IMPACT OF REGIONAL TRADE AGREEMENTS ON INDIA'S AGRICULTURAL TRADE

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Goa Business School
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By

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DECLARATION

I, Krishnakumar Nanu Bandolkar hereby declare that this thesis represents work which has been carried out by me and that it has not been submitted, either in part or full, to any other University or Institution for the award of any research degree.

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CONTENTS

1. CHAPTER I: INTRODUCTION 1

1.1 Introduction to Regionalism & Regional Trade Agreements (RTAs) 1

1.2 Common Forms of Regional Trade Agreements 3

1.3 RTAs Building or Stumbling Blocks? 5

1.3.1 RTAs as Building Blocks 6

1.3.2 RTAs as Stumbling Blocks 6

1.4 Present Status of RTAs in the World 8

1.5 RTAs and Agriculture 11

1.6 Theory of Customs Union and RTAs 13

1.7 Statement of the Research Problem 13

1.8 Objectives of the Study 15

1.9 Methodology 16

1.10 Significance of the Study 17

1.11 Outline of the Thesis 18

2. CHAPTER II: REVIEW OF LITERATURE 20

2.1 Introduction 20

2.2 Regional Trade Agreements (RTAs) 22

2.3 Agriculture within RTAs 28

2.4 Export Competitiveness of Agricultural Products 33

2.5 Trade Creation & Trade Diversion 42

2.6 Summary of the Review of Literature 49

2.7 Research Gap in the Existing Literature 50

3. CHAPTER III: AGRICULTURE SECTOR AND INDIA'S REGIONAL TRADE AGREEMENTS 52

3.1 Introduction 52

3.2 Overview of Global Agricultural Trade 54

3.3 Global Growth of RTAs 59

3.4 India's RTAs and Special Treatment to Agriculture 64

3.5 Summary 76

4. CHAPTER IV: INDIA'S BILATERAL TRADE AGREEMENTS: EXPORT-IMPORT GROWTH ANALYSIS OF AGRICULTURAL PRODUCTS 78

4.1 Introduction 78

4.2 Methodology 80

4.3 Results and Discussion 82

4.3.1 Total Agricultural Exports and Imports 82

4.3.2 India-Sri Lanka FTA 86

4.3.3 India-Afghanistan PTA 87

4.3.4 India-Thailand FTA 89

4.3.5 India-Singapore CECA 90

4.3.6 India-Bhutan FTA 91

4.3.7 India-Chile PTA 92

4.3.8 India-MERCOSUR PTA 94

4.3.9 India-Nepal PTA 95

4.3.10 India-the Republic of Korea CEPA 96

4.3.11 India-ASEAN FTA 97

4.3.12 India-Malaysia CECA 99

4.3.13 India-Japan CEPA 100

4.4 Summary 101

5. CHAPTER V: EXPORT COMPETITIVENESS OF INDIA'S AGRICULTURAL COMMODITIES UNDER REGIONAL TRADE AGREEMENTS 106

5.1 Introduction 106

5.2 Methodology 108

5.3 Results and Discussion 111

5.3.1 India-Sri Lanka FTA 111

5.3.2 India-Thailand FTA 112

5.3.3 India- Singapore CECA 114

5.3.4 India-Chile PTA 115

5.3.5 India-MERCOSUR PTA 117

5.3.6 India-The Republic of Korea CEPA 118

5.3.7 India-ASEAN FTA 119

5.3.8 India-Malaysia CECA 121

5.3.9 India-Japan CEPA 122

5.3.10 Product-wise Classification of RTAs through RCA Category 124

5.3.11 Summary of Export Competitiveness of India's Agricultural Commodities 129

5.4 Summary 131

6. CHAPTER VI: TRADE CREATION & TRADE DIVERSION IN INDIA'S AGRICULTURE UNDER REGIONAL TRADE AGREEMENTS: APPLICATION OF GRAVITY MODEL 134

6.1 Introduction 134

6.2 Gravity Model Specifications 135

6.2.1 Advantages of the Gravity Model of Trade 136

6.3 Trade Creation and Trade Diversion 137

6.4 Panel Data: Fixed Effects and Random Effects Models 138

6.4.1 'Fixed Effects Approach' to Panel Data Regression Model Estimation 139

6.4.2 'Random Effects Approach' to Panel Data Regression Model Estimation ... 139

6.5 Model Framework: Variables and Equations 140
6.5.1 Selection of the appropriate technique 143
6.6 Results of the estimated models 145
6.6.1 Gravity Model for Total Agricultural Trade 145
6.6.2 Gravity Model for Agriculture Exports 150
6.6.3 Gravity model for India's total trade with developed countries 155
6.6.4 Gravity model for India's total trade with developing countries 158
6.7 Summary 162

7. CHAPTER VII: SUMMARY, FINDINGS, CONCLUSIONS, AND IMPLICATIONS 164
7.1 Introduction 164
7.2 Chapter Summary 166
7.3 Major Findings 168
7.4 Major Conclusions 171
7.5 Policy Implications 173
7.6 Limitations of the Research 176
7.7 Scope for Future Research 176

REFERENCES 178

LIST OF TABLES

3.1	Region-wise Agricultural Exports ……....	56
3.2	Region-wise Agricultural Imports ……....	57
4.1	Agricultural Exports (Animals, Vegetables & Food Products) with India's Bilateral Trade Agreement Partners …….	83
4.2	Agricultural Imports (Animals, Vegetables & Food Products) with India's Bilateral Trade Agreement Partners …….	85
4.3	Exports & Imports under the India-Sri Lanka FTA ……..	86
4.4	Exports & Imports under the India-Afghanistan PTA ……..	88
4.5	Exports & Imports under the India- Thailand FTA ……...	89
4.6	Exports & Imports under the India-Singapore CECA ……...	90
4.7	Exports & Imports under the India-Bhutan FTA ……..	92
4.8	Exports & Imports under the India-Chile PTA …….	93
4.9	Exports & Imports under the India-MERCOSUR PTA …….....	94
4.10	Exports & Imports under the India-Nepal PTA ……	95
4.11	Exports & Imports under India- the Republic of Korea CEPA ……..	97
4.12	Exports & Imports under the India- ASEAN FTA ……...	98
4.13	Exports & Imports under the India-Malaysia CECA ……	99
4.14	Exports & Imports under the India-Japan CEPA ……..	100
4.15	Product-wise Classification of Exports Cases ……...	102
4.16	Product-wise Classification of Imports Cases ……...	103
5.1	Product Code and Description …….	109
5.2	India's Bilateral RTAs and the Study Period ……	110

5.3	Export Competitiveness under India- Sri Lanka FTA ……...	112
5.4	Export Competitiveness under India- Thailand FTA ……	113
5.5	Export Competitiveness under India- Singapore CECA ……...	115
5.6	Export Competitiveness under India-Chile PTA ……..	116
5.7	Export Competitiveness under the India-MERCOSUR PTA ……...	117
5.8	Export Competitiveness under India-The Republic of Korea CEPA …….	119
5.9	Export Competitiveness under the India-ASEAN FTA ……	120
5.10	Export Competitiveness under India-Malaysia CECA …….	121
5.11	Export Competitiveness under India-Japan CEPA ……...	123
5.12	Summary of Product-wise Classification.……..	124
5.13	Summary of Export Competitiveness ……...	130
6.1	Gravity Models Estimated ……...	142
6.2	Selection of the Model ……	144
6.3	Results for the total agricultural trade by the GDP ……	146
6.4	Results for the total agricultural trade by the total population ……	147
6.5	Results for the total agricultural trade by the PCI ……..……..	148
6.6	Results for the total agricultural trade by the GDP and total population …….	148
6.7	Results for the agricultural exports by the GDP ……...……..……..	150
6.8	Results for the agricultural exports by the total population …...……..	151
6.9	Results for the agricultural exports by the PCI ……..……..	152
6.10	Results for the agricultural exports by the GDP and total population ……..	153
6.11	Results for the total agricultural trade by the GDP ……..……..……..	155

6.12 Results for the total agricultural trade by the total population …..……..... 156

6.13 Results for the total agricultural trade by the PCI …..……....……..... 157

6.14 Results for the total agricultural trade by the GDP and total population ...……..... 157

6.15 Results for the total agricultural trade by the GDP ……..……..... 159

6.16 Results for the total agricultural trade by the total population ……..……..... 159

6.17 Results for the total agricultural trade by the PCI ……...……..... 160

6.18 Results for the total agricultural trade by the GDP and total population …….... 160

LIST OF FIGURES

3.1 RTAs in Force, 1948-2023 ……...……... 62

3.2 Region-wise RTAs in Force ……..……... 63

CHAPTER I

INTRODUCTION

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INTRODUCTION

1.1 Introduction to Regionalism & Regional Trade Agreements (RTAs)

International Trade is a mechanism for the interchange of goods and services across global regions or frontiers. It fosters the process of production, consumption, and economic interactions among universal stakeholders. Trade helps to alleviate the problem of uneven resource availability and distribution around the world by enabling the flow of raw materials, goods, and services. Economic regionalism is a phenomenon in global trade where nations form associations for trade accomplishment, which then collaborate to lower trade barriers among their members. The goal of regional economic groupings is to create a larger economic entity of two or more national economies. Regional groupings create an impact on international businesses and for designing global policies. The process of economic integration is progressive, where a country initiates the steps considering its economic attributes, which will generate desirable economic outcomes both in the short-run and long-term. Trade blockades between nations can be diminished through the liberal-implementing scheme of RTAs. Economic integration has attracted the attention of policymakers for many decades. The economics of regionalism and the effects of RTAs were studied by Bhagwati and Panagariya (1996b); Fernandez and Portes (1998); Freund (2010); Greenway and Milner (2002); Mansfield and Milner (1999); Kang (2016); Urata (2002); etc.

There has been a swift spread of economic regionalism across the globe by means of RTAs. A Regional Trade Agreement (RTA) is a pact among two or more nations that specifies the trade directives for all the group members. Such agreements facilitate the free flow of products and services across the borders of its member nations. RTAs intend to dilute protectionist policies to a more considerable extent. RTAs are structured in such a way that

encompasses more than usual conventional trade policies. In a RTA, the associated nations agree to commence the trade with integration and economic cooperation. Broadly, the two types of RTAs are bilateral and plurilateral (also termed 'multilateral'). However, within the RTA partnership, there is an extreme possibility of an exemption or exclusion for certain products from the 'duty-free or elimination' status to protect the corresponding producers or units. The member countries are strictly expected to follow the approved rules and regulations under the signed agreement. According to Whalley (1998), RTAs worldwide differ from one another, and governments negotiate for them, reflecting the diversity of distinct objectives.

A Regional Trade Agreement can be trade-encouraging only when the partner countries share significant trade volume before RTA formation (Pant & Paul, 2018). The proximity of geography, polity, and culture provides an advantageous institutional environment for materialising the trade-augmenting potential released by the framework of trade agreements. RTAs provide the channels that open the door of global liberalisation and regionalism. The efficacy of RTAs may exhibit significant variation dependent upon many criteria, including the particulars of the agreement, the regions associated, and the prevailing economic conditions of the participating economies.

The practice of offering concessions and well-designed schedules creates a conducive environment for liberalising trade and thus improving the trade relationship among the members. A primary motivation for excluded countries to join an existing RTA or create a new RTA is to safeguard their ability to follow outward-oriented growth policies, implying that RTAs can positively contribute to their economic growth and long-term development goals. RTAs are currently the focus of many economic policies and will likely impact trade and economic relations of global trade in the coming years. RTAs are expected to emerge as

building blocks in the spectacle of global trade unification. RTAs are growing rapidly and have recently become more familiar with the international trading system.

1.2 Common Forms of Regional Trade Agreements

RTAs across the world may not have an exact uniform pattern and coverage. The preferences and conflicting interests will lead to unusual forms of RTAs with some diverse arrangements. The extent of RTAs differs depending on the level of commitment and the arrangement among the allying member nations.

1. Preferential Trade Agreements (PTA)

The PTA requires a minimum level of commitment to lessen obstacles to trade by reducing import tariffs on a fixed number of products. These commitments enable the circumstances for partial scope agreements by including various provisions on customs cooperation and trade facilitation. Generally, PTAs do not thoroughly share usual external trade hindrances. They promote regulatory cooperation and systematize standards in various areas. As per the study by Ornelas et al. (2021), due to the presence of a relationship-strengthening effect, PTAs can still improve global welfare even if trade-creation forces are missing.

2. Free Trade Agreement (FTA)

In the FTA, all trade barriers among partners are eliminated at the optimum level. Nations can exchange products and services with ease among themselves. FTAs are assumed to develop lucid investment, stronger trade linkages, and fairer competitive commercial environments among member nations. As per the World Trade Organisation (WTO), nearly more than 80% of RTAs are of FTAs. The other names for FTAs across the globe are Comprehensive Economic Partnerships (CEPs) or Economic Partnership Agreements

(EPAs). Some well-known FTAs are the North American Free Trade Agreement, The African Continental Free Trade Area, the Association of Southeast Asian Nations, etc.

3. Customs Union

A Customs union is a trading association of nations that use a single set of processes, rules, and tariffs for nearly all their trading and transiting commodities. Customs union members typically have similar commercial and competition strategies. Member nations of a customs union often impose a 'common external tariff' on non-members' imports. This implies that all members within the union adopt uniform trade policies towards countries outside the union, resulting in a more restrictive trading environment than a FTA. They are projected to foster economic efficiencies by allocating tariff incomes among member nations. Some famous customs unions are the Southern African Customs Union (SACU), the East African Community (EAC), The Southern Common Market (MERCOSUR), the Caribbean Community (CARICOM), etc.

4. Economic Union

An economic union is an agreement in which members abolish trade obstacles in the union by approving common visible barriers and allowing nearly freer import and export. It is a market where member nations collaborate on macroeconomic-related issues and relevant trade approaches. It is said to be the ultimate phase in economic integration. This allows easy mobility of workers and capital along with other means of trade resources and transactions. It follows a collection of economic strategies and uses the common acceptable standard currency. Some popular economic unions are the European Union, Gulf Cooperation Council, and Eurasian Economic Union.

1.3 RTAs Building or Stumbling Blocks?

Ideally, RTAs offer plenty of potential benefits, such as expanded market access, economies of scale, increased investment flows, and elevated regional cooperation. As a result, RTAs are formed worldwide, each with its unique set of goals, provisions, and scope of integration. However, they can also present challenges such as the likelihood of trade diversion, regulations' complexity, and the exclusion of non-member nations. Economic integration, both regional and global, has sparked much discussion over trading prospects. There are two primary schools of thought in the arena of regional trade agreements (RTAs): one advocates potential gains through building and expanding RTAs, while the other highlights potential obstacles through stumbling blocks and limitations that could arise from RTAs.

According to Bhagwati's (1991) framework, a regional group is a building block when it promotes multilateralism and a stumbling block when it impedes it. RTAs are 'discriminatory' by description, but this does not mean that the RTAs are harmful to other nations or the global trading system (Lloyd, 1992). On one side, some economists believe that RTAs will pave the way for improved global trade. RTAs enable the creation of a broad economic block with a shared market and harmonisation of trade policy. The European Union (EU) is a classic example of regionalisation because of its closely integrated markets and rapid transport within member states. On the other hand, proponents of the multilateral trade system are uncertain about the effectiveness of RTAs in enhancing international economic integration. They consider RTAs as a violation of the nondiscrimination principle contained in Article 1 of the GATT (General Agreement on Tariffs and Trade) and Article 2 of the GATS (General Agreement on Trade in Services) and as an infringement of the fundamental spirit of multilateralism.

1.3.1 RTAs as Building Blocks

RTAs strengthen the foundation for multilateral trade liberalization without weakening the multilateral trading system (Herz & Wagner, 2011). RTAs have promoted commitments within their individual blocks that would be impossible to achieve multilaterally (Fink & Jansen, 2009). There has been a surge in RTAs over the years, indicating stronger relationships between nations and a push for international trade (Maria, 2017). Optimists argue that RTAs are developing policies for long-term international liberalizations because they materialize GATT objectives. Lee et al. (2008) found that RTAs can positively impact global trade by facilitating an increase in intra-bloc trade without affecting extra-bloc trade. Krugman (1993) argues that "modern trade barriers are much more difficult to negotiate in a multilateral forum" and that "most countries find it comfortable to deal with these issues on a bilateral or regional level".

Proponents of 'RTAs as building blocks' advocate that trade agreements do not threaten the multilateral trade system since they are governed by WTO standards that ensure RTAs' viability as a complement to multilateralism. The WTO adopted a tolerant stance towards RTAs, that such agreements can assist least developed or developing countries in blending with and gaining acceptance in the global economy. Indeed, the WTO is one of the optimists and supporters of RTAs, as these agreements are negotiated with the approval of the WTO. Hence, many economists argue that the WTO views RTAs as building blocks for the international trading system.

1.3.2 RTAs as Stumbling Blocks

While supporters of regionalism argue that the notion is a springboard to multilateralism, opponents of the multilateral trading system argue that RTAs create a "spaghetti bowl" problem instead. Regarding the validity of the RTA measures, the appellate body ruled that

RTAs could not untie members' rights and obligations under WTO multilateral accords. Among economists skeptical of RTAs' complimentary nature to multilateralism, Bhagwati's approach asserts that preferential trade agreements produce convoluted and exceedingly complicated regulatory frameworks akin to a spaghetti bowl. According to Bhagwati (1993), the discriminatory nature of RTAs promotes the supremacy of politically and economically dominant governments over less developed states. It not only causes trade wars but also exacerbates the resource curse in developing countries that are rich in minerals and natural resources.

One of the most significant criticisms of RTAs is that they can lead to a diversion of trade and diminished global economic efficiency (Bhagwati, 1992). According to Richard Oppong (2009), market access for items in specific states entirely depends on the country of origin of those products in a RTA structure. As a result, when states scurry to protect their interests in a complicated economic system, a lack of openness emerges. Pal (2005) believes that the expansion of RTAs would have adverse implications for global welfare. This is primarily due to the emergence of mistrust and the unequal power dynamics within these agreements, which may result in the exploitation of developing nations by developed economies.

Bhagwati and Panagariya (1996a) concluded that when a trading bloc consists of many less-developed countries, the developed countries will most likely redirect trade to the outside globe for greater chances. Panagariya, who agrees with Bhagwati, feels that the United States backing for regionalism is the fundamental reason for the rapid development of RTAs around the globe, prompting other countries to follow suit. Panagariya (2000) claimed that trade agreements are anticipated to lower welfare in member countries due to the dominance of trade diversion over trade creation.

The WTO encouraged and supported regionalism at its beginning. Pessimists claim that the proliferation of RTAs has increased trade diversion under the pretense of trade liberalisation, jeopardizing the multilateral trading system. The World Trade Organisation (Annual Report, 2003) noted that while RTAs can supplement the multilateral trading system, they are intrinsically vague and contradict the MFN clause, which is the cornerstone of GATT.

WTO Appellate Body's report on the Agricultural Products Dispute upheld the prevailing view that RTAs should be complementary to the multilateral trade system rather than competitive. Such studies and arguments show that RTAs can be both building blocks and stumbling obstacles for the multilateral trading system. It is essential to acknowledge that the consequences of RTAs can vary significantly based on their specific provisions, the countries involved, and the operating context. A well-designed RTA can serve as a foundation for multilateral trade by establishing high standards and incorporating liberalisation mechanisms for the future. Leaning toward the WTO position on RTAs, it appears that there is an extensive ability that RTAs are complementary to the multilateral trading system and hence cannot be eliminated.

1.4 Present Status of RTAs in the World

Regional trade agreements are becoming more common and changing in nature. RTAs have become an umbrella for more than 50% of world trade. The proliferation of RTAs has emerged as a prominent characteristic of global trade in the latter part of the 20th century. The European Economic Community (EEC), created by the Treaty of Rome in 1957, was the first major RTA under the GATT. The EEC was a customs union (CU) in GATT terminology because it established a common external tariff. There were only 12 RTAs formed till 1980. In 1990, there were only twenty-two RTAs in effect. After the mid-1990s, the coverage of regionalism intensified significantly and moved to areas with limited RTAs,

such as East Asia. Presently, there are a total of 356 RTAs (notified by WTO as of May 2023) in the global scenario. Out of the total of 356 active RTAs, PTAs are 26, FTAs are 310, and Customs Union (CU) are 17 in numbers. Based on these data, it is evident that FTAs are more common because they are easier to negotiate and reach an agreement as policy coordination of a lesser level is needed between the parties involved. The rapid spread of regionalism can be related to the 'domino theory of regionalism' put forth by Baldwin (1993). According to his theory, when a limited group of governments forms a trade bloc, non-member nations in the region are encouraged to join to achieve political and economic balance. This, in turn, invites more non-member countries to join the bloc.

As of May 2023, according to the World Trade Organisation database, the top 12 countries with the maximum RTAs are the United Kingdom, Chile, Singapore, Turkey, Mexico, Peru, the Republic of Korea, Japan, Panama, India, Australia, and China. The country with the highest of 36 RTAs is the United Kingdom. Chile follows it with 31 RTAs, Singapore with 27 RTAs, Turkey with 25 RTAs, and Mexico with 23 RTAs. The next leading country is Peru, which has 21 RTAs, followed by the Republic of Korea with 20 RTAs. Japan, India, and Panama have an equal number of 18 RTAs. At the bottom list of the top 12 countries, Australia has 17 RTAs while China has 16 RTAs.

There has been a steady growth of RTAs under the umbrella of GATT until 1995, while RTAs proliferated in all the world's major regions after the creation of WTO. India did not detach itself from the action of participation during the spread of this regional integration. In the 1990s, India embarked on a series of economic reforms to liberalise the economy. Among these has been a concerted push to open its global trade. India was a signatory of only four RTAs before the start of the new millennium, namely the Asia Pacific Trade Agreement (1976), the Global System of Trade Preferences among Developing Countries

(1989), the South Asian Preferential Trade Arrangement (1997) and the India – Sri Lanka FTA (2000). However, the total number of trade agreements climbed to 14 between 2000 and 2010. This demonstrates that India was particularly ambitious in improving regional trade in the first decade of the new century (21st) when ten new RTAs went into effect. Among these ten new RTAs, the two notable RTAs were with existing regional groupings of MERCOSUR (Southern Common Market) and ASEAN (Association of South East Asian Nations). India's RTA, like those of other countries throughout the globe, consists of a comprehensive set of agreements covering a wide range of commercial activities, from product and service exchanges to investment, innovation, and intellectual property to economic cooperation. This suggests that India's approach to the inception of various RTAs has remained constructive and optimistic.

The competitive economic environment between nations of different parts of the world has resulted in a trend of regional trade liberalization. Besides tariffs, many trade agreements cover other policies and critical areas, such as competition policy, government procurement procedures, and intellectual property rights, affecting trade and investment in products and services. Given RTA's cohesion, the tariffs and other border initiatives are considered "shallow" agreements; RTAs that address a broader range of policy issues at and beyond the border are considered "deep" accords. Deep trade treaties provide a critical institutional foundation for regional integration. They lower trade costs and provide several principles by which economies operate. They can increase cross-national policy collaboration and enhance investment and international trade, economic growth, and societal welfare if well-structured. Economies that want to enhance gains from global markets through deeper regional integration will need to integrate trade and investment initiatives into broader reform structures in the local economy. Mattoo et al. (2022) discovered that non-

discriminatory deep agreements create more extensive trading than shallow agreements and can experience a positive spillover effect on trade with non-member nations.

1.5 RTAs and Agriculture

RTAs have played a significant role in reshaping the agricultural trade landscape, presenting opportunities and challenges that vary widely depending on each agreement's particulars, the sector's competitiveness and innovation, and the policy framework within which it functions. Different regions, different commodities, and different political and economic climates all have different effects on agricultural trade. Nevertheless, how agricultural commodities have been treated does not align with the accords regulating trade liberalization in other sectors. The Economic Community of West African States (ECOWAS) stands out as a unique case in which agriculture is theoretically fully incorporated into the RTA. The European Union's (EU) influence on global agricultural markets has been substantial, and the bloc's coverage standards can be used as a yardstick against which other trade agreements can be evaluated.

The disparities among the trade policy reforms implemented by various member states and their distinct domestic policies posed obstacles to integrating the agriculture policy into a unified regional framework. However, RTAs can enhance market access, specialization, income, and investment in agriculture by reducing trade barriers and allowing countries to specialize in specific agricultural products. RTAs can also drive economic development by modernising and integrating the agricultural sector with global value chains. According to McCorriston (2002), RTAs usually strive to achieve the liberalization of agricultural markets, which can yield both advantageous and detrimental consequences. RTAs frequently have provisions aimed at harmonizing sanitary and phytosanitary (SPS) standards, enabling easier agricultural trade (Josling et al., 2004).

The role of RTAs in facilitating agricultural trade can be justified in some instances. The North American Free Trade Agreement (NAFTA) has resulted in removing a significant portion of tariffs, facilitating a notable surge in worldwide trade volume in agricultural commodities such as corn, soybeans, and pork. There has been an increase in Mexico's exports of fruits and vegetables to the United States. Implementing the ASEAN Free Trade Area (AFTA) has resulted in reducing tariffs and other trade impediments within member countries, which has been beneficial for the trade of tropical fruits, rice, rubber, and other indigenous agricultural commodities. The Common Agricultural Policy (CAP) of the European Union had a substantial impact on intra-EU agricultural trade, allowing countries to specialise in certain products. The Southern African Development Community (SADC) seeks to promote collaboration in key areas such as livestock and maize cultivation. Regional groupings like the East African Community (EAC), Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), MERCOSUR, etc., have aimed to reshape agricultural trade, particularly on an intra-regional basis.

A positive association between RTA and agricultural trade connectivity implies that this relationship may be more pronounced at the extensive margin of trade and for countries that share multiple RTAs, possibly indicating a greater political integration among these nations (Jafari et al., 2023). The effectiveness of RTAs and their positive impact on agricultural development can be attributed to enhanced policy coordination among members. The strengthening of trade agreements could serve as a significant policy measure within the increased framework for the liberalisation of agricultural trade. This approach has the potential to support agricultural and economic growth while also promoting better consistency for forthcoming rounds of multilateral trade negotiations.

1.6 Theory of Customs Union and RTAs

The theory that explicitly discussed regional groupings and their impacts is the theory of Customs Union by Jacob Viner (1950). The impact of customs unions on production using the concepts of trade creation and trade diversion was examined by Jacob Viner. He demonstrated that a customs union can have either a beneficial or detrimental impact. Viner stated that directives of the customs union could have a significant impact on trade creation and trade diversion. While trade creation leads to an increase in welfare, trade diversion leads to a decrease in welfare following the formation of a customs union. The reason for diversion is that trade flows from a more efficient to a less efficient country or a low-cost country to a high-cost country. Viner argued that a customs union might increase welfare if the gains from trade creation outweighed the costs from trade diversion.

The distinction between trade creation and diversion has served as the foundation for much of the subsequent investigations into the welfare consequences of customs unions. According to Lipsey (1960), the customs union is a free trade movement that would raise world welfare. Meade (1955), Johnson (1965), Cooper & Massell (1965), and Krauss (1972) are among those who have made significant contributions to the customs union theory. Customs Union provides insights on the economic ramifications of RTAs in general. The idea of a customs union has been integrated into the more significant notion of RTAs. RTAs have the potential to serve as catalysts for enhancing competitiveness through a mechanism of trade creation, which fosters a more efficient regional division of labour, and facilitates the gradual reduction of trade and investment barriers among member countries.

1.7 Statement of the Research Problem

India has aggressively engaged in talks for RTAs with several countries/regional groupings in the 21st century. India signed its first multilateral RTA, the Asia Pacific Trade Agreement

(APTA), in 1976. However, with Sri Lanka, India's first bilateral trade agreement became effective only in 2000. According to the RTAIS database (WTO), India currently engages in 18 bilateral and multilateral RTAs. India aims to experience enhanced economic advancement and growth through these RTAs. Such RTAs can positively or negatively impact the trading dynamics of goods and services depending upon their design and implementation.

It has been a challenging task for India to meet the demand for food for its continuously rising population. India has been following a protectionist policy regarding the agriculture sector. Hence, agriculture is the most contentious sector in all RTA negotiations. India's agricultural, horticultural, and processed food items are exported in significant quantities to numerous countries worldwide, besides meeting the home demand. How the agricultural sector is treated under the RTA framework is of great significance in India. Has India continued to protect the agriculture sector in RTAs, too? If yes, what kinds of protection are granted, and to what extent is an important research question? There are some studies on the effects of RTAs on trade in Agriculture. Studies specific to trade in agriculture under the RTA framework are very limited. In the Indian case, a comprehensive study on the agricultural sector under Trade Agreements is scarce.

It is a fact that several goods from agriculture also have experienced lowered tariffs and duties under the regime of India's RTAs. Therefore, there is a need for a comprehensive study across India's bilateral trade agreements on how India performed in agricultural exports and imports after the formation of these RTAs. A study on the trade advantages to agricultural commodities of India due to the formation of various RTAs assumes significance. It is imperative to study with which RTA countries India has done well in agricultural trade and with whom India has performed inefficiently after the formation of

RTAs. Further, it is desirable to know those agricultural commodities in which India has received a competitive edge in exports after the formation of RTAs and in which commodities India's dependence has minimised. The present study is a step to understand the impact of Regional Trade Agreements on agricultural trade. The thesis clusters around the research question of whether RTAs have benefited India's agricultural trade in terms of trade creation and diversion.

1.8 Objectives of the Study

The objective mainly revolves around identifying the changes in agricultural trading patterns between the pre-RTA and the post-RTA formation. India is one of the fastest-growing economies with a massive population, and hence primary sector (agriculture and allied segment) has been seen with utmost importance. The domestic policies have remained supportive of the agricultural sector. The RTAs have been formed mainly to take maximum advantage of the expansion of India's services and manufacturing sectors. It is critical to understand how RTAs affect the agricultural sector. The specific objectives of the study are:

1) To understand the nature and extent of special treatment the agriculture sector received under India's RTAs.

2) To study the trends in exports and imports for agricultural products under India's Regional Trade Agreements.

3) To examine the export competitiveness of the agricultural products under each bilateral trade agreement of India.

4) To study the trade creation and trade diversion effects of RTAs on trade in agricultural products.

1.9 Methodology

This study examines the impact of RTAs on the trade in Indian agricultural commodities. The study is based on secondary data gathered and compiled from diverse sources. The sources of data are the World Trade Organisation (WTO), World Integrated Trade Solution (WITS), World Development Indicators (WDI) of the World Bank, the CEPII (the Centre for Prospective Studies and International Information), Reserve Bank of India, and Ministry of Commerce & Industry, Government of India. The prime data source is WITS, an application designed, developed, and maintained jointly by UNCTAD (United Nations Conference on Trade and Development) and the World Bank, from where the bulk trade data on exports and imports of agricultural commodities is accessed.

The three main methods applied in the study are growth rate analyses, Balassa's index of Revealed Comparative Advantage (RCA), and the Gravity Model. In order to capture the immediate impact of the signed bilateral agreements, a growth rate analysis is performed. The Log-Linear model is applied to examine the growth rate, in which the dependent variable is expressed as a logarithm of exports or imports, whereas one independent variable is the time. It helps capture the significant changes in the growth of exports and imports of India specific to RTA countries during the immediate decade since the formation of RTA. The export competitiveness of various agricultural products with different bilateral trade agreements is studied using the RCA index. The RCA index is a quantitative mechanism to discover the export competitiveness and potential of any trading commodity. RCA examines the relative advantage or disadvantage of a particular commodity or service about a nation based on trade movements. The study used the gravity model to quantify trade creation and trade diversion concerning agricultural products in India's RTAs. The gravity model of trade is particularly appealing to researchers since it allows them to estimate the trade effects of

various trade-related metrics. It offers an insightful framework for comprehending and quantifying the interactions between economic magnitude, distance, and trade flows. The gravity model's most remarkable contribution to applied international trade economics is the empirical estimations and interpretations related to trade creation and trade diversion. The appropriate methodology of these three methods is given in the corresponding chapters/sections.

1.10 Significance of the Study

India has remained a key contributor to the agricultural goods basket of the globe. India is one of the foremost economies in producing certain prime agricultural commodities like rice, milk, pulses, wheat, cotton, groundnuts, sugarcane, and others (The Food and Agriculture Organization of the United Nations, 2019). The present study makes a worthy contribution to understanding the scenario of gains or losses of agricultural products at disaggregated levels and broad product categories (as per Harmonised System classification). The study will evaluate India's prospects among RTAs, focusing on agricultural exports. The study will examine the impact of RTA formation on India's agricultural sector. The favourable economic circumstances within RTA from the point of trade in the agriculture segment can be found, and it can be applied accordingly to unleash the agricultural export potential of India. The study will provide gainful information on agricultural trade patterns and traditional economic ties that are vital factors of trade flows. Overall, the study disseminates the latest information on comparative advantages and trade creation or diversion in the context of the agricultural trade of India.

The study will enlighten on whether and to what extent these agreements enhance trade in agricultural goods between the members of RTAs. It will assist in identifying the factors and characteristics that determine India's trade in agricultural products under the various trade

agreements. This empirical approach can be a remarkable yardstick in obtaining optimistic prospects related to agricultural trade within the forthcoming trade agreements of India. This will assist in rectifying and re-establishing the rules and provisions of RTAs for advancing India's agricultural trade. The present empirical study on agricultural trade under the structure of RTAs enhances the robustness of the study due to the implications on the external agricultural economy for similar developing nations.

1.11 Outline of the Thesis

The study is structured into seven chapters. Chapter I is an introductory chapter that highlights regionalism, types of RTAs, the contradicting views on RTAs as building and stumbling blocks, the global growth of RTAs, the relevance of agriculture within RTAs, the theory of Customs Union and RTAs, the statement of the research problem, the significance of the study, objectives of the study and the data methodology.

Chapter II presents a review of the literature and the gap in the existing literature. Within the context of RTAs, this chapter reviewed recent theoretical and empirical developments pertaining to agricultural commodities and trade.

Chapter III provides an overview of global agricultural trade, the background and status of India's various trade agreements, and the special treatment the agricultural sector received under RTAs. Chapter IV studies the export-import growth analysis of agricultural products under India's bilateral trade agreements by applying the Log-Linear model.

Chapter V is analysing the revealed comparative advantages (RCA) for agricultural products of Animals (PC 01 to 05), Vegetables (PC 06 to 15), Food Products (PC 16 to 24), Silk (PC 50), and Cotton (PC 52) based on Harmonized System (HS2) classification for nine bilateral

trade agreements of India. In this chapter, Balassa's RCA index enables us to gauge the export potential of India's agricultural commodities among RTAs.

In Chapter VI, the worldwide acceptable Gravity model is applied to understand the effects of trade creation or trade diversion on agricultural trade due to the formation of India's RTAs.

Chapter VII presents the summary, findings, conclusions, and implications. An overview of the previous chapters is provided in this chapter. The significant findings, conclusions, and policy implications of the study are also given.

CHAPTER II

REVIEW OF LITERATURE

CHAPTER II

REVIEW OF LITERATURE

2.1 Introduction

Regional Trade Agreements (RTAs) have drawn the attention of many researchers since the early 1990s. As the dynamics of worldwide trade have changed, the number, depth, and characteristics of RTAs have expanded throughout time. As the world's economies continue to grow closer together, RTAs are primarily seen as a bridge between developing and developed nations. RTAs provide opportunities for developing nations to strengthen their trade capacity through increased knowledge of trade practices, policies, regulations, and negotiations. Well-known American economist Paul Krugman (1991a) concluded that "world welfare would reach a minimum when there are a few large blocs, and would be higher with more blocs, each having less market power". Empirical literature defends this with vital evidence that expanded participation in worldwide trade can stimulate economic growth. This is a prerequisite for achieving broader development goals. Most studies have found that RTAs have encouraged more trade within the regional trading group (Dianzah, 2022; Ejones et al., 2021; Zhou, 2022). The latest research has tried to disclose the practicality of RTAs in promoting trade in agricultural commodities (Balogh & Leitão, 2019; Cantin & Duchesne, 2019; Sunge & Ngepah, 2020).

Research on RTAs from various disciplinary perspectives and for multiple nations and regions has been conducted. Assessment of RTA's consequences in view of the 'welfare' notion has remained a critical subject among researchers. Trade agreements can either contribute to an increase in global trade and welfare or lead to a decrease in welfare. According to Burfisher et al. (2001), determining the effect of RTAs is primarily an empirical question that can only be answered by statistical examination. The gravity model

was employed by Tinbergen (1962a) to analyse the impact of British Commonwealth trade among its members. His research revealed that the 'average treatment effects' of trade agreements on trade movements are economically inconsequential. Historically, studies by Abrams (1980), Aitken (1973), and Brada & Mendez (1983) revealed that RTAs have a substantial effect on trade movements between members. In contrast, studies by Bergstrand (1985) and Frankel, Stein, and Wei (1995) inferred that the effect is comparatively not so significant.

Over the years, numerous studies have been conducted in different regions of the globe, such as North America, East Asia, the Middle East, Africa, etc., to appraise the trade segments and economic approaches related to trade agreements. A notable attempt has been made to conduct studies on trade in RTAs based on interlinkages among core regional groupings (Cernat, 2001; Lindberg & Alvstam, 2007; Fugazza & Vanzetti, 2008; Francois & Wignaraja, 2009). These studies highlight capturing the trade gains and other welfare outcomes by developing closer integration and substantial reforms within RTAs to implement mutually acceptable trade strategies. However, such studies are not undertaken from the view of the agricultural trade of India.

The recent increase in regional trade agreements supports Prof. Jagdish Bhagwati's remark that regionalism will persist here for a longer period. In the last two decades, the trade strategies of India have realized a striking shift near regionalism. India's economic and trade policies in the 21st century have strongly emphasised RTAs, thereby constructively changing its approach to regional integration. India's perspective on RTAs has changed over time, driven by variables like the country's economic interests, indigenous industries, geopolitical circumstances, and other strategic considerations. During the period between 1998 and 2005 and, more specifically, after 2000, India was actively involved in negotiations to establish

RTAs with other countries and regional groups. India also became a constituent in the spreading wave of regionalism by gradually increasing its participation in the RTAs. Studies on India's RTAs were unable to explore the agricultural trade parameters most suitably.

Within the context of the present study, the literature in the following areas is reviewed: Regional trade agreements in general, agriculture and RTAs, the export competitiveness of agricultural products under RTAs, trade creation and trade diversion effects of RTAs, etc. The review focused on studies that are empirical in nature and mainly pertaining to agricultural trade. An effort is made to cover more recent literature on the topic.

