating the skilful diplomatic strengths that India possesses, western Europe would like to see India playing a crucial mediating role in finding a solution to the Russian aggression in Ukraine.

India's current stance on Ukraine derives from the intricacies of the relationship triangle between India, Russia, and China, and the evolution of the balance of power between them and the outside world[8]. India has long looked at its relationship with Russia through the prism of the latter's capacity and willingness to balance China. The war in Ukraine has impacted India's strategic priorities, specifically its concerns about a more assertive and powerful China[9].

2.15 Trade between India and the European Union

India, as an emerging economy is also one of the fastest growing economies in the world with a projected GDP growth rate of 6-8 percent as per IMF. As an important player, India has been contributing to the global economic governance and remains a key trade and investment partner for the EU. With a growing middle class, India boasts of a large and dynamic market making it an attractive trade destination for the EU.

For India, EU is India’s third largest trading partner with a total trade of goods worth Euro 88 billion in 2021. This is almost 10.8% of the total trade of India. India’s trade with the United States was at 11.6% and with China at 11.4% of its total trade for the same period. As far as Indian exports are concerned, EU is the second-largest destination for Indian exports (accounting for 14.9% of total exports from India), after the United States which has a share of 18.1% of total exports from India. As far as Indian exports to China are concerned, they remain at a modest 5.8% of the total.

From the point of view of the European Union (EU), India is EU’s 10th largest trading partner. India accounted for 2.1% of EU’s total trade in goods in 2021. This was insignificant when compared to China, which had a 16.2% share of EU’s total trade in goods, United States, which accounted for 14.7% of the EU’s total trade in goods and even the United Kingdom, which accounted for 10% of the EU’s total trade in goods for

[8] https://ecfr.eu/publication/a-question-of-balance-india-and-europe-after-russias-invasion-of-ukraine/
[9] https://www.freiheit.org/india/impact-war-ukraine-indian-perspective

the same period. Within Europe but not part of the EU, UK, Switzerland and Norway have a higher trade volume with the EU. ASEAN, Russia, Turkey, Japan and South Korea are also ahead of India in their trading volume with the EU.

Though, the trade figures do not look as promising as they should be and there is a further potential to increase trading relations between India and the EU, it needs to be noted that the trade in goods between India and the EU has grown by 30% in the last 10 years. The trade in services has also consistently grown and reached Euro 30.4 billion in 2020.

While both sides understand the potential for growth, the two sides have different objectives of intensifying trade with each other. The EU wants to work towards a sound, transparent, open, non-discriminatory and predictable regulatory and business environment for European companies trading with or investing in India, including the protection of their investments and intellectual property. The main aim of the EU is to contribute to unlocking the untapped potential of two-way trade and investment between the EU and India. According to the European Union, India needs to remove restrictions on its trade regime and the regulatory environment. Technical barriers to trade (TBT), sanitary and phyto-sanitary measures, non-compliance with internationally-agreed standards, as well as discrimination based on legislative or administrative measures by India, affect a wide range of sectors, including goods and services, public procurement and investment[10].

2.16 Imports of India and EU from the world

While looking into the merchandise imports of EU from the world over a period of last 50 years i.e. from 1972-2021, it is clear that the EU imports have grown over this period. The growth rate as per the data is approx. 128%. During the same time, Indian imports from the world have also grown at an average rate of 10% per annum.

[10] https://policy.trade.ec.europa.eu/eu-trade-relationships-country-and-region/countries-and-regions/india_en

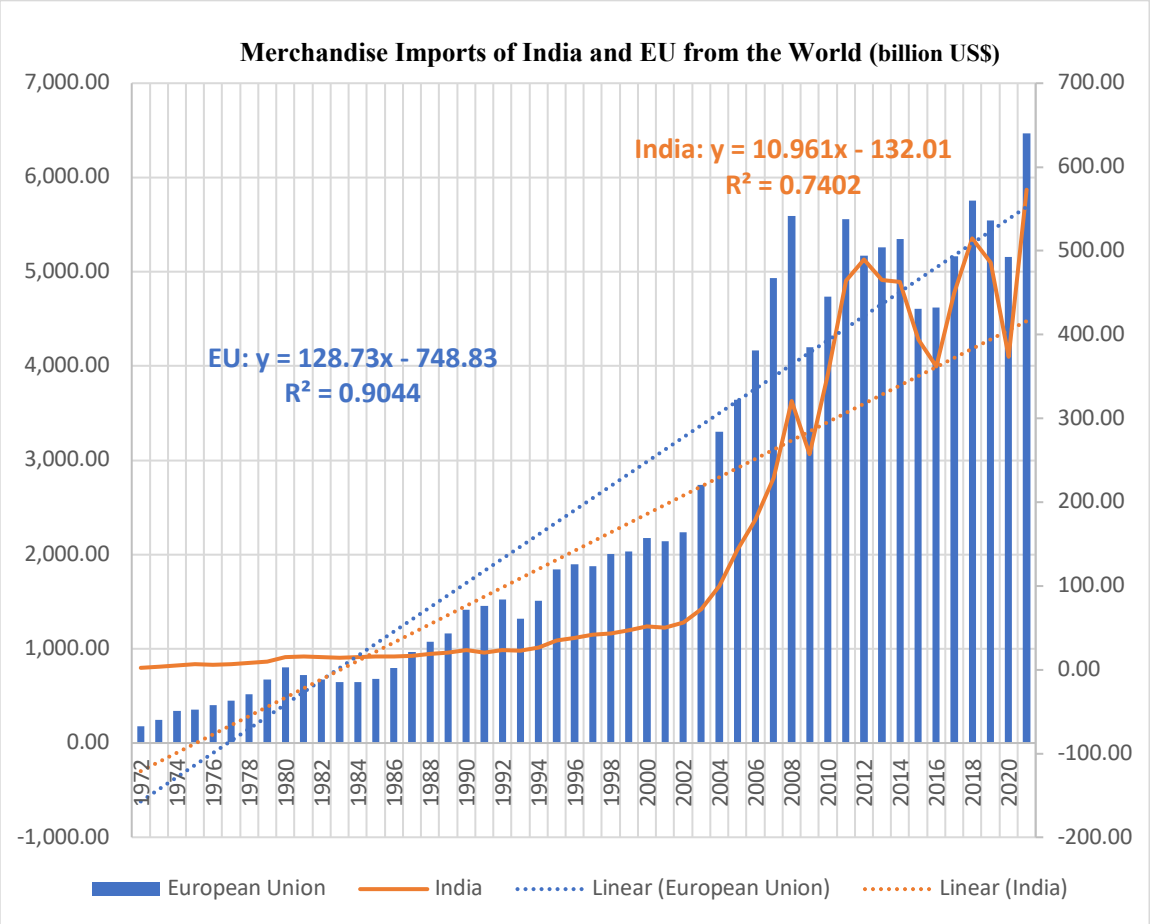
Table 2.2: Merchandise imports of EU and India from the World (billion USD)

Year	Imports into EU from the World	Imports into India from the World
1972	176.55	2.22
1973	245.10	3.21
1974	337.66	5.14
1975	354.10	6.38
1976	404.36	5.67
1977	449.72	6.65
1978	518.94	7.87
1979	674.48	9.83
1980	802.70	14.86
1981	718.25	15.42
1982	676.77	14.79
1983	644.03	14.06
1984	649.65	15.27
1985	677.22	15.93
1986	795.90	15.42
1987	968.47	16.68
1988	1,072.04	19.10
1989	1,160.92	20.55
1990	1,412.50	23.58
1991	1,455.75	20.45
1992	1,523.62	23.58
1993	1,319.96	22.79
1994	1,507.49	26.84
1995	1,841.03	34.71
1996	1,893.02	37.94
1997	1,873.46	41.43
1998	2,002.91	42.98
1999	2,028.84	46.98
2000	2,172.47	51.52
2001	2,142.64	50.39
2002	2,237.90	56.52
2003	2,738.28	72.56
2004	3,303.66	99.78
2005	3,644.82	142.87
2006	4,165.40	178.41
2007	4,932.36	229.37
2008	5,594.62	321.03
2009	4,196.95	257.20

2010	4,734.66	350.23
2011	5,558.13	464.46
2012	5,167.08	489.69
2013	5,258.99	465.40
2014	5,348.80	462.91
2015	4,609.27	394.13
2016	4,621.87	361.65
2017	5,161.13	449.93
2018	5,752.01	514.46
2019	5,544.47	486.06
2020	5,154.99	373.20
2021	6,469.06	572.91

Source: World-Bank

Graph 2.2: Merchandise Imports of India and EU from the World



Source: Authors own prepared using World-Bank data

Graph 2.2 above graphically represents the linear regression line of Import from the world with respect to India and EU.

For EU:

$Y = 128.73x – 748.83$

$R^2 = 0.9044$

For India:

$Y = 10.961x – 132.01$

$R^2 = 0.7402$

2.17 Exports from India and EU to the World

At the same time, the exports of goods from India in the corresponding period of 1972-2021, have grown at an average of a little over 7% per annum, while the exports from EU to the world have grown on an average of 134%.

Table 2.3: Merchandise Exports from India and EU to the World (billion USD)

Year	Exports from EU to the world	Exports from India to the world
1972	171.77	2.45
1973	237.17	2.92
1974	311.88	3.93
1975	337.60	4.36
1976	371.60	5.55
1977	423.30	6.38
1978	507.23	6.67
1979	633.66	7.81
1980	708.35	8.59
1981	659.34	8.30
1982	636.28	9.36
1983	625.53	9.15
1984	645.83	9.45
1985	675.10	9.14
1986	837.53	9.40
1987	999.22	11.30
1988	1,109.21	13.23
1989	1,176.93	15.87
1990	1,402.17	17.97
1991	1,381.44	17.73
1992	1,475.09	19.63
1993	1,370.87	21.57
1994	1,570.09	25.02

1995	1,942.36	30.63
1996	2,005.87	33.11
1997	1,977.06	35.01
1998	2,090.75	33.44
1999	2,090.57	35.67
2000	2,173.08	42.38
2001	2,203.12	43.36
2002	2,363.86	49.25
2003	2,851.24	58.96
2004	3,422.98	76.65
2005	3,691.90	99.62
2006	4,155.40	121.81
2007	4,924.32	150.16
2008	5,482.74	194.83
2009	4,257.81	164.91
2010	4,769.31	226.35
2011	5,585.48	302.91
2012	5,335.78	296.83
2013	5,536.18	314.85
2014	5,653.03	322.69
2015	4,929.05	267.95
2016	4,969.74	264.54
2017	5,466.72	299.24
2018	5,992.95	324.78
2019	5,825.33	324.34
2020	5,475.47	276.41
2021	6,629.95	395.43

Source: World-Bank

Graph 2.3 above graphically represents the linear regression line of exports from India and the EU to the world.

For EU:

$Y = 134.85x – 837.25$

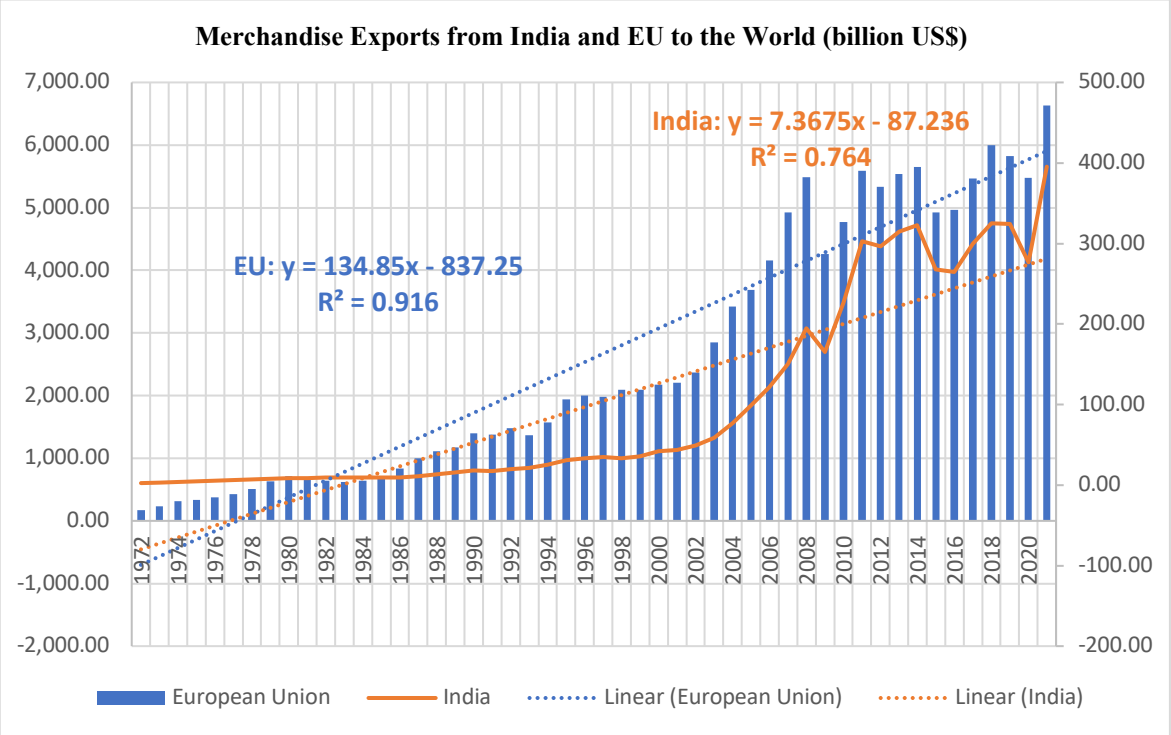
$R^2 = 0.916$

For India:

$Y = 7.3675x – 87.236$

$R^2 = 0.764$

Graph 2.3: Merchandise Exports from India and EU to the World



Source: Authors own prepared using World-Bank data

Graph 2.3 above graphically represents the linear regression line of exports from India and the EU to the world.

For EU:

$Y = 134.85x – 837.25$

$R^2 = 0.916$

For India:

$Y = 7.3675x – 87.236$

$R^2 = 0.764$

2.18 Conclusion

India and the EU urgently need to evaluate their relationship and take strategic decisions to strengthen their partnership in a fast changing global landscape. Despite the shared values, common beliefs and regular interactions, both India and the EU rarely find to be on the same side of the argument. Even after fifteen years, the trade deals remains elusive and differences plague any healthy outcome to any negotiation. The progress on economic front was marred by the inclusion of labour standards and environment concerns in any tangible outcome of the discussions. On issues of geo-politics, India's abstention to condemn Russia for its unprovoked war on Ukraine has further dented the

relationship. Such frequent disagreements only highlight the growing divergence between the two. Each is guided by their own motivations and self-interest and both lack the ability to comprehend the compulsions that force each of them to take decisions to suit their circumstances.

From India's viewpoint, the selective normative approach of the EU is a reflection of the double standards it has followed. Gross abuse of human rights in China's Xinjiang, its aggression in Asia, the misuse of rules based order have been ignored by the EU, while lecturing India on the preservation of the international liberal order.

As the threat of China looms large on the EU, with its investments in critical sectors in the EU, or its 'no-limits' partnership allegiance to Russia, EU is under a threat, not experienced since WWII. India faces the same threat on its borders with China, with frequent escalations on its northern borders, and the constant head-aches on its western borders with Pakistan.

India and the EU are to be blamed equally for the failure of their cooperation. The divergent views, perceptions and expectations have contributed to protect their self-interest and not look beyond themselves. As the threat to rules based order increases, non-cooperation between India and EU is not an option anymore.

There are already positive signals of both India and EU showing greater interest to strengthen their partnership and provide a formidable opposition to destructive forces in the multipolar world. The EU Global Strategy and the EU India Strategy of 2018 is indicative of the acceptance of the EU to change its approach. The EU is also prepared to interact with India by shedding its normative approach and adopting a convergence approach to Indian foreign policy preferences. India, on its side, has also shown an eagerness to restart negotiations with the EU.

While both may be guided again by their own interests in re-starting the negotiation process, the realisation of the influence of events in the wider world also guide these decisions. Both India and the EU would like to wean away their dependence on Chinese manufacturing, both would like to diversify their energy supply needs rather than

extensive dependence on Russian oil, and both would like to ensure that pandemics like COVID-19 do not reoccur.

A comprehensive economic FTA/BTIA would be the most desirable outcome for both partners. However, in light of an uncompromising attitude on certain sectors, the next best would be to sign an agreement on sectors and areas of a non-sensitive nature. This would be a step ahead and not halt the discussions abruptly and keep the window of negotiations open. Discussions of attracting European investors to manufacture in India is one such option. India gains from getting access to latest technology in order to develop its manufacturing capabilities and to gain market access for the export of its products and services. An investment deal with the EU will help India in bringing in foreign capital, machinery, technology and boost its employment, exports as well as add to its foreign reserves. Therefore, Indian policy makers should aspire to seal a deal like the EU-Vietnam deal for greater investments from the EU, in order to fulfill the domestic concerns and with an eye in the future.

For the European investors, the size of the Indian market remains a lucrative attraction. The shift of production bases to India, allows them to export and reach out to the demands of Asian countries and at the same time, have access to the vast Indian market for their products. India's strategic position as a gateway to Asia makes India a desirable destination for European investors.

Caught between US-China tussle, the EU needs other allies to pursue its strategic autonomy. India fits this role perfectly. Therefore, even if EU does not find India to be the perfect match, it still remains the most suitable actor in the global geo-politics for the EU.

The India-EU relations are bound to intensify in future. The increasing emergence of India not only economically but also politically and the US-China competition is likely to push EU towards India. India's ambitions and its circumstances of being in a tight spot with China will take India into the lap of the EU. This foreseeable future is glaring into the faces of both India and the EU. Moreover, the decisions taken by the two in this decade will shape the future of the two partners as well as have a major impact on the

world for the next three decades. Therefore, the time is ripe for India and the EU to make the best of it.

A strong India-EU partnership is not just for themselves and their economic benefits, but will help in balancing the geo-politics of the topsy-turvy world.

CHAPTER 3
INDIA AND GERMANY: POTENTIAL FOR A DEEPER COOPERATION

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3.1 Introduction

India and Germany are two economic powerhouses in their respective regions. The Indian dominance in South Asia is fairly similar to the German presence in Europe. Both India and Germany are parliamentary democracies and federal republics. They believe in pluralist and open societies and are known to safeguard human rights. Their cultural ties have historical roots marked with friendship and cooperation. German scholar Max Mueller (1823-1900) was known for his admiration for India and studied Sanskrit in order to understand the deep-rooted knowledge of the ancient Indian literature. The German interest in India and Indology can also be witnessed in the Indology courses offered by some German Universities even today. Well-known German figures like Goethe and Beethoven have also been known to have a fascination with India. Therefore, with a history of shared interests and admiration for each other, it would be natural to build a strong relationship with each other. However, due to the different political, social and economic trajectories of India and Germany, they are yet to fully realise the potential that exists between them.

India is known as a vast and dominant country of South Asia with a population of 1.39 billion[1] people having diverse cultures. India attained independence from Great Britain in 1947. Flanked with smaller nations on its east and west, countries that were carved out of the Union of India by the British, none of the neighbours have been a match to the overpowering geographical presence of India.

Germany, which was founded in 1949, shares the same beliefs with India. Germany is also a dominant country of Europe with an estimated population of 83 million[2] people sharing a border with nine other countries. No other European country shares its borders with so many other countries than Germany. Hence, its geographical location, at the heart of Europe, offers it many strategic advantages.

[1] Total Population figures for 2021; source: data.worldbank.org
[2] Total Population figures for 2021; source: data.worldbank.org

India and Germany are known to have trade links and cooperation on economic issues since the 16th century, when Jakob Fugger, a merchant and banker from Augsburg, financed a shipping voyage to Goa, thus opening the trade opportunities between the two countries. In the next two centuries, various German companies established trading links with India in search of opportunities with India and other east Asian countries. Siemens, a German conglomerate, is credited with building the first telegraph line between Kolkata and London via Berlin in the 19th century[3].

On the economic front, India has been traditionally an agricultural economy, producing rice, wheat, cotton, sugarcane coconut, spices, jute, tobacco, tea, coffee and rubber, which have been the main agricultural products of India. Though, India did formulate its Industrial Policy in 1956, it did not bring in any significant gains to the Indian economy, which remained weak until 1991.

In recent years, India's exports to the world predominantly consist of pearls, precious and semi-precious stones and jewellery; mineral fuels, oils and waxes and bituminous substances; vehicles, parts and accessories; nuclear reactors, boilers, machinery and mechanical appliances; pharmaceutical products; and organic chemicals. India's top three export destinations are the United States, United Arab Emirates (UAE) and Hong Kong (United Nations, 2021 International Trade Statistics Yearbook, Vol I).

India was Germany's 24th largest trading partner in 2010 (Shaner, J, 2013). India and Germany continued to grow their trading relationship since 2000. However, they still have potential to grow their economic relationship. This is based on the simple premise that some of the smaller countries like Poland rank better as Germany's trading partners (Tiwari, R, 2012). Therefore, the potential to increase economic relations and improve on the current trade remains high as both Germany and India are yet to reach the peak of their potential.

Germany is the third largest exporter in the world, with exports accounting for almost half of its economic output. In 2021, main exports of Germany included motor vehicles,

[3] https://india.diplo.de/in-en/themen/wirtschaft

trailers and semi-trailers; machinery and equipment; chemicals and chemical products; computer, electronic and optical products; basic pharmaceutical products and pharmaceutical preparations; electrical equipment. Top three export partners of Germany in 2021 have been the United States, China, France and the Netherlands (both occupying third position with 7% of total exports of Germany) (United Nations, 2021 International Trade Statistics Yearbook, Vol I).

3.2 Literature Review

The development between India and Germany has hinged on the perceptions about each other. A charcterstic feature of Indian economy is the spurts of economic growth experienced in India from time to time rather than the steady rise of the economy. This is true mostly of the early years of liberalisation. Agarwal, Hussain & Agarwal (2021) have discussed this in their paper on India-EU relations. They have analysed the India-EU Relations and growth of the Indian economy vis-à-vis European countries.

Tiwari R (2012) has looked at the 60 years of bilateral diplomatic relations between India and Germany and finds that the two countries have improved their business relations. The relationship between India and Germany is seen as consisting of 'infinite opportunities' with the opportunities being actually utilised progressively. His work on trade reveals that the bilateral trade in 2010 has outperformed the overall growth in Germany's trade with the rest of the world, which comes in the wake of Europe still struggling with the financial crisis.

Shaner (2013) suggests that the confidence in India becoming a major hub of automobile parts manufacturing could be a win win for India and the major auto-producers of the world. With significant growth in its capacity to produce automotive parts at a reasonable cost, the optimism in Indian economy is providing confidence in other sectors as well. With the right policy framework, India could use its growth to its advantage in attracting investments.

Gurcharan Das (2006) notes that India's rise follows a unique path. Rather than the classic Asian strategy – India's growth is due to its internal market and not necessarily export-driven, it is consumption driven rather than investment driven, it comprises of services rather than manufacturing, and high-tech more than low-skilled manufacturing.

While comparing India's growth with China's, he applauds India on its democratic approach bottoms-up approach when compared to the top-down technocratic approach to transform its economy.

Similar conclusions are drawn by Agarwal S.K., Hussain Tareef and Agarwal Archana (2023), when they compare Indian growth with that of China's growth. They have found that India has grown as a democracy with all its weaknesses while China has been an autocratic success story. The major difference being that the growth of India is the growth of the people of India, whereby, in China, the growth remains largely of the ruling elite with the people still remaining devoid of most of their fundamental freedoms.

India's ambitions to be a world leader and be among the top elites of the world will require it to be a sufficiently wealthy nation. An emerging economy, India is competing with the developed nations to be heard as an important voice in global matters. Both Khatoon (2013) and Andersen (2001) have found that to be part of the rich nations club, India too needs to be rich. An economically equal status will make India share the same podium as the other leaders at the world stage.

India's economic liberalisation remains one of the major milestones in Indian independent history. However, this development was not without challenges of its own. The reforms package was undertaken by the Narsimha Rao, the Prime Minister of India and the first Prime Minister of non Nehru-Gandhi dynasty within the congress party. Hence, the deftness in getting the reforms through, with staunch opposition from traditional congress loyalists is the subject of Ahluwalia (2020), who enumerates these challenges in his book, 'Backstage'. The author was part of the close circles within the bureaucracy and the political leaders, when the reforms were being discussed and introduced.

Similarly, Krishna, (2019) has looked into the reforms from the industrial tariffs as a component in his whole essay on trade policy of India. With the exception of the agricultural sector, he notes that the average tariffs were drastically reduced. The composite reforms package submitted to the International Monetary Fund (IMF) aimed at opening the economy was a significant departure from the protectionist approach followed by India until 1991.

Gallenkamp (2009) takes an overview of the Indo-German relations briefly going through the cold-war period, when he terms the relationship insignificant and Germany's attention more focussed on the East Asian economies. However, after the reforms of 1991, he discusses the growth in trade and cooperation in areas beyond economics. He also suggests that the potential with India remains high and the partnership took a positive turn with the Agenda for development in the 21st centrury. He has also looked at the security and defence cooperation and the political relations between India and Germany.

In the paper on India and Germany: Global Partnership in the 21st Century, Khashimwo (2015) stresses the need for a deeper and more intense cooperation between India and Germany that goes beyond economics and selling of BMW cars. He has looked at the relations between the two countries after the second world war and finds that the two have much in common which can make these two countries cooperate more on sensitive fields as well as cooperation in technologoical areas. The potential for both countries is yet to be fully realised and the two countries need to strategically engage with each other.

Singh (2020) from Observer Research Foundation (ORF) has looked into the perceptions that Germany and India carry of each other. The important role palyed by perceptions has been minutely looked by him in this paper. As two important player at the global level, it is not just the economics and politics of India and Germany that determine their decisions, but also how the civil society in a country perceives the other. Germany has a vibrant civil society, which plays a key role in influencing government decisions and hence, it becomes vital for the international players to invest in perception-building. He recommends perception building by both countries. In India, in particular, it becomes all the more important to address the requirements of a growing strategic partneship in a multipolar world.

In a journey of history and culture, Rothermund (1995) discusses the growth of India from a socialist state to an economically prominent country with a great future. He also examines the relationship of India and Germany over the last fifty years and finds that despite the economic gap between the two countries, they continued to cooperate on cultural issues. This kept the cooperation and understanding between these two countries going.

Bems, Johnson and Yi (2010) and Yi (2009) have discussed the financial crisis of 2008. This led to the shrinking of demand across the globe and had ramifications for the trade between nations. Germany was hit by the financial crisis more than India was as India was not directly affected by the global crisis. Alessandria, Kaboski and Midrigan (2010), also have looked into the Great Trade Collapse of 2008-09, wherein trade suffered between India and Germany and is also noticeable in the data, which shows decline of Indian exports to Germany and the world.

3.3 India-Germany Relationship after Indian independence

India was the first country to end the state of war with Germany (after the second world war) and it established diplomatic relations with Germany as early as 1951. The first Prime Minister of India, Jawaharlal Nehru, who was in office from 1947-1964, inherited a young nation which had to be re-built after the departure of the British, who ruled India for almost two centuries. This was a colossal task before Nehru, who had to steer India out of its mess both domestically and internationally. On the domestic front, Nehru had to ensure that the right policy framework would lead to economic growth to lift millions out of poverty. Internationally, the bitter experience of second world war was still fresh in the minds of the people. The cold war conditions were weighing heavily on the countries and the challenge before India was to navigate the two power centers, the United States and the Soviet Union.

Konrad Adenauer, the first Chancellor of Germany from 1949-1963 inherited a war-ravaged country after World War II. Moreover, the harsh reality of Germany being the cause of the war came with challenges of its own. Given its past, Germany was demilitarized so as not to venture into any expansionist ambitions in the near future. Germany was divided into four units – each under the control of one ally. The four allies namely the United States, the United Kingdom, France and Russia further divided Berlin, the capital until 1945, into four units – each ally controlling its respective territory. It was when the Soviets started to build the Berlin wall that west Berlin became an island surrounded by the eastern bloc. It was then that the true and deep divisions of capitalism and communism became visible. Through West Berlin shone the bright lights of capitalism that would entice the east with their development, openness and freedom.

Adenauer, representing Federal Republic of Germany had the arduous task of re-building the war-torn country. Moreover, in a situation, when Germany was occupied by the allied forces. Adenauer had no easy task given the harsh realities of the German past and its current situation (Khashimwo, 2015).

On the other hand, Nehru wanted to capitalize on the industrial prowess of Germany and made two trips to Germany, in 1956 and 1960. He wanted Germany to help India with technology, know-how and develop its industries. Nehru was keen to seek investments and collaboration from Germany for its Rourkela Steel Plant. It was not just economics that impelled Nehru to engage in a collaborative engagement with Germany. India and Germany discussed engagements in diverse fields spanning academics, industrial, and even German aid that helped India immensely to finance key projects.

The creation of two ideological blocs in the period succeeding the second world war had a significant impact on the world. The capitalists, pursuing a policy of *laissez-faire*, were perceived as exploitative and money-minded. On the other hand, the communists believed in equal distribution of resources amongst the people thus eradicating all forms of inequality from society. The United States and its allies, which included West Germany (FRG) were the proponents of the capitalist world, whereas the entire eastern bloc, which included East Germany (GDR), followed the communist ideology aligning with the Soviet Union.

Indian leaders thought that the best for the people of India would be to have a mix of both these ideologies. Formally, India did not align with any of the two superpowers. India became a founding member of the third group, the Non-Aligned countries. However, India was strongly inclined towards the Soviet Union. Despite its inclination, India viewed the Federal Republic of Germany as an important partner. The issue regarding diplomatic relations with German Democrtic Republic (GDR-East Germany) led to sharp controversies, which ended only after Germany abolished the Hallstein-doctrine in 1969. According to the Hallstein-doctrine, the recognition of the German Democratic Republic by a third state was seen as an unfriendly act (*acte peu amical*) upon which the FRG would end diplomatic relations with the respective country. This policy was abolished in 1969 in the course of the new Ostpolitik, established under

Chancellor Brandt. India eventually recognized and established diplomatic ties with GDR (East Germany) in 1972.

India focused on rebuilding its economy. This could be done using multiple means. It required investments, technical know-how and funding. Indo-German relationship thrived on these factors as Germany continued to cooperate with India on economic and technological know-how. Moreover, German aid was extremely important for India as it helped Indian state to cushion the finances for major projects. It could be said that Germany and India continued to cooperate together despite the ideological differences that separated India and Germany.

After the stable alliance built by Nehru and Adenauer, a period of stagnation in relations between India and Germany, followed. India was absorbed with its domestic challenges and the two wars with Pakistan kept it pre-occupied. With the US and its allies, which included Germany, supporting Pakistan, India tilted more towards the Soviet Union. This further widened the ideological differences India had with the western countries.

India's policy of not commenting on the internal affairs of other nations also strained the relations with Germany. In particular, not criticizing the Soviet Union for building the Berlin Wall, was met with disapproval in Germany. This did not augment well for the bilateral relationship. Germany viewed India's close affiliation with the Soviet Union as a sign of India's inclination towards communist regimes. As a result, the Indo-German relations deteriorated further during the mid 1960s and late 1970s with little prospect of any meaningful cooperation.

Notwithstanding, India and Germany maintained relations with each other, though there was neither enthusiasm nor any special effort to strengthen this relationship during the cold war era. The Soviet occupation of Afghanistan and situation in Iran are instances where the Indian and the German viewpoints differed. Germany's pro-America inclination and Indian friendship with the Soviets were factors which separated India and Germany to take a common stand. Germany was following a capitalist approach to boost its economic growth whereas India, under Nehru, decided to adopt a planned/mixed economy (socialist) for its growth, until it adopted a free-market approach in 1991.

Europe was an important source of supplies for India especially for India's defense needs. Hence, India's attention towards Europe was driven by its need to upgrade its defense systems in the aftermath of the two wars with Pakistan and with China. The looming conflicts with both these neighbours prompted India to go shopping for military equipment from countries other than the Soviet Union. Defense procurement led to strengthening of relations with France and the UK. Even Germany was a supplier, when India purchased four T-1500 submarines in 1986-87, manufactured at the Howaldtswerke Deutsche Werft (HDW) in Kiel, Germany. This deal was significant for both India and Germany and played a key role in altering the hitherto dull relationship between the two countries. Negotiations for the purchase of more submarines continued with Germany in 1987. Apart from these few incidents of cooperation, German interests in India remained low marked with a policy of 'benign neglect' (Rothermund, D., 1995). While various forms of cooperation continued in the Indo-German relations, economic interaction was not high on the agenda.

3.4 Cultural, Social, Educational, Technical and Industrial Cooperation

The mutual understanding between India and Germany has considerably strengthened due to the exchanges and interactions that have extended beyond economic and political sphere. These exchanges, dating back a long history, have played a pivotal role in influencing the foreign policy of both nations vis-à-vis each other and with the rest of the world. The establishment of formal diplomatic relations between India and Germany further enhanced cultural relations.

Cultural Cooperation

A significant step in fostering cultural ties occurred through the signing of a cultural agreement on January 15th, 1973. This agreement aimed at fostering cooperation in various fields, such as education, science, technology, drama, theatre, music and medicine, further solidifying the commitment of both countries to promote civil society engagement and cultivate a comprehensive relationship.

Germany boasts of a unique network of Max Mueller Bhavans in India. Max Mueller Bhavans are branches of the *Goethe Institut* of Munich in Germany primarily engaged in

the promotion of German language courses for Indians as well as encouraging bilateral cultural exchanges. Regular events are organized which inform the Indian society about the cultural and social diversity of Germany. Indian students, job-seekers, business aspirants, who seek to engage with Germany, can learn the language and the German culture before taking a leap into their higher studies, jobs or even negotiating with their German business partners. Numerous Indian students now study at German Universities and software professionals are working in Germany, most of them having done their basic or intermediate level of German language. Nurses from Kerala are another group of Indians, who are coveted in Germany. And one of the conditions for the Indian nurses willing to go to Germany is the knowledge of German language. Max Mueller Bhavans are the primary and reliable source of learning the language. Over the last two decades, many private institutions have mushroomed teaching German language courses to Indians, however, even the participants from private institutions have to clear the German language exam organized by the Max Mueller Bhavans, which are the only recognized language certification courses in Germany.

In addition to the German language courses, Max Mueller Bhavans, like the German Foundations operating in India, are engaged in the promotion of cultural exchanges between Germany and India. They have a similar work trajectory, as the Foundations however, with the prime objective of promoting German culture.

Social Cooperation

Notably, the involvement of German Foundations operating in India needs to be emphasized. These foundations have actively contributed to promoting Indo-German relations, particularly, at the civil society level. Aligned with the different political parties of Germany such as Konrad Adenauer Stiftung (KAS) with the Christian Democratic Party (CDU), the Friedrich Ebert Stiftung (FES) with the Social Democratic Party (SPD) and the Friedrich Naumann Stiftung for Freedom (FNF) with the Free Democratic Party (FDP). Beyond the aforementioned foundations, others like the Heinrich Böll Stiftung (HBS), Hans Seidel Stiftung (HSS), Rosa Luxembourg Stifttung also operate in India. All these foundations receive federal funding for their work abroad, and the funding amounts are determined by a complex process based on the average of the performance of the political parties in the last four German general elections. This funding mechanism

ensures that these foundations bring valuable foreign aid, thereby promoting a deeper understanding of Germany through their interactions with the civil society actors in India. These foundations have played a vital role in boosting dialogue and engagement between the two countries.

In order to promote close interaction between India and Germany, the Foundations work to increase people-to-people contact, undertake exchange programs, organize study tours between the two countries. The Foundations engage in activities to disseminate German ideas and German thinking to a wider audience. Their target audiences being the civil society, the private sector as well as the Indian polity.

The government of India allows these Foundations to bring in the much-needed foreign exchange after following the due processes and formalities of the Foreign Exchange Management Act (FEMA). The Foundations are allowed to work with India NGO's fulfilling certain conditions as laid down in the Foreign Contribution Regulatory Act (FERA). This way the Foundations do bring in grants to work in various sectors and fields of the Indian society.

Educational Cooperation

German Cooperation has also extended to educational institutions which comes in the form of financial assistance, material assistance and knowledge-based assistance. Under the knowledge-based assistance, Germany has provided India with numerous experts, both technical and non-technical, as well as equipment. The engagement with institutions of higher learning including IIT's of India have helped Indian engineers to foray into technical fields which might not have been possible without external support. The technical cooperation coupled with scientific cooperation between India and Germany is a testimony to the commitment that both partners have shown in the identification of suitable solutions towards sustainable development. Both India and Germany have committed to address the growing concerns of Climate Change and have been working together to develop environment friendly responses. Numerous collaborative projects have been undertaken by India and Germany jointly to minimize carbon emissions. Agreements are also in place to share research findings and help academics, scholars and experts to exchange information and knowledge in order to deepen understanding for

both countries. These initiatives have helped in deepening cooperation between the two nations.

Technical and Industrial Cooperation

The Indian government also receives cooperation and direct aid through the federal agency of Germany. The Gesellschaft für Internationale Zusammenarbeit (GIZ) has been working directly through various Indian state departments to foster technical cooperation and finance big projects. Similarly, Kreditanstalt für Wiederaufbau (KFW) is also engaged with the Indian government for financing of projects.

Industrial assistance is another area where Germany has been helping India. The assistance is both economic and/or technical. Depending on the objectives and the need of the Indian industry, Germany has come forth with its expertise in technology and wherever needed contributed financially in the development of Indian industry. The technical cooperation is in the form of German experts who are engaged in training and upskilling Indian workers with the latest machinery, operations etc. German industrial assistance has been across diverse sectors such as iron and steel, fertilizer, power equipment, ship-building machinery and ships.

Technical assistance is also in different fields. One of the ambitious projects being discussed with Germany is the “Clean Ganga” project.

Outcomes of Cultural, Social, Educational, Technical and Industrial Cooperation

The exchanges and interactions facilitated by cultural, civil society and the governmental institutions are a parallel step towards strengthening of relations between India and Germany. These collaborations promote mutual understanding and cooperation across various sectors. The investment in developing cultural and social relations will have long term impacts on understanding each other. Cultural exchanges have helped the younger generation to understand and adopt some of the German attributes in their personal and professional lives. The cooperation at various levels have encouraged students, academics, scientists and business representatives to learn German language.

Indian visibility in Germany has not been that planned and foresighted. India does not have formal institutions – like the political Foundations or Centers of Learning like Max Mueller Bhavans - that would permeate the civil society in Germany and it lacks the political instruments to do so. Therefore, knowledge about India in Germany is fairly restricted. Though, Indology is offered as a course in German Universities, there have been practically no effort on the part of the Indian government to educate the German civil society about India

In the recent years, India has taken some steps to increase its visibility by introducting innovative instruments like organizing the "Days of India" in Germany on themes like 'Connecting Cultures', 'Connecting Ideas', 'Connecting Minds', etc. However, such instruments need to be organized regularly in order to make any substantial impact on the German society. India needs to sustain its visibility and educate Germans about its rich traditions, rich culture and rich heritage.

Alongwith the economic and political relations, which underline the real strength of the partnership, the social, cultural, educational, technical and industrial relationsplay a significant role in strengthening of relations between partner countries.

3.5 Fall of the Berlin Wall-1989

One of the most momentous and historic moment not only for Germany but for modern Europe was the fall of the Berlin wall in November 1989. The wall, constructed in 1961 by the Soviet Union to create an eastern bloc, snapped all communication links and travel for its people beyond the boundaries of the eastern bloc. This wall came to be popularly known as the 'Iron Curtain'. This wall was symbolic of the cold war era and represented the existence of two ideologies – the capitalist and the communist.

The fall of the Berlin wall was a consequence of various events that finally signalled the end of the communist era. In 1980's, the economic crisis of Soviet Union posed great challenges for the leadership to provide for basic amenities for its people. The concept of self-sufficiency was no longer proving to be successful and coupled with the grave food shortages, the problems mounted. It was only after the Chernobyl disaster of 1986, when the collapse of the communist era became imminent.

The Soviet leader Mikhail Gorbachev, introduced his reform policy of '*glasnost'* (openness) and '*perestroika'* (restructuring). However, he could not control the speed of these reforms. Countries of eastern Europe, members of the communist bloc, were already seeing a sweeping change taking over. Hungary had opened its borders to Austria in August 1989, resulting in east Germans travelling to Hungary, and crossing into Austria from there, never to return back. Czechoslovakia, too, opened its borders and the West German embassy was filled with people wanting to go to West Germany. These incidents indicated the weaknesses of the system within the Iron Curtain.

With unrest in numerous member states of the Soviet Union, Gorbachev, ruled out the use of force or military deployment to control the mass protests taking place in countries like Poland, Estonia, Lithuania, Latvia, Romania and a few others. Military deployment to crush the protesters had been used earlier in the Soviet Union and in the territory of Soviet Union. Far in the east too, earlier in the same year, the Chinese regime had crushed the student protests in the Tiananmen Square in a major military crackdown. However, in member states of USSR use of force was not seen.

The German re-unification became a reality. It was a euphoric moment for Germany. The west gladly accepted the costs associated with the unification and in the coming months, a detailed plan was worked out on how to integrate east Germany and its people with the West.

Germany had an uphill task of integrating former East Germany (GDR) into the Federal Republic of Germany (FRG). It needed to re-build infrastructure, re-allocate resources, re-shuffle ministries, in a nutshell, unification of Germany was an ardent task.

The end of the cold war era began a new chapter of alignments, friendships and partnerships across the world and especially for India too. India had to re-think its foreign policy objectives, make new friends globally, attract investments and open to the world, something that India was not used to before this. This posed challenges especially on how to create a balance between old friends and gain new friends, given the ideological differences they had had over decades.

India was already mulling over suitable policy reforms in view of the political and economic crisis it was facing. The success of the South-East Asian economies and the success of China in implementing economic openness would help Indian economy. To emulate the export-led growth of the South East Asian economies, India needed to reform its economic policy embracing a more open trade and investment regime. This eventually happened in 1991 when India liberalized its economy.

3.6 India's Economic Reforms of 1991

The economic reforms of 1991 in India have been an important milestone in Indian independent history. India under severe economic crisis submitted a comprehensive reforms package to the International Monetary Fund (IMF) covering trade, public finance, exchange rate as well as reforms in the capital market. The resistance from the old school partymen within the congress and the bureaucracy had to be deftly overcome in getting through these reforms package (Ahluwalia, 2020). The reforms introduced a reduction in average applied industrial tariffs though agriculture continued to remain a protected sector (Krishna, 2019).

Until 1991, the Indian economic environment, mired in red-tape and bureaucratic procedures, was not only slow but also bred corruption. License Raj reared inefficiency making Indian businesses non-competitive in the international market. Large businesses were primarily under the control of the State and were disorganized. Wasteful government expenditure in some of the State-Owned Enterprises (SOE) drained valuable state resources. SOE's were characterized by lack of transparency and accountability. Tedious government approvals, excessive regulation and unprofessional working attitude affected businesses.

A new era began for India after 1991. Most tariff structures were reduced, steps taken to abolish license raj, businesses were opened for private players and business procedures and regulations were eased. The behemoth monopoly of the state in sectors like telecommunications and aviation was scrapped. Indians, for the first time experienced how easy and quick it could be to obtain a telephone connection, Indians, for the first time experienced how airlines could work smartly, efficiently and with a smile. The government operations in these two sectors continued but were no match to the efficiency

and promptness in delivery of service provided by the private sector. Early 2022, the government has eventually sold its stake in the state-run Air-India to the private business house TATAs. Communications is another sector where the subscriber base of government operator continues to fall questioning the very role of state in still holding on to this sector.

The convalescing relations between India and Germany from the 1980's accelerated after India's liberalization in the 1990's. As the world noticed the opportunities in India, Germany too realized the economic potential of India. This realization of India being an emerging economy, with a huge market having robust institutions gave rise to "Agenda for German Indian Partnership in the 21st Century". Formalizing the partnership, the German Foreign Policy aimed to strengthen the relationship between India and Germany (Gallenkamp, 2009). Both India and Germany committed to deepen their relations, politically, economically and socially.

This boosted the economic growth of the country which has seen noteworthy progress in its economic sphere. India realized that to exert influence in the global order, it had to be a wealthy nation and it aspired to be a major player in the global arena (Khatoon, 2013).

India's development has been erratic at times. It can best be described as a "kangaroo-jump" development, which has been unpredictable. India needs to work hard to stabilize its development in order to attract increased investments and increase its share of international trade (Agarwal, et al, 2021)

3.7 Role of Perceptions in Relations between India and Germany

Perceptions are vital to the success of any relationship. Perceptions define international relations, and are vital as they influence decisions (Singh, G. 2022). They also play an important role while defining the image within the civil society. In the age of social media, perceptions have played a huge role in building public opinion. However, the social media has also been used to malign the image of countries using fake material. Hence, the authenticity and veracity of facts need to be verified before just building perceptions in today's times. Moreover, perceptions need to be followed by actions.

It is common knowledge that historical events and cultural ties form an image in the minds of the people. These in turn influence how we deal with particular situations. The importance of perceptions can be felt across the civil society, the political decision making, business interactions and other sections of the society. Perceptions formed in one particular sector can also influence the decisions made in any other sector. Therefore, it is important to invest in 'perception building' especially in international relations.

Political leaders leverage on perception building to regain power, popularity and a permanent presence in the minds of their voters. Similarly, the dynamics of inter-country relationships is greatly influenced by the perceptions too. These perceptions strengthen the relations between nations. According to Gurjit Singh (2022) of Observer Research Foundation (ORF), perceptions are not only playing an important role but have an equally important role in boosting relations among nations (Singh, 2022)

While discussing political relations, India and Germany have been working towards building a favourable perception in the minds of their people. Germany has been ahead in this, with its cultural, social and educational outreach in India. India has ignored the strength of perception building until now. During the visits of the Prime Minister to Germany, there are few good photo-optic images that circulate both in India and in Germany. However, this photo-op image and perception building is short, event-based and may not have a wider outreach than desired.

The changing perception between India and Germany is visible in the growing collaborations that have grown in the last few years. The rising economic trends, the frequent interactions and a common understanding have been outcomes of this change of perception. The economic liberalization and changes in the life-cycle of a country also contribute to perception building. In the case of India, the German perception has also gone from that of indifference to a realization of an important strategic partner. Similar values and belief systems also shape how the other is perceived and act as a cohesive factor in bringing the two partners together. This can be witnessed in the case of India and Germany.

The political leaders have an important task of building or changing perceptions. Their actions, behaviour and decisions send an important message to both the other partner and

the civil society in both the countries. In the case of India and Germany, the foreign policy has reflected the outcomes of such posture of the political leadership too.

A social, economic and political effort will change the negative perception existing between the two countries and India and Germany need to make a conscious effort to build a positive perception for the advancement of relations.

3.8 COVID-19-2020

German dependence on China has consistently grown since the 1980's. As China relaxed its economic policies and opened doors for FDI, it became the hub of manufacturing activity. In order to benefit from economies of scale and the comparative advantage that China brought with itself, most industrial nations and Germany, in particular, had shifted their production bases to China. These were both for the consumer goods as well as intermediate goods needed by the still existing manufacturing activity in Germany. During the period from 1974-1982, Germany strengthened its relations with China. For the then Chancellor of Germany, Helmut Schmidt, 'Asia' meant only China.

Early 2020 started with an unprecedented event that shut down the entire world. Globally, countries began to impose lockdowns, suspended air-travel, switched off production units and sealed their borders. A deadly disease was spreading like wild-fire across the globe, transmitting through human-to-human contact. This came to be known as the Coronavirus, and was named COVID-19. The origins of the Coronavirus were in China, the 'factory of the world'. It was a contagious disease spreading rapidly, without any medical antidote available to contain it. The pharmaceutical industry, which normally takes years before introducing an antidote for public consumption, put all their knowledge, effort and resources in finding a quick cure for the disease.

The virus spread rapidly in China, Italy, Japan, Korea, US and Germany. These countries account for a large proportion of economic activity. More than 50% of the global manufacturing (including manufacturing exports) can be attributed to these countries. With economic activity coming to a grinding halt, supplies stopped. And with the lockdowns, world-over, the demand slumped too. Coronavirus became highly

contagiousnot just medically but its contagion effect was equally disastrous economically.

COVID-19 posed not just supply issues, it also exposed demand issues. As Chinese supply of intermediate goods stopped, the manufacturing industries in other countries stopped too, thereby unleashing a 'supply chain contagion'. This affected even those countries which were relatively less affected by the pandemic. This was a déjà vu moment of the Great Trade Collapse of 2008-09 (Bems, et. al., 2010; Alessandria, et. al., 2010; Yi, 2009).

On the contrary, most countries were dismayed and disappointed at the Chinese aggression during this time. The trade wars with China and its aggression disrupted the normal process of international rules. Even, the Chinese-centric stand and the gross negligence of International Agencies like WHO was questioned. The Australian insistence on conducting an investigation on the origins of the virus by a multi-lateral body were met with high tariffs on its wine exports to China. This caused Australian exports to plunge by 92%[4]. Arrogance of the Chinese especially against Taiwan and its provocative movements in the South China Sea have shaken the global status-quo. Along with concerns of the pandemic, discussions on safety and security have become a regular feature in international fora. This has prompted the revival of groupings like QUAD with US, Australia, India and Japan. The high tariffs on its wine exports by China have not deterred Australia to participate in the maritime drills in the Indian Ocean and the South China Seas.

Germany with substantial investments and economic alignment with China did not comment on the origins of the virus. Its long-term interests prevented it from ruffling feathers with its Chinese counterparts. Germany found itself in a very awkward position vis-à-vis China and the virus. No substantive statement was issued by Germany condemning the unprovoked Chinese incursion and skirmishes on the Indian border in 2020. Germany has not acknowledged the atrocities of Chinese in Tibet. The strong business lobby in Germany influences its government to overlook the misgivings of the

[4] https://www.scmp.com/economy/china-economy/article/3197160/australian-wine-exports-china-plunge-92-cent-tariffs-and-covid-disruptions-decimate-market#

Chinese regime. The pandemic has been a lesson to Germany as to not be so dependable on any one country that it dilutes its own moral stand.

The Indian response to COVID-19, was appreciated and recognised internationally. The acknowledgement of impending danger, the swift lockdowns, evacuation of Indians stuck abroad including students and the willingness to assist other countries with medical supplies and equipment did not go unnoticed.

A democratic India remains better than an autocratic China (Agarwal, et al. 2023). Sensing the global sentiment against China and looking for investment opportunities, India has invited interested countries, including Japan to set up production facilities in India. The pandemic also revealed India's pharmaceutical capabilities. India and Germany could join together to discuss ideas, innovations and capabilities in the health sector.

According to Gurcharan Das, India's growth is a "bottoms-up" success. The success of India cannot be attributed to the state alone. India has risen, in spite of the odds. Many other factors like entrepreneurship skills, hard-work of individuals, knowledge (especially of the English language) and a host of other reasons are the shakers and movers of Indian growth. China, on the other hand, had a "top-down" triumph. The success of China is due to the decisions made by the technocratic elite of the authoritarian state. The stubborn persistence of democracy in India is even more bizarre. Time and again, India has shown itself to be resilient and enduring – giving the lie to the old prejudice that "the poor are incapable of the kind of self-discipline and sobriety that make for self-government." (Das, 2006).

In order to shield from such 'Black Swan' events happening in the future, most countries started to re-think their strategies. It was prudent to protect the economic interests if such an event happened again – or in a particular country. The disastrous effects could be cushioned by production facilities elsewhere. The shift in strategic ties and global partnerships is getting more and more noticeable. Some countries looking to minimise the risk of their supply chain issues are considering investing in other suitable destinations.

In the post COVID era, partnerships and alliances have taken a new meaning altogether. While new friendships are developing, a few old ones are being re-kindled. Nations are becoming more protective of their own interests. While India has taken on Atma-nirbhar (self-reliant) as its adage, others are scouting for new destinations for their investments. Putting all eggs in one basket may not be the ideal solution. And thus, scattered economic interests make much more sense. India has been well recognised and appreciated during COVD and has jumped on to fill the vacuum as an attractive FDI destination. Germany and Indian partnership in the aftermath of COVID can be further strengthened.

