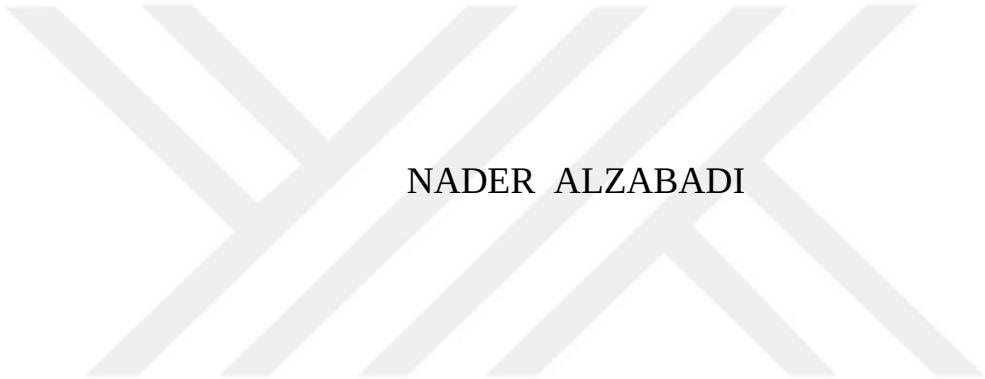


SIX ESSAYS ON TRADE LIBERALIZATION: FOREIGN DIRECT
INVESTMENT, INNOVATION AND EXPORTS, EXPORTS,
IMPORTS, TRADE BALANCE, GOVERNMENT SIZE
IN TURKEY



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YEDITEPE UNIVERSITY

June, 2022

YEDITEPE UNIVERSITY INSTITUTE OF SOCIAL SCIENCES

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IN TURKEY

by

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DISSERTATION SUBMITTED IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR THE
DEGREE OF DOCTOR OF PHILISOPHY

in

ECONOMICS

YEDITEPE UNIVERSITY

June, 2022

PLAGIARISM

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.



Date: 20/06/2022

Nader Alzabadi

ABSTRACT

This study aims to examine the impact of trade liberalization on some macroeconomic indicators (foreign direct investment, exports, imports, trade balance, and government size) in Turkey. Our study employed the autoregressive distributed lag bound test (ARDL) approach, unit root test, bound test for long-run estimation, and error correction term (EC).

Findings show that trade liberalization does not have a positive impact on foreign direct investment inflow into the Turkish market, as well as that currency depreciation accompanied by an open economy decreases foreign capital inflow. Trade liberalization impacts positively on exports to the G7 by enhancing technological competitiveness. Moreover, foreign income impacts positively on exports, compared to pre-liberalization exports increased gradually, based on econometric results compared to some advanced countries, where short-run policies will lead to increased exports. Consequently, intermediate imports influenced manufacturing exports positively; this result confirms the cointegration relationship matching advanced economies.

To show the impact of trade liberalization on the trade balance, a dummy variable was introduced as a liberalization indicator. The results reveal that trade liberalization has a positive impact on the trade balance. Last but not least, trade liberalization has a negative impact on government size.

The study recommended that a strong currency be considered the short way to attract foreign direct investment. To increase exports to the G7, innovation is the best factor. Exporting to high-income countries should be a priority. Importing sophisticated inputs

will lead to increased exports. Increasing government spending on education, health, and social protection will compensate for losses from trade liberalization.

Keywords: Trade liberalization, macroeconomic indicators, Turkey.



ÖZET

Bu çalışma, ticari serbestleşmenin Türkiye'deki bazı makroekonomik göstergeler (doğrudan dış yatırım, ihracat, ithalat, dış ticaret ve devlet büyüklüğü) üzerindeki etkisini incelemeyi amaçlamaktadır. Çalışmamızda Otoregresif (ardışık bağımlı) dağıtılmış gecikmeli (ARDL) sınırı testi yaklaşımı, birim kök testi, uzun dönemli tahmin için sınır testi ve hata düzeltme terimi (EC) kullanıldı.

Bulgular, ticaretin serbestleştirilmesinin Türkiye piyasasına doğrudan yabancı yatırım girişleri üzerinde olumlu bir etkisinin olmadığını aynı zamanda açık bir ekonomini de para biriminin değer kaybetmesinin yabancı sermaye girişini azalttığını göstermektedir. Ticaretin serbestleştirilmesi, teknolojik rekabet gücünü artırarak G7'ye yapılan ihracatı olumlu yönde etkiler. Ayrıca, ekonometrik bulgulara göre, kısa vadeli politikaların ihracatı artırdığı bazı ileri ülkelerle kıyaslandığında, serbestleşme öncesi yavaş yavaş artan ihracata kısaya dış gelir ihracatı olumlu etkiler. Sonuç olarak, ara malı ithalatı, imalat ihracatını olumlu yönde etkiler. Bu sonuç, eş bütünleşme ilişkisinin gelişmiş ekonomilerle örtüştüğünü göstermektedir.

Ticaret serbestleşmesinin dış ticaret üzerindeki etkisini göstermek için, serbestleşme göstergesi olarak bir kukla değişken ilave edildi. Sonuçlar, ticaretin serbestleştirilmesinin dış ticaret üzerinde olumlu bir etkisi olduğunu ortaya koymaktadır. Son olarak önemli noktalardan bir tanesi de, ticari serbestleşmenin devlet büyüklüğü üzerinde olumsuz bir etkisi vardır.

Çalışma, güçlü bir para biriminin doğrudan yabancı yatırımı çekmenin kısa yolu olarak görür. G7'ye ihracatı artırmak için teknolojik yenilikler en iyi etkindir. Yüksek gelirli ülkelere ihracat öncelikli olmalıdır. Teknolojik girdilerin ithal edilmesi ihracatın

artmasına yol açacaktır. Eğitim, sağlık ve sosyal korumaya yönelik artan devlet harcamaları, ticaretin serbestleştirilmesinden kaynaklanan kayıpları telafi edecektir.

Anahtar Kelimeler: Ticaretin serbestleşmesi, makroekonomik göstergeler, Türkiye.



ACKNOWLEDGMENTS

First and foremost, I would like to thank my supervisor Prof. Dr. Natalya KETENCI for his support and guidance throughout my thesis project. I would also like to express my gratitude to Prof Dr. Ahmet OZCAM for the numerous Econometric comments in which he provided valuable advice on my work.

Furthermore, I am very thankful to Prof. Dr. Ozlem KUNDAY, for their research method guidance over the last two years. I would also like to express my gratitude to external jury members Doc. Dr. Elmas YALDIZ HANEDAR, Doc. Dr. Merve KOCOGLU SAZKAYA who attends this defense.

Finally, I would like to thank Yeditepe university library as well as the social institute officials for their cooperation.

Nader Alzabadi

June 2022

TABLE OF CONTEXT

PLAGIARISM	i
ABSTRACT.....	ii
ÖZET	iv
ACKNOWLEDGMENTS	vi
TABLE OF CONTEXT.....	vii
LIST OF TABLES	xiii
LIST OF FIGURES	xvii
ABBREVIATIONS	xix
1. INTRODUCTION	1
1.1 Background	1
1.2 Trade Liberalization Overview	3
1.3 Turkey's trade liberalization	7
1.4 Study Hypothesis.....	10
1.5 Statement of the Problem	11
1.6 The Importance of Study	13
1.7 Study Objectives	14
1.8 Justification of the Study	15
1.9 Study Outline.....	15
2.1 Introduction	17
2.2 Review of Literature.....	18

2.3.	Foreign Direct Investment and Turkey's Openness	22
2.4.	Econometrics Methodology	33
2.4.1.	Autoregressive Distributed Lag (ARDL).....	33
2.4.2.	Stability Test	38
2.5.	Theoretical framework	39
2.6.	Model specification	43
2.7.	Empirical results.....	44
2.7.1.	Unit Root Test.....	45
2.7.2.	Determination of lag length	45
2.7.3.	Cointegration test results.....	46
2.7.4.	Long run estimation	48
2.7.5.	Short Run Results	50
2.7.6.	Granger causality test.....	52
2.7.7.	Stability Test	52
2.8.	Conclusion.....	54
3.	TRADE LIBERALIZATION, INNOVATION AND MANUFACTURING EXPORTS.....	56
3.1.	Introduction	58
3.2.	Literature review	59
3.3.	Innovation and Globalization	63
3.4.	Turkey's Innovation.....	65
3.5.	Theoretical framework	73

3.6.	Empirical results.....	78
3.6.1.	Unit Root Test.....	78
3.6.2.	Determination of Lag Length.....	79
3.6.3.	Cointegration test.....	80
3.6.4.	Stability Test	82
3.6.5.	Long run results of Turkey's export to the World.....	84
3.6.6.	Short run results of Turkey's export to the World	85
3.6.7.	Long run results of Turkey's export to G7	86
3.6.8.	Short run results of Turkey's export to G7.....	88
3.7.	Conclusion.....	89
4.	TRADE LIBERALIZATION AND EXPORTS	92
4.1.	Introduction	93
4.2.	Literature review	95
4.3.	Development of Turkey's Exports Pre-Liberalization (1960-1980).....	99
4.4.	Development of Turkey's exports post-liberalization (1980-2018)	102
4.5.	Exports and GDP.....	107
4.6.	Manufacturing Exports (1980–2018)	109
4.7.	Manufacturing Exports and GDP	114
4.8.	Theoretical Framework:	119
4.8.1.	Study Variables definition:	120
4.8.2.	Specifications for the model	122

4.9.	Empirical Findings	124
4.9.1.	Unit Root Test.....	124
4.9.2.	Lag length selection test.....	124
4.9.3.	Breusch–Godfrey Serial Correlation LM.....	125
4.9.4.	Cointegration test	126
4.9.5.	Stability Test	128
4.9.6.	Long Run Coefficients of Manufacturing Exports	129
4.9.7.	Short Run Results	131
4.10.	Conclusion.....	138
5.	TRADE LIBERALIZATION AND IMPORTS.....	140
5.1.	Introduction	142
5.2.	Literature review	144
5.3.	Development of Turkey's Imports (1980-2018).....	148
5.4.	Imports of Intermediate Goods (1980-2018)	151
5.5.	Turkey's Intermediate Imports and GDP.....	154
5.6.	Intermediate Imports and Manufacturing Exports (1980-2018)	161
5.7.	Theoretical Framework	164
5.8.	Empirical Findings	171
5.8.1.	Unit Roots Test	172
5.8.2.	Lag length selection test.....	172
5.8.3.	Breusch-Godfrey Serial Correlation LM Test	173

5.8.4.	Cointegration results	174
5.8.5.	Stability Test	175
5.8.6.	Long Run Coefficients	176
5.8.7.	Short Run Results	178
5.9.	Conclusion.....	180
6.	TRADE LIBERALIZATION AND TRADE BALANCE	182
6.1.	Introduction	184
6.2.	Literature review	185
6.3.	Turkey's Trade Balance	190
6.4.	Trade and Growth.....	195
6.5.	Growth and Trade Deficit	198
6.6.	Currency Depreciation and Trade Balance	203
6.7.	Theoretical Framework	204
6.8.	Empirical Results	208
6.8.1.	Unit Root Test.....	208
6.8.2.	Determination of Lag Length.....	209
6.8.3.	Breusch–Godfrey Serial Correlation LM.....	210
6.8.4.	Cointegration test	211
6.8.5.	Stability Test	212
6.8.6.	Long Run Coefficients	214
6.8.7.	Short Run Results	216