2.2 Regional Trade Agreements (RTAs)

Lloyd and Maclaren (2004) provided a perspective review of the concepts of RTAs and verified factual evidence relating to the gains and losses of countries. It begins the examination by relating the predictions of trade theory with the gains and losses to member and non-member countries of liberalizing trade in goods preferentially by launching a FTA or a customs union. The study has underlined the attributes of the developing network of trade agreements and their impact on multilateral and unilateral methods of trade modernization. As a case study, they assessed the CGE modelling of the recently agreed FTA between Australia and the USA. Few general inferences are made about the pattern of agreements and reform initiatives in the directives of the WTO. The global trading system must develop measures to mitigate the effects of trade discrimination on third nations while also making RTAs more trade liberalising.

Dennis (2006) examined the latent contribution of RTAs and trade improvements in amplifying the prospects of the Middle East and North Africa (MENA) region. It is observed that both intra-regional integration and integration with the EU cause favourable influence on welfare status in the MENA region by applying the Global Trade Analysis Project

(GTAP) model and relevant database. This analysis emphasizes the significance of RTAs and trade facilitation improvements to welfare and GDP growth opportunities. The welfare advantages from EU integration are at least twice as large as those from intra-regional integration. These welfare benefits are perceived at least three times when the execution of the RTAs is supplemented with trade-enabling advances. With the current status of trade progress in the MENA region, significant trade improvements can be reaped by restructuring inconvenient customs procedures.

Egger et al. (2008) constructed a pragmatic approach to assess the impact of endogenic new RTA affiliation in shaping trade norms. The analysis gives some insight into the impact of endogenous RTA participation on intra-industry trade volumes within the OECD since 1970. Elements like factor endowments, country size, investment costs, etc., determine the chances of pioneering RTA presence. In a sample of country pairs, covering primarily the OECD economies, they identified a robust impact of endogenic RTAs on intra-industry trade in a difference-in-difference examination grounded on findings of matching techniques. The overall inference made from the findings is that the formerly identified RTA brought a rise in trade volumes, which can be accredited to a coupled growth in intra-industry trade, specifically in the developed economies. Eventually, they constructed an opinion that association in RTA may diminish inter-industry trade in relative and absolute terms. According to this study, trade progress within industries causes changes in trade volume.

The consequences of the formation of RTAs like ASEAN, NAFTA, EU, and MERCOSUR over India’s presence as a non-member country were investigated by Pant and Sadhukhan (2009). Their approach relies on calculating an RTA's income elasticities of import demand for some sensible period before and after the launch of an RTA. One unit of regression results directed that supply-side positive impacts are exclusively found with

MERCOSUR. India's exports increased in the post-RTA period due to the demand effect of rising GDPs in member countries (except for ASEAN). They disclosed that 'India's export to these groupings is possibly more affected by the demand factor but not due to the beginning of these RTAs, by controlling the non-RTA determinants that cause exports.

Park (2009) assessed the sustainability of East Asian regional trade agreements using a multi-country and multi-sector computable general equilibrium model. The study evaluates the likely impact of proposed East Asian RTA policies on East Asian economies and the global economy in terms of consumption, production, trade volume, and terms of trade effects. These approaches include (i) the ASEAN Free Trade Area (AFTA: a being-left-alone approach); (ii) an ASEAN Hub RTA (a hub-and-spoke type of overlapping RTA approach); (iii) the AFTA versus a China-Japan-Korea RTA (a duplicating or competing RTA approach); and (iv) an ASEAN+3 RTA (an expansionary RTA approach). We conclude that an expansionary ASEAN+3 RTA could be a sustainable policy choice because the members' profits would be notably positive, with more equally distributed gains amongst members than other methods. The effect on global well-being would be favourable, and the negative impact on non-members would be minimal. More intriguingly, if East Asian countries collaborate with Pacific Basin countries to construct an APEC-level RTA, the enlargement of the regional trade bloc may be seen as a more desirable policy choice for East Asian economies than the projected East Asian RTAs.

Baldwin and Seghezza (2010) attempted to study regionalism and trade blocs to explicate the linkages between Most Favoured Nation (MFN) and preferential tariffs by utilising the tariff-line data of 23 sizeable trading countries. They discovered that MFN and PTA tariffs are supplements and not replacements, as margins of preference for goods are inclined to either low or zero where high MFN duties are applied. According to one understanding,

regionalism is neither a strength nor a hindrance. Political-economic processes produce forces that impact the choice of MFN and PTA tariffs at the equivalent time. A third component, 'Sectoral conferred interests', a political consensus either for protection or liberal trade policies, contributes to the constructive association between duty proportions of MFN and PTA.

Freund and Ornelas (2010) conducted a literature survey on empirical and theoretical regionalism. Due to the discriminatory nature of these agreements, three major legitimate concerns have been raised: that the trade diversion would be widespread as a result of distinct interest groups pressuring governments to sign the most distortive agreements, that wider liberalization of external trade would stall or converse; and that the multilateralism may be undermined. Empirical evidence suggests that both broad trade diversion and stalled external liberalization have not occurred, whereas the undermining of multilateralism was inadequately explored. It is likely because countries "choose well" when adopting RTAs and adapt other trade policies to mitigate the distortions caused by discrimination. Several features of regionalism have received insufficient devotion from researchers despite their importance in understanding its sources and implications.

Kurihara (2011) studied the gravity model to assess the motives for international trade. This study eliminates the so-called constant hypothesis that ‘currency integration varies the amount of global trade between countries by forming the proportion constant’. It specifies that RTAs alter the slope of the interconnections between countries and thus boost global trade. The methodology spotlights that the share is not the same throughout. The constitutions of the concerned nations determine whether and how RTAs encourage bilateral trade. Also, the findings reveal that RTAs are more effective in encouraging global trade in OECD countries than non-OECD countries. The ultimate

suggestion is to confirm that RTAs do not threaten the trading system in the global arena, although the WTO can monitor them through political jurisdictive review procedures.

MacPhee & Sattayanuwat (2014) examined the effects of 12 key RTAs on intra- and extra-regional trade movements in developing nations, including both intra-RTA trade and the effect of RTAs on non-member trade, over the period 1981-2008. The study has dealt with and overcome statistical issues resulting from logarithms, zero observations, and heteroskedasticity. The regression results do not support regional integration as an alternative for multilateral trade liberalisation (with some exceptions). Several RTAs were unable to develop intra-block trade creation. This is basically due to a failure to abolish many tariffs and non-tariff obstacles for imports from member countries. Seven of the twelve RTAs cause import trade diversion, but most extra-bloc export dummies are statistically insignificant. Nevertheless, three of the five RTAs of Africa in the illustration enhanced intra-bloc trade. The disparities in RTA performance are connected to their executed policies.

Ghoshal (2015) studied the causal relationship between trade and growth in India, focusing on the impact of several trade agreements on this relationship. This study has extensively examined the effects of RTAs, FTAs, and PTAs on economies. The purpose of the study is to determine whether the enforcement of the agreements has had a significant (positive or negative) impact on trade and growth in India. The ANOVA findings supported the idea that the trade agreements had altered the expected correlation between exports and GDP in India. The findings exhibit that the exports caused growth before India joined the trade agreements, but that growth did not cause export formation. However, after the implementation of trade agreements, the causality has been observed to run in the opposite direction, and the link has been seen to strengthen. Exports also clearly caused growth before trade agreements were

implemented, but their impact on growth was insignificant. GDP caused exports after trade agreements came into force, and the relationship is statistically significant and negative (an increase in GDP led to a decrease in exports).

A study by Liu (2016) examines the growth consequences of RTAs, considering RTA countries' involvement in the World Trade Organization (WTO). Assuming smaller RTA preference margins for WTO members than non-members, the model presents that RTAs have a more extensive growth effect for non-WTO members than for WTO members. Based on an inclusive set of 270 RTAs and an extensive panel data set from 1960 to 2007, the regression estimates reveal that RTAs stimulate growth for non-WTO members, while their growth effect for WTO members is more negligible and often insignificantly different from zero. This means that RTAs and the WTO have limited complementarity.

Kaushal (2022) studied the contribution of RTAs in influencing India’s export efficiency by applying the gravity model’s stochastic frontier version. The study estimated the effects of certain selected RTAs and the governing ability of a companion country on India's export efficiency during 2008–2018. The results recommend that India was markedly able to accomplish export efficiency to its trading nations under FTAs such as ASEAN & SAFTA and bilateral agreements in contrast to PTAs like MERCOSUR & APTA; yet, India’s exports remain distant from the prospective frontier. Apart from APTA, the remaining agreements were statistically significant, showing that trade agreement membership raises India’s export efficiency. The findings also show that distance has an insignificant impact on India's export efficiency. According to this study, the monitoring superiority of importing countries has a considerable beneficial impact on India's export efficiency. This emphasizes the worth of solid institutions and improved governing ability in acquiring a level of latent exports with partner countries.

2.3 Agriculture within RTAs

Grant and Lambert (2008) broadly examined the trade movement consequences of RTAs utilizing the gravity methodology. The usage of aggregate data in trade is an outstanding attribute identical to previous studies. The results exhibit that the WTO has encouraged improvement in liberalizing manufacturing (non-agriculture) trade over trade in agriculture. Study shows that RTA consequences on partners' trade essentially depend on whether the examination emphasizes agricultural or non-agricultural sectors, using new improvements in the gravity model. Rendering to the findings, the remarkable policy suggestion is the scope for nations to liberalize RTAs and upsurge members' trade in agriculture since the GATT or WTO could not make an essential advancement in agriculture.

Cissokho et al. (2013) estimated a unit-elastic structural gravity model of agricultural trade for the Economic Community of West African States (ECOWAS). This RTA has eliminated tariffs on agricultural trade among its members to determine if non-tariff barriers (NTBs) are stifling trade in this sector. Data from 135 nations for the years 2000, 2003, and 2006 is applied with Tobit and other forms of structural specification. A firm conclusion emerges: agricultural trade between ECOWAS countries is substantial. While this certainly does not rule out the existence of NTBs within ECOWAS, it suggests that the impact of such barriers on agricultural trade within the bloc is less severe than elsewhere. Results for COMESA and the South African Development Community (SADC) are consistent with these hypotheses. This indicates that African governments are not opposed to agricultural trading, and regional traders have successfully capitalized on trade opportunities.

Nin-Pratt and Diao (2014) evaluated the impact of a FTA on agriculture among allying member nations of the Southern African Development Community (SADC). Findings exhibit negative welfare outcomes for regional importers due to the rise in imports from

incompetent regional producers, who are the prime gainers from this agreement. The results showed that exports of products such as cotton, beer, leather, oilseed cakes, rice, tea, cigarettes, malt, oilseed cake, meal, refined sugar, and wheat flour produce more considerable advantages to exporting countries. The SADC domain can increase paybacks by executing regional strategies beyond trade provisions like enhancing investment, the productivity of agricultural goods, and the diversification of products.

Ashish and Kannan (2015) evaluated the revealed comparative advantage (RCA) in agro-processed products of India. The study assessed the structure of India's comparative advantage and its change between 2003 to 2013. The pattern of commodity aggregation is adopted from the World Integrated Trade Solution (WITS) to analyse objectives. Correspondingly, 116 agro-processed products were grouped into three main categories: processed animals, vegetables, and food products. The four variants of the RCA index were applied to find the products with the comparative advantage to exports. Careful examination of the Revealed Comparative Advantage (RCA) index showed that India's RCA in processed animal products and processed vegetable products has somewhat weakened during the studied period. The study has suggested practical implications for policymakers, producers, and traders to identify the most relevant agro-processed products to export that have exhibited the utmost advantage in the global market.

Bhasin and Manocha (2015) examined the analytical impact of only two RTAs, SAFTA and APTA, on India's agricultural exports by applying a gravity framework to data from 2001 to 2013 to record India's agricultural exports with 16 economies of Asia. Variables such as exporter-importer labour participation ratio, trade openness of importing countries, and taste differential were encompassed in the model, along with the traditional determinants of gravity (economic size and distance). The results mention that Indian agricultural exports

are favorably affected by the above factors with the membership of RTAs. The impact of India's membership in APTA is positive and significant. At the same time, in the context of SAFTA, it is acknowledged as 'positive but insignificant' for agricultural exports of India.

Saxena et al. (2015) assessed the design and movement of trade among the economies of SAARC. The study disclosed that concerning agricultural trade, India counts for 74 % of the exports from the SAARC and 55 % of the region's imports. Cereals, cotton, tea, beverages, and fish & crustaceans were the most extensive exported products, enumerating more than 50 % of exports to the global hub from SAARC nations. In contrast, animal or vegetable fat, rubber, and cotton were the largely imported products by SAARC. Agricultural GDP and agricultural exports exhibit a one-way causal relationship. This specifies that the growth of agricultural exports was instrumental to India's comprehensive agricultural growth. The findings have recommended that the policy environment of Indian trade should be more supportive to improve the global competitiveness of India's exports and attract international buyers.

Hndi et al. (2016) studied the impact of FTA on agricultural trade flow in general and particularly on products such as vegetables, meat, live animals, dairy, and sugar. This study has estimated the gravity model by collecting panel data. The study concentrates on selected nations of North Africa (Algeria, Morocco, Egypt, and Tunisia) as reporting nations and the remaining world as partner nations. The estimation is conducted for aggregate and disaggregated trade flow in agriculture and trade agreements. Consequently, the study reveals that FTA membership is positively related to aggregate agricultural trade flow. The disaggregated data of trade flow highlights that the trade agreement mainly affects commodities like live animals and vegetables. The countries have begun exporting products such as dairy and vegetables because of the established trade agreement. Disaggregate

agriculture does not uphold a similar relationship. Vegetable trade movement is positively determined by FTA, whereas trade of live animals is negatively affected by FTA.

Huchet-Bourdon et al. (2016) evaluated the impacts of RTAs on trade in agriculture, focusing on the contribution from rules of origin (RO). The study distinguishes between trade in raw agricultural goods and processed food products by employing a gravity model for a sample of 180 nations over four time periods: 2001, 2004, 2007, and 2011. The estimation results internationally assist a meaningful non-linear impact of RTAs, its positive effect on trade between members declining with the extent of restrictiveness of included RO. Their results imply that the food products trade is more sensitive to RTAs than the agricultural products trade and RO matters concerning the trade consequences of RTAs.

Jean and Bureau (2016) assessed the trade effect of RTAs by applying the panel data method at a particular product level. This method is vigorous to endogeneity and heterogeneity across agreements and commodities and distinguishes between the outcomes of tariff and non-tariff arrangements. The study obtains the 74 nations' pairs of agricultural and food products connected by a treaty implemented from 1998–2009. Counterfactual simulations recommend that RTAs have enhanced bilateral agricultural and food exports of partners via an average of 30–40 % through marked heterogeneity across trade agreements. Similarly, RTAs are expected to increase the chances of exporting the commodity to a partner nation with a marginal impact. The findings revealed that non-tariff rules have no quantifiable trade impact. Manufacturing products reveal more sensitivity than agricultural and food products to non-tariff provisions.

Ghazalian (2017) examined the effects of the North American Free Trade Agreement (NAFTA) and its precursor, the Canada-United States Free Trade Agreement (CUSFTA), on agricultural trade movements at disaggregated product groupings. The pragmatic method

is implemented by gravity models utilizing various econometric techniques. The estimation of the NAFTA/CUSFTA trade consequences considers the baseline NAFTA/CUSFTA-unrelated dimensions of trade between member nations. The standard estimates reveal extensive differences across agricultural product groupings. To some extent, the net post-NAFTA/CUSFTA magnitudes of trade among member nations have highlighted missing prospects within regional trade. Furthermore, the empirical study estimates the NAFTA/CUSFTA trade consequences through the period and a bilateral trading association, revealing significant variations.

Pandey and Choubey (2019) evaluated the diversity in agricultural trade between India and ASEAN countries, considering the relevance of trade associations between ASEAN and India. The research has incorporated HS-2-digit codes to classify the agricultural commodities appearing in 01-24 chapters. In the study, the time series data in trade is applied from 2001 to 2015. Proportions of India's trade with ASEAN relative to the world have been calculated to identify the significance of ASEAN being a vital trading partner. It is evident from the analysis that imports of India from ASEAN are larger than its export during the studied period. A Simpsons Diversity Index has been employed to find the scope and extent of diversification in agricultural trade between the two trading allies. The results inferred that exports of Indian agricultural products are relatively diversified with ASEAN compared to India's imports. The result proposes the existence of stability in agricultural export revenues of India from grouping ASEAN, which can promote Economic growth in the long run.

Ratna et al. (2021) studied the issues of agriculture within the FTAs of India. They provided a broad assessment of its commitments by evaluating the trade performance of India's agriculture over the years. The research imparts an overview of the WTO's Agreement on

Agriculture (AoA) and the difficulties confronting Indian agriculture under its many aspects. It examines crucial concerns for the agriculture sector of India, such as market import surges, price support, food security, and special and differential treatment (S&DT) at the WTO, and provides valuable understanding from negotiations. The study recommends that Indian farmers should have a level playing field in agricultural trade at the regional and multilateral levels.

He (2022) examined the influence of RTAs on agricultural producer protection in excluded countries. The study measures the causal impact of an average trading partner's import share from its RTA members. The preferential import share is based on the excluded nations' nominal rate of assistance (NRA) to agricultural producers. The empirical examination is based on a panel dataset that spans 54 agricultural products and 88 nations from 1986 to 2018. The consequences are more significant and more severe for net-importing countries than net-exporting countries. According to the results of a heterogeneity analysis, developed nations lessen protection for more protected and subsidized producers, while developing countries decrease protection for less protected and taxed producers. These findings imply that it is critical for farmers in developing countries to offer complementary mitigation plans to compensate for the diminished protection caused by the creation of RTAs with their partners.

2.4 Export Competitiveness of Agricultural Products

Bojnec and Fertő (2016) used the revealed comparative advantage (RCA) index to examine the levels and compositions of export competitiveness of differentiated fruit and vegetable products. A hypothesis is tested regarding the duration and likelihood of long-term survival of persistent export competitiveness. The study examines the export competitiveness of European Union (EU-27) member states' fruit and vegetable products in worldwide markets

from 2000-2011. The majority of the EU-27 member countries experienced comparative disadvantages in the international markets for fruit and vegetable products. The results exhibit that most EU-27 member countries' horticulture export specialty is still heavily reliant on the Mediterranean and Black Sea climatic situations and natural factor endowments. Netherlands and Spain outperformed the remaining EU-27 states in terms of revealed comparative advantages from 2000-2011.

Pawlak et al. (2016) attempted to discover the changes in agri-food products between the bilateral trading of the European Union (EU) and China and to assess mutual relations-ex post competitive advantages of leading groups of agri-food products from 2008-2015. For this research, the data is collected from the Statistical Office of the EU (Eurostat). The examination viewed the value, shares in total trade, trade balance, and commodity structure of trade in agri-food products between China and the EU. Chosen indices of revealed comparative advantage (XRCA, MRCA, RTA), Specialization Indicators (SI), Coverage Ratios (CR), and the Intra-Industry Trade (IIT) were evaluated for major commodity groups of the Combined Nomenclature. It was concluded that bilateral trade in agri-food commodities between the EU and China expanded significantly between 2008 and 2015, transforming the EU from an importer to a net exporter. Although their mutual trade has intensified, China's contribution to EU agri-food exports has prevailed relatively small. The Chinese agri-food sector is yet in the phase of a factor-driven economy. In contrast, the agriculture and food industry in the EU nations has moved to the phase of an innovation-driven economy.

Renjini and Kar (2016) examined the current state, intensity, composition, and competitiveness of agricultural trade between India and the ASEAN from 1995 to 2014. The Trade Intensity Index (TII) measure was established to determine the strength of India's

trading relationship with ASEAN. Compared to Cambodia, Brunei, and Laos, India maintained a higher agricultural trade intensity with Malaysia, Indonesia, Vietnam, Thailand, and Myanmar. India exports more than 10% of its agricultural products to the ASEAN region, while 30%–40 % of India's agricultural imports come from the ASEAN region, in comparison to the rest of the world. India accomplished competitiveness in spices, rice, marine products, and oilcake meals more than Australia, China, and the USA, which are the ASEAN's significant agricultural exporters considered for the study.

Suresh and Mathur (2016) examined the trend in agricultural product exports from India, the changes in the comparative advantage, the agricultural export scenario of India witnessed over the last decade, and possibilities for further increasing agricultural exports. Differential trend growth has led to shifts in export composition. The study reveals that the share of exports of cereals, guar gum & other resins, spices, cotton, and sugar has increased significantly. Conversely, the share has reduced in some notable commodities such as fish & marine products, fruits & nuts, and coffee & tea. The research also examined India's comparative advantage using the revealed comparative advantage (RCA) technique. For products like cotton, maize, and certain fruits and vegetables, the RCA has improved over time but deteriorated for some spices, wheat, and rice. India is slowly losing its competitive advantage in plantation-based spices and other commodities, primarily to Asian nations. The study identified the growth in total factor productivity (TFP) as a potential yield-improving factor that would generate exportable surpluses, thus boosting exports of India.

Irena et al. (2017) examined Russia's position in the worldwide market for agricultural products and foodstuffs, focusing on the comparative advantage of Russian agricultural exports compared to certain areas and states. The key objective of the study is to categorize the most critical changes in the structure of Russian agricultural exports. The results revealed

that the structure of Russian trade is constantly altering and evolving along with the development of economic transformation and trade liberalization. Throughout the studied period, some items' competitiveness (sunflower oil, wheat) improved while others (sunflower seeds, furs, and hides) deteriorated. Exports become less diverse and more concentrated in a few segments. Cereals, seafood, and vegetable oils are the categories of Russian exports that are becoming more important in comparative advantages. The Russian exports' comparative advantages are boosting, particularly in Asian, African, and CIS countries.

Jagdambe (2019) examined the global competitiveness of Indian agricultural products. For the period between 1996-2015, four indices of revealed comparative advantage (RCA) were utilized at the four-digit level of the harmonized system (HS) classification. For live animal products, 7 of the 26 products exhibited RCA. 21 of 58 commodities exhibited strong RCA for vegetable products. Likewise, RCA was expressed by two among 16 animal or vegetable fat and nine among 49 prepared foodstuff products. During the study period, it was identified that India lost its comparative advantage in global markets for vegetable products, animal or vegetable fat products, and prepared foodstuff products. Furthermore, the consistency tests show that the indices perform less satisfactorily as cardinal and dichotomous measures but more satisfactorily as ordinal measures. As a result, this study presented an ordinal interpretation of RCA's implications for superior policy development. The study also discovered that the pattern of RCA indices has remained relatively steady throughout the refereed period.

Matkovski et al. (2019) estimated the level of competitiveness of agri-food products in South East European (SEE) nations as part of the European Union (EU) and regional integration processes, as well as the determinants that influence agri-food competitiveness. The revealed

comparative advantages (RCAs) index is utilised in this study to decide the extent of the comparative advantage of agri-food items. A model for analyzing the factors of SEE agri-food comparative advantage was also established and estimated. The findings reveal that all SEE nations (excluding Albania) enjoy comparative advantages in the agri-food sector as part of the international market. Furthermore, the model's estimation demonstrates that partial productivity in agriculture has a favorable effect on comparative advantage, whereas GDP per capita has a negative effect. With reference to SEE countries, the research will assist policymakers in recognizing those factors that can improve or worsen the competitiveness of the agri-food sector.

Nabi and Kaur (2019) estimated the Revealed Comparative Advantage (RCA) and the Revealed Symmetric Comparative Advantage (RSCA) of the Indian agriculture sector about the top five agricultural exporting countries: the United States, the United Kingdom, the United Arab Emirates, Singapore, and China. Based on data from the Standard International Trade Classification (SITC-1), the study assessed the structure of comparative advantage from 1995 to 2017. The indices disclose the comparative advantage in an inclusive range of products, including fish and fish preparations, sugar and sugar preparations, fruits and vegetables, timber, lumber, miscellaneous food goods, and cork. The increasing global demand for exports, followed by the competitiveness of Indian exports, had a significant impact on export performance.

Szczepaniak (2019) evaluated the trade competitiveness of Poland’s food products by applying comparative advantages (relative). The methodology of comparative advantages is based on the relative trade advantage (RTA) index and the Lafay trade balance (TBI) index from 2004–2017. The data was assembled from the WITS - Comtrade trading database, and the analysis was conducted at the HS chapter level. The comparative advantages analysis in

the Polish trade in food products revealed that Poland had relative 'comparative advantages' in food trade on the global market throughout its membership in the European Union. Between 2004 and 2017, Polish agri-food exports increased by more than 4.5 times, and the positive trade balance in these products improved by more than 9.0 times. Products with comparative trade advantages accounted for 55.5% of Poland's agri-food industry in the global market in 2017, a 12.8% increase from the year of Poland's acceptance in the EU. The dynamic expansion of food product trade after Poland participated in the EU and its strong comparative advantages in food product trade proves the competitiveness and utmost relevance of the Polish food sector to the national economy.

Erdem (2020) discovered the competitiveness of the global dried sector for some chosen products, namely dried apples, apricots, prunes, figs, and grapes. The data have undergone the techniques of the Revealed Comparative Advantage (RCA), Relative Export Advantage (RXA), Relative Import Advantage (RMA), Relative Trade Advantage (RTA), and Relative Competitiveness (RC) indices. To determine the economic perspective for the global dry sector, data from 2007 to 2017 were compared for China, the United States, Chile, Germany, Netherlands, Iran, South Africa, France, Argentina, Uzbekistan, Spain, Turkey, and India, as these countries dominate the sector of selected dried agricultural commodities. The findings indicated that the global dry sector is sensitive to economic crises and domestic currency rates. In 2007, the RCA index for Turkey was 4.66; amid the global economic crisis, it fell to 4.45 by 2009. Another critical point occurred in 2013 when Turkey experienced political and economic difficulties. The research draws a policy implication that, while Turkey still has comparative and competitive advantages in the dried sector, with developing market changes, Turkey requires more investments and knowledge transfer to producers.

Fayaz and Ahmed (2020) examined the performance of India's fisheries exports by applying techniques such as revealed comparative advantage (RCA), revealed symmetric comparative advantage (RSCA), and the constant market share (CMS) analysis from 1980–2016. Data on fish, crustaceans, and mollusk exports were obtained from UN Comtrade. Indian fisheries exports have exhibited a positive trend of comparative advantage in all markets studied by RCA and RSCA. However, CMS findings reveal that, for most markets, competitiveness was the most important driving factor of change in market shares of India's fish exports throughout the study period. Trade reforms during the 1990s appear to have aided Indian fish exports even further. However, there is a high risk of losing comparative advantage because trade measures have streamlined this sector and made it more competitive in global markets.

Mizik et al. (2020) evaluated the agri-food export competitiveness patterns of the Association of Southeast Asian Nations (ASEAN). The study sought to ascertain whether ASEAN countries and goods are more competitive in agri-food trade, whether raw materials or processed products are more competitive, whether regional or global agri-food trading is more competitive, and how persistent competitiveness has been over the years. The research is based on ASEAN–ASEAN and ASEAN–world agri-food trade movements from 2010 to 2018, revealing international and regional competitiveness patterns. Findings exhibited that Myanmar, Laos, and the Philippines have the uppermost levels of agri-food trade competitiveness in the global market. Laos, Cambodia, and Myanmar are the most competitive in regional markets. Raw materials and processed products are typically competitive; regional trade was more competitive for many countries than global trade. The results, however, indicate a general diminishing trend in maintaining these competitive positions, verified by the duration tests.

Singh et al. (2020) studied numerous agricultural products' growth trends, variability, and trade specification coefficient index. The methods of compound growth trend, coefficient of variation, revealed comparative advantage (RCA), Revealed symmetric comparative advantage (RSCA), Revealed competitive advantage (RC), and trade specification coefficient (TSC) were applied to examine the objectives of the research. Growth trend analysis for the value of export and import reveals that, except for jute hessian and guar gum meal imports, all agricultural products showed a positive trend with considerable inter-annual variability during the study period. The TSC analysis recommends that exports exceed imports' value for all crops except pulses, fresh fruits, vegetable oils, cashews, cocoa products, and raw jute. The analysis of the export competitiveness of spices disclosed a conducive competitive scenario. At the same time, the export-import balance declined slightly from the high dominance of export over import.

Ahmad et al. (2021) evaluated the export competitiveness of Pakistan's foremost fruits and vegetables during 2001-2018 by utilising Balassa's index of revealed comparative advantage (RCA) and its extensions. The research assessed the presence and pattern of comparative advantage and compared the sectors with low and high comparative advantage. The findings indicated that citrus, dates, and mangoes had revealed a comparative advantage. Potatoes and onions have displayed both revealed comparative advantages and disadvantages. The presence of comparative advantage underscores the substantial export potential of fruits and vegetables from Pakistan. Exploiting this potential can considerably contribute to increasing exports and foreign exchange gains, creating employment opportunities, and reducing the country's trade deficit. The study proposes investing in research and development to find innovative strategies to improve production and quality and reduce post-harvest losses to strengthen the export competitiveness of fruits and

vegetables. Likewise, value chain and infrastructure development are required to boost Pakistan's export competitiveness in fruits and vegetables.

Bhatia et al. (2021) determined the growth and output model of agricultural exports from India from 2000-2019. Data is examined by applying techniques such as growth rates and RCA. Export of principal agricultural products, including rice, wheat, cotton, sugar, fruits, and vegetables, is 'free'. In contrast, the export of some pulses and edible vegetable oil is 'restricted' to satisfy the domestic demand. The findings revealed that while Indian agricultural exports increased, the proportion of agricultural exports to the nation's total exports declined. Additionally, the study investigates the changing behavior of commodity allocation to the total agricultural export basket. It covers the main agricultural products or crops that contribute the maximum to agricultural exports throughout various periods. Throughout the duration of the study, the balance of trade in agricultural goods has remained positive; there is an increasing trend in the balance of trade. The study discovered a marginal increase in the share of agricultural imports in total imports and a steady surge in the share of agricultural exports among total exports in India from 2000 to 2019, owing to low commodity prices and surplus in the international market.

Long (2021) assessed the global competitiveness of China through six representative agricultural products, i.e., live pigs, live cattle, live chickens, tea, apples, and beer. The changing trends of these products' competitiveness are examined from 1994–2013 by applying the trade competitiveness (TC) index and revealed comparative advantage (RCA) index. The results exhibit that the export competitiveness of tea and live pigs is relatively strong, the competitiveness of live cattle is relatively weak, and the competitiveness of other agricultural products lies between them. Agricultural commodities like tea and live pigs have distinctive regional features. Overall findings highlight the weakening trend in the export

competitiveness of China's agricultural products. China should strongly endorse the production and foreign trade in conventional agricultural products with distinguishing regional features. It is required to reduce export costs, fast-track agricultural technological innovation, and implement agricultural policy support to strengthen the export competitiveness of agricultural products along with sustainable agricultural development.

2.5 Trade Creation & Trade Diversion

Koo et al. (2006) evaluated the impact of preferential regional trade agreements (RPTA) on trade in agriculture by applying a gravity model. The study emphasizes the benefits accumulating to member countries (trade creation) and the negative effect on non-member countries (trade diversion). The inclusive effects of RPTA are positive and significant, signifying that RPTAs generally raise trade value among member countries via inter- and intra-industry trade. The trade creation consequences of NAFTA were not significant, probably due to the existing vibrant trade relationship among these countries as an outcome of their proximity. The overall trade-diverting effect was positive, indicating that RPTAs do not relocate agricultural trade with non-member nations. The potential cause for this result is that the trade-creating effect of RPTAs could increase overall demand to a level where the income effect offsets the trade-diversion effect of the agreements. Although the benefits of RPTAs are larger for member countries than for non-members, the findings of this study specify that RPTAs are not detrimental to non-member countries. This recommends that RPTA expand global welfare by enhancing agricultural trade volume among member nations and, to a lesser extent, among non-member nations. Overall, this study states that RPTA is welfare-enhancing for member and non-member nations regarding agriculture.

Susanto et al. (2007) investigated the trade creation and trade diversion effects between the United States and Mexico in the North American Free Trade Agreement (NAFTA). This

study utilised panel data of 35 selected 4-digit HTS levels from 1989 to 2005 to estimate U.S. agricultural import demand functions from both Mexico and the rest of the world (ROW). The results imply that tariff rate reductions given to Mexican products influenced agricultural imports into the United States. A one-percentage-point reduction in tariff rates is related to a 5.31% rise in agricultural imports from Mexico in the initial six years of NAFTA and a 2.62% rise in the last six years of NAFTA. The pre-NAFTA tariff rates have also affected US imports from Mexico. The findings showed that agricultural imports from Mexico were around 54% higher during NAFTA than over the entire time. In contrast, imports from ROW were not significantly more remarkable due to NAFTA. The results show that the United States and Mexico under NAFTA have led to trade creation rather than trade diversification.

Jayasinghe and Sarker (2008) examined the effects of the North American Free Trade Agreement (NAFTA) on trade in six significant agri-food items from 1985 to 2000. These six commodities, namely red meat, vegetables, fruits, grains, sugar, and oilseeds, were chosen because of their prominence in NAFTA countries' production, consumption, and trading. The study attempts to make a value-added contribution to the discussion over the viability of growing RTAs. Using a consolidated data set and a least squares approach, the study constructs a more comprehensive gravity model. While the exact magnitude of the trade creation and trade diversion effects cannot be determined, the study does shed light on their existence. The finding demonstrates that NAFTA trade has supplanted that of the rest of the world and that intraregional trade within NAFTA is rising. While NAFTA has increased trade among its members, it hampered trade openness with countries outside the pact.

Kandogan (2008) measured the trade creation and diversion effects of the PTAs in the Euro-Mediterranean region by developing a modified triple-indexed gravity model. The methodology for identifying trade creation and diversion effects is based on analyzing changes in error terms for various import components for member and non-member nations of groups. The gravity model is applied to various components of imports since the welfare effects of each component are expected to differ. The research uses these measures to explore the validation for the Natural Trade Partners Theory utilizing three descriptions of natural partners. When geographical distance or preliminary trade volumes are employed to define naturalness, only intra-industry components support the idea. Robust support is observed when complementarity is employed to find natural partners.

Korinek and Melatos (2009) evaluated the agricultural trade impact of three RTAs – the ASEAN Free Trade Agreement (AFTA), the Common Market for Eastern and Southern Africa (COMESA), and the Southern Common Market (MERCOSUR). The findings of the applied gravity model recommend that the establishment of AFTA, COMESA, and MERCOSUR has enhanced agricultural trade amongst its member countries. There is no reliable indication of trade diversion regarding imports from outside the region. Transport and logistics costs are significant variables in determining agricultural trade movements. In some RTAs, nations with a comparative advantage in exporting numerous of the same agricultural products have a lower impact on preferential market access. All RTAs evaluated in the study favor trade creation because trade obstacles drastically decrease within a group of countries. Some major implications for South-South RTAs are drawn by examining these typical agreements.

Lambert and McKoy (2009) applied the gravity model to isolate the worldwide impact of many PTAs on intra- and extra-bloc agricultural and food product trade for 1995, 2000, and

2004. The study validates whether PTA membership creates or diverts agricultural and food trade by analyzing the elements influencing cross-country agricultural and food trade consistency with the intermediate agricultural product and food markets. The findings of the research significantly support the benefits of PTAs in terms of enhanced intra-bloc trade in both sectors. According to the study, a considerable association exists between global competitiveness in export markets and a country's economic variety and progress. Results also provide the phenomenon of trade creation in agricultural products. Similarly, PTA membership was related to food trade creation in many cases, although divergence was found for various associations constituted basically of developing countries.

Sun and Reed (2010) assessed the effects of the most prominent FTAs on agricultural trade creation and diversion. The impacts of trade formation and diversion are estimated by applying a Poisson Pseudo-Maximum-Likelihood (PPML) estimator with several fixed effects to account for heteroskedasticity and zero trade observations. The analysis concludes that PPML estimation is preferable to OLS estimation, and the estimated effects of FTAs differ when zero trade observations are evaluated. The ASEAN-China preferential trade deal, as well as the EU-15, EU-25, and Southern African Development Community agreements, have resulted in significant growth in agricultural trade among their respective members. The research suggests that the WTO should make structural adjustments to lower agricultural tariffs to realize the gains of international free trade.

Urata and Okabe (2014) evaluated the effects of RTAs on trade flows, emphasizing their trade creation and diversion. The study has estimated the gravity equation spanning 67 countries or regions from 1980 to 2006 at a disaggregated level of 20 commodities. The fixed effects, PPML estimator was used in this estimation to address the issues of endogeneity bias and zero trade flows. The research discovered that the influence of RTAs

on trade movements varies depending on the product and the type of RTA. When comparing customs unions (CUs) to FTAs, the trade creation effect is observed for more products in CUs, while the trade diversion effect is found for fewer products in CUs. Furthermore, plurilateral RTAs generate trade for far more products than bilateral RTAs. Another conclusion is that RTAs between industrialized nations provide a trade creation effect for half of all products. In contrast, the trade diversion effect is found only for medical and pharmaceutical products. On the other hand, RTAs between poor nations result in trade diversion for many more products than RTAs between developed nations. As per these findings, ideal RTA characteristics promote the trade creation effect and diminish the trade diversion effect.

Nwali and Arene (2015) examined the impact of Economic Partnership Agreements (EPAs) on Agricultural trade between Nigeria and the European Union (EU). The technique of Smart simulation Computable Partial Equilibrium (CPE) was applied in the study to identify the patterns of Nigeria's imports, the potential import effects, the potential revenue effects, the potential welfare effects, and the sensitive products for the country under the trade agreements. International trade and protection data and built-in analytical tools for the research were accessed from the World Integrated Trade Solutions (WITS). The research on the country's import patterns revealed that Nigeria imported many of its agricultural products from the Rest of the World (ROW) and imported the same on a limited basis from the ECOWAS area. According to the findings of the potential import effect of EPAs, Nigeria will benefit $35330.1 million in "Trade Creation" and lose $14947.484 million in "Trade Diversion," for a total import effect of $50277.6 million. The potential tariff revenue effect resulted in a total possible tariff revenue loss of $16666.7 million to the country. The potential welfare effect resulted in expected welfare gains of $2238.8 million for consumers across all agricultural items evaluated. Based on criteria of volume and source, sensitive

product groups 3, 4, and 15 were acknowledged as potentially sensitive for the country and must be excluded from EPAs. It is also suggested that fiscal measures like VAT be placed on imported duty-free food products from the EU to prevent revenue loss from Nigeria.

Gaurav and Bharti (2019) studied the trade creation and trade diversion effects of three FTAs in Asia, specifically India–Japan CEPA (IJCEPA), India–Sri Lanka FTA (ISFTA), and India–Bhutan FTA (IBFTA). The fundamental purpose of this research is to examine three unusual FTAs, which comprise developing-developed, developing-developing, and developing-least developed countries. The study's principal aim is to assess the effects of these FTAs on exports and bring out lessons for contracting parties and other economies interested in entering FTAs that encourage trade liberalization. Apart from the FTA dummies, explanatory factors like GDP, geographical distance, population, exchange rate, adjacency, and common official language were used in this analysis. The study utilizes the augmented gravity model to capture the impacts of trade creation and diversion. The findings validate that ISFTA and IBFTA produce a trade creation effect, while the IJCEPA has a trade diversion. The results suggest that similar bilateral agreements can pave the way for global trade liberalization in the long run.