3.9 Trade between India and Germany

The big game changer was the collapse of the Soviet Union and the fall of the Berlin wall. After the end of the cold war, the Indo-German relations have further deepened and the cooperation has grown to greater heights.

According to UN 2021 International Trade Statistics Yearbook, India's merchandise exports were US $ 394.8 billion in 2021, with imports being US $ 570.4 billion. A moderate trade deficit of US $ 175.6 billion was recorded in merchandise trade in 2021. Exports and imports were both diversified and top 30 partners accounted for 80% or more of exports and 23 top partners accounted for 80% or more of imports.

The top three main export destinations of India were the United States, the United Arab Emirates and China in 2021. The main products of export include Petroleum, oils other than crude, Diamonds, Medicaments, Articles of jewellery, Rice, Motor Cars and other motor vehicles for transport and their parts, etc.

The top three main imports for India were from China, the United States and the United Arab Emirates. Its main products of imports are Petroleum, oils and oil obtained from bituminous minerals, crude, Gold, Diamonds, Coal, Petroleum gases, Electrical apparatus for line telephony and telegraphy, electronic integrated circuits etc.

According to UN 2021 International Trade Statistics Yearbook, Germany's merchandise exports were US $ 1630.9 billion in 2021, with imports being US $ 1422.8 billion. A moderate trade surplus of US $ 208.1 billion was recorded in merchandise trade in 2021. Exports and imports were both diversified and top 21 partners accounted for 80% or more of exports and 21 top partners accounted for 80% or more of imports.

The top three main export destinations of Germany remained the United States, France and China in 2021. The main products of export include Motor cars and other motor vehicles, Medicaments, parts and accessories of motor vehicles and Commodities, Human Blood, Animal Blood for therapeutic use, other aircraft, spacecraft, etc.
The top three main imports for Germany were from China, the Netherlands and the United States in 2021. Its main products of imports are Commodities not specified according to kind, Motor car and other motor vehicles, principally designed for transport, Parts and accessories of motor vehicles, petroleum oils and oils obtained from bituminous minerals, Petroleum gases, medicaments etc.

Indian economy is the fifth largest in the world by nominal GDP and the third largest by Purchasing Power Parity (PPP).[5] A buoyant economic environment with growing consumer demand has contributed to India's growing GDP. The high calibre of Indian human capital sheds the perception of India being a labour intensive country only.
According to Biswarup (2012), India was eleventh largest by nominal GDP and third largest by PPP (Biswarup, 2012). India was Germany's 24th largest trading partner in 2010 (Shaner, 2013). India and Germany continued to grow their trading relationship since 2000, however they still have potential to grow their economic relationship. This is based on the simple premise that some of the smaller countries like Poland rank better as Germany's trading partners (Tiwari, 2012). Germany over the years has become the top most trading partner of India in Europe. In the period from 2021-22, bi-lateral trade between India and Germany was valued at US$ 24.8 billion. Germany stood at 12th position in 2022 (as of August 2022) as a trading partner of India. This is considerably better than its position in 2010.

While Germany expanded its trade interests in the far east wth the 'Asian Tigers' in the decade of 1990's, its trade volume with India during the period increased steadily, showing a slight decline during 1998-99, due to the imposition of sanctions for conducting nuclear tests by India.

[5] "IMF DataMapper / Datasets / World Economic Outlook (October 2022) / GDP per capita, current prices / List (2022) – Analytical group: European Union, World". IMF.org Internationation Monetary Fund. 11th October 2022. Retrieved 17 November 2022

Data collected from the UN Comtrade, is used to understand the exports and imports of India and Germany to each other and exports and imports of India and Germany with the world. This gives useful insight into the development of trade between India and Germany over the period 2002-2021. The four aspects of trade are dealt below:

3.9.1 India's Exports to Germany vis-à-vis World

India has increased its total exports to the world and also its exports to Germany in the last 20 years in absolute terms. It is evident that India's exports to Germany have increased 5-fold from US $ 2.37 to US $ 12.86 billion during the period from 2002-2021. While its total exports have increased 8-fold (approx.) in the same period.

Table 3.1: India's Exports to Germany vis-à-vis World (billion USD)

Year	Exports of India to the World	Exports of India to Germany	Percent Share
2002	50.10	2.37	**4.74**
2003	59.36	2.95	**4.98**
2004	75.90	3.65	**4.80**
2005	100.35	4.23	**4.22**
2006	121.20	5.29	**4.37**
2007	145.90	6.46	**4.43**
2008	181.86	7.93	**4.36**
2009	176.77	7.17	**4.06**
2010	220.41	8.39	**3.81**
2011	301.48	10.66	**3.53**
2012	289.56	9.15	**3.16**
2013	336.61	9.39	**2.79**
2014	317.54	9.59	**3.02**
2015	263.89	8.41	**3.19**
2016	260.96	8.47	**3.25**
2017	295.86	9.57	**3.24**
2018	323.99	10.55	**3.26**
2019	323.25	10.52	**3.26**
2020	275.49	10.83	**3.70**
2021	394.81	12.86	**3.26**

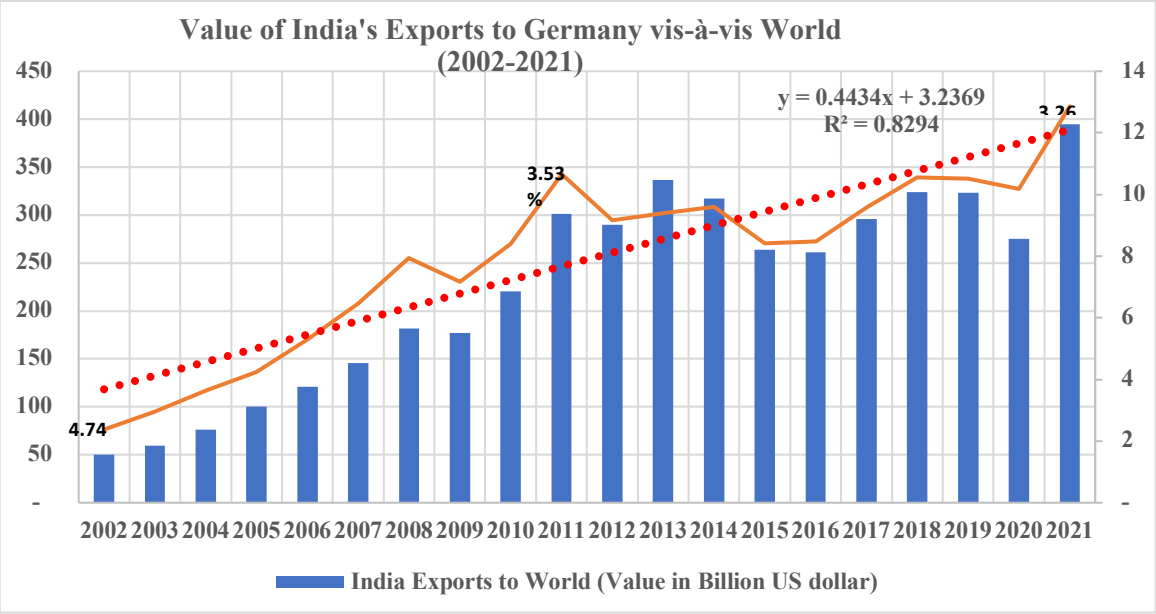
Source: UNComtrade

However, in relative terms, the percentage share of Indian exports to Germany (vis-a-viz, its share of total exports to the world) has declined from 4.74% in 2002 to 3.26% in 2021.

It is noteworthy to mention that the Indian exports continued to increase steadily from 2002-2008 and then saw a decline in 2009. Similarly, a decline is seen in 2012. The period from 2014-2020 has been a volatile period for Indian exports to Germany, wherein there are ups and downs, which are visible from the data given in Table 1.
The years 2009, 2012 are periods where the global financial setbacks have had an impact on Indian exports too. In 2008, the burst of the housing bubble led the developed world to an economic slowdown, some even calling it the great recession.

In 2013, in spite having a substantial increase in its exports to the world, India's share of exports was just 2.3% (in relative terms) to Germany.
An analysis of this data, shows that India has diversified its export basket by increasing the product portfolio as well as adding new export destinations.
Graph 3.1 shows the value of India's exports to Germany vis-à-vis the World. The two-scale graph shows the exports from India to the world (blue bars) and the orange line (line diagram) shows Indian exports to Germany.

Graph 3.1: Value of India's Exports to Germany vis-à-vis World



Graph 3.1 shows a linear trend line (red dotted line) shows linear trend to India's exports to Germany. The line of best fit is

$Y=0.4434X + 3.2369$ and $R^2 = 0.8294$ (Coefficient of Determination)

This trend line indicates an annual average growth rate of 44% of India's exports to Germany during the period 2002-2021.

3.9.2 India's Imports from Germany vis-à-vis World

Table 3.2: India's Imports from Germany vis-à-vis World (billion USD)

Year	Imports of India from World	Imports of India from Germany	Percent Share
2002	57.45	2.23	**3.88**
2003	72.43	2.77	**3.82**
2004	98.98	4.09	**4.14**
2005	140.86	5.21	**3.70**
2006	178.21	8.00	**4.49**
2007	218.65	10.13	**4.63**
2008	315.71	1,2.13	**3.84**
2009	266.40	11.33	**4.25**
2010	350.03	12.38	**3.54**
2011	462.40	15.19	**3.29**
2012	488.98	13.45	**2.75**
2013	466.05	12.22	**2.62**
2014	459.37	1,1.89	**2.59**
2015	390.80	10.79	**2.76**
2016	356.69	10.82	**3.03**
2017	443.85	12.07	**2.72**
2018	509.27	14.73	**2.89**
2019	478.83	13.33	**2.78**
2020	367.98	12.22	**3.32**
2021	570.40	14.71	**2.58**

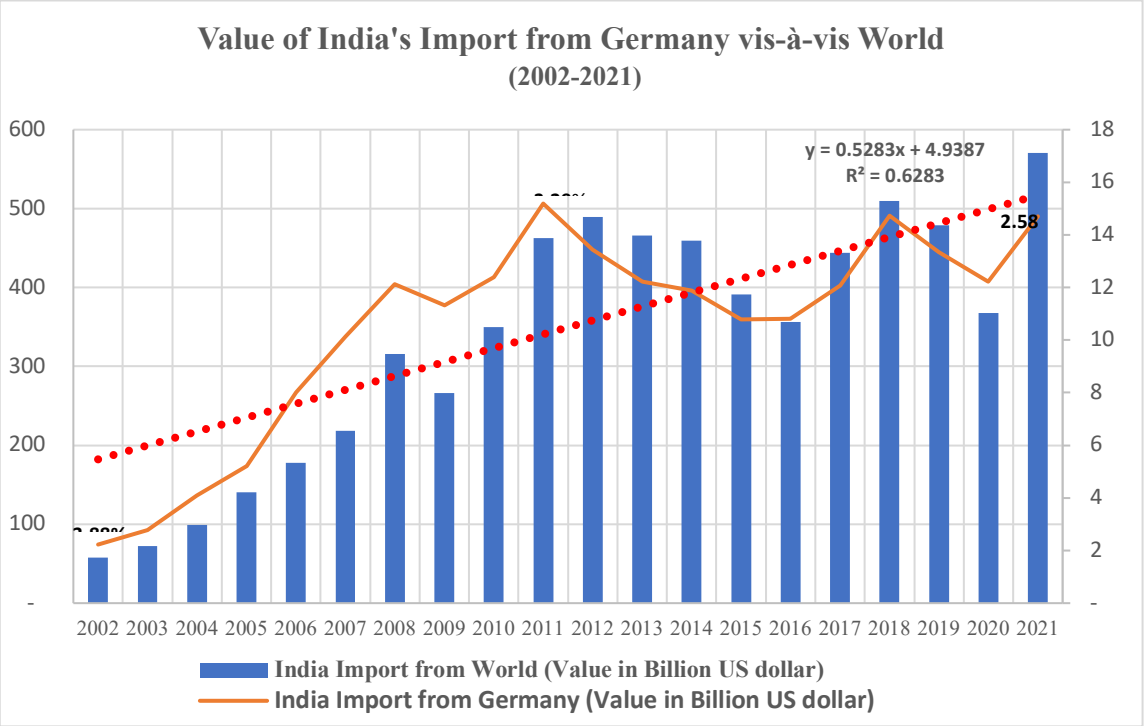
Source: UNComtrade

Table 3.2 shows that in absolute terms, Indian imports from the world have increased 10-fold from US $ 57.4 billion in 2002 to US $ 570.4 billion in 2021. Similarly, imports from Germany have also increased from US $ 2.22 billion to US $ 14.70 billion for the same period. It is noteworthy that Indian imports from Germany steadily increased from 2002-2011. The imports from Germany in 2011 were of a total value of US $15.19 billion in the year 2011. Thereafter, Indian imports from Germany have fluctuated till 2021 but still not seen the same levels of 2011.

However, in relative terms, the percentage share of Indian imports from Germany (vis-à-vis its share of total imports from the world) has declined from 3.88% in 2002 to 2.58% in 2021. The years 2013 and 2014 have recorded extremely low share of Indian imports from Germany showing only 2.62% and 2.59% respectively, in relative terms. The lowest import from Germany, however, is recorded in the year 2021, with the share of German exports at only 2.58% .

An analysis of this data shows that Indian imports have become more diversified in their product portfolio over the period and new import partners have been added.

Graph 3.2: Value of India's Import from Germany vis-à-vis World



Graph 3.2 shows the value of imports from Germany vis-à-vis the world. The two-scale graph shows the imports to India from the world (blue bars-scale on the left) and the orange line (line diagram-scale on the right) shows German imports to India. A linear trend line (red-dotted line) shows linear trend to India's import from Germany. The line of best fit is

$Y = 0.5283X + 4.9387$ and $R^2 = 0.6283$ (Coefficient of Determination)

This trend line indicates an annual average growth rate of 53% of India's Imports from Germany during the period 2002-2021.

3.9.3 German Exports to India vis-à-vis World

Table 3.3 shows that German exports to the world increased steadily during the period from 2002-2011. However, the first decline of German exports on YoY basis is seen in 2012. The German exports to the world shrank by around 5% in 2012 as compared to 2011, registering a negative growth YoY.. Similarly, the German exports to the world witnessed a growth of -11.65% in 2015 as compared to 2014. The period from 2014 until 2019 saw exports rise. In 2020, German exports to the world whereby COVID-19 had shut down the world in 2020.

Table 3.3: German Exports to India vis-à-vis World (billion USD)

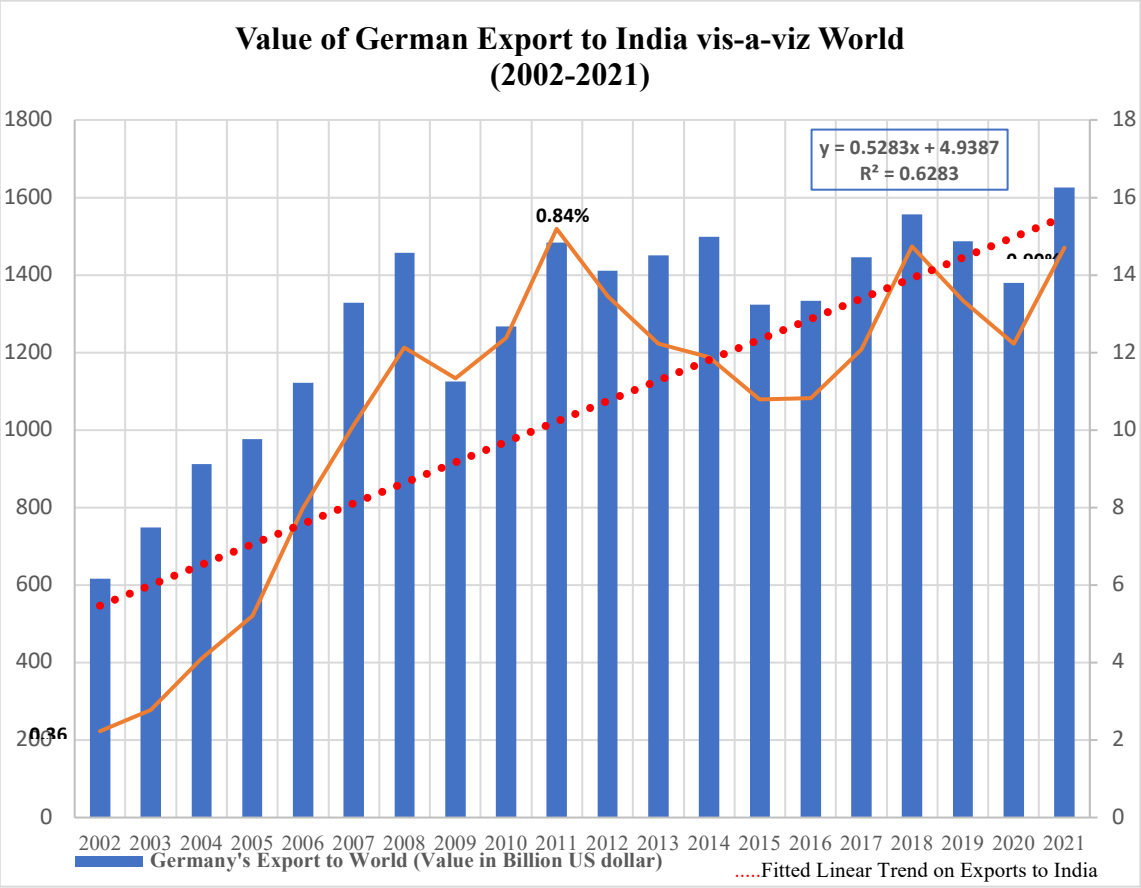
Year	Exports of Germany to the World	Exports of Germany to India	Per cent Share
2002	615.99	2.23	**0.36**
2003	748.53	2.77	**0.37**
2004	911.74	4.09	**0.45**
2005	977.13	5.21	**0.53**
2006	1,121.96	8.00	**0.71**
2007	1,328.84	10.13	**0.76**
2008	1,457.46	1,2.13	**0.83**
2009	1,125.84	11.33	**1.01**

2010	1,267.74	12.38	**0.98**
2011	1,483.80	15.19	**1.02**
2012	1,410.15	13.45	**0.95**
2013	1,450.94	12.22	**0.84**
2014	1,498.24	1,1.89	**0.79**
2015	1,323.67	10.79	**0.82**
2016	1,332.49	10.82	**0.81**
2017	1,444.78	12.07	**0.84**
2018	1,556.62	14.73	**0.95**
2019	1,486.88	13.33	**0.90**
2020	1,379.90	12.22	**0.89**
2021	1,626.39	14.71	**0.90**

Source: UNComtrade

Graph 3.3 shows the value of German exports to India vis-à-vis the world. The two-scale graph shows the German exports to the world (blue bars-scale on the left) and the orange line (line diagram-scale on the right) shows German exports to India. A linear trend line (red-dotted line) shows linear trend of German exports to India.

Graph 3.3: Value of German Export to India vis-a-viz World



The line of best fit is

$Y=0.5283X+4.9387$ and $R^2 = 0.6283$ (Coefficient of Determination)

This trend line indicates an annual average growth rate of 53% of German Exports to India during the period 2002-2021.

3.9.4 German Imports from India vis-à-vis World

Table 3.4: German Imports from India vis-à-vis World (billion USD)

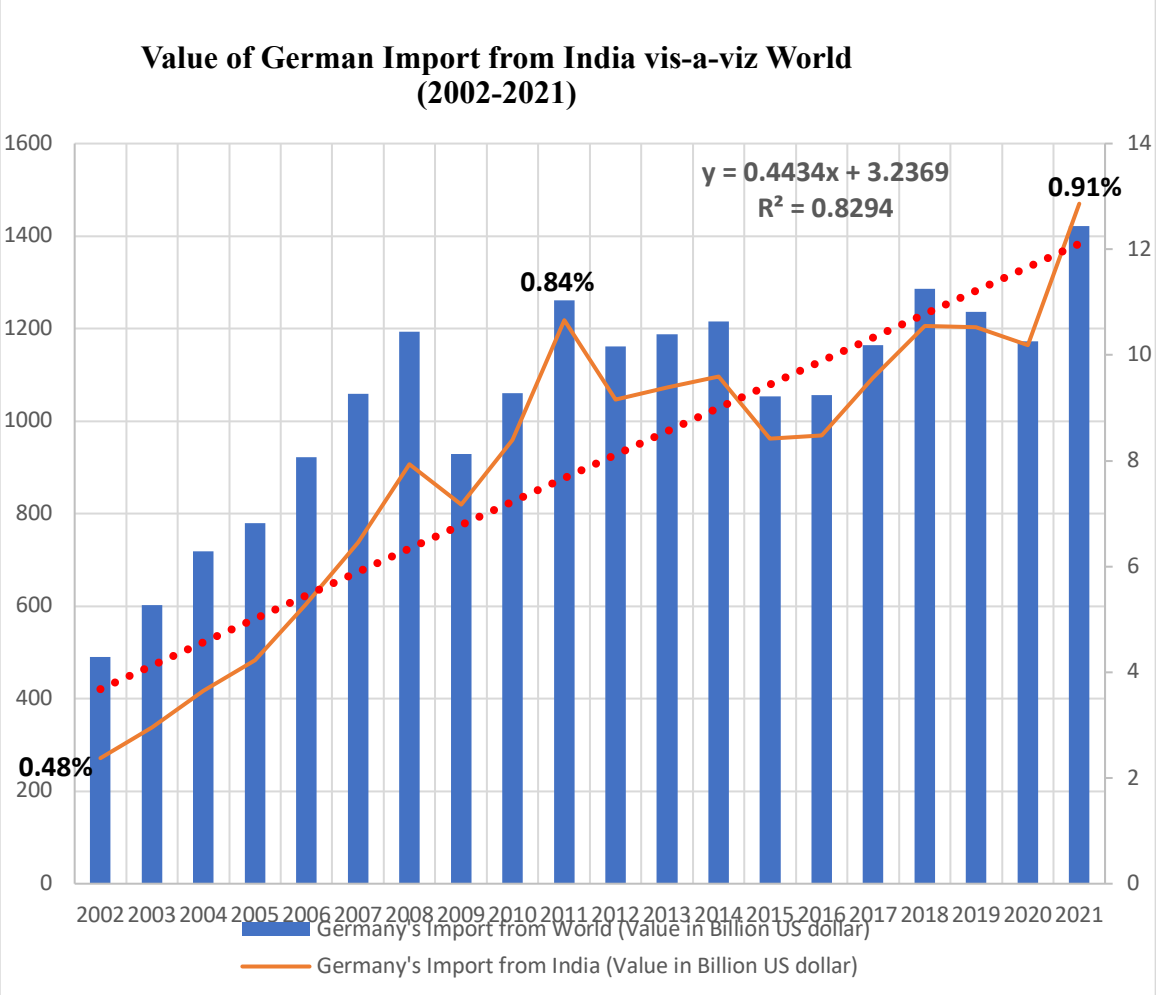
Year	Imports of Germany from the World	Imports of Germany from India	Per cent Share
2002	490.45	2.37	**0.48**
2003	601.76	2.95	**0.49**
2004	718.15	3.65	**0.51**
2005	779.82	4.23	**0.54**
2006	922.13	5.29	**0.57**
2007	1,059.31	6.46	**0.61**
2008	1,192.58	7.93	**0.66**
2009	928.89	7.17	**0.77**
2010	1,060.67	8.39	**0.79**
2011	1,261.59	10.66	**0.84**
2012	1,161.25	9.15	**0.79**
2013	1,187.30	9.39	**0.79**
2014	1,214.92	9.59	**0.79**
2015	1,053.39	8.41	**0.80**
2016	1,056.66	8.47	**0.80**
2017	1,164.59	9.57	**0.82**
2018	1,286.00	10.55	**0.82**
2019	1,236.28	10.52	**0.85**
2020	1,172.92	10.83	**0.87**
2021	1,421.197	12.86	**0.91**

Source: UNComtrade

Table 3.4 shows that German imports to the world increased approx. 3-folds during the period from 2002-2021. After a steady increase from 2002-2008, German imports shrank in the year 2009. A negative growth of -22% imports was witnessed in the year 2009. German imports from the world had a steady rise from 2010-2014. The year 2020 saw a reduction in German imports from the world on account of COVID-19.

Graph 3.4 shows the value of German imports from India vis-à-vis the world. The two-scale graph shows the German imports from the world (blue bars-scale on the left) and the orange line (line diagram-scale on the right) shows German imports from India.

Graph 3.4: Value of German Import from India vis-a-viz World



A linear trend line (red-dotted line) shows linear trend of German imports from India. The line of best fit is

$Y = 0.4434X + 3.2369$ and $R^2 = 0.8294$ (Coefficient of Determination)

This trend line indicates an annual average growth rate of 44% of German Imports from India during the period 2002-2021.

3.9.5 Top Products of Trade between India and Germany

Table 5 shows the top 10 industries exporting to Germany from India in the year 2021. Whereas, Organic Chemicals top the list with a total export value of US$ 1.69 billion, the Machinery, mechanical appliances, nuclear reactors, boilers etc come a close second with a exports worth US$ 1.28 billion. Textiles and apparels, electrical machinery, pharmaceutical products, iron and steel including vehicles also are the main industries exporting from India to Germany. The corresponding value in billion US$ alongwith the product code is given in Table 3.5:

Table: 3.5 Top 10 Merchandise Exports of India to Germany 2021 (billion USD)

Product Code	Product Label	Value
29	Organic chemicals	1.69
84	Machinery, mechanical appliances, nuclear reactors, boilers; etc	1.28
85	Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television …	1.13
61	Articles of apparel and clothing accessories, knitted or crocheted	0.84
62	Articles of apparel and clothing accessories, not knitted or crocheted	0.73
30	Pharmaceutical products	0.55
87	Vehicles other than railway or tramway rolling stock, etc	0.52
73	Articles of iron or steel	0.41
72	Iron and steel	0.41
64	Footwear, gaiters and the like; parts of such articles	0.41

Source: UNComtrade

Graph 3.5 shows the top 10 exporting industries of India to Germany. While organic chemicals command a value of US$ 1.69 billion worth of exports, the footwear, gaiters and the like, which are at the 10th spot on this graph have a total value of US$ 0.41billion.

Graph 3.5: Top 10 Merchandise Exports of India to Germany in 2021

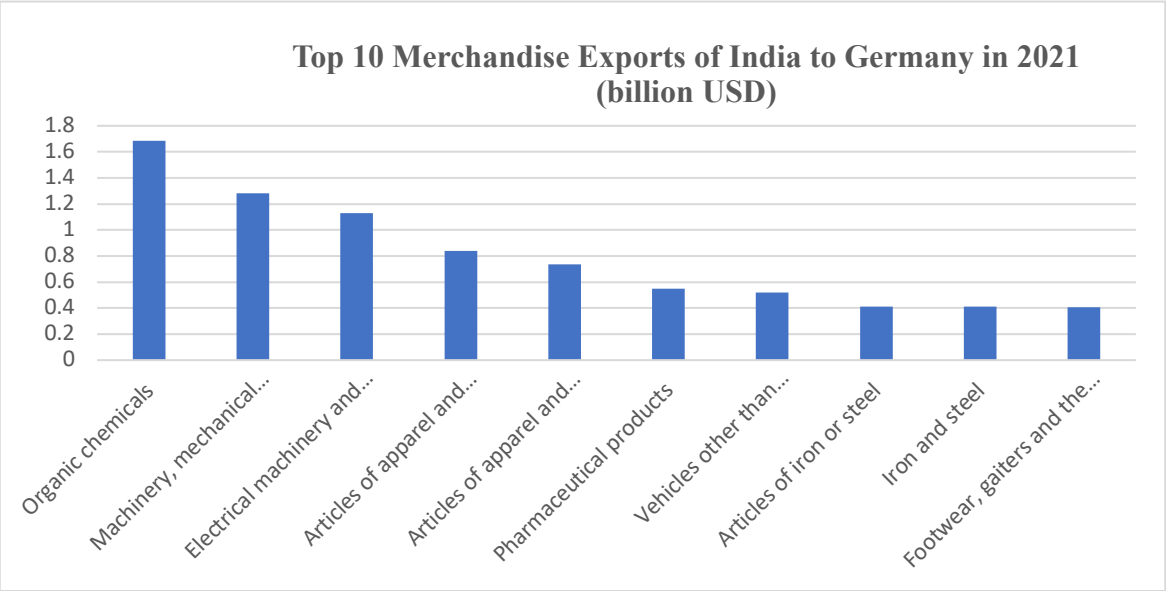
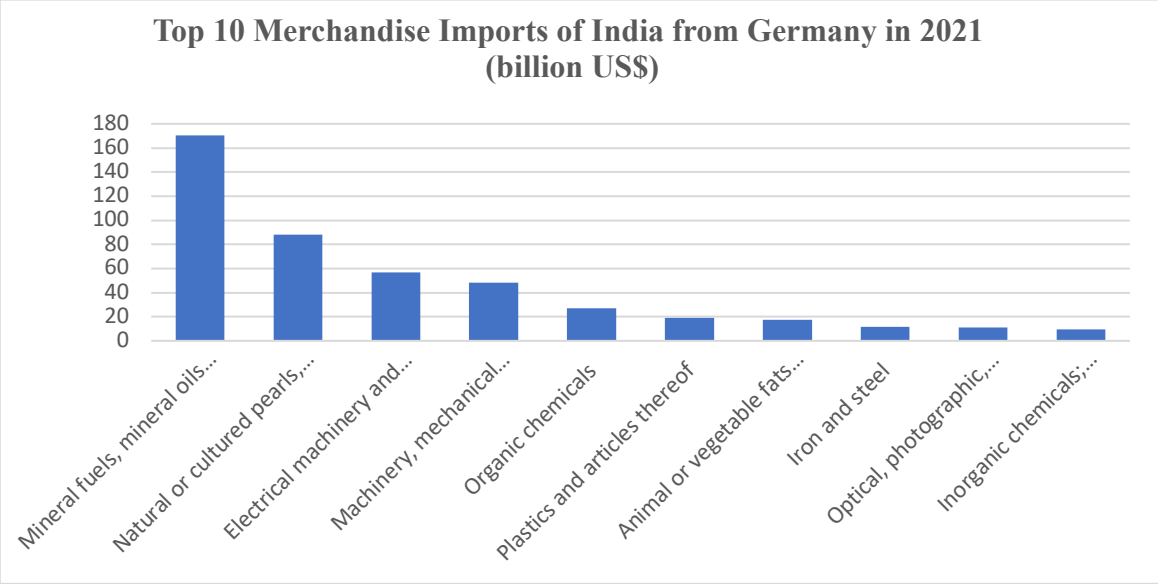


Table 3.6: Top 10 Merchandise Imports of India from Germany in 2021 (billion USD)

Product Code	Product Label	Value
27	Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral ...	170
71	Natural or cultured pearls, precious or semi-precious stones, precious metals, metals clad ...	88
85	Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television ...	57
84	Machinery, mechanical appliances, nuclear reactors, boilers; etc	48
29	Organic chemicals	27
39	Plastics and articles thereof	19
15	Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal…	17
72	Iron and steel	12
90	Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical ...	11
28	Inorganic chemicals; organic or inorganic compounds of precious metals, of rare-earth metals, ...	10

Similarly, Table 3.6 gives the top 10 merchandise imports of India from Germany in the year 2021. The main merchandise imports from Germany into India are of Mineral fuels, mineral oils and products of their distillation bituminous substances, etc , under the product code 27, having a value of USD 170 billion. This is followed by natural or cultured pearls, precious or semi-precious stones, precious metals, metal clad etc, under the product code 71, with a total import value of USD 88 billion in the year 2021. Under product code 85, Electrical machinery and equipment and parts thereof, etc have been imported worth USD 57 billion. These three products are the only products which have been imported to a value of USD 50 billion or more from Germany in the year 2021. Among the top 10 products, it is noticed that while the volume of imports of the topmost product is USD 170 billion, the 10th position occupied by product code 28, consisting of inorganic chemicals, organice or inorganic compounds of precious metsls, of rare-earth metals, etc have been imported worth USD 10 billion only.

Graph 3.6: Top 10 Merchandise Imports of India from Germany in 2021



Graph 3.6 shows the merchandise imports from Germany into India through a bar diagram. The graph shows the big difference in the value of imports in the first 10 category of products itself. While the first three products have an import value of more than USD 50 billion each, the products on the fourth position till the ninth position have an import value between USD 10-50 billion only. Among the top 10 imports product

code 28 has only a value of USD 10 billion. This shows the wide difference in the value of imports from Germany into India.

3.10 Conclusion:

A close analysis of the data shows that though, India's imports from Germany have increased from US $ 2.2 billion in 2002 to US $ 14.70 billion in 2021, its imports from the world have increased even at a faster pace during this period. A plausible inference is the shifting of German production facilities to a third country. Taking cue, Indian foreign policy making should devise suitable framework to attract such investments. This would increase Indian exports to Germany and to the world.

Diversification of Indian export basket to fulfill the demands of the German consumer would be another way of increasing Indian exports to Germany. A deeper understanding of the German market and its requirements will help in exporting the right products at the right price and quality. A mature Indian industry can cater to the German market thereby increasing the trade between India and Germany.

India also needs to invest in high-value products, to compete with other countries while looking at the German market. India needs to look at new technologies especially creating environment friendly products as Germany as a country is environment conscious country.

India offers a huge market for Germany and German industry should look at introducing their product portfolio in the Indian market. The big German firms like Siemens, ABB, Bosch have had very successful ventures in India. It would be prudent for German *Mittelstand* (Small and Medium Enterprises) to also seriously think of India as a big market and develop strategies to address the demands of the Indian consumer.

COVID-19 has forced countries to rethink their production strategies. With countries now spreading their production facilities across many nations, it is of utmost importance that India is high on the list of countries wanting to relocate production bases. This ensures economic benefits for India as well as the investing country. Demographic dividend of India is an added attraction with human capital being cheaply available in India. All such factors speak in favour of attracting foreign investments in India. At the

same time, easing regulations, a more liberalized economic regime, simplified procedures and reduction in bureaucratic barriers would help India to become an attractive investment destination. German investments would help strengthen the Indo-German partnership and help in economic growth of both India and Germany.

Another factor is the outbreak of the Russia-Ukraine war. The gas supplies to Germany from Russia have been significantly reduced and Germany is looking to secure its energy needs from other countries. With deteriorating relations with Russia, Germany, in all seriousness will look for alternatives for energy-intensive industries. Though, the German civil society and the political elite are disappointed with India's decision of not condemning the Russian invasion of Ukraine, India could still fill the gap by offering to manufacture energy-intensive products, in order to fulfill the demands of the German industry and consumers.

India and Germany remain two prominent countries in their respective geographical areas and internationally. Forging close and deep ties will result in sustainable and inclusive development and elate the stature of the two countries at the global arena.

Germany remains one of the strongest economies in Europe. However, it treads being a leader with caution. With a historical baggage of second world war, Germany has restricted to foray into an aggressive leadership role. Undoubtedly, Germany has been one of the prime movers of the common market and the common currency. EU has brought advantages for Germany economically for its exports as well as being an important player in the EU political system. German reconciliation with its neighbours, especially France, are the key ingredients of being a successful leader.

India is a dominant actor in South Asia but its relations with neighbours are prickly. India needs to tackle the neighbourhood with tactful diplomacy. It also has the threat of China looming large. However, China's edginess leads to its aggressive actions while luring countries into its debt trap. India's soft-power and growing stature are tilting the inter-country equations. With global powers realising India's potential, India's geographical importance, India is poised to play an important role in global politics.

India also is fully aware that to be relevant at the global politics, it would need to be a sufficiently wealthy nation (Andersen, W., 2001) and Indo-German economic cooperation with intensive trade and investment opportunities would help India reach that level where it could exert its role as a leader. India is also a vital player for Germany in the Indo-pacific given the geopolitical and economic developments that are currently at play in the region[6].

After COVID-19, the countries are looking at others through a new prism. A prism, which re-defines their partnerships, alliances and collaborations, at the same time, cushions them from perceived man-made threats. India plays a prominent role in this new global order. Germany has concentrated its manufacturing in China and is now seriously considering to re-locate its investments in order to mitigate itself from disastrous events (whether man-made or natural) taking place in one geographical location. India, being a democracy with promising potential, is high on their list. It is not only the economic advantages that attract foreign investors to India, but also its democratic values, its soft-power and the leadership role globally. India should make efforts to attract German investments by sorting out its regulatory procedures, improvement in infrastructure and seamless transportation facilities. In order to become an export-hub, India needs to simplify its operational systems.

Engaging the diaspora is a big initiative that has strengthened India's image internationally. India realises the invaluable contribution of the Indian diaspora. Each and every Indian is an ambassador to showcase the greatness of India. In the last few years, India has reached out and involved the Indian society abroad as influencers of India. The prominent roles occupied by persons of Indian origin, be it at Google, Alphabet or the World Bank are another reminder of the significance of India at the international platform. India is what Indians are. And Indians are making India proud and taking India to glorious heights.

The advancement in technological fields is another area where India comes forth as a serious player. In its repeated attempts to send missions to the moon, India has caught

[6]https://www.india-briefing.com/news/profiling-india-germany-trade-and-investment-relations-26995.html/

the world attention. India is considered one of the few countries that have a well-established space programme and is working assiduously towards regular innovation in the field of space technology and at a much reasonable cost when compared with other countries. A collaboration with Germany is likely to bring in technological exchange of know-how and take India to becoming a leader in space research.

Along-with space research, investments into R & D would make India a global leader in the long-run. Comparing to Chinese growth, which has been built on manufacturing without much R&D. India, known for its innovative and fresh approach can become a leader in R&D, which would again prove useful for India to be a world leader. Pharmaceutical industry is an example where Indian R&D is well-recognised and can be further improved. As India becomes a world leader in the pharma industry, it needs to emulate such distinctiveness in other sectors as well.

A deeper partnership with Germany would help India achieve its ambitions of being an important player at the global stage. Germany and India can cooperate in various sectors like R&D, defence and security, medicine, space-research, trade and investments to become world leaders. Understanding cultural differences, accepting geographical challenges and devoting additional effort and time in the partnership will be a pioneering change to the Indo-German alliance. It is time to up the ante of strategic partnership with an aim to become relevant participants at the world stage.

Engaging foreign media to showcase the strengths of India would go a long-way in changing the current discourse about India. India needs to make a concerted effort to engage with the foreign media in its successes. A continued and regular update about Indian news would educate the foreign civil society and have immense outcome. Engagements using social media are equally important for India. A well-planned global outreach programme would help India become a household name.

India and Germany have much in common. With their shared values, shared vision of a peaceful world, commitment to issues of climate change and great respect for human rights, tapping into their vast economic potential will further strengthen their future development. A deeper understanding of each other while keeping the doors of dialogue open will bring in opportunities that would bring gains to both the partners. The two need

to identify complementarities in business and deepen economic ties. Politically, a mature and balanced view of global issues will further strengthen the partnership between the two countries.

CHAPTER 4
ANALYSIS OF GROWTH TRADE RELATIONSHIP BETWEEN INDIA AND THE EUROPEAN UNION

Chapter 4:

ANALYSIS OF GROWTH-TRADE RELATIONSHIP BETWEEN INDIA AND THE EUROPEAN UNION

4.1 Introduction

Evidence based results contribute to the theoretical premise and are important instruments employed while developing foreign policy. An understanding of theoretical knowledge needs to be validated by empirical work. Targeted empirical analysis with a given objective will present a convincing result that can be useful for qualitative decision-making. A theory presented and applicable in one geographical area may not produce the same result when applied in another geographical area. Economists and academics thus, look at various aspects when computing data and analyzing the results using different techniques. Even while using the same variables, and the same data-set, results may differ due to a number of factors which may be influencing real life events and are not captured solely by data. This provides a fresh perspective and interpretation of presenting an analysis.

A quantitative examination using credible data compliments the qualitative analysis and thus provides a comprehensive output. This output helps in further research from an academic point of view and at the same time this empirical analysis provides the framework for international partners to engage in meaningful negotiations with other counterparts.

Trade negotiations on tariffs and non-tariff barriers have been the subject of much scrutiny since long. However, it may not be possible for economists to factor in all variables that effect the trade relationships with different partner countries. The data provides reliable information which can be used to determine and forecast the future of a relationship. Such analysis based on past trends and patterns gives a very robust output. Statisticians and economists have used this data to forecast the effect of international trade with other countries.

This chapter analyses the trade-growth nexus of India with major trading partners of India in the EU. These EU members states are Belgium, France, Germany, Italy and the

Netherlands. UK has not been considered in this work as it is no longer a member of the EU after Brexit. A substantive amount of Indian trade is with these five member states and thus these five member states of the EU are representative of the whole EU to achieve the objectives of this study. The literature review for this chapter is included in chapter 1, which talks of the existing literature (section 1.4) and the gaps in the existing literature (section 1.5), which justify the current research

4.2 Defining the parameters and Formulation of Hypotheses

The objective of the study is to understand the relationship between India's growth and its trade with the EU. This relationship of India is examined individually with six entities of EU. To examine the Growth -Trade relationship of India with the EU, the empirical analysis has been undertaken using the following parameters. The Indian GDP (denoted by Y_I) and log of India's GDP (denoted by $Ln(Y_I)$) is taken together with the trade data comprising of India's exports (denoted by X) as well as India's Imports (denoted by M). As the exports and imports pertain to a member country of the EU, the country has been depicted with a subscript with X and M. The natural logarithm is also depicted with Ln for log, the country's exports and imports with X and M and the subscript giving the identity of the country. The country-wise terms used for exports, imports, log of exports and log of imports are given below :

Table 4.2.1: Country representation in the analysis

Country	India's Exports to	India's Imports from	Log of Exports	Log of Imports
Belgium	X_B	M_B	$Ln(X_B)$	$Ln(M_B)$
France	X_F	M_F	$Ln(X_F)$	$Ln(M_F)$
Germany	X_G	M_G	$Ln(X_G)$	$Ln(M_G)$
Italy	X_T	M_T	$Ln(X_T)$	$Ln(M_T)$
The Netherlands	X_N	M_N	$Ln(X_N)$	$Ln(M_N)$
EU5	X_E	M_E	$Ln(X_E)$	$Ln(M_E)$

India's GDP is denoted by – Y_I

Log of India's GDP – $Ln(Y_I)$

4.2.1 Hypothesis Formulation:

In light of the objectives, the main hypothesis and their formulation are being mentioned here again

Table 4.2.2: Hypothesis Formulation		
Hypothesis	**Null Hypothesis**	**Alternate Hypothesis**
1.Growth Led Exports (GLE)	H_0: GDP does not cause exports	H_1: GDP does cause exports
2.Exports Led Growth (ELG)	H_0: Exports does not cause GDP	H_1: Exports does cause GDP
3.Growth Led Imports (GLI)	H_0: GDP does not cause imports	H_1: GDP does cause imports
4.Imports Led Growth (ILG)	H_0: Imports does not cause GDP	H_1: Imports does cause GDP
5.Exports Led Imports (ELI)	H_0: Exports does not cause imports	H_1: Exports does cuase imports
6.Imports Led Exports (ILE)	H_0: Imports does not cause exports	H_1: Imports does cause exports

The above hypothesis is checked for India with all the individual countries of EU namely, Belgium, France, Germany, Italy, the Netherlands and the collective EU5.

4.3 Trade Relationship of India with EU

Trade between India and the EU has increased with both exports and imports showing a healthy increase in the last 28 years. With the EU countries, which form a part of this study, India has considerably strengthened its trading relations with each of these countries and now stands as the 10^{th} largest trading partner of the EU. For India, EU is substantially more important and EU is the 3^{rd} largest trading partner.

The individual data for exports and imports, taken at current values alongwith their average growth rates is given below:

4.3.1 India's Exports to EU

Table 4.3.1 shows the value of exports to each of the five member states of the EU and to these five states collectively as EU5. India's exports to the Netherlands have increased from less than USD 1 billion in 1995 to a whopping USD 18 billion in 2022. With this the Netherlands is also the largest export destination for India in the EU. The second important export destination for India in the EU is Germany. India's exports to Germany are over USD 10 billion in 2022, while they were almost USD 2.0 billion in 1995.

Table 4.3.1: India's Exports to EU Member States (Current Value in mio USD)

Year	Belgium	France	Germany	Italy	Netherlands	EU5
1995	--	749.2	1,971.4	1,010.9	766.7	4,498.2
1996	--	718.9	1,893.0	933.7	852.3	4,397.9
1997	--	763.9	1,921.6	1,114.1	802.6	4,602.1
1998	--	836.6	1,851.3	1,054.6	763.3	4,505.7
1999	1,334.9	902.8	1,731.6	1,118.2	884.6	5,972.0
2000	1,428.8	975.7	1,821.7	1,266.8	855.6	6,348.5
2001	1,400.9	988.9	1,784.8	1,267.8	857.3	6,299.6
2002	1,618.6	1,038.8	2,030.0	1,268.7	969.3	6,925.6
2003	1,774.8	1,194.0	2,357.4	1,581.4	1,242.9	8,150.5
2004	2,212.9	1,567.6	2,683.5	2,041.3	1,458.3	9,963.6
2005	2,788.4	2,015.7	3,483.2	2,528.1	2,396.4	13,211.8
2006	3,326.6	2,158.6	3,851.7	3,386.2	2,470.3	15,193.4
2007	4,037.6	2,448.9	4,726.3	3,779.7	4,343.0	19,335.5
2008	4,717.9	3,086.4	5,915.2	3,999.9	6,528.6	24,248.0
2009	3,551.0	3,305.3	5,848.3	3,297.5	6,464.9	22,467.0
2010	5,025.9	4,903.0	5,989.5	4,187.7	6,572.9	26,679.1
2011	7,395.4	5,046.0	8,260.4	5,049.0	9,693.2	35,444.0
2012	5,558.5	5,020.3	7,133.8	4,294.3	9,466.4	31,473.3
2013	6,855.1	5,597.2	8,081.3	5,617.5	9,170.0	35,321.1
2014	5,895.0	5,093.4	7,745.2	5,445.5	6,762.2	30,941.4
2015	5,005.5	4,819.5	7,023.5	4,228.3	4,876.5	25,953.3
2016	5,356.4	4,867.9	7,178.1	4,463.9	4,868.5	26,734.8
2017	6,219.9	5,037.5	8,233.6	5,655.1	5,430.9	30,577.0
2018	6,810.2	5,278.8	8,953.6	5,521.7	8,659.8	35,224.0
2019	6,184.5	5,434.3	8,569.8	5,189.9	8,907.0	34,285.5
2020	4,565.3	4,363.5	7,657.0	4,347.9	6,261.2	27,195.0
2021	9,055.7	6,130.4	9,513.6	7,703.6	10,284.5	42,687.7

2022	9,693.6	8,048.2	10,442.0	8,508.6	18,500.4	55,192.8

Germany and the Netherlands have been competing for the the topmost export destinations of India in the EU. The Netherlands has been the topmost destination of exports from 2008 until 2013. Thereafter, the consistency to remain on top is not seen and both have remained in the top two export destinations for India in the EU.

In the year 2022, France was the least popular export destination in the EU from among these five member states, with Italy showing a better export value. Belgium was at third postion of exports, while as stated above, the top positon was of the Netherlands.

Table 4.3.2 compares the export figures taking an average of four year blocks and their average growth rate for the corresponding period is shown in percentage. The four year blocks show that the growth of 86.41 per cent is observed for EU5 during the period 2003-2006. The initial years of liberalisation show a nominal growth rate of 0.17 per cent for EU5 from 1995-1998. In the last block of 2019-2022, the growth for EU5 has been almost 61 per cent. The exports are showing a negative growth rate for EU5 during the period 2011-2014 of -12.70 per cent.

Table 4.3.2: Average Value and Growth Rate of Exports From India

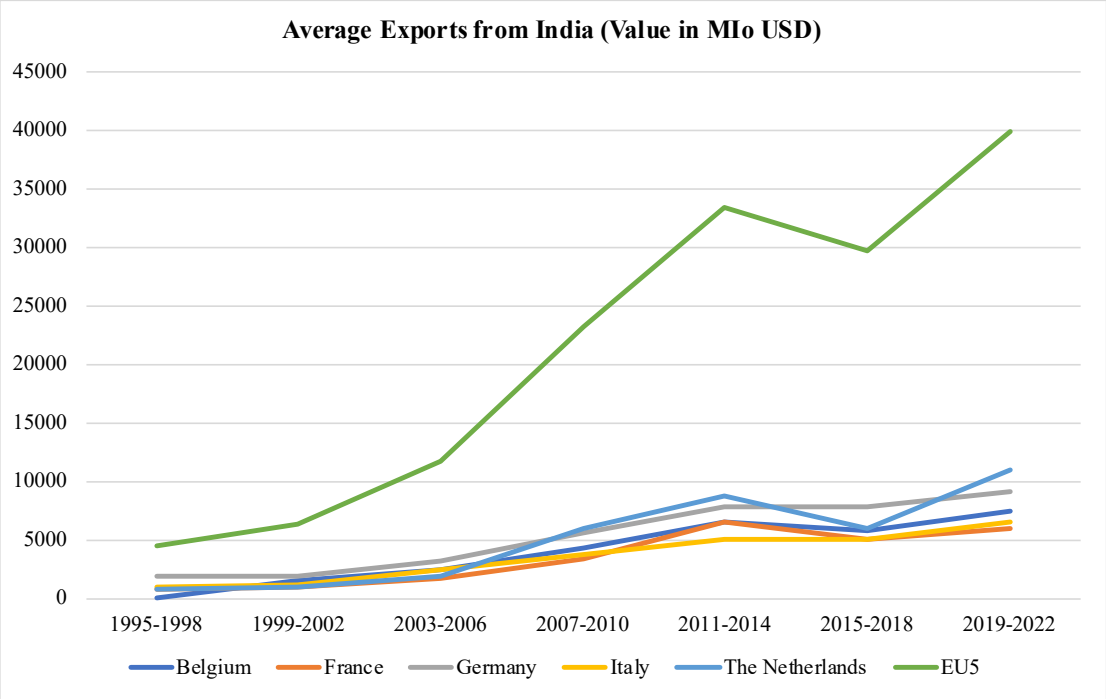
		Belgium	**France**	**Germany**	**Italy**	**Netherlands**	**EU5**
1995-1998	V	--	767.14	1909.31	1028.33	796.21	4500.99
	G	**--**	**11.66**	**-6.09**	**4.30**	**-0.45**	**0.17**
1999-2002	V	1445.78	976.54	1842.02	1230.37	891.72	6386.43
	G	**21.26**	**15.07**	**17.24**	**13.46**	**9.58**	**15.97**
2003-2006	V	2525.67	1733.98	3093.93	2384.25	1892.00	11629.83
	G	**87.44**	**80.79**	**63.39**	**114.12**	**98.75**	**86.41**
2007-2010	V	4333.09	3435.91	5619.83	3816.21	5977.36	23182.40
	G	**24.48**	**100.21**	**26.73**	**10.79**	**51.35**	**37.98**
2011-2014	V	6425.97	6425.97	7805.18	5101.57	8772.97	33294.93
	G	**-20.29**	**0.94**	**-6.24**	**7.85**	**-30.24**	**-12.70**
2015-2018	V	5847.99	5000.91	7847.18	4967.25	5958.93	29622.26
	G	**36.053**	**9.53**	**27.48**	**30.59**	**77.58**	**35.72**
2019-2022	V	7374.80	5994.11	9045.59	6437.49	10988.27	39840.26
	G	**56.74**	**48.10**	**21.85**	**63.95**	**107.71**	**60.98**

V--Stands for Average Value in mio USD
G-Average Growth Rate in per cent

At a bi-lateral level, Italy recorded a growth in exports of over 114 per cent during the period 2003-2006. While France recorded a boost in exports of 100 per cent in the subsequent four year period from 2007-2010. During the period from 1995-1998, Germany and the Netherlands both have shown negative growth in exports of -6.09 per cent and -0.45 per cent respectively. The growth of exports has declined during the period from 2011-2014 for Belgium, Germany and the Netherlands. However, the Netherlands has witnessed a growth of over 107 per cent in the last block from 2019-2022.