6.9. Conclusion.....	218
7. TRADE LIBERALIZATION AND GOVERNMENT SIZE.....	220
7.1. Introduction	221
7.2. Review of the Literature.....	222
7.3. Liberalization of trade and government size	225
7.4. Government Expenditures and Openness in Turkey	225
7.5. Theoretical framework	232
7.6. Empirical results.....	235
7.6.1. Unit Root Test.....	235
7.6.2. Lag length selection test.....	236
7.6.3. Cointegration test	237
7.6.4. Long run results	239
7.6.5. Short run results	240
7.6.6. Granger causality test.....	242
7.6.7. Stability Test	242
7.7. Conclusion.....	245
CONCLUSION.....	246
References.....	253
Appendix 5.1.....	282
Appendixes 6.1	283

LIST OF TABLES

Table 1.1: Foreign Direct Investment (1980-2018).....	28
Table 1.2: FDI in G7, China, Turkey.....	33
Table 1.3: FDI inflow % of World FDI.....	34
Table 1.4: Unit Root Test Results.....	47
Table 1.5: Lag length.....	48
Table 1.6: F-statistics for testing the existence of Long-run Cointegration	49
Table 1.7: Johansen-Juselius maximum likelihood cointegration test.....	50
Table 1.8: Breusch-Godfrey Serial Correlation <i>LM</i> Test of FDI.....	50
Table 1.9: Long-run coefficients.....	51
Table 1.10: Short Run Coefficients	53
Table 1.11: Granger Causality test.....	54
Table 2.1: Innovation index.....	68
Table 2.2: Research and development expenditure % of GDP.....	69
Table 2.3: Patents in selected advanced countries	70
Table 2.4: Some advanced economies patents share of world.....	71
Table 2.5: High technology exports (2007-2018).....	72
Table 2.6: High Tech Exports % of Manufacturing Exports.....	73
Table 2.7: Unit Root Result.....	79
Table 2.8: Lag length selection	80
Table 2.9: F-statistics for testing the existence of Long-run Cointegration.....	81
Table 2.10: Johansen-Juselius maximum likelihood cointegration test (to the World).....	82

Table 2.11: Johansen-Juselius maximum likelihood cointegration test (with G7).....	83
Table 2.12: Long-run Coefficients.....	85
Table 2.13: Short-run Coefficients.....	86
Table 2.14: Long Run Coefficients of Function to G7.....	87
Table 2.15: Short-run coefficients to G7.....	88
Table 3.1: Development of Turkey Exports pre- liberalization (1960-1980).....	100
Table 3.2: Turkey Exports (1980-2018).....	103
Table 3.3: Turkey Exports and GDP (1980-2018).....	107
Table 3.4: Turkey Manufacturing Exports (1980-2018).....	110
Table 3.5: G7, Turkey's manufacturing exports' share of world manufacturing exports.....	113
Table 3.6: Gross Domestic Product and Manufacturing Exports.....	115
Table 3.7: Manufacturing Exports Rate and Economic Growth (1980-2018)...	116
Table 3.8: Unit Root Test Results.....	124
Table 3.9: Lag length selection	124
Table 3.10: Breusch-Godfrey Serial Correlation LM Test.....	125
Table 3.11: F-statistics for testing the existence of Long-run Cointegration...	126
Table 3.12: Johansen-Juselius maximum likelihood cointegration test	127
Table 3.13: Long Run Coefficients of Manufacturing Export's Function	129
Table 3.14: Short Run Coefficients of Manufacturing Export's Function	131
Table 3.15: Turkey Manufacturing Export's elasticities (1960-1980), (1980-2018)	134
Table 3.16: Exports price and income elasticities in some advanced economies (1980-2018)	135

Table 3. 17: Price and income Elasticities over period 1980-2018	136
Table 4.1: Development of Turkey Imports (1980-2018).....	148
Table 4.2: Intermediate Imports share of Imports.....	151
Table 4.3: Imports, Intermediate Imports, and GDP.....	155
Table 4.4: Rates of Intermediate Import and GDP Growth (1980-2018).	158
Table 4.5: Intermediate Imports and Manufacturing Exports (1980-2018)	160
Table 4.6: Unit Root Results.....	169
Table 4.7: Lag selection.....	170
Table 4.8: Breusch-Godfrey Serial Correlation LM Test	170
Table 4.9: F-statistics for testing the existence of Long-run Cointegration.....	171
Table 4.10: Johansen-Juselius maximum likelihood cointegration test.....	172
Table 4.11: Long Run Coefficients of Intermediate Imports Function.....	174
Table 4.12: Short Run Coefficients of Intermediate Import's Function.....	175
Table 5.1: Deficit of Trade Balance of Turkey (1980-2018).....	190
Table 5.2: Trade Volume Share of GDP (1980-2018).....	193
Table 5.3: Turkey's Trade Deficit Rate and GDP Rate (1980-2018).....	196
Table 5.4: Net Trade Growth in China, Turkey, and the G7 Countries.....	198
Table 5.5: Unit Root Result.....	204
Table 5.6: Lag length selection	205
Table 5.7: Breusch-Godfrey Serial Correlation LM	206
Table 5.8: F-statistics for testing the existence of Long-run Cointegration.....	207
Table 5.9: Long Run Coefficients of Trade Balance.....	210
Table 5.10: Short Run Coefficients of Trade Balance.....	212

Table 6.1: Turkey government expenditures as a share of GDP during (1980-2018).	223
Table 6.2: Changes in trade openness and government spending per capita from 1980 to 2018.....	225
Table 6.3: Some advanced economies expenditures % of GDP (1980-2018)....	227
Table 6.4: Unit Root Test Results.....	230
Table 6.5: Lag length selection	231
Table 6.6: F-statistics for testing the existence of Long-run Cointegration.....	232
Table 6.7: Johansen-Juselius maximum likelihood cointegration test.....	233
Table 6.8: Breusch-Godfrey Serial Correlation LM Test.....	234
Table 6.9: Long Run Coefficients	235
Table 6.10: Short Run Coefficients	236
Table 6.10: Granger causality test results.....	237

LIST OF FIGURES

Figure 1.1: Trend of FDI Inflow to Turkey (1980-2018).....	29
Figure 1.2: Openness and FDI (1980-2018).....	30
Figure 1.3: FDI as % of GDP.....	31
Figure 1.4: Foreign direct investment and trade growth in Turkey (1980-2018).	32
Figure 1.5: Some advanced economies' FDI % of World FDI.....	35
Figure 1.6: Stability test.....	55
Figure 2.1: R&D Spending as a Percentage of GDP.....	70
Figure 2.2: High-Tech Exports in Turkey and Around the World as a Percentage of Manufacturing Exports.....	74
Figure 2.3: Turkey's Technological competitiveness.....	77
Figure 2.4: Stability test.....	84
Figure 3.1: Trends of export and manufacturing export (1963-1980).	101
Figure 3.2: Turkey's Manufacturing exports share of world manufacturing exports.....	102
Figure 3.3: Turkish Export Trends (1980-2018).....	104
Figure 3.4: Trends of export growth over different periods.....	105
Figure 3.5: Trends of Turkish and global exports from 1970 to 2018.	106
Figure 3.6: Exports of Turkey % global exports (1970-2018).....	106
Figure 3.7: Exports and GDP (1980-2018).....	108
Figure 3.8: Trend of Manufacturing Exports % Total Exports (1980-2018) ...	111
Figure 3.9: Turkey Manufacturing exports share of world manufacturing exports.....	113

Figure 3.10: Trends of manufacturing exports growth in Turkey and the world (1981-2018).....	114
Figure 3.11: Manufacturing Exports as % GDP (1980-2018).....	115
Figure 3.12: Growth in manufacturing exports and GDP.....	117
Figure 3.13: Growth in Turkish manufacturing exports and global GDP.	118
Figure 3.14: Export Model Stability Test.....	128
Figure 4.1: Trends of Turkey Imports and GDP (1980-2018).....	149
Figure 4.2: Imports and Intermediate Imports from 1980 to 2018.....	152
Figure 4.3: Imports, Intermediate Imports as % GDP from 1980 to 2018.	157
Figure 4.4: Manufacturing Exports and Intermediate Imports from 1980 to 2018.	161
Figure 4.5: Intermediate Import's Function Stability Test.....	173
Figure 5.1: Deficit in Trade Balance of Turkey Over (1980-2018).....	191
Figure 5.2: Trade Share of GDP (1980-2018).....	194
Figure 5.3: Trend of net Trade growth in G7, China, Turkey.....	198
Figure 5.4 Trade Balance Model Stability Test.....	209
Figure 5.5: Trends of Real Exchange Rate, Trade Balance, Foreign income, domestic income (1963-2018).	211
Figure 6.1: Trend of Government expenditures 1980-2018.....	224
Figure 6.2: Trends in openness and government spending per capita (1981-2018).....	226
Figure 6.3: Stability Test.....	238

ABBREVIATIONS

ADF: Augmented Dickey-Fuller

ARDL: Autoregressive Distributed Lag

ASIF: Annual Survey of Industrial Firms

BRICS: Brazil, Russia, India, China, South Africa

CUSUM: Cumulative Sum Control Chart

ECM: Error Correction Model

EU: European Union

EUCU: *European Union Customs Union*

FDI: Foreign Direct Investment

G7: France, Germany, Italy, Japan, the United States, the United Kingdom, and Canada.

GATT: *General Agreement on Tariffs and Trade*

GDP: Gross Domestic Product

IMF: International Monetary Fund

NAFTA: *North American Free Trade Agreement*

OECD: Organization for Economic Co-operation and Development

OLS: Ordinary Least Squares

QIZ: Qualified Industrial Zones.

R&D: Research and Development

RCA: Revealed Comparative Advantage

RER: *Real Exchange Rate*

TCMB: Central Bank of the Republic of Turkey

TURKSTAT: Turkish Statistical Institute

UNCTAD: United Nations Conference on Trade and Development

VECM: Vector Error Correction Model

WTO: World Trade Organization



1. INTRODUCTION

1.1. Background

Globalization is the integration process of world economic, political, cultural, and social variables that are transforming into "a global village" at an accelerating pace. This process has been driven by three factors. One involves technological progress, which has led to lower production costs; the second factor is the increasing wave of trade liberalization since 1980. Third, the role of the World Trade Organization (WTO), the World Bank, and the International Monetary Fund (IMF) is crucial. According to these institutions, trade liberalization acts as an "engine of growth".

The most important merits of the globalization era are innovation, investment, transactions, trade exchange, and welfare. Integration into the global economy accelerates trade movement and capital mobility. The dynamic of trade liberalization maintains trade ties and expands investment opportunities.