Using a gravity model, Ahcar-Olmos and Rodríguez-Barco (2020) estimated the impact of RTAs on bilateral exports while investigating the model's susceptibility to various specifications and approaches for observations spanning 1980-2018. RTAs have a significant positive impact. However, coefficients are systematically reduced when fixed effects are employed that fluctuate over time and between nation pairs. However, the RTA impact remains constant irrespective of approach or detail. There is considerable variation in the RTA impact ascribed to individual trade pacts. While many RTAs increase trade, others have insignificant or adverse effects. Individual RTA estimates are subjected to

robustness testing by presenting PPML time-invariant fixed effects, followed by country-pair and time-varying fixed effects estimates. As a result, 38.2% of RTAs are positive and significant in both parameters. Trade creation effects of RTAs tend to outweigh trade diversion consequences.

Jagdambe and Kannan (2020) evaluated the impact of trade creation and trade diversion on agricultural trade among the member nations due to the establishment of the ASEAN-India Free Trade Agreement (AIFTA). Data from 50 nations with five main FTAs were used between 2005 and 2014. The Poisson Pseudo-Maximum Likelihood (PPML) and ordinary least squares (OLS) techniques were used to estimate the gravity model. AIFTA, MERCOSUR, and the EU-15 are revealed to have a pure trade creation effect in the time-fixed effect model. According to the time and fixed effect model, AIFTA, NAFTA, and SAPTA exhibit greater trade creation impacts than trade diversion effects. OLS findings showed that a country's income and the flow of bilateral trade in agriculture are positively correlated. The effect of a common border and language was also statistically significant in all the models. According to the study, if both trading partners had a common language or border, they would likely trade more than they would with nations that lacked either.

Timsina and Culas (2020) applied the Poisson pseudo-maximum-likelihood (PPML) method to assess the agricultural trade creation and export diversion effects of Australia's FTAs at the aggregate and disaggregate levels. The analysis comprises 24 of Australia's largest trading partner countries, both FTA and non-FTA members, and spans 22 years, from 1996 to 2017. The heteroscedasticity robust regression error specification test (RESET) supports the superiority of PPML over the Ordinary Least Square (OLS) estimator. The results revealed that trade creation benefits in the agriculture sector are more significant between China and Australia, Korea and Australia, Australia and the United States, and Japan and

Australia. The variation in trade creation effects is estimated at the commodity level from the various trade agreements. The enactment of many trade agreements had the greatest impact on trade in sugar and wine among the examined commodities. Overall, trade creation outweighed export diversion caused by FTAs.

2.6 Summary of the Review of Literature

The review of literature envelopes the major studies that are acclaimed by the various researchers of the world who work in the domain of RTAs. By and large, these studies highlight the prospective contribution of RTAs in trade facilitation, interconnections between RTAs, tariffs, and growth, the pattern of agreements, and the requirement for future reforms in the RTA structure. It covers those studies highlighting the overall agricultural growth and the gradually changing pattern of agricultural trade among various RTAs. Many studies emphasise the potential gains and losses for countries involved in RTAs. Under the regime of RTAs, the trends in the movement of agricultural commodities are observed. Many RTA studies are of the opinion that RTAs' welfare agenda would gain a significant boost from a liberalized policy framework and tariff restructuring interventions. Most of these studies highlight the role that temporal and spatial components play in establishing the economic impact of RTAs.

Furthermore, the literature review considers studies that have revealed the export performance of selected agricultural commodities in the competitive environment of international markets. These studies have more extensively employed the Revealed Comparative Advantage (RCA) index over other measures. Some researchers have applied the same technique to study the agricultural export competitiveness of India with its trade partners by classifying the products with improved and weakened or poor comparative advantages.

Many noteworthy studies have exhibited the trade creation and trade diversion behavior of agricultural trade between various trading partners and regional groupings. Several significant inferences regarding the same have been made by employing the gravity model. Along with the empirical results, most of these studies make suggestions to attain trade creation concerning the agriculture trade. Such quantitative analyses are conducted among RTAs around various parts of the globe to understand the economic transformation regarding agricultural trade. After appraising the various studies regarding RTAs, the review of the literature has ultimately indicated the priority for essential research on agriculture trade for India's RTAs.

2.7 Research Gap in the Existing Literature

The treatment of agriculture within the rules and structure of RTAs has emerged as a central research topic in recent times. Agriculture has remained a sensitive sector for any developing nation (including India) due to its economic characteristics. The existing literature reveals that the scope of agricultural trade within the RTA framework has not been studied well. Studies pertinent to the agricultural trade of India within RTAs are insufficient. A recent analysis entwining such a wide range of trade agreements is somewhat lacking from India's agricultural trade perspective. Besides, coverage of the quantum of agricultural commodities with the disaggregated approach and substantial study duration is inadequate. The trends in agricultural trade and competitiveness of agricultural commodities under India's RTAs have not been covered in recent years.

The present study is one of the pioneering studies on various RTAs of India in the context of agricultural trade. No such study has taken on the comparative analysis of Pre-RTA and Post-RTA formation. Very few studies have used the RCA and gravity models to study various agricultural commodities in a RTA framework. The reviewed studies did not

consider multiple bilateral trade agreements simultaneously to examine the impact of RTAs on agriculture. An analysis of the pre-RTA and post-RTA effects is required to acquire more profound insights into the agricultural trade of India. The studies on the welfare effects of RTA on agriculture in general and studies on trade creation and trade diversion are scant, particularly in the Indian context. The present study is an attempt to fill the existing gap in the literature.

CHAPTER III

AGRICULTURE SECTOR AND INDIA'S REGIONAL TRADE AGREEMENTS

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3.1 Introduction

In the past, agricultural goods such as spices, textiles, and certain grains were commonly traded along historic trade routes like the Silk Road and the Spice Route (Adelson, 1960; Liu, 2010). Indigenous farming was severely affected during the colonial era. As a result of colonization, colonies exported cash crops like tobacco, cotton, sugar, etc., to their colonial rulers at the expense of local food production, which exacerbated social and economic inequalities. In the years following World War II, the General Agreement on Tariffs and Trade (GATT) in 1947 and later the World Trade Organization (WTO) in 1995 were established to facilitate the harmonization of trade regulations and the lowering of trade barriers.

Compared to manufactured commodities, which have gone through multiple rounds of liberalization, agriculture has traditionally been seen as a sensitive sector regarding trade policy restrictions and liberalisation. Indeed, the agricultural trade was only brought under the GATT regulations with the conclusion of the Uruguay Round of GATT in 1995, and it remains controversial in the context of the present Doha Development Agenda negotiations. Its cultural significance, role in territorial development, and economic, social, and political significance, especially in emerging nations, are only a few factors contributing to its unique status. As a result, governments' trade policy stance in RTA negotiations is not always based solely on pure economic efficiency grounds, and the agriculture sector is treated differently in RTAs compared to other goods.

Indian agriculture is pivotal because of its scale, diversity, and global food supply contribution. In the contemporary context, agricultural production in India is gradually shifting from conventional farming practices to cultivating horticultural crops and rearing livestock, including poultry, dairy, and fisheries (International Trade Administration, 2022). The transition has not only impacted domestic consumption but also India's agricultural trading patterns. Directorate General of Commercial Intelligence and Statistics (DGCI&S) preliminary data shows that agricultural exports increased by 19.92% in 2021-22, reaching $50.21 billion. In recent years, according to the Division of Agriculture Trade Policy, Promotion and Logistics Development of the Ministry of Agriculture & Farmers Welfare, Govt. of India (GOI, 2023), the top destinations for India's agricultural and allied exports are Bangladesh, the United States of America, China, Vietnam, Indonesia, the United Arab Emirates, Saudi Arabia, Malaysia, Egypt, Nepal, Sri Lanka, the Netherlands, Iran, Iraq, Japan, the United Kingdom, and Thailand. Similarly, India imports a wide variety of agricultural and allied products from countries including Indonesia, Malaysia, Argentina, Ukraine, Brazil, the United States of America, Nepal, Thailand, Myanmar, Afghanistan, Singapore, Tanzania, Vietnam, the United Arab Emirates, Bangladesh, Canada, China, Sri Lanka, the Netherlands, and Australia. According to the Food and Agricultural Organization (2019), India has expanded the variety of goods it exports, transitioning from conventional exports such as tea, coffee, and rice to a broader spectrum of items, including processed food and high-value fruits and vegetables.

According to the Trade Statistics Review 2020 of WTO, India's agricultural exports accounted for 2.07% of global agricultural trade in 2019, while its imports represented 1.46% (Kumar, 2021). India has effectively fostered export competitiveness in many specialized agriculture and related products, positioning itself as the ninth-largest exporter globally. In 2021, India achieved a global trade surplus of $11.8 billion, specifically in the

agriculture and related goods sector (International Trade Administration, 2022). The leading exports comprised Basmati rice, prawns, shrimp, carabeef, spices, and refined sugar. As per the report of the Press Information Bureau (2022), the agricultural trade has experienced notable expansion, with India emerging as a significant global provider of food and essential agricultural products, particularly during the COVID-19 epidemic. The robustness of agriculture exports is propelled by several commodities, including rice (both basmati and non-basmati), marine goods, wheat, spices, and sugar, among others. These commodities have contributed to the achievement of the highest-ever export volume of agricultural products in the fiscal year 2021-22. The export of marine products from India has had a significant surge in recent years, resulting in a substantial increase in its proportion relative to the overall agricultural exports, and its share has escalated from 14.5 percent in the fiscal year 2015-16 to 19 percent in the fiscal year 2019-20 (GOI, 2021).

3.2 Overview of Global Agricultural Trade

The rapid pace of globalization in the 21st century has significantly impacted agricultural trade. Rapidly falling transportation costs for bulky and perishable goods, the information and communication technology (ICT) revolution, and significant reductions in governmental distortions to agricultural trade have all contributed to this trend. These changes have altered global agrarian output, consumption, and trade patterns while simultaneously boosting economic growth and reducing extreme poverty worldwide. Agricultural trade on a global scale can also aid in food security by facilitating more equitable food distribution.

GATT and WTO have had a substantial impact on global agricultural commerce by lowering tariffs on agricultural products, standardizing sanitary and phytosanitary measures, resolving trade disputes over subsidies and dumping, and developing agriculture-specific agreements.

By lowering subsidies and providing support to the agricultural sector, the WTO's Agreement on Agriculture (AoA) intended to liberalize agricultural economic activities. The world's agricultural trading system has become more open and stable because of the efforts of the GATT and the WTO.

According to the report of the Food and Agricultural Organisation (2022), global agricultural exports in 2020 were worth 3.7 times as much as they were in 2000, and agriculture's share of total product trade value has enhanced from 6.3% in 2000 to 8.5% in 2020. In 2020, the export value of fresh fruits and vegetables was 22% of the overall value of food exports (excluding fish), followed by exports of grains and preparations (16%) and exports of meat and meat preparations (12%). Net food exports from the Americas are the highest, while net food imports from Asia are the highest. As of 2013, Europe was a net exporter of food. The top three exporters account for at least 30 percent of the worldwide export value among the primary traded commodities. The top exporters are also the top-producing countries in most circumstances. Due to the sheer magnitude of its home market, China is one of the world's leading importers of both cereals and meat.

The following tables, 3.1 and 3.2, explain the evolution of agricultural exports and imports in the world, respectively. The regions mentioned are Africa, Asia, CIS (Commonwealth of Independent States), Europe, the Middle East, North America, and South and Central America.

In Table 3.1, the value of African agricultural exports has increased steadily over the past two decades, from $13 billion in 2000 to $54 billion in 2020. From 2005 to 2010, there was dramatic growth. However, the rate of expansion has relatively lowered between 2010 and 2020. Agricultural exports from Asia have grown substantially, nearly quadrupling from $72 billion in 2000 to $314 billion in 2020. The growth rates experienced a rapid increase

between 2000 and 2010 for Asian exports. CIS agricultural exports have consistently increased over the years, with significant growth from $3 billion in 2000 to $35 billion in 2020. The export growth from the CIS region was noteworthy between 2000 and 2005, with the subsequent growth remaining strong but relatively slower. European agricultural exports have grown considerably from $85 billion in 2000 to $294 billion in 2020. Substantial growth occurred from 2000 to 2010, and the growth rate levelled out between 2010-2020.

Table 3.1 Region-wise Agricultural Exports

Region	Exports in 2000	Exports in 2005	Exports in 2010	Exports in 2015	Exports in 2020
Africa	13	22	40	51	54
Asia	72	111	212	278	314
CIS	3	7	13	22	35
Europe	85	135	201	246	294
Middle East	5	10	21	24	27
North America	81	100	174	211	243
South and Central America	42	76	142	167	190

Source: WTO (Value in U.S. Billion dollar)

As per Table 3.1, Exports from the regions of the Middle East and North America have also experienced consistent enlargement. The expansion of Middle Eastern countries' exports was relatively constant. However, the period spanning from 2000 to 2005 and 2005 to 2010 had remarkable growth, as exports experienced a twofold increase in both intervals. For North America, the most extensive rise occurred between 2005 and 2010. South and

Central America's exports have increased tremendously from 2000-2010, reaching $142 billion in 2010 from $42 billion in 2000. However, it is visible that agricultural exports of South and Central America have experienced slower growth in the period between 2010-2015 and 2015-2020. There is a general increasing trend in agricultural exports from almost every region from 2000 to 2020, which shows that the demand for agricultural products from these regions is snowballing on a global scale. Agricultural exports from Asia are consistently highest among the regions listed, followed by those from Europe and North America. Regions of Africa, the Middle East, and CIS have shown more stable export patterns.

Table 3.2 Region-wise Agricultural Imports

Region	Imports in 2000	Imports in 2005	Imports in 2010	Imports in 2015	Imports in 2020
Africa	17	28	57	69	77
Asia	99	144	271	369	454
CIS	10	20	41	38	41
Europe	98	152	212	235	259
Middle East	19	30	62	81	79
North America	64	98	138	185	214
South and Central America	19	24	46	57	62

Source: WTO (Value in U.S. Billion dollar)

According to the data presented in Table 3.2, Africa's agricultural imports have steadily increased over the years. Imports have almost tripled between 2000 and 2010, a period

during which growth was relatively more consistent. From 2010 to 2020, the growth rate decelerated in Africa. Asia's agricultural imports have increased profoundly, with exceptional growth between 2005-2010. From 2000 to 2020, imports increased by over fourfold. There were fluctuations in agricultural imports into the CIS region. There was consistent growth from 2000 to 2010, followed by a notable decline from 2010 to 2015. By 2020, imports in CIS had recovered to a level identical to that of 2010. European agricultural imports' growth rate was moderate compared to other regions. From 2005 to 2010, there was a substantial rise, while the growth rate slowed between 2010 and 2020.

In Table 3.2, the agricultural imports into the Middle East region increased significantly, particularly between 2005 and 2010. However, the growth has diminished considerably between 2010 and 2020, with a relatively negative rate from 2015-2020. North America and South and Central America also demonstrated a steady rise in agricultural imports. For North America, the period from 2000 to 2005 and 2005 to 2010 had a considerable expansion, as imports experienced an almost 50% increase in each interval. The increase between 2005 and 2010 was more prominent, with imports nearly doubling in South and Central America. Among the listed regions, Asia consistently imports the most agricultural products, followed by Europe and North America. However, Asia experiences greater fluctuations in imports over time. Import trends in the CIS and South and Central America are stable compared to other regions.

The regions of Europe and Asia-Pacific are known for sustaining highly active networks of RTAs (WTO, 2021). In general, the fluctuations in agricultural exports and imports could be attributed to changing economic circumstances, trade agreements, consumption patterns, and variations in demand for certain agricultural products. Factors such as a growing labor

force, advances in farming techniques, higher output, the possibility of new markets, etc., drive these trends.

3.3 Global Growth of RTAs

Over the past three decades, there has been a significant increase in the prevalence of regional trade agreements (RTAs), with the number of such accords rising from less than 50 in 1990 to over 350 now (WTO, 2023). Following the conclusion of World War II, the primary objective for most nations was to engage in economic reconstruction. Consequently, during the initial years that ensued, there was a notable absence of significant RTA activity. However, once the nations achieved stability, they began to direct their attention towards external affairs, resulting in the establishment of some of the earliest trade agreements. The rapid increase in the formation of RTAs can be attributed to various causes, encompassing economic benefits and market expansion (Krugman, 1991a), as well as geopolitical motivations (Mansfield & Milner, 2012).

The proliferation of RTAs may be classified into three waves within the conceptual framework. The first wave was instigated by the European Union, followed by the second wave, which saw the involvement of both the European Union and the United States. The third wave witnessed the participation of other players, including Asian countries. The first wave of regionalism may be traced back to the post-World War II era, a time marked by a heightened recognition of the necessity for economic cooperation. The European Coal and Steel Community, established in 1951, thereafter transformed into the European Economic Community (EEC) in 1957 and eventually developed into the European Union (EU). The establishment of the European Union (EU) established a significant precedent, enabling and promoting the extensive integration of economies among its member states. During this time, groups of developing countries in Africa, the Caribbean, and Central and

South America were inspired by the EEC to create their own regional sub-regional unions. This development served as a model for subsequent RTAs, providing a framework for their implementation and operation. Frenkel et al. (1997) claim that the European Union (EU) prompted other nations to contemplate regional integration as a feasible economic approach. This phenomenon activated a snowball effect, gaining momentum in successive waves.

The United States joined the EU as a major player in the second wave, which began in the 1980s and lasted into the 1990s. The United States signed an FTA with Israel in 1985 and Canada in 1988. The North American Free Trade Agreement (NAFTA) was established in early 1994. A new series of "developing-developing-country" trade agreements emerged during this time. Following the establishment of MERCOSUR in South America, efforts were initiated in Africa to establish the Common Market for Eastern and Southern Africa (COMESA), the East African Community (EAC), the Economic Community of West African States (ECOWAS), and the Southern African Development Community (SADC). This wave saw a shift in the forms of RTAs, with more comprehensive agreements that went beyond mere reductions in tariffs to include sectors such as services, investments, and intellectual property rights.

The third wave, which encompasses the period from the early 2000s to the present, is distinguished by the active participation of Asian economies. Throughout history, Asia has consistently advocated for the principles of multilateralism. However, in recent times, countries such as Japan, China, India, Singapore, and the Republic of Korea have emerged as dynamic contributors to RTAs. The Association of Southeast Asian Nations (ASEAN) expanded its reach by concluding FTAs with China, Japan, India, the Republic of Korea, as well as Australia and New Zealand. During this particular phase, RTAs had a significant expansion by incorporating non-traditional elements, such as labour rights, environmental

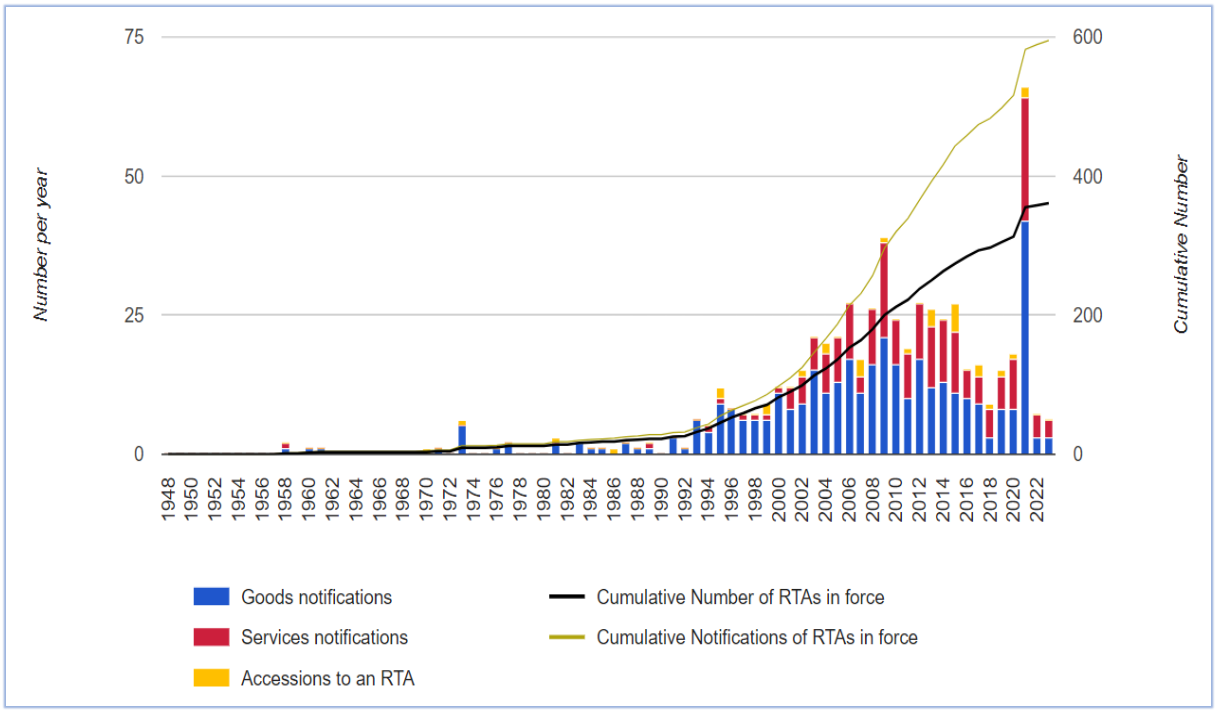
standards, and e-commerce. Additionally, it facilitated the implementation of more intricate and multi-faceted agreements such as the Regional Comprehensive Economic Partnership (RCEP) and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP). The inclusion of Asian economies in RTAs not only contributed to the overall increase in trade volume but also introduced novel perspectives and demands. The phenomenon was further amplified as the favourable outcomes of these agreements served as a catalyst for additional nations to participate in or reaffirm their steadfast commitment to the growth of RTAs.

As per the WTO terminology, the term "goods notifications" refers to the number of newly received notifications regarding trade agreements, with a specific focus on goods, throughout a given year. The services notifications indicate the total number of newly received notifications about trade agreements in services within a particular year. Accessions to an RTA refer to the number of new accessions made to pre-existing RTAs within a given year. The term "accession" refers to the process of formally joining or becoming a member of an existing trade agreement. The Cumulative Notifications of RTAs in force is the aggregate sum of all notifications pertaining to RTAs that have been implemented until the specified year. This includes both products and services within the scope of these agreements. The Cumulative Number of RTAs in force refers to the ongoing total of all RTAs that are currently effective as of the specified year.

Figure 3.1 presents a comprehensive overview of the evolution and changes observed in the growth of RTAs from 1948 to 2023 (Month of August). The time span, including 1948 to 1957, exhibits a lack of action regarding RTAs. The potential cause for this phenomenon can be attributed to the post-World War II era, as nations were primarily preoccupied with the reconstruction process rather than the establishment of trade agreements. The inaugural

occurrence of the RTA can be traced back to the year 1958, wherein a solitary notification was documented for both goods and services. By the year 1961, there existed a cumulative count of three RTAs. This can be considered as the beginning of structured global trade agreements. During the period from 1962 to 1980, there was a limited formation or revision of RTAs, resulting in relatively low cumulative figures. This can be attributed to the comparatively lower level of globalisation in trade during this period.

Figure 3.1 RTAs in Force, 1948-2023

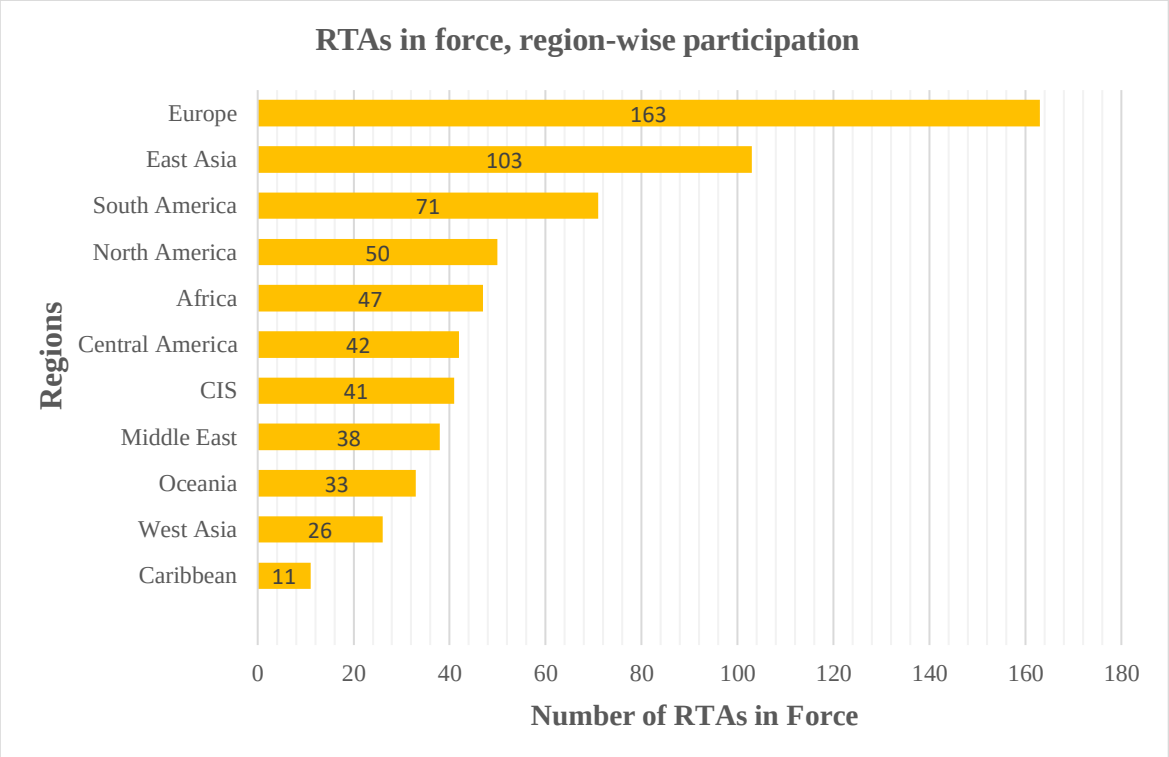


Source: WTO Secretariat (August, 2023)

During the period between the 1980s and early 1990s, there was a moderate rise in notifications pertaining to goods and services. However, a more significant increase was observed in the cumulative number of RTAs, which escalated from 14 in 1981 to 37 in 1994. This phenomenon may indicate the conclusion of the Cold War and the subsequent deregulation of economic boundaries. The period between 1995 and 2006 exhibits notable growth in various indicators, which aligns with the period characterised by globalisation and

advancements in technology. By 2006, there was a significant rise in the number of cumulative notices and RTAs in force, with 214 notifications and 153 RTAs compared to only 55 notifications and 45 RTAs in 1995. There was a noticeable decrease in RTAs between the years 2007 and 2015. Although the overall number of RTAs still exhibits an upward trend, the rate of increase has decelerated, potentially attributable to prevailing economic uncertainties. During the subsequent period from 2016 to the present, a notable annual shift took place in 2021, with the issuance of 42 notifications for goods and 22 service notifications. The notable surge in this phenomenon can be ascribed to various variables, including geopolitical realignments, trade conflicts, and worldwide happenings such as the COVID-19 pandemic impacting international trade policies.

Figure 3.2 Region-wise RTAs in Force



Source: WTO Secretariat (August, 2023)

Regional participation in RTAs also needs to be given the required attention. As per the World Trade Organisation database, till August 2023, the continent of Europe is involved in maximum RTAs region-wise. European countries have participated in 163 RTAs, followed by East Asia, which is engaged in 103 RTAs. These are the only two regions participating in more than one hundred RTAs. The countries from regions of South America and North America are signatories of 71 RTAs and 50 RTAs, respectively. The remaining regions are engaged in less than 50 RTAs (at an individual level). Countries of Africa are participants of 47 RTAs, followed by Central America with 42 RTAs, the Commonwealth of Independent States (CIS) with 41 RTAs, and the Middle East is engaged in 38 RTAs. The countries from the Oceania region are part of 33 RTAs, whereas the West Asia region is involved in only 26 RTAs. The region with the least participation in RTAs is the Caribbean, with 11 RTAs.

The complexity and number of RTAs have witnessed a sustained rise in the 21st century, particularly in the aftermath of major global occurrences such as the 2008 financial crisis and the COVID-19 pandemic. The essence of RTAs is undergoing a transformation as contemporary accords increasingly incorporate clauses about electronic commerce, environmental sustainability, and societal issues. The proliferation of RTAs worldwide represents a multifaceted and dynamic aspect of contemporary international relations. The primary cause of the surge in RTAs can be traced to the economic advantages and opportunities the global markets offer. As the proliferation and expansion of RTAs persist, it is evident that they will progressively assume a pivotal role in influencing the trajectory of global trade, economics, finance, and diplomacy.

3.4 India's RTAs and Special Treatment to Agriculture

The possibility of experiencing 'economies of scale' has made RTA membership appealing to countries, and India has not been an exception to this idea. Regional Trading Agreements

(RTAs) are seen optimistically by India as building blocks toward the larger goal of trade liberalization. As a result, it is a signatory to many RTAs, such as Free Trade Agreements (FTAs), Preferential Trade Agreements (PTAs), Comprehensive Economic Cooperation Agreements (CECAs), and others. These agreements are agreed upon into either bilateral treaties or regional groupings.

India-Sri Lanka FTA

In March 2000, the India–Sri Lanka Free Trade Agreement (ISFTA) came into existence. The ISFTA deals only with trade in goods. It provides duty-free access (zero duty) or duty preferences for products on the 'positive list.' Sri Lanka offers duty-free access to 2802 Indian products, whereas India offers duty-free access to 4227 Sri Lankan products. At present, there are 1180 tariff lines on Sri Lanka's negative list, while India's negative list comprises 429 items. It is noteworthy that India has consented to granting duty-free access to a significantly larger quantity of items compared to the reciprocal commitment made by Sri Lanka towards India. In contrast to India, Sri Lanka has been afforded a longer term of 8 years to gradually eliminate its tariffs, which has been allocated a shorter period of 3 years for the same endeavour. The negative list encountered by Sri Lanka under the ISFTA is approximately half the size of the negative list observed in other accords, such as the South Asian Free Trade Agreement (SAFTA).

Even though India's MFN and Effective Tariffs to the world are very high at above 80%, the country has extended zero or near-zero Tariffs on most of the items imported from Sri Lanka, including some sensitive items in the agriculture sector under the Edible Fruits & Nuts category and even for Beverages, Spirits, and Vinegar (0%). Preferential duties are primary for only two essential agricultural import commodities: coffee, tea, mate & spices (6.2%) and Animals or vegetable fats & oils (8%). On the other side, Sri Lanka has extended zero

Tariffs in a few two-digit codes, and that too only for a small number of commodities in the code where imports from India are negligible, from a list of agricultural items with a two-digit code import value of more than $50 million. It is only in the non-agricultural sector that India has received any significant preferential treatment. With a few notable exceptions, India's preferential trade with Sri Lanka is primarily an "Unequal Exchange," with Sri Lanka reaping more benefits than India.

India-Afghanistan PTA

Following the signing of the Preferential Trade Agreement (PTA) between India and Afghanistan in March 2003, India granted significant tariff reductions to Afghanistan. This substantially included a specific category of Afghan dry fruits with duty exemptions ranging from 50 to 100 percent. Extensively, India extended preferred tariff treatment to a range of commodities arriving from Afghanistan. These commodities encompassed various dried fruits such as raisins, dried apricots, dried figs, pistachios, walnuts, pine nuts, etc. Additionally, other items include plums, album, mulberries, apples, melons, pomegranates, asafetida, alfalfa seeds, sesame seeds, linseeds, anise seeds, etc. Similarly, Afghanistan has relaxed restrictions (on a minimal basis) on Indian exports like tea, sugar, pharmaceuticals, and cement. India gave a total of 35 agricultural items special concessions, whereas Afghanistan offered such treatment to only 03 agricultural products. In the wake of the SAARC Summit in Male, India eliminated basic customs tariffs for all SAARC LDCs, allowing Afghanistan's exports to the Indian market (except for alcoholic beverages and tobacco) to enter duty-free.

India-Thailand FTA

India – Thailand FTA came into force in September 2004. The Indo-Thai FTA includes 84 items and numerous areas in the first phase. It includes goods, services, investment, and

economic cooperation. The tariff reduction or abolition program of both countries involves the gradual reduction and elimination of tariffs by both countries on listed products as per Article 3 (deals with trade in goods). An equal number of 11 agricultural items were provided special treatment by both parties in the India-Thailand FTA. Zero tariff reductions have been proposed for 82 products under the 'Early Harvest initiative', including prominent products like fruits, processed foods, gems and jewellery, auto parts, iron and steel, and electronic goods. The rules of origin were applicable in determining the basis of products acceptable for the preferential tariff concessions under the framework agreement between India and Thailand. Thailand exhibits a notable level of import demand, which India has effectively addressed in terms of a diverse range of agricultural commodities over an extended period. Thailand exhibits a comparatively lower average tariff rate in comparison to India.

From the view of India's imports from Thailand, except for edible fruits and nuts, which have a duty of 3.1%, and animals or vegetable fats, etc., which have a preferential charge of 6.4% but relatively limited preferential imports, most major agricultural commodities have zero or near-zero duties. Intriguingly, for some 2-digit agricultural categories, like Residues and waste from food industries, India has zero average weighted Preferential tariffs. Still, these items only make up a small portion of imports in the respective groupings, and the effective tariffs are high, implying that the remaining items have high MFN tariffs. Similarly, such concessions are given to various agricultural exports from India to Thailand. The agricultural tariff for 11 commodities of export interest to India has been expeditiously abolished. Some of them are edible vegetables, fruits, & nuts, aquatic animals, coffee, tea, spices, wheat, etc. There appear to be product-specific gains for both nations in the India-Thailand FTA.

India- Singapore CECA

The India–Singapore Comprehensive Economic Cooperation Agreement (CECA) became operational in August 2005. This RTA was India's first comprehensive FTA with any nation. To boost the trade among this CECA, there is a list of Products for stage-by-stage elimination and reduction in duty. The products' duty abolition and reduction are structured upon three target tariff rate timelines. Singapore has agreed to abolish customs duties on all originating goods from India once the Agreement is in force.

Regarding India's imports from Singapore, the most important agricultural commodities with zero or near-zero preferential tariffs are animal or vegetable fats and oils, edible fruits and nuts. In the case of preferential tariff commitments to India's exports, the products with a better preferential margin or lesser duties are found to be relatively in low demand in Singapore (e.g., Beverages, Spirits, and Vinegar). In the instance of the India-Singapore CEPA, India receives few tariff-related benefits. Instead, India has made significant concessions to Singapore, including nil or low tariffs on many commodities with strong preferential margins. The advantages must be demonstrated in areas other than tariffs.

Regarding this CECA, it is striking that India did not accord significant attention to the tariff liberalisation in products within the agreement, given Singapore's pre-existing open economy. In contrast, India prioritised the exploration of advantages derived from the deregulation of tariffs in the services sector, thereafter shifting its attention to agricultural commodities.

India-Bhutan FTA

The India-Bhutan Trade Agreement holds significant importance within the broader framework of the bilateral relationship since it operates under the governance of the India-

Bhutan Trade, Commerce, and Transit Agreement. The agreement has undergone repeated renewal and updates to reflect the dynamic economic and trade environment accurately. The initial commercial agreement between India and Bhutan was formally established in 1972 and subsequently elevated to the status of the India-Bhutan FTA in July 2006. The India-Bhutan FTA permits Bhutanese exports, including many agricultural products such as fruits, vegetables, herbs, etc., to enter India without any or with minimal tariffs, depending on the type of product category. India's agricultural exports primarily include a variety of grains and processed food products to Bhutan under this treaty.

India's overarching foreign policy plan encompasses maintaining amicable relations and economic collaboration with neighboring countries, thereby extending preferential treatment to Bhutan, which stands to gain from this approach. In accordance with India's "Neighbourhood First Policy," a recent development has occurred in market access for selected agricultural commodities between Bhutan and India. Specifically, five agri-commodities, namely areca nut, mandarin, apple, potato, and ginger, are now eligible for trade from Bhutan to India. Additionally, three commodities, namely tomato, onion, and okra, can now be traded from India to Bhutan. This new market access arrangement came into effect on 16 October 2020. India possesses significant untapped potential for exporting new agricultural products to Bhutan and favorable prospects for growth for its existing products.

India-Chile PTA

The India-Chile PTA became effective in August 2007. Both countries have agreed to sign a PTA for the free flow of goods between their countries through the abolition or reduction of tariffs. This PTA is controlled by the provisions of Annexe A (India's list of products for Chile) and Annexe B (Chile's list of products for India). As part of the PTA's introductory

phase, India reduced tariffs on 176 Chilean products, and Chile reduced them on 296 Indian products. To facilitate liberal and augmented trade between the two countries, India and Chile each extended concessions on 1,031 tariff lines and 1,798 tariff lines, respectively, as part of the expanded PTA signed in May 2017.

Under this expanded PTA, it is noteworthy that India's tariff concession is for 329 lines of Chile's agricultural products (out of 1031). In contrast, Chile is providing concessions for 178 agricultural products' tariff lines (out of 1798) of India. Similarly, as per the HS4 classification, 91 agricultural items were placed in a particular concession category by India, while Chile offered similar treatment to only 25 agricultural products. The majority of the agricultural products India has granted tariff concessions to Chile belong to meat and fish products (84 tariff lines), vegetable oils, and fresh fruits. In a broad sense, Chile is currently providing tariff reductions to a more extensive range of Indian products compared to the tariff concessions granted by India on the whole of Chilean exports. However, this pattern is the opposite concerning the agricultural sector, as it is observed that Chile enjoys tariff concession on a larger range of agricultural products than India.

India-MERCOSUR PTA

MERCOSUR (Southern Common Market) is a trading alliance in the South American region consisting of Argentina, Brazil, Paraguay, and Uruguay. The India-MERCOSUR PTA has become operational with effect from 1st June 2009. As India and Latin America did not have extensive economic relations in the past, one of the core objectives of the pact was to provide stronger economic ties and encourage more trade between the two regions. India and MERCOSUR offer tariff concessions of 10% to 100% to each other on 450 and 452 tariff lines, respectively. India and MERCOSUR aspire to amplify trade by giving reciprocal fixed tariff preferences through this PTA.