Graph 4.3.1 shows the value of exports increasing steadily between the period 1995-2022. The blue bar in the graph represents the Netherlands, where it shows a jump in exports from the period 2003-2006 and then a sudden drop during 2011-2014. The significant drop can be seen in 2014, after which the volume of exports has stayed low and recovered only after 2016-2017. The drop in the case of other countries is also seen during this period, however, the drop is not so significant.

Graph 4.3.1: India's Average Exports to EU Member States



4.3.2 India's Imports from EU

Table 4.3.3 shows the value of imports from each of the five member states of the EU and collectively from these five states shown as EU5. India's imports from the Netherlands have increased from less than USD 1 billion in 1995 to almost USD 5 billion in 2022. India's imports are largest from Germany in the EU with a value of USD 15,500 million. The imports from Germany were only USD 3,325 million in 1995. Imports from Germany are followed by Belgium, Italy, France and the Netherlands.

Table 4.3.3: India's Imports from EU Member States (Current Value in Mio USD)

Year	Belgium	France	Germany	Italy	Netherlands	EU5
1995	--	971.4	3,324.5	1,082.0	501.7	5,879.5
1996	--	960.1	3,198.2	1,196.6	529.9	5,884.8
1997	--	869.3	2,716.0	1,051.4	493.5	5,130.2
1998	--	812.3	2,348.8	1,155.8	463.1	4,780.0
1999	3,695.5	932.0	2,060.5	856.6	503.0	8,047.7
2000	3,677.7	902.1	2,147.6	942.9	526.4	8,196.8
2001	1,400.9	1,014.0	2,328.6	961.4	595.7	6,300.6
2002	1,618.6	1,223.0	2,736.7	1,052.1	531.7	7,162.0
2003	1,774.8	1,370.3	3,347.8	1,341.4	679.5	8,513.8
2004	2,212.9	1,823.5	4,643.0	1,698.9	1,001.0	11,379.3
2005	2,788.4	3,331.4	6,791.2	2,415.6	1,351.0	16,677.6
2006	5,489.7	4,120.9	8,213.0	2,830.2	1,368.2	22,022.0
2007	5,820.3	4,257.2	9,298.2	3,718.1	1,904.1	24,997.8
2008	6,534.7	5,366.0	12,161.4	4,727.2	2,221.5	31,010.8
2009	6,185.0	4,037.5	11,676.5	3,924.9	2,251.0	28,074.8
2010	8,516.8	4,084.9	12,465.5	4,547.2	2,263.5	31,877.8
2011	11,426.1	4,328.2	16,265.5	5,537.3	2,582.9	40,140.0
2012	10,767.4	4,746.7	14,922.8	4,922.0	2,759.7	38,118.5
2013	11,204.7	4,008.6	13,869.4	4,458.2	2,772.4	36,313.3
2014	11,985.5	3,886.2	13,113.5	4,471.7	2,786.8	36,243.7
2015	8,935.7	3,743.8	12,075.5	4,164.5	2,182.3	31,101.7
2016	8,554.9	4,182.2	11,754.4	3,925.6	1,997.5	30,414.6
2017	7,826.3	6,174.4	13,192.6	4,472.2	2,515.7	34,181.1
2018	9,770.7	5,654.3	15,147.7	5,257.4	3,319.3	39,149.4
2019	8,740.5	5,391.2	13,712.4	4,844.9	3,310.5	35,999.6
2020	6,022.4	4,538.6	11,455.5	3,740.0	2,665.3	28,422.0
2021	8,712.1	6,402.4	14,514.4	4,922.7	3,812.1	38,363.6

2022	8,835.2	5,454.7	15,445.3	5,609.6	4,955.1	40,300.0

Imports from Germany are almost double when compared to Belgium, the second placed importer to India with a value of USD 8,8350 million. The other three members of the EU are almost one-third of the total imports of Germany in the year 2022 with values of USD 5,600 millon for Italy, USD 5,500 million for France and USD 5,000 million for the Netherlands.

Table 4.3.4 compares the import figures taking an average of four year blocks and their average growth rate for the corresponding period shown in percentage. The four year blocks show a negative growth of -18.70 per cent for the period 1995-1998. During this period, only Italy recorded a modest growth of 6.82 per cent.

The period from 2003-2006 has recorded the maximum imports of 158 per cent since 1995. During this period all the five member states increased their imports to India by more than 100 per cent. Whereas Belgium shows an increase of 210 per cent, France shows an increase of 200 percent. The other three members have recorded growths of 145 per cent in the case of Germany, 111 percent in the case of Italy and 101 per cent in the case of the Netherlands.

Table 4.3.4: Average Value and Growth Rate of Imports to India

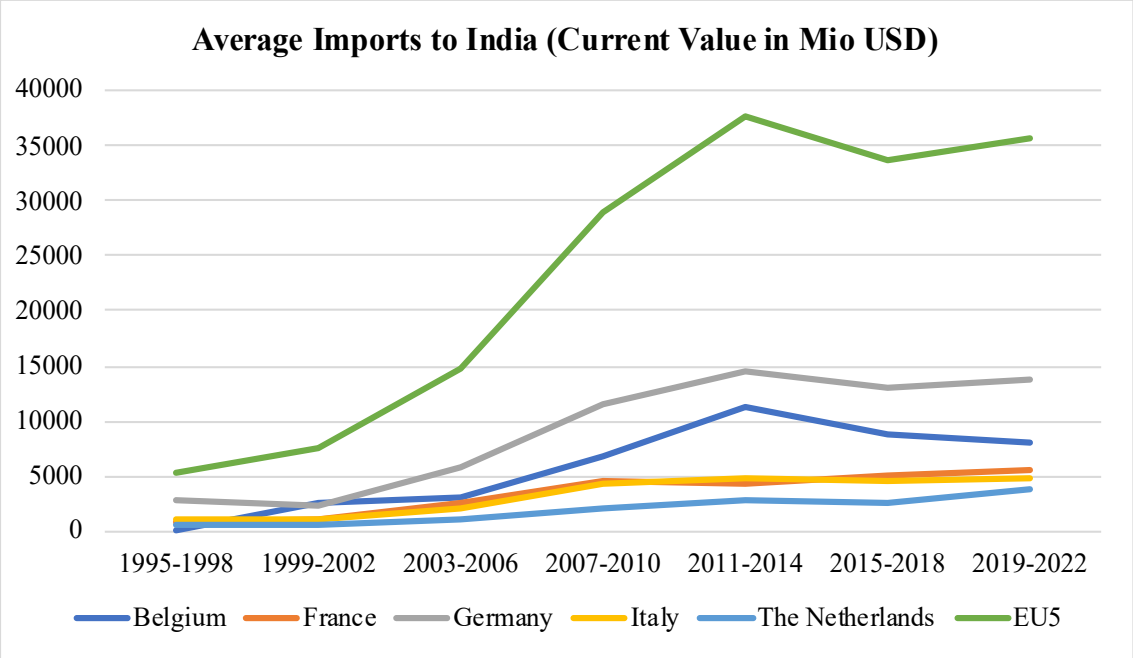
		Belgium	**France**	**Germany**	**Italy**	**Netherlands**	**EU5**
1995-1998	V	--	903.28	2896.87	1121.43	497.05	5418.64
	G	--	-16.37	-29.35	6.82	-7.70	-18.70
1999-2002	V	2598.18	1017.77	2318.33	953.27	539.22	7426.77
	G	-56.20	31.22	32.82	22.82	5.70	-11.00
2003-2006	V	3066.44	2661.52	5748.74	2071.52	1099.94	14648.15
	G	209.32	200.72	145.33	110.99	101.36	158.66
2007-2010	V	6764.19	4436.40	11400.37	4229.35	2160.01	28990.32
	G	46.33	-4.05	34.06	22.30	18.87	27.52
2011-2014	V	11345.93	4242.40	14542.78	4847.29	2725.48	37703.89
	G	4.90	-10.21	-19.38	-19.24	7.89	-9.71
2015-2018	V	8771.91	4938.64	13042.55	4454.92	2503.68	33711.70
	G	9.34	51.03	25.44	26.24	52.10	25.88
2019-2022	V	8077.56	5446.74	13781.91	4779.34	3685.74	35771.29
	G	1.08	1.18	12.64	15.78	49.68	11.95

V--Stands for Average Value in mio USD
G-Average Growth Rate in per cent

The period from 2011-2014 also recorded a negative growth of -10 per cent when taken cumulatively for all the EU%. During this period, Belgium and the Netherlands have shown a positive increase in importing to India with a growth value of 5 per cent and 8 percent respectively. The other three members states recorded a decline in importing to India during this period

During 2019-2022, there has been a modest growth in imports into India from EU5 of almost 12 per cent. There have been negligible growth in imports of Belgium and France. Even Germany and Italy have shown a modest increase of 13 percent and 16 per cent respectively. A seemingly big jump of 50 per cent is seen in imports from the Netherlands during this period.

Graph 4.3.2: India's Average Imports from EU Member States



The Graph 4.3.2 gives a birds-eye view of the pattern of imports from EU5. It is clear that Belgium, Italy and France have a somewhat flat curve and growth is on the rise, though modestly. While Germany has shown a more rapid increase in importing to India, imports from the are also growing. There has been a decline during the period 2011-2014.

4.3.3 Empirical Analysis of India's Grwoth-Trade Relationship with EU

The empirical analysis of data between India and its trading partner(s) in the EU is discussed in the following sections. Section 4.4 discusses India's trading relationship between India and Belgium taking all three variables as dependent variables and looking at the relationship between the varibles. The same methodology gives the results of India's GDP and its trade with France in section 4.5.

In the following section, 4.6, the growth-trade relationship with Germany is shown. Section 4.7 shows the relationship of India's growth and its trade with Italy. The Netherlands is the fifth country in the EU, which this study has dealt with at a bi-lateral level and section 4.8 covers the bi-lateral relationship of India's GDP and its trade with the Netherlands. Section 4.9 takes the cumulative of all the five countries studied under this study. It then looks at the growth-trade relationship between India and the EU5. EU5 is representative of the whole of Europe.

The results are discussed briefly at the end of each section and the conclusion of this chapter has a summary of all the results and their interpretation.

INDIA AND BELGIUM: GROWTH TRADE RELATIONSHIP

INDIA AND BELGIUM: GROWTH TRADE RELATIONSHIP

4.4.1 Introduction

As a founding member of the European Union, right from the days the European Economic Community was formed, Belgium has been a member. As an important member of the EU, Belgium and Indian economic ties have also strengthened over the years.

Total exports from India to Belgium in the year 2022 were 8.52 billion USD as against 7.19 billion USD in the year 2021. In the year 2022, main items of export included Natural or cultural pearls or semi-precious stones, precious metals. The total value of which is 3.10 billion USD. This is 36 per cent of the total exports of India to Belgium. This category is predominantly diamonds (whether or not worked) but not mounted or set under the product code-71, which constitute 95 per cent of the total exports from India within the product code-71. This is closely followed by Iron and steel to the value of 1.06 billion USD for the same period. Organic chemicals occupied the third position with a value of 0.72 billion USD. The fourth and fifth place was of pharmaceutical products and nuclear reactors, boilers, machinery and mechanical appliances and there parts.

Total imports from Belgium into India were 7.39 billion USD in the year 2022 as against 7.28 billion USD in 2021. Natural or cultural pearls or semi-precious stones, precious metals have been the topmost products under the product code-71, that were imported into India from Belgium. The total value of which is 4.95 billion USD. The imports under the product code-71 amount to 67 per cent of the total imports from Belgium into India. Even within this category, diamonds constitute of 98 per cent of the total value under this product code. This was closely followed by nuclear reactors, boilers, machinery and mechanical appliances and there parts to an amount of 0.44 billion USD in the year 2022. The third category constitutes of plastics and articles thereof under the product code-39 with a value of 0.29 billion USD. The fourth and fifth position is occupied by Iron and Steel and optical photographic cinematographic measuring checking precision medical or surgical instruments and apparatus parts and accessories thereof.

4.4.2 Trade Data

Table 4.4.1 gives the value in million US Dollar of India's real GDP, the real exports to Belgium from India and real imports from Belgium into India. The natural logarithm of the three variables is also shown.

Table 4.4.1: India's Real GDP, Belgium Real Exports and Belgium Real Imports (in Mio USD)

	India		Belgium			
Yea	Y_I	$Ln(Y_I)$	X_B	$Ln(X_B)$	M_B	$Ln(M_B)$
1995	596058.81	5.77528911	-	-	-	-
1996	641058.40	5.80689760	-	-	-	-
1997	667020.12	5.82413893	-	-	-	-
1998	708271.42	5.85019972	-	-	-	-
1999	770923.38	5.88701121	2242.85705	3.350802	6209.31652	3.793044
2000	800534.47	5.90338004	2441.96930	3.387740	6285.63674	3.798349
2001	839151.99	5.92384063	2421.56831	3.384097	2421.56831	3.384097
2002	871073.12	5.94005461	2738.02984	3.437438	2738.02984	3.437438
2003	939542.79	5.97291657	2743.92736	3.438373	2743.92736	3.438373
2004	1013982.17	6.00603032	3164.07569	3.500247	3164.07569	3.500247
2005	1094324.35	6.03914606	3719.54436	3.570490	3719.54436	3.570490
2006	1182534.91	6.07281397	4183.78524	3.621569	6904.20318	3.839114
2007	1273126.72	6.10487163	4224.69846	3.625796	6090.01023	3.784618
2008	1312424.30	6.11807426	5164.70880	3.713046	7153.48356	3.854518
2009	1415605.63	6.15094228	3746.04940	3.573574	6524.76703	3.814565
2010	1535897.92	6.18636235	4606.81243	3.663401	7806.64777	3.892465
2011	1616399.17	6.20854862	6557.06266	3.816709	10130.9242	4.005649
2012	1704596.19	6.23162151	5184.26845	3.714687	10042.46450	4.001840
2013	1813453.52	6.25850643	6695.31653	3.825771	10943.61943	4.039161
2014	1947834.55	6.28955207	5631.03339	3.750588	11448.92408	4.058765
2015	2103588.35	6.32296076	5005.52100	3.699449	8935.704000	3.951129
2016	2277267.03	6.35741396	5315.46977	3.725542	8489.594115	3.928887
2017	2432016.05	6.38596644	5705.07982	3.756262	7178.488611	3.856033
2018	2588974.75	6.41312782	6523.05577	3.814451	9358.799252	3.971220
2019	2689205.28	6.42962396	5865.24281	3.768286	8289.268301	3.918516
2020	2532396.29	6.40353167	4327.45527	3.636233	5708.645890	3.756533
2021	2761585.19	6.44115845	7938.29760	3.899727	7637.061675	3.882926
2022	2954977.66	6.47055420	8461.96273	3.927471	7712.609904	3.887201

Source: UNComtrade and WorldBank

Descriptive Statistics

Table 4.4.2 gives below the summary of the statistics of the data for values of Indian GDP and its exports to Belgium and imports from Belgium and the values of the natural logarithm of the parameters.

Table 4.4.2: Descriptive Statistics: India and Belgium

	Y_I	X_B	M_B	$Ln(Y_I)$	$Ln(X_B)$	$Ln(M_B)$
Mean	1686309	4775.325	6984.888	6.18825	3.650073	3.806882
Median	1576149	4806.167	7165.986	6.197455	3.681425	3.855275
Maximum	2954978	8461.963	11448.92	6.470554	3.927471	4.058765
Minimum	770923.4	2242.857	2421.568	5.887011	3.350802	3.384097
Std. Dev.	707001.2	1723.078	2602.616	0.190422	0.165782	0.197776
Skewness	0.318578	0.322098	-0.261549	-0.099802	-0.300175	-0.929797
Kurtosis	1.745638	2.396992	2.270724	1.685705	2.111247	2.746206
Jarque-Bera	1.979391	0.778606	0.805476	1.767212	1.150303	3.5225
Probability	0.37169	0.677529	0.668487	0.41329	0.56262	0.17183
Sum	40471416	114607.8	167637.3	148.518	87.60175	91.36518
Sum Sq. Dev.	1.15E+13	68286975	1.56E+08	0.833993	0.632123	0.899655
Observations	24	24	24	24	24	24

From table 4.4.2, the Jarque-Bera test shows that the probability is greater than 0.05, which accepts the Null Hypothesis of Normality. The series follows a normal distribution.

Unit Root Test

In order to conduct the data analysis under ARDL, the series needs to be stationary. The stationarity of the current series was checked by the application of the Unit Root Test through the Augmented Dicky-Fuller Test (ADF) test.

The ADF test as per Table 4.4.3 reveals that all variables are non-stationary at level at 5 per cent significance level. To make the series stationary, further tests were conducted and the series was found to be stationary at first difference for Intercept and Intercept and Trend for all variables. However, the $Ln(Y_I)$ was found to be non-stationary at neither Intercept nor Trend.

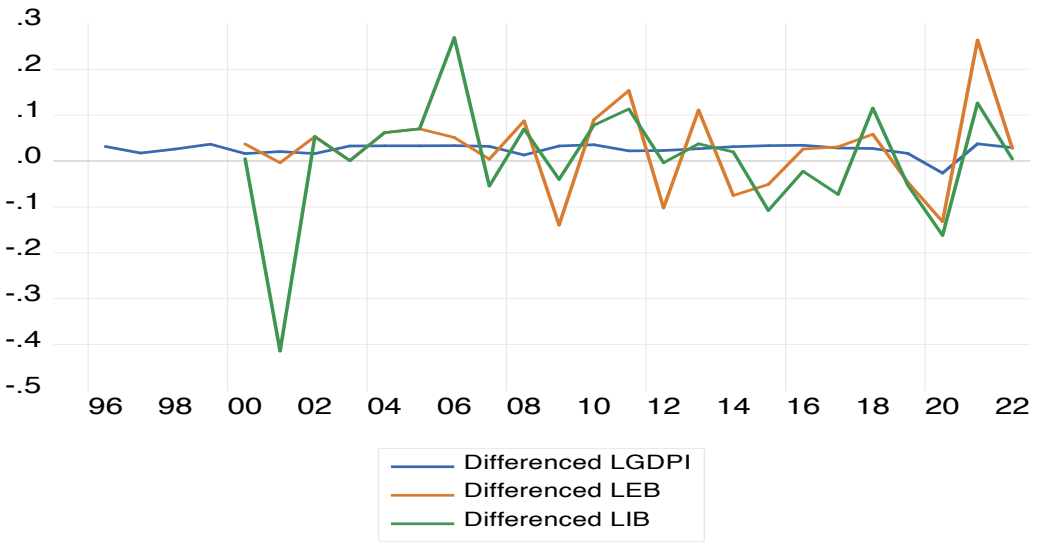
Table 4.4.3 : Unit Root Test: India and Belgium

Augmented Dickey Fuller (ADF) Test

		At Level			At First Difference		
		Ln(Y_I)	**Ln(X_B)**	**Ln(M_B)**	**D(Ln(Y_I))**	**D(Ln(X_B))**	**D(Ln(M_B))**
Intercept	t-Stats	-0.7645	-1.6049	-1.5053	-4.91	-4.9778	-5.0081
	Prob.	0.8131	0.4626	0.5131	0.0006	0.0007	0.0006
		no	no	no	***	***	***
Intercept and Trend	t-Stats	-1.8068	-3.3371	-2.1927	-4.8532	-5.0024	-4.8926
	Prob.	0.6733	0.0853	0.4712	0.0033	0.0034	0.0039
		no	*	no	***	***	***
None	t-Stats	10.457	2.2635	0.0773	-0.7605	-6.158	-5.126
	Prob.	1	0.9919	0.6974	0.3762	0	0
		no	no	no	no	***	***

(*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent and (no) Not Significant

Graph 4.4.1: Graphical Representation of the ADF Test at First Difference: India and Belgium



The stationary series is graphically represented in Graph 4.4.1, whereby the LGDPI denotes the $Ln(Y_I)$ at first difference, the LEB denotes the $Ln(X_B)$ at first difference and the LIB denotes the $Ln(M_B)$ at first difference

4.4.3 ARDL Model: India's GDP as Dependent Variable

To run the ARDL model, the natural logarithm of GDP of India is taken as a dependent variable while the natural logarithm of exports to Belgium and natural logarithm of imports from Belgium are the exogeneous variables.

The results of the ARDL model are

Table 4.4.4: ARDL: India's GDP as Dependent Variable

Dependent Variable: $Ln(Y_I)$				
Method: ARDL				
Sample (adjusted): 1999 2022				
Maximum dependent lags: 1 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (2 lags, automatic): $Ln(X_B)$, $Ln(M_B)$				
Fixed regressors: C				
Number of models evaluated: 9				
Selected Model: ARDL(1, 0, 0)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
$Ln(Y_I)_{(t-1)}$	0.9253	0.0276	33.482	0.0000***
$Ln(X_B)$	0.0759	0.0363	2.0888	0.0497**
$Ln(M_B)$	0.0057	0.0189	0.3032	0.7649
C	0.1868	0.0878	2.1265	0.0461**
R-squared	0.9965	Mean dependent var		6.18825
Adjusted R-squared	0.9959	S.D. dependent var		0.19042
S.E. of regression	0.0120	Akaike info criterion		-5.84347
Sum squared residual	0.0029	Schwarz criterion		-5.64713
Log likelihood	74.121	Hannan-Quinn criter.		-5.79138
F-statistic	1898.3	Durbin-Watson stat		2.06300
Prob(F-statistic)	0			

(*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent

Table 4.4.4 shows that $Ln(X_B)$ is influencing $Ln(Y_I)$ at 5 per cent significance level, which means that a 1 per cent change in $Ln(X_B)$ will cause a positive change of 0.076 per cent in $Ln(Y_I)$, ceteris paribus. $Ln(M_B)$ is not significant and hence not influencing $Ln(Y_I)$ at 5 per cent significance level. The Wald Test has been applied where p-value of the F-statistic is 0.7649, which leads to acceptance of null hypothesis of $Ln(M_B)$ not having any influence on $Ln(Y_I)$.

The resulting ARDL relationship for the short run is

$$\Delta Ln(Y_I) = 0.1869 + 0.9253*\Delta Ln(Y_I)_{(t-1)} + 0.0759*\Delta Ln(X_B) + 0.0058*\Delta Ln(M_B)$$

[Eq. 4.4.1]

The ARDL bounds test is applied

ARDL Long Run Form and Bounds Test

Table 4.4.5: ARDL Long Run Form and Bounds Test

Dependent Variable: $\Delta(Ln(Y_I))$				
Selected Model: ARDL(1, 0, 0)				
Case 3: Unrestricted Constant and No Trend				
Sample: 1995 2022				
Included observations: 24				
Conditional Error Correction Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.186881	0.08788	2.12655	0.0461
$Ln(Y_I)_{(t-1)}$ [a]	-0.074658	0.027636	-2.701417	0.0137
$Ln(X_B)$ [b]	0.075927	0.036349	2.088835	0.0497
$Ln(M_B)$ [b]	0.005752	0.018972	0.303206	0.7649
[a] p-value incompatible with t-Bounds distribution.				
[b] Variable interpreted as Z = Z(-1) + D(Z).				
Levels Equation				
Case 3: Unrestricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
$Ln(X_B)$	1.017001	0.303176	3.354493	0.0032
$Ln(M_B)$	0.07705	0.256005	0.30097	0.7665

EC = Ln(Y_I) - (1.0170*Ln(X_B) + 0.0770*Ln(M_B))				
F-Bounds Test	**Null Hypothesis: No levels relationship**			
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
			Asymptotic: n=1000	
F-statistic	2.500228	10%	3.17	4.14
k	2	5%	3.79	4.85
		2.5%	4.41	5.52
		1%	5.15	6.36
Actual Sample Size	24		Finite Sample: n=35	
		10%	3.393	4.41
		5%	4.183	5.333
		1%	6.14	7.607
			Finite Sample: n=30	
		10%	3.437	4.47
		5%	4.267	5.473
		1%	6.183	7.873
t-Bounds Test	**Null Hypothesis: No levels relationship**			
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
t-statistic	-2.701417	10%	-2.57	-3.21
		5%	-2.86	-3.53
		2.5%	-3.13	-3.8
		1%	-3.43	-4.1

In order to examine the long-run relationship between the variables, the ARDL long run form and bounds test has been applied.

According to the table 4.4.5, the Null Hypothesis of "No Cointegration" is accepted as the F-Statistic and t-statistic, both are lower than the critical value of the lower bound (I(0) at 5 per cent significance level. Hence, it is concluded that there exists no long-run relationship between the variables.

Residual Test and Stability Test

The Residual Serial Correlation was tested through the Serial Correlation LM Test. The null hypothesis for this test is that there is no serial correlation between the residuals. The null hypothesis is accepted for the above model. The Residual Test for Normality shows that the distribution is normally distributed. The null hypothesis was accepted as the p-value was greater than 5 per cent. This suggests the independence of random errors. The

VEC Residual Heteroskedasticity test confirms that there is homoskedasticity amongst the variables by rejecting the heteroskedasticity as the p-value is greater than 5 per cent. The stability diagnostic shows the model is unstable, as the model shows a structural break.

Summary

Table 4.4.6: Results of the Hypothesis

Hypothesis	Null Hypothesis	Result
Exports Led Growth (ELG)	H_0: Exports does not cause GDP	Rejected
	H_1: Exports does cause GDP	Accepted
Imports Led Growth (ILG)	H_0: Imports does not cause GDP	Accepted
	H_1: Imports does cause GDP	Rejected

As per Table 4.4.6, there is Export Led Growth (ELG) as Exports to Belgium cause GDP in the short run.

4.4.4 ARDL Model: Exports to Belgium as Dependent Variable

To run the ARDL model, the natural logarithm of exports of India to Belgium is taken as an endogenous variable while the natural logarithm of GDP of India and natural logarithm of imports from Belgium are the exogeneous variables. The results of the ARDL are as follows:

Table 4.4.7: ARDL: Exports to Belgium as Dependent Variable

Dependent Variable: Ln(X_B)				
Method: ARDL				
Sample (adjusted): 2001 2022				
Included observations: 22 after adjustments				
Maximum dependent lags: 2 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (1 lag, automatic): Ln(Y_I) Ln(M_B)				
Fixed regressors: C				
Number of models evaluated: 8				
Selected Model: ARDL(2, 0, 0)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***

$Ln(X_B)_{(t-1)}$	-0.3806	0.1817	-2.094692	0.0515*
$Ln(X_B)_{(t-2)}$	-0.5416	0.1734	-3.122137	0.0062***
$Ln(Y_I)$	0.8581	0.1572	5.455726	0.0000***
$Ln(M_B)$	0.6318	0.1144	5.518704	0.0000***
C	-0.7097	0.4176	-1.699398	0.1075
R-squared	0.9119	Mean dependent var		3.6756
Adjusted R-squared	0.8912	S.D. dependent var		0.1479
S.E. of regression	0.0487	Akaike info criterion		-3.0063
Sum squared resid	0.0404	Schwarz criterion		-2.7583
Log likelihood	38.069	Hannan-Quinn crit.		-2.9479
F-statistic	44.019	Durbin-Watson stat		1.7003
Prob(F-statistic)	0			

(*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent

Table 4.4.7 shows that $Ln(Y_I)$ has a significant influence on $Ln(X_B)$ at 5 per cent significance level. A 1 per cent change in $Ln(Y_I)$ will cause a positive change of 0.86 per cent in $Ln(X_B)$, other factors remaining constant. Similarly, $Ln(M_B)$ has a significant influence on $Ln(X_B)$ at 5 per cent significance level. A 1 per cent change in $Ln(M_B)$ will cause a positive change of 0.63 per cent in $Ln(X_B)$, ceteris paribus. Wald Test rejects the null hypothesis of no significance of $Ln(X_B)_{(t-1)}$ and $Ln(X_B)_{(t-2)}$ at 5 per cent significance level.

The resulting ARDL relationship for the short run is

$$\Delta Ln(X_B) = - 0.7098 - 0.3806*\Delta Ln(X_B)_{(t-1)} - 0.5416*\Delta Ln(X_B)_{(t-2)} + 0.8581*\Delta Ln(Y_I) + 0.6319*\Delta Ln(M_B) \quad \text{[Eq. 4.4.2]}$$

The ARDL bounds test is applied

ARDL: Long Run Form and Bounds Test

Table 4.4.8: ARDL Long Run Form and Bounds Test

Dependent Variable: $\Delta(Ln(X_B))$		
Selected Model: ARDL(2, 0, 0)		
Case 3: Unrestricted Constant and No Trend		
Sample: 1995 2022		
Included observations: 22		
Conditional Error Correction Regression		

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.70977	0.417664	-1.699398	0.1075
$(Ln(X_B)_{(t-1)}$[a]	-1.92226	0.273364	-7.03188	0.0000
$Ln(Y_I)$[b]	0.85810	0.157284	5.455726	0.0000
$Ln(M_B)$[b]	0.63187	0.114496	5.518704	0.0000
$\Delta(Ln(X_B)_{(t-1)}$	0.54163	0.173481	3.122137	0.0062

[a] p-value incompatible with t-Bounds distribution.

[b] Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation

Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$Ln(Y_I)$	0.446402	0.047344	9.428982	0.0000***
$Ln(M_B)$	0.328712	0.040113	8.194657	0.0000***

$EC = (Ln(X_B) - (0.4464* Ln(Y_I) + 0.3287* Ln(M_B))$

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
			Asymptotic: n=1000	
F-statistic	16.57122	10%	3.17	4.14
k	2	5%	3.79	4.85
		2.5%	4.41	5.52
		1%	5.15	6.36
Actual Sample Size	22		Finite Sample: n=35	
		10%	3.393	4.410
		5%	4.183	5.333
		1%	6.140	7.607
			Finite Sample: n=30	
		10%	3.437	4.470
		5%	4.267	5.473
		1%	6.183	7.873
t-Bounds Test		**Null Hypothesis: No levels relationship**		

Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
t-statistic	-7.03188	10%	-2.57	-3.21
		5%	-2.86	-3.53
		2.5%	-3.13	-3.80
		1%	-3.43	-4.10

(*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent

In order to examine the long-run relationship between the variables, the ARDL long run form and bounds test has been applied.

According to the Table 4.4.8, the Null Hypothesis of "No Cointegration" is rejected as the F-statistic and t-statistic, both are greater than the critical value of the upper bound I(1) at 5 per cent significance level.. A 1 per cent increase in economic growth boosts 0.45 per cent and a 1 per cent increase in imports is associated with 0.33 per cent increase in exports, on an average, ceteris paribus.

Hence, it is concluded that there exists a long-run relationship between the variables.

This leads to the application of the Error Correction Model (ECM):

ARDL: Error Correction Model

Table 4.4.9: ARDL Error Correction Regression

Dependent Variable: $\Delta(Ln(X_B))$				
Selected Model: ARDL(2, 0, 0)				
Case 3: Unrestricted Constant and No Trend				
Sample: 1995 2022				
Included observations: 22				
ECM Regression				
Case 3: Unrestricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-0.709777	0.100301	-7.07646	0.0000
$\Delta(Ln(X_B)_{(t-1)})$	0.541631	0.163514	3.312438	0.0041
CointEq(-1)*	-1.92226	0.257883	-7.454014	0.0000
R-squared	0.781874	Mean dependent var		0.024533

Adjusted R-squared	0.758914	S.D. dependent var		0.093971
S.E. of regression	0.04614	Akaike info criterion		-3.188145
Sum squared residual	0.040449	Schwarz criterion		-3.039367
Log likelihood	38.0696	Hannan-Quinn criter.		-3.153097
F-statistic	34.05283	Durbin-Watson stat		1.700324
Prob(F-statistic)	0.000001			
* p-value incompatible with t-Bounds distribution.				
F-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
F-statistic	16.57122	10 per cent	3.17	4.14
k	2	5 per cent	3.79	4.85
		2.5 per cent	4.41	5.52
		1 per cent	5.15	6.36
t-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
t-statistic	-7.454014	10 per cent	-2.57	-3.21
		5 per cent	-2.86	-3.53
		2.5 per cent	-3.13	-3.80
		1 per cent	-3.43	-4.10

Table 4.4.9 shows the cointegrating equation has a negative value of 1.92, which indicates that a disequilibrium is corrected at a rate of 1.92 per cent within one period. The high value of t-statistic being -7.45 shows that the coefficient is highly significant. This means that the adjustment towards equilibrium will happen in a dampening manner.

The equation for ECM is given below

$$\Delta \mathrm{LnX}_{Bt} = a_{02} + \sum_{n=1}^{p} a_{1n} \Delta LnX_{B(t-2)} + \sum_{n=1}^{q} a_{2n} \Delta LnY_{I(t-1)} + \sum_{n=1}^{q} a_{3n} \Delta LnM_{B\,(t-1)} + \lambda ECT_{(t-1)} + e_{2t}$$

[Eq. 4.4.3]

The resulting equation for our model based on the ECM equation above is as follows:

$$\Delta(Ln(X_B)) = -0.7098 - 0.3806*\Delta Ln(X_B)_{(t-1)} - 0.5416*\Delta Ln(X_B)_{(t-2)} + 0.8581*\Delta Ln(Y_I) + 0.6319*\Delta Ln(M_B) - 1.9223*(Ln(X_B)_{(t-1)}) - (0.4464*Ln(Y_I) + 0.3287*Ln(M_B))$$

[Eq. 4.4.4]

Residual Test and Stability Test

The Residual Serial Correlation was tested through the Serial Correlation LM Test. The null hypothesis for this test is that there is no serial correlation between the residuals. The null hypothesis is accepted for the above model. The Residual Test for Normality shows that the distribution is normally distributed. The null hypothesis was accepted as the p-value was greater than 5 per cent. This suggests the independence of random errors. The VEC Residual Heteroskedasticity test confirms that there is homoskedasticity amongst the variables by rejecting the heteroskedasticity as the p-value is greater than 5 per cent. The stability diagnostic shows the model is stable.

Summary

Table 4.4.10: Results of Hypothesis

Hypothesis	Null Hypothesis	Result
Growth Led Exports (GLE)	H_0: GDP does not cause exports	Rejected
	H_1: GDP does cause exports	Accepted
Imports Led Exports (ILE)	H_0: Imports does not cause exports	Rejected
	H_1: Imports does cause exports	Accepted

This analysis leads to the conclusion that GDP of India and Imports from Belgium are causing Exports to Belgium.

The model shows a strong causality between GDP and exports to Belgium. Similarly, imports from Belgium show a strong causal relationship with exports to Belgium.

4.4.5 ARDL Model: Imports from Belgium as Dependent Variable

To run the ARDL model, the natural logarithm of imports from Belgium is taken as an endogenous variable while the natural logarithm of GDP of India and natural logarithm

of exports to Belgium are the exogeneous variables. The results of the ARDL are as follows:

Table 4.4.11: ARDL: Imports from Belgium as Dependent Variable

Dependent Variable: $Ln(M_B)$				
Method: ARDL				
Sample (adjusted): 2001 2022				
Included observations: 22 after adjustments				
Maximum dependent lags: 1 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (2 lags, automatic): $Ln(X_B)$ $Ln(Y_I)$				
Fixed regressors: C				
Number of models evaluated: 9				
Selected Model: ARDL(1, 2, 1)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
$Ln(M_B)_{(t-1)}$	0.109494	0.135608	0.80743	0.4320
$Ln(X_B)$	0.912096	0.201496	4.526627	0.0004***
$Ln(X_B)_{(t-1)}$	0.646055	0.234039	2.760465	0.0146**
$Ln(X_B)_{(t-2)}$	0.771645	0.215483	3.580996	0.0027***
$Ln(Y_I)$	0.550051	1.174303	0.468407	0.6462
$Ln(Y_I)_{(t-1)}$	-1.465258	1.109744	-1.320357	0.2065
C	0.532168	0.554013	0.960569	0.3520
R-squared	0.937955	Mean dependent var		3.807899
Adjusted R-squared	0.913137	S.D. dependent var		0.206947
S.E. of regression	0.060992	Akaike info criterion		-2.502764
Sum squared residual	0.055801	Schwarz criterion		-2.155614
Log likelihood	34.5304	Hannan-Quinn criter.		-2.420986
F-statistic	37.79348	Durbin-Watson stat		1.903887
Prob(F-statistic)	0			

(*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent

Table 4.4.11 shows that $Ln(X_B)$ has a significant influence on $Ln(M_B)$ at 5 per cent significance level. A 1 per cent change in $Ln(X_B)$ will cause a positive change of 0.91 per cent in $Ln(M_B)$ on an average, other factors remaining constant. Similarly, a 1 per cent change in $Ln(X_B)_{(t-1)}$ will cause a positive change of 0.65 per cent and $Ln(X_B)_{(t-2)}$ will cause a positive change of 0.77 per cent in $Ln(M_B)$ on an average, ceteris paribus. The

Wald Test rejects the null hypothesis of insignificance of $Ln(M_B)_{(t-1)}$, $Ln(Y_I)$, $Ln(Y_I)_{(t-1)}$ on $Ln(M_B)$.

The resulting ARDL relationship for the short run is

$$\Delta Ln(M_B) = 0.5322 + 0.1095*\Delta Ln(M_B)_{(t-1)} + 0.9121*\Delta Ln(X_B) + 0.6461*\Delta Ln(X_B)_{(t-1)} + 0.7716*\Delta Ln(X_B)_{(t-2)} + + 0.5501*\Delta Ln(Y_I) - 1.465*\Delta Ln(Y_I)_{(t-1)} \quad [Eq. 4.4.5]$$

The ARDL bounds test is applied

ARDL Long Run Form and Bounds Test

Table 4.4.12: ARDL Long Run Form and Bounds Test

Dependent Variable: $\Delta(Ln(M_B))$				
Selected Model: ARDL(1, 2, 1)				
Case 3: Unrestricted Constant and No Trend				
Sample: 1995 2022				
Included observations: 22				
Conditional Error Correction Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.532168	0.554013	0.960569	0.3520
$Ln(M_B)_{(t-1)}$[a]	-0.890506	0.135608	-6.56675	0.0000
$Ln(X_B)_{(t-1)}$	2.329797	0.364407	6.393394	0.0000
$Ln(Y_I)_{(t-1)}$	-0.915207	0.228097	-4.012356	0.0011
$\Delta(Ln(X_B))$	0.912096	0.201496	4.526627	0.0004
$\Delta(Ln(X_B)_{(t-1)})$	-0.771645	0.215483	-3.580996	0.0027
$\Delta(Ln(Y_I))$	0.550051	1.174303	0.468407	0.6462
[a] p-value incompatible with t-Bounds distribution.				
Levels Equation				
Case 3: Unrestricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
$Ln(X_B)$	2.616262	0.337103	7.761028	0.0000***
$Ln(Y_I)$	-1.027738	0.260823	-3.940369	0.0013***
EC = $Ln(M_B)$ - (2.6163*$Ln(X_B)$-1.0277* $Ln(Y_I)$)				

F-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
			Asymptotic: n=1000	
F-statistic	17.23735	10%	3.17	4.14
k	2	5%	3.79	4.85
		2.5%	4.41	5.52
		1%	5.15	6.36
Actual Sample Size	22		Finite Sample: n=35	
		10%	3.393	4.41
		5%	4.183	5.333
		1%	6.14	7.607
			Finite Sample: n=30	
		10%	3.437	4.47
		5%	4.267	5.473
		1%	6.183	7.873
t-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
t-statistic	-6.56675	10%	-2.57	-3.21
		5%	-2.86	-3.53
		2.5%	-3.13	-3.8
		1%	-3.43	-4.1

(*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent

In order to examine the long-run relationship between the variables, the ARDL long run form and bounds test has been applied.

According to the Table 4.4.12, the Null Hypothesis of "No Cointegration" is rejected as the F-Statistic and t-statistic, both are greater than the critical value of the upper bound I(1) at 5 per cent significance level. Hence, it is concluded that there exists a long-run relationship between the variables.

A 1 per cent increase in exports boosts imports by 2.62 per cent and a 1 per cent increase in GDP is negatively associated with 1.03 per cent decrease in imports, on an average, ceteris paribus. The estimated long-run elasticities indicate that imports are export elastic.

Hence, it is concluded that there exists a long-run relationship between the variables.

This leads to the application of the Error Correction Model (ECM):

ARDL Error Correction Model

Table 4.4.13: ARDL Error Correction Regression

Dependent Variable: $\Delta(Ln(M_B))$				
Selected Model: ARDL(1, 2, 1)				
Case 3: Unrestricted Constant and No Trend				
Sample: 1995 2022				
Included observations: 22				
ECM Regression				
Case 3: Unrestricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.53216	0.08216	6.47647	0.0000
$\Delta(Ln(X_B))$	0.91209	0.15952	5.71773	0.0000
$\Delta(Ln(X_B)_{(t-1)})$	-0.77164	0.19767	-3.90365	0.0014
$\Delta(Ln(YI))$	0.55005	1.02617	0.53602	0.5998
CointEq(-1)[a]	-0.89050	0.11632	-7.65552	0.0000
R-squared	0.845342	Mean dependent var		0.004039
Adjusted R-squared	0.808951	S.D. dependent var		0.131077
S.E. of regression	0.057292	Akaike info criterion		-2.684582
Sum squared resid	0.055801	Schwarz criterion		-2.436618
Log likelihood	34.5304	Hannan-Quinn criter.		-2.626169
F-statistic	23.22991	Durbin-Watson stat		1.903887
Prob(F-statistic)	0.000001			
[a] p-value incompatible with t-Bounds distribution.				
F-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
F-statistic	17.23735	10 per cent	3.17	4.14
k	2	5 per cent	3.79	4.85
		2.5 per cent	4.41	5.52
		1 per cent	5.15	6.36
t-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
t-statistic	-7.65552	10 per cent	-2.57	-3.21
		5 per cent	-2.86	-3.53

		2.5 per cent	-3.13	-3.8
		1 per cent	-3.43	-4.1

Table 4.4.13 shows the cointegrating equation has a coefficient value of -0.89, which represents the error correction term. This clarifies that the rate of adjustment is 89 per cent to achieve a state of equilibrium within one period. The coefficient is extremely significant as the t-statistic is very high. This means that the adjustment towards equilibrium will happen in a monotonical manner.

The equation for ECM is given below

$$\Delta \mathrm{LnM}_t = a_{03} + \sum_{n=1}^{p} a_{1n} \Delta LnM_{(t-n)} + \sum_{n=1}^{q} a_{2n} \Delta LnY_{(t-n)} + \sum_{n=1}^{q} a_{3n} \Delta LnX_{(t-n)} + \lambda ECT_{(t-1)} + e_{3t} \quad \text{[Eq. 4.4.6]}$$

The resulting equation for the ECM model is

$$\Delta(\mathrm{Ln}(M_B)) = 0.5322 + 0.1095*\Delta\mathrm{Ln}(M_B)_{(t-1)} + 0.9121*\Delta\mathrm{Ln}(X_B) + 0.6461*\Delta\mathrm{Ln}(X_B)_{(t-1)} + 0.7716*\Delta\mathrm{Ln}(X_B)_{(t-2)} + + 0.5501*\Delta\mathrm{Ln}(Y_I) - 1.465*\Delta\mathrm{Ln}(Y_I)_{(t-1)} - 0.8905*(\mathrm{Ln}(M_B)_{(t-1)} - (2.6163*\mathrm{Ln}(X_B)_{(t-1)} - 1.0278*\mathrm{Ln}(Y_I)_{(t-1)})) \quad \text{[Eq. 4.4.7]}$$

Residual Test and Stability Test

The Residual Serial Correlation was tested through the Serial Correlation LM Test. The null hypothesis for this test is that there is no serial correlation between the residuals. The null hypothesis is accepted for the above model. The Residual Test for Normality shows that the distribution is normally distributed. The null hypothesis was accepted as the p-value was greater than 5 per cent. This suggests the independence of random errors. The VEC Residual Heteroskedasticity test confirms that there is homoskedasticity amongst the variables by rejecting the heteroskedasticity as the p-value is greater than 5 per cent. The stability diagnostic shows the model is stable.

Summary

Table 4.4.14: Results of Hypothesis

Hypothesis	Null Hypothesis	Result
Growth Led Imports (GLI)	H_0: GDP does not cause imports	Rejected
	H_1: GDP does cause imports	Accepted
Exports Led Imports (ELI)	H_0: Exports does not cause imports	Rejected
	H_1: Exports does cause imports	Accepted

This analysis leads to the conclusion that GDP of India and exports to Belgium are causing imports from Belgium.

The model shows a strong causality between growth and imports as well as exports and imports as there exists both a short run as well as a long run causality.

4.4.6 India and Belgium: Results of Growth-Trade Relationship

Table 4.4.15: Results Table

	Dependent Variable	Explanators	Short-run relationship	Long-run relationship
1	**$Ln(Y_I)$**	$Ln(X_B)$, $Ln(M_B)$	$Ln(X_B)$ Significant	No Cointegration
2	**$Ln(X_B)$**	$Ln(Y_I)$, $Ln(M_B)$	$Ln(Y_I)$ Significant $Ln(M_B)$ Significant	Cointegration
3	**$Ln(M_B)$**	$Ln(Y_I)$, $Ln(X_B)$	$Ln(X_B)$ Significant	Cointegration

INDIA AND FRANCE: GROWTH TRADE RELATIONSHIP

INDIA AND FRANCE: GROWTH TRADE RELATIONSHIP

4.5.1 Introduction

As a founding member of the European Union, right from the days the European Economic Community was formed, France has been a member. As an important member of the EU, France and Indian economic ties have also strengthened over the years.

Total exports from India to France in the year 2022 were 9.53 billion USD as against 7.95 billion USD in the year 2021. In the year 2022, main items of export included Mineral Fuels, mineral oils and products of their distillation; bituminous substances; etc. The total value of which is 1.48 billion USD. This is 16 per cent of the total exports of India to France. This category is predominantly petroleum oils and oils obtaining from bituminous minerals (excluding crude) under the product code-2710, which constitute 99.15 per cent of the total exports from India within the product code-27.

This is closely followed by Electric Machinery and Equipment and parts thereof; sound recorders and reproducers, television etc under the product code 85 with a total value of 0.87 billion USD for the period 2022. Within this product code, telephone sets, including smartphones and other telephones for cellular networks or for other wireless etc constitute an amount of 0.36 billion USD which equals 41 per cent of the total value under this product code. Organic chemicals occupied the third position with a value of 0.71 billion USD. The fourth and fifth place was of nuclear reactors, boilers, machinery and mechanical appliances and there parts and articles of apparel and clothing accessories, not knitted or crocheted[1].

Total imports from France into India were 6.26 billion USD in the year 2022 as against 6.97 billion USD in 2021. Aircraft, spacecraft and parts thereof under the product code 88, have been the topmost products that were imported into India from France. The total value of which is 2.44 billion USD. This amounts to 39 per cent of the total imports from France into India. Even within this category, powered aircrafts for example helicopters and aeroplanes dominate this product code with 96 per cent of total imports. The

[1] https://www.trademap.org/Bilateral_TS.aspx

noticeable feature is that total imports from France constitute almost 68 per cent of India's total imports under this product code from the world.

This was closely followed by nuclear reactors, boilers, machinery and mechanical appliances and there parts to an amount of 0.87 billion USD in the year 2022, under the product code-84. The third category constitutes of Electric Machinery and Equipment and parts thereof; sound recorders and reproducers, television etc with a value of 0.73 billion USD. The fourth position is occupied by optical photographic cinematographic measuring checking precision medical or surgical instruments and apparatus parts and accessories thereof and fifth position is of plastics and articles thereof.[2]

4.5.2 Trade Data

Table 4.5.1 gives the value in million US Dollar of India's real GDP, the real exports to Belgium from India and real imports from Belgium into India. The natural logarithm of the three variables is also shown.

Table 4.5.1: India's Real GDP, France Real Export and France Real Imports (in Mio USD)

	India		France			
Year	**Y_I**	**Ln(Y_I)**	**X_F**	**Ln(X_F)**	**M_F**	**Ln(M_F)**
1995	5,96,058.81	5.77529	1,239.5	3.09325	1,607.0	3.20603
1996	6,41,058.40	5.80690	1,173.0	3.06931	1,566.5	3.19494
1997	6,67,020.12	5.82414	1,225.2	3.08820	1,394.3	3.14437
1998	7,08,271.42	5.85020	1,406.2	3.14805	1,365.4	3.13527
1999	7,70,923.38	5.88701	1,516.9	3.18094	1,566.0	3.19479
2000	8,00,534.47	5.90338	1,667.5	3.22207	1,541.8	3.18802
2001	8,39,151.99	5.92384	1,709.4	3.23285	1,752.8	3.24374
2002	8,71,073.12	5.94005	1,757.3	3.24485	2,068.8	3.31572
2003	9,39,542.79	5.97292	1,846.0	3.26622	2,118.6	3.32606
2004	10,13,982.17	6.00603	2,241.5	3.35054	2,607.3	3.41619
2005	10,94,324.35	6.03915	2,688.8	3.42955	4,443.8	3.64776
2006	11,82,534.91	6.07281	2,714.8	3.43374	5,182.7	3.71455
2007	12,73,126.72	6.10487	2,562.4	3.40865	4,454.5	3.64880
2008	13,12,424.30	6.11807	3,378.7	3.52874	5,874.1	3.76894
2009	14,15,605.63	6.15094	3,486.8	3.54243	4,259.3	3.62933
2010	15,35,897.92	6.18636	4,494.2	3.65265	3,744.3	3.57337
2011	16,16,399.17	6.20855	4,474.0	3.65070	3,837.6	3.58406
2012	17,04,596.19	6.23162	4,682.3	3.67046	4,427.1	3.64612

[2] https://www.trademap.org/Bilateral_TS.aspx

2013	18,13,453.52	6.25851	5,466.8	3.73773	3,915.1	3.59275
2014	19,47,834.55	6.28955	4,865.4	3.68712	3,712.2	3.56963
2015	21,03,588.35	6.32296	4,819.5	3.68300	3,743.8	3.57331
2016	22,77,267.03	6.35741	4,830.7	3.68401	4,150.2	3.61807
2017	24,32,016.05	6.38597	4,620.6	3.66469	5,663.4	3.75307
2018	25,88,974.75	6.41313	5,056.2	3.70382	5,415.9	3.73367
2019	26,89,205.28	6.42962	5,153.7	3.71212	5,112.9	3.70867
2020	25,32,396.29	6.40353	4,136.2	3.61660	4,302.1	3.63369
2021	27,61,585.19	6.44116	5,373.9	3.73029	5,612.4	3.74915
2022	29,54,977.66	6.47055	7,025.6	3.84668	4,761.7	3.67776

Source: UNComtrade and WorldBank

Descriptive Statistics

Table 4.5.2 gives below the summary of the statistics of the data for values of Indian GDP and its exports to France and imports from France and the values of the natural logarithm of the parameters.

Table 4.5.2: Descriptive Statistics: India and France

	Y_I	X_F	M_F	$Ln(Y_I)$	$Ln(X_F)$	$Ln(M_F)$
Mean	1538708	3414.756	3578.634	6.134805	3.474261	3.506708
Median	1364015	3432.757	3876.357	6.134508	3.535589	3.588402
Maximum	2954978	7025.615	5874.136	6.470554	3.846684	3.768944
Minimum	596058.8	1173.031	1365.438	5.775289	3.06931	3.135272
Std. Dev.	749401.2	1669.33	1512.27	0.220843	0.241377	0.218113
Skewness	0.439736	0.158387	-0.209279	-0.045152	-0.331167	-0.559993
Kurtosis	1.84082	1.844831	1.653625	1.682025	1.659731	1.727503
Jarque-Bera	2.47003	1.673887	2.319235	2.036083	2.607506	3.352552
Probability	0.29083	0.433032	0.313606	0.361302	0.271511	0.187069
Sum	43083825	95613.17	100201.7	171.7745	97.2793	98.18783
Sum Sq. Dev.	1.52E+13	75239928	61747940	1.316836	1.573094	1.284474
Observations	28	28	28	28	28	28

From Table 4.5.2 it is observed that the series follows a normal distribution. The Jarque-Bera test shows that the probability is greater than 0.05, which accepts the Null Hypothesis of Normality.