The economic theory deals with international trade and has passed through many stages, starting with Adam Smith (1776) and passing through modern economic theories like Solow (1956) and Romer (1991). Previously, theories focused on self-sufficiency, therefore, this did not require attention to international trade, and more restrictions were adopted. As for modern theories, they see that the expansion of intra-trade will contribute to achieving growth and prosperity and allocating resources to a higher degree of efficiency. Trade liberalization has emerged as a modern philosophy to restore growth.

The rise of globalization since 1980 has transformed the world at an accelerated pace. Integration of the world continues, broadening and increasing international linkages in

economic, political, and social relations. Unambiguously, liberalization of trade and finance, greased by innovative changes in information technology, has resulted in substantial changes embodied by economic growth at the global level. Contrarily, the process of globalization is changing the nature of production patterns, dismantling nation-states' responsibilities, and allowing the market to drive economic activity.

Globalization is associated with policies of openness, high competition, innovation, privatization, and an influx of foreign investment. Trade liberalization and capital movements open the possibility of global growth, according to the prevalent neoclassical theory. Economically, globalization facilitates trade movement across countries and integrates the world market closely. For example, in 1977, global trade volume was 2.687 trillion USD; after 41 years, this volume had skyrocketed to 49.990 trillion USD in 2018, (www.worldbank.org).

International trade has paved the way for firms and individuals to access more markets, inducing innovation and lowering production costs. Hence, consumers benefited from low prices as well as a greater variety of products. Although some home firms will lose this type of international exchange, internal industrial exchanges do not affect revenue and employment significantly.

In the era of globalization, there have been many changes. International trade has increased significantly. Free trade has become the title of growth, economies of scale, innovation, and it plays a substantial role in welfare as well as product variety. Free trade agreements are among countries willing to encourage and activate trade and investment. The European Union (1991), the North American Free Trade Agreement (NAFTA) between the United States, Canada, and Mexico (1994), and others have contributed significantly to the globalization of international trade.

The dynamic of trade liberalization increases the geographic dispersion of production and accelerates trade between cities and countries. Therefore, trade liberalization will have an effective impact on connectivity and progress between the old and new production arts.

Unambiguously, trade liberalization enables countries to modernize the manufacturing sector through access to advanced technology embodied by intermediate imports that raise productivity. Free trade will lead to improving the economic performance of the industrial sector through increasing productivity and more specialization in production (Fan et al. 2019).

Globalization will compel domestic manufacturers to maintain product competitiveness through high product manifestations based on complex technological design and efficient logistic chains.

However, trade liberalization may affect economic growth negatively for countries that specialize in low-quality products. For instance, countries exporting primary goods are vulnerable to terms of trade shocks if products have elastic demand (Hausman and Rodrik, 2007).

1.2. Trade Liberalization Overview

International trade is one of the most significant foundations of the success and prosperity of the global economy. Through integration into international trade, reciprocal benefits, investments, technology spillover, cheap and sophisticated inputs, and product varieties have contributed significantly to augmenting the production base.

Trade liberalization policies are associated with removing barriers, relaxing previous government restrictions, and facilitating commercial activities. These policies expose the national economy to global competition, which requires allocating resources with high efficiency (Black et al. 2009). Typically, trade liberalization involves relaxing trade protection; opening up the economy to foreign investment; and the adopting of flexible exchange rates (Ingham, 2004, pp. 102).

Correspondingly, countries depend on trade liberalization programs to sustain high growth based on export-led growth. Economies of scale and innovation should be employed to be able to access global markets. High levels of productivity are considered the main engine of trade liberalization (Krugman, 1994).

In the trade liberalization context, economic growth was collaborative with increasing productivity, high competition, and high efficiency. Productivity in the manufacturing sector drives fierce competition among producers to use the most advanced and effective production arts, which increase output, reduce costs, and offer low-cost goods (Aghion et al. 2003). (Melitz, 2008).

Kreuger (1978) and Balassa (1981) indicated that the countries that enjoy free markets are the fastest-growing. Trade liberalization forces sectors toward resource allocation, which leads to a positive impact on productivity if countries can achieve production shocks based on many factors: (a) Low tariffs: As a result of liberalization, competition plays an important role in lowering costs, and industries can shift productivity gains from lower input tariffs to more diverse inputs (Grossman and Helpman, 1991).

(b) Scale economies: trade liberalization encourages domestic firms to produce for both global and domestic markets. When economies of scale and imperfect competition exist, further efficiency from trade liberalization gains.

By liberalization, a new production process was employed, and a large output was achieved. Trade liberalization offers many opportunities which allow a greater variety of final goods and intermediate inputs to be reached (Dunn, 2004, 171).

(c) Increased competition: Import liberalization increases competition between domestic industries and foreign products, which causes domestic producers to improve productivity and quality in order to maintain their market share. Severe competition induces producers to think strategically about distinct products depending on innovation which is followed by high productivity (Dijkstra, 2000).

(d) Externalities: Externalities are achieved when exports and imports lead to shifting interactions with global markets and, as a result, increase acquisition of advanced technology, learning by doing, ease of obtaining a variety of imported inputs, spillover benefits to non-trading firms, and quality.

(e) Residual effects: it's difficult to observe residual effects and measure them. These effects may be gains from rising capacity utilization in the long run, but residual effects improved after trade liberalization in two ways: First, it leads to lower prices for imported intermediate goods. Second, orthodox theory suggests that by augmented competition from imported goods forces, national producers strongly compete with imported goods to become more effective, resulting in high effectiveness (Dijkstra, 2000).

Trade liberalization works to entice countries to specialize through the benefits they derive from trade liberalization, whether static or dynamic. Static benefits: Smith (1776), Ricardo (1817), documented that the exchange rate among nations requires division of labor and improves productivity as a result. Specialization will be held. The extent of the home and foreign market plays a crucial effect on specialization degrees (Balassa, 1969, pp 69-93).

The emerging benefits of international trade argue that trade will lead to growth. Over time, the cumulated small increase in economic growth will yield a large gain. The intuition behind it is that economic growth depends on two sources: the first, increasing production inputs (Newquist et al. 1993); the second, making those inputs more productive, via investment in innovation and technology, better education, and so on. Dynamic gains increase with static benefits. The joint relationship between static and dynamic benefits will rationalize the allocation of labor and capital, which are considered the engine of specialization.

Learning by doing results in improved productivity, thus sustaining economic growth, trade liberalization influences industry specialization through two channels: the first is industry-inter specialization, which is influenced by the dynamic of trade liberalization that focuses on economies of scale, more goods produced, and experience accumulation (Weinhold and Rauch, 1999).

The second, intra-industry trade, integration in global trade, allows countries to import specialized inputs. Through liberalization, countries can access foreign accumulated experience in the production of specialized inputs, more intermediate input will lead to specialization and more growth.

Successful trade liberalization programs aim to achieve a set of goals such as improving dynamic productivity and employing innovation as an essential incentive for the manufacturing sector to expand production and increase competitiveness. Within liberalization, many countries achieved economic stabilization by stimulating economic growth, exchange rate stabilization, promoting investment, reforming the financial system, reducing or controlling unemployment, market liberalization, international economic integration, resulting in high economic growth.

1.3. Turkey's trade liberalization

While the Second World War was going on, the International Monetary Fund and the World Bank were established in 1944 in the United States of America. As soon as the war ended, the General Agreement on Tariffs and Trade (GATT), an agreement on reducing tariffs between countries was established, which is the first step towards liberalizing global trade. In 1948, a Marshall plan was announced. This plan aimed to reconstruct Europe. The plan was accompanied by a growth in the volume of trade and investment that continued until the beginning of the 70th century.

The increase in trade volume requires more flexibility in the exchange rate. In 1971, the United States of America unilaterally ended the convertibility of the US dollar to gold, which caused a disturbance in the exchange rate and international trade. Subsequently, in 1973, the world witnessed the first global crisis in oil, which led to the disruption of oil production in many industrialized countries. In 1979, the world witnessed the second crisis in oil, which greatly affected emerging countries like Turkey, causing a severe economic crisis (Baysan and Blitzer, 1990).

All these developments were accompanied by a global wave of trade liberalization and global openness. At the beginning of the eighties, dozens of countries began to prepare plans and programs to liberalize their trade, aiming to reform their economies on the one hand and to be consistent with international initiatives in free trade.

Following these changes, in 1980 the Turkish government cooperated with various sectors of the economy, worked, and announced the features of economic reform. This program aimed to follow outward-oriented policies instead of inward-oriented policies. The trade liberalization program in Turkey involved these fields as well (Arıcanlı and Rodrik, 1990):

a) Flexible exchange rate: With the success of the trade liberalization program and the resulting export growth, and to restore equilibrium in the balance of payment that previously coincided with the overvalued exchange rate, it was necessary to have a flexible exchange rate that dealt with the trends towards growing trade exchange between countries.

b) Austerity and export driver: Economic growth achieved through rapid export growth. This has been one of the primary goals of the trade liberalization program. The export expansion was critical to improving the trade balance. The government has found that liberalizing intermediate inputs and raw materials will inject manufacturing sectors with cheap and new inputs.

c) Privatization and public institution reform: With the liberalization of trade, the modernization of many government institutions has become a huge burden on the state treasury, in addition to the existence of bureaucracy in public institutions. The state saw that through privatization, efficiency would be improved and development would be

achieved. Moreover, the government tried to stimulate foreign direct investment in the Turkish market by privatizing some institutions.

d) Financial liberalization: Under IMF pressure, the government liberalizes the financial sector in order to restore equilibrium, correct inefficiencies in direct credit allocation, and recover demand for bank deposits.

e) Import liberalization: One of the main goals of Turkish foreign policy and economic reforms is to open up the Turkish economy to the European market, willing to become an official member by modernizing the Turkish economy for full integration because 80% of all liberalization measures applied to imports from the European Union.

f) Foreign direct investment promotion policies: The inflow of foreign investments into the Turkish market was below the required levels. To attract foreign investments into the Turkish market, the government adopted many procedures and facilities for capital mobility, as well as reduced bureaucratic procedures to attract foreign investments (Togan, 2005; Gokmen & Hamsioglu, 2009).

To implement an ambitious trade liberalization program in Turkey, the following phases were carried out by the government (Krueger, 1984):

1-Coordinated efforts of government agencies: The government made a high effort to coordinate and adopt policies toward export promotion through access to intermediate inputs from foreign markets.

2-Targeted promotion of exports: The government gave priority to supporting exporters and constructing companies to serve industries instead of traditional agricultural export sectors. This will lead to employing an import-substitution strategy.

3-Gradual introduction of liberalization measures: Export promotion collaborated with the liberalization of the foreign exchange market. In January 1980, the government introduced the liberalization of the foreign exchange regime by devaluating the Turkish lira by 33%.

4-Determination and long-term commitment of the government: Government policies were pursued with a long-term commitment despite strong resistance from import-substituting industrial and traditional sectors. This determination created trust in the economy, and finally, the private sector changed its behavior and structure in favor of export-oriented growth.