The principal goods wrapped by the Indian offer list are meat and meat products, organic and inorganic chemicals, dyes and pigments, leather articles, raw hides and skins, cotton yarn, wool, machinery items, glass and glassware, electrical machinery and equipment, iron and steel articles, optical, photographic, and cinematographic apparatus. Food preparations, essential oils, organic chemicals, pharmaceuticals, rubber and rubber goods, plastics and articles, machinery items, tools and implements, and electrical machinery & equipments are the main products covered by MERCOSUR's offer list. As a whole, group MERCOSUR provided special tariff concessions for 12 agricultural commodities to India. Conversely, India agreed to consider the same tariff concession of 45 agricultural commodities to MERCOSUR.

India – Nepal PTA

The Trade Treaty between India and Nepal was officially ratified on October 27, 2009. The PTA underwent an automatic renewal process in October 2016, extending its duration for another seven years. The Trade Treaty grants Nepal unilateral and duty-free entry into the Indian market. According to Article VI of the India-Nepal PTA, it is stipulated that Nepal shall exempt any additional customs duty on any exports originating from India throughout the duration of the treaty.

The India-Nepal Treaty of Trade, outlined explicitly in Article IV, designates a list of primary commodities eligible for preferential treatment within the bilateral trade relationship between the two nations. These commodities encompass a range of products derived from various sectors such as agriculture, horticulture, floriculture, and forestry. They include staple food items like rice, pulses, flour, bran, atta, husk, jaggery (gur and shakar), livestock, poultry birds, and fish, milk & and dairy products, eggs along with byproducts such as bees, bees-wax, and honey. It includes items of economic significance like ghani-

produced oil and oilcake, herbs, ayurvedic and herbal medicines, including essential oils and their extracts, unprocessed minerals, timber, akara and yak tail, construction materials like stone aggregate, boulder, sand, and gravel. Besides, raw materials like wool, bristles, goat hair, and bones used for bone meal contribute to the local economy. Commodities such as semi-milled or wholly milled rice, maize, and oilcake exhibit significant potential for expanded trade. The exports of India in these particular commodities exhibit a significant magnitude when compared to the imports of Nepal from the global market, implying an array of unexplored market potential.

India-The Republic of Korea CEPA

This Comprehensive Economic Partnership Agreement (CEPA) was established in January 2010. Both countries agreed to lower or eliminate import tariffs on a vast range of goods for the next decade and simultaneously enhance opportunities for trade in investments and services. The Republic of Korea was prepared to eliminate or reduce tariffs on 90% of Indian goods over the following ten years, while India had agreed to do the same for 85% of Korean goods.

Non-agricultural products make up the bulk of the Preferential Tariff list. Oil seeds and oleaginous fruits are the primary agricultural products for which preferential tariffs have been extended. Despite being extended to various food preparations, the Preferential Tariffs (weighted) are relatively high at 15.9%. India's preference margin for the Republic of Korea’s imports is far more than the preference margin offered by Korea. This is because Korea has comparatively low MFN tariffs.

India-ASEAN FTA

A free trade agreement between the group Association of South East Asian Nations (ASEAN) and India (AIFTA) in goods was signed and came into force on 1 January 2010 (after six years of negotiations). Basically, under AIFTA, tariff reduction/elimination consists of a sensitive track and a normal track. The typical products on which the associated parties agreed to exchange tariff concessions are listed in 'Annex A'. India and ASEAN member nations have agreed to liberalise their respective markets by gradually reducing and eliminating duties on 76.4% coverage of goods. India, unexpectedly, seemed to have taken the lead in the negotiations, proposing deeper and faster tariff reductions than the ASEAN nations had proposed in return.

There are four types of tariff lines in AIFTA: Normal Track, Sensitive Track, Special Products, and Highly Sensitive Products (also an exclusion list). Each AIFTA member may exclude a different number of tariff lines from its exclusion list. As of now, 10.7% of India's tariff lines are excluded. There are 489 total items, with 302 of those being agricultural items. The AIFTA's Normal Track is subdivided into Normal Track 1 and Normal Track 2. Countries participating in the agreement were obligated to do away with tariffs on Normal Track 1 products by 2013. About two-thirds of all Indian tariff lines covered by AIFTA have been impacted. Countries on Normal Track 2 are obligated to abolish tariffs by 2016 thoroughly. Given that only 10.3 percent of all Indian tariff lines are included in Normal Track 2 (the most severe and far-reaching track for tariff reductions), more than 70 percent of all Indian tariff lines are included in the Normal Track. However, extended time was given to the Philippines, Cambodia, Lao PDR, Myanmar, and Vietnam to eliminate their levies by making necessary arrangements.

Within the highly sensitive products track, surprisingly, India does not record any tariff lines for this track. Instead, it appears India was given its unique treatment by being given its list of "special products" within AIFTA. These five products are crude palm oil, refined palm oil, coffee, tea, and pepper, and together, they account for only 0.3% of India's tariff lines within AIFTA. There is little uniformity in the reduction commitments among these five product groups, but generally, the reduction commitments specified for the Special Products are much more substantial. For instance, there will be a reduction in the tariff rates applied to crude palm oil to 37.5% and refined palm oil to 45% from their prevailing rates (at the establishment of AIFTA) by December 31, 2019. Base rates for AIFTA's sensitive track items must be reduced to 5% by the end of 2016. However, there will be a five-year grace period for Cambodia, the Lao People's Democratic Republic, Myanmar, and Vietnam.

India-Malaysia CECA

On 18 February 2011, the Malaysia-India Comprehensive Economic Cooperation Agreement (MICECA) was signed and became effective from 1 July 2011. It is divided into 16 Chapters and 15 Annexes, including commitment schedules under Goods and Services. The MICECA is a comprehensive treaty that includes provisions for trade in goods, services, investments, and the movement of people.

Some significant zero or near-zero preferential tariff products are in India's imports from Malaysia, including agricultural and plantation items valued at less than $50 million. Edible fruits and nuts, some animal and vegetable fats and oils, including palm oil, sugars and sugar confectioneries, cocoa and cocoa preparations, cereal preparations, vegetable, fruit, and nut preparations, and miscellaneous edible preparations figure among them. Animal or vegetable fats and oils are a crucial import commodity of these products, albeit favoured imports are limited. By the end of 2019, India was required to lower tariffs on

several unique products from the base rate. They include from 100% to 45% (for coffee, tea, palm kernel oil, and its fractions), 70% to 50% (for pepper), 80% to 45% (for margarine of vegetable origin, edible grade), from 90% to 45% (refined palm oil) and 80% to 37.5% (for crude palm oil). Throughout a certain period, commodities such as pineapples, watermelons, papayas, and cocoa paste have been excluded from India's list of exclusions. The Malaysian government has also decided to eliminate bananas, mangoes, guavas, and rice from their Exclusion list.

According to the India-Malaysia CECA agreement, the primary commodities for which Malaysia has expanded market access to India include Basmati rice, eggs, mangoes, motorcycles, trucks, and cotton textiles. According to the CECA under Speed Track, tariffs on Basmati rice must be decreased from 40% to 20% by December 31, 2016. The in-quota and out-quota tariff rates for hens' and ducks' eggs will be decreased to 0% and 10%, respectively, from MFN in-quota and out-quota rates of 10% and 50%. Accordingly, India and Malaysia profit from exporting certain items from this CECA. However, the value of exports (from India) of many items is low, for which the preference margin is relatively higher. In agricultural commodities, these products precisely include refined Palm Oil for Malaysia and semi-milled or milled rice for India.

India-Japan CEPA

In August 2011, India - Japan CEPA became functional. This CEPA wanted to reduce or abolish tariffs over the next ten years for more than 90 % of goods traded between India and Japan. This Agreement, along with others, provides a 'schedule for India' and a 'schedule for Japan'. The schedule provided a list with details on the product-wise plan for reducing or abolishing import duties into India and Japan.

While the preference margin in the India-Japan CEPA is vast for most items on India's import side, the preference margin on the Japanese side is comparatively low because India already has low or nil MFN duties for several commodities in Japan. Some commodities with India’s exports between $10 million and $50 million at the two-digit level provide advantages for India due to a high preference margin and reasonable levels of imports. Among these, Agricultural commodities exist in a broad classification of preparations of vegetables, meat, fish, and so on, as well as miscellaneous food preparations. While the India-Japan CEPA appears to be a 'fair exchange' in terms of tariffs, it is possible that India's agricultural exports of commodities to Japan may not fetch expected profitability.

The trade agreements of India aim to promote trade liberalization and provide preferential treatment to certain agricultural products. The agreements involve duty-free access or duty preferences for specific products, tariff reductions, and elimination of tariffs on listed products. India has granted special concessions to agricultural items from these countries while also receiving concessions for its agricultural exports. The agreements vary regarding the number of products and the extent of tariff concessions provided.

3.5 Summary

The chapter provides a historical context for agricultural trade and current details on Indian agricultural trade, including exports and imports. A comprehensive analysis of worldwide agricultural exports and imports is provided for each region. According to the WTO, global trade in agricultural products has experienced a substantial increase, with distinct world regions witnessing varying growth rates in both agricultural exports and imports from 2000 to 2020. The chapter also provides an extensive overview of the global expansion of RTAs including the emergence of waves of regionalism and the spread of RTAs each region-wise.

This chapter provides a bird’s eye view of India's Regional Trade Agreements (RTAs), with a particular focus on agricultural trade and commodities. It highlights the presence of a tariff reduction/elimination mechanism for a significant range of agricultural commodities within the specified RTAs of India. Such a process is conducted in a phased and timely manner in accordance with the pact signed by India and other countries. India's agricultural trade policy and approach to agricultural products within several RTAs involve a delicate equilibrium between enhancing exports and protecting domestic interests. India has engaged in the exchange of tariff concessions for agricultural goods, both offering and receiving such concessions. It is apparent that India has granted somewhat more favorable tariff and duty reductions to its RTA partners than the concessions it received in return. However, the country exercises caution in fully liberalizing this sector, primarily due to the social and economic ramifications involved.

CHAPTER IV

INDIA'S BILATERAL TRADE AGREEMENTS: EXPORT-IMPORT GROWTH ANALYSIS OF AGRICULTURAL PRODUCTS

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4.1 Introduction

The value of exports and imports of any nation plays an important part in its economic growth. A nation's trend in exports and imports can impact various economic parameters such as the balance of trade, gross domestic product, inflation, employment rates, exchange rates, etc. Conventionally, it is believed that a nation will be in a beneficial position by enhancing exports and reducing imports of goods and services. Apart from providing wide preferences to consumers, imports are essential because they provide access to commodities and services that may not be available domestically or that can be received with greater efficiency or at a lesser cost from other nations. Many nations actively promote and assist their export-based industries through various strategies such as tax incentives, export subsidies, trade agreements, etc. However, in the modern global approach, an economy experiencing growth in exports and imports can be considered robust. Overall, the dynamic relationship between exports and imports can be influenced by international trade theories, agreements, and economic policies. Generally, it is believed that a bilateral trade agreement will possibly create a significant impact on the imports and exports of both nations.

Saxena and Nath (2012) evaluated the impact of globalization on exports and imports of agricultural products in India. Results showed that post-WTO trade liberalization did not help much in agriculture export growth but proceeded to a sizeable and continuous increase in imports. The buoyancy in exports of agricultural products of India is distinctly noticeable. Research was carried out by Ratna and Kullumal (2013) to assess the bilateral trade data for fisheries and selected agricultural products between India and ASEAN. The study

highlighted the salient features of the India–ASEAN FTA and summarized some threats and opportunities for Indian agricultural producers. Tandon (2005) assessed the performance of India's agricultural trade growth by employing average annual growth rates and Log-Lin regression techniques. It conducts a comparative analysis of the growth of agricultural trade before and after reforms and details the shifts in agricultural exports and imports following the liberalisation, with a specific emphasis on long-term trade patterns.

A semi-log regression model was applied to examine the growth and trend of important spices from Bangladesh (Rana et al., 2021). The study provides policy implications for production and self-sufficiency in these spices, considering their exports and imports. Devi (2014) has studied the overall scenario of the food processing industry, growth rates of export value of processed food items, and foremost export destinations of some processed foods like Jaggery, guar gum, and Confectionery and Cocoa products. Ammani (2013) evaluated the trend in rice output, productivity, and import value of Nigeria by designing and applying a semi-log growth rate model and simple linear regression models for the period 1986-2010.

Agricultural trade can be understood as an economic transaction that involves the provision of food or other supplies to importing nations while generating export income for producing countries (Anderson, 2010). The domain of worldwide agricultural exports and imports serves as a fundamental aspect within the field of trade relations and the global economy. The comprehension of the growth patterns in the export and import of agricultural products enables policymakers to discern and address obstacles and prospects in trade relations. The examination of export-import growth pertaining to agricultural products under RTAs is an essential tool for contemporary global trade policy.

4.2 Methodology

In general, agricultural exports and imports are a crucial part of international trade, promoting collaboration between nations in the agriculture sector, ensuring economic growth, and contributing to the world's food security. This chapter is based on the overall analysis of the total exports and imports for three broad categories of products like Animals (PC 01 to 05), Vegetables (PC 06 to 15), and Food Products (PC 16 to 24) as per the Harmonized System (HS2) classification developed by the World Customs Organization (WCO). The Harmonized System is the most widely accepted trade classification system in the world. Here, the 'decadal' comparison is made between the exports and imports (in US$ Thousand) before and after the formation of the RTA for each country or regional group with which India formed the RTA.

The objective of this chapter is to identify trends in the growth pattern of exports and imports of agricultural products under India's RTAs. The growth pattern will help to understand whether India's various agreements have opened up markets and facilitated growth in exports of agricultural products or whether RTAs have led to a surge in imports. Such patterns of growth can provide valuable insights into the implications of current agricultural trade policies within agreements of India. In this chapter, the growth of exports and imports of agricultural commodities are analysed across twelve partners with which India has bilateral trade agreements. They are Sri Lanka, Afghanistan, Thailand, Singapore, Bhutan, Chile, MERCOSUR, Nepal, the Republic of Korea, ASEAN, Malaysia, and Japan.

The methodology used for studying the impact of RTA is growth rate analysis using the Log-Linear model. The Semi-log (Log-Lin) model is a type of regression used in econometrics in which only the dependent variable is converted by natural logarithm (ln), leaving the independent variable(s) in linear form. The semi-log (Log-Lin) model makes the

essential assumption that the relationship between the variables is consistent across all data ranges. Furthermore, a linear relationship between the independent variable(s) and the logarithm of the dependent variable is assumed when the coefficients are interpreted as approximations of percentage changes. When the intended relationship between the dependent variable and the independent variable(s) is a multiplicative one, this specification is employed. In the context of this study, the formula of the Semi-log model is denoted as:

$\ln Y = \alpha + \beta_1 t + \beta_2 Drta + u.$

In this model, the dependent variable 'lnY' is the Log value of exports/imports (in US$ Thousand), the Independent Variables are t= Time trend variable and Drta = Dummy variable representing the RTA (D=0, before RTA formation and D=1, after RTA formation). Similarly, the α value represents the coefficient of constant, β_1 represents the coefficient of time, and β_2 is the dummy variable's coefficient. The p values are used to test whether there is any statistically significant difference between the pre-RTA and post-RTA values of exports or imports of products, Animals (summation of PC 01 to 05), Vegetables (summation of PC 06 to 15), and Food products (summation of PC 16 to 24).

The null hypothesis (H_0) is that there is no significant difference in the growth of exports or imports of India with other partner countries after the formation of the RTA. The alternate hypothesis (H_1) is that a significant difference exists in the growth of exports or imports after establishing the RTA. If the coefficient pertaining to the dummy variable is statistically significant, it implies that the exports or imports have increased or decreased after the formation of RTA. In these analyses, the statistical significance is tested at 1%, 5%, and 10% levels of significance based on the 'p' values. Primarily, the growth model and methodology are applied to cumulative agricultural (total of animals, vegetables, and food products) exports and imports of India with its above twelve bilateral RTA partners. Here,

the comparative analysis is conducted for exports and imports between the pre-and post-RTA formation decade.

4.3 Results and Discussion

In the first instance, the Semi-log model is applied to India's agricultural exports and imports with its bilateral trade agreements. The agricultural trade in India exhibits commodity-specific behaviour, making it pertinent to analyse changes at the level of individual commodities. Hence, the methodology is extended to commodity-wise exports and imports of animals, vegetables, and food products under each bilateral RTA of India. This will enable us to identify the impact of RTA formation on growth rate at the aggregate level and product level, too. Since the analysis is conducted for ten years of each pre- and post-RTA formation, the immediate impact will be visible to highlight the growth rate trends of agricultural exports and imports.

4.3.1 Total Agricultural Exports and Imports

Growth rate analysis is carried out for India's total exports and imports with its RTA trade partners, and the result is presented in Tables 4.1 and 4.2. In each table, the values presented are of α (constant), β1 (time-variable), β2 (RTA Dummy variable), and R^2. The coefficient of determination (R^2) provides an understanding of the extent to which the variance in the dependent variable (in this case, the value of agricultural exports/imports) can be explained by the independent variables (time and the RTA Dummy).

Table 4.1 shows the growth model results estimated for total agricultural exports of commodities (Animals, Vegetables, and Food Products) from India to the above bilateral partners individually. For most RTA partners, the R^2 values are quite high, implying a better fit.

Table 4.1 Agricultural Exports (Animals, Vegetables & Food Products) with India's Bilateral Trade Agreement Partners

RTA	α (constant)	β_1 (time)	β_2 (RTA Dummy)	R^2
Sri Lanka FTA	−211.710 (0.0004) ***	0.112 (0.0002) ***	−0.028 (0.9279)	0.8505
Afghanistan PTA	−350.892 (<0.0001) ***	0.180 (<0.0001) ***	0.558 (0.1590)	0.9348
Thailand FTA	−226.879 (0.0054) ***	0.119 (0.0039) ***	0.129 (0.7748)	0.7809
Singapore CECA	−13.667 (0.8058)	0.0128 (0.6459)	0.318 (0.3617)	0.3398
Bhutan FTA	−347.025 (0.0151) **	0.178 (0.0131) **	−0.717 (0.3807)	0.5269
Chile PTA	−10.370 (0.9389)	0.009 (0.8915)	1.151 (0.1817)	0.387
MERCOSUR PTA	−188.013 (0.0051) ***	0.099 (0.0036) ***	0.849 (0.0316) **	0.8945
Nepal PTA	−425.988 (<0.0001) ***	0.218 (<0.0001) ***	−0.304 (0.3328)	0.9462
The Republic of Korea CEPA	−111.986 (0.1139)	0.062 (0.0825) *	0.317 (0.4563)	0.6401
ASEAN FTA	−117.918 (0.0407) **	0.066 (0.0239) **	0.852 (0.0192) **	0.8693
Malaysia CECA	−128.733 (0.0144) **	0.071 (0.0081) ***	0.134 (0.6526)	0.7618
Japan CEPA	−23.422 (0.4637)	0.018 (0.2565)	0.124 (0.5298)	0.4618

Values in the parenthesis are p-values

*** Significant at 1% level, ** Significant at 5% level, * Significant at 1% level

In Table 4.1, the coefficient of the time variable with Sri Lanka, Afghanistan, Thailand, Bhutan, MERCOSUR, Nepal, the Republic of Korea, ASEAN, and Malaysia has been found statistically significant during the whole period (20 years) considered with each of these RTA. However, only the coefficients of the Dummy Variable with respect to MERCOSUR PTA & ASEAN FTA have been found statistically significant between the pre-and post-RTA formation decade. It implies that only with two RTAs of India, the agricultural exports have increased after the formation of RTA. In all other cases, RTAs have not made any impact, positive or negative.

Table 4.2 shows the results of the growth model estimated for total agricultural imports to India from each of the above bilateral partners individually. The regression models in Table 4.2 explain a significant percentage of the variance in import growth based on the relatively higher R^2 values. The coefficient of the dummy variable for the India-The Republic of Korea CEPA, India-ASEAN FTA, and India-Malaysia CECA is statistically significant. The coefficient of the time variable with seven partners, namely Sri Lanka, Afghanistan, Thailand, Chile, MERCOSUR, Nepal, and ASEAN, was significant. It implies that though India's imports have grown over the period of 20 years with its RTA partners, only in 3 cases, it has shown after the formation of RTAs.

In general, the analysis in Tables 4.1 and 4.2 reveals that the formation of trade agreements did not have a larger significant impact on India's agricultural trade with the trading partners regarding total exports and imports. It is to be noted that the imports of agricultural commodities have increased to India from the Republic of Korea, ASEAN, and Malaysia. Similarly, the overall exports of agricultural commodities have enhanced only to ASEAN & MERCOSUR groupings.

Table 4.2 Agricultural Imports (Animals, Vegetables & Food Products) with India's Bilateral Trade Agreement Partners

RTA	α (constant)	β_1 (time)	β_2 (RTA Dummy)	R^2
Sri Lanka FTA	−428.146 (<0.0001) ***	0.219 (<0.0001) ***	−0.001 (0.9989)	0.8823
Afghanistan PTA	−315.082 (0.0004) ***	0.162 (0.0003) ***	0.332 (0.4623)	0.883
Thailand FTA	−321.520 (0.0230) **	0.166 (0.0196) **	0.017 (0.9833)	0.6489
Singapore CECA	−28.119 (0.7610)	0.019 (0.6811)	0.565 (0.3309)	0.345
Bhutan FTA	−232.587 (0.3189)	0.120 (0.3051)	−0.061 (0.9660)	0.2219
Chile PTA	−345.270 (0.0021) ***	0.177 (0.0017) ***	0.066 (0.9119)	0.8004
MERCOSUR PTA	−165.560 (0.0009) ***	0.089 (0.0004) ***	0.347 (0.1909)	0.8956
Nepal PTA	−153.392 (0.0006) ***	0.082 (0.0003) ***	−0.379 (0.1145)	0.7263
The Republic of Korea CEPA	47.218 (0.4903)	−0.019 (0.5725)	1.321 (0.0054) ***	0.665
ASEAN FTA	−111.861 (0.0255) **	0.063 (0.0132) **	0.689 (0.0260) **	0.8753
Malaysia CECA	−39.508 (0.4873)	0.026 (0.3573)	1.264 (0.0019) ***	0.8492
Japan CEPA	−97.635 (0.1595)	0.053 (0.1280)	0.368 (0.3823)	0.6186

Values in the parenthesis are p-values

*** Significant at 1% level, ** Significant at 5% level

The analysis in Tables 4.1 and 4.2 do not show many favourable results for India's agriculture trade with its bilateral trade partners after the formation of RTAs. However, it is possible that RTAs might have created a substantial and significant impact in the case of certain commodities. Hence, an attempt is made to estimate the growth rate of certain individual commodities such as animals, vegetables, and food products.

4.3.2 India-Sri Lanka FTA

The periods for which the analysis conducted are 1990-1999 and 2001-2010, the pre-RTA formation and post-RTA formation, respectively, since this FTA was started in March 2000. Table 4.3 shows the results of the growth models estimated to understand whether there is any significant change in the growth of agricultural products' exports and imports after the formation of the India-Sri Lanka FTA.

Table 4.3 Exports & Imports under the India-Sri Lanka FTA

Product	Exports				Imports			
	α *(Constant)*	β_1 *(Time)*	β_2 *(Dummy)*	R^2	α *(Constant)*	β_1 *(Time)*	β_2 *(Dummy)*	R^2
Animals	−236.61 (0.001) ***	0.12 (0.001) ***	−0.47 (0.218)	0.72	−667.80 (0.001) ***	0.34 (0.001) ***	−1.85 (0.075) *	0.67
Vegetables	−277.13 (<0.0001) ***	0.14 (<0.0001) ***	−0.48 (0.098) *	0.88	−346.71 (0.003) ***	0.18 (0.002) ***	0.35 (0.582)	0.82
Food Products	−127.05 (0.221)	0.07 (0.189)	0.74 (0.253)	0.63	−873.57 (0.002) ***	0.44 (0.002) ***	−1.14 (0.429)	0.73

Values in the parenthesis are p-values

*** Significant at 1% level, * Significant at 10% level

In Table (4.3), in the case of exports, the coefficient of dummy variables for 'animals' is statistically insignificant (as the p-value is >0.10). It implies that there has been no

significant change in the export of animals after the formation of the India-Sri Lanka FTA. According to the coefficient of the dummy variable for vegetable exports, there is a statistically significant negative growth in exports of vegetables after the formation of this RTA. The creation of the India-Sri Lanka FTA did not affect food product exports from India to Sri Lanka, as the coefficient is not statistically significant. The p-values of the coefficient of time for animals and vegetables exports indicate the overall significant difference in exports of animals and vegetables for the duration from 1990-2010. However, the same is not shown in food products export.

In the case of imports, the p-value of the dummy variable's coefficient is significant at a 10% level, which means there is a statistically significant difference in the value of animals' imports from Sri Lanka FTA after FTA formation. The above p-values of the dummy variable's co-efficient of vegetables and food products imports show that there is neither positive nor negative growth in imports from Sri Lanka to India as an outcome of the India-Sri Lanka FTA. Time co-efficient p-values exhibit an overall significant increase in imports (since the coefficients are positive) of all the above three commodities from 1990-2010.

4.3.3 India-Afghanistan PTA

India – Afghanistan Preferential Trade Agreement came into effect in May 2003. Therefore, the analysis was conducted for 1993-2002 and 2004-2013, pre- and post-RTA formation, respectively.

In the case of exports in Table 4.4, the coefficient of the dummy variable concerning 'Animals' is statistically significant at 1%, which means there is a significant difference in the value of animals' exports for the decade (2004-2013) in comparison to exports from 1993-2002. There is an increase in exports of animals by 15.6% per annum during 1993-2013. The co-efficient pertaining to the dummy variable of the vegetables is statistically

insignificant. The coefficient of time is also insignificant. Vegetables exports did not show growth during the whole period and also after the formation of RTA. In the case of food products, the export growth is statistically significant for the entire period. However, it did not show any change in growth rate after the formation of RTA, as the coefficient of the dummy is statistically insignificant.

Table 4.4 Exports & Imports under the India-Afghanistan PTA

Product	Exports				Imports			
	α *(Constant)*	β_1 *(Time)*	β_2 *(Dummy)*	R^2	α *(Constant)*	β_1 *(Time)*	β_2 *(Dummy)*	R^2
Animals	−307.61 (0.079) *	0.16 (0.076) *	4.03 (0.001) ***	0.91	NA	NA	NA	NA
Vegetables	−183.22 (0.185)	0.09 (0.169)	0.62 (0.461)	0.56	−315.11 (0.000) ***	0.16 (0.003) ***	0.33 (0.462)	0.88
Food Products	−588.76 (<0.0001) ***	0.29 (<0.0001) ***	−0.49 (0.459)	0.88	−545.12 (0.317)	0.28 (0.315)	−4.69 (0.295)	0.22

Values in the parenthesis are p-values

*** Significant at 1% level, * Significant at 10% level

In Table 4.4, regarding imports, the regression results for ‘Animals’ imports are not interpreted due to insufficient data. The coefficient of dummy variables for vegetables and food products suggests no statistically significant difference in their imports from Afghanistan to India. The p-values of the coefficient of time variable for vegetables exhibit an overall significant difference in its imports from 1993-2013, but the same is not found in the case of food products imports.

4.3.4 India-Thailand FTA

The periods considered for the decadal analysis are 1994-2003 and 2005-2014, pre- and post-RTA formation, respectively. Table 4.5 shows the results of the growth model estimated regarding the India- Thailand FTA.

Table 4.5 Exports & Imports under the India- Thailand FTA

Product	Exports				Imports			
	α *(Constant)*	β_1 *(Time)*	β_2 *(Dummy)*	R^2	α *(Constant)*	β_1 *(Time)*	β_2 *(Dummy)*	R^2
Animals	−445.98 (<0.0001) ***	0.23 (<0.0001) ***	−1.08 (0.034) **	0.83	−646.28 (0.001) ***	0.33 (0.001) ***	−2.06 (0.068) *	0.59
Vegetables	−337.15 (0.001) ***	0.17 (0.001) ***	−0.09 (0.858)	0.81	−479.31 (<0.0001) ***	0.24 (<0.0001) ***	−0.35 (0.552)	0.86
Food Products	−39.32 (0.596)	0.03 (0.501)	0.98 (0.045) **	0.68	−123.98 (0.519)	0.07 (0.491)	0.98 (0.412)	0.38

Values in the parenthesis are p-values

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level

In Table 4.5, in the context of exporting, the coefficient of the dummy variables for animals and food products exhibits a statistically significant difference (at a 5% level) in their exports from India to Thailand as an outcome of this FTA. The coefficient of dummy variables for 'vegetables' is statistically insignificant (since the p-value is >0.10). Food products exports did not show an overall growth during the entire studied period from 1994-2014. Conversely, p-values of the coefficient of time for animals and vegetables exports exhibit an overall growth from 1994-2014.

Regarding imports in Table 4.5, the coefficient of the dummy variable belonging to 'Animals' implies the statistically significant difference in the value of animals' imports for the decade (2005-2014) compared to 1994-2003 from the Thailand FTA. The growth for animal imports is statistically significant for the period from 1994-2014. The formation of the India-Thailand FTA did not affect vegetables and food product imports from India to Thailand, as the coefficient of the dummy variable is not statistically significant. The p-values of the coefficient of time variable for vegetables indicate the overall significant growth in its imports from 1994-2014. However, the same is not exhibited in the case of food products.

4.3.5 India-Singapore CECA

For the decadal analysis of pre-RTA formation and post-RTA formation, the years considered are 1995-2004 and 2006-2015, respectively, since India - Singapore CECA became functional in August 2005.

Table 4.6 Exports & Imports under the India-Singapore CECA

Product	Exports				Imports			
	α *(Constant)*	β_1 *(Time)*	β_2 *(Dummy)*	R^2	α *(Constant)*	β_1 *(Time)*	β_2 *(Dummy)*	R^2
Animals	−54.05 (0.151)	0.03 (0.092) *	0.34 (0.148)	0.74	−3.15 (0.979)	0.004 (0.944)	1.91 (0.019) **	0.66
Vegetables	−116.72 (0.044) **	0.06 (0.029) **	0.13 (0.711)	0.67	187.82 (0.063) *	−0.09 (0.077) *	0.62 (0.309)	0.24
Food Products	77.95 (0.221)	−0.03 (0.293)	0.45 (0.259)	0.08	−298.35 (<0.0001) ***	0.15 (<0.0001) ***	0.27 (0.409)	0.93

Values in the parenthesis are p-values

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level

Regarding exports in Table 4.6, the p-value of the coefficient of dummy variables for animals, vegetables, and food products specifies that their exports have not statistically changed during the decade (2006-2015) compared to exports from 1995-2004. However, the coefficient of time shows the overall difference in exports of animals and vegetables from 1995-2015. However, the same is not observed in the case of food products exports.

In Table 4.6, in the case of imports, animals from Singapore are showing a statistical increase in their imports during the post-RTA formation period (2006-2015) with India. The coefficient of time for animals is insignificant. There is no statistically significant difference in the imports of vegetables and food products from Singapore to India, as indicated by the coefficient of dummy variables of these products. The p-values of the coefficient of time for vegetables and food products indicate the overall imports growth during the studied years 1995-2015.

4.3.6 India-Bhutan FTA

The India-Bhutan FTA became effective in July 2006. Hence, the periods selected for the decadal analysis are 1996-2005 and 2007-2016 for this pre-RTA formation and post-RTA formation, respectively.

In the context of exports in Table 4.7, based on the p-value of the coefficient of the dummy variable for the animals, vegetables, and food products, it is found that the exports of these products do not show a statistically significant difference from 2007-2016 after India entered into a trade agreement with Bhutan. The coefficient of time for vegetables does not establish an overall export growth from 1996-2016. On the contrary, the time coefficient's p-values for exports of animals and food products exhibit an overall statistically significant increase from 1996 to 2016.

Table 4.7 Exports & Imports under the India-Bhutan FTA

Product	Exports				Imports			
	α *(Constant)*	β_1 *(Time)*	β_2 *(Dummy)*	R^2	α *(Constant)*	β_1 *(Time)*	β_2 *(Dummy)*	R^2
Animals	−717.06 (0.006) ***	0.36 (0.006) ***	−0.90 (0.536)	0.66	NA	NA	NA	NA
Vegetables	−202.48 (0.1902)	0.11 (0.175)	−0.74 (0.431)	0.15	45.69 (0.922)	−0.02 (0.931)	0.59 (0.844)	0.01
Food Products	−400.21 (0.004) ***	0.204 (0.003) ***	−0.78 (0.306)	0.64	−604.34 (0.002) ***	0.31 (0.002) ***	−1.99 (0.063) *	0.57

Values in the parenthesis are p-values

*** Significant at 1% level, * Significant at 10% level

In the case of imports in Table 4.7, the values for product animals are not expressed in the above table due to the non-availability of sufficient data on animals imports from Bhutan to India. While the coefficient of the dummy variable for vegetables imports is statistically insignificant, the food products imports have shown negative growth. The p-value of the coefficient of time variable for vegetables import is found to be insignificant, whereas, for food products import, the growth is statistically significant for the whole period from 1996-2016.

4.3.7 India-Chile PTA

The periods for which the decadal analysis for growth was conducted are from 1997-2006 and 2008-2017 for this pre-RTA formation and post-RTA formation, respectively. Table 4.8 reveals the results of the growth model estimated concerning PTA between India and Chile.

In the context of exports in Table 4.8, the coefficient pertaining to the dummy variable of animals implies no significant change in the export of animals after the formation of this PTA. Likewise, the coefficient of time is also found to be insignificant. On the contrary, vegetables exports have shown beneficial growth. There is an overall increase in exports of vegetables at a considerable rate of 10.99% per annum from 1997 to 2017. The coefficients associated with the dummy variable and the time variable of the food products are statistically insignificant. Food products exports did not reveal any growth during the whole period or after the formation of the India-Chile PTA.

Table 4.8 Exports & Imports under the India-Chile PTA

Product	Exports				Imports			
	α *(Constant)*	β_1 *(Time)*	β_2 *(Dummy)*	R^2	α *(Constant)*	β_1 *(Time)*	β_2 *(Dummy)*	R^2
Animals	−194.38 (0.761)	0.099 (0.754)	−3.41 (0.398)	0.09	−220.904 (0.734)	0.11 (0.733)	1.29 (0.672)	0.16
Vegetables	−213.05 (0.007) ***	0.11 (0.006) ***	0.82 (0.074) *	0.87	−887.19 (0.0001) ***	0.45 (0.0001) ***	0.07 (0.952)	0.87
Food Products	45.94 (0.827)	−0.02 (0.849)	2.103 (0.121)	0.37	−262.72 (0.027) **	0.14 (0.023) **	−2.03 (0.008) ***	0.35

Values in the parenthesis are p-values

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level

In Table 4.8, in the case of imports, the animals and vegetables imports have statistically neither improved nor declined from Chile to India during the post-RTA formation years 2008-2017 in comparison to the pre-RTA formation decade. However, the imports of food products have shown statistically significant negative growth. The coefficient of time for animals was statistically insignificant. The p-values of the coefficient of time variable for

vegetables and food products imports signify the overall significant difference in their imports for the entire duration from 1997-2017.

4.3.8 India-MERCOSUR PTA

For the decadal analysis of pre-RTA formation and post-RTA formation, the years considered are 1999-2008 and 2010-2019, respectively, since India-MERCOSUR PTA became effective in June 2009.

Table 4.9 Exports & Imports under the India-MERCOSUR PTA

Product	Exports				Imports			
	α *(Constant)*	β_1 *(Time)*	β_2 *(Dummy)*	R^2	α *(Constant)*	β_1 *(Time)*	β_2 *(Dummy)*	R^2
Animals	−123.91 (0.295)	0.07 (0.272)	1.05 (0.156)	0.64	−103.94 (0.799)	0.06 (0.789)	1.05 (0.6595)	0.12
Vegetables	−179.74 (0.002) ***	0.09 (0.002) ***	0.801 (0.0204) **	0.91	−184.23 (<0.0001) ***	0.099 (<0.0001) ***	0.12 (0.601)	0.91
Food Products	−436.53 (0.006) ***	0.22 (0.005) ***	0.23 (0.789)	0.77	−83.107 (0.725)	0.05 (0.693)	2.47 (0.104)	0.54

Values in the parenthesis are p-values

*** Significant at 1% level, ** Significant at 5% level

In Table 4.9, regarding exports, the coefficient of dummy variables for animals and food products is statistically insignificant (since the p-value is >0.10). The coefficient of the dummy variables for 'vegetables' exhibits a statistically significant difference (at a 5% level) in their exports from India to MERCOSUR due to the establishment of this PTA. Animals exports did not show an overall growth during the studied period from 1999-2019. However, p-values of the coefficient of time for vegetables and food products exports are exhibiting an overall increase from 1999-2019.

For imports in Table 4.9, the coefficient of the dummy variable belonging to each of the Animals, vegetables, and food products imports is statistically insignificant. The creation of this PTA did not statistically impact the imports from MERCOSUR countries to India. The p-values of the coefficient of time variable for vegetables exhibit an overall significant difference in its imports from 1999-2019. However, the same is not shown in the case of animals and food products imports.

4.3.9 India-Nepal PTA

In October 2009, the India-Nepal PTA became operational. The period considered for which the decadal analysis conducted is from 1999-2008 and 2010-2019 for this pre-RTA formation and post-RTA formation, respectively.

Table 4.10 Exports & Imports under the India-Nepal PTA

Product	Exports				Imports			
	α *(Constant)*	β_1 *(Time)*	β_2 *(Dummy)*	R^2	α *(Constant)*	β_1 *(Time)*	β_2 *(Dummy)*	R^2
Animals	−594.24 (0.0008) ***	0.301 (0.0007) ***	−1.23 (0.192)	0.71	−40.25 (0.442)	0.02 (0.364)	−0.39 (0.2402)	0.08
Vegetables	−475.13 (<0.0001) ***	0.24 (<0.0001) ***	−0.46 (0.256)	0.93	−115.797 (0.072) *	0.06 (0.051) *	−0.595 (0.131)	0.22
Food Products	−341.14 (<0.0001) ***	0.18 (<0.0001) ***	0.07 (0.776)	0.96	−254.54 (<0.0001) ***	0.13 (<0.0001) ***	−0.21 (0.446)	0.89

Values in the parenthesis are p-values

*** Significant at 1% level, * Significant at 10% level

In the case of exports in Table 4.10, according to the p-values of the coefficient of the dummy variables of animals, vegetables, and food products, it can be stated that the creation

of the India-Nepal PTA had no statistically significant effect on these product exports between 1999-2008 and 2010-2019. However, the p-values of the coefficient of time for these three products' exports suggest an overall significant difference in their exports from 1999-2019.

Concerning imports in Table 4.10, from the coefficient of the dummy variable in all three cases, it can be concluded that establishing a trade agreement with Nepal has not created positive or negative growth in the imports of the above agricultural products from Nepal to India. The coefficient of time variable for animals imports does not exhibit an overall difference in its imports during the entire duration from 1999-2019. However, the p-values of the coefficient of time for vegetables and food products imports show overall change during the total study duration for this RTA.