Unit Root Test

In order to conduct the data analysis under ARDL, the series needs to be stationary. The stationarity of the current series was checked by the application of the Unit Root Test through the Augmented Dicky-Fuller Test (ADF) test.

Table 4.5.3 : Unit Root Test: India and France

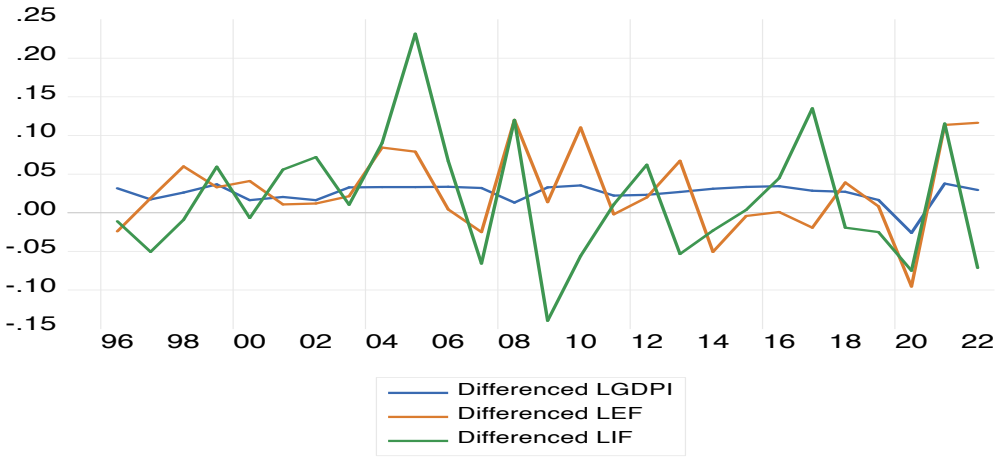
Augmented Dickey Fuller (ADF) Test							
		At Level			**At First Difference**		
		Ln(Y_I)	**Ln(X_F)**	**Ln(M_F)**	**D(Ln(Y_I))**	**D(Ln(X_F))**	**D(Ln(M_F))**
Intercept	t-Stats	-0.7645	-0.621	-1.3001	-4.91	-5.1966	-4.8703
	Prob.	0.8131	0.8499	0.6146	0.0006	0.0003	0.0006
		no	no	no	***	***	***
Intercept and Trend	t-Stats	-1.8068	-1.9111	-1.5581	-4.8532	-5.1255	-4.8405
	Prob.	0.6733	0.6211	0.7828	0.0033	0.0017	0.0034
		no	no	no	***	***	***
None	t-Stats	10.457	2.6791	1.0491	-0.7605	-3.9499	-4.7174
	Prob.	1	0.9972	0.9185	0.3762	0.0003	0
		no	no	no	no	***	***

a: (*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent and (no) Not Significant
b: Lag Length based on SIC
c: Probability based on MacKinnon (1996) one-sided p-values.

The ADF test as per Table 4.5.3 reveals that all variables are non-stationary at level at 5 per cent significance level. To make the series stationary, further tests were conducted and the series was found to be stationary at first difference for Intercept and Intercept and Trend for all variables. However, the log of Ln(Y_I) was found to be non-stationary at neither Intercept nor Trend.

The stationary series is graphically represented in Graph 4.5.1, whereby the LGDPI denotes the Ln(Y_I) at first difference, the LEF denotes the Ln(X_F) at first difference and the LIF denotes the Ln(M_F) at first difference

Graph 4.5.1: Graphical Representation of the ADF Test at First Difference: India and France



4.5.3 ARDL Model: India's GDP as Dependent Variable

To run the ARDL model, the log of GDP of India is taken as an endogenous variable while the log of Exports to France and log of Imports from France are the exogeneous variables.

The results of the ARDL model are

Table 4.5.4: ARDL: India's GDP as Dependent Variable

Dependent Variable: $Ln(Y_I)$				
Method: ARDL				
Sample (adjusted): 1996 2022				
Maximum dependent lags: 1 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (1 lags, automatic): $Ln(X_F)$, $Ln(M_F)$				
Fixed regressors: C				
Number of models evaluated: 4				
Selected Model: ARDL(1, 0, 0)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***

$Ln(Y_I)_{(t-1)}$	0.902178	0.033514	26.91949	0.0000***
$Ln(X_F)$	0.081031	0.033863	2.392917	0.0253**
$Ln(M_F)$	0.006195	0.020996	0.295057	0.7706
C	0.320191	0.108458	2.952202	0.0071***
R-squared	0.997459	Mean dependent var		6.14812
Adjusted R-squared	0.997127	S.D. dependent var		0.21328
S.E. of regression	0.011432	Akaike info criterion		-5.96886
Sum squared residual	0.003006	Schwarz criterion		-5.77688
Log likelihood	84.57965	Hannan-Quinn criterion		-5.91177
F-statistic	3009.169	Durbin-Watson stat		2.13447
Prob(F-statistic)	0			

(*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent

Table 4.5.4 shows that $Ln(X_F)$ is also influencing $Ln(Y_I)$ at 5 per cent significance level, which means that a 1 per cent change in $Ln(X_F)$ will cause a positive change of 0.08 per cent in $Ln(Y_I)$, on an average, ceteris paribus. Wald Test has been applied where p-value of the F-statistic is 0.7706, which leads to acceptance of null hypothesis of $Ln(M_F)$ not having any influence on $Ln(Y_I)$.

The resulting equation for the short run is

$$\Delta Ln(Y_I) = 0.3202 + 0.9022*\Delta Ln(Y_I)_{(t-1)} + 0.0810*\Delta Ln(X_F) + 0.0062*\Delta Ln(M_F) \quad \text{[Eq. 4.5.1]}$$

The ARDL bounds test is applied

ARDL Long Run Form and Bounds Test

Table 4.5.5: ARDL Long Run Form and Bounds Test

Dependent Variable: $\Delta(Ln(Y_I))$				
Selected Model: ARDL(1, 0, 0)				
Case 3: Unrestricted Constant and No Trend				
Sample: 1995 2022				
Included observations: 27				
Conditional Error Correction Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.320191	0.108458	2.952202	0.0071
$Ln(Y_I)_{(t-1)}$ [a]	-0.097822	0.033514	-2.918831	0.0077

$Ln(X_F)$ [b]	0.081031	0.033863	2.392917	0.0253
$Ln(M_F)$ [b]	0.006195	0.020996	0.295057	0.7706
[a] p-value incompatible with t-Bounds distribution.				
[b] Variable interpreted as Z = Z(-1) + D(Z).				
Levels Equation				
Case 3: Unrestricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
$Ln(X_F)$	0.828355	0.195764	4.231401	0.0003
$Ln(M_F)$	0.06333	0.214019	0.295905	0.7700
EC = $Ln(Y_I)$ - (0.8284*$Ln(X_F)$ + 0.0633*$Ln(M_F)$)				
F-Bounds Test	**Null Hypothesis: No levels relationship**			
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
			Asymptotic: n=1000	
F-statistic	2.842538	10%	3.17	4.14
k	2	5%	3.79	4.85
		2.5%	4.41	5.52
		1%	5.15	6.36
Actual Sample Size	27		Finite Sample: n=35	
		10%	3.393	4.41
		5%	4.183	5.333
		1%	6.14	7.607
			Finite Sample: n=30	
		10%	3.437	4.47
		5%	4.267	5.473
		1%	6.183	7.873
t-Bounds Test	**Null Hypothesis: No levels relationship**			
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
t-statistic	-2.918831	10%	-2.57	-3.21
		5%	-2.86	-3.53
		2.5%	-3.13	-3.8
		1%	-3.43	-4.1

In order to examine the long-run relationship between the variables, the ARDL long run form and bounds test has been applied.

According to the Table 4.5.4, the Null Hypothesis of "No Cointegration" is accepted as the F-Statistic is lower than the critical value of the lower bound (I(0) at 5 per cent

significance level. As the value of t-statistic lies between the critical values of lower I(0) and upper bound I(1), the relationship is inconclusive.

Hence, it is concluded that there exists no long-run relationship between the variables.

Residual Test and Stability Test

The Residual Serial Correlation was tested through the Serial Correlation LM Test. The null hypothesis for this test is that there is no serial correlation between the residuals. The null hypothesis is accepted for the above model. The Residual Test for Normality shows that the distribution is not normally distributed. The null hypothesis was rejected as the p-value was less than 5 per cent. The VEC Residual Heteroskedasticity test confirms that there is no homoskedasticity amongst the variables by accepting the heteroskedasticity as the p-value is less than 5 per cent. The stability diagnostic shows the model is unstable.

Summary

Table 4.5.6: Results of Hypothesis

Hypothesis	Null Hypothesis	Result
Exports Led Growth (ELG)	H_0: Exports does not cause GDP	Rejected
	H_1: Exports does cause GDP	Accepted
Imports Led Growth (ILG)	H_0: Imports does not cause GDP	Accepted
	H_1: Imports does cause GDP	Rejected

This analysis leads to the conclusion that there is Export Led Growth (ELG) as Exports to France cause GDP in the short run.

4.5.4 ARDL Model: Exports to France as Dependent Variable

To run the ARDL model, the natural logarithm of exports of India to France is taken as an endogenous variable while the natural logarithm of GDP of India and natural logarithm of imports from France are the exogeneous variables.

The results of the ARDL are as follows:

Table 4.5.7: ARDL: Export to France as Dependent Variable

Dependent Variable: $Ln(X_F)$				
Method: ARDL				
Sample (adjusted): 1996 2022				
Included observations: 27 after adjustments				
Maximum dependent lags: 1 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (1 lag, automatic): $Ln(Y_I)$ $Ln(M_F)$				
Fixed regressors: C				
Number of models evaluated: 4				
Selected Model: ARDL(1,1, 0)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
$Ln(X_F)_{(t-1)}$	0.64661	0.142932	4.523884	0.0002***
$Ln(Y_I)$	1.84951	0.768505	2.406642	0.0249**
$Ln(Y_I)_{(t-1)}$	-1.56344	0.736618	-2.122458	0.0453**
$Ln(M_F)$	0.10667	0.082229	1.297338	0.2080
C	-0.92357	0.500874	-1.843916	0.0787*
R-squared	0.966768	Mean dependent var		3.48837
Adjusted R-squared	0.960725	S.D. dependent var		0.23390
S.E. of regression	0.046356	Akaike info criterion		-3.13936
Sum squared residual	0.047275	Schwarz criterion		-2.89939
Log likelihood	47.38148	Hannan-Quinn criter.		-3.06801
F-statistic	160.0013	Durbin-Watson stat		1.76243
Prob(F-statistic)	0			

(*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent

Table 4.5.7 shows that $Ln(Y_I)$ has a significant influence on $Ln(X_F)$ at 5 per cent significance level. A 1 per cent change in $Ln(Y_I)$ will cause a positive change of 1.85 per cent in $Ln(X_F)$ on an average, ceteris paribus. Wald Test has been applied where p-value of the F-statistic is 0.208, which leads to acceptance of null hypothesis of $Ln(M_F)$ not having any influence on $Ln(X_F)$.

The resulting equation for the short run is

$$\Delta Ln(X_F) = - 0.9236 -0.6466*\Delta Ln(X_F)_{(t-1)} + 1.8495*\Delta Ln(Y_I) - 0.5634*\Delta Ln(Y_I)_{(t-1)} + 0.1067*\Delta Ln(M_F) \quad \text{[Eq. 4.5.2]}$$

The ARDL bounds test is applied

ARDL: Long Run Form and Bounds Test

Table 4.5.8: ARDL Long Run Form and Bounds Test

Dependent Variable: $\Delta(Ln(X_F))$				
Selected Model: ARDL(1, 1, 0)				
Case 3: Unrestricted Constant and No Trend				
Sample: 1995 2022				
Included observations: 27 after adjustment				
Conditional Error Correction Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-0.92357	0.500874	-1.843916	0.0787
$(Ln(XF)_{(t-1)}$ [a]	-0.35339	0.142932	-2.472429	0.0216
$Ln(Y_I)_{(t-1)}$	0.28607	0.156683	1.825829	0.0815
Ln(MF)[b]	0.10667	0.082229	1.297338	0.2080
Δ (Ln(Y_I))	1.84951	0.768505	2.406642	0.0249
[a] p-value incompatible with t-Bounds distribution.				
[b] Variable interpreted as Z = Z(-1) + D(Z).				
Levels Equation				
Case 3: Unrestricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Ln(Y_I)	0.809519	0.233868	3.461439	0.0022
Ln(M_F)	0.301873	0.235793	1.280247	0.2138
EC = (Ln(X_F) - (0.8095* Ln(Y_I) + 0.3019* Ln(M_F))				
F-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
			Asymptotic: n=1000	
F-statistic	2.219117	10%	3.17	4.14
k	2	5%	3.79	4.85
		2.5%	4.41	5.52
		1%	5.15	6.36
Actual Sample Size	27		Finite Sample: n=35	
		10%	3.393	4.410

		5%	4.183	5.333
		1%	6.140	7.607
			Finite Sample: n=30	
		10%	3.437	4.470
		5%	4.267	5.473
		1%	6.183	7.873
t-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
t-statistic	-2.472429	10%	-2.57	-3.21
		5%	-2.86	-3.53
		2.5%	-3.13	-3.80
		1%	-3.43	-4.10

In order to examine the long-run relationship between the variables, the ARDL long run form and bounds test has been applied.

According to the Table 4.5.8, the Null Hypothesis of "No Cointegration" is accepted as the F-Statistic and t-statistic is less than the critical value of the lower bound I(0) at 5 per cent significance level.

Hence, it is concluded that there exists only a short-run relationship between the variables.

Residual Test and Stability Test

The Residual Serial Correlation was tested through the Serial Correlation LM Test. The null hypothesis for this test is that there is no serial correlation between the residuals. The null hypothesis is accepted for the above model. The Residual Test for Normality shows that the distribution is normally distributed. The null hypothesis was accepted as the p-

value was greater than 5 per cent. This suggests the independence of random errors. The VEC Residual Heteroskedasticity test confirms that there is homoskedasticity amongst the variables by rejecting the heteroskedasticity as the p-value is greater than 5 per cent. The stability diagnostic shows the model is stable.

Summary

Table 4.5.9: Results of Hypothesis

Hypothesis	Null Hypothesis	Result
Growth Led Exports (GLE)	H_0: GDP does not cause exports	Rejected
	H_1: GDP does cause exports	Accepted
Imports Led Exports (ILE)	H_0: Imports does not cause exports	Accepted
	H_1: Imports does cause exports	Rejected

This analysis leads to the conclusion that the GDP of India is causing Exports to France.

4.5.5 ARDL Model: Imports from France as Dependent Variable

To run the ARDL model, the natural logarithm of imports from France is taken as an endogenous variable while the natural logarithm of GDP of India and natural logarithm of exports to France are the exogeneous variables. The results of the ARDL are as follows:

Table 4.5.10: ARDL: Imports to France as Dependent Variable

Dependent Variable: Ln(M_F)				
Method: ARDL				
Sample (adjusted): 1996 2022				
Included observations: 27 after adjustments				
Maximum dependent lags: 1 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (1 lags, automatic): Ln(X_F) Ln(Y_I)				
Fixed regressors: C				
Number of models evaluated: 4				
Selected Model: ARDL(1, 0, 0)				

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$Ln(M_F)_{(t-1)}$	0.734589	0.150052	4.895568	0.0001***
$Ln(Y_I)$	-0.010491	0.255186	-0.04111	0.9676
$Ln(X_F)$	0.194821	0.249302	0.781466	0.4425
C	0.331398	0.818695	0.404788	0.6894
R-squared	0.878268	Mean dependent var		3.517845
Adjusted R-squared	0.86239	S.D. dependent var		0.214002
S.E. of regression	0.079386	Akaike info criterion		-2.093043
Sum squared residual	0.144948	Schwarz criterion		-1.901067
Log likelihood	32.25608	Hannan-Quinn criter.		-2.035958
F-statistic	55.31328	Durbin-Watson stat		1.682534
Prob(F-statistic)	0			

(*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent

Table 4.5.10 shows that $Ln(Y_I)$ and $Ln(X_F)$ do not have any significant influence on $Ln(M_F)$ at 5 per cent significance level. Wald Test has been applied where p-value of the F-statistic is 0.424, which leads to acceptance of null hypothesis of $Ln(Y_I)$ and $Ln(X_F)$ not having any influence on $Ln(M_F)$.

The resulting equation for the short run is

$$\Delta Ln(M_F) = - 0.3314 -07346*\Delta Ln(M_F)_{(t-1)} - 0.0105*\Delta Ln(Y_I) + 0.1948*\Delta Ln(X_F) \quad \text{[Eq. 4.5.3]}$$

The ARDL bounds test is applied

ARDL Long Run Form and Bounds Test

Table 4.5.11: ARDL Long Run Form and Bounds Test

Dependent Variable: $\Delta(Ln(M_F))$				
Selected Model: ARDL(1, 0, 0)				
Case 3: Unrestricted Constant and No Trend				
Sample: 1995 2022				
Included observations: 27				
Conditional Error Correction Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**

C	0.331398	0.818695	0.404788	0.6894
$Ln(M_F)_{(t-1)}$ [a]	-0.265411	0.150052	-1.768792	0.0902
$Ln(Y_I)$ [b]	-0.010491	0.255186	-0.04111	0.9676
$Ln(X_F)$ [b]	0.194821	0.249302	0.781466	0.4425
[a] p-value incompatible with t-Bounds distribution.				
[b] Variable interpreted as Z = Z(-1) + D(Z).				
Levels Equation				
Case 3: Unrestricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
$Ln(Y_I)$	-0.039526	0.964671	-0.040974	0.9677
$Ln(X_F)$	0.734035	0.871086	0.842667	0.4081
EC = $Ln(M_F)$ - (-0.0395* $Ln(Y_I)$ + 0.7340*$Ln(X_F)$)				
F-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
			Asymptotic: n=1000	
F-statistic	1.152345	10%	3.17	4.14
k	2	5%	3.79	4.85
		2.5%	4.41	5.52
		1%	5.15	6.36
Actual Sample Size	27		Finite Sample: n=35	
		10%	3.393	4.41
		5%	4.183	5.333
		1%	6.14	7.607
			Finite Sample: n=30	
		10%	3.437	4.47
		5%	4.267	5.473
		1%	6.183	7.873
t-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
t-statistic	-1.768792	10%	-2.57	-3.21
		5%	-2.86	-3.53
		2.5%	-3.13	-3.8
		1%	-3.43	-4.1

In order to examine the long-run relationship between the variables, the ARDL long run form and bounds test has been applied.

According to the Table 4.5.11, the Null Hypothesis of "No Cointegration" is accepted as the F-Statistic and t-statistic are less than the critical value of the lower bound I(0) at 5 per cent significance level.

Hence, it is concluded that there exists only a short-run relationship between the variables

Residual Test and Stability Test

The Residual Serial Correlation was tested through the Serial Correlation LM Test. The null hypothesis for this test is that there is no serial correlation between the residuals. The null hypothesis is accepted for the above model. The Residual Test for Normality shows that the distribution is normally distributed. The null hypothesis was accepted as the p-value was greater than 5 per cent. This suggests the independence of random errors. The VEC Residual Heteroskedasticity test confirms that there is homoskedasticity amongst the variables by rejecting the heteroskedasticity as the p-value is greater than 5 per cent. The stability diagnostic shows the model is stable.

Summary

Table 4.5.12: Results of Hypothesis

Hypothesis	Null Hypothesis	Result
Growth Led Imports (GLI)	H_0: GDP does not cause imports	Accepted
	H_1: GDP does cause imports	Rejected
Exports Led Imports (ELI)	H_0: Exports does not cause imports	Accepted
	H_1: Exports does cause imports	Rejected

4.5.6 India and France: Results of Growth Trade Relationship

Table 4.5.13: Results Table

	Dependent Variable	Explanators	Short-run relationship	Long-run relationship
1	**$Ln(Y_I)$**	$Ln(X_F)$, $Ln(M_F)$	$Ln(X_F)$ Significant	No Cointegration

2	**Ln(X_F)**	Ln(Y_I), Ln(M_F)	Ln(Y_I)Significant	No Cointegration
3	**Ln(M_F)**	Ln(Y_I), Ln(X_F)	Ln(Y_I) Not Significant Ln(X_F)-Not Significant	No Cointegration

INDIA AND GERMANY: GROWTH TRADE RELATIONSHIP

INDIA AND GERMANY: GROWTH TRADE RELATIONSHIP

4.6.1 Introduction

As a founding member of the European Union, right from the days the European Economic Community was formed, Germany has been a member. As an important member of the EU, Germany and Indian economic ties have also strengthened over the years.

Total exports from India to Germany in the year 2022 were 15.77 billion USD as against 12.87 billion USD in the year 2021. In the year 2022, main items of export included Organic Chemicals (product code-29) with a total value of 1.81 billion USD. This amounts to 11.5% of the total exports of India to Germany for the year 2022.

This is closely followed by Electric Machinery and Equipment and parts thereof; sound recorders and reproducers, television etc under the product code 85 with a total value of 1.55 billion USD for the period 2022. Within this product code, telephone sets, including smartphones and other telephones for cellular networks or for other wireless etc constitute an amount of 0.63 billion USD, which equals 41 per cent of the total value under this product code. Nuclear reactors, boilers, machinery and mechanical appliances and there parts occupied the third position with a value of 1.51 billion USD. The fourth and fifth place was of pharmaceutical products followed by articles of apparel and clothing accessories, knitted or crocheted.

Total imports from Germany into India were 15.64 billion USD in the year 2022 as against 14.67 billion USD in 2021. Nuclear reactors, boiler, machinery and mechanical appliances; parts thereof (product code-84) have been the topmost products that were imported into India from Germany. The total value of which is 4.29 billion USD. This amounts to 27 per cent of the total imports from Germany into India.

This was closely followed by Aircrafts, spacecrafts and parts thereof to an amount of 2.09 billion USD in the year 2022, under the product code-88. The third category constitutes of Electric Machinery and Equipment and parts thereof; sound recorders and reproducers, television etc with a value of 1.71 billion USD. The fourth position is

occupied by optical photographic cinematographic measuring checking precision medical or surgical instruments and apparatus parts and accessories thereof and fifth position is of plastics and articles thereof.[1]

4.6.2 Trade Data

Table 4.6.1 gives the value in million US Dollar of India's real GDP, the real exports to Germany from India and real imports from Germany into India. The natural logarithm of the three variables is also shown.

Table 4.6.1: India's Real GDP, Germany's Real Exports and Germany's Real Imports (in Mio USD)

	India		Germany			
Year	**Y_I**	**Ln(Y_I)**	**X_G**	**Ln(X_G)**	**M_G**	**Ln(M_G)**
1995	5,96,058.81	5.77529	3,261.5	3.51342	5,500.1	3.74037
1996	6,41,058.40	5.80690	3,088.6	3.48976	5,218.3	3.71753
1997	6,67,020.12	5.82414	3,082.0	3.48884	4,356.2	3.63911
1998	7,08,271.42	5.85020	3,111.9	3.49303	3,948.2	3.59640
1999	7,70,923.38	5.88701	2,909.4	3.46381	3,462.1	3.53934
2000	8,00,534.47	5.90338	3,113.5	3.49324	3,670.5	3.56473
2001	8,39,151.99	5.92384	3,085.2	3.48928	4,025.2	3.60479
2002	8,71,073.12	5.94005	3,434.0	3.53580	4,629.3	3.66552
2003	9,39,542.79	5.97292	3,644.7	3.56167	5,175.9	3.71399
2004	10,13,982.17	6.00603	3,837.0	3.58399	6,638.8	3.82209
2005	10,94,324.35	6.03915	4,646.3	3.66710	9,058.9	3.95707
2006	11,82,534.91	6.07281	4,844.2	3.68522	10,329.2	4.01407
2007	12,73,126.72	6.10487	4,945.3	3.69420	9,729.1	3.98807
2008	13,12,424.30	6.11807	6,475.3	3.81126	13,313.0	4.12428
2009	14,15,605.63	6.15094	6,169.6	3.79026	12,317.9	4.09054
2010	15,35,897.92	6.18636	5,490.1	3.73958	11,426.1	4.05790
2011	16,16,399.17	6.20855	7,324.0	3.86475	14,421.7	4.15902
2012	17,04,596.19	6.23162	6,653.5	3.82305	13,918.2	4.14358
2013	18,13,453.52	6.25851	7,893.0	3.89724	13,546.2	4.13182
2014	19,47,834.55	6.28955	7,398.5	3.86914	12,526.4	4.09783
2015	21,03,588.35	6.32296	7,023.5	3.84655	12,075.5	4.08190
2016	22,77,267.03	6.35741	7,123.3	3.85268	11,664.6	4.06687
2017	24,32,016.05	6.38597	7,552.1	3.87807	12,100.7	4.08281
2018	25,88,974.75	6.41313	8,576.1	3.93329	14,509.1	4.16164
2019	26,89,205.28	6.42962	8,127.4	3.90995	13,004.4	4.11409
2020	25,32,396.29	6.40353	7,258.0	3.86082	10,858.7	4.03578
2021	27,61,585.19	6.44116	8,339.7	3.92115	12,723.4	4.10460
2022	29,54,977.66	6.47055	9,115.2	3.95977	13,482.8	4.12978

Source: WorldBank and UNComtrade

[1] https://www.trademap.org/Bilateral_TS.aspx?

Descriptive Statistics:

Table 4.6.2 gives below the summary of the statistics of the data for values of Indian GDP and its exports to Germany and imports from Germany and the values of the natural logarithm of the parameters.

Table 4.6.2: Descriptive Statistics of India and Germany

	Y_I	X_G	M_G	$Ln(Y_I)$	$Ln(X_G)$	$Ln(M_G)$
Mean	1538708	5625.821	9558.234	6.134805	3.718462	3.933768
Median	1364015	5829.855	11142.37	6.134508	3.764919	4.046837
Maximum	2954978	9115.199	14509.09	6.470554	3.959766	4.16164
Minimum	596058.8	2909.445	3462.097	5.775289	3.46381	3.539339
Std. Dev.	749401.2	2083.95	3955.722	0.220843	0.17319	0.218494
Skewness	0.439736	0.022555	-0.382705	-0.045152	-0.227353	-0.62718
Kurtosis	1.84082	1.49506	1.5067	1.682025	1.446272	1.730314
Jarque-Bera	2.47003	2.644691	3.285095	2.036083	3.057634	3.716481
Probability	0.29083	0.266509	0.193487	0.361302	0.216792	0.155947
Sum	43083825	157523	267630.6	171.7745	104.1169	110.1455
Sum Sq. Dev.	1.52E+13	1.17E+08	4.22E+08	1.316836	0.809856	1.28897
Observations	28	28	28	28	28	28

From Table 4.6.2 it is observed that the series follows a normal distribution. The Jarque-Bera test shows that the probability is greater than 0.05, which accepts the Null Hypothesis of Normality.

Unit Root Test

In order to conduct the data analysis under ARDL, the series needs to be stationary. The stationarity of the current series was checked by the application of the Unit Root Test through the Augmented Dicky-Fuller Test (ADF) test.

The ADF test as per Table 4.6.3 reveals that all variables are non-stationary at level at 5 per cent significance level. To make the series stationary, further tests were conducted and the series was found to be stationary at first difference for Intercept. For Intercept

and Trend Ln(Y_I) and Ln(M_G) are stationary at first difference. And at neither Intercept nor Trend, Ln(M_G) was non-stationary even at first difference.

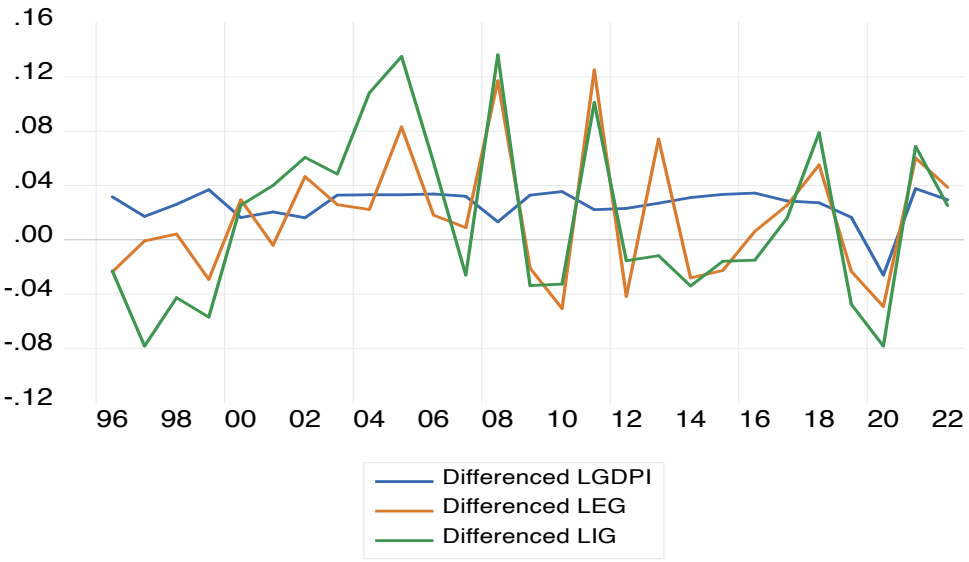
Table 4.6.3 : Unit Root Test: India and Germany

Augmented Dickey Fuller (ADF) Test							
	At Level				At First Difference		
		Ln(Y_I)	Ln(X_G)	Ln(M_G)	D(Ln(Y_I))	D(Ln(X_G))	D(Ln(M_G))
Intercept	t-Stats	-0.611	-2.1994	-0.7645	-4.7929	-4.0556	-4.91
	Prob.	0.8511	0.2115	0.8131	0.0008	0.0044	0.0006
		no	no	no	***	***	***
Intercept and Trend	t-Stats	-2.6969	-2.2595	-2.172	4.701	-3.2254	-4.8532
	Prob.	0.2454	0.4383	0.4835	0.0049	0.1023	0.0033
		no	no	no	***	no	***
None	t-Stats	2.7003	1.1563	10.457	-5.9736	-1.7211	-0.7605
	Prob.	0.9972	0.9318	1	0	0.0805	0.3762
		no	no	no	***	*	no

(*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent and (no) Not Significant

The stationary series is graphically represented in Graph 4.6.1, whereby the LGDPI denotes the Ln(Y_I) at first difference, the LEG denotes the Ln(X_G) at first difference and the LIG denotes the Ln(M_G) at first difference.

Graph 4.6.1: Graphical Representation of the ADF Test at First Difference India and Germany



4.6.3 ARDL Model: India's GDP as Dependent Variable

To run the ARDL model, the log of GDP of India is taken as an endogenous variable while the log of Exports to Germany and log of Imports from Germany are the exogeneous variables.

The results of the ARDL model are

Table 4.6.4: ARDL: India's GDP as Dependent Variable

Dependent Variable: $Ln(Y_I)$				
Method: ARDL				
Sample (adjusted): 1996 2022				
Included Observations: 27 after adjustments				
Maximum dependent lags: 1 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (2 lags, automatic): $Ln(X_G)$, $Ln(M_G)$				
Fixed regressors: C				
Number of models evaluated: 9				
Selected Model: ARDL(1, 0, 0)				
Variable	**Coefficient**	**Std. Error**	**t-Stats**	**Prob.**
$Ln(Y_I)_{(t-1)}$	0.942918	0.051874	18.17699	0.0000***
$Ln(X_G)$	0.044132	0.108498	0.406757	0.6879
$Ln(M_G)$	0.016475	0.046849	0.351674	0.7283
C	0.145859	0.089474	1.630182	0.1167
R-squared	0.99693	Mean dependent var		6.14812
Adjusted R-squared	0.99653	S.D. dependent var		0.21328
S.E. of regression	0.01256	Akaike info criterion		-5.77990
Sum squared residual	0.00363	Schwarz criterion		-5.58793
Log likelihood	82.0287	Hannan-Quinn criter		-5.72282
F-statistic	2489.73	Durbin-Watson stat		2.14298
Prob(F-statistic)	0			

(*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent

Table 4.6.4 shows that $Ln(X_G)$ and $Ln(M_G)$ are not significantly influencing $Ln(Y_I)$ at 5 per cent significance level as p-value is greater than 0.05. The Wald Test has been applied

where p-value of the F-statistic is 0.3048, which leads to acceptance of null hypothesis of $Ln(X_G)$ and $Ln(M_B)$ not having any influence on $Ln(Y_I)$.

The resulting ARDL relationship for the short run is

$$\Delta Ln(Y_I) = 0.14599 + 0.94193*\Delta Ln(Y_I)_{(t-1)} + 0.0441*\Delta Ln(X_G) + 0.0165*\Delta Ln(M_G)$$

[Eq. 4.6.1]

The ARDL bounds test is applied

ARDL Long Run Form and Bounds Test

Table 4.6.5: ARDL Long Run Form and Bounds Test

Dependent Variable: $\Delta(Ln(Y_I))$				
Selected Model: ARDL(1, 0, 0)				
Case 3: Unrestricted Constant and No Trend				
Sample: 1995 2022				
Included observations: 27				
Conditional Error Correction Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.145859	0.089474	1.630182	0.1167
$Ln(Y_I)_{(t-1)}$ [a]	-0.057082	0.051874	-1.100389	0.2825
Ln(XG) [b]	0.044132	0.108498	0.406757	0.6879
Ln(MG) [b]	0.016475	0.046849	0.351674	0.7283
[a] p-value incompatible with t-Bounds distribution.				
[b] Variable interpreted as Z = Z(-1) + D(Z).				
Levels Equation				
Case 3: Unrestricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
$Ln(X_G)$	0.773139	1.301507	0.594034	0.5583
$Ln(M_G)$	0.288628	1.006421	0.286787	0.7768
EC = $Ln(Y_I)$ - (0.7731*Ln(XG) + 0.2886*Ln(MG))				
F-Bounds Test	**Null Hypothesis: No levels relationship**			
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**

			Asymptotic: n=1000	
F-statistic	1.033081	10%	3.17	4.14
k	2	5%	3.79	4.85
		2.5%	4.41	5.52
		1%	5.15	6.36
Actual Sample Size	27		Finite Sample: n=35	
		10%	3.393	4.41
		5%	4.183	5.333
		1%	6.14	7.607
			Finite Sample: n=30	
		10%	3.437	4.47
		5%	4.267	5.473
		1%	6.183	7.873
t-Bounds Test	**Null Hypothesis: No levels relationship**			
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
t-statistic	-1.100389	10%	-2.57	-3.21
		5%	-2.86	-3.53
		2.5%	-3.13	-3.8
		1%	-3.43	-4.1

In order to examine the long-run relationship between the variables, the ARDL long run form and bounds test has been applied.

According to the Table 4.6.5, the Null Hypothesis of "No Cointegration" is accepted as the F-Statistic and t-statistic are lower than the critical value of the lower bound (I(0) at 5 per cent significance level.

Hence, it is concluded that there exists only a short-run relationship between the variables.

Residual Test and Stability Test

The Residual Serial Correlation was tested through the Serial Correlation LM Test. The null hypothesis for this test is that there is no serial correlation between the residuals. The null hypothesis is accepted for the above model. The Residual Test for Normality shows that the distribution is not normally distributed. The null hypothesis was rejected as the p-value was less than 5 per cent. The VEC Residual Heteroskedasticity test confirms that there is no homoskedasticity amongst the variables by accepting the heteroskedasticity as the p-value is less than 5 per cent. The stability diagnostic shows the model is unstable.

Summary

Table 4.6.6: Results of Hypothesis

Hypothesis	Null Hypothesis	Result
Exports Led Growth (ELG)	H_0: Exports does not cause GDP	Accepted
	H_1: Exports does cause GDP	Rejected
Imports Led Growth (ILG)	H_0: Imports does not cause GDP	Accepted
	H_1: Imports does cause GDP	Rejected

This analysis leads to the conclusion that there is no short-run or long-run relationship between the variables.

4.6.4 ARDL Model: Exports to Germany as Dependent Variable

To run the ARDL model, the natural logarithm of exports of India to Germany is taken as an endogenous variable while the natural logarithm of GDP of India and the natural logarithm of Imports from Germany are the exogeneous variables.

The results of the ARDL are as follows:

Table 4.6.7: ARDL: Export to Germany as Dependent Variable

Dependent Variable: $Ln(X_G)$				
Method: ARDL				
Sample (adjusted): 1997 2022				
Included observations: 26 after adjustments				
Maximum dependent lags: 1 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (2 lag, automatic): $Ln(M_G)$ $Ln(Y_I)$				
Fixed regressors: C				
Number of models evaluated: 9				
Selected Model: ARDL(1,2, 0)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
$Ln(X_G)_{(t-1)}$	0.180936	0.272966	0.66285	0.5150
$Ln(M_G)$	0.467703	0.107209	4.36253	0.0003**
$Ln(M_G)_{(t-1)}$	-0.291955	0.210493	-1.38700	0.1807
$Ln(M_G)_{(t-2)}$	0.169231	0.082813	2.04354	0.0544*

$Ln(Y_I)$	0.327271	0.140879	2.32306	0.0308**
C	-0.315879	0.217863	-1.44990	0.1626
R-squared	0.98415	Mean dependent var		3.73514
Adjusted R-squared	0.98019	S.D. dependent var		0.16831
S.E. of regression	0.02368	Akaike info criterion		-4.44856
Sum squared residual	0.01122	Schwarz criterion		-4.15823
Log likelihood	63.8313	Hannan-Quinn criter.		-4.36496
F-statistic	248.462	Durbin-Watson stat		2.23610
Prob(F-statistic)	0			

(*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent

Table 4.6.7 shows that $Ln(Y_I)$ has a significant influence on $Ln(X_G)$ at 5 per cent significance level. A 1 per cent change in $Ln(Y_I)$ will cause a positive change of 0.33 per cent in $Ln(X_G)$ on an average, ceteris paribus. Wald Test rejects the null hypothesis of no significance of $Ln(M_G)$, $Ln(M_G)_{(t-1)}$ and $Ln(M_G)_{(t-2)}$ at 5 per cent significance level. The resulting equation for the short run is

$$\Delta Ln(X_B) = - 0.3159 + 0.1809*\Delta Ln(X_G)_{(t-1)} + 0.4677*\Delta Ln(M_G) - 0.2919*\Delta Ln(M_G)_{(t-1)} + 0.1692*\Delta Ln(M_G)_{(t-2)} + 0.3273*\Delta Ln(Y_I) \quad [Eq. 4.6.2]$$

The ARDL bounds test is applied

ARDL Long Run Form and Bounds Test

Table 4.6.8: ARDL Long Run Form and Bounds Test

Dependent Variable: $D(Ln(X_G))$				
Selected Model: ARDL(1, 2, 0)				
Case 3: Unrestricted Constant and No Trend				
Sample: 1995 2022				
Included observations: 26				
Conditional Error Correction Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-0.315879	0.217863	-1.449901	0.1626
$Ln(X_G)_{(t-1)}$ [a]	-0.819064	0.272966	-3.000604	0.0071
$Ln(M_G)_{(t-1)}$	0.344979	0.100425	3.435183	0.0026
$Ln(Y_I)$ [b]	0.327271	0.140879	2.32306	0.0308
$D(Ln(M_G))$	0.467703	0.107209	4.362539	0.0003
$D(Ln(M_G)_{(t-1)})$	-0.169231	0.082813	-2.043543	0.0544

[a] p-value incompatible with t-Bounds distribution.				
[b] Variable interpreted as Z = Z(-1) + D(Z).				
Levels Equation				
Case 3: Unrestricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
$Ln(M_G)$	0.421187	0.067469	6.242656	0
$Ln(Y_I)$	0.399567	0.067129	5.95218	0
EC = ($Ln(X_G)$ - (0.4212* $Ln(M_G)$ + 0.3996* $Ln(Y_I)$))				
F-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
			Asymptotic: n=1000	
F-statistic	3.96195	10 %	3.17	4.14
k	2	5 %	3.79	4.85
		2.5 %	4.41	5.52
		1 %	5.15	6.36
Actual Sample Size	26		Finite Sample: n=35	
		10 %	3.393	4.41
		5 %	4.183	5.333
		1 %	6.14	7.607
			Finite Sample: n=30	
		10 %	3.437	4.47
		5 %	4.267	5.473
		1 %	6.183	7.873
t-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
t-statistic	-3.000604	10 %	-2.57	-3.21
		5 %	-2.86	-3.53
		2.5 %	-3.13	-3.8
		1 %	-3.43	-4.1

In order to examine the long-run relationship between the variables, the ARDL long run form and bounds test has been applied.

According to the Table 4.6.8, as F-statistic and t-statistic lie between the critical value of lower bound I(0) and upper bound I(1) the relationship is inconclusive at 5 per cent significance level.

Hence, it is concluded that there exists only a short-run relationship between the variables.

Residual Test and Stability Test

The Residual Serial Correlation was tested through the Serial Correlation LM Test. The null hypothesis for this test is that there is no serial correlation between the residuals. The null hypothesis is accepted for the above model. The Residual Test for Normality shows that the distribution is normally distributed. The null hypothesis was accepted as the p-value was greater than 5 per cent. This suggests the independence of random errors. The VEC Residual Heteroskedasticity test confirms that there is homoskedasticity amongst the variables by rejecting the heteroskedasticity as the p-value is greater than 5 per cent. The stability diagnostic shows the model is stable.

Summary

Table 4.6.9: Results of Hypothesis

Hypothesis	Null Hypothesis	Result
Growth Led Exports (GLE)	H_0: GDP does not cause exports	Rejected
	H_1: GDP does cause exports	Accepted
Imports Led Exports (ILE)	H_0: Imports does not cause exports	Rejected
	H_1: Imports does cause exports	Accepted

This analysis leads to the conclusion that the GDP of India and Imports from Germany are causing Exports to Germany.

4.6.5 ARDL Model: Imports to Germany as Dependent Variable

To run the ARDL model, the natural logarithm of Imports from Germany is taken as an endogenous variable while the natural logarithm of GDP of India and natural logarithm

of Exports to Germany are the exogeneous variables. The results of the ARDL are as follows:

Table 4.6.10: ARDL: Imports to Germany as Dependent Variable

Dependent Variable: $Ln(M_G)$				
Method: ARDL				
Sample (adjusted): 1997 2022				
Included observations: 26 after adjustments				
Maximum dependent lags: 1 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (2 lags, automatic): $Ln(Y_I)$ $Ln(X_G)$				
Fixed regressors: C				
Number of models evaluated: 9				
Selected Model: ARDL(1, 0, 2)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
$Ln(M_G)_{(t-1)}$	1.07836	0.181575	5.9389	0.0000***
$Ln(Y_I)$	0.42043	0.24764	1.6977	0.1051
$Ln(X_G)$	0.93934	0.230858	4.0689	0.0006***
$Ln(X_G)_{(t-1)}$	-1.08636	0.327914	-3.3129	0.0035***
$Ln(X_G)_{(t-2)}$	-0.50059	0.16757	-2.9873	0.0073***
C	0.500421	0.348244	-1.4369	0.1662
R-squared	0.980424	Mean dependent var		3.949523
Adjusted R-squared	0.97553	S.D. dependent var		0.218939
S.E. of regression	0.034248	Akaike info criterion		-3.711189
Sum squared residual	0.023459	Schwarz criterion		-3.420859
Log likelihood	54.24546	Hannan-Quinn criter.		-3.627585
F-statistic	200.3331	Durbin-Watson stat		1.881447
Prob(F-statistic)	0			

(*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent

Table 4.6.10 shows that $Ln(X_G)$, $Ln(X_G)_{(t-1)}$, $Ln(X_G)_{(t-2)}$ also have a significant influence on $Ln(M_G)$ at 5 per cent significance level. A 1 per cent change in $Ln(X_G)$ will cause a positive change of 0.94 per cent on $Ln(M_G)$, a 1 per cent change in $Ln(X_G)_{(t-1)}$ will cause a negative change of 1.08 per cent on $Ln(M_G)$ and a 1 per cent change in $Ln(X_G)_{(t-2)}$ will cause a negative change of 0.50 per cent on $Ln(M_G)$ on an average, ceteris paribus. However, $Ln(Y_I)$ does not have any significant influence on $Ln(M_G)$ at 5 per cent

significance level. The Wald Test accepts the null hypothesis of insignificance of Ln(YI) on $Ln(M_B)$.

The resulting equation for the short run is

$$\Delta Ln(M_G) = -0.5004 + 1.0784*\Delta Ln(M_B)_{(t-1)} + 0.4204*\Delta Ln(Y_I) + 0.9394*\Delta Ln(X_B) - 1.0864*\Delta Ln(X_B)_{(t-1)} - 05006*\Delta Ln(X_B)_{(t-2)} \quad \text{[Eq. 4.6.3]}$$

The ARDL bounds test is applied

ARDL Long Run Form and Bounds Test

Table 4.6.11: ARDL Long Run Form and Bounds

Dependent Variable: $\Delta(Ln(M_G))$				
Selected Model: ARDL(1, 0, 2)				
Case 3: Unrestricted Constant and No Trend				
Sample: 1995 2022				
Included observations: 26				
Conditional Error Correction Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-0.500421	0.348244	-1.436982	0.1662
$Ln(M_G)_{(t-1)}$ [a]	0.078367	0.181575	0.431599	0.6707
$Ln(Y_I)$ [b]	0.420435	0.24764	1.697767	0.1051
$Ln(X_G)_{(t-1)}$ [b]	-0.647615	0.5034	-1.286481	0.213
$\Delta(Ln(X_G))$	0.939349	0.230858	4.068952	0.0006
$\Delta(Ln(X_G)_{(t-1)})$	0.500595	0.16757	2.987386	0.0073
[a] p-value incompatible with t-Bounds distribution.				
[b] Variable interpreted as Z = Z(-1) + D(Z).				
Levels Equation				
Case 3: Unrestricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
$Ln(Y_I)$	-5.364926	10.06853	-0.532841	0.6000
$Ln(X_G)$	8.263837	13.37181	0.618005	0.5435
EC = $Ln(M_G)$ - (-5.3649* $Ln(Y_I)$ + 8.2638*$Ln(X_G)$)				

F-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
			Asymptotic: n=1000	
F-statistic	2.084854	10%	3.17	4.14
k	2	5%	3.79	4.85
		2.5%	4.41	5.52
		1%	5.15	6.36
Actual Sample Size	26		Finite Sample: n=35	
		10%	3.393	4.41
		5%	4.183	5.333
		1%	6.14	7.607
			Finite Sample: n=30	
		10%	3.437	4.47
		5%	4.267	5.473
		1%	6.183	7.873
t-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
t-statistic	0.431599	10%	-2.57	-3.21
		5%	-2.86	-3.53
		2.5%	-3.13	-3.8
		1%	-3.43	-4.1

In order to examine the long-run relationship between the variables, the ARDL long run form and bounds test has been applied.

According to the Table 4.6.11, the Null Hypothesis of "No Cointegration" is accepted as the F-Statistic and t-statistics are lower than the critical value of the lower bound (I(0) at 5 per cent significance level.

Hence, it is concluded that there exists no long-run relationship between the variables.

Residual Test and Stability Test

The Residual Serial Correlation was tested through the Serial Correlation LM Test. The null hypothesis for this test is that there is no serial correlation between the residuals. The null hypothesis is accepted for the above model. The Residual Test for Normality shows

that the distribution is normally distributed. The null hypothesis was accepted as the p-value was greater than 5 per cent. This suggests the independence of random errors. The VEC Residual Heteroskedasticity test confirms that there is homoskedasticity amongst the variables by rejecting the heteroskedasticity as the p-value is greater than 5 per cent. The stability diagnostic shows the model is stable.

Summary

Table 4.6.12: Results of Hypothesis

Hypothesis	Null Hypothesis	Result
Growth Led Imports (GLI)	H_0: GDP does not cause imports	Accepted
	H_1: GDP does cause imports	Rejected
Exports Led Imports (ELI)	H_0: Exports does not cause imports	Rejected
	H_1: Exports does cause imports	Accepted

4.6.6 India and Germany: Results of Growth-Trade Relationship

Table 4.6.13: Results Table

	Dependent Variable	Explanators	Short-run relationship	Long-run relationship
1	**$Ln(Y_I)$**	$Ln(X_G)$, $Ln(M_G)$	$Ln(X_G)$ Not Significant $Ln(M_G)$ Not Significant	No Cointegration
2	**$Ln(X_G)$**	$Ln(Y_I)$, $Ln(M_G)$	$Ln(Y_I)$ Significant $Ln(M_G)$ Significant	Inconclusive
3	**$Ln(M_G)$**	$Ln(Y_I)$, $Ln(X_G)$	$Ln(Y_I)$Not Significant $Ln(X_G)$ Significant	No Cointegration

INDIA AND ITALY: GROWTH TRADE RELATIONSHIP

INDIA AND ITALY: GROWTH TRADE RELATIONSHIP

4.7.1 Introduction

As a founding member of the European Union, right from the days the European Economic Community was formed, Italy has been a member. As an important member of the EU, Italy and Indian economic ties have also strengthened over the years.

Total exports from India to Italy in the year 2022 were 11.43 billion USD as against 7.81 billion USD in the year 2021. In the year 2022, main items of export included Iron and Steel under the product code 72. The total value of which is 2.28 billion USD. This is 20% of the total exports of India to Italy. This category is predominantly diamonds (whether or not worked) but not mounted or set under the product code-71, which constitute 95% of the total exports from India within the product code-71.

This is closely followed by Mineral fuels, mineral oils and products of their distillation; bituminous substances; minerals etc.(product code-27) to the value of 1.08 billion USD for the period 2022. Electrical Machinery and Equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers and parts and accessories of such articles (product code-85) occupied the third position with a value of 1.01 billion USD. The fourth and fifth place was of organic chemicals (product code-29) and nuclear reactors, boilers, machinery and mechanical appliances and there parts (product code-84).

Total imports from Italy into India were 5.41 billion USD in the year 2022 as against 4.59 billion USD in 2021. In the year 2022, main items of import nuclear reactors, boilers, machinery and mechanical appliances and there parts (product code-84) have been the topmost products, that were imported into India from Italy. The total value of which is 2.12 billion USD. The imports under the product code-84 amount to 39% of the total imports from Italy into India. This is followed by Electrical Machinery and equipment and parts thereof; sound recorders and reproducers, television images, etc. under the product code-85, having a total value of 0.33 billion USD for the year 2022

Third position is occupied by organic chemicals (product code-29) to an amount of 0.30 billion USD in the year 2022. The fourth position Plastics and articles thereof and fifth position is occupied by Optical, photographic, cinematographic, measuring, checking, precision medical or surgical instruments and apparatus (product code-90).

4.7.2 Trade Data

Table 4.7.1 gives the value in million US Dollar of India's real GDP, the real exports to Italy from India and real imports from Italy into India. The natural logarithm of the three variables is also shown.