The novelty of this study has shown the impact of trade liberalization on main macroeconomic indicators over the period 1980–2018. Unlike previous studies, this study investigated the impact of trade liberalization on macroeconomic indicators in the same period, which provides decision-makers in Turkey with how trade liberalization impacts positively on some indicators and negatively on others.

1.4. Study Hypothesis

This study examined the following hypothesis:

First Hypothesis: There is a positive impact of trade liberalization on the inflow of foreign direct investment into the Republic of Turkey's market over the period from 1980 to 2018.

The second hypothesis: Turkish manufacturing exports are significantly influenced by innovation performance after the trade liberalization program's implementation.

Third hypothesis: Trade liberalization has had a positive impact on the Republic of Turkey's manufacturing exports from 1980 to 2018.

Fourth hypothesis: Is that there is a positive impact of trade liberalization on the intermediate import volume of the Republic of Turkey over the period from 1980 to 2018.

Fifth hypothesis: Trade liberalization has had a positive impact on the Republic of Turkey's trade balance from 1980 to 2018.

Sixth hypothesis: Trade liberalization has a positive impact on government size from 1980 to 2018.

1.5. Statement of the Problem

Numerous economists around the world have criticized trade liberalization. In the field of foreign investment, there is a great fear that, in the event of economic crises, foreign investments will end their business and move to another country. On the one hand, this will lead to disturbances in the national economy, and on the other hand, the competition of foreign investments with the home economy does not contribute to economic growth. Others argue that foreign investment flows into countries that have high production capabilities where spending on research and development is high.

Concerning the transfer of technology and innovation embodied by FDI to countries that have liberalized their trade and opened their markets. Have these countries been able to absorb the technology provided by the dynamic of trade liberalization and globalization?

Many countries have been able to double their exports within a short period, such as Korea, Singapore, and China. Can Turkey achieve this? Trade liberalization in many countries has been accompanied by a significant increase in the variety of imports, is this has led them to maximize their exports.

Trade liberalization has contributed to increasing the deficit in the trade balance in some countries, but other countries have been able to improve their trade balances. Finally, with the implementation of the trade liberalization program, many people and institutions are negatively affected and lose social protection provided to citizens. In small open economies, government revenues decreased as a result of openness, privatization, market liberalization, and the abolition of customs. All these factors create instability in macroeconomic policy.

In recent decades, emerging and developed countries have benefited from global trade not only in increasing export competitiveness but also in attracting new advanced technology. Advanced technology and trade liberalization have led countries to specialize in products that have comparative advantages and exchange them with others (Ricardo, 1817).

The trade liberalization program (1980) paved the way for expanding the export base, maintaining the manufacturing sector with varieties of intermediate imports, reaching advanced technology, achieving economies of scale, attracting foreign direct investment, improving the balance of payments, and reaping growth.

Many countries have liberalized their trade and achieved their economic goals by increasing the pace of their economic growth, such as South Korea, China, and Israel.

However, other countries are still relatively benefiting from trade liberalization, such as Turkey, Mexico, Brazil, and Romania. Why?

Recently, the United States and the United Kingdom have shown some signs that domestic economies are influenced negatively by trade liberalization. In Turkey, there are two controversial visions regarding trade liberalization. The first claims that trade liberalization hurt the Turkish economy, and the second supports the openness toward global markets. This study examined the impact of trade liberalization on some macroeconomic indicators, foreign investment, innovation, and manufacturing exports, imports & trade liberalization, trade balance, and government expenditures.

1.6. The Importance of Study

Today, trade liberalization is one of the most important topics in international trade, openness, and integration in a global economy. The technological revolution and the emerging new global economic players such as China and India have changed many aspects of the national economy through globalization.

The liberalization of trade is one of the policies that shift production from domestic consumption to export, where resources will be used better as well as work to increase the quality of these products in a way that supports achieving high competitiveness. Trade liberalization contributes to increasing the degree of competition and innovation across the world toward more efficient use of resources.

The acceleration of Brexit programs and protection tendencies, as well as trade tensions between the largest two economies in the world (U.S.A. & China), attract the wide intention of global trade researchers to show the cost of protection and trade liberalization benefits.

In Turkey's case, since 1980, liberalization of trade has led to growth in trade and integration into a global economy. The importance of this study tried to show the impact of trade liberalization on some macroeconomic indicators. In terms of foreign investment, some argue that inflows of FDI support growth. On the contrary, others see that FDI is looking for rapid profit and not engaging in productive activity.

Additionally, in light of increasing demands for protection and based on the fact that protection can limit the negative effects of trade liberalization and keep the domestic market from the external severe competition, stopping privatization of vital institutions, enhancing industrial capacity, and improving the terms of trade, which all lead to a decline in the trade deficit. Moreover, improve basic services like education, health, social insurance.

1.7. Study Objectives

The primary aim of this study is to identify the impact of trade liberalization on some macroeconomic indicators, mainly foreign investment, manufacturing exports, intermediate imports, trade balance, and government expenditure of the Republic of Turkey over the period from 1980 to 2018. In more specific terms, this study aimed to analyze:

- 1-How does trade liberalization impact the inflow of foreign direct investment?
- 2- Trade liberalization and its impact on manufacturing exports through innovation activities.
- 3-How does trade liberalization impact the development of manufacturing exports?
- 4: How does trade liberalization impact the development of intermediate imports?

5-How does trade liberalization impact on the trade balance growth of Turkey?

6- Government size and trade liberalization.

1.8. Justification of the Study

Trade liberalization affected relatively macroeconomic indicators such as investment, technology capabilities, exports, imports, trade balance, and government expenditures. It is necessary to investigate the impact of trade liberalization on these indicators in the long and short run.

1.9. Study Outline

The study is primarily concerned with the role of trade liberalization and its impact on macroeconomic indicators of Turkey, direct investment, manufacturing exports, intermediate imports, trade balance, and government expenditures covering the period from 1980 to 2018. It examines the empirical relationship between trade liberalization and some important macroeconomic indicators, in light of Turkey's effort to integrate its economy with the rest of the world. To sufficiently address this objective, our study consists of an introduction, six essays, and a conclusion. **Essay 1:** Foreign direct investment and trade liberalization. **Essay 2:** Trade liberalization Innovation and manufacturing exports in Turkey. **Essay 3:** Trade Liberalization and Exports. **Essay 4:** Trade Liberalization and Imports. **Essay 5:** Trade Liberalization and the Trade Balance. **Essay 6:** Trade liberalization and government size.

2. FOREIGN DIRECT INVESTMENT AND TRADE

LIBERALIZATION

Abstract

Globalization plays an important role in trade activities; foreign direct investment (FDI) is considered the most vital source of external financing for countries that have adopted trade liberalization. FDI is an effective tool to transfer new technologies, knowledge, innovation skills, and so on. This study aims to examine the impact of trade liberalization on foreign direct investment inflow to the Turkey market over the period of 1980-2018. In the first section of this study, descriptive statistics of the FDI trend in Turkey have been shown. In the second section, the study employed the autoregressive distributed lag bound test (ARDL) approach, unit root test, and error correction term (EC).

Study findings show that all variables are stationary at the first difference, $I(1)$. The boundary test displays that FDI, openness degree, real exchange rate, and gross domestic product (GDP) are cointegrated in the long run. Long and short-run estimations show that GDP has a positive statistically significant impact on FDI in Turkey over the period from 1980 to 2018. While the impact of openness is slight and positive but not statistically significant, the impact of currency depreciation on FDI is negative. The study recommends that it is necessary to review the trade liberalization policies, depending on advanced economies' policies employed to attract foreign direct investment.

Keywords: foreign direct investment, trade openness, real exchange rate, ARDL test.

2.1. Introduction

The emergence of the phenomenon of globalization enables countries to engage in a new phase of economic relations. Countries that followed the trade liberalization approach had a great opportunity to attract foreign investment, as these investments are one of the dynamism factors of production and international trade.

Many countries are working to create the appropriate environment to attract foreign investments, particularly countries which suffer from a large shortage of capital. In recent years, the rate of growth of foreign investment has grown faster. Foreign investment flows to countries where there are great opportunities for profit, and this is associated with the economic growth of these countries.

Countries that are integrated into the global economy, such as Singapore, attracted a high share of foreign investments at the beginning of liberalizing the economy. One of the most important features of an open economic policy is trade facilitation. Stimulating foreign and national capital to finance economic projects, and employing advanced technology embodied in FDI inflow to raise the rates of economic growth by supporting the self-capabilities of the national economy are three of the most important features of this policy.

Government policies in the trade liberalization era such as promoting innovation, attracting advanced technology, upgrading government procedures, and supporting research and development (R&D) contribute significantly to FDI attraction. Thus, to sustain economic growth in the long term (Belloumi, 2014), increased capital inflow, advanced technology, employment, and spillovers affect domestic firms' productivity positively. Klasra (2011) indicated that increased capital inflow, advanced technology,

employment, and spillovers affect domestic firms' productivity positively. Nevertheless, many countries are afraid that FDI may compete with domestic industries, and increase unemployment.

Foreign direct investment has taken great importance in recent years in many emerging countries that have tried to take advantage of this to support development projects and growth. The acceleration of trade among countries and the rise of globalization surged FDI sharply and recoded 3.134 trillion USD. The huge dynamic of FDI inflow clarifies how trade liberalization leads to globalizing the mobility of foreign investment across the globe. For instance, China attracted 236,043 billion USD in 2018. In the case of Turkey, foreign direct investment inflows were 18 million USD in 1980, but through trade liberalization and privatization, FDI increased slightly to 13.200 billion USD in 2018, (www.worldbank.org).

One of the main factors that prompted Turkey towards the trade liberalization program is the lack of capital. In order to ease the deficit in the balance of payment, through trade liberalization, Turkey is willing to achieve. Many arguments ensure that openness to global markets is unable to attract capital (Balasubramanyam, 1996).

The study's contribution can be seen in three key areas: first, the growth of foreign direct investment in Turkey relative to the G7 during the study period, second, Turkey's share of global foreign direct investment inflows, third, testing the impact of trade liberalization on the inflow of foreign investment in the long and short term.

2.2. Review of Literature

The rapid growth of FDI associated with trade liberalization policies over the last 40 years has increased the importance of the inflow of foreign capital into developed and

developing countries. FDI plays an essential role in development plans in some countries. Openness and reform policies, as well as macroeconomic stability, contribute significantly to attracting new investors. Mudiyounsilage et al. (2021) scrutinize the link between trade openness and foreign direct investment inflow into Romania over the 1997–2019 period. Findings show that trade openness has a negative impact on FDI inflow in both the long and short run.

Gnangnon (2017) examined the impact of multilateral trade liberalization on foreign direct investment inflow. The analysis employed a panel data set of 171 countries over the period 1995–2012. The results confirmed that trade liberalization led to the attraction of foreign direct investments.

Banday et al. (2021) examined the relationship between FDI, trade openness, and economic growth in BRICS countries (Brazil, Russia, India, China, South Africa). Panel data was employed over 1990–2018. The results show that there is a bidirectional causality from FDI to economic growth and trade openness, and there is a unidirectional causality from trade openness to FDI.