4.3.10 India-the Republic of Korea CEPA

CEPA between India and the Republic of Korea (South Korea) was established in January 2010. Consequently, the periods preferred for the decadal growth analysis are 2000-2009 and 2011-2020 for this pre- and post-RTA formation, respectively.

For exports in Table 4.11, the coefficients of dummy variables for animals do not highlight a statistical difference in exports during the decade of post-RTA creation. However, the p-value of the coefficient of time for animals implies the overall change in its exports during the whole duration from 2000-2020. The coefficients of both the dummy variable and the time variable for vegetables are statistically insignificant. The export growth is statistically significant for food products during the whole period from 2000-2020. However, food products imports did not reveal a statistically significant change in growth rate after the formation of RTA.

Table 4.11 Exports & Imports under India- the Republic of Korea CEPA

Product	Exports				Imports			
	α *(Constant)*	β_1 *(Time)*	β_2 *(Dummy)*	R^2	α *(Constant)*	β_1 *(Time)*	β_2 *(Dummy)*	R^2
Animals	−88.23 (0.075) *	0.05 (0.051) *	0.12 (0.689)	0.63	43.28 (0.911)	−0.02 (0.919)	1.001 (0.679)	0.03
Vegetables	−106.596 (0.278)	0.06 (0.235)	0.89 (0.151)	0.66	188.95 (0.033) **	−0.09 (0.041) **	1.98 (0.001) ***	0.57
Food Products	−148.82 (0.0501) *	0.08 (0.036) **	−0.11 (0.799)	0.53	−201.39 (0.002) ***	0.104 (0.002) ***	0.17 (0.629)	0.83

Values in the parenthesis are p-values

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level

In the case of imports in Table 4.11, the coefficients of the dummy variable and the time variable for 'animals' are statistically insignificant. The coefficient of the dummy variable for the vegetables has shown a statistical increase in imports during 2011-2020 in comparison to the imports during 2000-2009. The coefficient of the time variable for vegetables shows an overall decline in imports by 9.02% per annum. The p-value of the coefficient of the dummy variable for food products does not exhibit a statistically significant difference in its imports after the formation of this CEPA. However, the overall change in imports from 2000-2020 is revealed by the coefficient of time variable of food products.

4.3.11 India-ASEAN FTA

India – ASEAN FTA has been functional since January 2010. Accordingly, the analysis was carried out for the periods 2000-2009 and 2011-2020, pre-RTA formation and post-RTA formation, respectively.

Table 4.12 Exports & Imports under the India- ASEAN FTA

Product	Exports				Imports			
	α *(Constant)*	β_1 *(Time)*	β_2 *(Dummy)*	R^2	α *(Constant)*	β_1 *(Time)*	β_2 *(Dummy)*	R^2
Animals	−133.15 (0.0301) **	0.07 (0.019) **	1.596 (0.0003) ***	0.93	−146.67 (0.008) ***	0.08 (0.006) ***	1.339 (0.0004) ***	0.94
Vegetables	−76.06 (0.275)	0.05 (0.204)	0.995 (0.029) **	0.78	−102.39 (0.044) **	0.06 (0.024) **	0.71 (0.025) **	0.86
Food Products	−131.01 (0.042) **	0.07 (0.027) **	−0.22 (0.565)	0.50	−333.86 (<0.0001) ***	0.17 (<0.0001) ***	0.14 (0.583)	0.96

Values in the parenthesis are p-values

*** Significant at 1% level, ** Significant at 5% level

In Table 4.12, concerning the exports, the coefficient of the dummy variables for animals and vegetables exhibits a statistically significant difference in their exports from India to ASEAN nations. However, the dummy variable's coefficient for food products does not reveal a statistical difference in its exports after the establishment of the India-ASEAN FTA. For animals and vegetables exports, the growth is statistically significant for the whole period from 2000-2020.

In Table 4.12, regarding imports, the coefficients of the dummy variable belonging to ‘Animals’ and ‘vegetables’ imports are found to be statistically significant. However, the same is not observed for the dummy variable of food products. The imports of animals, vegetables, and food products have grown throughout the period, from ASEAN nations to India.

4.3.12 India-Malaysia CECA

The Malaysia-India Comprehensive Economic Cooperation Agreement (MICECA) became functional in July 2011. Thus, the years chosen for the pre-RTA formation and post-RTA formation analysis are 2001-2010 and 2012-2021, respectively.

Table 4.13 Exports & Imports under the India-Malaysia CECA

Product	Exports				Imports			
	α *(Constant)*	β_1 *(Time)*	β_2 *(Dummy)*	R^2	α *(Constant)*	β_1 *(Time)*	β_2 *(Dummy)*	R^2
Animals	−78.08 (0.012) **	0.05 (0.005) ***	0.79 (0.0003) ***	0.94	−395.15 (0.093) *	0.199 (0.089) *	−1.28 (0.364)	0.24
Vegetables	−177.62 (0.031) **	0.095 (0.022) **	−0.24 (0.609)	0.54	−35.26 (0.543)	0.02 (0.406)	1.30 (0.002) ***	0.85
Food Products	−85.44 (0.219)	0.05 (0.167)	0.07 (0.869)	0.41	−188.45 (0.009) ***	0.01 (0.006) ***	0.03 (0.945)	0.73

Values in the parenthesis are p-values

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level

In the case of exports in Table 4.13, the coefficients of dummy variables for animals show that the export trends are improving for India with positive growth since trade came under the regime of this CECA. There is an overall export increase of 4.47% per annum during the entire duration of 2001-2021. According to the coefficients of dummy variables for the exports of vegetables and food products, it can be stated that their exports have statistically neither improved nor deteriorated from India to Malaysia. The p-value of the coefficient of time for vegetables illustrates the overall difference in their exports for the entire duration of 2001-2021, while such an overall difference is lacking in the case of food products exports.

Regarding the imports in Table 4.13, the creation of India-Malaysia CECA could not statistically impact the imports of animals from Malaysia to India between 2012 and 2021. The coefficient of time for animals imports is statistically significant. For the case of vegetables, the p-value of the coefficient of the dummy variable implies a statistically positive impact on its imports. The coefficient of time for vegetables imports shows an increase of 2.41% per annum during 2001-2021. The coefficient of the dummy variable for food products does not highlight growth in its imports during the post-RTA formation decade. The coefficient of time for food products is statistically significant.

4.3.13 India-Japan CEPA

The periods selected for the decadal growth analysis are 2001-2010 and 2012-2021 for this pre-RTA formation and post-RTA formation, respectively, as India - Japan CEPA became operational in August 2011.

Table 4.14 Exports & Imports under the India-Japan CEPA

Product	Exports				Imports			
	α *(Constant)*	β_1 *(Time)*	β_2 *(Dummy)*	R^2	α *(Constant)*	β_1 *(Time)*	β_2 *(Dummy)*	R^2
Animals	40.65 (0.106)	−0.01 (0.253)	0.59 (0.001) ***	0.71	−336.33 (0.039) **	0.17 (0.036) **	−0.43 (0.652)	0.49
Vegetables	−51.18 (0.067) *	0.03 (0.028) **	0.26 (0.132)	0.80	−88.803 (0.354)	0.05 (0.314)	0.38 (0.519)	0.43
Food Products	−175.11 (0.212)	0.09 (0.184)	−1.14 (0.1901)	0.11	−113.91 (0.066) *	0.06 (0.052) *	0.32 (0.379)	0.701

Values in the parenthesis are p-values

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level

In Table 4.14, concerning the exports, the p-value of the coefficient of dummy variables for product animals has exhibited a statistically significant difference between the pre and post-RTA formation decade. The dummy variable's coefficient for exports of vegetables and food products is statistically insignificant. The coefficient of time for animals and food products does not reveal an overall difference in their exports during the total years from 2001-2021. Conversely, an overall significant increase is noticed in the exports of vegetables from India to Japan during the whole period from 2001-2021.

In the case of imports in Table 4.14, the p-values of the coefficient of dummy variables for all three agricultural commodities imply that their imports have not statistically changed from Japan to India for the referred decade of 2012-2021 compared to the previous period of RTA formation. For animals, the import growth is statistically significant for the whole period. The coefficient of time for vegetables is insignificant. The coefficient of time for food products shows an increase of 6.04% per annum in its imports during the entire duration from 2001-2021.

4.4 Summary

There are a total of 36 cases of product-wise exports in Tables 4.3 to 4.14 for the analysis of the growth model. Similarly, 34 cases of product-wise imports are analysed in Tables 4.3 to 4.14. There is a difference of two cases between exports and imports due to the non-availability of sufficient data on imports of animals from Afghanistan and Bhutan to India. Of these total 70 cases (comprising exports and imports), 22 represent values for animals, 24 for vegetables, and 24 for food products. Among these 22 cases for animals, 12 cases represent exports, and 10 cases represent imports of animals. In contrast, for 24 cases each of vegetables and food products, both exports and imports equally correspond to 12 cases each in vegetables and food products.

Table 4.15 Product-wise Classification of Exports Cases

Products	**RTAs with Positive Growth**	**RTAs with Negative Growth**	**RTAs with No change in Growth**
Animals	Afghanistan PTA, ASEAN FTA, Malaysia CECA, Japan CEPA	Thailand FTA	Sri Lanka FTA, Singapore CECA, Bhutan FTA, Chile PTA, MERCOSUR PTA, Nepal PTA, the Republic of Korea CEPA
Vegetables	Chile PTA, MERCOSUR PTA, ASEAN FTA	Sri Lanka FTA	Afghanistan PTA, Thailand FTA, Singapore CECA, Bhutan FTA, Nepal PTA, the Republic of Korea CEPA, Malaysia CECA, Japan CEPA
Food Products	Thailand FTA		Sri Lanka FTA, Afghanistan PTA, Singapore CECA, MERCOSUR PTA, Bhutan FTA, Chile PTA, Nepal PTA, the Republic of Korea CEPA, ASEAN FTA, Malaysia CECA, Japan CEPA

In Table 4.15, three groups are formed for the cases of exports of agricultural products from India based on the growth rate analysis in Section 4.3 Results and Discussion. Considering the 'animals exports' from India to the twelve-studied RTAs, a statistically significant difference is observed in five agreements: Afghanistan, Thailand, ASEAN, Malaysia, and Japan. Among these five agreements, India's exports of animals have shown positive growth in Afghanistan, ASEAN, Malaysia, and Japan, while negative growth is exhibited only in Thailand.

As per Table 4.15, for the category of 'vegetables exports' of India, four RTAs have shown a statistically significant change during the specified post-RTA formation decade compared to the pre-RTA formation decade. Vegetable exports have exhibited negative growth between India and Sri Lanka FTA. However, beneficial growth in exports of vegetables is observed from the Chile PTA, MERCOSUR PTA, and ASEAN FTA. Out of the 12 'food products exports' cases, only one has shown statistically significant change with positive growth. India's food products exports have experienced a rise with Thailand's FTA.

Table 4.16 Product-wise Classification of Imports Cases

Products	**RTAs with Positive Growth**	**RTAs with Negative Growth**	**RTAs with No change in Growth**
Animals	Singapore CECA, ASEAN FTA	Sri Lanka FTA, Thailand FTA	Chile PTA, MERCOSUR PTA, Nepal PTA, the Republic of Korea CEPA, Malaysia CECA, Japan CEPA
Vegetables	The Republic of Korea CEPA, ASEAN FTA, Malaysia CECA		Sri Lanka FTA, Afghanistan PTA, Thailand FTA, Singapore CECA, Bhutan FTA, Chile PTA, MERCOSUR PTA, Nepal PTA, Japan CEPA
Food Products		Bhutan FTA, Chile PTA	Sri Lanka FTA, Afghanistan PTA, Thailand FTA, Singapore CECA, MERCOSUR PTA, Nepal PTA, the Republic of Korea CEPA, ASEAN FTA, Malaysia CECA, Japan CEPA

As per Table 4.16, the commencement of RTA with Sri Lanka, ASEAN, Thailand, and Singapore has shown a statistical impact on 'imports of animals' to India. While there is a fall in imports of animals from Sri Lanka and Thailand to India, animals imports from Singapore and ASEAN to India have shown a statistical rise.

In Table 4.16, from the notion of 'vegetables imports' in India, there has been an increasing trend in imports from the Republic of Korea CEPA, ASEAN FTA, and Malaysia CECA. None of the above RTA has exhibited a negative growth in India's imports of vegetables. Regarding the 'food products imports' to India, there is a declining trend from Bhutan and Chile. India's food imports have not statistically increased since the inception of the above-stated RTAs.

Among the above three agricultural product categories considered in the study, products of 'animals' have shown the most vigorous results compared to vegetables and food products. As per Tables 4.15 and 4.16, product 'animals' have experienced statistically significant differences in exports with five RTAs and in imports with four trading partners, from a total of 22 cases of exports and imports. Interestingly, the India-Thailand FTA has encountered positive and negative growth simultaneously both in the exports and imports of animals. Out of the total 24 cases for 'vegetables' (including cases of exports and imports), a statistically significant change is identified in 07 cases. Among these 07 cases of vegetables, 04 cases are from exports and 03 are from imports. For 'food products,' statistically significant change is exhibited in only 03 cases, of which one case is of exports and two of imports, after the formation of RTAs with India.

The growth analysis of the pre-and post-RTA establishment period reveals the most significant changes in a total of four cases of exports and imports, specifically between India and ASEAN. Among these four cases under consideration, two are

for animals, encompassing both exports and imports, while the remaining two cases address both exports and imports of vegetable products. This is followed by the India-Thailand FTA with change in three cases; the export of both animals and food products, and the import of animals. The India-Sri Lanka FTA, India-Chile PTA, and India-Malaysia CECA also show statistically significant changes in two cases each. In the context of the Sri Lanka FTA, there is a change in exports of vegetables and imports of animals. Chile PTA has exhibited a change in exports of vegetables and imports of food products, whereas Malaysia CECA has experienced the same in both exports and imports of vegetables. No statistically significant differences were found in the PTA between India and Nepal. However, the India-Afghanistan PTA, India-Singapore CECA, India-Bhutan FTA, India-MERCOSUR PTA, India-the Republic of Korea CEPA, and India-Japan CEPA have experienced similar changes in every single case.

CHAPTER V

EXPORT COMPETITIVENESS OF INDIA'S AGRICULTURAL COMMODITIES UNDER REGIONAL TRADE AGREEMENTS

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5.1 Introduction

Revealed Comparative Advantage (RCA) has served as one of the remarkable foundations for research in international trade patterns. In his book 'Principles of Political Economy and Taxation', David Ricardo (1817) described the valuable technique known as the 'comparative advantage'. This theory contends that comparative advantage controls the structure of international trade, with countries possessing comparative advantages in exporting and imports being relatively disadvantageous. The study applies Balassa's Revealed Comparative Advantage (RCA) index to measure India's export competitiveness with its RTA partners. The principle of revealed comparative advantage (Balassa 1965, 1977, 1979, 1986) refers to individual countries' relative trading performance in certain commodities. As furtherance in trade research, the variations in trade patterns have been extensively studied using RCA. The RCA hypothesis was developed to give insight into a nation's or sector's export activity based on how that movement compares to one or more similar entities. In the literature, this RCA index has been employed in various studies to evaluate comparative advantages at the product level as well as the sectoral level (Yeats, 1985; Vollrath, 1991; Fertö & Hubbard, 2003; Serin & Civan, 2008; Bojnec & Fertő, 2019).

The Revealed Comparative Advantage (RCA) index is the ratio of the share of a country's total exports of the commodity j in its total exports and the share of world exports of the same commodity (commodity j) in total world exports. RCA is a valuable tool in identifying the items and markets with maximum opportunities for prosperity. RCA can take a value that ranges between 0 and $+\infty$. If the value of RCA is greater than one, a country is to obtain

a revealed comparative advantage. A nation having a high RCA in product 'j' is seen as an export powerhouse for that specific product. A country's export competitiveness in product j is proportional to the value of its RCA for that product j. This indicates that the nation specializes in that product and has a competitive advantage in its production and exporting process.

The primary purpose of the RCA analysis is to assess the comparative strengths and weaknesses of a country in certain products or sectors by examining its export performance. RCA measures can be used to assess patterns of economically feasible specialization along exclusive product lines. To determine a country's export competitiveness, measures of RCA have been utilized. Export competitiveness in agricultural commodities checks the ability of nations to take advantage of their natural resources, labor markets, climate, and agricultural expertise to acquire a comparative advantage in global trade. A nation's proportion of global exports of goods and services and how that proportion changes over time are reliable indicators of its export competitiveness. The World Economic Forum (2015) defines competitiveness as “the set of institutions, policies, and factors that determine the level of productivity of a country.”

Effective liberalised agreements-cum-strategies can boost export-led growth. The minimised trade barriers produce competitive forces, which stimulate productivity gains and the reorganisation of an economy towards its comparative advantage. The RCA index has the distinguishing feature of considering the intrinsic advantage of certain exporting goods and being correlated with changes in relative factor endowment and competitiveness of an economy. Since trade demonstrates such advantages, it is believed that the RCA index can be utilised to identify and generate trade patterns.

The frameworks of improvement, deterioration, and stability in export competitiveness (by means of RCA) under the framework of RTAs offer a perspective to understand the subtle shifts in demand and trade dynamics related to the agriculture sector. Economic causes such as structural change, improved global demand, and trade specialisation can influence the changes in RCA. Although this is a fundamental theoretical understanding of comparative advantage, applying this concept in empirical studies is always challenging, particularly when attempting to gauge trade performance.

5.2 Methodology

Data for the study is collected from the World Integrated Trade Solution (WITS). The data has been analyzed for 26 agricultural products of Animals (PC 01 to 05), Vegetables (PC 06 to 15), Food Products (PC 16 to 24), Silk (PC 50), and Cotton (PC 52) based on Harmonized System (HS2) classification. Table 5.1 lists product codes (PC) and product descriptions.

The formula for the RCA index of country i for product j is:

$RCA_{ij} = (x_{ij}/X_{it}) / (x_{wj}/X_{wt})$

Where x_{ij} and x_{wj} are the values of the country i's exports of product j and world exports of product j, X_{it} and X_{wt} refer to the country i's total exports and world total exports, respectively. The formula for calculating the RCA index for a country (i) concerning a specific product (j) entail comparing the country's share of that product's exports to total exports with the world's share of that product's exports to total exports. The numerator indicates how important the single product's exports are with respect to the country's overall export composition. At the same time, the denominator can be used as a benchmark to evaluate the product's relevance on a worldwide scale.

Table 5.1 Product Code and Description

PC	Product Description	PC	Product Description
01	Live animals	14	Vegetable plaiting materials and other vegetable products
02	Meat, edible meat, and offal	15	Animal/vegetable fats & oils and their cleavage products
03	Fish & crustaceans, mollusks & other aquatic invertebrates	16	Preparations of meat, fish or crustaceans, mollusks & others
04	Dairy products, birds' eggs, natural honey & other edible animal products	17	Sugars and sugar confectionery
05	Other products of animal origin	18	Cocoa and cocoa preparations
06	Live trees and other plants, bulbs, roots, cut flowers & others	19	Preparations of cereal, flour, starch, milk & pastrycooks' products
07	Edible vegetables, certain roots, and tubers	20	Preparations of vegetables, fruit, nuts, or other parts of plants
08	Edible fruit and nuts, citrus fruit peel	21	Miscellaneous edible preparations
09	Coffee, tea, matï, and spices	22	Beverages, spirits, and vinegar
10	Cereals	23	Residues & waste from the food industry; prepared animal fodder
11	Products of the milling industry, malt, starches, inulin, wheat gluten	24	Tobacco and manufactured tobacco substitutes
12	Oil seeds, oleaginous fruits, miscellaneous grains, seeds, & others	50	Silk
13	Lac, gums, resins, and other vegetables saps & extracts	52	Cotton

Source: WITS, World Bank PC- Product Code

The RCA technique is employed for each of the agricultural products specified in Table 5.1. Since the key objective of this study is to measure whether India's agriculture export

competitiveness has increased or decreased after the formation of RTAs, a 't test' is employed to test whether there is a statistically significant increase or decrease in the export competitiveness in terms of RCA, with selected nine nations/regional groups with whom India has signed RTAs. The t-test was carried out for 26 product lines of agricultural commodities. The null hypothesis is that there is no difference between the RCA values before the establishment of the RTA (RCA-1) and after the establishment of the RTA (RCA-2). The alternative hypothesis is that there is a significant difference in the RCA values (RCA-1 and RCA-2).

Table 5.2 India's Bilateral RTAs and the Study Period

Sr. No.	Name of the RTA	Year of Establishment	Study Period
1	India-Sri Lanka FTA	2000	1990-2020
2	India-Thailand FTA	2004	1991-2020
3	India-Singapore CECA	2005	1997-2020
4	India-Chile PTA	2007	1997-2019
5	India-MERCOSUR PTA	2009	1996-2021
6	India-The Republic of Korea CEPA	2010	1996-2020
7	India-ASEAN FTA	2010	1996-2021
8	India-Malaysia CECA	2011	1997-2020
9	India-Japan CEPA	2011	1996-2020

The statistical significance is tested based on the ‘p’ values at 1%, 5%, and 10% significance levels. Commodities are classified based on ‘improvement in export competitiveness’, ‘deterioration of export competitiveness’, and ‘no change in export competitiveness’. If the calculated 't' value is insignificant, the null hypothesis is retained (not rejected), suggesting that there is no change in export competitiveness. Statistically significant plus ‘t’ values imply a statistically significant improvement in RCA, and a statistically significant minus

‘t’ value suggests a deterioration in the RCA concerning a particular commodity. The RTAs of India considered for estimating RCA values and the 't-test’ are given in Table (5.2). The study period is different for different RTAs as the year of establishment is different.

5.3 Results and Discussion

Each of the following tables from 5.3 to 5.11 has the product-wise mean values before the formation of RTA (RCA-1) and mean values after the formation of RTA (RCA-2). The t-values and p-values are vigorously checked to disclose the export competitiveness related to each of the products under India's following nine bilateral trade agreements. The numerical results regarding the export competitiveness of agricultural commodities are presented in tables from Table 5.3 to Table 5.11. The products that have exhibited statistically significant differences are considered primarily for the discussion section.

5.3.1 India-Sri Lanka FTA

The RCA values of pre- and post-FTA formation between India and Sri Lanka, along with ‘t’ values to test the statistically significant difference, are presented in Table 5.3.

Table (5.3) shows mean RCA values before and after the creation of the FTA and ‘t’ values to understand any significant change in the RCA values before and after the formation of the India and Sri Lanka FTA. Based on p-values, out of these 26 commodities, 11 commodities have shown a significant change in export competitiveness since the formation of the India – Sri Lanka FTA.

The product codes 03 (Fish & crustaceans, mollusks & other aquatic invertebrates), 10 (Cereals), 13 (Lac, gums, resins, and other vegetables saps & extracts), 14 (Vegetable plaiting materials and other vegetable products), 17 (Sugars and sugar confectionery), 18 (Cocoa and cocoa preparations), 19 (Preparations of cereal, flour, starch, milk &

pastrycooks' products), 20 (Preparations of vegetables, fruit, nuts, or other parts of plants), 23 (Residues & waste from the food industry; prepared animal fodder), 24 (Tobacco and manufactured tobacco substitutes), and 52 (Cotton) have shown a statistically significant decline in RCA values.

Table 5.3 Export Competitiveness under India- Sri Lanka FTA

PC	RCA-1	RCA-2	t value	P-value	PC	RCA-1	RCA-2	t value	P-value
01	182	225	0.033	0.974	14	8.54	2.42	-3.976	0.001***
02	0.46	0.69	0.371	0.714	15	0.16	0.63	1.159	0.258
03	0.73	0.16	-3.629	0.001***	16	2.61	0.17	-1.219	0.235
04	1.65	2.52	0.839	0.41	17	629	207	-2.115	0.045**
05	0.36	0.26	-0.541	0.593	18	8.68	2.18	-2.706	0.012**
06	0.15	0.06	-1.605	0.122	19	16	3.32	-4.779	0.000***
07	17	12.1	-0.825	0.417	20	1.94	0.18	-2.653	0.014**
08	0.1	0.09	-0.562	0.579	21	0.36	0.43	0.382	0.706
09	0.13	0.13	-0.107	0.916	22	1.47	1.45	0.71	0.485
10	84.3	36.7	-1.716	0.099*	23	53032	5.22	-2.09	0.047**
11	0.21	0.44	0.807	0.428	24	0.53	0.12	-4.075	0.000***
12	1.13	1.73	1.355	0.188	50	7.304	457.088	1.082	0.290
13	3.03	1.66	-1.745	0.094*	52	69.962	19.654	-2.983	0.006***

RCA-1=Mean RCA Before RTA RCA-2= Mean RCA After RTA

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level.

The sample size (n) = 31

It means all these eleven commodities have exhibited a statistically significant deterioration in RCA for exports after the formation of the India – Sri Lanka FTA.

5.3.2 India-Thailand FTA

The t-test findings for determining if there is a statistically significant difference in RCA values before and after the creation of the India and Thailand FTA are shown in Table (5.4).

As per the calculated p-values, out of these 26 commodities, 16 products have shown a significant difference in RCA after the formation of the India – Thailand FTA.

Table 5.4 Export Competitiveness under India- Thailand FTA

PC	RCA-1	RCA-2	t value	P-value	PC	RCA-1	RCA-2	t value	P-value
01	0.14	0.12	0.743	0.464	14	0.76	1.07	1.285	0.209
02	0.01	12	2.65	0.013**	15	20.8	3.68	-4.421	0.000***
03	1.22	4.19	3.278	0.003***	16	0	0.04	3.533	0.001***
04	0.87	1.59	1.761	0.089*	17	0.03	0.12	1.423	0.166
05	0.54	0.99	1.125	0.27	18	0	3.2	2.032	0.052*
06	0.06	0.2	5.533	0.000***	19	0.2	0.43	2.158	0.04**
07	0.02	0.23	4.074	0.000***	20	0.01	0.1	1.558	0.131
08	0.11	0.64	5.109	0.000***	21	0.11	0.09	0.09	0.929
09	0.91	48.5	4.489	0.000***	22	0.17	0.42	1.038	0.308
10	0.03	0.15	1.451	0.158	23	23.6	9.48	-4.284	0.000***
11	0.15	0.24	2.401	0.023**	24	0.34	3.88	3.191	0.004***
12	4.56	14.8	3.122	0.004***	50	13.497	8.455	-1.171	0.252
13	6.69	12.6	3.314	0.003***	52	7.982	9.288	0.89	0.381

RCA-1=Mean RCA Before RTA RCA-2= Mean RCA After RTA

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level.

The sample size (n) = 30

In Table 5.4, product codes 02 (Meat, edible meat, and offal), 03 (Fish & crustaceans, mollusks & other aquatic invertebrates), 04 (Dairy products, birds' eggs, natural honey & other edible animal products), 06 (Live trees and other plants, bulbs, roots, cut flowers & others), 07 (Edible vegetables, certain roots, and tubers), 08 (Edible fruit and nuts; citrus fruits peel), 09 (Coffee, tea, matï, and spices), 11 (Products of the milling industry, malt, starches, inulin, wheat gluten), 12 (Oil seeds, oleaginous fruits, miscellaneous grains, seeds, & others), 13 (Lac, gums, resins, and other vegetables saps & extracts), 16 (Preparations of meat, fish or crustaceans, mollusks & others), 18 (Cocoa and cocoa preparations), 19

(Preparations of cereal, flour, starch, milk & pastrycooks' products), and 24 (Tobacco and manufactured tobacco substitutes) have also shown a statistically significant positive change in the RCA after the formation of India–Thailand FTA.

Product codes 15 (Animal/vegetable fats & oils and their cleavage products) and 23 (Residues & waste from the food industry; prepared animal fodder) have shown negative growth in the RCA. As per the statistical results, a total of 14 products showed a significant improvement in export competitiveness from India, whereas only two products have lost their export competitiveness.

5.3.3 India- Singapore CECA

The t-test findings for comparing the RCA values before and after the establishment of the India and Singapore CECA are displayed in Table (5.5). Based on p-values, a total of 17 products of 26 commodities have shown a significant change in RCA since the formation of India – Singapore CECA.

In Table 5.5, the product codes such 01 (Live animals), 02 (Meat, edible meat, and offal), 05 (Other products of animal origin), 08 (Edible fruit and nuts; citrus fruits peel), 10 (Cereals), 12 (Oil seeds, oleaginous fruits, miscellaneous grains, seeds, & others), 13 (Lac, gums, resins, and other vegetables saps & extracts), 17 (Sugars and sugar confectionery), 19 (Preparations of cereal, flour, starch, milk & pastrycooks' products), 20 (Preparations of vegetables, fruit, nuts, or other parts of plants), 21 (Miscellaneous edible preparations), 23 (Residues & waste from the food industry; prepared animal fodder), 24 (Tobacco and manufactured tobacco substitutes), 50 (Silk), and 52 (Cotton) have exhibited a deterioration in RCA.

Table 5.5 Export Competitiveness under India- Singapore CECA

PC	RCA-1	RCA-2	t value	P-value	PC	RCA-1	RCA-2	t value	P-value
01	0.09	0.01	-1.735	0.097*	14	0.79	0.6	-0.965	0.345
02	8.88	0.71	-4.636	0.000***	15	0.93	0.6	-1.507	0.146
03	9.78	10.3	0.133	0.896	16	1.21	1.88	0.867	0.395
04	0.56	0.99	1.928	0.067*	17	7.77	1.57	-2.038	0.054*
05	35.7	0.47	-4.856	0.000***	18	0.01	0.16	1.173	0.253
06	2.71	1.87	-1.255	0.223	19	0.91	0.17	-6.305	0.000***
07	15.8	20.2	1.244	0.227	20	1.44	0.8	-2.806	0.01**
08	8.81	4.29	-4.799	0.000***	21	1.43	0.45	-4.748	0.000***
09	3.78	3.23	-0.929	0.363	22	0.16	0.27	1.915	0.069*
10	351	48.6	-5.655	0.000***	23	147	6.28	-5.89	0.000***
11	4.55	2.54	-1.18	0.251	24	1.46	1.06	-1.951	0.064*
12	11.6	6.23	-4.64	0.000***	50	63.458	23.025	-3.785	0.001***
13	22	3.45	-8.887	0.000***	52	23.025	6.803	-5.379	0.000***

RCA-1=Mean RCA Before RTA RCA-2= Mean RCA After RTA

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level.

The sample size (n) = 24

The commodities of Dairy products, birds' eggs, natural honey & other edible animal products (04) and Beverages, spirits, and vinegar (22) have seen a rise in RCA. The total number of products that have seen beneficial growth in export competitiveness is only two. In contrast, fifteen products have shown a fall in export competitiveness after the formation of the India–Singapore CECA.

5.3.4 India-Chile PTA

The t-test was conducted for 22 agricultural commodities under the India – Chile PTA. As per the results in Table 5.6, out of the total 22 products, only 06 products have shown a significant difference in RCA after the formation of India – Chile PTA.

Table 5.6 Export Competitiveness under India-Chile PTA

PC	RCA-1	RCA-2	t value	P-value	PC	RCA-1	RCA-2	t value	P-value
01	N/A	N/A	N/A	N/A	14	0.39	0	-1.164	0.257
02	N/A	N/A	N/A	N/A	15	0.22	0.09	-0.76	0.456
03	0.41	0.03	-2.958	0.008***	16	N/A	N/A	N/A	N/A
04	0.23	0.003	-1.186	0.249	17	1.63	0.1	-1.87	0.076*
05	0.79	0.001	-1.718	0.101	18	N/A	N/A	N/A	N/A
06	0.06	0.01	-1.005	0.327	19	0.04	0.05	0.492	0.628
07	0.04	0.01	0.73	0.474	20	0.03	0.1	3.719	0.001***
08	0.01	0.002	-1.735	0.097*	21	0.03	0.06	2.011	0.057*
09	0.44	2.53	0.734	0.471	22	0.01	0.01	2.561	0.018**
10	0.01	0.03	1.104	0.282	23	0.7	0.12	-0.76	0.456
11	0	0.03	0.898	0.379	24	5.03	1.93	-0.833	0.414
12	0.07	0.04	-0.572	0.573	50	114.036	21459.11	1.718	0.101
13	0.27	0.28	0.042	0.967	52	33.194	51.413	1.319	0.201

RCA-1=Mean RCA Before RTA RCA-2= Mean RCA After RTA

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level.

The sample size (n) = 23

Product codes 20 (Preparations of vegetables, fruit, nuts, or other parts of plants), 21 (Miscellaneous edible preparations), and 22 (Beverages, spirits, and vinegar) have shown an improvement in the RCA after the establishment of India's PTA with Chile.

Likewise, product codes 03 (Fish & crustaceans, mollusks & other aquatic invertebrates), 08 (Edible fruit and nuts; citrus fruits peel), and 17 (Sugars and sugar confectionery) have highlighted a drop in RCA. As per the analysis in Table 5.6, an equal number of products (03 agricultural commodities) have shown positive and negative growth in export competitiveness after the India–Chile PTA formation.

5.3.5 India-MERCOSUR PTA

Out of the 24 agricultural commodities for whom the t-test was carried out after the formation of India – MERCOSUR PTA (Table 5.7), a total of 10 products have exhibited a significant difference in RCA.

Table 5.7 Export Competitiveness under the India-MERCOSUR PTA

PC	RCA-1	RCA-2	t value	P-value	PC	RCA-1	RCA-2	t value	P-value
01	N/A	N/A	N/A	N/A	14	1.68	0.11	-3.006	0.006***
02	0.01	0.000	-1.382	0.18	15	0.15	0.09	-0.817	0.422
03	0.04	0.01	-2.624	0.015**	16	0.03	0.001	-1.922	0.067*
04	0.03	0.004	-1.619	0.119	17	0.008	0.007	0.394	0.697
05	0.08	0.29	2.115	0.045**	18	N/A	N/A	N/A	N/A
06	0.47	0.54	1.306	0.204	19	0.01	0.02	0.879	0.388
07	0.44	0.65	2.102	0.046**	20	0.005	0.008	1.692	0.104
08	0.12	0.03	-2.778	0.010**	21	0.02	0.03	1.144	0.264
09	0.26	0.19	-0.517	0.61	22	1.93	0.002	-1	0.328
10	0.004	0.004	0.358	0.723	23	0.003	0.01	3.196	0.004***
11	0.011	0.008	-0.098	0.923	24	0.14	0.27	2.222	0.036**
12	0.05	0.02	-3.493	0.002***	50	1914.39	1.86	-1.003	0.326
13	21.15	9.42	-2.457	0.022**	52	4.19	2.74	-1.202	0.241

RCA-1=Mean RCA Before RTA RCA-2= Mean RCA After RTA

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level.

The sample size (n) = 26

In Table 5.7, product codes 05 (Other products of animal origin), 07 (Edible vegetables, certain roots, and tubers), 23 (Residues & waste from the food industry; prepared animal fodder) & 24 (Tobacco and manufactured tobacco substitutes) have shown a rise in RCA.

The products 03 (Fish & crustaceans, mollusks & other aquatic invertebrates), 08 (Edible fruit and nuts; citrus fruit peel), 12 (Oil seeds, oleaginous fruits, miscellaneous grains, seeds,

& others), 13 (Lac, gums, resins, and other vegetables saps & extracts), 14 (Vegetable plaiting materials and other vegetable products) & 16 (Preparations of meat, fish or crustaceans, mollusks & others) have exhibited the fall in RCA. As per the results in Table 5.7, four commodities have shown progress in export competitiveness of agricultural commodities, whereas six commodities have shown a decline in export competitiveness after the formation of India - MERCOSUR PTA.

5.3.6 India-The Republic of Korea CEPA

Table (5.8) displays mean RCA values before and after the creation of the CEPA and 't' values to identify any significant change in the RCA values before and after the formation of the India -Republic of Korea CEPA. Based on p-values, out of these 26 commodities, 14 products have shown a significant difference in RCA after the formation of India – The Republic of Korea CEPA.

As per the analysis in Table 5.8, the products that have exhibited beneficial growth in RCA are Live trees and other plants, bulbs, roots, cut flowers & others (06), Edible fruit and nuts; citrus fruits peel (08), Oil seeds, oleaginous fruits, miscellaneous grains, seeds, & others (12), Vegetable plaiting materials and other vegetable products (14), Sugars and sugar confectionery (17), Preparations of cereal, flour, starch, milk & pastrycooks' products (19), Preparations of vegetables, fruit, nuts, or other parts of plants (20), and Tobacco and manufactured tobacco substitutes (24).

The products code with 04 (Dairy products, birds' eggs, natural honey & other edible animal products), 05 (Other products of animal origin), 15 (Animal/vegetable fats & oils and their cleavage products), 22 (Beverages, spirits, and vinegar), 23 (Residues & waste from the food industry; prepared animal fodder) and 50 (Silk) have shown a fall in RCA. The total number of products whose export competitiveness from India has increased is eight. In contrast, six

products have shown a decline in the competitiveness of agricultural commodities after the formation of India–the Republic of Korea CEPA.

Table 5.8 Export Competitiveness under India-The Republic of Korea CEPA

PC	RCA-1	RCA-2	t value	P-value	PC	RCA-1	RCA-2	t value	P-value
01	3.35	0.37	-1.426	0.167	14	85.6	416.5	3.721	0.001***
02	28.7	2.25	-1.407	0.173	15	31.83	21.25	-2.226	0.036**
03	2.48	2.35	-0.282	0.781	16	1.764	1.55	-0.115	0.91
04	27.6	1.65	-5.359	0.000***	17	1.44	4.85	1.786	0.087*
05	2.19	1.16	-1.717	0.099*	18	0.17	4.87	1.392	0.177
06	0.57	1.39	3.081	0.005***	19	0.08	0.19	2.539	0.018**
07	0.85	0.67	-0.83	0.415	20	0.65	1.52	3.397	0.003***
08	2.9	11	3.917	0.001***	21	0.61	0.56	-0.255	0.801
09	44.38	71.59	1.39	0.178	22	3.01	0.46	-2.271	0.033**
10	6002	1395	-1.694	0.104	23	492	115	-4.475	0.000***
11	7.481	11.5	0.878	0.389	24	2.38	5.44	2.9	0.008***
12	14.94	31.23	3.234	0.003***	50	4.166	0.797	-3.482	0.002***
13	21.26	26.72	1.536	0.138	52	53.16	48.281	-0.926	0.364

RCA-1=Mean RCA Before RTA RCA-2= Mean RCA After RTA

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level.

The sample size (n) = 25

5.3.7 India-ASEAN FTA

In Table (5.9), a total of 17 products have highlighted the statistically significant difference in RCA after the formation of the India – ASEAN FTA.