Table 4.7.1: India's Real GDP, Italy Real Exports and Italy Real Imports (in Mio USD)

	India		Italy			
Year	**Y_I**	**Ln(Y_I)**	**X_T**	**Ln(X_T)**	**M_T**	**Ln(M_T)**
1995	5,96,058.81	5.77529	1,672.5	3.22337	1,790.0	3.25286
1996	6,41,058.40	5.80690	1,523.4	3.18280	1,952.4	3.29056
1997	6,67,020.12	5.82414	1,786.9	3.25211	1,686.3	3.22695
1998	7,08,271.42	5.85020	1,772.7	3.24865	1,942.8	3.28844
1999	7,70,923.38	5.88701	1,878.8	3.27388	1,439.3	3.15815
2000	8,00,534.47	5.90338	2,165.0	3.33546	1,611.6	3.20725
2001	8,39,151.99	5.92384	2,191.6	3.34076	1,662.0	3.22062
2002	8,71,073.12	5.94005	2,146.2	3.33167	1,779.7	3.25036
2003	9,39,542.79	5.97292	2,445.0	3.38828	2,073.9	3.31678
2004	10,13,982.17	6.00603	2,918.8	3.46521	2,429.2	3.38546
2005	10,94,324.35	6.03915	3,372.3	3.52792	3,222.2	3.50815
2006	11,82,534.91	6.07281	4,258.7	3.62927	3,559.4	3.55138
2007	12,73,126.72	6.10487	3,954.9	3.59714	3,890.4	3.59000
2008	13,12,424.30	6.11807	4,378.6	3.64134	5,174.8	3.71390
2009	14,15,605.63	6.15094	3,478.7	3.54142	4,140.5	3.61706
2010	15,35,897.92	6.18636	3,838.5	3.58416	4,168.0	3.61993
2011	16,16,399.17	6.20855	4,476.7	3.65096	4,909.6	3.69104
2012	17,04,596.19	6.23162	4,005.2	3.60262	4,590.6	3.66187
2013	18,13,453.52	6.25851	5,486.6	3.73930	4,354.3	3.63892
2014	19,47,834.55	6.28955	5,201.7	3.71615	4,271.5	3.63058
2015	21,03,588.35	6.32296	4,228.3	3.62617	4,164.5	3.61956
2016	22,77,267.03	6.35741	4,429.8	3.64639	3,895.7	3.59058
2017	24,32,016.05	6.38597	5,187.0	3.71492	4,102.0	3.61300
2018	25,88,974.75	6.41313	5,288.9	3.72336	5,035.7	3.70206
2019	26,89,205.28	6.42962	4,921.9	3.69213	4,594.8	3.66227

2020	25,32,396.29	6.40353	4,121.4	3.61504	3,545.2	3.54964
2021	27,61,585.19	6.44116	6,753.0	3.82950	4,315.3	3.63501
2022	29,54,977.66	6.47055	7,427.5	3.87084	4,896.9	3.68992

Source: WorldBank and UNComtrade

Descriptive Statistics:

Table 4.7.2 below gives the summary of the statistics of the data for values of Indian GDP and its exports to Italy and imports from Italy and the values of the natural logarithm of the parameters.

Table 4.7.2: Descriptive Statistics of India and Italy

	Y_I	X_T	M_T	$Ln(Y_I)$	$Ln(X_T)$	$Ln(M_T)$
Mean	1538708	3761.096	3399.955	6.134805	3.535386	3.495796
Median	1364015	3980.054	3893.039	6.134508	3.59988	3.590289
Maximum	2954978	7427.454	5174.829	6.470554	3.87084	3.713896
Minimum	596058.8	1523.367	1439.304	5.775289	3.182805	3.158153
Std. Dev.	749401.2	1566.496	1270.978	0.220843	0.195786	0.188195
Skewness	0.439736	0.351032	-0.312114	-0.045152	-0.326925	-0.54407
Kurtosis	1.84082	2.529048	1.53151	1.682025	1.949282	1.636657
Jarque-Bera	2.47003	0.833804	2.970477	2.036083	1.786784	3.549884
Probability	0.29083	0.659086	0.226448	0.361302	0.409265	0.169493
Sum	43083825	105310.7	95198.74	171.7745	98.99082	97.8823
Sum Sq. Dev.	1.52E+13	66255524	43615372	1.316836	1.034968	0.956267
Observations	28	28	28	28	28	28

From table 4.7.2 it is observed that the series follows a normal distribution. The Jarque-Bera test shows that the probability is greater than /equal to 0.05, which accepts the Null Hypothesis of Normality.

Unit Root Test:

In order to conduct the data analysis under ARDL, the series needs to be stationary. The stationarity of the current series was checked by the application of the Unit Root Test through the Augmented Dicky-Fuller Test (ADF) test.

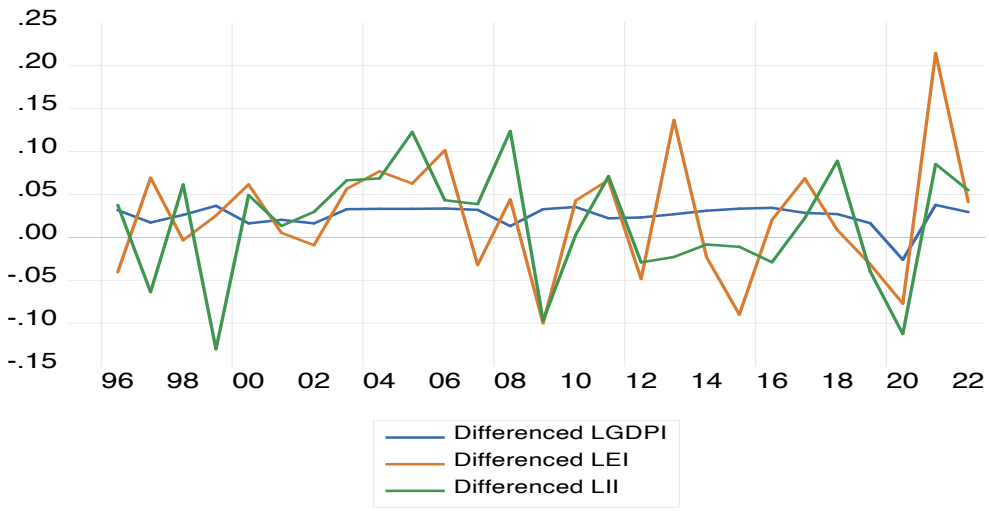
Table 4.7.3 : Unit Root Test: India and Italy

Augmented Dickey Fuller (ADF) Test							
	At Level				At First Difference		
		Ln(Y_I)	Ln(X_T)	Ln(M_T)	D(Ln(Y_I))	D(Ln(X_T))	D(Ln(M_T))
Intercept	t-Stats	-0.764	-0.827	-1.225	-4.91	-6.291	-5.5336
	Prob.	0.8131	0.7949	0.6463	0.0006	0	0.0001
		no	no	no	***	***	***
Intercept and Trend	t-Stats	-1.806	-2.760	-1.6269	-4.8532	-6.162	-3.6082
	Prob.	0.6733	0.2224	0.7551	0.0033	0.0002	0.0495
		no	no	no	***	***	**
None	t-Stats	10.457	1.728	1.2007	-0.7605	-5.4855	-1.9573
	Prob.	1	0.9766	0.9369	0.3762	0	0.0498
		no	no	no	no	***	**

(*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1% and (no) Not Significant

The ADF test as per table 4.7.3 reveals that all variables are non-stationary at level at 5 per cent significance level. To make the series stationary, further tests were conducted and the series was found to be stationary at first difference for Intercept and Intercept and Trend for all variables. However, the D(Ln(Y_I)) was found to be non-stationary at neither Intercept nor Trend at first difference

Graph 4.7.1: Graphical Representation of the ADF Test at First Difference: India and Italy



The stationary series is graphically represented in Graph 4.7.1, whereby the LGDPI denotes the D(Ln(Y_I)) at first difference, the LET denotes the D(Ln(X_T)) at first difference and the LIB denotes the D(Ln(M_T)) at first difference.

4.7.3 ARDL Model: India's GDP as Dependent Variable

To run the ARDL model, the natural logarithm of GDP of India is taken as an endogenous variable while the natural logarithm of Exports to Italy and the natural logarithm of Imports from Italy are the exogeneous variables.

The results of the ARDL model are

Table 4.7.4: ARDL: India's GDP as Dependent Variable

Dependent Variable: Ln(Y_I)				
Method: ARDL				
Sample (adjusted): 1996 2022				
Included observations: 27 after adjustments				
Maximum dependent lags: 1 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (1 lag, automatic): Ln(X_T), Ln(M_T)				
Fixed regressors: C				
Number of models evaluated: 4				
Selected Model: ARDL(1, 0, 0)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Ln(Y_I) $_{(t-1)}$	0.92466	0.026954	34.3056	0.0000***
Ln(X_T)	0.08371	0.040426	2.07071	0.0498**
Ln(M_T)	-0.00204	0.029946	-0.06836	0.9461
C	0.19726	0.078426	2.51527	0.0193**
R-squared	0.99740	Mean dependent var		6.14812
Adjusted R-squared	0.99706	S.D. dependent var		0.21328
S.E. of regression	0.01154	Akaike info criterion		-5.94869
Sum squared residual	0.00306	Schwarz criterion		-5.75671
Log likelihood	84.3073	Hannan-Quinn criter.		-5.89160
F-statistic	2948.92	Durbin-Watson stat		2.10729
Prob(F-statistic)	0			

(*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent

Table 4.7.4 shows that $Ln(X_T)$ is also influencing $Ln(Y_I)$ at 5 per cent significance level, which means that a 1 per cent change in $Ln(X_T)$ will cause a positive change of 8 per cent in $Ln(Y_I)$ on an average, ceteris paribus. Wald Test has been applied where p-value of the F-statistic is 0.9461, which leads to acceptance of null hypothesis of $Ln(M_T)$ not having any influence on $Ln(Y_I)$.

The resulting ARDL relationship for the short run is

$$\Delta Ln(Y_I) = 0.1973 + 0.92467*\Delta Ln(Y_I)_{(t-1)} + 0.0837*\Delta Ln(X_T) - 0.0020*\Delta Ln(M_T)$$

[Eq. 4.7.1]

ARDL Long Run Form and Bounds Test

Table 4.7.5: ARDL Long Run Form and Bounds Test

Dependent Variable: $\Delta(Ln(Y_I))$				
Selected Model: ARDL(1, 0, 0)				
Case 3: Unrestricted Constant and No Trend				
Sample: 1995 2022				
Included observations: 27				
Conditional Error Correction Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.197263	0.078426	2.515275	0.0193
$Ln(Y_I)_{(t-1)}$ [a]	-0.075339	0.026954	-2.79513	0.0103
$Ln(X_T)$ [b]	0.08371	0.040426	2.070712	0.0498
$Ln(M_T)$ [b]	-0.002047	0.029946	-0.068361	0.9461
[a] p-value incompatible with t-Bounds distribution.				
[b] Variable interpreted as Z = Z(-1) + D(Z).				
Levels Equation				
Case 3: Unrestricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
$Ln(X_T)$	1.111116	0.3901	2.848284	0.0091
$Ln(M_T)$	-0.027173	0.397709	-0.068324	0.9461
EC = $Ln(Y_I)$ - (1.1111*$Ln(X_T)$ - 0.0272*$Ln(M_T)$)				
F-Bounds Test	**Null Hypothesis: No levels relationship**			

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	2.632691	10%	3.17	4.14
k	2	5%	3.79	4.85
		2.5%	4.41	5.52
		1%	5.15	6.36
Actual Sample Size	27		Finite Sample: n=35	
		10%	3.393	4.41
		5%	4.183	5.333
		1%	6.14	7.607
			Finite Sample: n=30	
		10%	3.437	4.47
		5%	4.267	5.473
		1%	6.183	7.873
t-Bounds Test	**Null Hypothesis: No levels relationship**			
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
t-statistic	-2.79513	10%	-2.57	-3.21
		5%	-2.86	-3.53
		2.5%	-3.13	-3.8
		1%	-3.43	-4.1

In order to examine the long-run relationship between the variables, the ARDL long run form and bounds test has been applied.

According to the table 4.7.5, the Null Hypothesis of "No Cointegration" is accepted as the F-Statistic and t-statistic are lower than the critical value of the lower bound (I(0) at 5 per cent significance level.

Hence, it is concluded that there exists no long-run relationship between the variables.

Residual Test and Stability Test

The Residual Serial Correlation was tested through the Serial Correlation LM Test. The null hypothesis for this test is that there is no serial correlation between the residuals. The null hypothesis is accepted for the above model. The Residual Test for Normality shows that the distribution is not normally distributed. The null hypothesis was accepted as the p-value was less than/equal to 5%. This suggests the independence of random errors. The VEC Residual Heteroskedasticity test confirms that there is homoskedasticity amongst

the variables by rejecting the heteroskedasticity as the p-value is greater than 5%. The stability diagnostic shows the model is unstable.

Summary

Table 4.7.6: Results of Hypothesis

Hypothesis	Null Hypothesis	Result
Exports Led Growth (ELG)	H_0: Exports does not cause GDP	Rejected
	H_1: Exports does cause GDP	Accepted
Imports Led Growth (ILG)	H_0: Imports does not cause GDP	Accepted
	H_1: Imports does cause GDP	Rejected

This analysis leads to the conclusion that there is no short-run or long-run relationship between the variables.

4.7.4 ARDL-Exports to Italy as Dependent Variable

To run the ARDL model, the natural logarithm of exports of India to Italy is taken as an endogenous variable while the natural logarithm of GDP of India and natural logarithm of Imports from Italy are the exogeneous variables.

The results of the ARDL are as follows:

Table 4.7.7: ARDL: Export to Italy as Dependent Variable

Dependent Variable: $Ln(X_T)$				
Method: ARDL				
Sample (adjusted): 1996 2022				
Included observations: 27 after adjustments				
Maximum dependent lags: 1 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (1 lag, automatic): $Ln(Y_I)$ $Ln(M_T)$				
Fixed regressors: C				
Number of models evaluated: 4				
Selected Model: ARDL(1, 1, 1)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
$Ln(X_T)_{(t-1)}$	0.23263	0.218076	1.06674	0.2982

$Ln(Y_I)$	1.57127	0.87397	1.79786	0.0866*
$Ln(Y_I)_{(t-1)}$	-1.08917	0.852755	-1.27723	0.2155
$Ln(M_T)$	0.57635	0.183902	3.13401	0.0050***
C	-0.35381	0.173456	-2.03977	0.0542*
R-squared	0.93930	Mean dependent var		3.54694
Adjusted R-squared	0.92485	S.D. dependent var		0.18953
S.E. of regression	0.05195	Akaike info criterion		-2.88371
Sum squared residual	0.05668	Schwarz criterion		-2.59574
Log likelihood	44.9301	Hannan-Quinn criter.		-2.79808
F-statistic	65.0005	Durbin-Watson stat		1.81434
Prob(F-statistic)	0			

(*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent

Table 4.7.7 shows that $Ln(M_T)$ has a significant influence on $Ln(X_T)$ at 5 per cent significance level. A 1 per cent change in $Ln(M_T)$ will cause a positive change of 0.58 per cent in $Ln(X_T)$ on an average, ceteris paribus. Wald Test has been applied where p-value of the F-statistic is 0.0002, which leads to rejection of null hypothesis of $Ln(X_T)_{(t-1)}$, $Ln(Y_I)$, $Ln(Y_I)_{(t-1)}$, $Ln(M_T)_{(t-1)}$ having a significant influence on $Ln(X_T)$. A 1 per cent change in $Ln(Y_I)$ and $Ln(Y_I)_{(t-1)}$ will cause a positive change of 1.57 per cent and a negative change of -1.09 per cent in $Ln(X_T)$ respectively, other factors remaining constant. The resulting ARDL relationship for the short run is

$$\Delta Ln(X_T) = -1.0504 + 0.2326*\Delta Ln(X_T)_{(t-1)} + 1.5713*\Delta Ln(Y_I) - 1.0891*\Delta Ln(Y_I)_{(t-1)} + 0.5764*\Delta Ln(M_T) - 0.3538*\Delta Ln(M_T)_{(t-1)}. \quad \text{[Eq. 4.7.2]}$$

The ARDL bounds test is applied

ARDL Long Run Form and Bounds Test

Table 4.7.8: ARDL Long Run Form and Bounds Test

Dependent Variable: $\Delta(Ln(X_T))$				
Selected Model: ARDL(1, 1, 1)				
Case 3: Unrestricted Constant and No Trend				
Sample: 1995 2022				
Included observations: 27				
Conditional Error Correction Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-1.050399	0.385317	-2.726066	0.0127

$Ln(X_T)_{(t-1)}$ [a]	-0.767369	0.218076	-3.518806	0.0020
$Ln(Y_I)_{(t-1)}$	0.482109	0.134755	3.577658	0.0018
$Ln(M_T)_{(t-1)}$	0.222539	0.161986	1.373814	0.1840
$\Delta(Ln(Y_I))$	1.571278	0.87397	1.797863	0.0866
$\Delta(Ln(M_T))$	0.576351	0.183902	3.134017	0.0050

[a] p-value incompatible with t-Bounds distribution.

Levels Equation

Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$Ln(Y_I)$	0.628262	0.139965	4.488696	0.0002***
$Ln(M_T)$	0.290003	0.162626	1.783253	0.0890*

EC = ($Ln(X_T)$ - (0.6282*$Ln(Y_I)$ + 0.2900*$Ln(M_T)$))

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	5.061522	10%	3.17	4.14
k	2	5%	3.79	4.85
		2.5%	4.41	5.52
		1%	5.15	6.36
Actual Sample Size	27		Finite Sample: n=35	
		10%	3.39	4.41
		5%	4.18	5.33
		1%	6.14	7.60
			Finite Sample: n=30	
		10%	3.43	4.47
		5%	4.26	5.47
		1%	6.18	7.87

t-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)

t-statistic	-3.518806	10%	-2.57	-3.21
		5%	-2.86	-3.53
		2.5%	-3.13	-3.8
		1%	-3.43	-4.1

(*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent

In order to examine the long-run relationship between the variables, the ARDL long run form and bounds test has been applied.

According to the table 4.7.8, the Null Hypothesis of "No Cointegration" is rejected as the F-Statistic is greater than the critical value of the upper bound I(1) at 5 per cent significance level. And the t-statistics is greater than the critical value of the upper bound I(1) at 10 per cent significance level. A 1 per cent increase in imports boosts exports by 0.29 per cent at 10 per cent significance level. A 1 per cent increase in GDP increases exports by 0.63 per cent, on an average, ceteris paribus.

Hence, it is concluded that there exists a long-run relationship between the variables.

This leads to the application of the Error Correction Model (ECM):

$$\Delta \mathrm{LnX}_{Tt} = a_{02} + \sum_{n=1}^{p} a_{1n} \Delta LnX_{T(t-2)} + \sum_{n=1}^{q} a_{2n} \Delta LnY_{I(t-1)} + \sum_{n=1}^{q} a_{3n} \Delta LnM_{T\,(t-1)} + \lambda ECT_{(t-1)} + e_{2t} \quad \text{[Eq. 4.7.3]}$$

ARDL Error Correction Model

Table 4.7.9: ARDL Error Correction Regression

Dependent Variable: Δ(Ln(X_T))				
Selected Model: ARDL(1, 1, 1)				
Case 3: Unrestricted Constant and No Trend				
Sample: 1995 2022				
Included observations: 27				
ECM Regression				
Case 3: Unrestricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**

C	-1.05039	0.256214	-4.09969	0.0005
$\Delta(Ln(Y_I))$	1.57127	0.813029	1.93262	0.0669
$\Delta(Ln(M_T))$	0.57635	0.156402	3.68506	0.0014
CointEq(-1)	-0.76736	0.188169	-4.07807	0.0005
R-squared	0.55541	Mean dependent var		0.02398
Adjusted R-squared	0.49742	S.D. dependent var		0.07002
S.E. of regression	0.04964	Akaike info criterion		-3.03185
Sum squared residual	0.05668	Schwarz criterion		-2.83988
Log likelihood	44.9301	Hannan-Quinn criter.		-2.97477
F-statistic	9.57784	Durbin-Watson stat		1.81434
Prob(F-statistic)	0.000271			
F-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
F-statistic	5.061522	10%	3.17	4.14
k	2	5%	3.79	4.85
		2.5%	4.41	5.52
		1%	5.15	6.36
t-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
t-statistic	-4.078078	10%	-2.57	-3.21
		5%	-2.86	-3.53
		2.5%	-3.13	-3.8
		1%	-3.43	-4.1

Table 4.7.9 shows the cointegrating equation has a negative value of 0.77, which indicates that a disequilibrium is corrected at a rate of 77 per cent within one period. The high value of t-statistic being -4.08 shows that the coefficient is highly significant. This means that the adjustment towards equilibrium will happen in a monotonic manner, as the value of λ lies between 0 and 1.

The ECM equation is

$\Delta Ln(X_T) = -1.0504 + 0.2326*\Delta Ln(X_T)_{(t-1)} + 1.5713*\Delta Ln(Y_I) - 1.0891*\Delta Ln(Y_I)_{(t-1)} + 0.5764*\Delta Ln(M_T) - 0.3538*\Delta Ln(M_T)_{(t-1)} - 0.7674*(Ln(X_T)_{(t-1)} - (0.6283*Ln(Y_I)_{(t-1)} + 0.2900*Ln(M_T)_{(t-1)}))$. [Eq. 4.7.4]

Residual Test and Stability Test

The Residual Serial Correlation was tested through the Serial Correlation LM Test. The null hypothesis for this test is that there is no serial correlation between the residuals. The null hypothesis is accepted for the above model. The Residual Test for Normality shows that the distribution is normally distributed. The null hypothesis was accepted as the p-value was greater than 5%. This suggests the independence of random errors. The VEC Residual Heteroskedasticity test confirms that there is homoskedasticity amongst the variables by rejecting the heteroskedasticity as the p-value is greater than 5%. The stability diagnostic shows the model is stable.

Summary

Table 4.710: Results of Hypothesis

Hypothesis	Null Hypothesis	Result
Growth Led Exports (GLE)	H_0: GDP does not cause exports	Rejected
	H_1: GDP does cause exports	Accepted
Imports Led Exports (ILE)	H_0: Imports does not cause exports	Rejected
	H_1: Imports does cause exports	Accepted

This analysis leads to the conclusion that the GDP of India and Imports from Italy are causing Exports to Italy.

4.7.5 ARDL: Imports to Italy as Dependent Variable

To run the ARDL model, the natural logarithm of Imports from India to Italy is taken as an endogenous variable while the natural logarithm of GDP of India and natural logarithm of Exports to Italy are the exogeneous variables.

The results of the ARDL are as follows:

Table 4.7.11: ARDL: Imports from Italy as Dependent Variable

Dependent Variable: $Ln(M_T)$				
Method: ARDL				
Sample (adjusted): 1996 2022				
Included observations: 27 after adjustments				
Maximum dependent lags: 1 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (1 lags, automatic): $Ln(X_T)$ $Ln(Y_I)$				
Fixed regressors: C				
Number of models evaluated: 4				
Selected Model: ARDL(1, 0, 0)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
$Ln(M_T)_{(t-1)}$	0.64544	0.10537	6.12511	0.0000***
$Ln(X_T)$	0.63220	0.14545	4.34647	0.0002***
$Ln(Y_I)$	-0.27076	0.13201	-2.05101	0.0518*
C	0.67539	0.35751	1.88911	0.0715*
R-squared	0.93685	Mean dependent var		3.5047
Adjusted R-squared	0.92862	S.D. dependent var		0.1855
S.E. of regression	0.04957	Akaike info criterion		-3.0348
Sum squared residual	0.05651	Schwarz criterion		-2.8429
Log likelihood	44.9709	Hannan-Quinn criter.		-2.9778
F-statistic	113.751	Durbin-Watson stat		2.3264
Prob(F-statistic)	0			

(*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent

Table 4.7.11 shows that $Ln(X_T)$ has a significant influence on $Ln(M_T)$ at 5 per cent significance level. A 1 per cent change in $Ln(X_T)$ will cause a positive change of 63 per cent in $Ln(M_T)$, other factors remaining constant. Similarly, $Ln(Y_I)$ has a significant influence on $Ln(M_T)$ at 10 per cent significance level. A 1 per cent change in $Ln(Y_I)$ will cause a negative change of 0.27 per cent on $Ln(M_T)$ on an average, ceteris paribus.

The resulting ARDL relationship for the short run is

$$\Delta Ln(M_T) = -0.6754 - 0.3546*\Delta Ln(M_T)_{(t-1)} + 0.6322*\Delta Ln(X_T) - 0.2708*\Delta Ln(Y_I)$$

[Eq. 4.7.5]

The ARDL bounds test is applied

ARDL Long Run Form and Bounds Test

Table 4.7.12: ARDL Long Run Form and Bounds Test

Dependent Variable: $\Delta(Ln(M_T))$				
Selected Model: ARDL(1, 0, 0)				
Case 3: Unrestricted Constant and No Trend				
Sample: 1995 2022				
Included observations: 27				
Conditional Error Correction Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.675392	0.357517	1.88911	0.0715
$Ln(M_T)_{(t-1)}$ [a]	-0.354555	0.105377	-3.36464	0.0027
$Ln(X_T)$ [b]	0.632208	0.145453	4.34647	0.0002
$Ln(Y_I)$ [b]	-0.270767	0.132016	-2.05101	0.0518
[a] p-value incompatible with t-Bounds distribution.				
[b] Variable interpreted as Z = Z(-1) + D(Z).				
Levels Equation				
Case 3: Unrestricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
$Ln(X_T)$	1.783104	0.570554	3.125218	0.0048***
$Ln(Y_I)$	-0.763682	0.498433	-1.532164	0.1391
$EC = Ln(M_T) - (1.7831*Ln(X_T) – 0.7637*Ln(Y_I))$				
F-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
			Asymptotic: n=1000	
F-statistic	7.984506	10%	3.17	4.14
k	2	5%	3.79	4.85
		2.5%	4.41	5.52
		1%	5.15	6.36

Actual Sample Size	27		Finite Sample: n=35	
		10%	3.393	4.41
		5%	4.183	5.33
		1%	6.14	7.61
			Finite Sample: n=30	
		10%	3.437	4.47
		5%	4.267	5.47
		1%	6.183	7.87
t-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
t-statistic	-3.36464	10%	-2.57	-3.21
		5%	-2.86	-3.53
		2.5%	-3.13	-3.8
		1%	-3.43	-4.1

In order to examine the long-run relationship between the variables, the ARDL long run form and bounds test has been applied.

According to the table 4.7.12, the Null Hypothesis of "No Cointegration" is rejected as the F-Statistic is greater than the critical value of the upper bound I(1) at 5 per cent significance level. The t-statistic is greater than the critical value of the upper bound I(1) at 10% significance level.

Hence, it is concluded that there exists a long-run relationship between the variables.

A 1 per cent increase in exports boosts imports by 1.78 per cent on an average, ceteris paribus. The estimated long-run elasticities indicate that imports are export elastic. A 1 per cent increase in GDP will cause a negative 0.76 per cent decline in imports on an average, ceteris paribus.

This leads to the application of the Error Correction Model (ECM):

$$\Delta \mathrm{LnM}_t = a_{03} + \sum_{n=1}^{p} a_{1n} \Delta LnM_{(t-n)} + \sum_{n=1}^{q} a_{2n} \Delta LnY_{(t-n)} + \sum_{n=1}^{q} a_{3n} \Delta LnX_{(t-n)} + \lambda ECT_{(t-1)} + e_{3t} \quad \text{[Eq. 4.7.6]}$$

Table 4.7.13: ARDL Error Correction Regression

Dependent Variable: $\Delta(Ln(M_T))$				
Selected Model: ARDL(1, 0, 0)				
Case 3: Unrestricted Constant and No Trend				
Sample: 1995 2022				
Included observations: 27				
ECM Regression				
Case 3: Unrestricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.675392	0.12951	5.21482	0
CointEq(-1)	0.354555	0.06948	-5.10259	0
R-squared	0.510154	Mean dependent var		0.01618
Adjusted R-squared	0.49056	S.D. dependent var		0.06661
S.E. of regression	0.047546	Akaike info criterion		-3.18303
Sum squared resid	0.056517	Schwarz criterion		-3.08704
Log likelihood	44.97095	Hannan-Quinn criter.		-3.15449
F-statistic	26.03643	Durbin-Watson stat		2.32640
Prob(F-statistic)	0.000029			
F-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
F-statistic	7.984506	10%	3.17	4.14
k	2	5%	3.79	4.85
		2.5%	4.41	5.52
		1%	5.15	6.36
t-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
t-statistic	-5.102591	10%	-2.57	-3.21
		5%	-2.86	-3.53
		2.5%	-3.13	-3.80
		1%	-3.43	-4.10

Table 4.7.10 shows the speed of adjustment) is 35% and it will converge into equilibrium. The cointegrating equation has a negative value of 0.35, which indicates that a

disequilibrium is corrected at a rate of 35% within one period. The high value of t-statistic being -5.10 shows that the coefficient is highly significant. This means that the adjustment towards equilibrium will happen in a monotonic manner, as the value of λ lies between 0 and 1.

The ECM equation is

$$\Delta Ln(M_T) = -0.6754 - 0.3546*\Delta Ln(M_T)_{(t-1)} + 0.6322*\Delta Ln(X_T) - 0.2708*\Delta Ln(Y_I) - 0.3546*(Ln(M_T)_{(t-1)} - (1.7831*Ln(X_T) - 0.7637*Ln(Y_I))). \quad \text{[Eq. 4.7.7]}$$

Residual Test and Stability Test

The Residual Serial Correlation was tested through the Serial Correlation LM Test. The null hypothesis for this test is that there is no serial correlation between the residuals. The null hypothesis is accepted for the above model. The Residual Test for Normality shows that the distribution is normally distributed. The null hypothesis was accepted as the p-value was greater than 5%. This suggests the independence of random errors. The VEC Residual Heteroskedasticity test confirms that there is homoskedasticity amongst the variables by rejecting the heteroskedasticity as the p-value is greater than 5%. The stability diagnostic shows the model is stable.

Summary

Table 4.7.14: Results of Hypothesis

Hypothesis	Null Hypothesis	Result
Growth Led Imports (GLI)	H_0: GDP does not cause imports	Rejected
	H_1: GDP does cause imports	Accepted
Exports Led Imports (ELI)	H_0: Exports does not cause imports	Rejected
	H_1: Exports does cause imports	Accepted

4.7.6 India and Italy: Results of Growth-Trade Relationship

Table 4.7.15 Results Table

	Dependent Variable	Explanators	Short-run relationship	Long-run relationship
1	**Ln(Y_I)**	Ln(X_T), Ln(M_T)	Ln(X_T) Significant	No Cointegration
2	**Ln(X_T)**	Ln(Y_I), Ln(M_T)	Ln(Y_I) Significant, Ln(M_T)Significant	Cointegration
3	**Ln(M_T)**	Ln(Y_I), Ln(X_T)	Ln(Y_I) Significant, Ln(X_T) Significant	Cointegration

INDIA AND THE NETHERLANDS: GROWTH TRADE RELATIONSHIP

INDIA AND NETHERLANDS: GROWTH TRADE RELATIONSHIP

4.8.1 Introduction

As a founding member of the European Union, right from the days the European Economic Community was formed, The Netherlands has been a member. As an important member of the EU, The Netherlands and Indian economic ties have also strengthened over the years.

Total exports from India to the Netherlands in the year 2022 were 18.5 billion USD as against 10.28 billion USD in the year 2021. In the year 2022, main items of export included Mineral Fuels, mineral oils and products of their distillation; bituminous substances; etc. The total value of which is 9.45 billion USD. This is 51% of the total exports of India to the Netherlands. This category is predominantly petroleum oils and oils obtaining from bituminous minerals (excluding crude) under the product code-2710, which constitute 99.95% of the total exports from India to the Netherlands within the product code-27.

This is followed by Electric Machinery and Equipment and parts thereof; sound recorders and reproducers, television etc under the product code 85 with a total value of 1.44 billion USD for the period 2022. Within this product code, telephone sets, including smartphones and other telephones for cellular networks or for other wireless etc constitute an amount of 1.04 billion USD which equals 72% of the total value under this product code. Organic chemicals occupied the third position with a value of 1.26 billion USD. The fourth place was of Aluminium and articles thereof (product code-76) and fifth position was of Pharmaceutical products (product code-30).[1]

Total imports from the Netherlands into India were 5.92 billion USD in the year 2022 as against 4.35 billion USD in 2021. Mineral fuels, mineral oils and products of their distillation; bituminous substances; minerals etc.(product code-27), have been the topmost products that were imported into India from the Netherlands. The total value of

[1] https://www.trademap.org/Bilateral_TS.aspx

which is 0.95 billion USD. This amounts to 16% of the total imports from the Netherlands into India.

This was closely followed by nuclear reactors, boilers, machinery and mechanical appliances and there parts to an amount of 0.82 billion USD in the year 2022, under the product code-84. The third category constitutes of optical photographic cinematographic measuring checking precision medical or surgical instruments and apparatus parts and accessories thereof (product code-90) with a value of 0.45 billion USD. The fourth position is occupied by Animal, vegetable or microbial fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes (product code-15) and fifth position is of plastics and articles thereof (product code-39).[2]

4.8.2 Trade Data

Table 4.8.1 gives the value in million US Dollar of India's real GDP, the real exports to the Netherlands from India and real imports from the Netherlands into India. The natural logarithm of the three variables is also shown.

Table 4.8.1: India's Real GDP, the Netherlands Real Exports and the Netherlands Real Imports (in Mio USD)

	India		The Netherlands			
Year	**Y_I**	**$Ln(Y_I)$**	**X_N**	**$Ln(X_N)$**	**M_N**	**$Ln(M_N)$**
1995	5,96,058.81	5.77529	1,268.4	3.10327	830.0	2.91910
1996	6,41,058.40	5.80690	1,390.7	3.14322	864.6	2.93681
1997	6,67,020.12	5.82414	1,287.3	3.10967	791.6	2.89850
1998	7,08,271.42	5.85020	1,283.0	3.10823	778.4	2.89121
1999	7,70,923.38	5.88701	1,486.4	3.17213	845.2	2.92696
2000	8,00,534.47	5.90338	1,462.3	3.16504	899.7	2.95411
2001	8,39,151.99	5.92384	1,482.0	3.17084	1,029.8	3.01275
2002	8,71,073.12	5.94005	1,639.8	3.21478	899.4	2.95396
2003	9,39,542.79	5.97292	1,921.7	3.28368	1,050.5	3.02141
2004	1013,982.17	6.00603	2,085.2	3.31915	1,431.3	3.15573
2005	1094,324.35	6.03915	3,196.7	3.50470	1,802.1	3.25579
2006	1182,534.91	6.07281	3,106.8	3.49232	1,720.8	3.23573
2007	1273,126.72	6.10487	4,544.3	3.65746	1,992.3	3.29936
2008	1312,424.30	6.11807	7,146.8	3.85411	2,431.9	3.38595
2009	1415,605.63	6.15094	6,820.1	3.83379	2,374.6	3.37560

[2] https://www.trademap.org/Bilateral_TS.aspx?

2010	1535,897.92	6.18636	6,024.9	3.77995	2,074.7	3.31696
2011	1616,399.17	6.20855	8,594.4	3.93422	2,290.1	3.35986
2012	1704,596.19	6.23162	8,829.1	3.94592	2,573.9	3.41060
2013	1813,453.52	6.25851	8,956.3	3.95213	2,707.8	3.43262
2014	1947,834.55	6.28955	6,459.5	3.81020	2,662.1	3.42522
2015	2103,588.35	6.32296	4,876.5	3.68811	2,182.3	3.33891
2016	2277,267.03	6.35741	4,831.3	3.68406	1,982.2	3.29716
2017	2432,016.05	6.38597	4,981.4	3.69735	2,307.5	3.36313
2018	2588,974.75	6.41313	8,294.7	3.91880	3,179.3	3.50234
2019	2689,205.28	6.42962	8,447.1	3.92671	3,139.6	3.49687
2020	2532,396.29	6.40353	5,935.0	3.77342	2,526.4	3.40251
2021	2761,585.19	6.44116	9,015.4	3.95499	3,341.7	3.52397
2022	2954,977.66	6.47055	16,149.8	4.20817	4,325.5	3.63603

Source: WorldBank and UNComtrade

Descriptive Statistics:

Table 4.8.2 below gives the summary of the statistics of the data for values of Indian GDP and its exports to the Netherlands and imports from the Netherlands and the values of the natural logarithm of the parameters.

Table 4.8.2: Descriptive Statistics Of India and the Netherlands

	Y_I	X_N	M_N	$Ln(Y_I)$	$Ln(X_N)$	$Ln(M_N)$
Mean	1538708	5054.167	1965.557	6.134805	3.585942	3.240326
Median	1364015	4853.919	2033.517	6.134508	3.686088	3.308159
Maximum	2954978	16149.76	4325.484	6.470554	4.208166	3.636035
Minimum	596058.8	1268.431	778.4108	5.775289	3.103267	2.891209
Std. Dev.	749401.2	3582.098	935.0029	0.220843	0.341547	0.227094
Skewness	0.439736	1.000593	0.40992	-0.045152	-0.154576	-0.292977
Kurtosis	1.84082	4.173092	2.627298	1.682025	1.629521	1.750631
Jarque-Bera	2.47003	6.277705	0.946221	2.036083	2.302754	2.221642
Probability	0.29083	0.043333	0.623061	0.361302	0.316201	0.329289
Sum	43083825	141516.7	55035.6	171.7745	100.4064	90.72914
Sum Sq. Dev.	1.52E+13	3.46E+08	23604224	1.316836	3.149672	1.392431
Obsns	28	28	28	28	28	28

From table 4.8.2 it is observed that the series follows a normal distribution. The Jarque-Bera test shows that the probability is greater than 0.05, which accepts the Null Hypothesis of Normality. The series for Exports to the Netherlands is not normally distributed but as the natural logarithm values of all the variables are taken, series for all variables are normally distributed.

Unit Root Test

In order to conduct the data analysis under ARDL, the series needs to be stationary. The stationarity of the current series was checked by the application of the Unit Root Test through the Augmented Dicky-Fuller Test (ADF) test.

Table 4.8.3 : Unit Root Test: India and the Netherlands

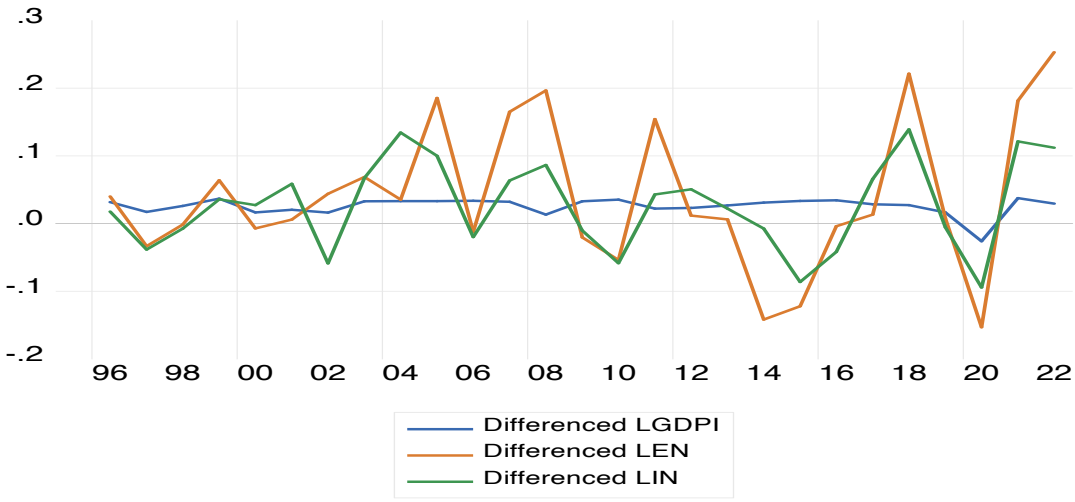
Augmented Dickey Fuller (ADF) Test							
		At Level			**At First Difference**		
		Ln(Y_I)	**Ln(X_N)**	**Ln(M_N)**	**D(Ln(Y_I))**	**D(Ln(X_N))**	**D(Ln(M_N))**
Intercept	t-Stat	-0.764	-0.391	-0.7643	-4.91	-3.9527	-5.7818
	Prob.	0.813	0.897	0.8119	0.0006	0.0057	0.0001
		no	no	no	***	***	***
Intercept and Trend	t-Stat	-1.8068	-1.791	-1.3145	-4.8532	-3.8617	-5.6727
	Prob.	0.673	0.680	0.8605	0.0033	0.029	0.0005
		no	no	no	***	**	***
None	t-Stat	10.45	1.922	2.8478	-0.7605	-3.5278	-2.0567
	Prob.	1	0.984	0.9981	0.3762	0.0011	0.0403
		no	no	no	no	***	**

(*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1% and (no) Not Significant

The ADF test as per table 4.8.3 reveals that all variables are non-stationary at level at 5 per cent significance level. To make the series stationary, further tests were conducted and the series was found to be stationary at first difference for Intercept and for Intercept and Trend. However, Ln(Y_I) series is non-stationary at first difference at neither Intercept nor Trend.

The stationary series is graphically represented in Graph 4.8.1, whereby the LGDPI denotes the Ln(Y_I) at first difference, the LEN denotes the Ln(X_N) at first difference and the LIN denotes the Ln(M_N) at first difference.

Graph 4.8.1: Graphical Representation of the ADF Test at First Difference India and the Netherlands



4.8.3 ARDL Model: India's GDP as Dependent Variable

To run the ARDL model, the natural logarithm of GDP of India is taken as an endogenous variable while the natural logarithm of Exports to the Netherlands and natural logarithm of Imports from the Netherlands are the exogeneous variables.

The results of the ARDL model are

Table 4.8.4: ARDL: India's GDP as Dependent Variable

Dependent Variable: $Ln(Y_I)$				
Method: ARDL				
Sample (adjusted): 1997 2022				
Included observations: 26 after adjustments				
Maximum dependent lags: 1 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (2 lags, automatic): $Ln(X_N)$, $Ln(M_N)$				
Fixed regressors: C				
Number of models evaluated: 9				
Selected Model: ARDL(1, 2, 0)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
$Ln(Y_I)_{(t-1)}$	0.9239	0.03673	25.153	0.0000***
$Ln(X_N)$	-0.0018	0.04105	-0.0449	0.9646

$Ln(X_N)_{(t-1)}$	-0.0674	0.03508	-1.9217	0.0690*
$Ln(X_N)_{(t-2)}$	0.0507	0.02772	1.8307	0.0821*
$Ln(M_N)$	0.0958	0.06455	1.4847	0.1532
C	0.2472	0.12213	2.0243	0.0565
R-squared	0.9972	Mean dependent var		6.1612
Adjusted R-squared	0.9965	S.D. dependent var		0.2060
S.E. of regression	0.0121	Akaike info criterion		-5.7802
Sum squared residual	0.0029	Schwarz criterion		-5.4899
Log likelihood	81.143	Hannan-Quinn criterion		-5.6966
F-statistic	1429.5	Durbin-Watson stat		2.1118
Prob(F-statistic)	0			

(*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent

Table 4.8.4 shows that $Ln(X_N)$ and $Ln(M_N)$ are not significantly influencing $Ln(Y_I)$ at 5 per cent significance level as p-value is greater than 0.05. Wald Test has been applied where p-value of the F-statistic is 0.1727, which leads to acceptance of null hypothesis of $Ln(Y_I)_{(t-1)}$, $Ln(X_N)$, $Ln(X_N)_{(t-1)}$, $Ln(X_N)_{(t-2)}$ and $Ln(M_T)$ not having any influence on $Ln(Y_I)$.

The resulting ARDL relationship for the short run is

$$\Delta Ln(Y_I) = 0.2472 + 0.9239*\Delta Ln(Y_I)_{(t-1)} - 0.0018*\Delta Ln(X_N) - 0.0674*\Delta Ln(X_N)_{(t-1)} + 0.0508**\Delta Ln(X_N)_{(t-2)} + 0.0958*\Delta Ln(M_N) \quad \text{[Eq. 4.8.1]}$$

The ARDL bounds test is applied

ARDL Long Run Form and Bounds Test

Table 4.8.5: ARDL Long Run Form and Bounds Test

Dependent Variable: $\Delta(Ln(Y_I))$				
Selected Model: ARDL(1, 2, 0)				
Case 3: Unrestricted Constant and No Trend				
Sample: 1995 2022				
Included observations: 26				
Conditional Error Correction Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.247242	0.122131	2.024399	0.0565

$Ln(Y_I)_{(t-1)}$ a	-0.076044	0.036733	-2.070177	0.0516
$Ln(X_N)_{(t-1)}$	-0.018501	0.03387	-0.546245	0.5909
$Ln(M_N)$**	0.095839	0.064551	1.484702	0.1532
$\Delta(Ln(X_N))$	-0.001845	0.041057	-0.04494	0.9646
$\Delta(Ln(X_N)_{(t-1)})$	-0.050763	0.027728	-1.830736	0.0821
a p-value incompatible with t-Bounds distribution.				
b Variable interpreted as Z = Z(-1) + D(Z).				
Levels Equation				
Case 3: Unrestricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Ln(XN)	-0.243298	0.446673	-0.544689	0.592
Ln(MN)	1.260305	0.667981	1.886738	0.0738
EC = Ln(YI) - (-0.2432*Ln(XN) + 1.2603*Ln(MN))				
F-Bounds Test	Null Hypothesis: No levels relationship			
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
			Asymptotic: n=1000	
F-statistic	1.469698	10%	3.17	4.14
k	2	5%	3.79	4.85
		2.5%	4.41	5.52
		1%	5.15	6.36
Actual Sample Size	26		Finite Sample: n=35	
		10%	3.393	4.41
		5%	4.183	5.333
		1%	6.14	7.607
			Finite Sample: n=30	
		10%	3.437	4.47
		5%	4.267	5.473
		1%	6.183	7.873
t-Bounds Test	**Null Hypothesis: No levels relationship**			
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
t-statistic	-2.070177	10%	-2.57	-3.21
		5%	-2.86	-3.53
		2.5%	-3.13	-3.8
		1%	-3.43	-4.1

In order to examine the long-run relationship between the variables, the ARDL long run form and bounds test has been applied.

According to the table 4.8.5, the Null Hypothesis of "No Cointegration" is accepted as the F-Statistic and t-statistic are lower than the critical value of the lower bound (I(0) at 5 per cent significance level.

Hence, it is concluded that there exists neither a short-run nor a long-run relationship between the variables.

Residual Test and Stability Test

The Residual Serial Correlation was tested through the Serial Correlation LM Test. The null hypothesis for this test is that there is no serial correlation between the residuals. The null hypothesis is accepted for the above model. The Residual Test for Normality shows that the distribution is not normally distributed. The null hypothesis was rejected as the p-value was less than 5%. The VEC Residual Heteroskedasticity test confirms that there is no homoskedasticity amongst the variables by accepting the heteroskedasticity as the p-value is less than 5%. The stability diagnostic shows the model is unstable.

Summary

Table 4.8.6: Results of Hypothesis

Hypothesis	Null Hypothesis	Result
Exports Led Growth (ELG)	H0: Exports does not cause GDP	Accepted
	H1: Exports does cause GDP	Rejected
Imports Led Growth (ILG)	H0: Imports does not cause GDP	Accepted
	H1: Imports does cause GDP	Rejected

This analysis leads to the conclusion that there is no short-run or long-run relationship between the variables.

4.8.4 ARDL: Exports to the Netherlands as Dependent Variable

To run the ARDL model, the natural logarithm of exports of India to the Netherlands is taken as an endogenous variable while the natural logarithm of GDP of India and natural logarithm of Imports from the Netherlands are the exogeneous variables.

The results of the ARDL are as follows:

Table 4.8.7: ARDL: Exports to the Netherlands as Dependent Variable

Dependent Variable: $Ln(X_N)$				
Method: ARDL				
Sample (adjusted): 1996 2022				
Included observations: 27 after adjustments				
Maximum dependent lags: 1 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (2 lag, automatic): $Ln(M_N)$ $Ln(Y_I)$				
Fixed regressors: C				
Number of models evaluated: 9				
Selected Model: ARDL(1, 1, 0)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
$Ln(X_N)_{(t-1)}$	0.53396	0.169808	3.14449	0.0047***
$Ln(M_N)$	1.36351	0.196544	6.93747	0.0000***
$Ln(M_N)_{(t-1)}$	-0.48830	0.33248	-1.46868	0.1561
$Ln(Y_I)$	-0.18295	0.165865	-1.10299	0.2819
C	-0.03318	0.561279	-0.05911	0.9534
R-squared	0.97205	Mean dependent var		3.6038
Adjusted R-squared	0.96697	S.D. dependent var		0.3344
S.E. of regression	0.06077	Akaike info criterion		-2.5977
Sum squared residual	0.08125	Schwarz criterion		-2.3577
Log likelihood	40.0698	Hannan-Quinn criter.		-2.5264
F-statistic	191.344	Durbin-Watson stat		1.8650
Prob(F-statistic)	0			

(*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent

Table 4.8.7 shows that $Ln(M_N)$ has a significant influence on $Ln(X_N)$ at 5 per cent significance level. A 1 per cent change in $Ln(M_N)$ will cause a positive change of 1.36 per cent in $Ln(X_N)$ other factors remaining constant. Wald Test has been applied where p-value of the F-statistic is 0.0002, which leads to rejection of null hypothesis of $Ln(M_N)$, $Ln(M_N)_{(t-1)}$ and $Ln(Y_I)$, having a significant influence on $Ln(X_N)$. A 1 per cent change in $Ln(M_N)_{(t-1)}$ will cause a negative change of 0.49 per cent in $Ln(X_N)$ and a 1 per cent change in $Ln(Y_I)$ will cause a negative change of 0.18 per cent in $Ln(X_N)$, other factors remaining constant.

The resulting ARDL relationship for the short run is

$\Delta Ln(X_N) = -0.0331 + 0.5339*\Delta Ln(X_N)_{(t-1)} + 1.3635*\Delta Ln(M_N) - 0.4883**\Delta Ln(M_N)_{(t-1)}$
$-0.1829*\Delta Ln(Y_I)$

[Eq. 4.8.2]

The ARDL bounds test is applied

ARDL Long Run Form and Bounds Test

Table 4.8.8: ARDL Long Run Form and Bounds Test

Dependent Variable: $\Delta(Ln(X_N))$				
Selected Model: ARDL(1, 1, 0)				
Case 3: Unrestricted Constant and No Trend				
Sample: 1995 2022				
Included observations: 27				
Conditional Error Correction Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-0.03318	0.561279	-0.059115	0.9534
$Ln(X_N)_{(t-1)}$ a	-0.466039	0.169808	-2.744502	0.0118
$Ln(M_N)_{(t-1)}$	0.875211	0.313807	2.789009	0.0107
$Ln(Y_I)$ b	-0.18295	0.165865	-1.102999	0.2819
$\Delta(Ln(M_N))$	1.363519	0.196544	6.93747	0
a p-value incompatible with t-Bounds distribution.				
b Variable interpreted as Z = Z(-1) + D(Z).				
Levels Equation				
Case 3: Unrestricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
$Ln(M_N)$	1.877977	0.361562	5.194072	0
$Ln(Y_I)$	-0.392563	0.364131	-1.07808	0.2927
EC = ($Ln(X_N)$ - (0.4212* $Ln(M_N)$ + 0.3996* $Ln(Y_I)$))				
F-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
			Asymptotic: n=1000	

F-statistic	2.764877	10%	3.17	4.14
k	2	5%	3.79	4.85
		2.5%	4.41	5.52
		1%	5.15	6.36
Actual Sample Size	27		Finite Sample: n=35	
		10%	3.393	4.41
		5%	4.183	5.333
		1%	6.14	7.607
			Finite Sample: n=30	
		10%	3.437	4.47
		5%	4.267	5.473
		1%	6.183	7.873
t-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
t-statistic	-2.744502	10%	-2.57	-3.21
		5%	-2.86	-3.53
		2.5%	-3.13	-3.8
		1%	-3.43	-4.1

(*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent

In order to examine the long-run relationship between the variables, the ARDL long run form and bounds test has been applied.

According to theTable 4.8.8, the Null Hypothesis of “No Cointegration” is accepted as the F-Statistic is lower than the critical value of the lower bound (I(0) at 5 per cent significance level.

Hence, it is concluded that there exists no long-run relationship between the variables.