Martnez-San Román et al. (2016) examined the relationship between foreign direct investment inflow and trade integration in the European Union over the period 1995–2009. The results show that trade integration has a positive impact on FDI.

Ho et al. (2013) have tested the impact of trade openness and market size on FDI in six emerging countries (Brazil, China, India, Russia, South Africa, and Malaysia) from 1977–2010. The results show that trade openness impacts positively on FDI only in Malaysia.

Liargovas and Skandalis (2012) examined the impact of trade openness on attracting FDI. The study sample encompassed 36 developing economies from 1990–to 2008. The results indicated that trade openness will support developing countries in attracting foreign direct investment.

Castro et al. (2013) studied the main determinants of FDI in Brazil and Mexico from 1990–to 2010. The results show that the trade liberalization variable has a significant role in attracting FDI in Mexico, while the size of the market has a positive impact on FDI in Brazil.

Shah and Khan (2016) investigated the impact of trade liberalization on FDI inflow into six emerging countries (China, India, Turkey, Brazil, Mexico, and the Russian Federation) over the 1996–2014 period. The results showed that trade liberalization had a positive impact on FDI inflow into these nations. Erdal (2015) shows that the openness of the economy to international markets is an important variable in FDI flow into Turkey. In Latin America, Ponce (2006) found a positive and significant relationship between openness and the FDI inflow to these countries.

Ahbaz et al. (2016) examined the relationship between openness, FDI, and poverty in Turkey from 1980 to 2015 and found that openness and FDI have a causal relationship.

Larger host countries' markets are linked with higher foreign direct investment due to larger potential demand, lower costs, economies of scale, and innovation opportunities. In Central and Eastern Europe, where larger consumers tend to attract more FDI, largely vertical FDI inflows benefit from openness and international trade flows in inputs and capital goods, which are important for sustainable growth. Bevan and Estrin (2000) found that transition economies with larger economies also tend to attract more FDI.

An increase in openness might be linked with more horizontal FDI, as investment firms could achieve benefit from avoiding trade barriers through establishing production plants abroad. Considering the positive side of openness, Chakrabarti (2001, p.100) has assumed that, as the openness ratio increases, countries will attract more investors. Liu et al. (2009) indicated that a bidirectional causality between trade and inflow FDI in most emerging countries, trade liberalization, and FDI inflows are the components of growth in some Asian countries.

According to Markusen (1984), horizontal FDI models are market-seeking and investment abroad to avoid trade costs. Therefore, an expansion in horizontal FDI inflows will be connected with higher trade restrictions in any destination, consequently leading to a substitutive relationship with the trade. As a result, trade liberalization creates a lower inflow of horizontal-type FDI.

Helpman and Krugman (1985) revealed that FDI is resource-oriented investment and trade could be complementary while vertical FDI streams increase from the geographical fragmentation of the production process. The vertical FDI model plays a crucial role in motivating foreign investments by lowering production costs in the host country. So, by lowering the parent country's tariffs, the stronger the complementarity between FDI and trade. Hence, trade liberalization induces higher inflows of vertical FDI.

Finally, the complex-vertical FDI model is linked to advanced investment strategies. This model is driven by the desire to minimize production costs. The production of this model is associated with several locations, so this model requires third-country participation. The country has trade exchange with the host country and the host

country's integration into the world economy. Multilateral trade liberalization is likely to prime the higher level of complex-vertical FDI inflow.

Tolentino (2010) argues that the flexible exchange rate has significant effects on investment decisions via two main channels. The first is the "wealth effect," whereby depreciation in the host country's currency maximizes foreign investors' wealth relative to domestic investors. The second is the "relative production cost" when domestic production costs decline in the host country due to depreciation, which raises the profitability of export-oriented FDI and FDI inflows.

Froot and Stein (1991), Blonigen (1997), report that a weaker host country currency in open economies tends to increase inward FDI within an imperfect capital market model, as depreciation makes host country assets less expensive relative to assets in the home country.

Dhakal et al. (2010) pointed out that the impact of the exchange rate on FDI among a sample of East Asian countries such as China, Indonesia, Malaysia, the Philippines, South Korea, and Thailand, showed that exchange rate volatility has a favorable effect on foreign direct investment in our sample countries.

However, foreign direct investment is sensitive to exchange rate changes in open economies. Buch and Kleinert (2006) indicated that stability and appreciation of the home currency increase profits via cheaper imported inputs, thus FDI increased.

2.3. Foreign Direct Investment and Turkey's Openness

Prior to 1980, Turkey had applied import substitution policies, but after the January 24th, 1980 decisions, it abandoned this policy and employed an openness policy.

Consequently, a significant relationship is forecasted between external openness and direct foreign capital investments. The trade liberalization program in Turkey has an important impact on the development and growth period.

The liberalization of Turkish trade and the opening of international markets in the early 1980s contributed to a limited flood of foreign investments into the Turkish market, but these amounts increased with the start of the 1990s and Turkey's joint membership in the World Trade Organization (WTO). Qualifying and adopting a policy of export promotion and deregulation of foreign trade served as great incentives for foreign investors.

Ogrul and Eryicit (2015) reported that political stability plays a vital role in determining foreign direct investment in Turkey. According to Erdilek (2005), there are three factors that require any country to be engaged in the globalization era, which include the background for attracting FDI, international trade, labor mobility, and capital movement. Since Turkey has moved towards an export promotion strategy related to the process of establishing a stable macroeconomic environment, multinational companies prefer these policies rather than tax incentives in making investment decisions.

According to Koyunca and Cinar (2009), trade liberalization in Turkey which was implemented in 1980 contributes to attracting FDI. Tari and Bidirdi (2009) found that FDI in Turkey was influenced by GDP and degree of openness positively, but affected negatively by labor costs and inflation.

Other scholars suggest that to maintain FDI inflows, the currency value should be high against other currencies. Erünlü (2018) found that foreign direct investment (FDI)

inflows to Turkey surge when the Turkish Lira appreciates against the US dollar. This impact is particularly strong during periods of high investment inflows. Hence, for Turkey to attract and maintain productive capital flows, it should keep its home currency strong against the US dollar.

To attract foreign direct investment in Turkey, Aydoan (2017) ensured that it is necessary to improve the technological environment, modernize infrastructure, and minimize the income gap.

Ögöl and Eryiğit (2015) findings display that there is a statistical relationship between GDP and foreign direct investment. In contrast, political stability had a negative impact on FDI inflow to Turkey between the 1995 and 2012 period. Cambazolu and Güneş (2016) revealed that the depreciation of the Turkish currency due to openness would increase FDI.

Topalli (2016) found that there is unidirectional causality from economic growth to FDI and a bi-directional causality between FDI and openness in the BRICS countries. Regarding Turkey, this study displays a unidirectional causality from economic growth to FDI, but no causality is proved between FDI and openness or economic growth and openness.

The development of infrastructure is considered one of the most important factors in attracting direct foreign investments so that investors have a strong motivation to invest in this country. Within the development of infrastructure, as per the deep vision toward a developing economy, this creates an opportunity for a wide market, which generates integration among many industries within the same country. Erdal and Tatolu (2002)

revealed that openness, size of the market, physical infrastructure, and real GDP had positive effects on total FDI between 1980 and 1998 in Turkey.

According to Ok (2004), a country's investment opportunities are determined by its economic, political, and demographic circumstances. Organizing foreign investments through government policies such as incentives, subventions, legal implementations, and appropriate privatization is an efficient strategy to influence investment facilities. Turkey is a potential country because of its geographical location, vast market, skilled labor, and natural resources.

Without a doubt, Turkey's goal in liberalizing trade was to manage economic activities through the market mechanism, attract foreign investments, have a flexible exchange rate, privatize some projects, and liberalize the import sector, as Turkey has become desperate for investments from foreign investment inflows.

The novelty of this study explains why foreign direct investment inflow into the Turkish market has not increased significantly after trade liberalization was adopted compared to advanced and emerging economies when taking openness of trade, flexible exchange rate, and GDP as the main determinants of FDI inflow based on ARDL methodology.

Turkey aims to modernize the production and service sectors, provide sufficient liquidity for some projects, and support the financial sector to overcome crises based on the reality that the financial sector is the backbone of the economy. The development of foreign investment inflows into the Turkish market during the period 1980-2018 can be seen in Table 1.1.

Table 1.1 Foreign direct investment (1980-2018) (U.S. \$ billion)

Year	Value	Growth rate	Year	Value	Growth rate	Year	Value	Growth rate
1980	0.018		1993	0.636	-25%	2006	20.185	101%
1981	0.095	428%	1994	0.608	-4%	2007	22.047	9%
1982	0.055	-42%	1995	0.885	46%	2008	19.851	-10%
1983	0.046	-16%	1996	0.722	-18%	2009	8.5850	-57%
1984	0.113	146%	1997	0.805	11%	2010	9.0990	6%
1985	0.099	-12%	1998	0.940	17%	2011	16.182	78%
1986	0.125	26%	1999	0.783	-17%	2012	13.744	-15%
1987	0.115	-8%	2000	0.982	25%	2013	13.563	-1%
1988	0.354	208%	2001	3.352	241%	2014	13.119	-3%
1989	0.663	87%	2002	1.082	-68%	2015	18.002	37%
1990	0.684	3%	2003	1.702	57%	2016	13.343	-26%
1991	0.810	18%	2004	2.785	64%	2017	10.904	-18%
1992	0.844	4%	2005	10.031	260%	2018	13.200	21%

Source: TCMB

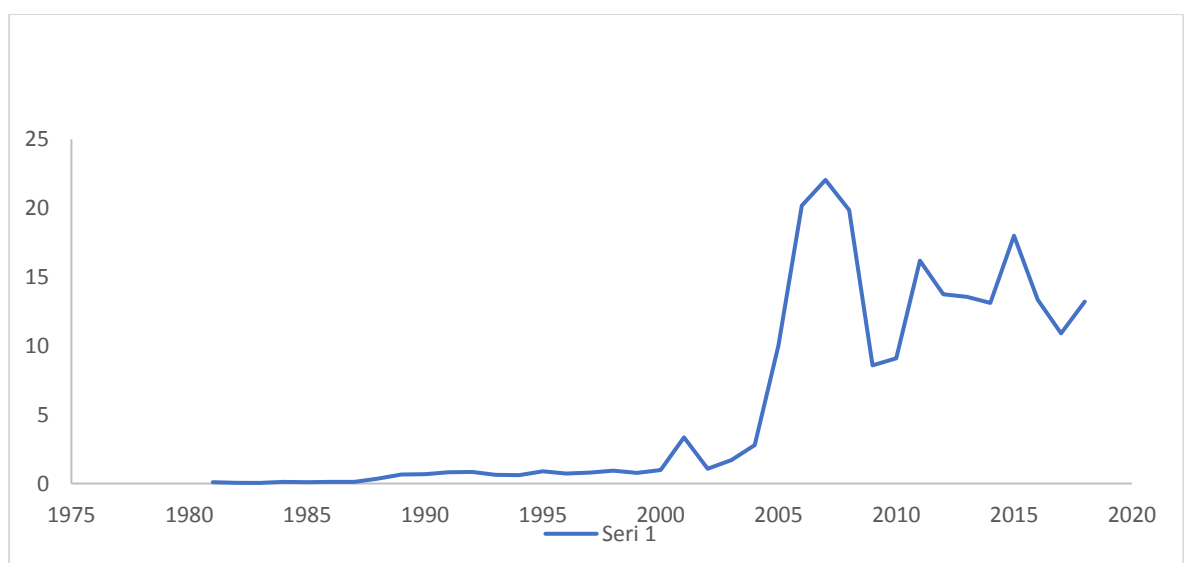
As represented in Table 1.1, Turkey received a total of 221.158 billion USD in foreign direct investments between 1980 and 2018. The program of trade liberalization adopted by the Turkish government in 1980 contributed to the influx of foreign investments in a large share of the Turkish market, where the percentage rose by 428% in 1981, but in the years 1982 and 1983, FDI growth declined. Political conditions in the Middle East contributed to declining FDI inflow, as the financial crisis in Asian countries emerged in 1997, the Turkish market witnessed an influx of these investments of 17%. In 2001, the percentage increased by 241%, and 3.352 billion USD was poured into Turkey.