As per Table 5.9, product codes 01 (Live animals), 06 (Live trees and other plants, bulbs, roots, cut flowers & others), 07 (Edible vegetables, certain roots, and tubers), 08 (Edible fruit and nuts; citrus fruits peel), 11 (Products of the milling industry, malt, starches, inulin,

wheat gluten), 12 (Oil seeds, oleaginous fruits, miscellaneous grains, seeds, & others), 13 (Lac, gums, resins, and other vegetables saps & extracts), 14 (Vegetable plaiting materials and other vegetable products), 15 (Animal/vegetable fats & oils and their cleavage products), 19 (Preparations of cereal, flour, starch, milk & pastrycooks' products), 20 (Preparations of vegetables, fruit, nuts, or other parts of plants), 21 (Miscellaneous edible preparations), 23 (Residues & waste from the food industry; prepared animal fodder) and 50 (Silk) have exhibited the deterioration in RCA.

Table 5.9 Export Competitiveness under the India-ASEAN FTA

PC	RCA-1	RCA-2	t value	P-value	PC	RCA-1	RCA-2	t value	P-value
01	0.05	0.004	-2.808	0.009***	14	0.9	0.18	-5.468	0.000***
02	87.19	98.72	0.555	0.584	15	0.19	0.08	-2.717	0.012**
03	1.41	3.35	3.748	0.000***	16	0.07	0.08	0.284	0.779
04	0.79	0.92	0.929	0.362	17	4.02	2.88	-0.631	0.534
05	5.68	9.93	1.385	0.179	18	0.01	0.27	5.163	0.000***
06	0.79	0.39	-1.863	0.075*	19	0.49	0.18	-5.209	0.000***
07	6.65	1.91	-3.268	0.003***	20	0.90	0.23	-1.904	0.069*
08	1.24	0.35	-2.639	0.014**	21	0.83	0.38	-3.893	0.000***
09	1.8	2.79	4.056	0.000***	22	0.36	0.28	-0.524	0.605
10	18.38	2.64	-1.647	0.113	23	47.74	6.22	-4.548	0.000***
11	3.45	0.94	-2.055	0.051*	24	1.67	1.59	-0.335	0.74
12	33.1	26.38	-1.732	0.096*	50	24.12	4.80	-3.588	0.001***
13	11.57	3.69	-2.87	0.008***	52	9.24	7.55	-1.461	0.157

RCA-1=Mean RCA Before RTA RCA-2= Mean RCA After RTA

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level.

The sample size (n) = 26

Product codes 03 (Fish & crustaceans, mollusks & other aquatic invertebrates), 09 (Coffee, tea, matï, and spices), and 18 (Cocoa and cocoa preparations) have seen a rise in RCA. The total number of products that have seen detrimental growth in export competitiveness is

fourteen. In contrast, an improvement in export competitiveness is revealed by only three products after the formation of the India–ASEAN FTA.

5.3.8 India-Malaysia CECA

A 't-test' was performed to see if there was a statistically significant difference in RCA values before and after CECA between India and Malaysia was formed, and the findings are shown in Table (5.10).

Table 5.10 Export Competitiveness under India-Malaysia CECA

PC	RCA-1	RCA-2	t value	P-value	PC	RCA-1	RCA-2	t value	P-value
01	0.03	0	-1.204	0.242	14	12.2	0.22	-1.504	0.147
02	807	430	-2.359	0.028**	15	0.09	0.08	-0.568	0.576
03	6.07	3.46	-2.156	0.042**	16	1.88	0.1	-3.037	0.006***
04	0.3	0.5	0.91	0.373	17	18.6	7.84	-1.249	0.225
05	4.84	2.18	-1	0.328	18	0.02	0.1	3.875	0.001***
06	0.64	0.41	-1.826	0.081*	19	0.75	0.38	-3.445	0.002***
07	53	22.4	-5.94	0.000***	20	3.74	1.25	-2.538	0.019**
08	3.75	4.53	1.309	0.204	21	1.45	0.75	-2.774	0.011**
09	50.5	36.3	-1.188	0.248	22	0.17	0.36	3.25	0.004***
10	2038	663	-1.435	0.166	23	20.7	1.09	-2.813	0.01*
11	4.75	7.26	0.891	0.382	24	2.96	1.93	-1.134	0.269
12	127	93.5	-1.701	0.103	50	289.870	143.314	-2.018	0.056*
13	76.1	37.5	-2.156	0.042**	52	26.183	8.884	-6.418	0.000***

RCA-1=Mean RCA Before RTA RCA-2= Mean RCA After RTA

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level.

The sample size (n) = 24

As suggested by the p-values in Table 5.10, a total of 14 commodities have shown a significant difference in RCA after the formation of India – Malaysia CECA. Products such as Live trees and other plants, bulbs, roots, cut flowers & others (06), Edible vegetables,

certain roots, and tubers (07), Preparations of meat, fish or crustaceans, mollusks & others (16), Preparations of cereal, flour, starch, milk & pastrycooks' products (19), Residues & waste from the food industry; prepared animal fodder (23), Silk (50), and Cotton (52) have revealed the negative growth in RCA whereas as products Cocoa and cocoa preparations (18) and Beverages, spirits, and vinegar (22) have exhibited the improvement in RCA.

The product codes 02 (Meat, edible meat, and offal), 03 (Fish & crustaceans, mollusks & other aquatic invertebrates), 13 (Lac, gums, resins, and other vegetables saps & extracts), 20 (Preparations of vegetables, fruit, nuts, or other parts of plants) & 21 (Miscellaneous edible preparations) have also shown the statistically significant difference (at 5% level). All these five products have shown the deterioration in RCA after the formation of India – Malaysia CECA.

As per the statistical outcomes in Table 5.10, only two commodities have shown progress in the export competitiveness of agricultural commodities, whereas 12 products have worsened in export competitiveness after the formation of the Malaysia–India CECA.

5.3.9 India-Japan CEPA

Based on p-values, out of these 26 commodities, 13 products have shown a significant difference in RCA after the formation of India – Japan CEPA.

In Table 5.11, the RCA associated with product codes 03 (Fish & crustaceans, mollusks & other aquatic invertebrates), 04 (Dairy products, birds' eggs, natural honey & other edible animal products), 05 (Other products of animal origin), 06 (Live trees and other plants, bulbs, roots, cut flowers & others), 08 (Edible fruit and nuts; citrus fruits peel), 09 (Coffee, tea, matï, and spices), 15 (Animal/vegetable fats & oils and their cleavage products), 16 (Preparations of meat, fish or crustaceans, mollusks & others), 19 (Preparations of cereal,

flour, starch, milk & pastrycooks' products), 24 (Tobacco and manufactured tobacco substitutes) and 50 (Silk) have shown a statistically significant deterioration.

Table 5.11 Export Competitiveness under India-Japan CEPA

PC	RCA-1	RCA-2	t value	P-value	PC	RCA-1	RCA-2	t value	P-value
01	0.57	0.03	-0.967	0.344	14	416.6	529.4	1.001	0.327
02	2.69	0.00	-1.506	0.146	15	64.8	35.19	-5.177	0.000***
03	132	42	-3.182	0.004***	16	8.658	1.796	-2.632	0.015**
04	145	38.3	-3.003	0.006***	17	0.28	0.07	-1.039	0.309
05	208	27.3	-5.579	0.000***	18	0.25	0.02	-0.982	0.336
06	91.1	3.75	-3.637	0.001***	19	0.47	0.19	-2.408	0.025**
07	10.4	7.42	-1.026	0.316	20	9.16	18	3.428	0.002***
08	158	60.7	-3.192	0.004***	21	1.68	1.36	-1.09	0.287
09	315.7	50.15	-4.597	0.000***	22	2.76	0.23	-1.699	0.103
10	31.55	19.18	-0.667	0.511	23	308	223	-0.777	0.445
11	1.371	3.2	3.323	0.003***	24	0.74	0.18	-2.596	0.016**
12	15.14	16.47	0.402	0.692	50	5.961	2.636	-4.191	0.000***
13	160.1	153.8	-0.262	0.796	52	19.477	16.369	-1.641	0.114

RCA-1=Mean RCA Before RTA RCA-2= Mean RCA After RTA

*** Significant at 1% level, ** Significant at 5% level.

The sample size (n) = 25

As per the analysis in Table 5.11, the products that have seen the most statistically significant improvement in RCA are Products of the milling industry, malt, starches, inulin, wheat gluten (11), and Preparations of vegetables, fruit, nuts, or other parts of plants (20). Only two products have shown an improvement in export competitiveness. In contrast, eleven products have shown a drop in export competitiveness of agricultural commodities after the formation of the India–Japan CEPA.

5.3.10 Product-wise Classification of RTAs through RCA Category

Table 5.12 displays the product-wise classification for each product under all nine specified RTAs. For each product under every RTA, the classification is based on the improvement in RCA, deterioration in RCA, and no change in the RCA. Such classification assists in an improvised understanding of the export competitiveness of each commodity under India's RTA framework.

In Table (5.12), the column of 'RTAs with improvement in RCA' covers the RTAs where the specific agricultural product has strengthened (statistically) its Revealed Comparative Advantage. In other words, these trade agreements have boosted India's export competitiveness for a particular product. The column 'RTAs with deterioration in RCA' presents the RTAs under whom India's export competitiveness for the given product has declined significantly. The last column of 'RTAs with no change in RCA' details the RTAs where India's RCA remains statistically constant for the specified agricultural product.

Table 5.12 Summary of Product-wise classification

PC	Product Description	RTAs with improvement in RCA	RTAs with deterioration in RCA	RTAs with no change in RCA
01	Live animals	NIL	Singapore CEPA ASEAN FTA	The Republic of Korea CEPA, Japan CEPA, Malaysia CECA, Sri Lanka FTA, Thailand FTA
02	Meat, edible meat, and offal	Thailand FTA	Singapore CEPA Malaysia CECA	The Republic of Korea CEPA, Japan CEPA, Sri Lanka FTA, MERCOSUR PTA, ASEAN FTA

03	Fish & crustaceans, mollusks & other aquatic invertebrates	Thailand FTA ASEAN FTA	Japan CEPA Malaysia CECA Chile PTA Sri Lanka FTA MERCOSUR PTA	The Republic of Korea CEPA Singapore CEPA
04	Dairy products, birds' eggs, natural honey & other edible animal products	Thailand FTA Singapore CECA	The Republic of Korea CEPA Japan CEPA	Malaysia CECA, Sri Lanka FTA, Chile PTA, MERCOSUR PTA, ASEAN FTA
05	Other products of animal origin	Thailand FTA MERCOSUR PTA	The Republic of Korea CEPA Singapore CEPA India-Japan CEPA	Malaysia CECA, Sri Lanka FTA, Chile PTA, ASEAN FTA
06	Live trees and other plants, bulbs, roots, cut flowers & others	Thailand FTA The Republic of Korea CEPA	Japan CEPA Malaysia CECA ASEAN FTA	Singapore CEPA, Sri Lanka FTA, Chile PTA, MERCOSUR PTA
07	Edible vegetables, certain roots, and tubers	MERCOSUR PTA	Malaysia CECA ASEAN FTA	The Republic of Korea CEPA, Singapore CEPA, Japan CEPA, Chile PTA, Sri Lanka FTA, Thailand FTA
08	Edible fruit and nuts, citrus fruit peel	Thailand FTA The Republic of Korea CEPA	Singapore CEPA Japan CEPA Chile PTA MERCOSUR PTA ASEAN FTA	Malaysia CECA Sri Lanka FTA

09	Coffee, tea, matï, and spices	Thailand FTA ASEAN FTA	Japan CEPA	The Republic of Korea CEPA, Singapore CEPA, Malaysia CECA, Chile PTA, MERCOSUR PTA, Sri Lanka FTA
10	Cereals	NIL	Singapore CEPA Sri Lanka FTA	The Republic of Korea CEPA, Japan CEPA, Malaysia CECA, Chile PTA, Thailand FTA, MERCOSUR PTA, ASEAN FTA
11	Products of the milling industry, malt, starches, inulin, wheat gluten	Japan CEPA Thailand FTA	ASEAN FTA	The Republic of Korea CEPA, Singapore CEPA, Malaysia CECA, Chile PTA, Sri Lanka FTA, MERCOSUR PTA
12	Oil seeds, oleaginous fruits, miscellaneous grains, seeds, & others	The Republic of Korea CEPA Thailand FTA	Singapore CEPA MERCOSUR PTA ASEAN FTA	Japan CEPA, Malaysia CECA, Chile PTA, Sri Lanka FTA
13	Lac, gums, resins, and other vegetables saps & extracts	Thailand FTA	Singapore CEPA Malaysia CECA Sri Lanka FTA MERCOSUR PTA ASEAN FTA	The Republic of Korea CEPA, Japan CEPA, Chile PTA
14	Vegetable plaiting materials and other vegetable products	The Republic of Korea CEPA	Sri Lanka FTA MERCOSUR PTA ASEAN FTA	Singapore CEPA, Malaysia CECA, Japan CEPA, Chile PTA, Thailand FTA

15	Animal/vegetable fats & oils and their cleavage products	NIL	The Republic of Korea CEPA Japan CEPA Thailand FTA ASEAN FTA	Singapore CEPA, Malaysia CECA, Chile PTA, Sri Lanka FTA, MERCOSUR PTA
16	Preparations of meat, fish or crustaceans, mollusks & others	Thailand FTA	Japan CEPA Malaysia CECA MERCOSUR PTA	The Republic of Korea CEPA, Singapore CEPA, Sri Lanka FTA, ASEAN FTA
17	Sugars and sugar confectionery	The Republic of Korea CEPA	Singapore CEPA Chile PTA Sri Lanka FTA	Japan CEPA, Malaysia CECA, Thailand FTA, MERCOSUR PTA, ASEAN FTA
18	Cocoa and cocoa preparations	Malaysia CECA Thailand FTA ASEAN FTA	Sri Lanka FTA	The Republic of Korea CEPA, Singapore CEPA, Japan CEPA
19	Preparations of cereal, flour, starch, milk & pastrycooks' products	Thailand FTA The Republic of Korea CEPA	Singapore CEPA Japan CEPA Malaysia CECA Sri Lanka FTA ASEAN FTA	Chile PTA MERCOSUR PTA
20	Preparations of vegetables, fruit, nuts, or other parts of plants	The Republic of Korea CEPA Japan CEPA Chile PTA	Singapore CEPA Malaysia CECA Sri Lanka FTA ASEAN FTA	Thailand FTA MERCOSUR PTA
21	Miscellaneous edible preparations	Chile PTA	Singapore CEPA Malaysia CECA ASEAN FTA	The Republic of Korea CEPA, Japan CEPA, Sri Lanka FTA, Thailand FTA, MERCOSUR PTA
22	Beverages, spirits, and vinegar	Chile PTA Malaysia CECA	The Republic of Korea CEPA	Japan CEPA, Sri Lanka FTA, Thailand FTA,

		Singapore CECA		MERCOSUR PTA, ASEAN FTA
23	Residues & waste from the food industry; prepared animal fodder	MERCOSUR PTA	The Republic of Korea CEPA Singapore CEPA Malaysia CECA Sri Lanka FTA Thailand FTA ASEAN FTA	Japan CEPA Chile PTA
24	Tobacco and manufactured tobacco substitutes	The Republic of Korea CEPA Thailand FTA MERCOSUR PTA	Singapore CEPA Japan CEPA Sri Lanka FTA	Chile PTA, Malaysia CECA, ASEAN FTA
50	Silk	NIL	Singapore CEPA The Republic of Korea CEPA ASEAN FTA Malaysia CECA Japan CEPA	Sri Lanka FTA, Thailand FTA, Chile PTA, MERCOSUR PTA
52	Cotton	NIL	Sri Lanka FTA Singapore CEPA Malaysia CECA	Thailand FTA, Chile PTA, MERCOSUR PTA, The Republic of Korea CEPA, ASEAN FTA, Japan CEPA

As per Table (5.12), products Live animals (01), Cereals (10), Animal/vegetable fats & oils and their cleavage products (15), Silk (50), and Cotton (52) have not shown statistically significant improvements in RCA in any of the above RTAs. Products (PC 02, 07, 13, 14, 16, 17, 21 & 23) have exhibited skimpy improvement in export competitiveness with each one of a single case. There are a total of three products that have displayed modest

deterioration in RCA, with each of the products representing one such case of deterioration. They are Coffee, tea, matï, and spices (09), Cocoa and cocoa preparations (18), and Beverages, spirits, and vinegar (22).

Significant deterioration in the export competitiveness is revealed by commodities like Fish & crustaceans, mollusks & other aquatic invertebrates (03), Edible fruit and nuts; citrus fruits peel (08), Lac, gums, resins, and other vegetables saps & extracts (13), Vegetable plaiting materials and other vegetable products (19), Residues & waste from the food industry; prepared animal fodder (23) and Silk (50). Interestingly, 04 products from the 'food products' category alone have expressed maximum improvements, with 03 cases of each. They are PC 18 (Cocoa and cocoa preparations), 20 (Preparations of vegetables, fruit, nuts, or other parts of plants), 22 (Beverages, spirits, and vinegar), and 24 (Tobacco and manufactured tobacco substitutes).

5.3.11 Summary of Export Competitiveness of India's Agricultural Commodities

By delving into the summary of results presented in Table 5.13, it is possible to identify distinctive patterns and diverse trajectories in the export competitiveness of agricultural commodities within the context of India's RTAs.

As per Table 5.13, the India-Sri Lanka FTA analysis reveals a notable absence of any product demonstrating improved RCA. Conversely, 11 products showed a decline in RCA, while 15 products remained unaffected by any changes. This observation implies that the agreement has not yielded positive outcomes for India in terms of enhancing its export competitiveness. The India-Thailand FTA demonstrates significant benefits for India, as it exhibits an improvement in the RCA for 14 products, while just 2 products experienced a decline. Additionally, there were no changes observed in 10 products. The India-Singapore Comprehensive Economic Cooperation Agreement appears to be less advantageous for

India, as it exhibits a decline in RCA in 15 products while showing improvement in only 2 products, with 9 products remaining unaltered. The agreement between India and Chile demonstrates a state of neutrality, as it is observed that three products have shown improvement, and three have experienced deterioration. The India-MERCOSUR PTA witnessed improvements in four products, deterioration in six products, and no change in fourteen products. This agreement demonstrates a varied influence on India's export competitiveness.

Table 5.13 Summary of Export Competitiveness

RTA	No. of Products RCA improved	No. of Products RCA deteriorated	No. of Products RCA unchanged
India-Sri Lanka FTA	0	11	15
India-Thailand FTA	14	02	10
India-Singapore CECA	02	15	09
India-Chile PTA	03	03	16
India-MERCOSUR PTA	04	06	14
India-the Republic of Korea CEPA	08	06	12
India-ASEAN FTA	03	14	09
India-Malaysia CECA	02	12	12
India-Japan CEPA	02	11	13

Additionally, in Table 5.13, the CEPA between India and the Republic of Korea revealed that out of the total number of products assessed, eight showed improvement, six experienced deterioration, and twelve maintained stability. This indicates a rather balanced

impact throughout the evaluated approach. The India-ASEAN FTA exhibits a resemblance to the agreement established with Singapore, as it demonstrates a less beneficial outcome with 14 products experiencing a decline, while just 3 products exhibit improvement. The CECA between India and Malaysia observed enhancements in two commodities while experiencing a decline and no change in RCA for an equal number of 12 commodities each. These findings indicate a predominantly unfavourable outcome from India's standpoint. The India-Japan CEPA exhibits an adverse outcome, as evidenced by the deterioration of 11 products, improvement in 2 products, and no change in 13 products.

In Table 5.13, out of the total 228 cases of agricultural export competitiveness, 118 cases have shown statistically significant changes. Among these 118 cases, 38 cases have shown improvement in RCA, whereas 80 cases have shown the deterioration of RCA. Of these nine bilateral RTAs studied, the highest number of improvements in different product lines (total of 14) is seen in the India – Thailand FTA, which came into effect on 01-09-2004. India lost export competitiveness of 15 products (maximum) due to the India-Singapore CECA. The only RTA that has not resulted in a rise in RCA for any specific product pertains to the bilateral trade agreement between India and Sri Lanka. There have been some shifts in export competitiveness under the India-Chile PTA, but the majority of 16 products have maintained stability in RCA. The observations in Table 5.13 suggest that India has derived greater disadvantages from agreements with Sri Lanka, Singapore, ASEAN, Malaysia, and Japan, particularly in relation to quantified agricultural products.

5.4 Summary

The performance of agricultural exports of India after the formation of RTAs is not uniform across all the RTAs. The effect of various regional trade agreements on India's export competitiveness exhibits significant variation. The analysis sheds light on the multifaceted

trend of India's export competitiveness, illustrating how each agricultural commodity follows a unique trajectory within the regime of trade agreements. The export competitiveness of India's agricultural products has generally deteriorated after the formation of RTAs. The export competitiveness remained unchanged for around 50% of cases.

The export competitiveness of India’s agricultural commodities gained substantial momentum under the Thailand FTA and The Republic of Korea CEPA. Among India's nine RTAs studied, the most beneficial RTA for agricultural exports is the India-Thailand FTA. The creation of the India-The Republic of Korea CEPA has considerably benefited India's comparative advantage in exports and improved export competitiveness for eight products.

India-Singapore CECA, India-ASEAN FTA, India-Malaysia CECA, and India-Japan CEPA provided few benefits to India regarding the export competitiveness of agricultural commodities. On the other hand, these four RTAs have exhibited compelling deterioration in RCA for a total of 52 cases. This represents 65% of the total cases of RCA deterioration observed in the present study. The FTA with Sri Lanka can be treated as highly incompetent as not a single product fulfils the criteria of improvement in RCA, whereas 11 products have exhibited deterioration in RCA.

There is a mixed impact of India-Chile and India-MERCOSUR PTA formation. The influence of India-Chile PTA on agriculture export competitiveness is negligible. Under the India-Chile PTA, the RCA for 16 products remained unchanged (out of 22); hence, this RTA can be considered the most uninfluential. It is followed by India-Sri Lanka FTA and India-MERCOSUR PTA with 15 and 14 products (unchanged RCA), respectively. Similarly, the India-Japan CEPA has experienced unchanged RCA for 13 products. From an individual RTA perspective, these four RTAs have found unchanged RCA for more than half of the

products. The RCA remained unaltered for an equal number of 12 products each under India-the Republic of Korea CEPA and India-Malaysia CECA. This ‘unchanged RCA’ scenario has limited the prospects of agricultural trade potential of India under the broader regime of RTAs, although there was no detrimental effect collectively due to it.

CHAPTER VI

TRADE CREATION & TRADE DIVERSION IN INDIA'S AGRICULTURE UNDER REGIONAL TRADE AGREEMENTS: APPLICATION OF GRAVITY MODEL

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6.1 Introduction

The gravity model in international trade is one of the robust empirical discoveries in the discipline of Economics. Newton's law of universal gravitation inspired the gravity model. About sixty years ago, Jan Tinbergen (1962b) used an analogy with Newton's universal law of gravitation to express the patterns of bilateral aggregate trade flows between two countries as "proportional to the gross national products of those countries and inversely proportional to the distance between them". Accordingly, it can be stated that exports are positively correlated with the degree of economic growth and negatively correlated with the distance between the two economies. To estimate the dynamics of international trade, Tinbergen employs the economic components of both originating and destination countries that affect trade movements between the two sets of countries.

The Gravity Model has emerged as a prominent foundation in the field of international economics, especially in the latter half of the 20th century and the beginning of the 21st century (Pöyhönen, 1963; Anderson, 1979; McCallum, 1995; Anderson & Van Wincoop, 2003; Head & Mayer, 2014). It has garnered significant attention for its application in evaluating and forecasting the consequences of trade policies, such as RTAs and tariffs. In the literature, the gravity model application in its primary form is vital in describing bilateral and multilateral trade. In a Gravity model, the determinants of GDP, population, and distance between countries are the ones that are instrumental among various economic determinants.

6.2 Gravity Model Specifications

Different forms of the gravity model of trade can be specified depending on the nature of the research question and the data availability.

The basic Gravity Model formula:

$$Tij = G \frac{MiMj}{Dij}$$

(Where 'i' is the country of origin and 'j' is a place of destination; Tij – Trade flow; G – Constant; Mi & Mj are parameters; Dij is the distance between country 'i' & 'j').

The logarithmic form of the basic gravity model equation will be:

$$\ln (Tij) = \alpha + \beta 1 \ln (Mi) + \beta 2 \ln (Mj) + \beta 3 \ln (Dij) + \mu_{ij}$$

Where α is a constant and $\beta 1$, $\beta 2$, and $\beta 3$ are estimated coefficients. The error term or residual is denoted by μ_{ij}. The error term 'μ_{ij}' accounts for the impact of any additional shocks or random events on trade between the two nations. The sign of the variable 'distance' (ln Dij) will be negative in the actual regression model since trade flow is inversely related to the geographical distance between countries.

The gravity trade hypothesis predicts an inverse relationship between trade costs and trade volume. We anticipate that a common border, common language, colonial links, and membership in the same RTA will positively correlate with the size of exports. In contrast, closer proximity between trading partners will lead to more significant exports.

The extended Gravity Model considers additional variables thought to have an impact on international trade. Among the most frequent variants are: The population of the countries involved in trade can be used as a controlling variable. Some geographical factors include a shared border, the physical proximity of two countries (in terms of either land or water borders), and a common language or culture. The impact of trade barriers can be captured

by including trade costs like tariffs, transportation, and information costs. Metrics for economic integration may consist of indicators of regional integration, such as participation in a regional trade agreement.

6.2.1 Advantages of the Gravity Model of Trade

The international economics community places a high value on the gravity model of trade due to its versatility. Many studies have proved that this model belongs to a large and diverse group of economic theories (Feenstra et al., 2001; Burger et al., 2009; Kepaptsoglou et al., 2010; Tayyab et al., 2012; Maciejewski & Wach, 2019; Mishra & Jena, 2019). Crucial applications and implications of the gravity model are listed below:

1. Assessment of trade agreement: The gravity model can be used to assess the success of any RTAs. Researchers can examine whether RTAs have increased trade among member countries and if the trade creation effect is more extensive than any trade diversion effect by evaluating the impact of RTAs on trade movements. The model enables us to determine the factors that lead to increased or decreased trade between specific trading partners and specific pairs of countries among larger plurilateral RTAs.

2. Evaluation of trade cost: The gravity model sheds light on how trade costs affect bilateral economic activity. Researchers can assess the elasticity of trade regarding changes in trade costs by including variables such as distance, transportation expenses, and cultural elements. This data assists policymakers in identifying trade obstacles and developing strategies to remove such barriers, thereby lowering trade costs and encouraging trade activities.

3. Analysis of trade policies: To analyze the effect of trade regulations like tariffs, quotas, and RTAs on bilateral trade flows, economists apply the gravity model. Policymakers can assess the efficacy and implications of various trade policy initiatives by estimating the

model with relevant data on trade volumes and policy variables. Analysts can forecast how economic trends or policy changes may affect trade patterns by employing the gravity model.

6.3 Trade Creation and Trade Diversion

Based on the economic outcomes of a RTA, the situation of welfare gains or losses may occur. Trade creation and trade diversion are two significant direct consequences of forming trade agreements. The idea of 'trade creation and trade diversion' was first examined by Jacob Viner (1950). Viner argues that RTAs can be beneficial or detrimental to the participating countries since these trade agreements' privileged and exclusive nature generates both trade creation and trade diversion. He defined trade creation as the circumstance in which a participant of a preferential trading group has a comparative advantage in producing a commodity and is now able to sell it to its free trade area partners due to the removal of trade barriers. Trade creation will mean that consumption shifts from a high-cost producer to a low-cost producer, and hence, trade expands. Under the process of trade creation, the exports take place from the more efficient producers of a product.

Trade diversion is likely to happen when trade agreements create an environment for imports to shift from low-cost to higher-cost countries. Under trade diversion, the trade shifts from a lower-cost producer outside the union to a higher-cost producer inside the union. Trade diversion is unwelcome by economies since it comes with a lower comparative advantage and increased opportunity cost. The lack of access to more affordable international goods within the union will not benefit consumers. Misallocation of resources due to trade diversion reduces worldwide trade and economic welfare. In all trade agreements, the ultimate purpose is to engender higher trade creation than trade diversion. In a nutshell,

from an economic dimension, ‘trade creation’ is preferable and efficient, while ‘trade diversion’ is undesirable and incompetent.

6.4 Panel Data: Fixed Effects and Random Effects Models

Panel data refers to a dataset with a cross-sectional and time series component. A "panel" is a collection of observations of the same unit throughout time, allowing us to track the observed units over an extended period. Due to the nature of panel data, which consists of repeated cross-sections throughout time, there will be spatial and temporal dimensions. In common terms, Panel Data can be Cross-sectional data (information gathered on multiple individuals or units at the same time) or Time series data (information gathered about an individual or unit over a period). Effects not apparent in cross-sectional or time-series data can be better detected and measured using panel data.

The panel data analysis approach maximises the use of the supplemental information provided by the panel structure and, therefore, can produce more efficient and robust estimations. However, endogeneity, serial correlation, and heteroscedasticity are the only challenges that can arise while conducting a panel data evaluation. Using the panel data analysis, we can compare the average annual unemployment rates across states, the average quarterly sales of specific stores, and the average wages for the same person across multiple jobs.

Panel data and panel analysis models offer several advantages. They provide researchers with a large number of data points, increasing the degrees of freedom and reducing collinearity among explanatory variables. This improves the efficiency of econometric estimates and helps control heterogeneity bias. Panel data are better suited for investigating the dynamics of change as they examine the repeating cross-section of observations. Panel data can help resolve important econometric problems in empirical studies, such as the

presence of omitted variables correlated with explanatory variables. The N and T dimensions in panel data represent the number of observations in the cross-section and time series, respectively. Although estimates for panel data may be more difficult to calculate than single-sample cross-sections or time series, accessing panel data streamlines calculations and inference in specific scenarios.

6.4.1 'Fixed Effects Approach' to Panel Data Regression Model Estimation

In the Fixed Effect Model (FEM), the intercept of the regression model might vary between individuals to account for their distinct characteristics. Dummy variables are used for this purpose, although care must be taken to avoid the dummy variable trap. Least-squares dummy variable model (LSDV) refers to the FEM that uses dummy variables. In order to accommodate for unobserved heterogeneity, the fixed effects model includes fixed effects at the individual level. These fixed effects reflect the individual-specific traits that remain consistent over time but vary across individuals.

The fixed effects model can be mathematically denoted as:

$Y_{it} = \alpha + \beta_1 X_{it} + \beta_{2i} + \varepsilon_{it}$

(Where: Y_{it} is the dependent variable for individual i at time t; α is the intercept term; X_{it} is a vector of explanatory variables for individual i at time t; β_1 is a vector of coefficients associated with the explanatory variables; β_{2i} represents the individual-specific fixed effect for individual i; ε_{it} is the error term).

6.4.2 'Random Effects Approach' to Panel Data Regression Model Estimation

An individual unit's intercept value is assumed to be drawn randomly from a pool with a constant mean in the Random Effect Model (REM). The individual intercept is then represented as a variance from the mean. When it comes to the cost of estimating the

parameters of Random Effects Models, REM is preferable to FEM. The vital principle of the random effects model is that the effects of interest are independent of one another and the independent variables. The regressors in a REM model do not affect the (random) intercept of each cross-sectional unit. In REM, time-invariant regressors are permitted, which is not the case in FEM.

The multifactorial gravity equation is typically estimated in investigations that employ cross-sectional or panel data after a log-linear transformation of the model. Traditional methods of estimate can be used with this technique. Researchers typically use fixed or random effects estimate approaches when working with panel data.

6.5 Model Framework: Variables and Equations

To apply the gravity model and to study the pattern of trade creation and trade diversion of India's agriculture trade, the top 40 countries are identified, which account for around 84% of world agricultural trade. The data was collected from databases of the World Bank, the WTO, CEPII, and the World Integrated Trade Solution (WITS). The World Development Indicators (WDI) of the World Bank provided data on Gross Domestic Product (GDP), per capita income (PCI), and the total population. The data on RTA membership is accessed from the WTO, whereas the distance between countries was collected from the CEPPI database. Exports and imports data of agricultural commodities is obtained from the WITS. The period of study is from 2001 to 2021. A total of 24,360 observations (panel data) are produced using 1160 cross-sectional units and 21 time series/periods. For any individual country in this model, 819 observations used 39 cross-sectional units and 21 time series/periods. In this chapter, the country 'i' refers to India, whereas 'j' refers to the remaining specified 39 countries.

For this study, the variables employed are the following:

- ✓ Log of the GDP of Country i = l_GDPi
- ✓ Log of the GDP of Country j = l_GDPj
- ✓ Log of the Per capita Income of Country i = l_PCIi
- ✓ Log of the Per capita Income of Country j = l_PCIj
- ✓ Log of the Absolute difference between PCIi & PCIj = l_ADPCIij
- ✓ Log of the Total population of Country i = l_Pi
- ✓ Log of the Total population of Country j = l_Pj
- ✓ Log of the Geographical Distance between two countries = l_d
- ✓ Log of the Total Agricultural Trade between i and j (expi + expj) = l_Tij
- ✓ Log of the Exports of agricultural commodities from country i to country j = l_expi
- ✓ Log of the Exports of agricultural commodities from other country j (Imports of country i) = l_expj
- ✓ Dummy Variable (0 - non-RTAs & 1- RTA in existence) = dummy

The dummies are binary (0,1) variables that will capture the RTA-specified characteristics between two countries (i & j). In the gravity model, such a variable will be one whenever the trade agreement exists between i & j, but zero otherwise (Baier & Bergstrand, 2007; Ekanayake et al., 2010; Kahouli & Maktouf, 2015; Ahcar-Olmos & Rodríguez-Barco, 2020). In the regression, a dummy variable with a positive sign means a phenomenon of 'trade creation' among the economies. Contrarily, if the dummy variable exhibits a negative sign, the 'trade diversion' process has occurred (Koo et al., 2006; Moktan, 2008; Lambert & McKoy, 2009; Baier et al., 2019). This framework facilitates the evaluation of the impact of trade agreements on the trade flow between nations as part of an empirical analysis of RTAs.

Table 6.1: Gravity Models Estimated

Sr. No.	Equation
1	ln (Tij) = α + β1ln (GDPi) + β2ln (GDPj) – β3ln (d) + β4RTA-member + μij
2	ln (Tij) = α + β1ln (Pi) + β2ln (Pj) – β3ln (d) + β4RTA-member + μij
3	ln (Tij) = α + β1ln (PCIi) + β2ln (PCIj) – β3ln (d) + β4RTA-member + μij
4	ln (Tij) = α + β1ln (GDPi) + β2ln (GDPj) + β3ln (Pi) + β4 ln (Pj) – β5ln (d) + β6RTA-member + μij
5	ln (expi) = α + β1ln (GDPi) + β2ln (GDPj) – β3ln (d) + β4RTA-member + μij
6	ln (expi) = α + β1ln (Pi) + β2ln (Pj) – β3ln (d) + β4RTA-member + μij
7	ln (expi) = α + β1ln (PCIi) + β2ln (PCIj) – β3ln (d) + β4RTA-member + μij
8	ln (expi) = α + β1ln (GDPi) + β2ln (GDPj) – β3ln (Pi) + β4 ln (Pj) – β5ln (d) + β6RTA-member + μij
9	ln (Tij) = α + β1ln (GDPi) + β2ln (GDPj) + β3ln (d) − β4RTA-member + μij
10	ln (Tij) = α + β1ln (Pi) + β2ln (Pj) + β3ln (d) − β4RTA-member + μij
11	ln (Tij) = α + β1ln (PCIi) + β2ln (PCIj) + β3ln (d) − β4RTA-member + μij
12	ln (Tij) = α + β1ln (GDPi) + β2ln (GDPj) – β3ln (Pi) + β4 ln (Pj) + β5ln (d) – β6RTA-member + μij
13	ln (Tij) = α + β1ln (GDPi) + β2ln (GDPj) – β3ln (d) + β4RTA-member + μij
14	ln (Tij) = α + β1ln (Pi) − β2ln (Pj) − β3ln (d) + β4RTA-member + μij
15	ln (Tij) = α + β1ln (PCIi) + β2ln (PCIj) − β3ln (d) +β4RTA-member + μij
16	ln (Tij) = α + β1ln (GDPi) + β2ln (GDPj) – β3ln (Pi) – β4 ln (Pj) – β5ln (d) + β6RTA-member + μij

In Table 6.1, models 1 to 4 present the gravity estimations for total agricultural trade, while models 5 to 8 present results for exports of India. Considering the total agricultural trade

separately between India and developed nations and India and developing nations, models 9 to 12 are related to developed nations and models 13 to 16 are to developing nations, among the 40 leading nations utilised in this gravity model.

The top 40 countries are the United States, Netherlands, China, Germany, Brazil, France, Spain, Italy, Canada, India, Argentina, Belgium, Australia, Indonesia, Thailand, United Kingdom, Mexico, Poland, Vietnam, Malaysia, New Zealand, Denmark, Turkey, Russian Federation, Chile, Ukraine, Ireland, Austria, Hong Kong (China), Norway, Singapore, Sweden, Switzerland, Czech Republic, the Republic of Korea (South Korea), United Arab Emirates, Portugal, Japan, Egypt, and Saudi Arabia.

6.5.1 Selection of the appropriate technique

In econometrics, regression models can be estimated using one of three methods: Ordinary Least Squares (OLS), Fixed Effects Model (FEM), or Random Effects Model (REM). There are certain presumptions and merits to each method. The selection among these methods can be done by using the F-test. The F-test is useful for contrasting the Fixed Effects Model (FEM) with the Ordinary Least Squares (OLS) model. The F-test is applied to assess if incorporating fixed effects to the model significantly enhances the model's fit over the OLS model without fixed effects.

The Breusch-Pagan test (or Breusch-Pagan-Godfrey test) is a statistical test for determining whether a regression model exhibits heteroscedasticity. The Breusch-Pagan test can be used to compare the fit of the Ordinary Least Squares (OLS) model with the Random Effects Model (REM), which considers unobserved heterogeneity, to determine if heteroscedasticity exists in the OLS residuals. When contrasting two estimators, such as the Fixed Effects Model (FEM) and the Random Effects Model (REM), the Hausman test is commonly employed to determine which is more effective and consistent. It aids in determining

whether the REM's random effects assumption is correct and whether the FEM, which accounts for individual differences, presents a better fit.