Residual Test and Stability Test

The Residual Serial Correlation was tested through the Serial Correlation LM Test. The null hypothesis for this test is that there is no serial correlation between the residuals. The null hypothesis is accepted for the above model. The Residual Test for Normality shows that the distribution is normally distributed. The null hypothesis was accepted as the p-value was greater than 5%. This suggests the independence of random errors. The VEC Residual Heteroskedasticity test confirms that there is homoskedasticity amongst the

variables by rejecting the heteroskedasticity as the p-value is greater than 5%. The stability diagnostic shows the model is stable.

Summary

Table 4.8.9 Results of Hypothesis

Hypothesis	Null Hypothesis	Result
Growth Led Exports (GLE)	H0: GDP does not cause exports	Rejected
	H1: GDP does cause exports	Accepted
Imports Led Exports (ILE)	H0: Imports does not cause exports	Rejected
	H1: Imports does cause exports	Accepted

This analysis leads to the conclusion that the economic growth of India and Imports from the Netherlands are both causing Exports to the Netherlands, in the short run.

4.8.5 ARDL: Imports to the Netherlands as Dependent Variable

To run the ARDL model, the natural logarithm of Imports from India to the Netherlands is taken as an endogenous variable while the natural logarithm of GDP of India and natural logarithm of Exports to the Netherlands are the exogeneous variables.

The results of the ARDL are as follows:

Table 4.8.10: ARDL: Imports to the Netherlands as Dependent Variable

Dependent Variable: $Ln(M_N)$				
Method: ARDL				
Sample (adjusted): 1997 2022				
Included observations: 26 after adjustments				
Maximum dependent lags: 2 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (1 lags, automatic): $Ln(Y_I)$ $Ln(X_N)$				
Fixed regressors: C				
Number of models evaluated: 8				
Selected Model: ARDL(2, 0, 1)				

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Ln(MN) (t-1)	0.52715	0.183089	2.87922	0.0093***
Ln(MN) (t-2)	-0.26590	0.126942	-2.09471	0.0491**
Ln(YI)	0.29651	0.103164	2.87419	0.0094***
Ln(XN)	0.47538	0.070199	6.77197	0.0000***
Ln(XN) (t-1)	-0.17600	0.113514	-1.55047	0.1367
C	-0.50594	0.345085	-1.46614	0.1582
R-squared	0.97919	Mean dependent var		3.2643
Adjusted R-squared	0.97399	S.D. dependent var		0.2174
S.E. of regression	0.03506	Akaike info criterion		-3.6638
Sum squared residual	0.02459	Schwarz criterion		-3.3734
Log likelihood	53.6294	Hannan-Quinn criter.		-3.5801
F-statistic	188.235	Durbin-Watson stat		1.9284
Prob(F-statistic)	0			

(*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent

Table 4.8.10 shows that $Ln(Y_I)$ also has a significant influence on $Ln(M_N)$ at 5 per cent significance level. A 1 per cent change in $Ln(Y_I)$ will cause a positive change of 0.30 per cent in $Ln(M_N)$, ceteris paribus. $Ln(M_N)_{(t-1)}$ has a significant influence on $Ln(M_N)$ at 5 per cent significance level. A 1 per cent change in $Ln(M_N)_{(t-1)}$ will cause a positive change of 0.53 per cent on $Ln(M_N)$, other factors remaining constant. Similarly, $Ln(X_N)$ also have a significant influence on $Ln(M_N)$ at 5 per cent significance level. A 1 per cent change in $Ln(X_N)$ will cause a positive change of 0.48 per cent on $Ln(M_N)$, ceteris paribus. Wald Test has been applied where p-value of the F-statistic is 0.0000, which leads to rejection of null hypothesis of $Ln(X_N)$, $Ln(X_N)_{(t-1)}$ not having a significant influence on $Ln(M_N)$.

The resulting ARDL relationship for the short run is

$$\Delta Ln(M_N) = -0.5060 + 0.5272*\Delta Ln(M_N)_{(t-1)} - 0.2659*\Delta Ln(M_N)_{(t-2)} + 0.2965*\Delta Ln(Y_I) + 0.4754*\Delta Ln(X_N) - 0.1760*\Delta Ln(X_N)_{(t-1)}$$

[Eq. 4.8.3]

The ARDL bounds test is applied

ARDL Long Run Form and Bounds Test

Table 4.8.11: ARDL Long Run Form and Bounds Test

Dependent Variable: Δ(Ln(MN))				
Selected Model: ARDL(2, 0, 1)				
Case 3: Unrestricted Constant and No Trend				
Sample: 1995 2022				
Included observations: 26				
Conditional Error Correction Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-0.505943	0.345085	-1.466141	0.1582
Ln(MN) (t-1) a	-0.738754	0.2012	-3.671744	0.0015
Ln(YI)**	0.296514	0.103164	2.874199	0.0094
Ln(XN) (t-1)	0.299384	0.106912	2.800284	0.0111
Δ(Ln(MN) (t-1))	0.265907	0.126942	2.094718	0.0491
Δ(Ln(XN))	0.475386	0.070199	6.771973	0.0000
a p-value incompatible with t-Bounds distribution.				
b Variable interpreted as Z = Z(-1) + D(Z).				
Levels Equation				
Case 3: Unrestricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Ln(YI)	0.401371	0.111156	3.610871	0.0017***
Ln(XN)	0.405256	0.072659	5.577505	0.0000***
EC = Ln(MN) – 0.4014*Ln(YI) + 0.4053*Ln(XN))				
F-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Significance**	**(0)**	**I(1)**
			Asymptotic: n=1000	
F-statistic	4.716255	10%	3.17	4.14
k	2	5%	3.79	4.85
		2.5%	4.41	5.52
		1%	5.15	6.36
Actual Sample Size	26		Finite Sample: n=35	
		10%	3.393	4.41
		5%	4.183	5.33
		1%	6.14	7.60
			Finite Sample: n=30	
		10%	3.437	4.47

		5%	4.267	5.47
		1%	6.183	7.87
t-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Significance**	**I(0)**	**I(1)**
t-statistic	-3.671744	10%	-2.57	-3.21
		5%	-2.86	-3.53
		2.5%	-3.13	-3.80
		1%	-3.43	-4.10

In order to examine the long-run relationship between the variables, the ARDL long run form and bounds test has been applied.

According to the table 4.8.11, as F-statistic and t-statistic are greater than the value of critical upper bound I(1) at 10 per cent significance level indicating cointegrating relationship.

Hence, it is concluded that there exists a long-run relationship between the variables.

A 1 per cent increase in GDP will cause 0.40 per cent change in imports and 1 per cent increase in exports boosts imports by 0.41 per cent, on an average, ceteris paribus. The estimated long-run elasticities indicate that imports are GDP and export inelastic.

This leads to the application of the Error Correction Model (ECM):

$$\Delta \mathrm{LnM}_t = a_{03} + \sum_{n=1}^{p} a_{1n} \Delta LnM_{(t-n)} + \sum_{n=1}^{q} a_{2n} \Delta LnY_{(t-n)} + \sum_{n=1}^{q} a_{3n} \Delta LnX_{(t-n)} + \lambda ECT_{(t-1)} + e_{3t} \quad \text{[Eq. 4.8.4]}$$

ARDL Error Correction Model

Table 4.8.12: ARDL Error Correction Regression

Dependent Variable: Δ(Ln(M_N))
Selected Model: ARDL(2, 0, 1)
Case 3: Unrestricted Constant and No Trend
Sample: 1995 2022
Included observations: 26
ECM Regression
Case 3: Unrestricted Constant and No Trend

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-0.5059	0.130063	-3.88997	0.0009
Δ(Ln(MN) (t-1))	0.2659	0.119728	2.22093	0.0381
Δ(Ln(XN))	0.4753	0.061518	7.72761	0.0000
CointEq(-1)	-0.7387	0.187260	-3.94507	0.0008
R-squared	0.7839	Mean dependent var		0.026893
Adjusted R-squared	0.7544	S.D. dependent var		0.067482
S.E. of regression	0.0334	Akaike info criterion		-3.81765
Sum squared resid	0.0245	Schwarz criterion		-3.624097
Log likelihood	53.629	Hannan-Quinn criter.		-3.761914
F-statistic	26.607	Durbin-Watson stat		1.928486
Prob(F-statistic)	0			
F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
F-statistic	4.716255	10%	3.17	4.14
k	2	5%	3.79	4.85
		2.5%	4.41	5.52
		1%	5.15	6.36
t-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
t-statistic	-3.945078	10%	-2.57	-3.21
		5%	-2.86	-3.53
		2.5%	-3.13	-3.8
		1%	-3.43	-4.1

Table 4.8.12 shows the speed of adjustment in $Ln(M_N)$ as -0.74 per cent and it will converge into equilibrium.

The high value of t-statistic being -3.95 shows that the coefficient is highly significant. This means that the adjustment towards equilibrium will happen in a monotonic manner, as the value of λ lies between 0 and 1.

The ECM equation is

$$\Delta Ln(M_N) = -0.5060 + 0.5272*\Delta Ln(M_N)_{(t-1)} - 0.2659*\Delta Ln(M_N)_{(t-2)} + 0.2965*\Delta Ln(Y_I) + 0.4754*\Delta Ln(X_N) - 0.1760*\Delta Ln(X_N)_{(t-1)} - 0.7387*(Ln(M_N)_{(t-1)} - (0.4014* Ln(Y_I) + 0.4053*Ln(X_N)_{(t-1)}))$$ [Eq. 4.8.5]

Hence, it is concluded that there exists a short-run and a long-run relationship between the variables.

Residual Test and Stability Test

The Residual Serial Correlation was tested through the Serial Correlation LM Test. The null hypothesis for this test is that there is no serial correlation between the residuals. The null hypothesis is accepted for the above model. The Residual Test for Normality shows that the distribution is normally distributed. The null hypothesis was accepted as the p-value was greater than 5%. This suggests the independence of random errors. The VEC Residual Heteroskedasticity test confirms that there is homoskedasticity amongst the variables by rejecting the heteroskedasticity as the p-value is greater than 5%. The stability diagnostic shows the model is stable.

Summary

Table 4.8.13: Results of Hypothesis

Hypothesis	Null Hypothesis	Result
Growth Led Imports (GLI)	H0: GDP does not cause imports	**Rejected**
	H1: GDP does cause imports	**Accepted**
Exports Led Imports (ELI)	H0: Exports does not cause imports	**Rejected**
	H1: Exports does cause imports	**Accepted**

4.8.6 India and the Netherlands: Results of Growth and Trade Relationship

Table 4.8.14: Results Table

	Dependent Variable	Explanators	Short-run relationship	Long-run relationship
1	**$Ln(Y_I)$**	$Ln(X_N)$, $Ln(M_N)$	$Ln(X_N)$ Not Significant $Ln(M_N)$ Not Significant	No Cointegration
2	**$Ln(X_N)$**	$Ln(Y_I)$, $Ln(M_N)$	$Ln(Y_I)$ Significantw $Ln(M_N)$ Significant	No Cointegration
3	**$Ln(M_N)$**	$Ln(Y_I)$, $Ln(X_N)$	$Ln(Y_I)$ Not Significant $Ln(X_N)$ Not Significant	Cointegration*

w denotes the significance of the variable after conducting Wald Test

* at 10% significance level

INDIA AND EU5: GROWTH TRADE RELATIONSHIP

INDIA AND EU5: GROWTH TRADE RELATIONSHIP

4.9.1 Introduction

The relationship between India's economic growth in relation to its exports to the European Union and it imports from the European Union are examined in this section. As the European Union is a regional bloc of 27 member states, it has been noticed that India's imports and exports are predominantly with 5 EU member states referred to as EU5. These are Belgium, France, Germany, Italy and the EU5. The total trade of India with the EU5 members is around 70-80%, due to which the study has taken into account the trade figures of India with these 5 member states of the EU. In addition to the 5 member states being the founding members, the consistency of trade with the EU5 is a true reflection of India's trade with the EU as a whole.

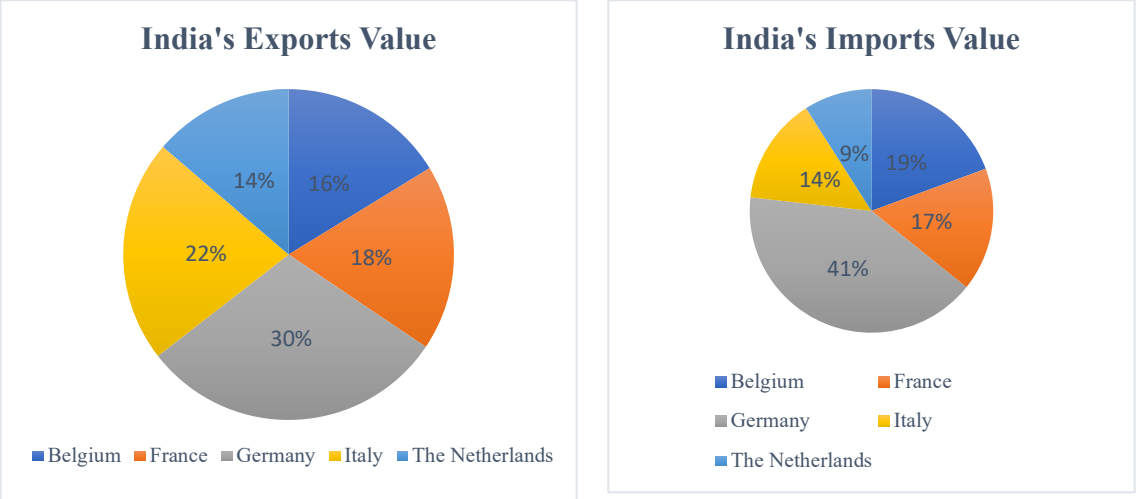


Figure 4.9.1: India's Exports and Imports with the EU5 for the year 2022

The composition of EU has changed to include new members at different time periods. Croatia was inducted as a member of the EU in 2013, whereby Bulgaria and Romania became EU members in 2005. As the trade relations of India with newly formed members of the EU has not been significant, therefore, their exclusion on the study will have no great impact on the results. Therefore, this study examines the relationship between India and the EU5 and these EU5 are representative of European Union for the purposes of examining the trade-growth nexus between India and the European Union.

4.9.2 Trade Data

Table 4.9.1 gives the value in million US Dollar of India's real GDP, the real exports to the EU5 from India and real imports from the EU5 into India. The natural logarithm of the three variables is also shown.

Table 4.9.1: India's Real GDP, EU5 Real Exports and EU5 Real Imports (in Mio USD)

	India		EU5			
Year	Y_I	$Ln(Y_I)$	X_E	$Ln(X_E)$	M_E	$Ln(M_E)$
1995	5,96,058.81	5.77529	7,442.0	3.87169	9,727.2	3.98799
1996	6,41,058.40	5.80690	7,175.7	3.85586	9,601.8	3.98235
1997	6,67,020.12	5.82414	7,381.4	3.86814	8,228.5	3.91532
1998	7,08,271.42	5.85020	7,573.9	3.87932	8,034.9	3.90498
1999	7,70,923.38	5.88701	10,034.3	4.00149	13,521.9	4.13104
2000	8,00,534.47	5.90338	10,850.3	4.03544	14,009.2	4.14641
2001	8,39,151.99	5.92384	10,889.8	4.03702	10,891.4	4.03708
2002	8,71,073.12	5.94005	11,715.3	4.06875	12,115.3	4.08334
2003	9,39,542.79	5.97292	12,601.3	4.10041	13,162.9	4.11935
2004	1013,982.17	6.00603	14,246.6	4.15371	16,270.7	4.21141
2005	1094,324.35	6.03915	17,623.5	4.24609	22,246.6	4.34726
2006	1182,534.91	6.07281	19,108.2	4.28122	27,696.3	4.44242
2007	1273,126.72	6.10487	20,231.7	4.30603	26,156.4	4.41758
2008	1312,424.30	6.11807	26,544.1	4.42397	33,947.3	4.53081
2009	1415,605.63	6.15094	23,701.3	4.37477	29,617.1	4.47154
2010	1535,897.92	6.18636	24,454.5	4.38836	29,219.8	4.46568
2011	1616,399.17	6.20855	31,426.2	4.49729	35,589.9	4.55133
2012	1704,596.19	6.23162	29,354.4	4.46767	35,552.3	4.55087
2013	1813,453.52	6.25851	34,498.0	4.53779	35,467.1	4.54983
2014	1947,834.55	6.28955	29,556.1	4.47065	34,621.1	4.53934
2015	2103,588.35	6.32296	25,953.3	4.41419	31,101.7	4.49278
2016	2277,267.03	6.35741	26,530.6	4.42375	30,182.3	4.47975
2017	2432,016.05	6.38597	28,046.2	4.44787	31,352.0	4.49627
2018	2588,974.75	6.41313	33,738.9	4.52813	37,498.8	4.57402
2019	2689,205.28	6.42962	32,515.4	4.51209	34,141.0	4.53328
2020	2532,396.29	6.40353	25,778.0	4.41125	26,941.1	4.43041
2021	2761,585.19	6.44116	37,420.4	4.57311	33,629.9	4.52673
2022	2954,977.66	6.47055	48,180.0	4.68287	35,179.4	4.54629

Source: WorldBank and UNComtrade

Descriptive Statistics:

Table 4.9.2 below gives the summary of the statistics of the data for values of Indian GDP and its exports to the EU5 and imports from the EU5 and the values of the natural logarithm of the parameters.

Table 4.9.2: Descriptive Statistics of India and the EU5

	Y_I	X_E	M_E	$Ln(Y_I)$	$Ln(X_E)$	$Ln(M_E)$
Mean	1538708	5054.167	1965.557	6.13480	3.585942	3.24032
Median	1364015	4853.919	2033.517	6.13450	3.686088	3.30815
Maximum	2954978	16149.76	4325.484	6.47055	4.208166	3.63603
Minimum	596058.8	1268.431	778.4108	5.77528	3.103267	2.89120
Std. Dev.	749401.2	3582.098	935.0029	0.22084	0.341547	0.22709
Skewness	0.439736	1.000593	0.40992	-0.04515	-0.15457	-0.2929
Kurtosis	1.84082	4.173092	2.627298	1.68202	1.629521	1.75063
Jarque-Bera	2.47003	6.277705	0.946221	2.03608	2.302754	2.22164
Probability	0.29083	0.043333	0.623061	0.36130	0.316201	0.32928
Sum	4308382	141516.7	55035.6	171.774	100.4064	90.7291
Sum Sq. Dev.	1.52E+13	3.46E+08	23604224	1.31683	3.149672	1.39243
Observations	28	28	28	28	28	28

From Table 4.9.2 it is observed that the series follows a normal distribution. The Jarque-Bera test shows that the probability is greater than 0.05, which accepts the Null Hypothesis of Normality. The series for Exports to the EU5 is not normally distributed but as the log values of all the variables are taken, series for all variables are normally distributed.

Unit Root Test

In order to conduct the data analysis under ARDL, the series needs to be stationary. The stationarity of the current series was checked by the application of the Unit Root Test through the Augmented Dicky-Fuller Test (ADF) test.

Table 4.9.3 : Unit Root Test: India and the EU5

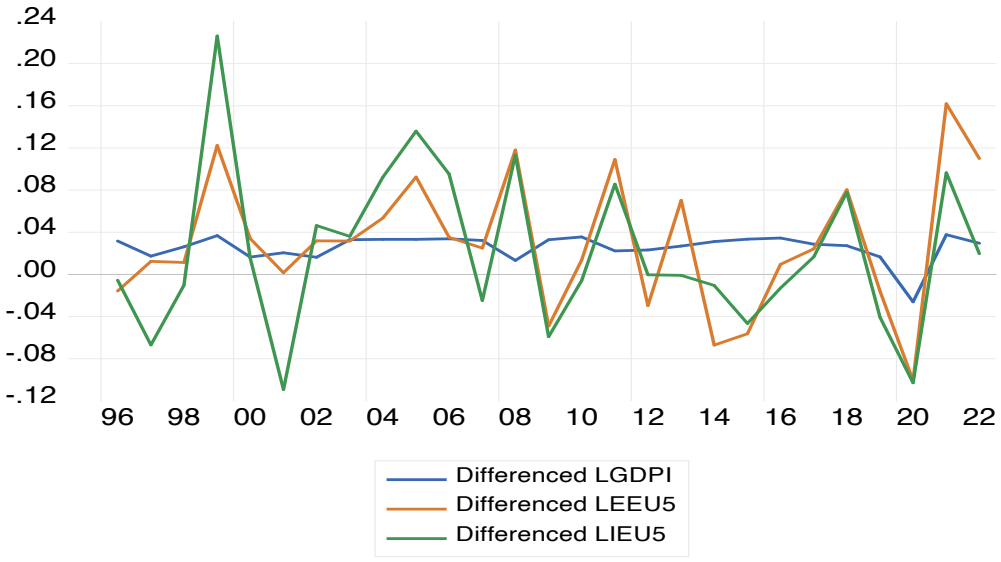
Augmented Dickey Fuller (ADF) Test							
		At Level			**At First Difference**		
		$Ln(Y_I)$	**$Ln(X_E)$**	**$Ln(M_E)$**	**$D(Ln(Y_I))$**	**$D(Ln(X_E))$**	**$D(Ln(M_E))$**
Intercept	t-Stats	-0.7645	-0.7109	-1.318	-4.91	-5.3002	-4.9996

	Prob.	0.8131	0.8275	0.6063	0.0006	0.0002	0.0004
		no	no	no	***	***	***
Intercept and Trend	t-Stats	-1.8068	-2.02	-1.5763	-4.8532	-4.4971	-5.0202
	Prob.	0.6733	0.5647	0.7757	0.0033	0.0076	0.0022
		no	no	no	***	***	***
None	t-Stats	10.457	2.4025	1.3362	-0.7605	-4.2846	-4.7249
	Prob.	1	0.9946	0.9503	0.3762	0.0001	0
		no	no	no	no	***	***

(*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1% and (no) Not Significant

The ADF test as per table 4.9.3 reveals that all variables are non-stationary at level at 5 per cent significance level. To make the series stationary, further tests were conducted and the series for Ln(Y_I), Ln(X_E) and Ln(M_E)was found to be stationary at first difference for Intercept and for Intercept and Trend. However, Ln(Y_I) series is non-stationary at first difference at neither Intercept nor Trend, whereby Ln(X_E) and Ln(M_E)was found to be stationary at first difference at neither Intercept nor Trend.

Graph 4.9.2: Graphical Representation of the ADF Test at First Difference: India and EU5



The stationary series is graphically represented in Graph 4.9.2, whereby the LGDPI denotes the Ln(Y_I) at first difference, the LEN denotes the Ln(X_E) at first difference and the LIN denotes the Ln(M_E) at first difference.

4.9.3 ARDL Model: India's GDP as Dependent Variable

To run the ARDL model, the natural logarithm of GDP of India is taken as an endogenous variable while the natural logarithm of Exports to the EU5 and natural logarithm of Imports from the EU5 are the exogeneous variables.

The results of the ARDL model are

Table 4.9.4: ARDL: India's GDP as Dependent Variable

Dependent Variable: $Ln(Y_I)$				
Method: ARDL				
Sample (adjusted): 1996 2022				
Included observations: 27 after adjustments				
Maximum dependent lags: 1 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (1 lags, automatic): $Ln(X_E)$, $Ln(M_E)$				
Fixed regressors: C				
Number of models evaluated: 4				
Selected Model: ARDL(1, 0, 0)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
$Ln(Y_I)_{(t-1)}$	0.93197	0.032629	28.5630	0.0000***
$Ln(X_E)$	0.05332	0.057105	0.93382	0.3601
$Ln(M_E)$	0.00454	0.044558	0.10209	0.9196
C	0.19335	0.099817	1.93712	0.0651
R-squared	0.99714	Mean dependent var		6.14812
Adjusted R-squared	0.99677	S.D. dependent var		0.213289
S.E. of regression	0.01211	Akaike info criterion		-5.853256
Sum squared resid.	0.00337	Schwarz criterion		-5.66128
Log likelihood	83.0189	Hannan-Quinn criterion		-5.796171
F-statistic	2679.80	Durbin-Watson stat		2.036287
Prob(F-statistic)	0			

(*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent

Table 4.9.4 shows that the $Ln(X_E)$ and $Ln(M_E)$ are not significantly influencing $Ln(Y_I)$ at 5 per cent significance level as p-value is greater than equal to 0.05. The Wald Test confirms the insignificance of $Ln(X_E)$ and $Ln(M_E)$ as the p-value of F-statistic in the Wald Test is greater than 0.05.

The resulting ARDL relationship for the short run is

$\Delta Ln(Y_I)$ 0.1934 + 0.9320*$\Delta Ln(Y_I)_{(t-1)}$ + 0.0533*$\Delta Ln(X_E)$ + 0.0045*$\Delta Ln(M_E)$

[Eq. 4.9.1]

The ARDL bounds test is applied

ARDL Long Run Form and Bounds Test

Table 4.9.5: ARDL Long Run Form and Bounds Test

Dependent Variable: $\Delta(Ln(Y_I))$				
Selected Model: ARDL(1, 2, 0)				
Case 3: Unrestricted Constant and No Trend				
Sample: 1995 2022				
Included observations: 26				
Conditional Error Correction Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.193359	0.099817	1.937124	0.0651
$Ln(Y_I)_{(t-1)}$[a]	-0.068026	0.032629	-2.084865	0.0484
$Ln(X_E)$[b]	0.053326	0.057105	0.933827	0.3601
$Ln(M_E)$[b]	0.004549	0.044558	0.102094	0.9196
[a] p-value incompatible with t-Bounds distribution.				
[b] Variable interpreted as Z = Z(-1) + D(Z).				
Levels Equation				
Case 3: Unrestricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
$Ln(X_E)$	0.783908	0.624399	1.25546	0.2219
$Ln(M_E)$	0.066872	0.666561	0.100324	0.9210
EC = $Ln(Y_I)$ - (0.7839*$Ln(X_E)$ + 0.0668*$Ln(M_E)$)				
F-Bounds Test	**Null Hypothesis: No levels relationship**			
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
			Asymptotic: n=1000	
F-statistic	1.695195	10%	3.17	4.14
k	2	5%	3.79	4.85
		2.5%	4.41	5.52

		1%	5.15	6.36
Actual Sample Size	27		Finite Sample: n=35	
		10%	3.393	4.41
		5%	4.183	5.333
		1%	6.14	7.607
			Finite Sample: n=30	
		10%	3.437	4.47
		5%	4.267	5.473
		1%	6.183	7.873
t-Bounds Test			**Null Hypothesis: No levels relationship**	
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
t-statistic	-2.084865	10%	-2.57	-3.21
		5%	-2.86	-3.53
		2.5%	-3.13	-3.8
		1%	-3.43	-4.1

In order to examine the long-run relationship between the variables, the ARDL long run form and bounds test has been applied.

According to the Table 4.9.5, the Null Hypothesis of "No Cointegration" is accepted as the F-Statistic and t-statistic are lower than the critical value of the lower bound (I(0) at 5 per cent significance level.

Hence, it is concluded that there exists neither a short-run nor a long-run relationship between the variables.

Residual Test and Stability Test

The Residual Serial Correlation was tested through the Serial Correlation LM Test. The null hypothesis for this test is that there is no serial correlation between the residuals. The null hypothesis is accepted for the above model. The Residual Test for Normality shows that the distribution is not normally distributed. The null hypothesis was rejected as the p-value was less than 5%. The VEC Residual Heteroskedasticity test confirms that there is no homoskedasticity amongst the variables by accepting the heteroskedasticity as the p-value is less than 5%. The stability diagnostic shows the model is unstable.

Summary

Table 4.9.6: Results of Hypothesis

Hypothesis	Null Hypothesis	Result
Exports Led Growth (ELG)	H_0: Exports does not cause GDP	Accepted
	H_1: Exports does cause GDP	Rejected
Imports Led Growth (ILG)	H_0: Imports does not cause GDP	Accepted
	H_1: Imports does cause GDP	Rejected

This analysis leads to the conclusion that there is no short-run or long-run relationship between the variables.

4.9.4 ARDL-Exports to the EU5 as Dependent Variable

To run the ARDL model, the natural logarithm of exports of India to the EU5 is taken as an endogenous variable while the natural logarithm of GDP of India and natural logarithm of imports from the EU5 are the exogeneous variables.

The results of the ARDL are as follows:

Table 4.9.7: ARDL: Exports to the EU5 as Dependent Variable

Dependent Variable: $Ln(X_E)$				
Method: ARDL				
Sample (adjusted): 1996 2022				
Included observations: 27 after adjustments				
Maximum dependent lags: 1 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (1 lag, automatic): $Ln(M_E)$ $Ln(Y_I)$				
Fixed regressors: C				
Number of models evaluated: 4				
Selected Model: ARDL(1, 1, 0)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
$Ln(X_E)_{(t-1)}$	0.55492	0.243806	2.276109	0.0329**
$Ln(M_E)$	0.65119	0.111125	5.860059	0.0000***
$Ln(M_E)_{(t-1)}$	-0.40351	0.194939	-2.069945	0.0504**
$Ln(Y_I)$	0.25236	0.120731	2.090322	0.0484**

C	-0.70899	0.362618	-1.955204	0.0634
R-squared	0.97611	Mean dependent var		4.29582
Adjusted R-squared	0.97176	S.D. dependent var		0.23768
S.E. of regression	0.03993	Akaike info criterion		-3.43751
Sum squared residual	0.03508	Schwarz criterion		-3.19754
Log likelihood	51.4064	Hannan-Quinn criter.		-3.3661
F-statistic	224.738	Durbin-Watson stat		1.60929
Prob(F-statistic)	0			

(*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent

Table 4.9.7 shows that $Ln(M_E)$ has a significant influence on $Ln(X_E)$ at 5 per cent significance level. A 1 per cent change in $Ln(M_E)$ will cause a positive change of 0.65 per cent in $Ln(X_E)$, ceteris paribus. $Ln(M_E)_{(t-1)}$ has a significant influence on $Ln(X_E)$ at 5 per cent significance level. A 1 per cent change in $Ln(M_E)$ will cause a negative change of 0.40 per cent in $Ln(X_E)$ other factors remaining constant. $Ln(Y_I)$ has a significant influence on $Ln(Y_I)$ at 5 per cent significance level. A 1 per cent change in $Ln(Y_I)$ will cause a positive change of 0.25 per cent in $Ln(X_E)$, ceteris paribus.

The resulting ARDL relationship for the short run is

$$\Delta Ln(X_E) = -0.7090 + 0.5549*\Delta Ln(X_E)_{(t-1)} + 0.6512*\Delta Ln(M_E) - 0.4035*\Delta Ln(M_E)_{(t-1)} + 0.2524*\Delta Ln(Y_I) \quad \text{[Eq. 4.9.2]}$$

The ARDL bounds test is applied

ARDL Long Run Form and Bounds Test

Table 4.9.8: ARDL Long Run Form and Bounds Test

Dependent Variable: $\Delta(Ln(X_E))$				
Selected Model: ARDL(1, 1, 0)				
Case 3: Unrestricted Constant and No Trend				
Sample: 1995 2022				
Included observations: 27				
Conditional Error Correction Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-0.708992	0.362618	-1.955204	0.0634

$Ln(X_E)_{(t-1)}$ [a]	-0.445071	0.243806	-1.825515	0.0815
$Ln(M_E)_{(t-1)}$	0.247685	0.194084	1.276172	0.2152
$Ln(Y_I)$ [b]	0.252368	0.120731	2.090322	0.0484
$\Delta(Ln(M_E))$	0.651198	0.111125	5.860059	0.0000

[a] p-value incompatible with t-Bounds distribution.

[b] Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation

Case 3: Unrestricted Constant and No Trend

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
$Ln(M_E)$	0.556507	0.202445	2.748931	0.0117
$Ln(Y_I)$	0.567027	0.223024	2.542454	0.0186

$EC = (Ln(X_E) - (0.55652*Ln(M_E) + 0.5670*Ln(Y_I))$

F-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
			Asymptotic: n=1000	
F-statistic	1.541937	10%	3.17	4.14
k	2	5%	3.79	4.85
		2.5%	4.41	5.52
		1%	5.15	6.36
Actual Sample Size	27		Finite Sample: n=35	
		10%	3.393	4.41
		5%	4.183	5.333
		1%	6.14	7.607
			Finite Sample: n=30	
		10%	3.437	4.47
		5%	4.267	5.473
		1%	6.183	7.873

t-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
t-statistic	-1.825515	10%	-2.57	-3.21
		5%	-2.86	-3.53
		2.5%	-3.13	-3.8

		1%	-3.43	-4.1

In order to examine the long-run relationship between the variables, the ARDL long run form and bounds test has been applied.

According to the Table 4.9.8, the Null Hypothesis of "No Cointegration" is accepted as the F-Statistic and t-statistic are lower than the critical value of the lower bound (I(0) at 5 per cent significance level.

Hence, it is concluded that there exists only a short-run relationship between the variables.

Residual Test and Stability Test

The Residual Serial Correlation was tested through the Serial Correlation LM Test. The null hypothesis for this test is that there is no serial correlation between the residuals. The null hypothesis is accepted for the above model. The Residual Test for Normality shows that the distribution is normally distributed. The null hypothesis was accepted as the p-value was greater than 5%. This suggests the independence of random errors. The VEC Residual Heteroskedasticity test confirms that there is homoskedasticity amongst the variables by rejecting the heteroskedasticity as the p-value is greater than 5 per cent. The stability diagnostic shows the model is unstable.

Summary

Table 4.9.9: Results of Hypothesis

Hypothesis	Null Hypothesis	Result
Growth Led Exports (GLE)	H_0: GDP does not cause exports	Rejected
	H_1: GDP does cause exports	Accepted
Imports Led Exports (ILE)	H_0: Imports does not cause exports	Rejected
	H_1: Imports does cause exports	Accepted

This analysis leads to the conclusion that the economic growth of India and Imports from EU5 are both causing Exports to EU5, in the short-run.

4.9.5 ARDL: Imports to the EU5 as Dependent Variable

To run the ARDL model, the natural logarithm of Imports from India to the EU5 is taken as an endogenous variable while the natural logarithm of GDP of India and natural logarithm of Exports to the EU5 are the exogeneous variables.

The results of the ARDL are as follows:

Table 4.9.10: ARDL: Imports to the EU5 as Dependent Variable

Dependent Variable: $Ln(M_E)$				
Method: ARDL				
Sample (adjusted): 1996 2022				
Included observations: 27 after adjustments				
Maximum dependent lags: 1 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (1 lags, automatic): $Ln(Y_I)$ $Ln(X_E)$				
Fixed regressors: C				
Number of models evaluated: 4				
Selected Model: ARDL(1, 0, 0)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
$Ln(M_E)_{(t-1)}$	0.34415	0.116425	2.9560	0.0071***
$Ln(Y_I)$	-0.30823	0.13124	-2.3486	0.0278**
$Ln(X_E)$	0.85864	0.148154	5.7956	0.0000***
C	1.06719	0.370865	2.8775	0.0085***
R-squared	0.95865	Mean dependent var		4.35101
Adjusted R-squared	0.95325	S.D. dependent var		0.22379
S.E. of regression	0.04838	Akaike info criterion		-3.08332
Sum squared residual	0.05384	Schwarz criterion		-2.89134
Log likelihood	45.6248	Hannan-Quinn criter.		-3.02623
F-statistic	177.746	Durbin-Watson stat		1.43664
Prob(F-statistic)	0			

(*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent

Table 4.9.10 shows that $Ln(Y_I)$ also has a significant influence on $Ln(M_E)$ at 5 per cent significance level. A 1 per cent change in $Ln(Y_I)$ will cause a negative change of 0.31 per cent in $Ln(M_E)$, ceteris paribus. $Ln(X_E)$ also have a significant influence on $Ln(M_E)$

at 5 per cent significance level. A 1 per cent change in $Ln(X_E)$ will cause a positive change of 0.86 per cent on $Ln(M_E)$, ceteris paribus.

The resulting ARDL relationship for the short run is

$$\Delta(Ln(M_E)) = 1.0672 + 0.3442*\Delta Ln(M_E)_{(t-1)} - 0.3082*\Delta Ln(Y_I) + 0.8586*\Delta Ln(X_E) \quad \text{[Eq. 4.9.3]}$$

The ARDL bounds test is applied

ARDL Long Run Form and Bounds Test

Table 4.9.11: ARDL Long Run Form and Bounds Test: India and the EU5

Dependent Variable: $\Delta(Ln(M_E))$				
Selected Model: ARDL(1, 0, 0)				
Case 3: Unrestricted Constant and No Trend				
Sample: 1995 2022				
Included observations: 27				
Conditional Error Correction Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	1.067197	0.370865	2.877588	0.0085
$Ln(M_E)_{(t-1)}$a	-0.655847	0.116425	-5.633194	0.0000
$Ln(Y_I)$b	-0.308233	0.13124	-2.348628	0.0278
$Ln(X_E)$b	0.858642	0.148154	5.795619	0.0000
a p-value incompatible with t-Bounds distribution.				
b Variable interpreted as Z = Z(-1) + D(Z).				
Levels Equation				
Case 3: Unrestricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
$Ln(Y_I)$	-0.469977	0.226617	-2.073884	0.0495**
$Ln(X_E)$	1.309211	0.201039	6.512218	0.0000***
EC = $Ln(M_E)$ – (0.4700*$Ln(Y_I)$ + 1.3092*$Ln(X_E)$)				
F-Bounds Test		**Null Hypothesis: No levels Relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
			Asymptotic: n=1000	

F-statistic	13.80329	10%	3.17	4.14
k	2	5%	3.79	4.85
		2.5%	4.41	5.52
		1%	5.15	6.36
Actual Sample Size	27		Finite Sample: n=35	
		10%	3.393	4.41
		5%	4.183	5.333
		1%	6.14	7.607
			Finite Sample: n=30	
		10%	3.437	4.47
		5%	4.267	5.473
		1%	6.183	7.873
t-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
t-statistic	-5.633194	10%	-2.57	-3.21
		5%	-2.86	-3.53
		2.5%	-3.13	-3.80
		1%	-3.43	-4.10

(*)Significant at the 10 per cent; (**)Significant at the 5 per cent; (***) Significant at the 1 per cent

In order to examine the long-run relationship between the variables, the ARDL long run form and bounds test has been applied.

According to the table 4.9.11, as F-statistic and t-statistic are greater than the critical value of upper bound I(1) there exists a long-run relationship at 5 per cent significance level.

Hence, it is concluded that there exists a long-run relationship between the variables.

A 1 per cent increase in GDP will cause a negative change of 0.47 per cent in imports and 1 per cent increase in exports boosts imports by 1.31 per cent on an average, ceteris paribus. The estimated long-run elasticities indicate that imports are export elastic.

Therefore, the ARDL Error Correction Regression is applied. The equation for the error correction regression model is

$$\Delta \mathrm{LnM}_t = a_{03} + \sum_{n=1}^{p} a_{1n} \Delta LnM_{(t-n)} + \sum_{n=1}^{q} a_{2n} \Delta LnY_{(t-n)} + \sum_{n=1}^{q} a_{3n} \Delta LnX_{(t-n)} + \lambda ECT_{(t-1)} + e_{3t} \quad \text{[Eq. 4.9.4]}$$

ARDL Error Correction Model

The results of the error correction regression are

Table 4.9.12: Error Correction Regression Model

Dependent Variable: Δ(Ln(M_E))				
Selected Model: ARDL(1, 0, 0)				
Case 3: Unrestricted Constant and No Trend				
Sample: 1995 2022				
Included observations: 27				
ECM Regression				
Case 3: Unrestricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	1.06719	0.156243	6.830377	0.0000
CointEq(-1)	-0.65584	0.097756	-6.709003	0.0000
R-squared	0.64291	Mean dependent var		0.02067
Adjusted R-squared	0.62862	S.D. dependent var		0.07615
S.E. of regression	0.04640	Akaike info criterion		-3.23146
Sum squared resid	0.05384	Schwarz criterion		-3.13548
Log likelihood	45.6248	Hannan-Quinn criter.		-3.20292
F-statistic	45.0107	Durbin-Watson stat		1.43664
Prob(F-statistic)	0			
F-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
F-statistic	13.80329	10%	3.17	4.14

k	2	5%	3.79	4.85
		2.5%	4.41	5.52
		1%	5.15	6.36
t-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
t-statistic	-6.709003	10%	-2.57	-3.21
		5%	-2.86	-3.53
		2.5%	-3.13	-3.8
		1%	-3.43	-4.1

Table 4.9.12 shows the speed of adjustment in $Ln(M_E)$ as -0.66 and it will converge into equilibrium.

The high value of t-statistic being -6.71 shows that the coefficient is highly significant. This means that the adjustment towards equilibrium will happen in a monotonic manner, as the value of λ lies between 0 and 1.

The ECM equation is

$$\Delta(Ln(M_E)) = 1.0672 + 0.3442*\Delta Ln(M_E)_{(t-1)} - 0.3082*\Delta Ln(Y_I) + 0.8586*\Delta Ln(X_E) - 0.6558*(Ln(M_E)_{(t-1)} - (-0.4699* Ln(Y_I) + 1.3092* Ln(X_E))). \quad [Eq. 4.9.5]$$

Hence, it is concluded that there exists short-run as well as a long-run relationship between the variables.

Residual Test and Stability Test

The Residual Serial Correlation was tested through the Serial Correlation LM Test. The null hypothesis for this test is that there is no serial correlation between the residuals. The null hypothesis is accepted for the above model. The Residual Test for Normality shows that the distribution is normally distributed. The null hypothesis was accepted as the p-value was greater than 5%. This suggests the independence of random errors. The VEC Residual Heteroskedasticity test confirms that there is homoskedasticity amongst the

variables by rejecting the heteroskedasticity as the p-value is greater than 5%. The stability diagnostic shows the model is stable.

Summary

Table 4.9.13: Results of Hypothesis

Hypothesis	Null Hypothesis	Result
Growth Led Imports (GLI)	H_0: GDP does not cause imports	Rejected
	H_1: GDP does cause imports	Accepted
Exports Led Imports (ELI)	H_0: Exports does not cause imports	Rejected
	H_1: Exports does cause imports	Accepted

4.9.6 India and EU5: Results of Growth-Trade Relationship

Table 4.9.14: Results Table

	Dependent Variable	Explanators	Short-run relationship	Long-run relationship
1	**$Ln(Y_I)$**	$Ln(X_E)$, $Ln(M_E)$	$Ln(X_E)$ Not Significant $Ln(M_E)$ Not Significant	No Cointegration
2	**$Ln(X_E)$**	$Ln(Y_I)$, $Ln(M_E)$	$Ln(Y_I)$ Significant $Ln(M_E)$ Significant	No Cointegration
3	**$Ln(M_E)$**	$Ln(Y_I)$, $Ln(X_E)$	$Ln(Y_I)$ Significant $Ln(X_E)$ Significant	Cointegration

SUMMARY OF RESULTS

SUMMARY OF RESULTS

4.10 Results

The analysis of the EU5 collectively and individually of the five constituent member states has been summarized to give an overview of all the significant results in table 4.10.1.

The table gives the short run as well as the long run relationships between the exogenous and endogenous variables. The entity-wise results for the parameters are given below:

Table 4.10.1: Summary of Results-India-EU Analysis

			Short-run causality results			**Decision of short-run causality**	**Long-run causality**	**Decision of long-run causality**
			Coefficient (p-value)				**ECM(-1)-Speed of Adjustment (p-value)**	
			Ln(Y)	**Ln(X)**	**Ln(M)**			
Belgium	1	Ln(Y/X,M)		0.0543 (0.0935)*		X→Y	No Cointegration	
	2	Ln(X/Y,M)	0.8581 (0.0000)		0.63188 (0.0000)	Y→X M→X	-1.9223 (0.0000)	Y→X M→X
	3	Ln(M/Y,X)		0.9121 (0.0004)		X→M	-0.8905 (0.0000)	Y→M X→M
France	1	Ln(Y/X,M)		0.0810 (0.0253)	-	X→Y	No Cointegration	-
	2	Ln(X/Y,M)	1.8495 (0.0249)		-	Y→X	No Cointegration	-
	3	Ln(M/Y,X)	-	-		None	No Cointegration	-
Germany	1	Ln(Y/X,M)		-	-	None	No Cointegration	-
	2	Ln(X/Y,M)	0.3273 (0.0308)		0.4677 (0.0003)	Y→X M→X	Inconclusive	-
	3	Ln(M/Y,X)	-	0.9393 (0.0006)		X→M	No Cointegration	-

Italy	1	Ln(Y/X,M)		0.0837 (0.0498)	-	X→Y	No Cointegration	-
	2	Ln(X/Y,M)	-		0.5764 0.0050)	M→X	-0.7674 (0.0005)	Y→X M→X *
	3	Ln(M/Y,X)	-0.2708 (0.0518) *	0.6322 (0.0002)		Y→M X→M	-0.3545 (0.0000)	X→M
The Netherlands	1	Ln(Y/X,M)		-	-	None	No Cointegration	
	2	Ln(X/Y,M)	-		1.3635 0.0000)	M→X	No Cointegration	
	3	Ln(M/Y,X)	0.2965 (0.0094)	0.4754 (0.0000)		Y→M X→M	-0.7387 (0.0008)	Y→M X→M
EU5	1	Ln(Y/X,M)		-	-	None	No Cointegration	
	2	Ln(X/Y,M)	0.2524 (0.0484)	0.6512 (0.0000)		Y→X M→X	No Cointegration	
	3	Ln(M/Y,X)	-0.3082 (0.0278)	0.8586 (0.0000)		Y→M X→M	-0.6558 (0.0000)	Y→M X→M

Bi-directional relationship:

A bi-directional relationship of exports and growth is seen in India's trade with Belgium and France. Similarly, barring France, a bi-directional relationship between imports and exports is seen amongst all the other five entities trading with India. Hence, Belgium, Germany, Italy, the Netherlands and the EU5 all have bi-directional relationship with imports and exports when trading with India.

Uni-directional relationship:

A uni-directional relationship of exports causing growth is seen with Italy. A uni-directional relationship of growth causing exports is seen with Germany and EU5.

A uni-directional relationship of growth causing imports is also seen with Italy, the Netherlands and the EU5. Imports causing growth is not seen with any of the actors studied.

Short-run causality:

A short run causality of exports causing growth is seen with Belgium, France, and Italy. A short run relationship of growth causing exports is seen with Belgium, France, Germany and EU5. Belgium, Germany, Italy, the Netherlands and EU5 are also showing a causal relationship between imports causing exports in the short run. A short run causal relationship of growth causing imports is with Italy, the Netherlands and the EU5. While export causing imports in the short run is seen with Belgium, Germany, Italy, the Netherlands and the EU5. None of the entities show a causal relationship of imports causing growth in the short run.

Long-run causality:

While Germany and France do not show any long run causality between any of the variables studied, A long run causal relationship between growth and exports is seen with Belgium and Italy. Belgium and Italy also have a long run causal relationship between imports and exports. A long run causal relationship between growth and imports is seen with Belgium, the Netherlands and the EU5. Whereas, exports causing imports in the long-run is seen in Belgium Italy, the Netherlands and the EU5. There is no long run relationship of either exports causing growth or imports causing growth.

Strong Relationship:

A strong relationship can be thus seen in growth causing exports in Belgium. Imports causing exports with Belgium and Italy show a strong relationship. A strong causal relationship of growth causing imports is seen with the Netherlands and the EU5. And a strong causal relationship of exports causing imports is also seen with Belgium, Italy, the Netherlands and the EU5.

Exports Led Growth:

Addressing the Hypothesis of ELG, Belgium, France and Italy show an ELG in the short run only.

Import Led Growth:

None of the countries show a causal relationship of Import Led Growth thereby showing a complete independence of the variables in this case.

Growth Led Exports:

Belgium, France Germany, Italy and the EU5 show a causal relationship of Growth Led Exports. Whereas Belgium has a strong causal relationship, the other three (France, Germany and the EU5) have only a short run relationship of Growth Led Exports.

Import Led Exports:

A causal relationship whereby imports lead to exports is seen with Belgium, Germany, Italy, the Netherlands and the EU5. France is the only country which does not show a causal relationship of Import Led Exports, implying the independence of the variables.

Growth Led Imports:

Belgium, Italy, the Netherlands and the EU5 show a causal relationship of growth causing imports. While the Netherlands and the EU5 show a strong causal relationship, of GLI, Belgium and Italy show a short-run relationship only.

Export Led Imports:

Except France, all other entities namely, Belgium, Germany, Italy, the Netherlands and the EU5 show a causal relationship between exports and imports.

With export led growth, the economy will see higher production, job employment, income for workers which will have a multiplier effect of increased consumer spending and a feedback relationship of higher imports. Exports injecting growth will also provide for improved infrastructure and technological advancements.

It is clear that this is due to the export and import of diamonds. Uncut diamonds from Belgium get a value addition and are being re-exported back to Belgium. The low-cost manpower and skill from India is being utilised in order to add value to the diamonds from Belgium.

Similarly, auto parts are being manufactured in India with raw materials from Germany, these are exported back to Germany and German manufactured cars are imported into India. This explains the relationship between exports and imports with Germany.

The results point to policy changes towards a strengthening of economic partnership which brings mutual gains for both the partners. This study reinforces the theory that trade is not a zero sum game and both India and the EU tend to gain from India-EU FTA. Though at a broader level, while trade is beneficial for both the countries, India needs to increase its manufacturing capacity to really reap substantial benefits of export led growth. The imports which are a leakage to the GDP means that consumption goods are being imported which have a negative impact on growth. India needs to ensure capital goods are imported in order to upgrade its technology to produce efficient, competitive manufacturing. This will help in a positive impact on imports and the GDP.

The bi-lateral trade-growth relationship and intra-trade relationship of India with EU member countries shows that the potential to increase trade exists with each of these member countries. At a multi-lateral level, the trade-growth relationship of India with EU5 also shows that India and EU need to expedite their negotiations especially to attract investments which boost its manufacturing capabilities within the BTIA negotiations.

CHAPTER 5

CONCLUSION, RECOMMENDATIONS, LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

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5.1 Interpretation of Results

The world is witnessing a very disturbing and worrisome transformation with the return of authoritarianism and egoistic nationalism. China and Russia becoming increasingly assertive, 'America-first' policy adopted by the Trump administration, the divisions in Europe including Brexit, a disturbed Middle East and the backlash against globalization in the recent years have contributed to the changing landscape of the world. The aggressive and arrogant demeanor of a few countries is contagious and unsettling the status-quo globally. The liberal ideology is being challenged by questioning the core principles of democracy. The rule-based international order is under threat posing a serious danger to multilateralism. The detrimental effects of COVID-19 reached all countries of the world. The Russia-Ukraine war has shaken the very nature of a peaceful co-existence. And the response of the international community is creating further divisions, giving rise to instability. The Russia-Ukraine war is changing the contours of the unipolar world. The spirit of cooperation and mutual assistance is being replaced by the fulfillment of personal interests putting international relations under severe stress.

According to the Foreign Minister of India, S. Jaishankar, the global unsettling developments have a profound impact. This can be seen in the world becoming increasingly multipolar, emerging economies demanding a greater voice, rise of nationalism, transactional relationships that will give rise to ad hoc groupings of disparate nations. International frenemies will bring competitors together while friends will go against each other for a common benefit. All this is likely to lead to more regional or local balances with less global influence (Jaishankar, S., 2020).

Many observers have pointed to the growing nationalism, authoritarianism and populism in China, Russia, North Korea, Turkey, Brazil etc. The emergence of these states threatens the rule-based multilateral order and democratic rule, posing greater stress to democratic governance. The worsening relations between China and the US have both the economic as well as the political dimension to it. China has started questioning the

supremacy of the United States leading the world to further chaos and calamity. As a consequence, the bonhomie of Russia and China and their 'no limits friendship' seeks to tilt the world to a greater danger.