In 2003, after the second Gulf War and the Iraq occupation, foreign investment continued to inflow into the Turkish market and increased by 57%. In 2005, after

political stability, currency appreciation, foreign direct investment soared by 260% and reached 10.03 billion USD. Undoubtedly, foreign direct investment was affected negatively by the global financial crisis of 2007-2008.

Although Turkey witnessed economic growth in the years 2012-2014, the volume of direct foreign investments declined, but it quickly returned to inflow in 2015. This coincided with the depreciation of the Turkish lira, but in 2016 and 2017, these investments declined, especially from the EU countries. After the 2018 presidential elections were held, political stability was observed. Despite the emergence of an economic war between the United States and China, these investments returned to the Turkish market and rose by 21% to reach 13.2 billion USD. Despite the global political and economic complexity, Turkey had an excellent opportunity to attract foreign direct investment. The above statistical data indicates that the international economic crises have positively affected foreign investment inflows to Turkey, as well as economic openness, political stability, and economic growth. Figure 1.1 shows the foreign direct investment in Turkey over (1980-2018).

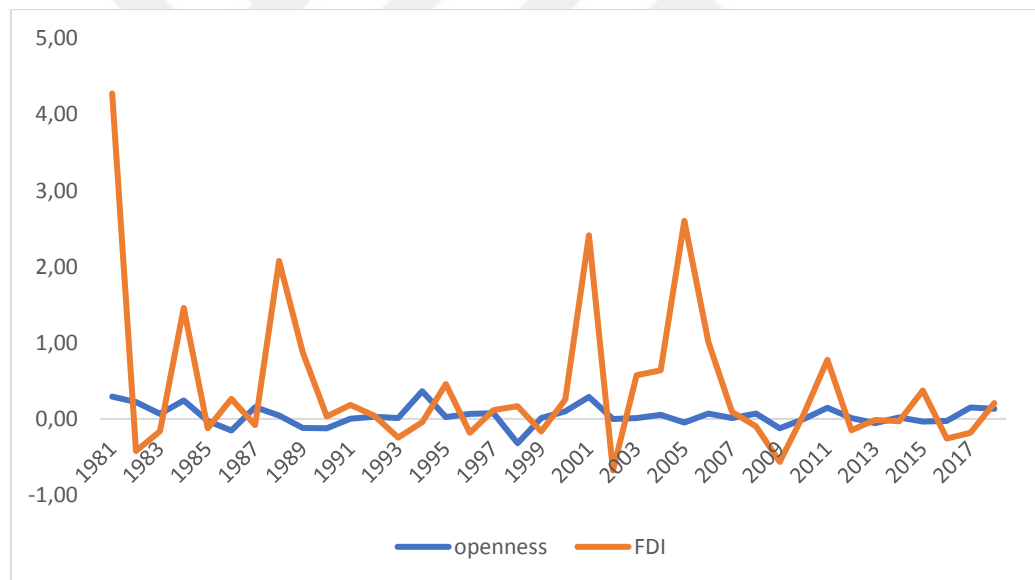
Figure 1.1 Trend of FDI inflow to Turkey (1980-2018). (U.S. \$ billion)



Source: Based on TCMB, WorldBank data.

According to the movement of foreign direct investment inflow into Turkey through 1980-2018, FDI moved steadily from 1980-2000, increased sharply in 2001 due to an attack on 11/9 in the USA, declined in 2012 due to a slight depreciation in the Turkish lira, and finally declined in 2016-2017 as Turkey witnessed a failed military coup and the Turkish lira depreciated more than 35%. These events contributed to the decline in FDI. Finally, in 2018, with political stability and an adjusted exchange rate, FDI returned to inflow into the Turkish market. To show the trend in trade openness and the inflow of foreign direct investment, Figure 1.2 has shown it.

Figure 1.2 Openness and FDI growth % (1981-2018)

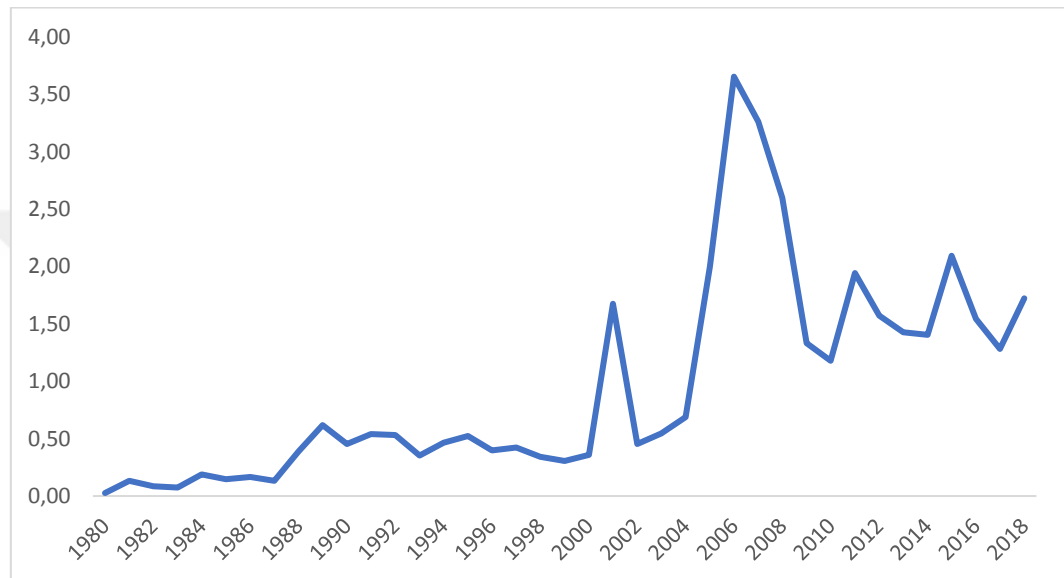


Source: Based on TCMB, WorldBank data.

According to Figure 1.2, the growth in FDI is not associated with trade openness. Although Turkey adopted trade liberalization aiming to attract FDI, the inflow of foreign capital into the Turkish market is still low compared to advanced countries like the Netherlands, which recorded growth in FDI of around 95.4% in 2007 (www.WorldBank.org).

Once considering foreign direct investment as a percentage of GDP as an indicator, we provide data for Turkey from 1980-2018. The minimum value during the period was 0.03 percent in 1980, and the maximum value was 3.6 percent in 2006. Finally, in 2018, the value was 0.017 percent. Figure 1.3 shows these trends.

Figure1.3 FDI as % of GDP



Source: Based on TCMB, WorldBank data.

Foreign direct investments pave the way for domestic products to enter export markets, which works to support the balance of payments, reduce the possibility of financial crises, reduce the deficit in repaying foreign debts, and increase national income. Foreign direct investments are an important source of taxes that the state receives from investment institutions, especially in advanced countries.

The great opportunities that globalization and trade liberalization have created for countries in the field of trade and investment have brought great challenges and competition to attract investments. Foreign direct investment inflows into developed countries reached 61% of global investments in 2018, indicating that foreign investment has become one of the engines of globalization and growth in developed countries,

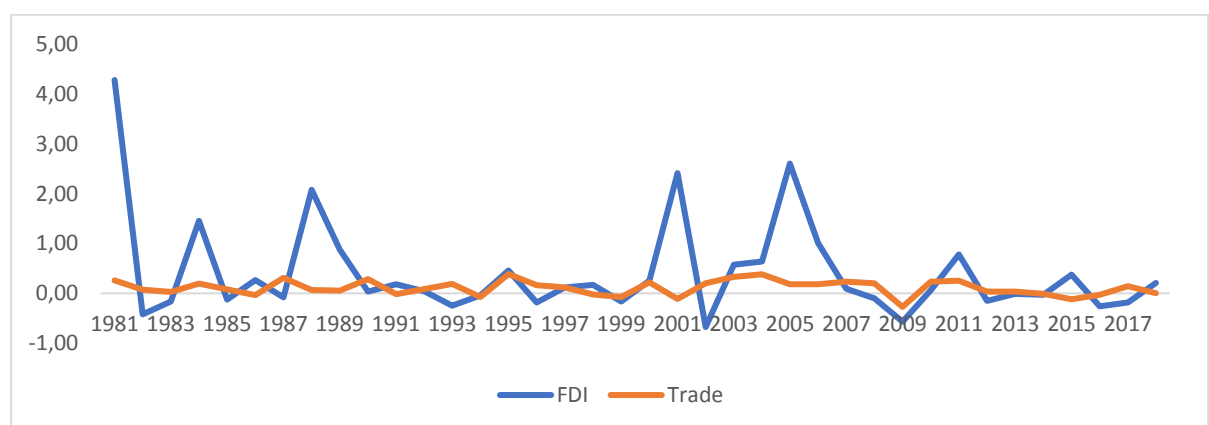
thanks to an appropriate investment environment, availability of production inputs, technology spillover, and stable financial and monetary policies.

The international competition to attract investments in recent years has contributed to an increase in the volume of trade globally by the transfer of technological expertise and of movement of funds easily.

Trade volume has great importance in attracting foreign investments. Trade liberalization paves the way for multinational companies to become involved in investment activities. Through trade expansion, these companies can obtain various production inputs at cheap prices.

Globalization and openness enable countries to have more integration into the global economy. international trade has been acted as a vehicle that brings foreign investments, in The Turkish case it is noted from Figure 1.4 that the relationship between foreign investment in Turkey and the volume of trade.

Figure 1.4: Foreign direct investment and trade growth in Turkey % (1980-2018).



Source: TCMB, WorldBank data.

When comparing foreign direct investment inflow to the Turkish market with the G7 and China, Table 1.2 shows that Turkey succeeds slightly in attracting foreign

investments in post-liberalization and openness initiatives into integration into the global economy.