Table 6.2 Selection of the Model

Model	F-test: OLS vs FEM (Chi-square value)	Breusch-Pagan test: OLS vs REM (Chi-square value)	Hausman test: FEM vs REM (Chi-square value)
1	1945.99 (0.000)	6342.08 (0.000)	4.33875 (0.114249)
2	1577.61 (0.000)	6135.53 (0.000)	4.66657 (0.096976)
3	1884.8 (0.000)	6660.52 (0.000)	19.883 (0.000048)
4	1941.01 (0.000)	6250.72 (0.000)	11.3387 (0.010029)
5	2342.16 (0.000)	6575.69 (0.000)	0.63497 (0.727977)
6	1504.6 (0.000)	6251.44 (0.000)	2.2895 (0.318306)
7	2169.91 (0.000)	7112.28 (0.000)	12.539 (0.001893)

The value in the parenthesis is the p-values.

In Table 6.2, the testing for selecting an appropriate model is conducted. F-test shows that the Fixed effect model is better when a comparison is made between OLS and FEM, whereas the random effect model is preferred over OLS through the Breusch-Pagan test. Now, the choice must be made between REM and FEM for the best fit. Considering the Hausman test, Models 1, 2, 3, and 4 exhibits that the Fixed effect model is suitable over the Random effect model. However, models 5, 6, and 7 show that REM is suitable over FEM. The p-values are found to be significant in models 5, 6, and 7.

The gravity model utilizes the variable of geographical distance, and hence, its implications will be incorrect without interpretation of this variable. The fixed effect model displays the problem of collinearity. In econometrics analysis, collinearity or multicollinearity occurs when a regression model has a strong relationship between two or more variables. Collinearity can lead to various problems, including adversity to statistical significance, inconsistent coefficient estimates, model specification instability, erroneous statistic interpretation, increased standard errors, and so on. The distance variable "ln(d)" in FEM is omitted due to exact collinearity, and thereby, the suitability of FEM cannot be accepted for the implications of the gravity model. Similarly, under the fixed effects approach (FEM), the signs of the coefficients of some variables do not match appropriately as per the expectations of the traditional standard gravity model. Hence, in this study, the Random effect model (REM) is more suitable and consistent for the econometric analysis of the gravity model.

6.6 Results of the estimated models

The results of the models stated in Table 6.1 are presented and interpreted in this section with regard to India's total agricultural trade and total agricultural exports. The dependent variable will be either l_Tij (the log of the total agricultural trade) or l_expi (the log of Exports of agricultural commodities from country i to country j) in the following tables. The models are divided into four sections: The gravity model for total agricultural trade, the gravity model for agriculture exports, the gravity model for India's total trade with developed countries, and the gravity model for India's total trade with developing countries.

6.6.1 Gravity Model for Total Agricultural Trade

Tables 6.3, 6.4, 6.5, and 6.6 present the data for the gravity models estimated regarding the total agricultural trade of India. The prime independent variables employed in Tables 6.3,

6.4, and 6.5 are the Gross Domestic Product, the population, and the per capita income, respectively. Similarly, the two main variables in Table 6.6 are Gross Domestic Product and Population.

Table 6.3: Results for the total agricultural trade by the GDP

Variables	Coefficient	Std. Error	Z	p-value
Const	−10.1886	3.57295	−2.852	0.0043 ***
l_GDPi	0.630423	0.0401354	15.71	<0.0001 ***
l_GDPj	0.538809	0.0579191	9.303	<0.0001 ***
l_d	−1.08556	0.399607	−2.717	0.0066 ***
Dummy	0.158897	0.0658457	2.413	0.0158**

*** Significant at 1% level, ** Significant at 5% level

Equation: ln (Tij) $= \alpha + \beta 1 \ln (GDPi) + \beta 2 \ln (GDPj) - \beta 3 \ln (d) + \beta 4$RTA-member $+ \mu ij$

Dependent Variable: Log of the total agricultural trade between i and j

In Table 6.3, the dependent variable is a log of total agricultural trade, and the explanatory variables are the log of India's GDP (l_ GDPi), the log of the GDP of other 39 countries (l_GDPj), the geographical distance (l_d) and the dummy variable of RTA membership. The signs of the coefficients of all variables are as per the expected signs under the standard gravity model. As expected, the log of India's GDP (l_ GDPi) and the log of the other 39 countries (l_GDPj) is positive. The coefficient of geographical distance (l_d) exhibits a negative sign for the coefficient, whereas the dummy variable of RTA membership shows a positive sign. The variables constant, l_ GDPi, l_GDPj, and l_d, are significant at a 1% significance level. The log of India's and other countries' GDP are highly significant in the regression, as demonstrated by their z-values. Since the coefficient of the dummy variable is positive and significant at a 5% significance level, it shows the trade creation in this model. Hence, India's total agricultural trade under RTA experiences 'trade creation' with the main explanatory variables of the gross domestic product (GDP).

Table 6.4: Results for the total agricultural trade by the total population

Variables	Coefficient	Std. Error	Z	p-value
Const	−120.865	5.18889	−23.29	<0.0001***
l_Pi	6.26165	0.210025	29.81	<0.0001***
l_Pj	0.520441	0.111159	4.682	<0.0001***
l_d	−0.765097	0.366749	−2.086	0.0370**
Dummy	0.360563	0.0678357	5.315	<0.0001***

*** Significant at 1% level, ** Significant at 5% level

Equation: ln (Tij) $= \alpha + \beta 1 \ln (Pi) + \beta 2 \ln (Pj) - \beta 3 \ln (d) + \beta 4$RTA-member $+ \mu ij$

Dependent Variable: Log of the total agricultural trade between i and j

In Table 6.4, the dependent variable is a log of total agricultural trade, and the main explanatory variables are the log of India's Population (l_Pi) and the log of the population of 'j' (l_Pj). Consistent with the conventional gravity model, all the coefficients of explanatory variables have the anticipated signs. In this model, the corresponding p-value of each coefficient denotes its statistical significance. A 1% increase in India's population is associated with a 6.26% increase in total agricultural trade. In comparison, a 1% increase in the population of 'j' will lead to an increase of 0.52% in total agricultural trade between countries i and j. However, the coefficient for ln (Pi) indicates that changes in the total population of India have a more enormous and significant impact on trade flows than changes in the total population in 'j.' In this context of the model, the agricultural trade between India and other countries decreases by about 0.77% for every 1% increase in the geographical distance. Based on the dummy variable's coefficient, membership in an RTA appears to favor agricultural trading.

Table 6.5 presents the per capita income of 'i' and the per capita income of 'j' as the prime predictor variables to estimate the total agricultural trade between i and j. The Z-scores are relatively high for all the coefficients, indicating that they considerably impact the dependent variable (the log of total agricultural trade) in this gravity model and are thus highly

statistically significant. The coefficient value of l_PCIi shows that an increase of 1% in India's economic size (PCIi) is linked to an increase of 0.83% in overall agricultural trade between countries i and j. Similarly, the variable l_PCIj is positively related by around 0.46%. A 1% increase in the distance variable (l_d) will reduce the total agricultural trade between countries i and j by approximately 1.01446%. This model also highlights the trade creation process since being a member of an RTA is accompanied by a 0.2% rise in agricultural trade between India and 'j'.

Table 6.5: Results for the total agricultural trade by the PCI

Variables	Coefficient	Std. Error	Z	p-value
Const	11.0985	4.06636	2.729	0.0063***
l_PCIi	0.829384	0.0429106	19.33	<0.0001***
l_PCIj	0.457239	0.0605371	7.553	<0.0001***
l_d	−1.01446	0.464372	−2.185	0.0289**
Dummy	0.191489	0.0662621	2.890	0.0039***

*** Significant at 1% level, ** Significant at 5% level

Equation: $\ln (Tij) = \alpha + \beta 1 \ln (PCIi) + \beta 2 \ln (PCIj) - \beta 3 \ln (d) + \beta 4 RTA\text{-}member + \mu ij$

Dependent Variable: Log of the total agricultural trade between i and j

Table 6.6: Results for the total agricultural trade by the GDP and total population

Variables	Coefficient	Std. Error	Z	p-value
const	−24.5061	19.8628	−1.234	0.2173
l_GDPi	0.531982	0.166378	3.197	0.0014 ***
l_GDPj	0.516962	0.0620618	8.330	<0.0001 ***
l_Pi	0.672687	1.14541	0.5873	0.5570
l_Pj	0.204486	0.114731	1.782	0.0747 *
l_d	−1.08049	0.369169	−2.927	0.0034 ***
dummy	0.163523	0.0660016	2.478	0.0132 **

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level

Equation: $\ln (Tij) = \alpha + \beta 1 \ln (GDPi) + \beta 2 \ln (GDPj) + \beta 3 \ln (Pi) + \beta 4 \ln (Pj) - \beta 5 \ln (d) + \beta 6 RTA\text{-}member + \mu ij$

Dependent Variable: Log of the total agricultural trade between i and j

In Table 6.6, the main explanatory variables are the GDP of India, the GDP for ‘j, the total population of India, and the total population for ‘j’ to estimate the total agricultural trade between India and other countries. This gravity model can be considered superior to all the previous models since the independent variables of the GDP and the total population are employed together. The signs of the coefficient of all variables are as expected in a gravity model. Other than the constant and the log of the total population of India (l_Pi), all other variables are statistically significant. The variable ‘l_Pj’ is marginally significant at the 10% level (indicated by * and z-value of 1.78). Results suggest that changes in the GDP of India have a significant positive impact on the total agricultural trade. Similarly, a 1% rise in the GDP (l_GDPj) and the population of ‘j’ (l_Pj) will increase the total trade by around 0.52% and 0.2%, respectively. However, the effect of l_GDPj will be relatively stronger than l_Pj, as indicated by the z and p-values. As found in previous models, the geographical distance is inversely related to the total agricultural trade between India and ‘j’. The coefficient of the dummy variable has a p-value of 0.0132, which is less than 0.05. As a result, the dummy variable is statistically significant at 5% (shown by **). This suggests the trade creation of agricultural trade in the context of India.

The gravity models estimated for the total agricultural trade of India provide insights into the factors that influence trade flows. Table 6.3 shows that India's GDP, the GDP of other countries, and geographical distance significantly affect agricultural trade. The dummy variable for RTA membership indicates trade creation. Table 6.4 reveals that India's population and the population of other countries also play a significant role in agricultural trade, with India's population having a more considerable impact. Table 6.5 demonstrates that the per capita income of India and other countries positively influences agricultural trade, with India's per capita income having a more significant effect. Geographical distance and RTA membership also impact trade. Table 6.6 combines GDP and population variables,

showing that changes in India's GDP have a significant positive impact on agricultural trade. The GDP and population of other countries also influence trade, with GDP having a more substantial effect. Geographical distance negatively affects trade flows, and RTA membership promotes trade. Overall, these gravity models reveal that the RTA membership appears to promote trade creation in the agricultural trade of India.

6.6.2 Gravity Model for Agriculture Exports

The gravity models estimated for India's agricultural commodities exports are displayed in Tables 6.7, 6.8, 6.9, and 6.10. GDP, population, and per capita income are the primary independent variables used in Tables 6.7, 6.8, and 6.9, respectively. Table 6.10 employs both GDP and population, along with distance and dummy variables.

Table 6.7: Results for the agricultural exports by the GDP

Variables	Coefficient	Std. Error	Z	p-value
Const	−2.89999	3.00703	−0.9644	0.3348
l_GDPi	0.402952	0.0339994	11.85	<0.0001***
l_GDPj	0.761824	0.0490487	15.53	<0.0001***
l_d	−1.94219	0.336222	−5.777	<0.0001***
Dummy	0.109611	0.0557997	1.964	0.0495**

*** Significant at 1% level, ** Significant at 5% level

Equation: $\ln(expi) = \alpha + \beta 1 \ln(GDPi) + \beta 2 \ln(GDPj) - \beta 3 \ln(d) + \beta 4 RTA\text{-}member + \mu ij$

Dependent variable: Log of the Exports of agricultural commodities from country i to j

In Table 6.7, the exports of agricultural commodities from India are explained by the variables such as the log of India’s GDP (l_ GDPi), the log of GDP of other countries (l_GDPj), the geographical distance (l_d) and the dummy variable of RTA membership. The p-values of each coefficient of variables l_ GDPi, l_GDPj, and l_d are highly statistically significant, demonstrating the robust relationship between the exports of India’s agricultural commodities and these variables. The coefficients of l_ GDPi and l_GDPj are positively related to the exports of India’s agricultural supplies. The coefficient of ln(d) shows that a

1% increase in the geographical distance between India and other countries ‘j’ is correlated to a 1.94% decrease in agricultural commodity exports from India, with ceteris paribus. Statistically, the coefficient of the dummy variable is significant at the 5% level. This dummy variable's coefficient suggests that RTA membership is correlated with an increase in exports of around 0.11% from India.

Table 6.8: Results for the agricultural exports by the total population

Variables	Coefficient	Std. Error	Z	p-value
Const	−98.1225	4.92954	−19.91	<0.0001***
l_Pi	5.38641	0.194777	27.65	<0.0001***
l_Pj	0.597967	0.108290	5.522	<0.0001***
l_d	−1.48490	0.365857	−4.059	<0.0001***
Dummy	0.380916	0.0623950	6.105	<0.0001***

*** Significant at 1% level

Equation: $\ln(expi) = \alpha + \beta 1 \ln(Pi) + \beta 2 \ln(Pj) - \beta 3 \ln(d) + \beta 4 RTA\text{-}member + \mu ij$

Dependent Variable: Log of the Exports of agricultural commodities from country i to j

The exports of agricultural commodities from India to 'j' are significantly influenced by economic size factors of the total population of India and the other 39 countries in the model, also by the distance between them and RTA membership, as shown in the regression results from the gravity model in Table 6.8. A 1% rise in the population of India (l_Pi) leads to an increase in agricultural merchandise exports from India of around 5.39%. This increase in exports is due to a larger population size, which can potentially result in the expansion of agricultural production. Through the implementation of large-scale production, there is a potential for a reduction in costs per unit, enhancing the price competitiveness of exports. In the same manner, a larger population can yield a more substantial labor force, a factor of particular significance in labor-intensive agricultural sectors and a diverse range of agricultural practices. The magnitude of the population variable in India (l_Pi) is significantly higher than that of other nations (l_Pj). In this model, the geographical distance

is negatively correlated by about 1.5%, while the membership of a RTA is positively associated by 0.38% regarding the agricultural exports from India.

As shown by the regression model in Table 6.9, India's agricultural exports to the destination are significantly affected by factors such as the per capita income of both India and the destination country 'j', the distance between India and 'j', and India's participation in the RTA. All the variables are statistically significant at the 1% level of significance. Higher Per Capita Income and RTA membership are both associated with more agricultural exports from India, as indicated by positive coefficients for ln(PCIi), ln(PCIj), and the Dummy variable (RTA membership). In contrast, a negative coefficient for ln(d) suggests that distance has a negative effect on agricultural exports from India. Both ln(PCIi) and ln(PCIj) can substantially impact the exports of agricultural commodities from India to other countries. A 1% change in each of the Per Capita Income for India (l_PCIi), the PCI for 'j'(l_PCIj), and the dummy variable of RTA membership will cause the exports of agricultural commodities from India to rise by around 0.6%, 0.67%, and 0.15%, respectively.

Table 6.9: Results for the agricultural exports by the PCI

Variables	Coefficient	Std. Error	Z	p-value
Const	17.4825	4.15165	4.211	<0.0001***
l_PCIi	0.600020	0.0370686	16.19	<0.0001***
l_PCIj	0.664517	0.0526382	12.62	<0.0001***
l_d	−1.85212	0.473883	−3.908	<0.0001***
Dummy	0.151014	0.0570564	2.647	0.0081***

*** Significant at 1% level

Equation: $\ln(expi) = \alpha + \beta 1 \ln(PCIi) + \beta 2 \ln(PCIj) - \beta 3 \ln(d) + \beta 4 RTA\text{-}member + \mu ij$

Dependent Variable: Log of the Exports of agricultural commodities from country i to j

In Table 6.10, the agricultural exports from India are significantly influenced by both the gross domestic products of India and the importing countries, with a considerable positive

effect. There is a substantial positive impact of the population size of the importing countries on the exports of agricultural products. Conversely, the population of India does not seem to have a significant impact. India's membership in the RTA has a statistically significant positive impact on its agricultural products exports. Based on the observed significance levels and corresponding Z-values, the GDP of trade countries and the distance between them appear to be the most robust predictors.

Table 6.10: Results for the agricultural exports by the GDP and total population

Variables	Coefficient	Std. Error	Z	p-value
const	5.57748	16.8176	0.3316	0.7402
l_GDPi	0.488356	0.140750	3.470	0.0005 ***
l_GDPj	0.730102	0.0526872	13.86	<0.0001 ***
l_Pi	−0.625106	0.968729	−0.6453	0.5187
l_Pj	0.171804	0.0999843	1.718	0.0857 *
l_d	−1.92996	0.327002	−5.902	<0.0001 ***
dummy	0.113720	0.0558579	2.036	0.0418 **

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level

Equation: ln (expi) $= \alpha + \beta 1 \ln (GDPi) + \beta 2 \ln (GDPj) - \beta 3 \ln (Pi) + \beta 4 \ln (Pj) - \beta 5 \ln (d) + \beta 6$RTA-member + μij

Dependent Variable: Log of the Exports of agricultural commodities from country i to j

Economic sizes are positively related in all estimated models (except for the l_Pi in Table 6.10), and geographical distances are inversely related in all the gravity models. In the context of a sizable economy such as India, it is possible to observe a positive correlation between a significant population and a consumption pattern that predominantly relies heavily on domestic goods. Consequently, this inclination towards domestic consumption may decrease the volume of exports (Krugman, 1991b; Egger, 2000). Research in the manufacturing and services sectors has produced similar results by employing this method. Results are in tune with the existing results. The above models suggest the 'trade creation' phenomenon regarding India's agricultural trade under RTA. The RTA dummies are also

statistically significant (with a ‘positive sign’ of the dummy co-efficient) in all the above seven models, revealing that the RTAs have resulted in trade creation. Members of such RTAs have a higher probability of engaging in agricultural trade more extensively with one another. There is a positive effect on the agricultural exports of India due to economic sizes (GDP, population, and PCI) and the participation in RTAs. The study does not suggest any strong evidence of trade diversion among members of RTAs in agricultural trade.

The gravity models estimated for India's agricultural commodity exports show that variables such as GDP, population, per capita income, and RTA membership significantly influence exports. In Table 6.7, the log of India's GDP and the log of GDP of other countries have a positive relationship with agricultural exports, while distance has a negative relationship. RTA membership is also positively correlated with exports. Similar patterns are observed in Table 6.8 and Table 6.9, where population and per capita income positively affect exports, while distance has a negative effect. RTA membership is again positively associated with exports. Table 6.10 combines GDP, population, and distance variables. The results of Table 6.10 show that the GDP of both India and importing countries are significant, and the population size of importing countries also has a positive impact, while the population of India does not seem to have a significant effect. Overall, the gravity models suggest that economic sizes and RTA membership positively influence India's agricultural exports, while distance has a negative effect. The study does not find strong evidence of trade diversion among RTA members in agricultural trade.

In this chapter, the dataset for the gravity model is constructed by including 40 countries. The countries can be classified based on HDI parameters, developed and developing countries, etc. In the present scenario, since the number of countries is substantial and they are from all the world's continents, the list can be classified into developed and developing countries. This study adds to the value of the global debate between developed and

developing nations, of which many do not agree on specific areas, and agricultural trade is one central area of contention. The upcoming analysis attempts to shed light by employing the gravity model on the group of developed and developing nations. This study is related to India's agricultural trade, and hence, India's trade will be viewed under the developed and developing classification of countries.

The countries are grouped into developed and developing nations based on the IMF databases. Apart from India, 25 developed and 14 developing nations are in the model. There are 525 observations for developed nations, whereas, for developing nations, the observations comprise 294 observations. The variables employed will be similar to that of stated in Section 6.5. In this case, the dependent variable will be l_Tij (the log of the total agricultural trade). Similarly, the regression models are interpreted with the REM approach.

6.6.3 Gravity model for India's total trade with developed countries

Tables 6.11, 6.12, 6.13, and 6.14 present an estimation of the total agricultural trade between India and developed nations, as outlined in the model. Tables 6.11, 6.12, and 6.13 employ the gross domestic product (GDP), population, and PCI as the primary variables, respectively, whereas Table 6.14 employs GDP and the population as the key variables.

Table 6.11 Results for the total agricultural trade by the GDP

Variables	Coefficient	Std. Error	Z	p-value
Const	−17.0723	5.92058	−2.884	0.0039 ***
l_GDPi	0.638219	0.0386620	16.51	<0.0001 ***
l_GDPj	0.286470	0.0693340	4.132	<0.0001 ***
l_d	0.406945	0.669825	0.6075	0.5435
Dummy	−0.273504	0.101699	−2.689	0.0072 ***

*** Significant at 1% level

Equation: $\ln (Tij) = \alpha + \beta 1 \ln (GDPi) + \beta 2 \ln (GDPj) + \beta 3 \ln (d) - \beta 4$RTA-member $+ \mu ij$

Dependent Variable: Log of the total agricultural trade between i and j

According to the findings presented in Table 6.11, the variables ln (GDPi) and ln (GDPj) exhibit positive and statistically significant coefficients, which is consistent with the gravity model's prediction that larger economies will generate greater levels of trade. The finding pertaining to the variable 'distance' is somewhat unexpected, as the gravity model often assumes a negative relationship between distance and trade volume. However, in this specific instance, distance does not affect agricultural trade significantly. The presence of a negative coefficient for the dummy variable implies that membership in a RTA has a diminishing effect on agricultural trade by approximately 0.27%, assuming other factors are constant.

Table 6.12 Results for the total agricultural trade by the total population

Variables	Coefficient	Std. Error	Z	p-value
const	−111.319	6.70608	−16.60	<0.0001 ***
l_Pi	5.10509	0.183313	27.85	<0.0001 ***
l_Pj	0.919747	0.150193	6.124	<0.0001 ***
l_d	0.128667	0.657972	0.1956	0.8450
dummy	−0.279170	0.103165	−2.706	0.0068 ***

*** Significant at 1% level

Equation: $\ln(T_{ij}) = \alpha + \beta_1 \ln(P_i) + \beta_2 \ln(P_j) + \beta_3 \ln(d) - \beta_4 \text{RTA-member} + \mu_{ij}$

Dependent Variable: Log of the total agricultural trade between i and j

In Table 6.12, the population size in India and developed nations has a significant positive impact on agricultural trade. This model yields results indicating that the impact of distance on trade is not statistically significant. Participation in a RTA appears to exhibit a little reduction in agricultural trade between India and developed nations, in contrast to the expectations from RTA membership.

The model's findings in Table 6.13 demonstrate that India's per capita income significantly influences agricultural trade with developed nations. A 1% rise in India's PCI would lead to approximately a 0.84% increase in the total agricultural trade between them. However, the

PCI of developed countries and distance do not significantly impact the volume of trade. Moreover, it might be asserted that India's RTA membership with the developed countries in this model has an adverse impact on trade, indicating the possibility of trade diversion.

Table 6.13: Results for the total agricultural trade by the PCI

Variables	Coefficient	Std. Error	Z	p-value
Const	−0.639745	8.32144	−0.07688	0.9387
l_PCIi	0.841853	0.0430219	19.57	<0.0001 ***
l_PCIj	0.102775	0.0764213	1.345	0.1787
l_d	0.661900	0.941626	0.7029	0.4821
Dummy	−0.293969	0.101096	−2.908	0.0036 ***

*** Significant at 1% level

Equation: ln (Tij) $= \alpha + \beta 1 \ln (PCIi) + \beta 2 \ln (PCIj) + \beta 3 \ln (d) - \beta 4$RTA-member $+ \mu ij$

Dependent Variable: Log of the total agricultural trade between i and j

Table 6.14: Results for the total agricultural trade by the GDP and total population

Variables	Coefficient	Std. Error	Z	p-value
const	−15.1633	19.7660	−0.7671	0.4430
l_GDPi	0.725507	0.163468	4.438	<0.0001 ***
l_GDPj	0.127611	0.0788042	1.619	0.1054
l_Pi	−0.506791	1.10954	−0.4568	0.6478
l_Pj	0.814888	0.166931	4.882	<0.0001 ***
l_d	0.0502670	0.659248	0.07625	0.9392
dummy	−0.299918	0.0997699	−3.006	0.0026 ***

*** Significant at 1% level

Equation: ln (Tij) $= \alpha + \beta 1 \ln (GDPi) + \beta 2 \ln (GDPj) - \beta 3 \ln (Pi) + \beta 4 \ln (Pj) + \beta 5 \ln (d) - \beta 6$RTA-member $+ \mu ij$

Dependent Variable: Log of the total agricultural trade between i and j

The data presented in Table 6.14 suggests a positive correlation between India's GDP, the population of developed countries, and the total agricultural trade. However, it is found that neither the population of India, the GDP of developed countries, nor the distance between them can be significant variables. The model additionally indicates a negative correlation

between India's participation in RTA and its agricultural trade, implying the possibility of trade diversion.

The gravity model analysis reveals key insights into India's total agricultural trade with developed countries. The empirical results derived from the gravity model indicate that economic determinants, such as GDP and population, exhibit a more significant influence on India's agricultural trade with developed nations compared to geographical proximity. The distance variable is positive and does not significantly impact agricultural trade, which is unexpected, assuming the gravity model. Such typical cases of a positive signed distance variable can possibly occur due to economic specialisation and some advancements in transportation technology (Krugman, 1991b; Behar & Venables, 2011; Baldwin & Venables, 2013), which is likely to arise due to the involvement of developed nations. Most remarkably, the negative and statistically significant coefficients for the RTA membership dummy variable across all tables exhibit that trade diversion is occurring. These findings raise concerns about the effectiveness of India's involvement in RTAs when it comes to advancing agricultural trade with developed nations.

6.6.4 Gravity model for India’s total trade with developing countries

Tables 6.15, 6.16, 6.17, and 6.18 present the pertinent data about India's trade with developing nations. Four models were introduced, each resembling similarities with the preceding sub-sections and each utilising key variables: Gross Domestic Product (GDP), population size, Per Capita Income (PCI), and a composite of GDP and population. The tables presented in this section are equally important to the preceding sub-sections within this chapter.

According to Table 6.15, the size of the economies (as measured by the GDP of both India and the partner countries) and the distance separating them are important factors that can be

used to predict the magnitude of agricultural trade between India and developing nations. The coefficient of the dummy variable is with a positive sign, but it is statistically insignificant. The analysis conducted in this model reveals that the presence of a RTA does not yield a substantial impact on the prediction of agriculture trade volumes.

Table 6.15: Results for the total agricultural trade by the GDP

Variables	Coefficient	Std. Error	Z	p-value
Const	−15.1998	3.75040	−4.053	<0.0001 ***
l_GDPi	1.08517	0.0995869	10.90	<0.0001 ***
l_GDPj	0.308272	0.105997	2.908	0.0036 ***
l_d	−1.17352	0.393009	−2.986	0.0028 ***
Dummy	0.0688722	0.0981734	0.7015	0.483

*** Significant at 1% level

Equation: ln (Tij) = α + β1ln (GDPi) + β2ln (GDPj) – β3ln (d) + β4RTA-member + μij

Dependent Variable: Log of the total agricultural trade between i and j

Table 6.16: Results for the total agricultural trade by the total population

Variables	Coefficient	Std. Error	Z	p-value
const	−175.202	9.82354	−17.83	<0.0001 ***
l_Pi	9.67136	0.483601	20.00	<0.0001 ***
l_Pj	−0.275615	0.178869	−1.541	0.1233
l_d	−1.05005	0.408372	−2.571	0.0101 **
dummy	0.212819	0.100458	2.118	0.0341 **

*** Significant at 1% level, ** Significant at 5% level

Equation: ln (Tij) = α + β1ln (Pi) − β2ln (Pj) − β3ln (d) + β4RTA-member + μij

Dependent Variable: Log of the total agricultural trade between i and j

As per Table 6.16, the population of India produces a substantial and favourable influence on the agricultural trade dynamics between India and region "j". Regions with higher population densities tend to indulge in a greater volume of agricultural trade. The population in developing nations does not have a statistically significant impact on the agricultural trade in this model. The positively signed and statistically significant coefficient of the dummy variable suggests that RTA membership is associated with a 0.21% increase in the exports

of agricultural commodities from India to 'j.' This indicates that trade creation has occurred due to the forming of trade agreements.

Table 6.17: Results for the total agricultural trade by the PCI

Variables	Coefficient	Std. Error	Z	p-value
Const	10.7533	3.57655	3.007	0.0026 ***
l_PCIi	1.24803	0.0950202	13.13	<0.0001 ***
l_PCIj	0.403460	0.0994639	4.056	<0.0001 ***
l_d	−1.13116	0.408701	−2.768	0.0056 ***
Dummy	0.0280448	0.0970978	0.2888	0.7727

*** Significant at 1% level

Equation: ln (Tij) $= \alpha + \beta 1 \ln (PCIi) + \beta 2 \ln (PCIj) - \beta 3 \ln (d) + \beta 4$RTA-member $+ \mu ij$

Dependent Variable: Log of the total agricultural trade between i and j

In Table 6.17, the PCI in both regions, 'i' and 'j', has a significant positive impact on agricultural trade. A positive correlation exists between higher income levels and increasing trade in both regions, although the impact is more apparent in India. The coefficient of the dummy variable is positive and insignificant, which predicts that RTA membership will not significantly affect the agricultural trade between regions.

Table 6.18: Results for the total agricultural trade by the GDP and total population

Variables	Coefficient	Std. Error	Z	p-value
const	12.3602	38.4795	0.3212	0.7480
l_GDPi	1.31408	0.336049	3.910	<0.0001 ***
l_GDPj	0.348476	0.110647	3.149	0.0016 ***
l_Pi	−1.26018	2.23897	−0.5628	0.5735
l_Pj	−0.515460	0.181926	−2.833	0.0046 ***
l_d	−1.09758	0.425988	−2.577	0.0100 ***
dummy	0.0312605	0.0976129	0.3203	0.7488

*** Significant at 1% level

Equation: ln (Tij) $= \alpha + \beta 1 \ln (GDPi) + \beta 2 \ln (GDPj) - \beta 3 \ln (Pi) - \beta 4 \ln (Pj) - \beta 5 \ln (d) + \beta 6$RTA-member $+ \mu ij$

Dependent Variable: Log of the total agricultural trade between i and j

In Table 6.18, the Gross domestic product in both regions 'i' and 'j' strongly impacts agricultural trade between them. The coefficient of India's population is negative but insignificant. The population from developing nations generates a considerable yet adverse effect on trade. This observation implies that countries with larger populations in the developing region may sometimes exhibit lower levels of agricultural trade as they emphasis a greater level of self-sufficiency in the agriculture sector. The geographical separation between regions remains a prominent obstacle to the facilitation of trade, as evidenced by past empirical studies. The inclusion of India in the RTA membership within this context does not hold much significance in this model. However, the existence of a positive coefficient on the dummy variable indicates a higher likelihood of trade creation in the short run.

Across models from 6.15 to 6.18, the GDP of both India (region 'i') and its developing trading partners (region 'j') consistently show a positive and significant impact on trade, suggesting greater trading volumes between them. Population dynamics and geographical distance are factors that contribute to the overall impact, albeit their influence is more intricate in nature. In general, it can be observed that India engages in trade creation with developing countries, particularly when considering factors like population and trade agreements (Table 6.16). However, it is essential to note that the magnitude of this trade creation is not consistently substantial across each variable examined. The existence of RTAs has the potential to facilitate trade creation, although the extent of this effect relies upon the particular model employed and the variables considered.

Concerning the developed nations, there may be effects on regional trade patterns and economic ties due to India's membership in the RTA, as the country is likely to shift its trade away from more efficient non-member countries. Among the 25 developed nations in the

gravity model, India has trade agreements with three nations: Japan, the Republic of Korea, and Singapore. Conversely, eight of the 14 developing nations in the model share bilateral or plurilateral RTAs with India. The economic performances and factors of agricultural trade tend to vary from developed to developing nations. Hence, the same is distinctly reflected in the regression results of the gravity model for developed nations and developing nations.

6.7 Summary

The chapter explores the specifications, framework, and methodology necessary for regression analyses using the gravity model. The results from the gravity models consistently demonstrate the importance of economic size and distance in determining agricultural trade patterns. The population of India and the importing countries, as well as their GDP and PCI, play a significant role in shaping the volume of agricultural trade. The models are classified into four main categories, including total agricultural trade, exports, India's trade with developed countries, and India's trade with developing countries. The research also underscores the significance of categorising nations into developed or developing categories when assessing India's agricultural trade. The findings presented in this study are consistent with prior research conducted in the same domain, underlining the significance of considering these variables when examining and forecasting agricultural trade trends.

The study estimates agricultural trade and exports using gravity models, and it suggests that India’s membership in RTAs boosts trade creation in India's agricultural trade. The study does not yield substantial empirical support for the occurrence of trade diversion among members of trade agreements in the context of India’s agricultural trade. However, few results exhibit the possibility of trade diversion regarding the developed nations. These findings raise concerns regarding India's participation in RTAs, particularly in dealing with

advanced nations. India's collaboration in the existing RTA framework generates more economic welfare (trade creation) due to the presence of developing countries than with developed countries. In general, the gravity model analysis implies that India's trade creation effects have outweighed the diversion effects quite significantly, thereby emerging a 'trade creation' phenomenon in the context of India's agricultural trade. Overall, the gravity models suggest that membership in regional trade agreements has a beneficial impact on the facilitation of trade creation.

CHAPTER VII

SUMMARY, FINDINGS, CONCLUSIONS, AND IMPLICATIONS

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SUMMARY, FINDINGS, CONCLUSIONS, AND IMPLICATIONS

7.1 Introduction

India has actively participated in establishing regional trade agreements (RTAs) with several countries and regional blocs. Throughout history, India has adopted a trading strategy that has predominantly emphasised protectionism, with the primary objective of safeguarding its own industries against the influence of international competition. Since the 1990s, there has been a notable shift in India's approach, with a greater emphasis on liberalization. This has resulted in adopting a more open trade policy, leading to the establishment of several RTAs with key trading partners. India's participation in RTAs reflects the increasing trend of economic regionalism on a global scale.

RTAs have exerted a substantial influence on the realm of agricultural trade. Although agriculture is technically included in several RTAs, variations exist across member states in terms of implementing trade policy changes and domestic laws. These variances present problems in the process of integrating agriculture into a cohesive regional framework. RTAs have the potential to strengthen market accessibility, specialisation, revenue, and agricultural investment through the reduction of trade obstacles. This enables countries to focus on certain agricultural products and reap the associated benefits. Furthermore, the modernisation and integration of the agriculture sector with global value chains can contribute to driving economic development. Nevertheless, including agricultural commodities in RTAs does not conform to the principles of trade liberalisation observed in other sectors. In the global trading system, RTAs have emerged as significant constructive components, with their influence on agriculture being contingent upon the particular agreement and regional circumstances.

The agricultural sector has emerged as a subject of dispute in the ongoing negotiations, primarily owing to India's adoption of protectionist policies. Periodically, there exists a discussion pertaining to the assessment and modification of existing RTAs in order to maximise their advantages for India. India has taken a cautious approach before establishing any new trade agreement. Comprehending the ramifications of RTAs on the agricultural trade holds significant implications for a nation such as India, characterised by an extensive population and a substantial dependence on the primary sector, specifically agriculture. During the COVID-19 pandemic, India played a significant role in becoming a vital global supplier of key food and agricultural commodities. In general, India has experienced substantial development in its agricultural trade, and it has actively participated in regional trade agreements to augment its export ability and promote dynamism in agricultural trade.

The study seeks to comprehend the agriculture sector's preferential status under India's RTAs and to examine developments in agricultural exports and imports. It examines the agricultural growth rate of exports-imports and export competitiveness under each bilateral trade agreement, as well as the trade creation and trade diversion effects of RTAs on agricultural trade. The study employs three major methodologies. To begin, growth rate assessments are carried out in order to reflect the immediate impact of signed bilateral agreements. The Log-Linear model is used to investigate the swift growth of exports and imports in RTA countries. Second, Balassa's Revealed Comparative Advantage (RCA) index is used to examine the export competitiveness of agricultural products under various bilateral trade agreements. Finally, in India's RTAs, the gravity model is employed to quantify trade creation and trade diversion effects. The gravity model estimates the trade effects of numerous trade-related measures and sheds light on the relationships between economic magnitude, distance, and trade flows.

7.2 Chapter Summary

The research is organised into a total of seven chapters. Chapter I serves as an introductory chapter, providing an overview of regional trade agreements and explores the global proliferation of RTAs and their implications for agricultural sectors. Furthermore, the chapter presents the research problem, highlights the significance of the study, outlines the objectives, and describes the data methodology employed.

Chapter II focuses on studies related to RTAs and their impact on trade facilitation, tariffs, growth, and agricultural trade. The review highlights the potential gains and losses for countries engaged in RTAs alongside the trends in the movement of agricultural commodities. It emphasises the importance of a liberalized policy framework and tariff restructuring interventions for the welfare agenda of RTAs. Overall, it provides a comprehensive review of the relevant scholarly works and identifies the research gap that currently exists in the area of study. The literature review highlights an immediate need for targeted research on India's agricultural trade within the RTA structure.

Chapter III presents a thorough review of global agricultural trade, encompassing an overview of the relevant research topic and exploring India's diverse trade agreements. It discusses the increase in global trade in agricultural products and the varying growth rates in different regions. The chapter also highlights the introduction of tariff reduction/elimination mechanisms in India's RTAs with a breakdown of the distinctive considerations given to the agriculture commodities under India’s RTAs.

In Chapter IV, the analysis of export-import growth of agricultural products under India's bilateral trade agreements is examined using the Log-Linear model. This chapter presents an in-depth analysis of the growth patterns observed in the exports and imports of agricultural products, including animals, vegetables, and food products, in various trade

agreements involving India. The analysis was conducted on a total of 36 export cases and 34 import cases pertaining to twelve bilateral trade agreements of India. Out of the total of 70 cases, which includes both exports and imports, 22 cases pertain to animals-related values, while 24 cases are associated with vegetables values, and the remaining 24 cases belong to food products values. The findings present a methodical description of growth patterns observed in the cases of exports and imports on the basis of agricultural products and India's RTAs.

Chapter V is analysing the RCA for agricultural products to identify the export competitiveness within nine bilateral trade agreements of India. Among the entire evaluation of 228 cases of agricultural export competitiveness, 118 cases have exhibited statistically significant changes. Out of these 118 cases, 38 cases have exhibited significant improvements in the context of RCA, whereas the remaining 80 cases have demonstrated a decline in RCA. In general, the export competitiveness of India's agricultural products has experienced a decline subsequent to the establishment of RTAs, with around 50% of cases exhibiting no significant change, thereby limiting India's agricultural export potential under the RTAs. The India-Thailand FTA has been the most advantageous RTA for agricultural exports, which is followed by the India-The Republic of Korea CEPA in terms of export competitiveness. In contrast, it can be observed that the India-Sri Lanka FTA, India-Singapore CECA, India-ASEAN FTA, India-Malaysia CECA, and India-Japan CEPA have demonstrated a decline in export competitiveness in almost 80% of the cases that experienced deterioration in RCA.