The Trump administration re-defined the role of the US in the world. It made its intentions clear that the US no longer wanted to be the police state of the world. The withdrawal of the United States from international agreements during the Trump regime, also contributed to a volatile future for the world. The US -EU relations during the Trump regime lacked a common vision. Both were keen to fulfill their self-interests. The cancellation of the Intermediate Range Nuclear Forces Treaty by the USA puts the EU under security threat especially from Russia.

The withdrawal from the Paris Agreement by the US adds additional burden on the existing signatories of the Climate Movement. The Trump administration projected confusing signs from the US in terms of trying to protect its own interests while also continuing to remain the leader of the world. The egocentric attitude of the US weakens the multilateral order encouraging the return of power politics.

India and the EU are natural partners (Wagner, 2008) and hence, a joint effort by them to restore peace to a hostile global environment would keep alive the spirit of multilateralism. Jointly, India and the EU would set an example and restore the weakened faith of a rule-based international system. This would have a great impact and boost confidence for the smaller countries, who would look up to the Indo-EU alliance as a forceful voice. Being relevant global players also fulfils the ambitious plans of India and the EU.

As the global game of power politics amongst new and old actors plays out, the mere intention of strengthening a partnership between India and the EU augments well. This reinstates the belief in international cooperation and partnership, even when EU might find India to be a natural partner but not necessarily an ideal partner (Müller-Brandeck-Bocquet, G., et. al. 2021).

The inconclusive outcome of BTIA negotiations can be underpinned to the separation of foreign policy issues with those of gains to be accrued via trade. Discussions on a trade

and investment agreement between India and the EU were marked with different objectives for each of them. This agreement for the EU was the first of its kind with an emerging market. While the EU was looking to a greater market access with India, it was not open to granting the same market access to India. The initial intention of the EU was to somehow use the aspect of commercial gain towards political leverage. India was used to deploy the opposite technique in its negotiations, wherein it would negotiate with strategic foreign policy goals with a willingness to make trade-offs in the endgame to come to an understanding. The diplomatic channel of discussion with individual member states of the EU at a bi-lateral level meant that India was simultaneously gaining political inroads with its European counterparts. Indian strategy of using the bi-lateral route proved more successful than the multi-lateral approach of coming to a common objective. And without a close link of foreign policy objectives with the trade goals, the process of strategic bargain remained elusive.

The initial objective of a free trade agreement for the EU was to gain greater market access to the large Indian market for its automobile sector, wine and spirits, as well as retail, insurance, and financial services. India was eager to promote its apparel and clothing exports to the EU with the phasing out of the preferential quotas. The movement of professionals was another issue that India was keen to take up with the EU. During the course of the discussions and inclusion of issues such as environmental standards and labour issues in the trade agreement, India took a strong stand against the inclusion of such clauses in the agreement.

Brexit adds a new dimension to the negotiations on the India-EU FTA. With the UK as a member of the EU, the Indian perspective of EU has been different. Traditional and historical linkages with the UK, provided a greater market to Indian businesses with UK acting as an entry point to the EU. The advantages of Indian firms having established their offices in the UK and managing European affairs from UK were much easier. At the same time, UK was adamant to push for lowering of tariffs on its Scotch whiskey and reluctant to provide access to Indian professional with a fairly liberalised visa regime. These issues have been the stumbling blocks on the FTA negotiations. The members of the continental Europe have all expressed positive signals on the issue of Brexit and their relationship with India. The EU finds that the entry for India could be via Germany, France or even Belgium for a trade deal to facilitate investment and trade flows.

With UK out of the EU, India has to rethink its strategy of a Europe sans UK and align its foreign policy and trade concerns on two levels – one with the EU and the other with UK. For India, both these have to be carefully navigated in order to achieve what would have been possible with one multi-lateral agreement had UK continued to be part of the EU. India has preferred EU to UK when negotiating trade deals and UK will have to come with attractive offers to finalise an FTA with India.

An EU-Vietnam FTA poses serious competition threats to India. It would be prudent for India to seal an FTA with the EU especially on non-sensitive issues in order to make some progress. A gradual progress on the trade front is far better than no progress at all. The civil society discussions insist on an India-EU FTA, not only for economic gains but for geo-strategic importance.

The changing global order has weakened EU's position as an economic powerhouse and its normative role. This realisation of a diluting rules based multilateral order not just threatens the EU but is glaring in the face of all economies. While the liberal order is losing its sheen, the assumption of an isolated existence is utopian. India as an economic heavy-weight of the future, can help India steer the outcome of the India-EU Strategic Partnership. The EU-India Strategic Partnership 2018, is an instrument to forge stronger ties together and find compromising solutions not just at the bi-lateral level, but at the regional and global level.

With the threat of Russia and the US-China rivalry being played out in the open, both India and the EU need to re-engage with a firm commitment to revive their partnership in a time to protect the rules based order and a slowing of the world economy.

5.2 Recommendations

A common commitment on certain global issues have opened avenues of a collaborative and cooperative partnership approach between India and the EU, especially where trade discussions have not yielded the desired results. Climate diplomacy is an issue that brings India and the EU, with member states of the EU on a common platform. There is a greater understanding amongst the EU players and India on issues of Climate Change. This

platform, which engages EU and the constituent members of the EU has larger implications than just a common understanding of climate concerns. During these engagements on Climate issues, the EU notices the growing geo-political and geo-economic clout of India and India finds the benefits of developmental and technical cooperation with the EU. Hence, Climate diplomacy is not just about the issues of climate change but are playing a greater reinforcing role in shaping the bi-lateral and plurilateral relationship between India and the EU.

Similarly, a new form of opportunity is through joint development cooperative initiatives. Lately, India has become a development actor and has engaged in various development initiatives in Africa and elsewhere. The EU's new Consensus on Development and India's growing interest in this field offers opportunities to explore the vast untapped potential of India-EU development partnership. Such initiative will forge a stronger alliance to address a common objective and strengthen the partnership. A dependable, long-term sustainable partnership is likely to spread to other areas of mutual interest, at the same time, contributing to the common global good.

While India needs to continue to deal with EU member states at a bi-lateral level, the multi-lateral approach also has to be given the same importance. India and EU need to find common solutions starting with easier issues and then moving on to the more difficult ones in terms of finding acceptable solutions to both parties.

Enhancing trade relations will contribute to a more meaningful relationship and provide the much needed trust which is currently missing in this partnership. With increased trade, the perceptions about each other will offer more areas of cooperation and understanding.

Our study shows that huge economic potential exists between India and the EU and the time is ripe to take this relationship to the next level. The decisions taken in this decade will have long-lasting impacts on not only the India-EU relationship but also the global landscape.

India remains one of the most integrated economies today than at any other point of time in history. This opens up opportunities for India as the world is looking inwards and the

recent trends are not promising for the economic future of the world. Though, some critics may point to the inappropriate timing of India's openness, India needs to seize the opportunity and move ahead in order to increase its economic scale and expand its manufacturing capacities.

With a growing and ambitious India, it continues to believe in the rules based international order and it would be in the interest of both the EU and India to support and protect the international rules based order.

The changing global landscape and the looming threat of growing authoritarianism can only be addressed if countries like the EU and India commit themselves to preserve the rules based international order. Protectionism and isolationism are not going to help in tackling the problems of the world. COVID has exposed the weaknesses of the global powers to tackle grave situations together. A joint approach of India and EU can set an example of a strong partnership beyond trade to make the world a better place for future generations.

5.3 Limitations of the Study

Availability of reliable data from authentic sources remains the biggest limitation of the current study. In order to eliminate the effects of policy, and external influences, the study has dealt with the qualitative analysis and given equal importance to the qualitative aspect of India-EU relations. However, though every effort has been made to incorporate all external factors and policy implications impacting the India-EU relations, some such aspects may not have been addressed in the current study.

Another significant limitation of the study is the heterogenous effects between India and the European Union. While the study has taken the annual data and worked on reliable data-sets, the simplification of the results may be influenced by the different levels of development of both the partners.

All attempts have been made to analyse the India-EU relations as well as to understand the Indo-German relations to provide an accurate and reliable outcome while restraining the impact of limitations as inconsequential in the study.

5.4 Suggestions for Future Research

As a growing economy, India needs to strengthen its trade of merchandise goods in order to improve its economic strength. The study has focussed on the merchandise trade of India as the strength of an economy relies on both the services and the goods sector. Neglecting one over the other may prove to be unhealthy for an economy in the long run.

The results of the current study have revealed unexpected results. India as a growing economy is mostly compared with China. Chinese growth with respect to the EU is to be studied and compared with India's growth with respect to EU. This will determine the positive lessons to be drawn from such a comparison.

The study can act as a template in conducting similar research with different trading partners and interpret the results in order to formulate the right policy decisions.

Academic research will contribute in guiding policy makers in India to undertake policy reforms in order to boost India's trade and strengthen Indian economy further.

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ANNEXURE

Annexure

A4.4 Relationship between India's GDP and Trade with Belgium

LGDPI on LEB LIB

Table 4.4.1: Residual Test: No Serial Correlation

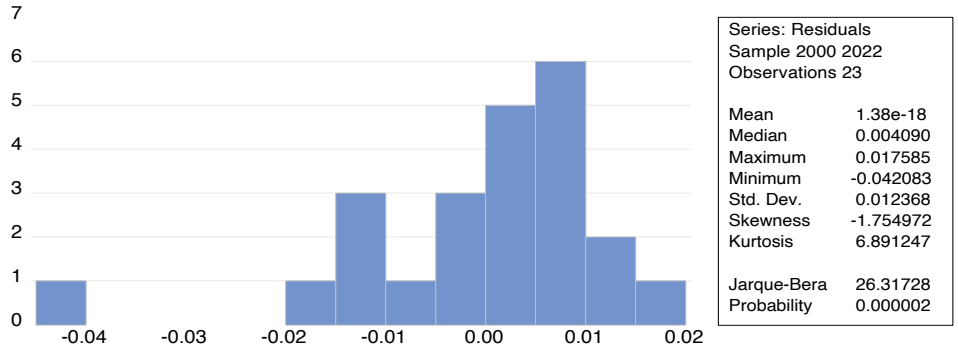
Breusch-Godfrey Serial Correlation LM Test:				
Null hypothesis: No serial correlation at up to 2 lags				
F-statistic	0.027531	Prob. F(2,18)		0.9729
Obs*R-squared	0.070143	Prob. Chi-Square(2)		0.9655
Test Equation:				
Dependent Variable: RESID				
Method: ARDL				
Sample: 2000 2022				
Included observations: 23				
Presample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGDPI(-1))	0.118622	0.58289	0.203507	0.841
D(LEB)	0.002078	0.034366	0.060453	0.9525
C	-0.003124	0.015652	-0.199605	0.844
RESID(-1)	-0.136742	0.623109	-0.219451	0.8288
RESID(-2)	-0.025762	0.239347	-0.107634	0.9155
R-squared	0.00305	Mean dependent var		1.38E-18
Adjusted R-squared	-0.218495	S.D. dependent var		0.012368
S.E. of regression	0.013652	Akaike info criterion		-5.560132
Sum squared resid	0.003355	Schwarz criterion		-5.313286
Log likelihood	68.94152	Hannan-Quinn criter.		-5.498051
F-statistic	0.013766	Durbin-Watson stat		1.949473
Prob(F-statistic)	0.999588			

Table 4.4.2: Residual Test: Homoskedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
Null hypothesis: Homoskedasticity				
F-statistic	3.197321	Prob. F(2,20)		0.0624
Obs*R-squared	5.572221	Prob. Chi-Square(2)		0.0617
Scaled explained SS	12.41109	Prob. Chi-Square(2)		0.0020
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Sample: 2000 2022				
Included observations: 23				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000366	0.000159	2.300033	0.0323
D(LGDPI(-1))	-0.006703	0.005367	-1.248803	0.2262
D(LEB)	-0.001904	0.000788	-2.416023	0.0254
R-squared	0.24227	Mean dependent var		0.000146
Adjusted R-squared	0.166498	S.D. dependent var		0.000363
S.E. of regression	0.000332	Akaike info criterion		-13.06469
Sum squared resid	2.20E-06	Schwarz criterion		-12.91658
Log likelihood	153.2439	Hannan-Quinn criter.		-13.02744
F-statistic	3.197321	Durbin-Watson stat		2.445998

Prob(F-statistic)	0.062394			

Graph 4.4.1: Residual Test: Normality Test



Graph 4.4.2: Stability Diagnostics

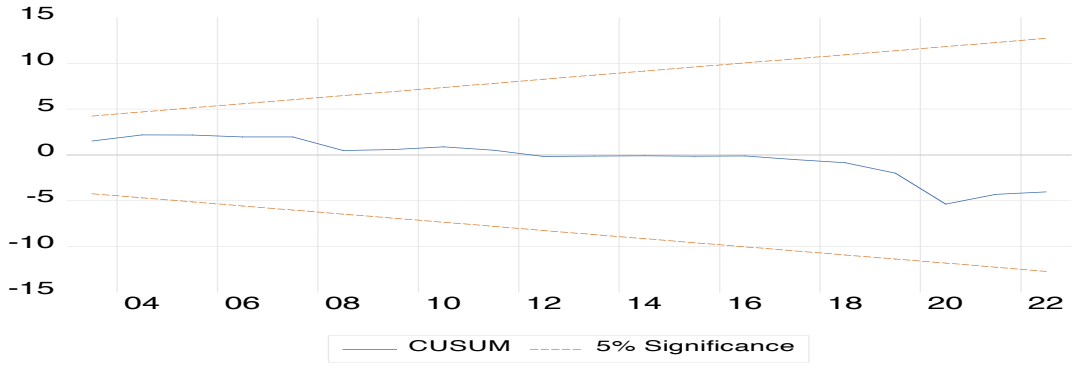


Table 4.4.3: Wald Test

Test: Wald Test			
Equation: LGDPI on LEB LIB			
Test Statistic	Value	df	Probability
t-statistic	0.303206	20	0.7649
F-statistic	0.091934	(1, 20)	0.7649
Chi-square	0.091934	1	0.7617
Null Hypothesis: C(3)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
LIB or C(3)		0.005752	0.018972
Restrictions are linear in coefficients.			

LEB On LGDPI LIB

Table 4.4.4: Residual Test: No Serial Correlation

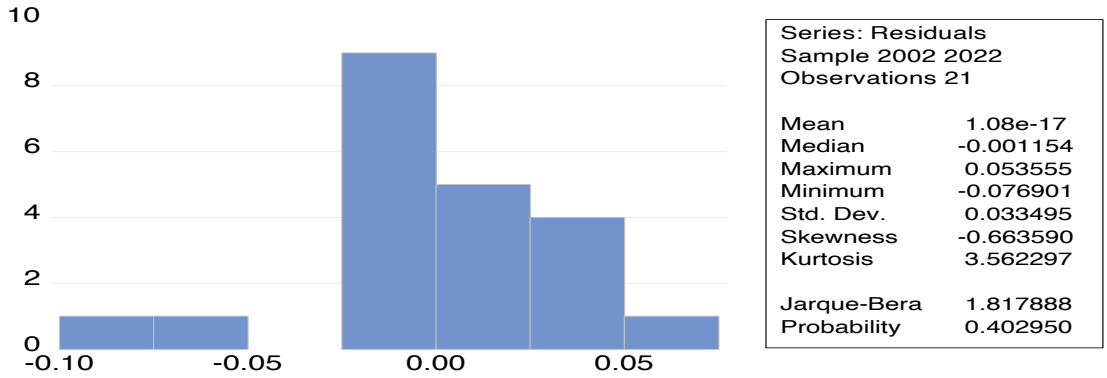
Breusch-Godfrey Serial Correlation LM Test:				
Null hypothesis: No serial correlation at up to 2 lags				
F-statistic	1.630705	Prob. F(2,13)		0.2334
Obs*R-squared	4.211788	Prob. Chi-Squa(2)		0.1217
Test Equation:				

Dependent Variable: RESID				
Method: ARDL				
Sample: 2002 2022				
Included observations: 21				
Presample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LEB(-1))	-0.037975	0.110048	-0.345076	0.7356
D(LEB(-2))	0.058954	0.131127	0.449596	0.6604
D(LGDPI)	0.441909	0.835393	0.528983	0.6057
D(LIB)	-0.055514	0.105128	-0.528067	0.6063
ECM	0.020298	0.192266	0.105572	0.9175
C	-0.010129	0.021839	-0.463792	0.6505
RESID(-1)	0.367685	0.341821	1.075665	0.3016
RESID(-2)	-0.44044	0.283173	-1.555373	0.1439
R-squared	0.200561	Mean dependent var		1.08E-17
Adjusted R-squared	-0.229906	S.D. dependent var		0.033495
S.E. of regression	0.037147	Akaike info criterion		-3.46556
Sum squared resid	0.017938	Schwarz criterion		-3.067647
Log likelihood	44.38838	Hannan-Quinn criter.		-3.379203
F-statistic	0.465916	Durbin-Watson stat		2.031523
Prob(F-statistic)	0.842388			

Table 4.4.5: Residual Test: Homoskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
Null hypothesis: Homoskedasticity				
F-statistic	1.187013	Prob. F(5,15)		0.3613
Obs*R-squared	5.953473	Prob. Chi-Square(5)		0.3108
Scaled explained SS	3.89147	Prob. Chi-Square(5)		0.5651
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Sample: 2002 2022				
Included observations: 21				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000642	0.000881	0.728656	0.4774
D(LEB(-1))	0.003747	0.004505	0.831847	0.4185
D(LEB(-2))	-0.005085	0.005544	-0.917328	0.3735
D(LGDPI)	0.02034	0.030958	0.657006	0.5211
D(LIB)	-0.004769	0.004501	-1.059384	0.3062
ECM	-0.009894	0.008665	-1.141915	0.2714
R-squared	0.283499	Mean dependent var		0.001069
Adjusted R-squared	0.044665	S.D. dependent var		0.001753
S.E. of regression	0.001713	Akaike info criterion		-9.666158
Sum squared resid	4.40E-05	Schwarz criterion		-9.367723
Log likelihood	107.4947	Hannan-Quinn criter.		-9.60139
F-statistic	1.187013	Durbin-Watson stat		1.654913
Prob(F-statistic)	0.361344			

Graph 4.4.3: Residual Test: Normality Test



Graph 4.4.4: Stability Diagnostics

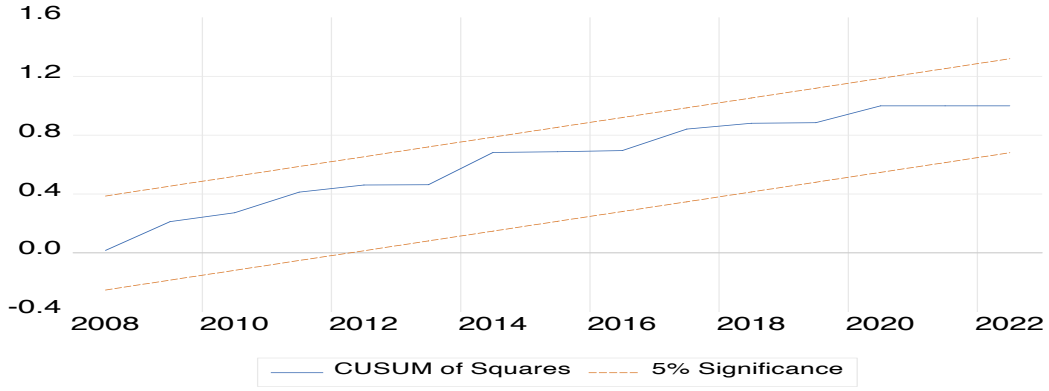


Table 4.4.6: Wald Test:

Wald Test			
Equation: LEB on LGDPI LIB			
Test Statistic	Value	df	Probability
F-statistic	6.069011	(2, 17)	0.0103
Chi-square	12.13802	2	0.0023
Null Hypothesis: C(1)=C(2)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
LEB(-1) or C(1)		-0.380629	0.181711
LEB(-2) or C(2)		-0.541631	0.173481
Restrictions are linear in coefficients.			

LIB on LEB LGDPI

Table 4.4.7: Residual Test: No Serial Correlation

Null hypothesis: No serial correlation at up to 1 lag

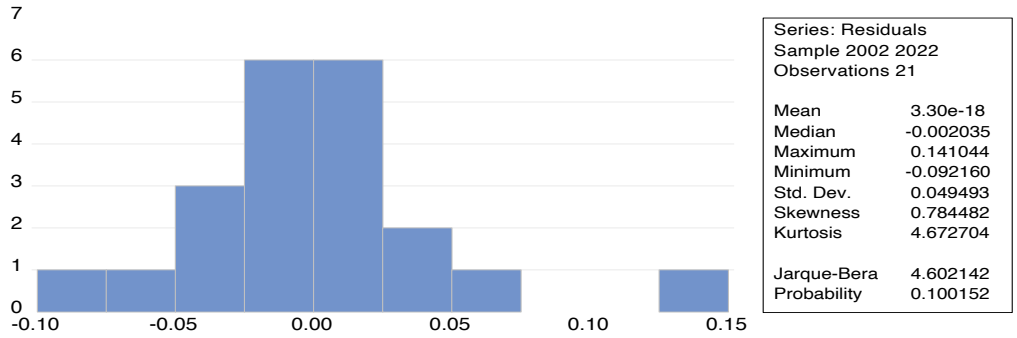
F-statistic	1.172388	Prob. F(1,12)		0.3002
Obs*R-squared	1.869072	Prob. Chi-Square(1)		0.1716
Test Equation:				
Dependent Variable: RESID				
Method: Least Squares				
Sample: 2002 2022				
Included observations: 21				
Pre sample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LIB(-1))	0.123121	0.173656	0.708997	0.4919
D(LEB)	0.064147	0.202976	0.31603	0.7574
D(LEB(-1))	0.168325	0.284399	0.591862	0.5649
D(LEB(-2))	0.135061	0.256101	0.527373	0.6075
D(LGDPI)	-0.352881	1.243834	-0.283705	0.7815
D(LGDPI(-1))	-0.673038	1.29309	-0.520488	0.6122
ECM(-1)	-0.64929	0.739481	-0.878035	0.3972
C	0.019116	0.045293	0.422052	0.6804
RESID(-1)	-0.760978	0.702808	-1.082769	0.3002
R-squared	0.089003	Mean dependent var		3.30E-18
Adjusted R-squared	-0.518328	S.D. dependent var		0.049493
S.E. of regression	0.060985	Akaike info criterion		-2.458843
Sum squared resid	0.04463	Schwarz criterion		-2.01119
Log likelihood	34.81785	Hannan-Quinn criter.		-2.361691
F-statistic	0.146548	Durbin-Watson stat		2.026849
Prob(F-statistic)	0.994521			

Table 4.4.8: Residual Test: Homoskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
Null hypothesis: Homoskedasticity				
F-statistic	1.093096	Prob. F(7,13)		0.4213
Obs*R-squared	7.780729	Prob. Chi-Square(7)		0.3523
Scaled explained SS	5.475508	Prob. Chi-Square(7)		0.6021
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Sample: 2002 2022				
Included observations: 21				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000141	0.003083	-0.045769	0.9642
D(LIB(-1))	0.001858	0.009703	0.191481	0.8511
D(LEB)	0.027836	0.014352	1.93952	0.0744
D(LEB(-1))	0.017164	0.017605	0.974901	0.3474
D(LEB(-2))	0.026569	0.016535	1.606835	0.1321
D(LGDPI)	-0.035854	0.088739	-0.404039	0.6928
D(LGDPI(-1))	0.081072	0.083824	0.967169	0.3511
ECM(-1)	0.044795	0.031989	1.40032	0.1848
R-squared	0.370511	Mean dependent var		0.002333

Adjusted R-squared	0.031555	S.D. dependent var		0.004581
S.E. of regression	0.004508	Akaike info criterion		-7.68343
Sum squared resid	0.000264	Schwarz criterion		-7.285517
Log likelihood	88.67602	Hannan-Quinn criter.		-7.597073
F-statistic	1.093096	Durbin-Watson stat		2.183435
Prob(F-statistic)	0.421297			

Graph 4.4.5: Residual Test: Normality Test



Graph 4.4.6: Stability Diagnostics

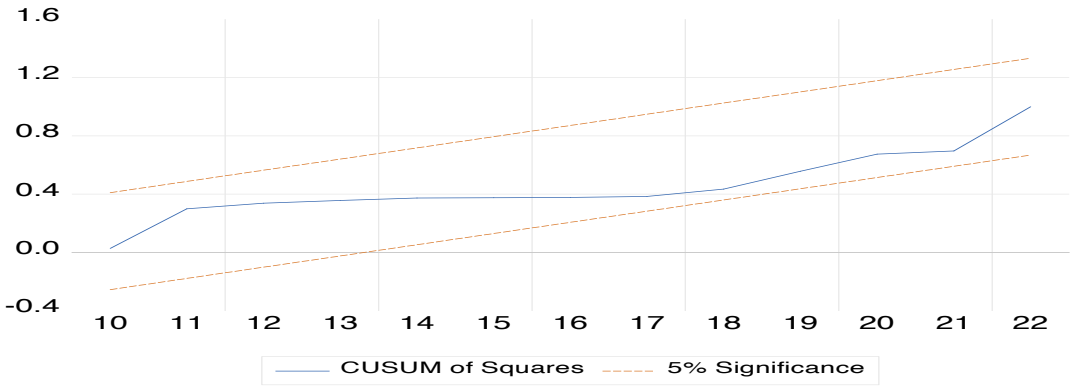


Table 4.4.9: Wald Test

Wald Test			
Equation: LIB on LEB LGDPI			
Test Statistic	Value	df	Probability
F-statistic	8.46738	(3, 15)	0.0016
Chi-square	25.40214	3	0
Null Hypothesis: C(1)=C(5)=C(6)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
LIB(-1) or C(1)		0.109494	0.135608
LGDPI or C(5)		0.550051	1.174303
LGDPI(-1) or C(6)		-1.465258	1.109744
Restrictions are linear in coefficients			

A4.5 Relationship between India's GDP and Trade with France

LGDPI on LEF LIF

Table 4.5.1: Residual Test: No Serial Correlation

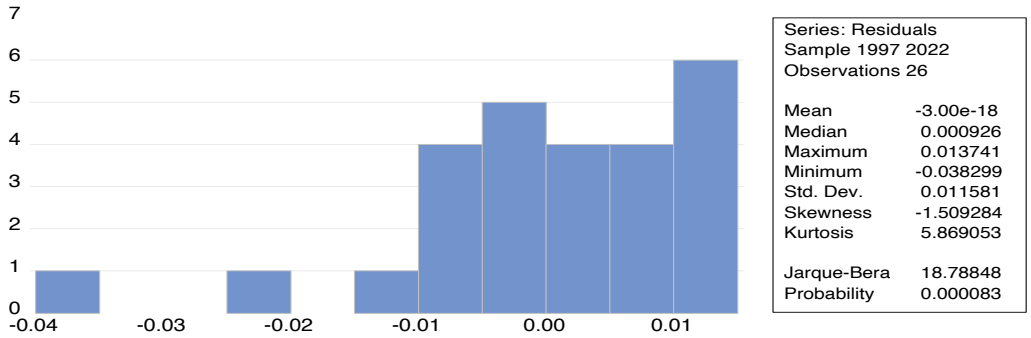
Null hypothesis: No serial correlation at up to 1 lag				
F-statistic	0.089303	Prob. F(1,22)		0.7679
Obs*R-squared	0.105113	Prob. Chi-Square(1)		0.7458
Test Equation:				
Dependent Variable: RESID				
Method: Least Squares				
Sample: 1997 2022				
Included observations: 26				
Pre sample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGDPI(-1))	0.131049	0.479274	0.273431	0.7871
D(LEF)	0.001815	0.047225	0.038432	0.9697
C	-0.003376	0.012707	-0.265707	0.7929
RESID(-1)	-0.158522	0.530466	-0.298836	0.7679
R-squared	0.004043	Mean dependent var		-3.00E-18
Adjusted R-squared	-0.13177	S.D. dependent var		0.011581
S.E. of regression	0.01232	Akaike info criterion		-5.814542
Sum squared resid	0.003339	Schwarz criterion		-5.620989
Log likelihood	79.58905	Hannan-Quinn criter.		-5.758806
F-statistic	0.029768	Durbin-Watson stat		1.96674
Prob(F-statistic)	0.992883			

Table 4.5.2: Residual Test: Homoskedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
Null hypothesis: Homoskedasticity				
F-statistic	3.301881	Prob. F(2,23)		0.0549
Obs*R-squared	5.799864	Prob. Chi-Square(2)		0.055
Scaled explained SS	11.04947	Prob. Chi-Square(2)		0.004
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Sample: 1997 2022				
Included observations: 26				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000283	0.000126	2.245211	0.0347
D(LGDPI(-1))	-0.003005	0.004186	-0.717983	0.48
D(LEF)	-0.002565	0.001014	-2.53038	0.0187
R-squared	0.223072	Mean dependent var		0.000129
Adjusted R-squared	0.155513	S.D. dependent var		0.00029
S.E. of regression	0.000267	Akaike info criterion		-13.51298

Sum squared resid	1.64E-06	Schwarz criterion		-13.36782
Log likelihood	178.6688	Hannan-Quinn criter.		-13.47118
F-statistic	3.301881	Durbin-Watson stat		2.227783
Prob(F-statistic)	0.054876			

Graph 4.5.1: Residual Test: Normality Test



Graph 4.5.2: Stability Diagnostics

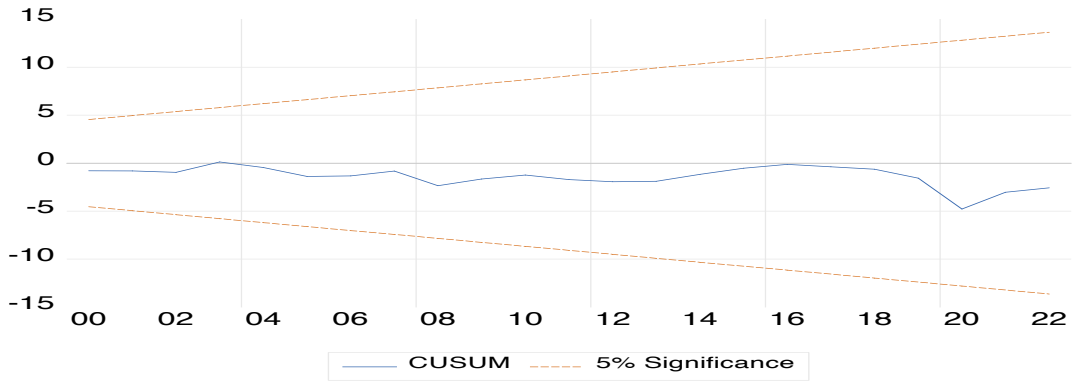


Table 4.5.3: Wald Test

Wald Test:			
Equation: LGDPI on LEF LIF			
Test Statistic	Value	df	Probability
t-statistic	0.295057	23	0.7706
F-statistic	0.087059	(1, 23)	0.7706
Chi-square	0.087059	1	0.768
Null Hypothesis: C(3)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
LIF or C(3)		0.006195	0.020996
Restrictions are linear in coefficients.			

LEF on LGDPI LIF

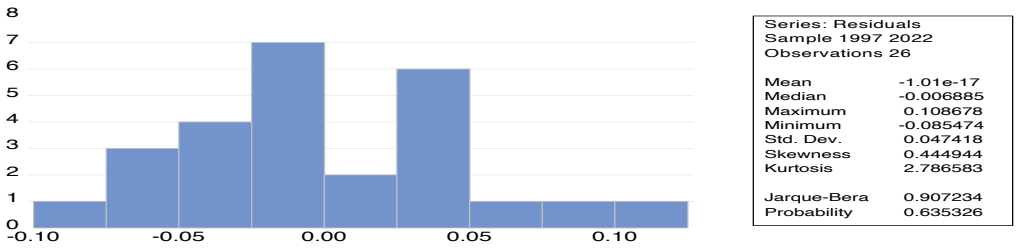
Table 4.5.4: Residual Test: No Serial Correlation

Breusch-Godfrey Serial Correlation LM Test:				
Null hypothesis: No serial correlation at up to 1 lag				
F-statistic	0.803346	Prob. F(1,21)		0.3803
Obs*R-squared	0.957972	Prob. Chi-Square(1)		0.3277
Test Equation:				
Dependent Variable: RESID				
Method: Least Squares				
Sample: 1997 2022				
Included observations: 26				
Presample missing value lagged residuals set to zero				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LEF(-1))	0.606452	0.71095	0.853016	0.4033
D(LGDPI)	-0.108635	0.806345	-0.134725	0.8941
D(LGDPI(-1))	-1.012813	1.422243	-0.712124	0.4842
C	0.011432	0.033329	0.342993	0.735
RESID(-1)	-0.681756	0.760637	-0.896296	0.3803
R-squared	0.036845	Mean dependent var		-1.01E-17
Adjusted R-squared	-0.146613	S.D. dependent var		0.047418
S.E. of regression	0.050775	Akaike info criterion		-2.951782
Sum squared resid	0.05414	Schwarz criterion		-2.70984
Log likelihood	43.37316	Hannan-Quinn criter.		-2.882111
F-statistic	0.200837	Durbin-Watson stat		1.798189
Prob(F-statistic)	0.935075			

Table 4.5.5: Residual Test: Homoskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
Null hypothesis: Homoskedasticity				
F-statistic	0.702846	Prob. F(3,22)		0.5604
Obs*R-squared	2.273965	Prob. Chi-Square(3)		0.5175
Scaled explained SS	1.454372	Prob. Chi-Square(3)		0.6928
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Sample: 1997 2022				
Included observations: 26				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000222	0.00182	0.122008	0.904
D(LEF(-1))	-0.006603	0.01290	-0.511904	0.6138
D(LGDPI)	0.008384	0.04711	0.177948	0.8604
D(LGDPI(-1))	0.073709	0.05104	1.444019	0.1628
R-squared	0.08746	Mean dependent var		0.002162
Adjusted R-squared	-0.036977	S.D. dependent var		0.002947
S.E. of regression	0.003001	Akaike info criterion		-8.639116
Sum squared resid	0.000198	Schwarz criterion		-8.445563
Log likelihood	116.3085	Hannan-Quinn criter.		-8.583379
F-statistic	0.702846	Durbin-Watson stat		1.361295
Prob(F-statistic)	0.560439			

Graph 4.5.3: Residual Test: Normality Test



Graph 4.5.4: Stability Diagnostics

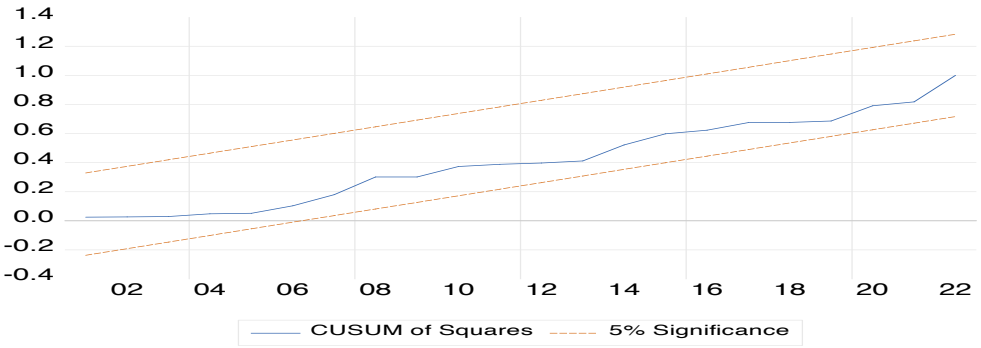


Table 4.5.6: Wald Test

Wald Test:			
Equation: LEF on LGDPI LIF			
Test Statistic	Value	df	Probability
t-statistic	-2.122458	22	0.0453
F-statistic	4.504829	(1, 22)	0.0453
Chi-square	4.504829	1	0.0338
Null Hypothesis: C(3)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
LIF or C(3)		-1.56344	0.736618
Restrictions are linear in coefficients.			

LIF on LGDPI LEF

Table 4.5.7: Residual Test: No Serial Correlation

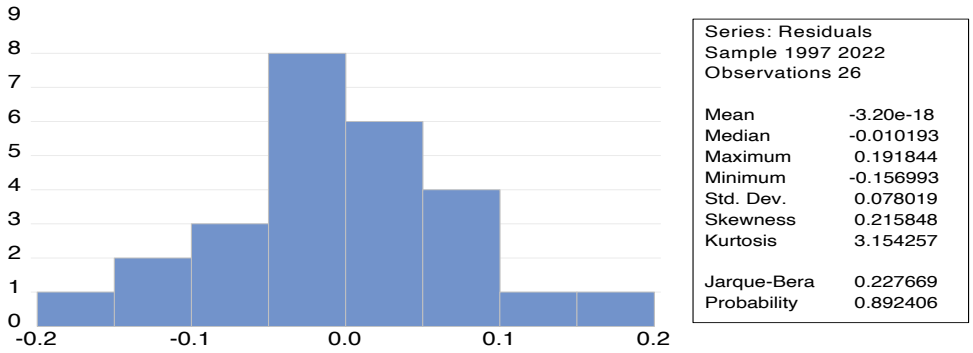
Breusch-Godfrey Serial Correlation LM Test:				
Null hypothesis: No serial correlation at up to 1 lag				
F-statistic	0.408746	Prob. F(1,21)		0.5295
Obs*R-squared	0.496405	Prob. Chi-Square(1)		0.4811
Test Equation:				
Dependent Variable: RESID				
Method: Least Squares				
Sample: 1997 2022				
Included observations: 26				
Pre sample missing value lagged residuals set to zero.				

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LIF(-1))	-0.449657	0.736423	-0.610596	0.548
D(LGDPI)	0.047984	1.493369	0.032131	0.9747
D(LEF)	-0.02047	0.359008	-0.057019	0.9551
C	0.006454	0.039228	0.164518	0.8709
RESID(-1)	0.502428	0.785862	0.639333	0.5295
R-squared	0.019092	Mean dependent var		-3.20E-18
Adjusted R-squared	-0.167747	S.D. dependent var		0.078019
S.E. of regression	0.084309	Akaike info criterion		-1.937614
Sum squared resid	0.149268	Schwarz criterion		-1.695672
Log likelihood	30.18898	Hannan-Quinn criter.		-1.867944
F-statistic	0.102187	Durbin-Watson stat		1.825612
Prob(F-statistic)	0.980497			

Table 4.5.8: Residual Test: Homoskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
Null hypothesis: Homoskedasticity				
F-statistic	1.758436	Prob. F(3,22)		0.1845
Obs*R-squared	5.02865	Prob. Chi-Square(3)		0.1697
Scaled explained SS	3.878087	Prob. Chi-Square(3)		0.2749
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Sample: 1997 2022				
Included observations: 26				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002672	0.003771	0.708602	0.486
D(LIF(-1))	0.033817	0.021717	1.55714	0.1337
D(LGDPI)	0.036805	0.148375	0.248051	0.8064
D(LEF)	0.051332	0.035572	1.443038	0.1631
R-squared	0.19341	Mean dependent var		0.005853
Adjusted R-squared	0.08342	S.D. dependent var		0.008761
S.E. of regression	0.008387	Akaike info criterion		-6.583583
Sum squared resid	0.001548	Schwarz criterion		-6.39003
Log likelihood	89.58658	Hannan-Quinn criter.		-6.527847
F-statistic	1.758436	Durbin-Watson stat		2.436024
Prob(F-statistic)	0.184503			

Graph 4.5.5: Residual Test: Normality Test



Graph 4.5.6: Stability Diagnostics

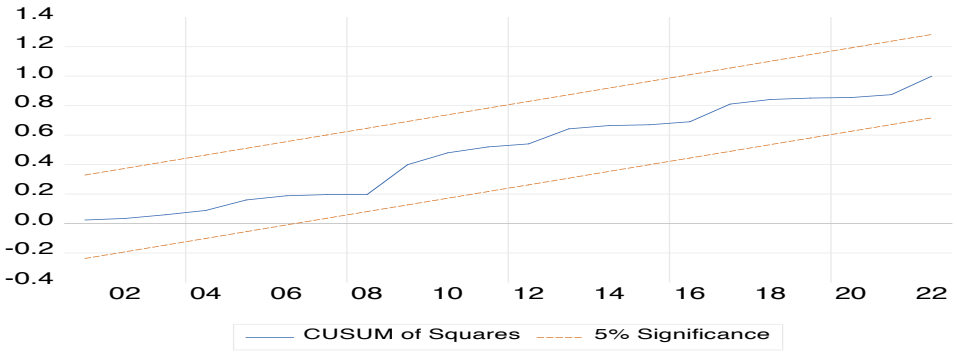


Table 4.5.9: Wald Test

Wald Test:			
Equation: LIF on LGDPI LEF			
Test Statistic	Value	df	Probability
F-statistic	0.89078	(2, 23)	0.424
Chi-square	1.781561	2	0.4103
Null Hypothesis: C(2)=C(3)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
LGDPI or C(2)		-0.010491	0.255186
LEF or C(3)		0.194821	0.249302
Restrictions are linear in coefficients.			

A4.6 Relationship between India's GDP and Trade with Germany

LGDPI on LEG LIG

Table 4.6.1: Residual Test: No Serial Correlation

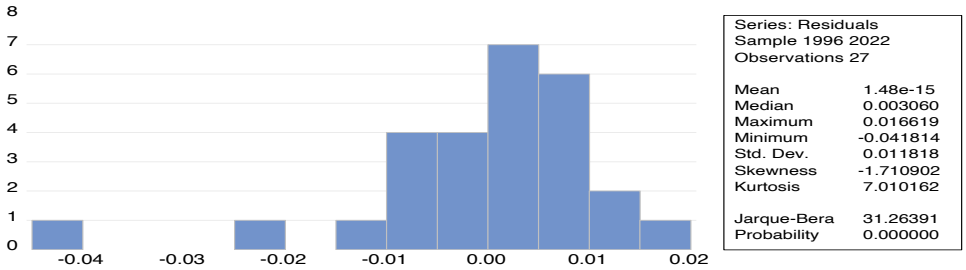
Breusch-Godfrey Serial Correlation LM Test:				
Null hypothesis: No serial correlation at up to 2 lags				
F-statistic	1.007729	Prob. F(2,21)		0.382
Obs*R-squared	2.364384	Prob. Chi-Square(2)		0.3066
Test Equation:				
Dependent Variable: RESID				
Method: ARDL				
Sample: 1996 2022				
Included observations: 27				
Pre sample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGDPI(-1)	0.011787	0.052602	0.224084	0.8249
LEG	-0.039499	0.112068	-0.352452	0.728

LIG	0.01952	0.048822	0.399814	0.6933
C	-0.002251	0.089623	-0.025111	0.9802
RESID(-1)	-0.130874	0.21471	-0.60954	0.5487
RESID(-2)	-0.314876	0.230979	-1.363223	0.1873
R-squared	0.08757	Mean dependent var		1.48E-15
Adjusted R-squared	-0.129675	S.D. dependent var		0.011818
S.E. of regression	0.01256	Akaike info criterion		-5.723401
Sum squared resid	0.003313	Schwarz criterion		-5.435438
Log likelihood	83.26592	Hannan-Quinn criter.		-5.637775
F-statistic	0.403092	Durbin-Watson stat		2.030345
Prob(F-statistic)	0.841152			

Table 4.6.2: Residual Test: Homoskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
Null hypothesis: Homoskedasticity				
F-statistic	2.305048	Prob. F(3,23)		0.1035
Obs*R-squared	6.241284	Prob. Chi-Square(3)		0.1004
Scaled explained SS	13.61	Prob. Chi-Square(3)		0.0035
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Sample: 1996 2022				
Included observations: 27				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.005481	0.00223	-2.45717	0.022
LGDPI(-1)	0.002723	0.001293	2.10550	0.0464
LEG	-0.00347	0.002705	-1.28283	0.2123
LIG	0.000475	0.001168	0.407104	0.6877
R-squared	0.231159	Mean dependent var		0.000134
Adjusted R-squared	0.130875	S.D. dependent var		0.000336
S.E. of regression	0.000313	Akaike info criterion		-13.1634
Sum squared resid	2.26E-06	Schwarz criterion		-12.97143
Log likelihood	181.706	Hannan-Quinn criter.		-13.10632
F-statistic	2.305048	Durbin-Watson stat		2.226133
Prob(F-statistic)	0.103524			

Graph 4.6.1: Residual Test: Normality Test



Graph 4.6.2: Stability Diagnostics

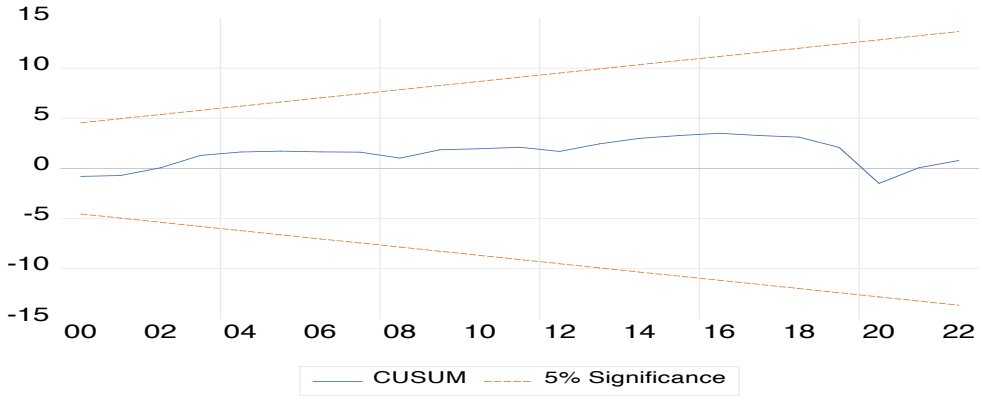


Table 4.6.3: Wald Test

Wald Test:			
Equation: Untitled			
Test Statistic	Value	df	Probability
F-statistic	1.251479	(2, 23)	0.3048
Chi-square	2.502959	2	0.2861
Null Hypothesis: C(2)=C(3)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
LEG or C(2)		0.044132	0.108498
LIG or C(3)		0.016475	0.046849
Restrictions are linear in coefficients.			

LEG on LGDPI LIG

Table 4.6.4 Residual Test: No Serial Correlation

Breusch-Godfrey Serial Correlation LM Test:				
Null hypothesis: No serial correlation at up to 2 lags				
F-statistic	3.075319	Prob. F(2,18)		0.071
Obs*R-squared	6.62163	Prob. Chi-Square(2)		0.0365
Test Equation:				
Dependent Variable: RESID				
Method: ARDL				

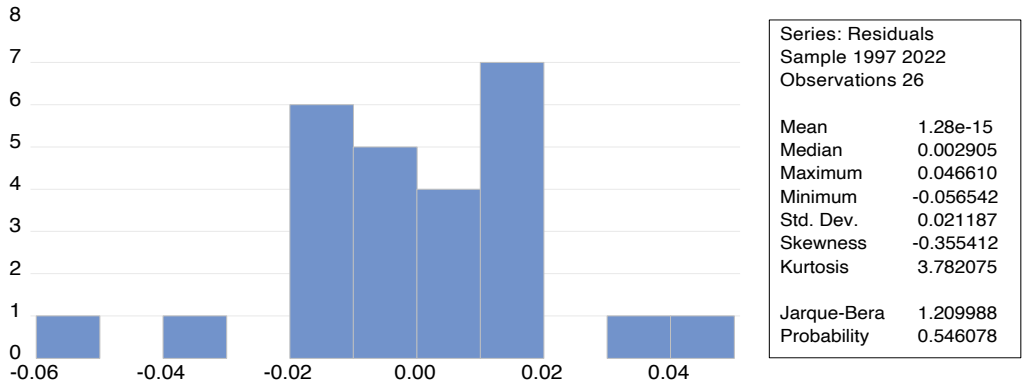
Sample: 1997 2022				
Included observations: 26				
Pre-sample missing value lagged residuals set to zero				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEG(-1)	1.016042	0.500931	2.028309	0.0576
LIG	-0.01395	0.098598	-0.141484	0.8891
LIG(-1)	-0.382804	0.246469	-1.553152	0.1378
LIG(-2)	0.029945	0.087257	0.343184	0.7354
LGDPI	-0.473307	0.241003	-1.963906	0.0652
C	0.581135	0.316105	1.838423	0.0826
RESID(-1)	-1.340544	0.551159	-2.432227	0.0257
RESID(-2)	-0.208959	0.277132	-0.754004	0.4606
R-squared	0.254678	Mean dependent var		1.28E-15
Adjusted R-squared	-0.035169	S.D. dependent var		0.021187
S.E. of regression	0.021556	Akaike info criterion		-4.588661
Sum squared resid	0.008364	Schwarz criterion		-4.201554
Log likelihood	67.65259	Hannan-Quinn criter.		-4.477188
F-statistic	0.878663	Durbin-Watson stat		1.979141
Prob(F-statistic)	0.541997			

Table 4.6.5: Residual Test: Homoskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
Null hypothesis: Homoskedasticity				
F-statistic	0.773676	Prob. F(5,20)		0.5799
Obs*R-squared	4.213854	Prob. Chi-Square(5)		0.5191
Scaled explained SS	3.468419	Prob. Chi-Square(5)		0.6282
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Sample: 1997 2022				
Included observations: 26				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001277	0.006911	0.184744	0.8553
LEG(-1)	-0.003288	0.008659	-0.379736	0.7081
LIG	-0.000648	0.003401	-0.190642	0.8507
LIG(-1)	0.002229	0.006677	0.333819	0.742
LIG(-2)	0.002143	0.002627	0.815851	0.4242
LGDPI	-0.000524	0.004469	-0.117345	0.9078
R-squared	0.162071	Mean dependent var		0.000432
Adjusted R-squared	-0.047411	S.D. dependent var		0.000734

S.E. of regression	0.000751	Akaike info criterion		-11.35018
Sum squared resid	0.0000113	Schwarz criterion		-11.05985
Log likelihood	153.5523	Hannan-Quinn criter.		-11.26657
F-statistic	0.773676	Durbin-Watson stat		2.221288
Prob(F-statistic)	0.579946			

Graph 4.6.3: Residual Test: Normality Test



Graph 4.6.4: Stability Diagnostics

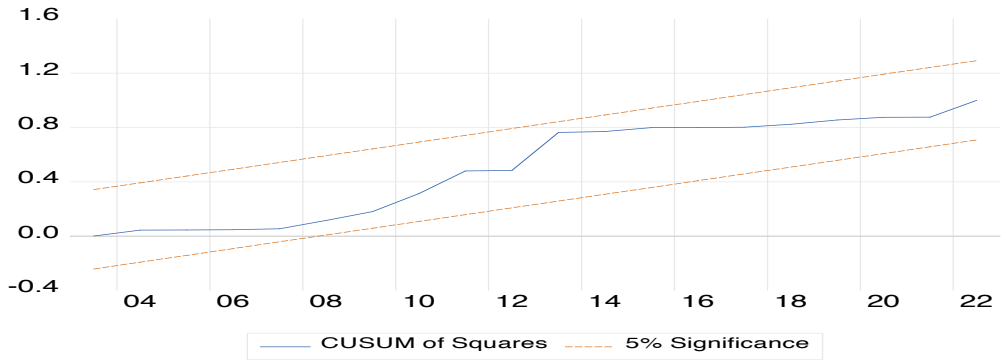


Table 4.6.6: Wald Test

Wald Test:			
Equation: Untitled			
Test Statistic	Value	df	Probability
F-statistic	18.79081	(3, 20)	0
Chi-square	56.37244	3	0
Null Hypothesis: C(2)=C(3)=C(4)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
LIG or C(2)		0.467703	0.107209
LIG(-1) or C(3)		-0.291955	0.210493

LIG(-2) or C(4)		0.169231	0.082813
Restrictions are linear in coefficients.			

Table 4.6.7: Wald Test

Wald Test:			
Equation: Untitled			
Test Statistic	Value	df	Probability
t-statistic	0.66285	20	0.515
F-statistic	0.43937	(1, 20)	0.515
Chi-square	0.43937	1	0.5074
Null Hypothesis: C(1)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
LEG (-1) or C(1)		0.180936	0.272966
Restrictions are linear in coefficients.			