Table 1.2 FDI in G7, China, Turkey (U.S. \$ billion)

Year	US	UK	Germany	France	Italy	Canada	Japan	China	Turkey
1980	16.74	10.123	-0.186	3.283	0.578	5.813	0.278	0.057	0.018
1985	9.23	5.476	0.531	2.595	1.067	1.257	0.608	1.659	0.099
1990	71.23	41.363	2.557	13.183	6.441	8.402	1.806	3.487	0.684
1995	69.08	29.129	12.042	23.736	4.844	13.658	0.415	35.849	0.885
2000	349.125	164.13	248.007	41.389	13.173	68.303	10.688	42.095	0.982
2005	142.344	252.653	59.835	85.137	36.762	25.552	5.46	104.109	10.031
2010	264.039	66.735	86.038	38.889	9.931	29.715	7.441	243.703	9.099
2015	511.434	45.333	62.422	42.825	13.303	59.986	5.252	242.489	18.002
2018	261.482	81.159	158.515	71.60	44.25	43.16	25.289	235.365	13.200

Source: World bank.

To be more specific, the G7 economies serve as a reference point for comparing the trend of FDI inflows into these countries with the rest of the world. based on the fact that these economies enjoy a free trade system and experience stable financial and monetary policies. Although China has liberalized trade lately, it was able to attract the bulk of foreign investments. The weak foreign investment inflow into Turkey, as shown in Table 1.2, may be associated with a number of reasons: large fluctuations in the exchange rate, limited economic capacity, limited investments in research and development, low real economic growth, high-interest rates, and inflation. All of these reasons are considered the main impediments to attracting foreign capital.

Table 1.3 FDI inflow % of World FDI

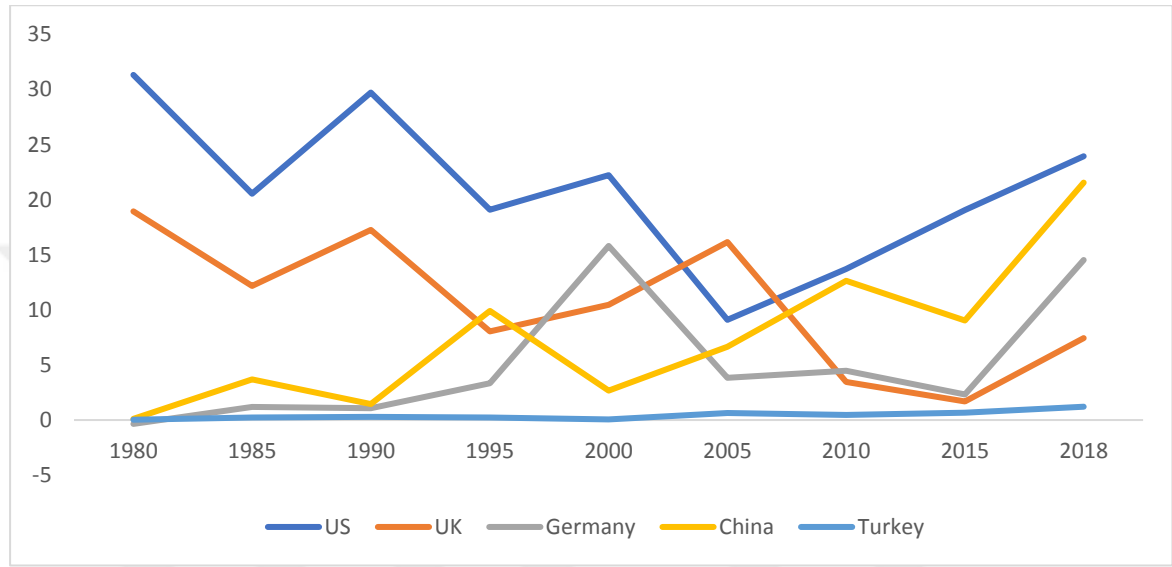
Year	US	UK	Germany	France	Italy	Canada	Japan	China	Turkey
1980	31.34	18.95	-0.35	6.15	1.08	10.88	0.52	0.11	0.03
1985	20.54	12.18	1.18	5.77	2.37	2.80	1.35	3.69	0.22
1990	29.75	17.28	1.07	5.51	2.69	3.51	0.75	1.46	0.29
1995	19.09	8.05	3.33	6.56	1.34	3.77	0.11	9.90	0.24
2000	22.25	10.46	15.81	2.64	0.84	4.35	0.68	2.68	0.06
2005	9.10	16.16	3.83	5.45	2.35	1.63	0.35	6.66	0.64
2010	13.71	3.46	4.47	2.02	0.52	1.54	0.39	12.65	0.47
2015	19.08	1.69	2.33	1.60	0.50	2.24	0.20	9.05	0.67
2018	23.95	7.44	14.52	6.56	4.05	3.95	2.32	21.56	1.21

Source: calculated by Researcher based on WorldBank data.

Table 1.3 indicates that Turkey's foreign investment share in 1980 was 0.03% compared to the United States, which was 31.3% despite many barriers linked to these investments, while Britain's share was 20%, and Canada's was 11%. In 2000, Turkey received the equivalent of 0.06% of international foreign investment, while FDI fell to 22% in the US and 10% in the UK, and rose in Germany by 15.8%. In 2010, Turkey's FDI share rose to 0.47%. In China, FDI has reached 12.65% and was recorded at 13.7% in the US. Finally, in 2018, Turkey received 1.21% of these investments, China received 21.56%, the United States received 24%, and Germany attracted more than 14.5%. These figures indicated that economic growth has a major role in attracting

foreign direct investments. Figure 1.5 depicts the trend of inflow FDI share of global FDI from 1980 to 2018.

Figure 1.5 Some advanced economies FDI % of World FDI



Source: Based on TCMB, WorldBank data.

2.4. Econometrics Methodology

2.4.1. Autoregressive Distributed Lag (ARDL)

The technique adopted within the methodology of this study is the autoregressive distributed lag (ARDL) bounds test to cointegration first tested by Pesaran and Shin (1999) and advocated by Pesaran et al. (2001). It permits for the estimation of cointegration using ordinary least squares (OLS) once the appropriate lag length has been selected. This method is employed due to the study requiring the long run and short run analysis of the dynamic interactions between multiple variables of interest. The lack of a requirement for all variables to be tested to be integrated in the same order

distinguishes this technique from earlier approaches such as Johansen and Juselius' (1990) system-based decreased rank regression or Engle and Granger's (1987) two-step residual-based approach. The bounds test gives the flexibility of being able to test the relationships of variables that are $I(0)$, $I(1)$ or mutually cointegrated (De Vita and Abbott, 2002). However, the test has been found to be unstable in the presence of $I(2)$ variables (Fosu and Magnus, 2006) and thus, for the purpose of this study, unit root testing on all variables prior to estimation was necessary. A further advantage of the testing procedure is that it has also been found to be robust when testing small and large sample sizes, unlike earlier cointegration tests which were sensitive to small samples (Odhambo, 2009).

Through the ARDL approach, results are more confident, which takes into consideration the short run change and converges into the long run. ECM is important and popular among economists for many reasons. Economic variables characterized by cointegration are supposed to be directed in the long term towards stability or the so-called equilibrium, but it may happen that they deviate from their path for temporary reasons, so it is not called stability unless it is proven that they are destined toward equilibrium in the long term, and therefore, we use a correction model to reconcile the long-and short-term behavior of economic relations.

After confirming the existence of the cointegration between two variables, the most appropriate model for estimating the relationship between them is the error correction model (ECM). Designed so that the error correction coefficient that represents the regression residuals is added to the long-term equation of the model used in the study with a time lag for the difference model, this is known as the short-term equation. The ECM model is usually used to reconcile short-term behavior with long-term behavior

in economic relations. It is a revisionary path that allows the introduction of the resulting changes in the short term within the long-term relationship, and thus it aims to isolate the relationship of simultaneous integration on the one hand, and on the other hand, to search for the common trend and the true link between variables (Haug, 2002).

The ECM test is able to examine the issue of time series instability at the level and the possibility of neutralizing the estimation of an incorrect correlation equation. Additionally, ECM is a dynamic model that does not need to be diagnosed in order to estimate the error correction structure where results seem to be consistent. Therefore, ECM it is an appropriate model to measure the correction from disequilibrium of the previous period (Asteriou and Hall, 2011).

Although the advantages of the ARDL approach are numerous, the major drawback of the ARDL approach to cointegration is that it fails to provide robust results in the presence of $I(2)$ variables. One weakness that has been leveled at ARDL models is that, if there is a stochastic (random) trend present in the data, the dynamics in an ARDL model will be approximating this trend rather than modeling 'real' dynamics. However, if there is not a stochastic trend in the data, this criticism is not valid. The existence, or otherwise, of such a stochastic trend is an empirical issue and is difficult to identify given the small number of time-series observations in the dataset available for this study.

Additionally, the bound test is centered on the Wald or joint F -statistic in a generalized Dickey-Fuller regression used to scrutinize the significance of the lagged levels of the test variables in a conditional unrestricted vector error correction model (VECM).

This test compares the calculated value of the F-statistic for lag coefficients of explanatory variables for one period with the corresponding F-statistic (tabular) statistic calculated by Pesaran et al. (2001).

Given that the F-test has a non-standard distribution, there are two critical values for the statistic of this test; the minimum value and it assumes that all variables are stable in their original values or in their level in the sense that they are cointegrated from the zero rank $I(0)$, and the upper limit value assumes that the variables are stable in the first differences for their values in the sense that they are cointegrated from the rank $I(1)$ and the decision is made in three cases:

1-If the calculated F-statistic value is greater than the upper bound value of the tabular F-value, then the null hypothesis is rejected that there is no cointegration between the variables, which means that there is a cointegration relationship between the variables (long-term equilibrium relationship between the variables).

2-If the calculated F-statistic value is less than the minimum value of the tabular F-value, then the null hypothesis is accepted that there is no cointegration between the variables.

3-If the calculated F-statistic value is between the lower and upper bound values for the tabular F-value, The results will be non-determined. This means that there is no ability to make a decision to determine whether or not there is a cointegration between the variables.

It should be noted that if all the variables are cointegrated from the order of one $I(1)$, the decision will be taken to determine whether there is a cointegration between the variables on the basis of comparing the values of the statistics of F calculated with the

tabular value of the upper limit, and likewise, if all the variables are cointegrated from zero $I(0)$, then this decision will be taken on the basis of comparing the calculated F-value with the tabular value of the minimum.

Subsequently, the (ARDL equation) can be expressed as:

$$y_t = a_0 X_t + a_1 X_{t-1} + a_2 X_{t-2} + \dots + a_p X_{t-p} + \mu_t \quad 1.1$$

While in dynamic behavior of variables, y_t depends on previous variable of (Y), this portrayed in Autoregressive Model AR(p):

$$y_t = B_0 + B_1 Y_{t-1} + B_2 Y_{t-2} + \dots + B_p Y_{t-p} + \varepsilon_t \quad 1.2$$

$$y_t = B_0 + B_1 Y_{t-1} + B_2 Y_{t-2} + \dots + B_p Y_{t-p} + a_0 X_t + a_1 X_{t-1} + a_2 X_{t-2} + \dots + a_p X_{t-p} + \varepsilon_t \quad 1.3$$

Above equation represents the main formula of Autoregressive-Distributed Lag (ARDL). By taking the summation of short and long run in one equation. As a result, this formula can be represented as in complete formula of ARDL, $(p, q_1, q_2, \dots, q_k)$:

$$\Delta y_t = B_0 + \sum_{i=1}^p B_1 \Delta Y_{t-i} + \sum_{i=0}^{q_1} B_2 \Delta X_{1t-i} + \sum_{i=0}^{q_2} B_3 \Delta X_{2t-i} + \dots + \sum_{i=0}^{q_k} B_k \Delta X_{kt-i} + a_1 Y_{t-1} + a_2 X_{1t-1} + a_3 X_{2t-1} + \dots + a_k X_{kt-1} + \varepsilon_t \quad 1.4$$

Where, Δ = first difference, K is variable numbers, P is dependent variable lagged period.