Chapter VI of this study employs the widely accepted Gravity model to evaluate the impact of India's RTAs on agricultural trade, specifically focusing on the effects of trade creation and trade diversion. The findings consistently demonstrate that both economic size and

distance play significant roles in influencing agricultural trade. The models are categorised into four distinct groups, including total agricultural trade, exports, India's trade with developed countries, and India's trade with developing countries. According to the findings of the study, India's participation in RTAs has been found to have a positive impact on trade creation within the agriculture sector. However, there is limited empirical support for the occurrence of trade diversion among members of trade agreements, except for some evidence of trade diversion with developed nations. In general, the gravity models suggest that the trade creation impacts on India's agricultural trade surpass the trade diversion effects. The participation in RTAs has been found to have a beneficial effect on the facilitation of trade and the overall economic welfare.

Chapter VII of the thesis provides a comprehensive overview of the summary, findings, conclusions, and implications derived from the research conducted, along with the limitations and the scope of the research.

7.3 Major Findings

The following major findings are based on the analysis carried out in various chapters and are in tune with the objectives of the study.

i. All RTAs have tried to protect India’s agriculture by including some of the agricultural products in the negative list, and many of these products have received further extended periods for the reduction of tariffs. India has given special treatment to the agriculture sector in general and various agricultural products in particular, in all RTAs formed. A close examination of preferential treatment to agricultural products in different RTAs reveals that, in some cases, India has granted more advantageous tariff and duty reductions to its partners, surpassing the concessions it obtained in exchange.

ii. India's agricultural exports and imports exhibited improvements during the 20 years under study for each RTA. However, exports and imports have not increased substantially after the formation of RTA with each trading partner/s. Only two RTAs in the case of exports and three in the case of imports have shown positive improvements.

iii. Regarding the product-wise analysis of the growth pattern of exports/imports for Animals, vegetables, and Food Products concerned, among the total number of 70 cases, only 19 cases have demonstrated statistically significant differences. It means approximately 70% of the total cases of exports and imports have remained unchanged after the formation of bilateral trade agreements under consideration.

iv. For the growth analysis, with most RTAs, India’s exports of animals (7 RTAs), vegetables (8 RTAs), and food products (11 RTAs) do not show any growth after the formation of RTAs. Growth rate analysis on the imports of considered products also reveals a similar pattern. With most RTAs, India’s imports of animals (6 RTAs), vegetables (9 RTAs), and Food Products (10 RTAs) did not show any substantial increase after the creation of RTAs.

v. Among all twelve RTAs, the India-ASEAN FTA appears to be the best-performed regarding the growth of exports and imports. India-Thailand FTA is next best-performing, followed by the India-Sri Lanka FTA, India-Chile PTA, and India-Malaysia CECA.

vi. An assessment of export competitiveness based on the RCA index revealed that India’s export competitiveness compared to trade partners has not improved much after the commencement of RTAs. The number of products for which RCAs have improved is less as compared to RCAs, which deteriorated and had no change in RCA. The export competitiveness of agricultural products in India has experienced

a decline, as compared to the improvement, with around 50% of instances exhibiting no change.

vii. RTA-wise analysis of export competitiveness showed mixed results. The India-Thailand FTA has been found favourable for agricultural exports, among the nine RTAs evaluated, with a total of 14 goods demonstrating improved export competitiveness. The CEPA between India and the Republic of Korea has resulted in enhanced export competitiveness for a total of eight products. In contrast, it can be observed that the India-Singapore CECA, India-ASEAN FTA, India-Malaysia CECA, and India-Japan CEPA have demonstrated a notable decline in export competitiveness across 52 cases. The FTA with Sri Lanka has been highly ineffective, with no products showing improvement in export competitiveness and 11 products experiencing deterioration.

viii. The findings of the product-wise analysis of export competitiveness also provide mixed results. There is no indication of statistically significant improvement in export competitiveness for the five agricultural commodities (PC 01, 10, 15, 50, and 52) with any of the nine RTAs considered. The four products (PC 18, 20, 22, and 24) that have demonstrated significant improvements, with three cases observed for each, are only from the 'food products' category. The analysis revealed that RCA associated with Product codes 03, 08, 13, 19, 23, and 50 have exhibited a significant decline in export competitiveness.

ix. It is found that economic sizes and geographical distances have a significant impact on the agricultural trade and exports of India. The study highlights the finding of the positive effect of economic sizes (GDP, population, and PCI) and participation in RTAs on India's agricultural exports. The study focuses on India's agricultural trade

under RTAs and finds that RTAs have resulted in trade creation, with members of these agreements engaging in more extensive agricultural trade with each other.

x. The gravity model results exhibit that the RTAs have helped in trade creation for India's total agricultural trade and exports. The RTA dummies are found to be statistically significant and positive. All dummies with respect to total agricultural trade and exports have shown a positive sign, indicating that the RTAs are bringing benefits to the agricultural trade, too. The gravity model for India's agricultural exports with developed countries showed that the dummy variable is significant and negative for GDP and the population. Thus, indicating a phenomenon of trade diversion with developed nations. However, with regard to developing nations, India's RTAs are found to result in trade creation.

xi. India's participation in the current RTA framework yields greater economic welfare, namely in terms of trade creation, when collaborating with developing countries as opposed to developed countries.

7.4 Major Conclusions

In the light of the above findings, the study makes the following valid conclusions.

i. In most of India's RTAs, agriculture has remained more protected as compared to other sectors. India has followed a strategy of reciprocal granting and receipt of tariff concessions for agricultural commodities. India approaches the liberalization of the agriculture sector under RTAs with caution, taking into account the potential social and economic consequences. The nation's trade policy seeks to achieve an optimal balance between enhancing exports and protecting domestic interests. Hence, it is concluded that the agriculture sector has been getting special treatment under India's

RTAs. India has always tried to find an equilibrium between liberalising markets and safeguarding its domestic agricultural stakeholders.

ii. The impact of various bilateral trade agreements on India is mixed. A limited number of RTAs have influenced India's trade in agricultural products. The extent of this influence is dependent upon the specific product category and trading partner involved. Though the agricultural exports and imports have exhibited a rise during the entire studied period, there is very little evidence to prove that the exports and imports have increased significantly after the formation of RTAs. Thus, RTAs have not helped in a substantial rise in India's agricultural exports to its trading partners.

iii. The export competitiveness of India's agricultural commodities has not improved much under RTAs. The prevalence of unaltered RCAs after the formation of RTAs indicates that RTAs have not played a remarkable role in improving the export competitiveness of agricultural commodities. Among different commodities, 'Food products' appear to be a potentially promising export area in the long run.

iv. It may be concluded from the growth analysis and assessment of the export competitiveness of India's agricultural commodities that India has not benefited in the expected and utmost fashion from these bilateral trade agreements. India has failed to gain adequately from RTAs. India's overall agricultural export potential has not improved much or remained unchanged after the formation of most RTAs, probably due to less flexible rules of origin, flawed phased-out tariff structure, high cost of compliance, and lack of awareness about regional agreements.

v. RTAs are trade-creating to agricultural trade since the obstacles are minimised to a greater extent within the cluster of RTA member countries. In general, RTAs can be regarded as 'welfare-enhancing' for the agricultural trade of India. It indicates that

the RTAs would benefit the agriculture sector in the long run, though in the short run, their performance is not satisfactory.

vi. The effects of RTAs on agricultural trade and exports vary between developed and developing nations. India would derive greater benefits by engaging in trade agreements with developing nations. However, this advantage is not as effectively realised in its dealings with developed countries. Hence, it is imperative for India to reassess its trade agreements and strategy in order to maximise advantages and mitigate trade diversion, particularly in its interactions with developed nations.

vii. Overall, the results lead us to conclude that India's participation in RTAs is rather beneficial for its agricultural trade, albeit with variations based on the specific terms and partners involved. The study underscores the potential of RTAs in enhancing India’s total agricultural trade and exports to a considerable extent.

7.5 Policy Implications

The analysis of the study should serve as an important basis for policymakers in India as they evaluate the performance of existing RTAs and consider future trade partnerships with regard to agriculture. These results are helpful for policymakers and analysts who want to better understand and promote agriculture under RTAs.

i. The study has significant trade policy implications as India is going ahead with new RTAs, and some are already in the proposal stages. The negotiations and tariff relaxations must be introduced in the agricultural sector after a thorough review to ensure the adaptability and effectiveness of prospective agreements.

ii. The study draws the attention of the stakeholders to take precautionary measures while granting tariff concessions to the RTA partners concerning India's agricultural

products in the forthcoming RTA negotiations. RTAs may benefit exports of products and services and bring investment to the country, but they should not be at the cost of India's agricultural sector.

iii. This study can help policymakers take the initiative in promoting the export of prominent agricultural commodities exhibiting comparative advantages. India should prioritise its export competitiveness mechanism on agricultural commodities as per its export competitiveness. India must consider prevailing market trends and assess demand in countries of plurilateral or bilateral agreements to determine possible export prospects and formulate effective plans to exploit them.

iv. The diverse findings of the study indicate that a uniform approach to trade agreements may lack effectiveness, necessitating customised strategies for individual trade agreement partners.

v. India has kept many agricultural products under the protected ‘negative list’. If the partner countries also follow the same, the liberalisation of trade in agriculture may not take place, as envisaged. As a point of comparison, it would be beneficial to analyse how India's agricultural trade performs with nations with which it does not have RTAs.

vi. There is an immediate need for policy intervention in order to comprehend the factors contributing to the fall or deterioration of specific agricultural products. The implementation of appropriate strategies is necessary for products that have shown limited or moderate enhancements in their export competitiveness, as well as for items that have experienced either negative growth or a decline in competitiveness to reverse this negative trajectory. The same can be extended to those products that

have experienced neither improvement nor deterioration so that they realise the potential gains.

vii. In order to maximise the benefits of RTAs in agriculture, countries should address non-tariff barriers, focus on investment and productivity improvements, consider special provisions for sectors with comparative disadvantages, diversify agricultural exports, negotiate RTAs to provide a level playing field, adjust protection measures to protect domestic agricultural sectors, and consider the impact of Rules of Origin on trade.

viii. It is possible that India's agriculture did not gain much from various RTAs because of poor infrastructure, poor packaging, poor storage and marketing facilities, and a lack of quality of exportable products up to global standards. These aspects need to be explored.

ix. India should tap the opportunities in the African region through the medium of RTA by strengthening the notion of 'south-south development'. Sri Lanka purchases agricultural products from other nations, such as potatoes, garlic, oranges, maize, wheat and meslin, etc. However, India has the potential to export it substantially to Sri Lanka.

x. India can consider specialising in the production and export of organic agricultural products by upgrading to the expected level of Sanitary and phytosanitary (SPS) measures to boost its exports in developed nations such as Denmark, the United States, Germany, Australia, Switzerland, France, the United Kingdom, Canada, Italy, and others, wherein the demand for organic products is substantial. This measure can enhance diverse agricultural products' export growth and competitiveness. This implication can be extended to existing and prospective RTA partners of India.

7.6 Limitations of the Research

The study may not account for all plausible confounding factors, such as governmental policies, subsidies, or economic fluctuations, that could impact agricultural trade. Trade agreements can be greatly influenced by intangible factors such as political stability, diplomatic ties, and public opinion, which are challenging to measure. The data utilised for conducting a comparison analysis between pre- and post-RTA is for a short period, since "RTAs" is a recent phenomenon.

7.7 Scope for Future Research

The present study provides an important framework for understanding the dynamics of RTAs, with a particular focus on India's agricultural trade. However, future research has substantial scope to deepen our understanding and guide policy decisions more effectively. One avenue could be an in-depth analysis of individual agricultural commodities to understand the specific factors affecting their potential. The study can be applied to recently formed trade agreements of India with Mauritius and UAE and to the forthcoming RTAs. Similarly, the approach can be elaborated on the plurilateral framework of RTAs to understand the efficacy of policy initiatives that have been implemented. This will highlight the emphasis on functionality and collaboration with WTO.

Further investigation might be conducted to explore non-tariff obstacles, inefficiencies within the supply chain, and the influence of foreign direct investment on the competitiveness of the agriculture sector. Furthermore, conducting a more thorough examination of external issues such as worldwide rivalry, demand trends, and economic situations in partner nations is important. The study can be extended to similar developing countries, especially in South Asia and Africa, given the significance of agriculture in South-South cooperation.

The existing research provides a good foundation for inquiry; however, it also highlights certain domains that require additional investigation to achieve a thorough comprehension of the intricacies surrounding India's agricultural trade inside RTAs. These prospective areas of research have the potential to enhance the development of a well-informed and efficient trade strategy for the agriculture sector in India.

REFERENCES

REFERENCES

Abrams, R. K. (1980). International trade flows under flexible exchange rates. *Economic Review*, *65*(3), 3-10.

Adelson, H. L. (1960). Early medieval trade routes. *The American Historical Review*, *65*(2), 271-287.

Ahcar Olmos, J., & Rodríguez-Barco, D. (2020). A sensitivity analysis on the impact of regional trade agreements in bilateral trade flows. *Estudios de Economía*, *47*(2), 193-219.

Ahmad, B., Anwar, M., Badar, H., Mehdi, M., & Tanveer, F. (2021). Analyzing export competitiveness of major fruits and vegetables of Pakistan: an application of revealed comparative advantage indices. *Pakistan Journal of Agricultural Sciences*, *58*(2), 719-730.

Aitken, N. D. (1973). The effect of the EEC and EFTA on European trade: A temporal cross-section analysis. *The American Economic Review*, *63*(5), 881-892.

Ammani, A. A. (2013). Impact of market-determined exchange rates on rice production and import in Nigeria. *International Journal of Food and Agricultural Economics (IJFAEC)*, *1*(1128-2016-92014), 85-98.

Anderson, J. E. (1979). A theoretical foundation for the gravity equation. *The American Economic Review*, *69*(1), 106-116.

Anderson, J. E., & Van Wincoop, E. (2003). Gravity with gravitas: A solution to the border puzzle. *American Economic Review*, *93*(1), 170-192.

Anderson, K. (2010). Globalization's effects on world agricultural trade, 1960–2050. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *365*(1554), 3007-3021.

Ashish, A., & Kannan, E. (2015). Analysis of India's revealed comparative advantage in agro-processed products. *Indian Journal of Economics and Business*, *14*(1), 115-130.

Baier, S. L., & Bergstrand, J. H. (2007). Do free trade agreements actually increase members' international trade?. *Journal of International Economics*, *71*(1), 72-95.

Baier, S. L., Yotov, Y. V., & Zylkin, T. (2019). On the widely differing effects of free trade agreements: Lessons from twenty years of trade integration. *Journal of International Economics*, *116*, 206-226.

Balassa, B. (1965), Trade Liberalisation and Revealed Comparative Advantage. *The Manchester School*, *33*(2), 99-123.

Balassa, B. (1977). 'Revealed' comparative advantage revisited: An analysis of relative export shares of the industrial countries, 1953–1971. *The Manchester School*, *45*(4), 327-344.

Balassa, B. (1979). The changing pattern of comparative advantage in manufactured goods. *The Review of Economics and Statistics*, 259-266.

Balassa, B. (1986). Comparative advantage in manufactured goods: a reappraisal. *The Review of Economics and Statistics*, 315-319.

Baldwin, R. (1993). A Domino theory of regionalism, NBER Working Paper Series, Vol. w4465. *Expanding Membership of the European Union*.

Baldwin, R. E., & Seghezza, E. (2010). Are trade blocs building or stumbling blocs? *Journal of Economic Integration*, *25*(2), 276-297.

Baldwin, R., & Venables, A. J. (2013). Spiders and Snakes: Offshoring and agglomeration in the global economy. *Journal of International Economics*, *90*(2), 245-254.

Balogh, J. M., & Leitão, N. C. (2019). A gravity approach of agricultural trade: The nexus of the EU and African, Caribbean and Pacific countries. *Agricultural Economics*, *65*(11), 509-519.

Behar, A., & Venables, A. J. (2011). Transport costs and international trade. In *A Handbook of Transport Economics* (pp. 97-115). Edward Elgar Publishing, Cheltenham, United Kingdom.

Bergstrand, J. H. (1985). The gravity equation in international trade: some microeconomic foundations and empirical evidence. *The Review of Economics and Statistics*, *67*(3), 474-481.

Bhagwati, J. N. (1991). *The World Trading System at Risk.* Princeton University Press, Princeton, United States.

Bhagwati, J. (1992). Regionalism versus multilateralism. *World Economy*, *15*(5), 535-556.

Bhagwati, J. (1993). Regionalism and multilateralism: an overview. *New Dimensions in Regional Integration*, 22-51.

Bhagwati, J., & Panagariya, A. (1996a). *The Economics of Preferential Trade Agreements*. American Enterprise Institute, Washington, U.S.

Bhagwati, J., & Panagariya, A. (1996b). The theory of preferential trade agreements: historical evolution and current trends. *The American Economic Review*, *86*(2), 82-87.

Bhasin, N., & Manocha, R. (2015). Impact of Regional Trade Agreements on India's Agricultural Exports. *FOCUS: Journal of International Business, 2*(2), 83-98.

Bhatia, J. K., Mehta, V. P., Bhardwaj, N., & Nimbrayan, P. K. (2021). Export-Import Performance of Major Agricultural Commodities in India. *Economic Affairs, 66*(1), 117-126.

Bojnec, S., & Ferto, I. (2016). Export competitiveness of the European Union in fruit and vegetable products in the global markets. *Agricultural Economics, 62*(7), 299-310.

Bojnec, Š., & Fertő, I. (2019). Agri-food comparative advantages in the European Union countries by value chains before and after enlargement towards the East. *Journal of Agricultural Science*, *30*(2), 1-9.

Brada, J. C., & Mendez, J. A. (1983). Regional economic integration and the volume of intra-regional trade: A comparison of developed and developing country experience. *Kyklos*, *36*(4), 589-603.

Burfisher, M. E., Robinson, S., & Thierfelder, K. (2001). 'The Impact of NAFTA on the United States'. *Journal of Economic Perspectives, 15*(1), 125-144.

Burger, M., Van Oort, F., & Linders, G. J. (2009). On the specification of the gravity model of trade: zeros, excess zeros and zero-inflated estimation. *Spatial Economic Analysis*, *4*(2), 167-190.

Cantin, M. H., & Duchesne, É. (2019). Canada-United States agricultural trade under the shadow of NAFTA: liberalization, conflicts and challenges. *Canadian Foreign Policy Journal*, *25*(2), 137-151.

Cernat, L. (2001). Assessing regional trade arrangements: Are South-South RTAs more trade diverting. *Global Economy Quarterly*, *2*(3), 235-59.

Cissokho, L., Haughton, J., Makpayo, K., & Seck, A. (2013). Why is agricultural trade within ECOWAS so high?. *Journal of African Economies*, *22*(1), 22-51.

Cooper, C. A., & Massell, B. F. (1965). Toward a general theory of customs unions for developing countries. *Journal of Political Economy*, *73*(5), 461-476.

Dennis, A. (2006). The impact of regional trade agreements and trade facilitation in the Middle East and North Africa region. *World Bank Policy Research Working Paper*, (3837).

Devi, C. U. (2014). Trade performance of Indian processed foods in the international market. *Procedia-Social and Behavioral Sciences*, *133*, 84-92.

Dianzah, Y. E. N. (2022). The effect of regional trade agreements on ASEAN trade flows. *Journal of Indonesian Applied Economics*, *10*(2), 40-71.

Ekanayake, E. M., Mukherjee, A., & Veeramacheneni, B. (2010). Trade blocks and the gravity model: A study of economic integration among Asian developing countries. *Journal of Economic Integration*, 627-643.

Egger, P. (2000). A note on the proper econometric specification of the gravity equation. *Economics Letters*, *66*(1), 25-31.

Egger, H., Egger, P., & Greenaway, D. (2008). The trade structure effects of endogenous regional trade agreements. *Journal of International Economics*, *74*(2), 278-298.

Ejones, F., Agbola, F. W., & Mahmood, A. (2021). Do regional trade agreements promote international trade? New empirical evidence from the East African Community. *The Journal of International Trade & Economic Development*, *30*(7), 1020-1053.

Erdem, T. (2020). Competitiveness of dried sector: A case study of world and Turkey. *Agricultural Economics*, *66*(8), 365-372.

Fayaz, M., & Ahmed, M. (2020). Fisheries exports of India: A constant market share analysis. *The Indian Economic Journal*, *68*(1), 29-39.

Feenstra, R. C., Markusen, J. R., & Rose, A. K. (2001). Using the gravity equation to differentiate among alternative theories of trade. *Canadian Journal of Economics/Revue Canadienne D₹Economique*, *34*(2), 430-447.

Fernandez, R., & Portes, J. (1998). Returns to regionalism: An analysis of nontraditional gains from regional trade agreements. *The World Bank Economic Review*, *12*(2), 197-220.

Fertö, I., & Hubbard, L. J. (2003). Revealed comparative advantage and competitiveness in Hungarian agri–food sectors. *World Economy*, *26*(2), 247-259.

Fink, C., & Jansen, M. (2009). Services provisions in regional trade agreements: Stumbling blocks or building blocks for multilateral liberalization?. *Multilateralizing regionalism: Challenges for the global trading system*, *6*, 221-261.

Francois, J., & Wignaraja, G. (2009). Pan-Asian integration: Economic implications of integration scenarios. *Pan-Asian Integration: Linking East and South Asia*, 487-536.

Frankel, J., Stein, E., & Wei, S. J. (1995). Trading blocs and the Americas: The natural, the unnatural, and the super-natural. *Journal of Development Economics*, *47*(1), 61-95.

Frankel, J. A., Stein, E., & Wei, S. J. (1997). *Regional Trading Blocs in the World Economic System*. Peterson Institute for International Economics, Washington, U.S.

Freund, C. (2010). Third-country Effects of Regional Trade Agreements. *The World Economy*, *33*(11), 1589-1605.

Freund, C., & Ornelas, E. (2010). Regional trade agreements. *Annual Review of Economics*, *2*(1), 139-166.

Fugazza, M., & Vanzetti, D. (2008). A South–South survival strategy: the potential for trade among developing countries. *World Economy*, *31*(5), 663-684.

Gaurav, K., & Bharti, N. (2019). Some common lessons from uncommon FTAs. *South Asia Economic Journal*, *20*(1), 138-157.

Ghazalian, P. L. (2017). The effects of NAFTA/CUSFTA on agricultural trade flows: an empirical investigation. *Canadian Journal of Agricultural Economics*, *65*(2), 219-248.

Ghoshal, I. (2015). Trade-growth relationship in India in the pre and post trade agreements regime. *Procedia Economics and Finance*, *30*, 254-264.

Grant, J. H., & Lambert, D. M. (2008). Do regional trade agreements increase members' agricultural trade?. *American journal of agricultural economics*, *90*(3), 765-782.

Greenaway, D., & Milner, C. (2002). Regionalism and gravity. *Scottish Journal of Political Economy*, *49*(5), 574-585.

He, X. (2022). Regional trade agreements and excluded countries. *American Journal of Agricultural Economics*, *104*(1), 428-449.

Head, K., & Mayer, T. (2014). Gravity equations: Toolkit, cookbook, workhorse. *Handbook of International Economics*, *4*, 131-195.

Herz, B., & Wagner, M. (2011). Regionalism as a Building Block for Multilateralism. *Global Economy Journal*, *11*(1), 1-25.

Hndi, B. M., Maitah, M., & Mustofa, J. (2016). Trade impacts of selected free trade agreements on agriculture: the case of selected North African countries. *Agris Online Papers in Economics and Informatics*, *8*(665-2016-45103), 39-50.

Huchet-Bourdon, M., Le Mouel, C., & Peketi, M. (2016). *The impact of regional trade agreements on agrifood trade flows: The role of rules of origin* (No. 913-2016-72218).

Irena, B., Mansoor, M., Lubos, S., Karel, T., & Natalia, I. (2017). Perspectives of the Russian agricultural exports in terms of comparative advantage. *Agricultural Economics*, *63*(7), 318-330.

Jafari, Y., Engemann, H., & Zimmermann, A. (2023). Food trade and regional trade agreements–A network perspective. *Food Policy*, *119*, 102516.

Jagdambe, S. (2019). Consistency test of revealed comparative advantage index: Evidence from India's agricultural export. *Foreign Trade Review*, *54*(1), 16-28.

Jagdambe, S., & Kannan, E. (2020). Effects of ASEAN-India Free Trade Agreement on agricultural trade: The gravity model approach. *World Development Perspectives*, *19*, Article, 100212.

Jayasinghe, S., & Sarker, R. (2008). Effects of regional trade agreements on trade in agrifood products: Evidence from gravity modeling using disaggregated data. *Applied Economic Perspectives and Policy*, *30*(1), 61-81.

Jean, S., & Bureau, J. C. (2016). Do regional trade agreements really boost trade? Evidence from agricultural products. *Review of World Economics*, *152*(3), 477-499.

Johnson, H. G. (1965). An economic theory of protectionism, tariff bargaining, and the formation of customs unions. *Journal of Political Economy*, *73*(3), 256-283.

Josling, T. E., Roberts, D., & Orden, D. (2004). *Food Regulation and Trade: Toward a Safe and Open Global System*. Peterson Institute for International Economics, Washington, U.S.

Kahouli, B., & Maktouf, S. (2015). Trade creation and diversion effects in the Mediterranean area: Econometric analysis by gravity model. *The Journal of International Trade & Economic Development*, *24*(1), 76-104.

Kandogan, Y. (2008). Regionalism versus Multilateralism: Evidence for the Natural Trade Partners Theory from the Euro-Mediterranean Region?. *Journal of Economic Integration*, 138-160.

Kang, Y. D. (2016). Development of regionalism: New criteria and typology. *Journal of Economic Integration*, 234-274.

Kaushal, L. A. (2022). Impact of regional trade agreements on export efficiency–A case study of India. *Cogent Economics & Finance*, *10*(1), Article, 2008090.

Kepaptsoglou, K., Karlaftis, M. G., & Tsamboulas, D. (2010). The gravity model specification for modeling international trade flows and free trade agreement effects: a 10-year review of empirical studies. *The Open Economics Journal*, *3*, 1-13.

Koo, W. W., Kennedy, P. L., & Skripnitchenko, A. (2006). Regional preferential trade agreements: Trade creation and diversion effects. *Review of Agricultural Economics*, *28*(3), 408-415.

Korinek, J., & Melatos, M. (2009). Trade Impacts of Selected Regional Trade Agreements in Agriculture. OECD Trade Policy Papers 87, OECD Publishing.

Krauss, M. B. (1972). Recent developments in customs union theory: An interpretive survey. *Journal of Economic Literature*, *10*(2), 413-436.

Krugman, P. (1991a). The move toward free trade zones. *Economic Review*, *76*(6), 7-58.

Krugman, P. (1991b). Increasing returns and economic geography. *Journal of Political Economy*, *99*(3), 483-499.

Krugman, P. (1993). Regionalism versus multilateralism: analytical notes. *New Dimensions in Regional Integration*, 5-25.

Kumar, V. (2021). Trends and performance of India's Agricultural Trade in the midst of COVID-19 pandemic. *Indian Journal of Agricultural Economics*, *76*(3), 352-370.

Kurihara, Y. (2011). The impact of regional trade agreements on international trade. *Modern Economy*, *2*(5), 846-849.

Lambert, D., & McKoy, S. (2009). Trade creation and diversion effects of preferential trade associations on agricultural and food trade. *Journal of Agricultural Economics*, *60*(1), 17-39.

Lee, J. W., Park, I., & Shin, K. (2008). Proliferating regional trade arrangements: Why and whither?. *World Economy*, *31*(12), 1525-1557.

Lipsey, R. G. (1960). The theory of customs unions: A general survey. *The Economic Journal*, *70*(279), 496-513.

Lindberg, L., & Alvstam, C. G. (2007). The national element in regional trade agreements: the role of Southeast Asian countries in ASEAN-EU trade. *ASEAN Economic Bulletin*, *24*(2), 267-275.

Liu, X. (2010). *The Silk Road in world history*. Oxford University Press, United Kingdom.

Liu, X. (2016). Trade agreements and economic growth. *Southern Economic Journal*, 82(4), 1374-1401.

Lloyd, P. J. (1992). Regionalisation and world trade. *OECD Economic Studies*, *18*, 7-43.

Lloyd, P. J., & Maclaren, D. (2004). Gains and losses from regional trading agreements: A survey. *Economic Record*, *80*(251), 445-467.

Long, Y. (2021). Export competitiveness of agricultural products and agricultural sustainability in China. *Regional Sustainability*, *2*(3), 203-210.

Maciejewski, M., & Wach, K. (2019). What determines export structure in the EU countries? The use of gravity model in international trade based on the panel data for the years 1995-2015. *Journal of International Studies*, *12*(1), 151-167.

MacPhee, C. R., & Sattayanuwat, W. (2014). Consequence of Regional Trade Agreements to Developing Countries. *Journal of Economic Integration*, *29*(1), 64-94.

Mansfield, E. D., & Milner, H. V. (1999). The new wave of regionalism. *International Organization, 53*(3), 589-627.

Mansfield, E. D., & Milner, H. V. (2012). *Votes, Vetoes, and the Political Economy of International Trade Agreements*. Princeton University Press, Princeton, United States.

Maria, V. (2017). *Regional Trade Agreements, Integration and Development*. UNCTAD, Geneva, Switzerland.

Matkovski, B., Kalaš, B., Zekić, S., & Jeremić, M. (2019). Agri-food competitiveness in South East Europe. *Outlook on Agriculture*, *48*(4), 326-335.

Mattoo, A., Mulabdic, A., & Ruta, M. (2022). Trade creation and trade diversion in deep agreements. *Canadian Journal of Economics, 55*(3), 1598-1637.

McCallum, J. (1995). National borders matter: Canada-US regional trade patterns. *The American Economic Review*, *85*(3), 615-623.

McCorriston, S. (2002). Why should imperfect competition matter to agricultural economists?. *European Review of Agricultural Economics*, *29*(3), 349-371.

Meade, J. E. (1955). *The Theory of Customs Unions.* North-Holland Publisher, Amsterdam.

Mishra, B. R., & Jena, P. K. (2019). Bilateral FDI flows in four major Asian economies: a gravity model analysis. *Journal of Economic Studies*, *46*(1), 71-89.

Mizik, T., Szerletics, Á., & Jambor, A. (2020). Agri-Food Export Competitiveness of the ASEAN Countries. *Sustainability*, *12*(23), 1-15.

Moktan, S. (2008). Evaluating the intra–regional exports and trade creation and trade diversion effects of trade agreements in SAARC countries. *South Asia Economic Journal*, *9*(2), 233-260.

Nabi, T., & Kaur, T. P. (2019). Export specialization of India with top five agricultural economies: An application of RCA and RSCA. *International Journal of Innovative Technology and Exploring Engineering, 8 (12), 4705-4708.*

Nin-Pratt, A., & Diao, X. (2014). Regional Integration of Agricultural Trade in Southern Africa. *Journal of Economic Integration*, *29*(3), 520-562.

Nwali, C. S., & Arene, C. J. (2015). Effects of economic partnership agreements on agricultural trade between Nigeria and the EU. *International Journal of Food and Agricultural Economics (IJFAEC)*, *3*(1128-2016-92078), 63-74.

Oppong, R. F. (2009). Redefining the relations between the African Union and regional economic communities in Africa. *Monitoring Regional Integration in Southern Africa Yearbook. Stellenbosch, South Africa: TRALAC & Windhoek, Namibia: Konrad-Adenauer-Stiftung.* 5-25.

Ornelas, E., Turner, J. L., & Bickwit, G. (2021). Preferential trade agreements and global sourcing. *Journal of International Economics*, *128*, 103395.

Pal, P. (2005). Regional Trade Agreements in a Multilateral Trade Regime: A Survey of Recent Issues. *Foreign Trade Review*, *40*(1), 27-48.

Panagariya, A. (2000). Preferential trade liberalization: the traditional theory and new developments. *Journal of Economic Literature*, *38*(2), 287-331.

Pandey, P., & Choubey, M. (2019). Agricultural trade diversity of India with ASEAN. *Economic Affairs*, *64*(3), 607-614.

Pant, M., & Paul, A. (2018). The role of regional trade agreements: in the case of India. *Journal of Economic Integration, 33*(3), 538-571.

Pant, M., & Sadhukhan, A. (2009). Does Regionalism Hinder Multilateralism: A Case Study of India. *Journal of Economic Integration*, *24*(2), 222-247.

Park, I. (2009). Regional trade agreements in East Asia: Will they be sustainable?. *Asian Economic Journal*, *23*(2), 169-194.

Pawlak, K., Kołodziejczak, M., & Xie, Y. (2016). Changes in foreign trade in agri-food products between the EU and China. *Journal of Agribusiness and Rural Development*, *42*(4), 607-618.

Pöyhönen, P. (1963). A Tentative Model for the Volume of Trade between Countries. *Weltwirtschaftliches Archiv*, *90*(1), 93-99.

Rana, M. J., Islam, S., & Kamruzzaman, M. (2021). Growth and instability in area, production and productivity of major spices in Bangladesh. *Journal of Agriculture and Food Research*, *6*, Article, 100216.

Ratna, R. S., & Kallummal, M. (2013). ASEAN–India Free Trade Agreement (FTA) and its impact on India: A case study of fisheries and selected agricultural products. *Foreign Trade Review*, *48*(4), 481-497.

Ratna, R. S., Sharma, S. K., & Dobhal, A. (2021). Indian Agriculture under WTO and FTAs: An Assessment. *India Studies in Business and Economics*, 3-25.

Renjini, V. R., & Kar, A. (2016). Composition, intensity and competitiveness of agricultural trade between India and ASEAN. *Indian Journal of Economics and Development*, *12*(2), 249-254.

Ricardo, D. (1817). *On the Principles of Political Economy and Taxation.* John Murray, Albemarle-Street, London, United Kingdom.

Saxena, M., & Nath, P. R. (2012). The Impact of Globalization on India's Export and Import of Agricultural Commodities. *Economic Affairs*, *57*(2), 177-183.

Saxena, R., Paul, R. K., Rana, S., Chaurasia, S., Pal, K., & Joshi, D. (2015). Agricultural trade structure and linkages in SAARC: An empirical investigation. *Agricultural Economics Research Review*, *28*(2), 311-328.

Serin, V., & Civan, A. (2008). Revealed comparative advantage and competitiveness: A case study for Turkey towards the EU. *Journal of Economic and Social Research*, *10*(2), 25-41.

Singh, O. P., Anoop, M., & Singh, P. K. (2020). Revealed Comparative Advantage, Competitiveness and Growth Performance: Evidences from India's Foreign Trade of Agricultural Commodities. *Indian Journal of Agricultural Economics*, *75*(4), 560-577.

Sun, L., & Reed, M. R. (2010). Impacts of free trade agreements on agricultural trade creation and trade diversion. *American Journal of Agricultural Economics*, *92*(5), 1351-1363.

Sunge, R., & Ngepah, N. (2020). Agricultural trade liberalization, regional trade agreements and agricultural technical efficiency in Africa. *Outlook on Agriculture*, *49*(1), 66-76.

Suresh, A., & Mathur, V. C. (2016). Export of agricultural commodities from India: Performance and prospects. *Indian Journal of Agricultural Sciences*, *86*(7), 876-883.

Susanto, D., Rosson, C. P., & Adcock, F. J. (2007). Trade creation and trade diversion in the North American Free Trade Agreement: the case of the agricultural sector. *Journal of Agricultural and Applied Economics*, *39*(1), 121-134.

Szczepaniak, I. (2019). Changes in comparative advantages of the Polish food sector in world trade. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, *14*(3), 463-480.

Tandon, A. (2005). Growth, Performance and Instability of India's Agricultural Exports: A Pre and Post Reform Analysis. *Indian Economic Journal*, *53*(4), 74-86.

Tayyab, M., Tarar, A., & Riaz, M. (2012). Review of gravity model derivations. *Mathematical Theory and Modeling*, *2*(9), 82-95.

Timsina, K. P., & Culas, R. J. (2020). Impacts of Australia's free trade agreements on trade in agricultural products: an aggregative and disaggregative analysis. *Australian Journal of Agricultural and Resource Economics*, *64*(3), 889-919.

Tinbergen, J. (1962a). An analysis of world trade flows. *Shaping the World Economy*, *3*, 1-117.

Tinbergen, J. (1962b). Shaping the world economy: Suggestions for an International Economic Policy. The Twentieth Century Fund, New York.

Urata, S. (2002). Globalization and the growth in free trade agreements. *Asia Pacific Review*, *9*(1), 20-32.

Urata, S., & Okabe, M. (2014). Trade creation and diversion effects of regional trade agreements: A product-level analysis. *The World Economy*, *37*(2), 267-289.

Viner, J. (1950). The Customs Union Issue. Carnegie Endowment for International Peace, New York.

Vollrath, T. L. (1991). A theoretical evaluation of alternative trade intensity measures of revealed comparative advantage. *Review of World Economics*, *127*(2), 265-280.

Whalley, J. (1998). Why do countries seek regional trade agreements?. *The Regionalization of the World Economy*, 63-90.

Yeats, A. J. (1985). On the appropriate interpretation of the revealed comparative advantage index: implications of a methodology based on industry sector analysis. *Review of World Economics*, *121*(1), 61-73.

Zhou, M. (2022). Differential effectiveness of regional trade agreements, 1958-2012: The conditioning effects from homophily and world-system status. *The Sociological Quarterly*, *63*(2), 337-358.

FAO (2022). *Trade of agricultural commodities 2000–2020.* FAOSTAT Analytical Brief Series No. 44. Rome, Food and Agriculture Organization.

FAO (2022). FAOSTAT Database. Food and Agriculture Organization.

GOI (2021). *Economic Survey 2020-21*. Ministry of Finance, Department of Economic Affairs, India.

GOI (2023). Department of Agriculture & Farmers Welfare, Government of India, India.

International Trade Administration (2022, September). *India - Food and Agriculture Value Chain.* ITA, U.S.

Press Information Bureau, Government of India (2022, March). *India overshoots export target*. PIB, New Delhi.

World Economic Forum. (2015). *The Global Competitiveness Report 2014–2015.* World Economic Forum, Cologny, Switzerland.

WTO (2021). *"Regional Trade Agreements Information System (RTA-IS)"*. World Trade Organization.

WTO (2023). *Regional Trade Agreements Gateway*. World Trade Organization.

WTO (2023). *Regional Trade Agreements*. World Trade Organization.