LIG on LEG and LGDPI

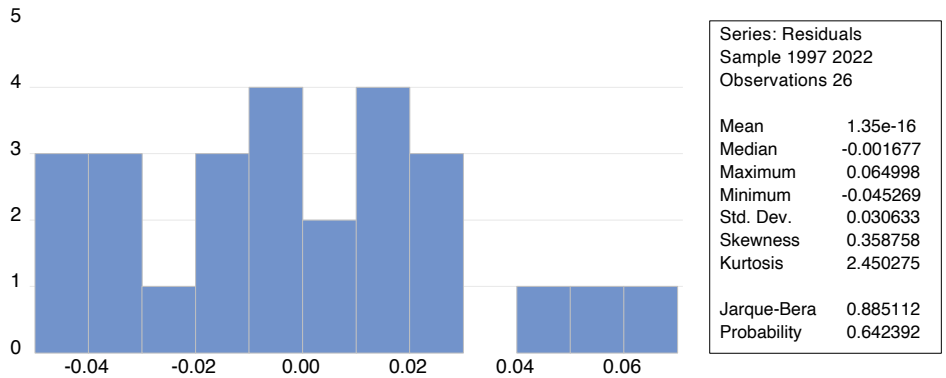
Table 4.6.8: Residual Test: No Serial Correlation

Breusch-Godfrey Serial Correlation LM Test:				
Null hypothesis: No serial correlation at up to 2 lags				
F-statistic	0.026367	Prob. F(2,18)		0.974
Obs*R-squared	0.075949	Prob. Chi-Square(2)		0.9627
Test Equation:				
Dependent Variable: RESID				
Method: ARDL				
Sample: 1997 2022				
Included observations: 26				
Pre sample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LIG(-1)	-0.01504	0.285494	-0.052679	0.9586
LGDPI	-0.01173	0.33356	-0.035166	0.9723
LEG	0.014841	0.264097	0.056196	0.9558
LEG(-1)	0.005791	0.458276	0.012636	0.9901
LEG(-2)	0.011604	0.211347	0.054905	0.9568
C	0.011482	0.435152	0.026385	0.9792
RESID(-1)	-0.018746	0.345557	-0.054249	0.9573
RESID(-2)	0.061164	0.338251	0.180823	0.8585
R-squared	0.002921	Mean dependent var		1.35E-16
Adjusted R-squared	-0.384832	S.D. dependent var		0.030633
S.E. of regression	0.036048	Akaike info criterion		-3.560268
Sum squared resid	0.02339	Schwarz criterion		-3.173162
Log likelihood	54.28349	Hannan-Quinn criter.		-3.448796
F-statistic	0.007533	Durbin-Watson stat		1.817645
Prob(F-statistic)	1			

Table 4.6.9: Residual Test: Homoskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
Null hypothesis: Homoskedasticity				
F-statistic	0.63664	Prob. F(5,20)		0.6743
Obs*R-squared	3.569967	Prob. Chi-Square(5)		0.6128
Scaled explained SS	1.531785	Prob. Chi-Square(5)		0.9094
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Sample: 1997 2022				
Included observations: 26				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001823	0.0117	0.155819	0.8777
LIG(-1)	0.006108	0.006101	1.001223	0.3287
LGDPI	0.002912	0.00832	0.349975	0.73
LEG	-0.009242	0.007756	-1.191484	0.2474
LEG(-1)	-0.007284	0.011017	-0.66114	0.5161
LEG(-2)	0.005054	0.00563	0.897609	0.3801
R-squared	0.137306	Mean dependent var		0.000902
Adjusted R-squared	-0.078367	S.D. dependent var		0.001108
S.E. of regression	0.001151	Akaike info criterion		-10.49774
Sum squared resid	2.65E-05	Schwarz criterion		-10.20741
Log likelihood	142.4706	Hannan-Quinn criter.		-10.41413
F-statistic	0.63664	Durbin-Watson stat		2.241701
Prob(F-statistic)	0.674301			

Graph 4.6.5: Residual Test: Normality Test



Graph 4.6.6: Stability Diagnostics

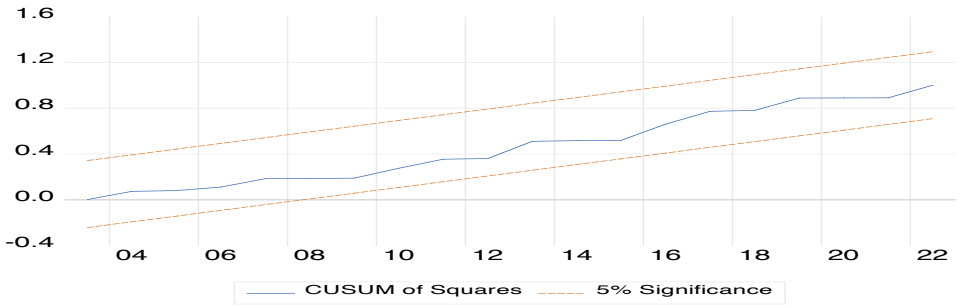


Table 4.6.10: Wald Test

Wald Test:			
Equation: Untitled			
Test Statistic	Value	df	Probability
t-statistic	1.697767	20	0.1051
F-statistic	2.882414	(1, 20)	0.1051
Chi-square	2.882414	1	0.0896
Null Hypothesis: C(2)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
LGDPI or C(2)		0.420435	0.24764
Restrictions are linear in coefficients.			

A4.7 Relationship between India's GDP and Trade with Italy

LGDPI on LEI LII

Table 4.7.1: Residual Test: No Serial Correlation

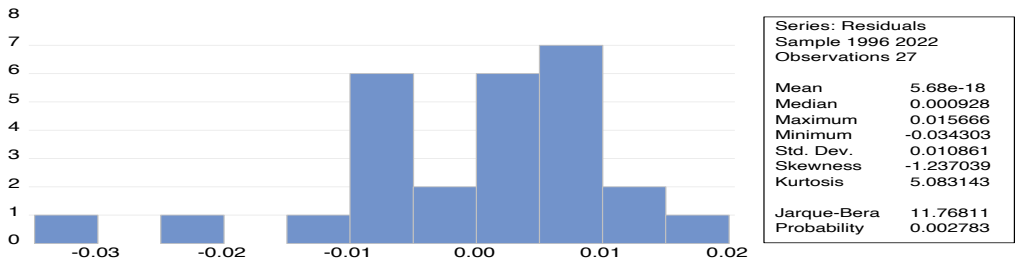
Breusch-Godfrey Serial Correlation LM Test:				
Null hypothesis: No serial correlation at up to 1 lag				
F-statistic	0.108829	Prob. F(1,22)		0.7446
Obs*R-squared	0.132905	Prob. Chi-Square(1)		0.7154
Test Equation:				
Dependent Variable: RESID				
Method: ARDL				
Sample: 1996 2022				
Included observations: 27				
Presample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGDPI(-1)	0.001419	0.027826	0.051005	0.9598
LEI	-0.001624	0.041525	-0.039111	0.9692
LII	8.51E-05	0.030545	0.002786	0.9978
C	-0.003229	0.080588	-0.040074	0.9684

RESID(-1)	-0.071037	0.215335	-0.329892	0.7446
R-squared	0.004922	Mean dependent var		5.68E-18
Adjusted R-squared	-0.176001	S.D. dependent var		0.010861
S.E. of regression	0.011778	Akaike info criterion		-5.879554
Sum squared resid	0.003052	Schwarz criterion		-5.639584
Log likelihood	84.37398	Hannan-Quinn criter.		-5.808198
F-statistic	0.027207	Durbin-Watson stat		1.988374
Prob(F-statistic)	0.998452			

Table 4.7.2: Residual Test: Homoskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
Null hypothesis: Homoskedasticity				
F-statistic	2.837552	Prob. F(3,23)		0.0604
Obs*R-squared	7.293632	Prob. Chi-Square(3)		0.0631
Scaled explained SS	10.80529	Prob. Chi-Square(3)		0.0128
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Sample: 1996 2022				
Included observations: 27				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.003695	0.001443	-2.56054	0.0175
LGDPI(-1)	0.001426	0.000496	2.876211	0.0085
LEI	-0.001534	0.000744	-2.061797	0.0507
LII	0.000147	0.000551	0.266693	0.7921
R-squared	0.270135	Mean dependent var		0.000114
Adjusted R-squared	0.174935	S.D. dependent var		0.000234
S.E. of regression	0.000212	Akaike info criterion		-13.93959
Sum squared resid	1.04E-06	Schwarz criterion		-13.74761
Log likelihood	192.1844	Hannan-Quinn criter.		-13.8825
F-statistic	2.837552	Durbin-Watson stat		2.292974
Prob(F-statistic)	0.060369			

Graph 4.7.1: Residual Test: Normality Test



Graph 4.7.2: Stability Diagnostics

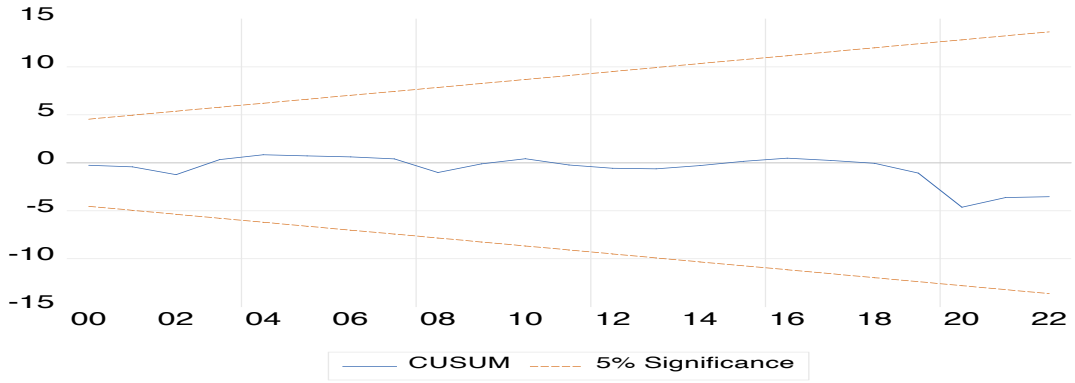


Table 4.7.3: Wald Test

Wald Test:			
Equation: Untitled			
Test Statistic	Value	df	Probability
t-statistic	-0.068361	23	0.9461
F-statistic	0.004673	(1, 23)	0.9461
Chi-square	0.004673	1	0.9455
Null Hypothesis: C(3)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
LII or C(3)		-0.002047	0.029946
Restrictions are linear in coefficients.			

LEI on LGDPI LII

Table 4.7.4: Residual Test: No Serial Correlation

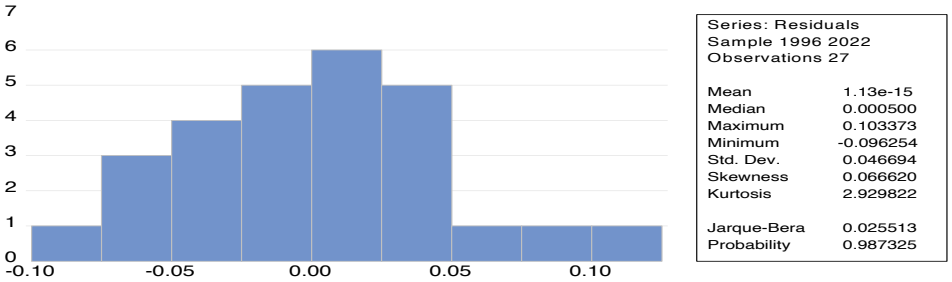
Breusch-Godfrey Serial Correlation LM Test:				
Null hypothesis: No serial correlation at up to 1 lag				
F-statistic	0.000269	Prob. F(1,20)		0.9871
Obs*R-squared	0.000364	Prob. Chi-Square(1)		0.9848
Test Equation:				
Dependent Variable: RESID				
Method: ARDL				
Sample: 1996 2022				
Included observations: 27				
Presample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEI(-1)	0.005504	0.402931	0.01366	0.9892
LGDPI	0.000174	0.895609	0.000194	0.9998
LGDPI(-1)	-0.00291	0.891614	-0.003264	0.9974
LII	0.000426	0.190218	0.002238	0.9982
LII(-1)	-0.002853	0.248601	-0.011477	0.991

C	0.00581	0.530267	0.010958	0.9914
RESID(-1)	-0.007445	0.453536	-0.016415	0.9871
R-squared	0.000013	Mean dependent var		1.13E-15
Adjusted R-squared	-0.299982	S.D. dependent var		0.046694
S.E. of regression	0.053239	Akaike info criterion		-2.80965
Sum squared resid	0.056687	Schwarz criterion		-2.473692
Log likelihood	44.93028	Hannan-Quinn criter.		-2.709752
F-statistic	0.0000449	Durbin-Watson stat		1.810269
Prob(F-statistic)	1			

Table 4.7.5: Residual Test: Homoskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
Null hypothesis: Homoskedasticity				
F-statistic	0.473146	Prob. F(5,21)		0.792
Obs*R-squared	2.73369	Prob. Chi-Square(5)		0.741
Scaled explained SS	1.595686	Prob. Chi-Square(5)		0.9018
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Sample: 1996 2022				
Included observations: 27				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.006301	0.023252	-0.270993	0.789
LEI(-1)	-0.012538	0.01316	-0.952772	0.3515
LGDPI	0.049158	0.05274	0.93208	0.3619
LGDPI(-1)	-0.046793	0.05146	-0.909312	0.3735
LII	0.004236	0.011098	0.381727	0.7065
LII(-1)	0.006301	0.010467	0.601954	0.5536
R-squared	0.101248	Mean dependent var		0.0021
Adjusted R-squared	-0.112741	S.D. dependent var		0.002972
S.E. of regression	0.003135	Akaike info criterion		-8.499063
Sum squared resid	0.000206	Schwarz criterion		-8.2111
Log likelihood	120.7374	Hannan-Quinn criter.		-8.413437
F-statistic	0.473146	Durbin-Watson stat		2.037168
Prob(F-statistic)	0.792033			

Graph 4.7.3: Residual Test: Normality Test



Graph 4.7.4: Stability Diagnostics

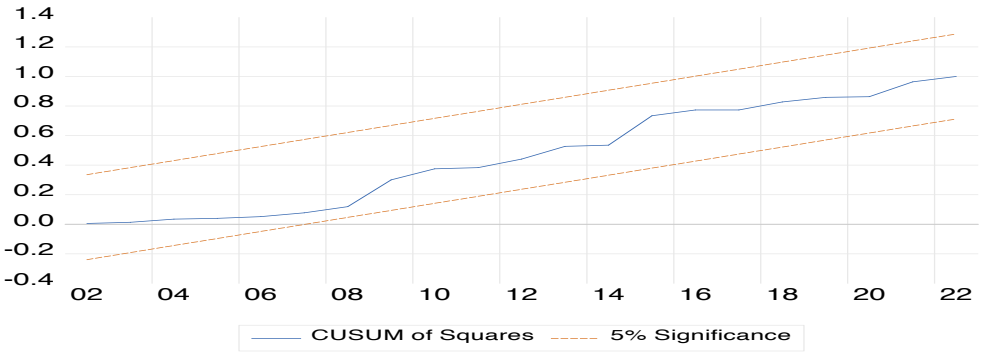


Table 4.7.6: Wald Test

Wald Test:			
Equation: Untitled			
Test Statistic	Value	df	Probability
F-statistic	9.122138	(4, 21)	0.0002
Chi-square	36.48855	4	0
Null Hypothesis: C(1)=C(2)=C(3)=C(5)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
LEI(-1) or C(1)		0.232631	0.218076
LGDPI or C(2)		1.571278	0.87397
LGDPI(-1) or C(3)		-1.08917	0.852755
LII(-1) or C(5)		-0.353812	0.173456
Restrictions are linear in coefficients.			

LII on LEI and LGDPI

Table 4.7.7: Residual Test: No Serial Correlation

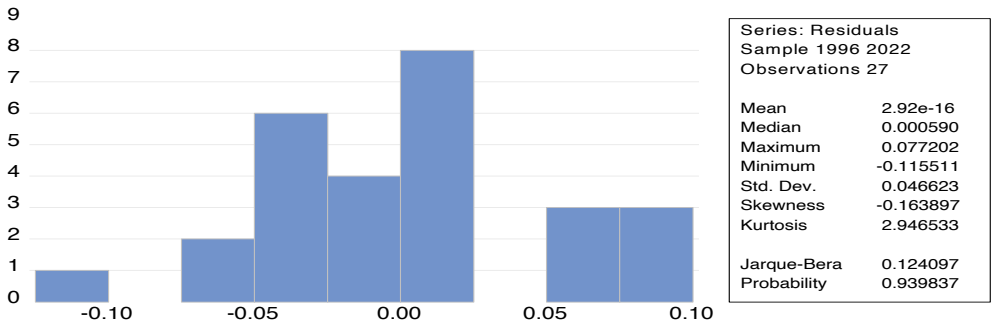
Breusch-Godfrey Serial Correlation LM Test				
Null hypothesis: No serial correlation at up to 1 lag				
F-statistic	1.588294	Prob. F(1,22)		0.2208
Obs*R-squared	1.818018	Prob. Chi-Square(1)		0.1775
Test Equation:				
Dependent Variable: RESID				
Method: ARDL				
Sample: 1996 2022				
Included observations: 27				
Presample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LII(-1)	0.078792	0.121392	0.649069	0.523
LEI	-0.044141	0.147837	-0.298582	0.7681
LGDPI	-0.020715	0.131392	-0.157659	0.8762

C	0.009357	0.353109	0.026498	0.9791
RESID(-1)	-0.305593	0.242481	-1.260275	0.2208
R-squared	0.067334	Mean dependent var		2.92E-16
Adjusted R-squared	-0.102242	S.D. dependent var		0.046623
S.E. of regression	0.048949	Akaike info criterion		-3.03052
Sum squared resid	0.052711	Schwarz criterion		-2.79055
Log likelihood	45.91201	Hannan-Quinn criter.		-2.959164
F-statistic	0.397074	Durbin-Watson stat		1.894195
Prob(F-statistic)	0.808547			

Table 4.7.8: Residual Test: Homoskedasticity Test

Null hypothesis: Homoskedasticity				
F-statistic	1.053958	Prob. F(3,23)		0.3878
Obs*R-squared	3.263167	Prob. Chi-Square(3)		0.3528
Scaled explained SS	2.30462	Prob. Chi-Square(3)		0.5116
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Sample: 1996 2022				
Included observations: 27				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.02876	0.021398	1.344079	0.1920
LII(-1)	0.0052	0.006307	0.824487	0.4181
LEI	-0.003648	0.008705	-0.419088	0.6790
LGDPI	-0.005183	0.007901	-0.655997	0.5183
R-squared	0.120858	Mean dependent var		0.002093
Adjusted R-squared	0.006187	S.D. dependent var		0.002976
S.E. of regression	0.002967	Akaike info criterion		-8.666703
Sum squared resid	0.000202	Schwarz criterion		-8.474728
Log likelihood	121.0005	Hannan-Quinn criter.		-8.609619
F-statistic	1.053958	Durbin-Watson stat		2.308034
Prob(F-statistic)	0.38776			

Graph 4.7.5: Residual Test: Normality Test



Graph 4.7.6: Stability Diagnostics

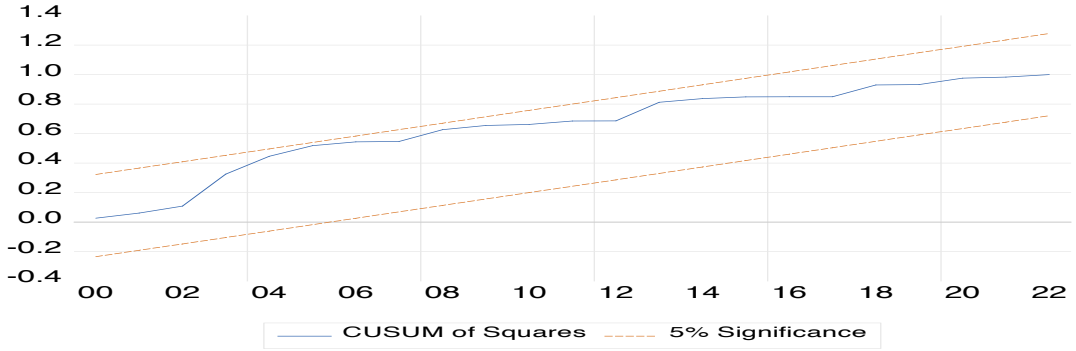


Table 4.7.9: Wald Test

Wald Test:			
Equation: Untitled			
Test Statistic	Value	df	Probability
t-statistic	-2.051016	23	0.0518
F-statistic	4.206665	(1, 23)	0.0518
Chi-square	4.206665	1	0.0403
Null Hypothesis: C(3)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
LGDPI or C(3)		-0.270767	0.132016
Restrictions are linear in coefficients.			

A4.8 Relationship between India's GDP and Trade with The Netherlands

LGDPI on LEN LIN

Table 4.8.2: Residual Test: No Serial Correlation

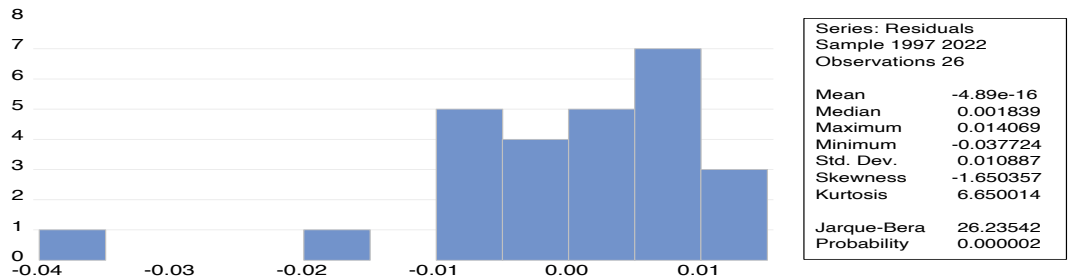
Breusch-Godfrey Serial Correlation LM Test:				
Null hypothesis: No serial correlation at up to 2 lags				
F-statistic	0.638703	Prob. F(2,18)		0.5395
Obs*R-squared	1.722875	Prob. Chi-Square(2)		0.4226
Test Equation:				
Dependent Variable: RESID				
Method: ARDL				
Sample: 1997 2022				
Included observations: 26				
Presample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGDPI(-1)	0.003677	0.037989	0.096791	0.924
LEN	-0.009603	0.042678	-0.225006	0.8245
LEN(-1)	-0.002975	0.035925	-0.082802	0.9349
LEN(-2)	0.002419	0.028405	0.085168	0.9331
LIN	0.010779	0.066833	0.16129	0.8737

C	-0.021013	0.126726	-0.165812	0.8702
RESID(-1)	-0.101689	0.236294	-0.430351	0.672
RESID(-2)	-0.261699	0.240928	-1.086214	0.2917
R-squared	0.066264	Mean dependent var		-4.89E-16
Adjusted R-squared	-0.296855	S.D. dependent var		0.010887
S.E. of regression	0.012398	Akaike info criterion		-5.694973
Sum squared resid	0.002767	Schwarz criterion		-5.307867
Log likelihood	82.03465	Hannan-Quinn criter.		-5.5835
F-statistic	0.182487	Durbin-Watson stat		1.998427
Prob(F-statistic)	0.985625			

Table 4.8.2: Residual Test: Homoskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
Null hypothesis: Homoskedasticity				
F-statistic	1.317368	Prob. F(5,20)		0.2967
Obs*R-squared	6.441451	Prob. Chi-Square(5)		0.2656
Scaled explained SS	10.76754	Prob. Chi-Square(5)		0.0562
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Sample: 1997 2022				
Included observations: 26				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.004916	0.002688	-1.828831	0.0824
LGDPI(-1)	0.001313	0.000808	1.624303	0.12
LEN	-0.000636	0.000904	-0.703695	0.4897
LEN(-1)	0.000995	0.000772	1.28814	0.2124
LEN(-2)	-0.000432	0.00061	-0.707245	0.4876
LIN	-0.000844	0.001421	-0.593955	0.5592
R-squared	0.247748	Mean dependent var		0.000114
Adjusted R-squared	0.059685	S.D. dependent var		0.000276
S.E. of regression	0.000268	Akaike info criterion		-13.41296
Sum squared resid	1.44E-06	Schwarz criterion		-13.12263
Log likelihood	180.3684	Hannan-Quinn criter.		-13.32935
F-statistic	1.317368	Durbin-Watson stat		2.286998
Prob(F-statistic)	0.296705			

Graph 4.8.1: Residual Test: Normality Test



Graph 4.8.2: Stability Diagnostics

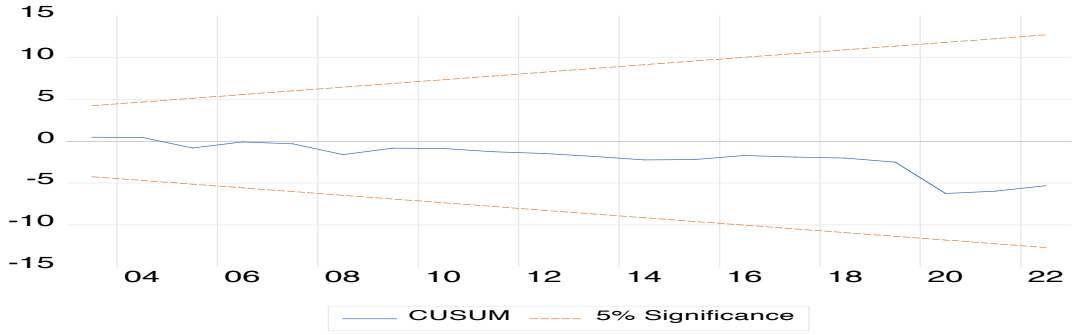


Table 4.8.3: Wald Test

Wald Test:			
Equation: LGDPI on LEN LIN			
Test Statistic	Value	df	Probability
F-statistic	1.779059	(4, 20)	0.1727
Chi-square	7.116236	4	0.1299
Null Hypothesis: C(2)=C(3)=C(4)=C(5)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
LEN or C(2)		-0.001845	0.041057
LEN(-1) or C(3)		-0.06742	0.035082
LEN(-2) or C(4)		0.050763	0.027728
LIN or C(5)		0.095839	0.064551
Restrictions are linear in coefficients.			

LEN on LGDPI LIN

Table 4.8.4: Residual Test: No Serial Correlation

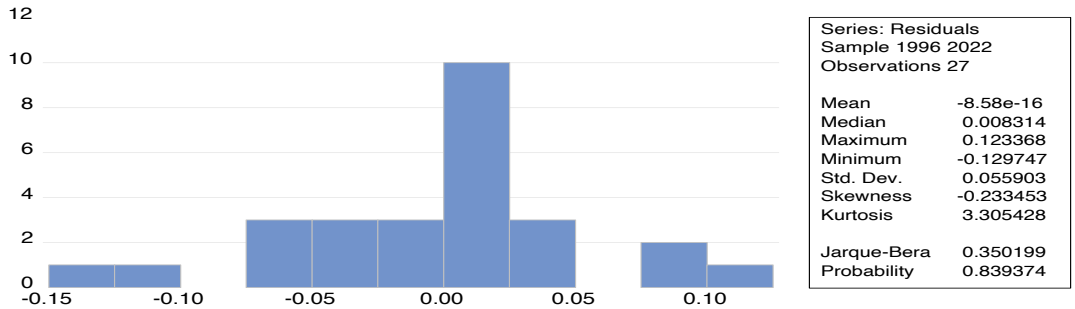
Breusch-Godfrey Serial Correlation LM Test:				
Null hypothesis: No serial correlation at up to 2 lags				
F-statistic	1.269252	Prob. F(2,20)		0.3027
Obs*R-squared	3.041	Prob. Chi-Square(2)		0.2186
Test Equation:				
Dependent Variable: RESID				
Method: ARDL				
Date: 09/13/23 Time: 19:43				
Sample: 1996 2022				
Included observations: 27				
Pre sample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEN(-1)	0.373142	0.393346	0.948636	0.3541
LIN	0.110296	0.213266	0.517176	0.6107
LIN(-1)	-0.648377	0.702103	-0.923479	0.3668
LGDPI	-0.024739	0.16521	-0.149742	0.8825
C	0.552797	0.715965	0.772101	0.4491
RESID(-1)	-0.365413	0.475023	-0.769254	0.4507

RESID(-2)	-0.493757	0.314279	-1.571078	0.1319
R-squared	0.11263	Mean dependent var		-8.58E-16
Adjusted R-squared	-0.153581	S.D. dependent var		0.055903
S.E. of regression	0.060043	Akaike info criterion		-2.569112
Sum squared resid	0.072102	Schwarz criterion		-2.233154
Log likelihood	41.68301	Hannan-Quinn criter.		-2.469214
F-statistic	0.423084	Durbin-Watson stat		1.920689
Prob(F-statistic)	0.854896			

Table 4.8.5: Residual Test: Homoskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
Null hypothesis: Homoskedasticity				
F-statistic	0.265624	Prob. F(4,22)		0.8969
Obs*R-squared	1.243897	Prob. Chi-Square(4)		0.8708
Scaled explained SS	0.951971	Prob. Chi-Square(4)		0.917
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Sample: 1996 2022				
Included observations: 27				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.018137	0.045662	0.397193	0.6951
LEN(-1)	0.009554	0.013814	0.691603	0.4964
LIN	0.011996	0.015989	0.750246	0.4611
LIN(-1)	-0.023737	0.027048	-0.877567	0.3897
LGDPI	-0.001889	0.013494	-0.140001	0.8899
R-squared	0.04607	Mean dependent var		0.003009
Adjusted R-squared	-0.127372	S.D. dependent var		0.004656
S.E. of regression	0.004944	Akaike info criterion		-7.615681
Sum squared resid	0.000538	Schwarz criterion		-7.375711
Log likelihood	107.8117	Hannan-Quinn criter.		-7.544325
F-statistic	0.265624	Durbin-Watson stat		2.55566
Prob(F-statistic)	0.896867			

Graph 4.8.3: Residual Test: Normality Test



Graph 4.8.4: Stability Diagnostics

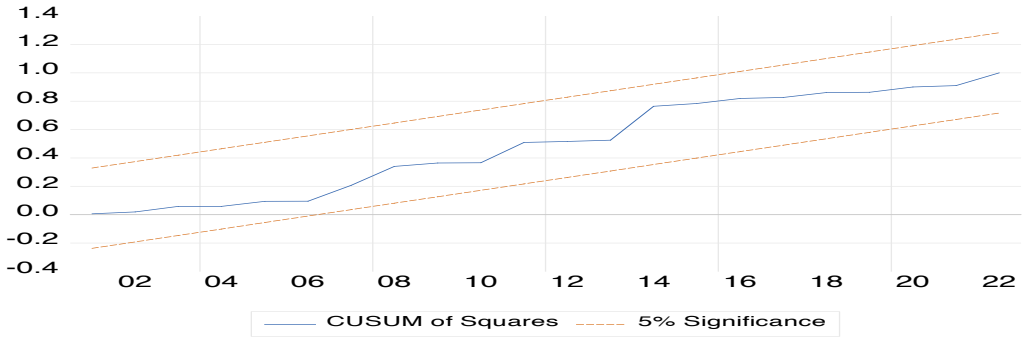


Table 4.8.6: Wald Test

Wald Test:			
Equation: LEN on LGDPI LIN			
Test Statistic	Value	df	Probability
F-statistic	2.509128	(2, 22)	0.1043
Chi-square	5.018257	2	0.0813
Null Hypothesis: C(3)=C(4)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
LIN(-1) or C(3)		-0.488308	0.33248
LGDPI or C(4)		-0.18295	0.165865
Restrictions are linear in coefficients.			

LIN on LGDPI LEN

Table 4.8.7: Residual Test: No Serial Correlation

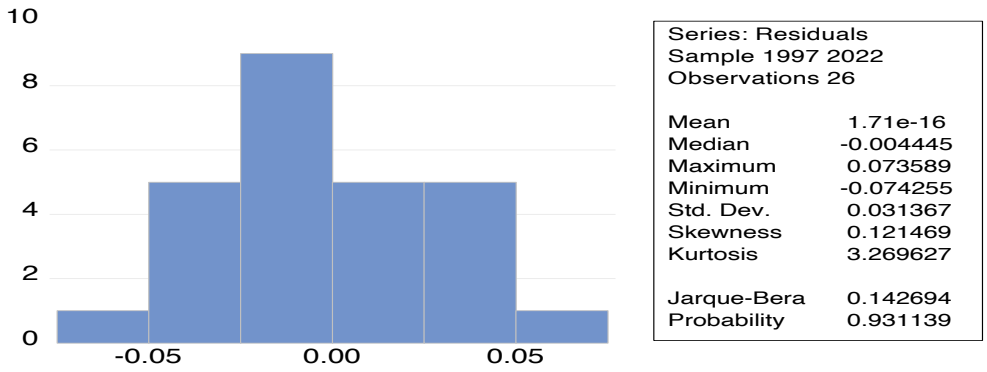
Breusch-Godfrey Serial Correlation LM Test:				
Null hypothesis: No serial correlation at up to 2 lags				
F-statistic	1.051703	Prob. F(2,18)		0.3698
Obs*R-squared	2.720364	Prob. Chi-Square(2)		0.2566
Test Equation:				
Dependent Variable: RESID				
Method: ARDL				
Sample: 1997 2022				
Included observations: 26				
Presample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LIN(-1)	0.367037	0.410694	0.8937	0.3833
LIN(-2)	0.046499	0.136868	0.339732	0.738
LGDPI	-0.156813	0.163962	-0.9564	0.3515
LEN	0.015285	0.074749	0.204489	0.8403
LEN(-1)	-0.185888	0.214031	-0.868511	0.3965
C	0.239012	0.386284	0.618746	0.5438
RESID(-1)	-0.354345	0.496115	-0.71424	0.4842
RESID(-2)	-0.496311	0.342332	-1.449791	0.1643

R-squared	0.104629	Mean dependent var		1.71E-16
Adjusted R-squared	-0.24357	S.D. dependent var		0.031367
S.E. of regression	0.034979	Akaike info criterion		-3.620475
Sum squared resid	0.022024	Schwarz criterion		-3.233369
Log likelihood	55.06618	Hannan-Quinn criter.		-3.509003
F-statistic	0.300487	Durbin-Watson stat		1.846131
Prob(F-statistic)	0.944528			

Table 4.8.8: Residual Test: Homoskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
Null hypothesis: Homoskedasticity				
F-statistic	0.54575	Prob. F(5,20)		0.7396
Obs*R-squared	3.121489	Prob. Chi-Square(5)		0.6813
Scaled explained SS	2.09604	Prob. Chi-Square(5)		0.8357
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Sample: 1997 2022				
Included observations: 26				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.007022	0.015	-0.468147	0.6447
LIN(-1)	0.004096	0.007958	0.514661	0.6124
LIN(-2)	-0.004677	0.005518	-0.847687	0.4066
LGDPI	0.003157	0.004484	0.704129	0.4895
LEN	-0.000906	0.003051	-0.29693	0.7696
LEN(-1)	-0.001796	0.004934	-0.364002	0.7197
R-squared	0.120057	Mean dependent var		0.000946
Adjusted R-squared	-0.099928	S.D. dependent var		0.001453
S.E. of regression	0.001524	Akaike info criterion		-9.935306
Sum squared resid	4.65E-05	Schwarz criterion		-9.644976
Log likelihood	135.159	Hannan-Quinn criter.		-9.851702
F-statistic	0.54575	Durbin-Watson stat		2.464442
Prob(F-statistic)	0.739602			

Graph 4.8.5: Residual Test: Normality Test



Graph 4.8.6: Stability Diagnostics

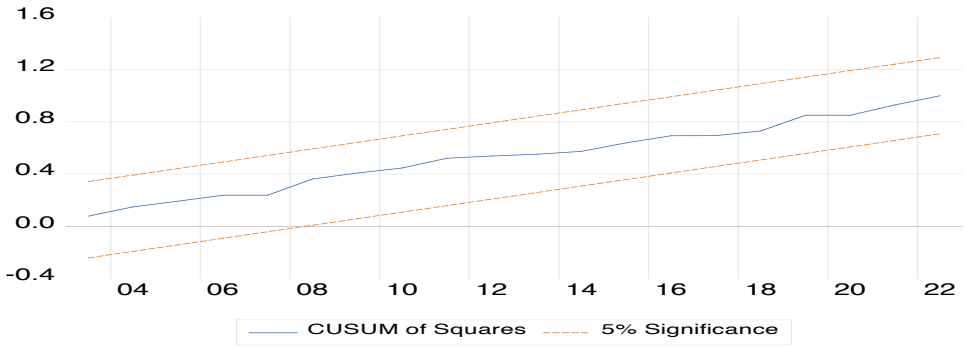


Table 4.8.9: Wald Test

Wald Test:			
Equation: LIN on LGDPI LEN			
Test Statistic	Value	df	Probability
t-statistic	-1.550474	20	0.1367
F-statistic	2.403971	(1, 20)	0.1367
Chi-square	2.403971	1	0.121
Null Hypothesis: C(5)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
LEN(-1) or C(5)		-0.176001	0.113514
Restrictions are linear in coefficients.			

A4.9 Relationship between India's GDP and Trade with EU5

LGDPI on LEEU5 LIEU5

Table 4.9.1: Residual Test: No Serial Correlation

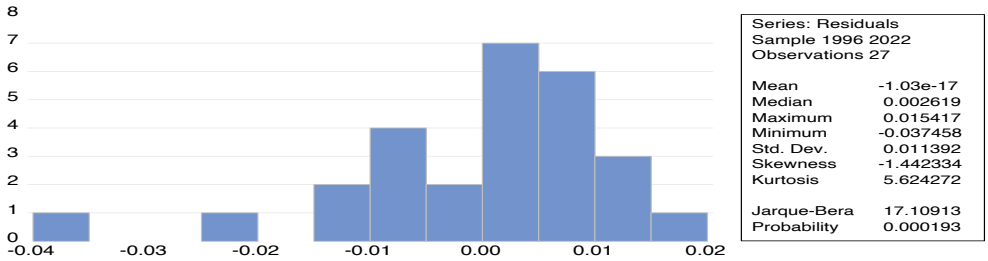
Breusch-Godfrey Serial Correlation LM Test:				
Null hypothesis: No serial correlation at up to 1 lag				
F-statistic	0.018902	Prob. F(1,22)		0.8919
Obs*R-squared	0.023178	Prob. Chi-Square(1)		0.8790
Test Equation:				
Dependent Variable: RESID				
Method: ARDL				
Sample: 1996 2022				
Included observations: 27				
Presample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGDPI(-1)	0.000912	0.034001	0.026833	0.9788
LEEU5	-0.001972	0.0601	-0.032809	0.9741
LIEU5	0.001294	0.046501	0.027818	0.9781
C	-0.002748	0.103956	-0.026431	0.9792
RESID(-1)	-0.030258	0.220083	-0.137484	0.8919
R-squared	0.000858	Mean dependent var		-1.03E-17
Adjusted R-squared	-0.180804	S.D. dependent var		0.011392
S.E. of regression	0.012379	Akaike info criterion		-5.780041

Sum squared resid	0.003371	Schwarz criterion		-5.540071
Log likelihood	83.03055	Hannan-Quinn criter.		-5.708685
F-statistic	0.004725	Durbin-Watson stat		1.987566
Prob(F-statistic)	0.999952			

Table 4.9.2: Residual Test: Homoskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
Null hypothesis: Homoskedasticity				
F-statistic	2.994843	Prob. F(3,23)		0.0517
Obs*R-squared	7.584363	Prob. Chi-Square(3)		0.0554
Scaled explained SS	12.72508	Prob. Chi-Square(3)		0.0053
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 09/28/23 Time: 10:48				
Sample: 1996 2022				
Included observations: 27				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.005708	0.002035	-2.805133	0.0101
LGDPI(-1)	0.001895	0.000665	2.849171	0.0091
LEEU5	-0.002043	0.001164	-1.754823	0.0926
LIEU5	0.000691	0.000908	0.760559	0.4546
R-squared	0.280902	Mean dependent var		0.000125
Adjusted R-squared	0.187107	S.D. dependent var		0.000274
S.E. of regression	0.000247	Akaike info criterion		-13.63912
Sum squared resid	1.40E-06	Schwarz criterion		-13.44715
Log likelihood	188.1282	Hannan-Quinn criter.		-13.58204
F-statistic	2.994843	Durbin-Watson stat		2.147952
Prob(F-statistic)	0.051659			

Graph 4.9.1: Residual Test: Normality Test



Graph 4.9.2: Stability Diagnostics

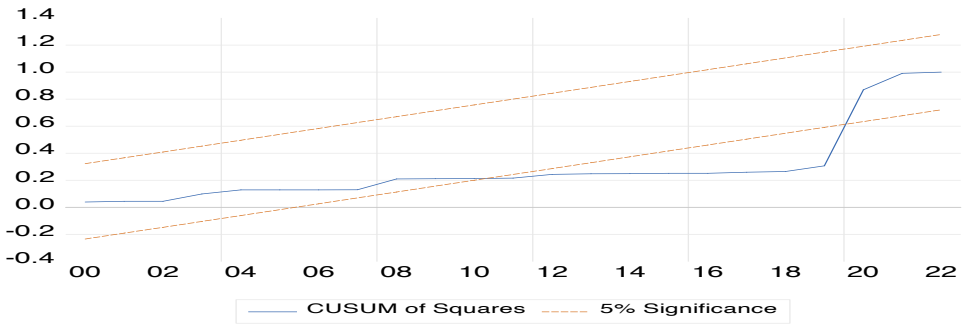


Table 4.9.3: Wald Test

Wald Test:			
Equation: Untitled			
Test Statistic	Value	df	Probability
F-statistic	2.221959	(2, 23)	0.1311
Chi-square	4.443918	2	0.1084
Null Hypothesis: C(2)=C(3)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
LEEU5 or C(2)		0.053326	0.057105
LIEU5 or C(3)		0.004549	0.044558
Restrictions are linear in coefficients.			

LEEU5 on LGDPI LIEU5

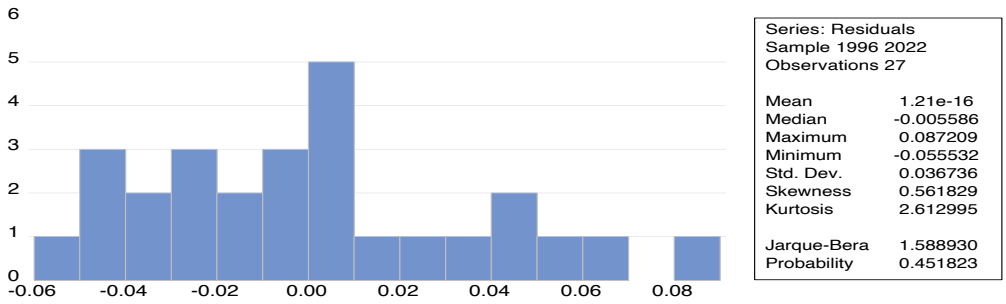
Table 4.9.4: Residual Test: No Serial Correlation

Breusch-Godfrey Serial Correlation LM Test:				
Null hypothesis: No serial correlation at up to 1 lag				
F-statistic	0.601036	Prob. F(1,21)		0.4468
Obs*R-squared	0.751258	Prob. Chi-Square(1)		0.3861
Test Equation:				
Dependent Variable: RESID				
Method: ARDL				
Sample: 1996 2022				
Included observations: 27				
Pre-sample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEEU5(-1)	-0.331934	0.493818	-0.672178	0.5088
LIEU5	0.007436	0.112556	0.066064	0.948
LIEU5(-1)	0.214346	0.33933	0.631674	0.5344
LGDPI	0.144913	0.223124	0.64947	0.5231
C	-0.434264	0.669095	-0.649033	0.5234
RESID(-1)	0.390582	0.503805	0.775265	0.4468
R-squared	0.027824	Mean dependent var		1.21E-16
Adjusted R-squared	-0.203646	S.D. dependent var		0.036736
S.E. of regression	0.040303	Akaike info criterion		-3.39166
Sum squared resid	0.034111	Schwarz criterion		-3.103697
Log likelihood	51.78742	Hannan-Quinn criter.		-3.306034
F-statistic	0.120207	Durbin-Watson stat		1.73346
Prob(F-statistic)	0.986407			

Table 4.9.5: Residual Test: Homoskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
Null hypothesis: Homoskedasticity				
F-statistic	1.905187	Prob. F(4,22)		0.1453
Obs*R-squared	6.94649	Prob. Chi-Square(4)		0.1387
Scaled explained SS	3.719516	Prob. Chi-Square(4)		0.4453
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 09/13/23 Time: 09:55				
Sample: 1996 2022				
Included observations: 27				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.009157	0.014308	-0.639977	0.5288
LEEU5(-1)	0.012672	0.00962	1.317245	0.2013
LIEU5	-0.003678	0.004385	-0.838802	0.4106
LIEU5(-1)	-0.008578	0.007692	-1.115272	0.2768
LGDPI	0.001553	0.004764	0.326111	0.7474
R-squared	0.257277	Mean dependent var		0.0013
Adjusted R-squared	0.122237	S.D. dependent var		0.001682
S.E. of regression	0.001576	Akaike info criterion		-9.902619
Sum squared resid	5.46E-05	Schwarz criterion		-9.662649
Log likelihood	138.6854	Hannan-Quinn criter.		-9.831263
F-statistic	1.905187	Durbin-Watson stat		1.664456
Prob(F-statistic)	0.145311			

Graph 4.9.3: Residual Test: Normality Test



Graph 4.9.4: Stability Diagnostics

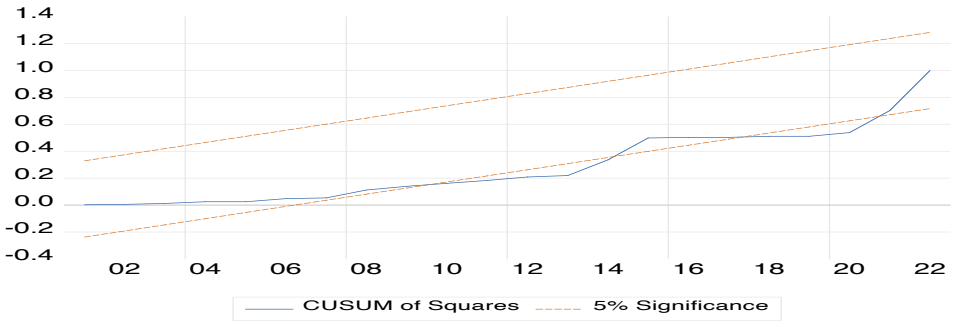


Table 4.9.6: Wald Test

Wald Test:			
Equation: Untitled			
Test Statistic	Value	df	Probability
F-statistic	14.20314	(3, 22)	0
Chi-square	42.60941	3	0
Null Hypothesis: C(2)=C(3)=C(4)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
LIEU5 or C(2)		0.252368	0.120731
LIEU5(-1) or C(3)		0.651198	0.111125
LGDPI or C(4)		-0.403513	0.194939
Restrictions are linear in coefficients.			

LIEU5 on LGDPI LEEU5

Table 4.9.7: Residual Test: No Serial Correlation

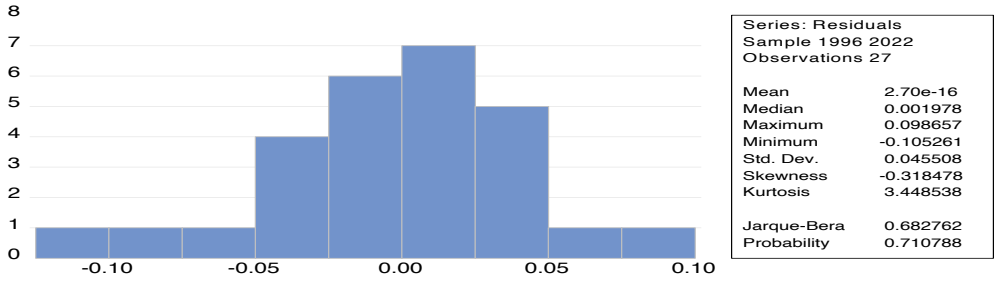
Breusch-Godfrey Serial Correlation LM Test:				
Null hypothesis: No serial correlation at up to 1 lag				
F-statistic	1.181438	Prob. F(1,22)		0.2888
Obs*R-squared	1.37605	Prob. Chi-Square(1)		0.2408
Test Equation:				
Dependent Variable: RESID				
Method: ARDL				
Sample: 1996 2022				
Included observations: 27				
Presample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LIEU5(-1)	-0.067024	0.131343	-0.510293	0.6149
LGDPI	0.006004	0.130842	0.045886	0.9638
LEEU5	0.047686	0.153956	0.309736	0.7597
C	0.047334	0.371969	0.127252	0.8999
RESID(-1)	0.29224	0.268865	1.08694	0.2888
R-squared	0.050965	Mean dependent var		2.70E-16
Adjusted R-squared	-0.121587	S.D. dependent var		0.045508
S.E. of regression	0.048195	Akaike info criterion		-3.061556
Sum squared resid	0.0511	Schwarz criterion		-2.821586
Log likelihood	46.331	Hannan-Quinn criter.		-2.9902
F-statistic	0.29536	Durbin-Watson stat		1.624401
Prob(F-statistic)	0.87781			

Table 4.9.8: Residual Test: Homoskedasticity Test

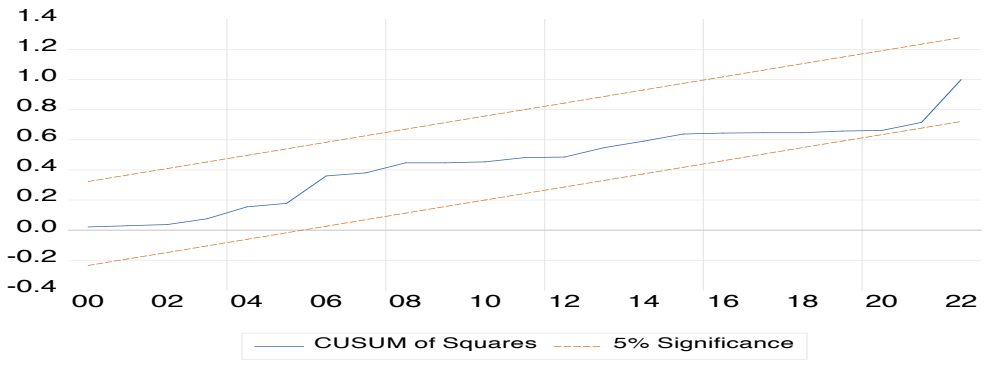
Heteroskedasticity Test: Breusch-Pagan-Godfrey				
Null hypothesis: Homoskedasticity				
F-statistic	1.784437	Prob. F(3,23)		0.1782

Obs*R-squared	5.097796	Prob. Chi-Square(3)		0.1648
Scaled explained SS	4.528845	Prob. Chi-Square(3)		0.2097
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Sample: 1996 2022				
Included observations: 27				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.01831	0.023341	0.784472	0.4408
LIEU5(-1)	-0.016165	0.007327	-2.206062	0.0376
LGDPI	-0.00149	0.00826	-0.180442	0.8584
LEEU5	0.01463	0.009324	1.568971	0.1303
R-squared	0.188807	Mean dependent var		0.001994
Adjusted R-squared	0.082999	S.D. dependent var		0.00318
S.E. of regression	0.003045	Akaike info criterion		-8.614572
Sum squared resid	0.000213	Schwarz criterion		-8.422596
Log likelihood	120.2967	Hannan-Quinn criter.		-8.557488
F-statistic	1.784437	Durbin-Watson stat		2.356239
Prob(F-statistic)	0.178227			

Graph 4.9.5: Residual Test: Normality Test



Graph 4.9.6: Stability Diagnostics



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