$q_1, q_2, \dots, q_k$ = Lagged period of independent variables.

$B_1, B_3, B_2, \dots, B_k$ = short run coefficients.

$a_1, a_2, a_3, \dots, a_k$ = long run coefficients.

Cointegration based on ARDL running as:

- There is no cointegration (long run equilibrium relationship) among variables if: $a_1 = a_2 = a_3 = a_k = 0$
- There is cointegration (long run equilibrium relationship) among variables.

$$a_1 \neq a_2 \neq a_3 \neq a_k \neq 0$$

Based on above explanations ARDL standard model as follows:

$$y_t = B_0 + \sum_{i=1}^p B_1 \Delta Y_{t-i} + \sum_{i=0}^{q_1} B_2 \Delta X_{1t-i} + \sum_{i=0}^{q_2} B_3 \Delta X_{2t-i} + \cdots \sum_{i=0}^{q_k} B_k \Delta X_{kt-i} + a_1 Y_{t-1} + a_2 X_{1t-1} + a_3 X_{2t-1} + \cdots + a_k X_{kt-1} + \varepsilon_t \quad 1.5$$

ARDL bounds testing procedure allow us to take into consideration I(0) and I(1) variables together. In bound test the null hypotheses are built up to test $\gamma_1, \gamma_2, \gamma_3$ ($H_0 = \gamma_1 = \gamma_2 = \gamma_3 = 0$). While the null hypothesis means that there is no cointegration, against the alternative hypothesis of cointegration. $H_0 = \gamma_1 \neq \gamma_2 \neq \gamma_3 \neq 0$.

Stability of the time series consider the main condition to compute ARDL, the majority of applied studies assume that these series are stable or static and are not subject to external influences over time. Many economists have pointed out that the stability of data or stability of the time series must have the following statistical characteristics (Hamilton, J.,1994).

2.4.2. Stability Test

The expected value of the time series (Y) is a fixed value.

$$E(Y_t) = Y \quad 1.6$$

$$E(Y_t) = \mu Y \quad 1.7$$

The time series variation (Y_t) is a constant value ie $VAR(Y_t) = (Y_t - \mu Y)^2$, this mean the common variation of the time series between time and time depends on time difference only. But there may be a lack of stability due to changes in the course of economic life as a result of the fluctuations of the economic cycle between recession and recovery and this characteristic of economic life, this generates an incorrect slope even with a high value of the parameters (R_2).

This framework resorted to many statisticians to use the Dicky-Fuller test to determine whether the time series is stable or not, where the following formula (1.8) is assumed:

$$1.8 Y_t = \rho Y_{t-1} + U_t$$

Thus, the value of Dicky-Fuller test is calculated by reference to the following relationship: $T = N(P-1)$ where N is the number of observations, and after calculation, we compare the value with the tabular value. If T is computed in the absolute value greater than the tabular value, the null hypothesis is accepted and thus the time series is considered stable. The time series is unstable as the first difference of data will be taken and retest until the series data stabilizes. Its main advantage is that it is a non-parametric test. Thus, it is not necessary to specify the model and lagged parameter in the test regression.

2.5. Theoretical framework

The impact of trade liberalization on FDI inflow may be mixed. Trade liberalization affects foreign direct investment either positively or negatively according to the host country's trade policies (Liargovas and Skandalis 2012; Ponce 2006). The majority of empirical studies have found that trade liberalization increases FDI inflows (Makoni, 2018; Sahoo, 2006; Janick and Wunnava, 2004, and Zaman et al. 2018). According to

these studies, countries with fewer barriers to trade have a higher opportunity to attract foreign direct investment.

Following Bajo-Rubio and S. Sosvilla-Rivero (1994), they object to minimizing costs in both domestic and foreign plants. Based on FDI, they take a cost-minimization approach to production.

$$C = \alpha_d(Q_d)Q_d + \alpha_f(Q_f)Q_f \quad 1.9$$

where C denotes the total cost, α_d and α_f are unit costs in domestic and foreign plants, respectively, and Q_d and Q_f are respective quantities produced in each plant. Unit costs in both plants are a function of the quantity produced.

The firm would minimize equation (1,9) subject to the constraint that output should equal total demand ($\bar{D}$):

Subject to total demand constraint

$$Q_d + Q_f = \bar{D} \quad 1.10$$

By Lagrangean function, equation 1.11 obtained by combining 1.9 and 1.10 as follow:

$$L = \alpha_d(Q_d)Q_d + \alpha_f(Q_f)Q_f + (\bar{D} - Q_d - Q_f) \quad 1.11$$

By differentiating equation 1.11 with respect to Q_d , Q_f and λ produces

$$\frac{\partial L}{\partial Q_d} = \alpha'_d Q_d + \alpha_d(Q_d) - \lambda \quad 1.12$$

$$\frac{\partial L}{\partial Q_f} = \alpha'_f Q_f + \alpha_f(Q_f) - \lambda \quad 1.13$$

$$\frac{\partial L}{\partial \lambda} = \bar{D} - Q_d - Q_f \quad 1.14$$

Where $\dot{\alpha}_d = d\alpha_d/dQ_d$ and $\dot{\alpha}_f = d\alpha_f/dQ_f$, setting 1.12, 1.13, 1.14, equal zero and solving it for Q_f gives:

$$Q_f = \gamma_1 \bar{D} + \gamma_2 (\alpha_d - \alpha_f) \quad 1.15$$

Where $\gamma_1 = \dot{\alpha}_d / (\dot{\alpha}_d + \dot{\alpha}_f)$ and $\gamma_2 = 1 / (\dot{\alpha}_d + \dot{\alpha}_f)$ are positive

Equation 1.7 reveals that output produced in foreign plants is positively to total demand ($\bar{D}$) and differences in unit costs, if $\alpha_d > \alpha_f$, foreign plants increase its production, if $\alpha_d < \alpha_f$, the firm expands production in its domestic plant, resulting in decreasing in output in its foreign plant.

Following microeconomic theory, to minimize cost, the firm uses two inputs labor and capital. Bajo Rubio and Sosvilla-Rivero then state that in addition to choosing the quantity of foreign production, of, the cost-minimizing firm must also choose the quantity of inputs used to produce of units. Assuming that the firm uses two inputs, labor and capital, the firm's total production cost in the foreign plant is:

$$C_f = W_f L_f + K_f K_f \quad 1.16$$

Where w and k denote the wage and cost of capital, based on economic theory, firm minimize cost via Cobb-Douglas production function

$$Q_f = L_f^a K_f^b \quad 1.17$$

To apply Lagrange function

$$L = W_f L_f - K_f K_f + \lambda (Q_f - L_f^a K_f^b) \quad 1.18$$

With first order conditions

$$\frac{\partial L}{\partial L_f} = W_f - \lambda a \left(\frac{Q_f}{L_f} \right) \quad 1.19$$

$$\frac{\partial L}{\partial K_f} = K_f - \lambda b \left(\frac{Q_f}{K_f} \right) \quad 1.20$$

$$\frac{\partial L}{\partial \lambda} = (Q_f - L_f^a K_f^b) \quad 1.21$$

By solving the first -order conditions in equation 1.19, 1.20 and 1.21 for K_f gives

$$K_f = \left[\left(\frac{b}{a} \right) \left(\frac{w_f}{K_f} \right) \right]^{a/(\alpha+b)} Q_f^{1/(\alpha+b)} \quad 1.22$$

Replacing Q_f from equation 1.15 we reach to

$$K_f = \left[\left(\frac{b}{a} \right) \left(\frac{w_f}{K_f} \right) \right]^{a/(\alpha+b)} [\gamma_1 \bar{D} + \gamma_2 (\alpha_d - \alpha_f)]^{1/(\alpha+b)} \quad 1.23$$

Desired capital stock is positively related to total demand ($\bar{D}$) and adversely related to hosting country's unit costs relative to those of home country. Firms increase investments in foreign countries when easily access to markets, high trade openness in host countries like China, Singapore, Hong Kong, Netherlands, and Hungary. This imply that there a positive impact of trade liberalization on FDI inflow, unit cost plays a critical factor in attract FDI, cheap labor unit will enhance the desire of investors, so that currency depreciation (RER) lead to decrease labor cost, this indicate that the relation between currency depreciation (RER) and FDI is positive.

$$FDI = \Phi(K_f) = F(\text{Aggregated demand}, \text{Openness}, \text{RER}) \quad 1.24$$

GDP in host country employed as market size and represents aggregated demand

$$FDI = F(\text{GDP}, \text{Openness}, \text{RER}) \quad 1.25$$

Where FDI: foreign direct investment, GDP: gross domestic product of Turkey, RER: real exchange rate, OP: openness degree (trade liberalization indicator).

2.6. Model specification

GDP: This is an indicator of a large market that has a competitive advantage in production and consumption; thus, in a large market, investors have numerous opportunities to profit (Ho et al. 2013; Asiamah et al. 2018).

Real exchange rate (RER): depreciation of the home currency encourages foreign investors to invest following the host country's depreciation currency due to more liberalized policies, investment costs will decrease as well as the country's competitiveness will increase (Klein & Rosengren, 1994). (Makoni, 2018).

Trade Openness: the most popular measure of trade liberalization is, Trade Openness = $\frac{X+M}{GDP} * 100$, according to Krugman, 1985, vertical FDI models are adopted by MNEs willing to expand activities abroad to avoid trade costs. Trade openness collaborates with a decline in production costs and eliminates barriers. This indicates that there is a positive relationship between openness and foreign direct investment. Openness provides a proxy for the technology spillover dimension of openness. Trade facilities' access to high technology in the world depends on openness degree (Grossman and Helpman, 1992, chp.9).

$$\ln FDI = \alpha + \beta_1 \ln GDP + \beta_2 \ln OP + \beta_3 \ln RER + \hat{u} \quad 1.26$$

Where; $\ln(FDI)$ is the log of FDI, $\ln RER$ log of real exchange rate, $\ln Y_d$ log of domestic income, $\ln OP$ log of trade openness. And $\delta_1 > 1$, $\delta_2 > 1$, $\delta_3 > 1$.

$$\begin{aligned} \Delta \ln(FDI) = & \alpha + \sum_{i=1}^n \beta_0 \Delta \ln(FDI)_{t-i} + \sum_{i=0}^n \beta_1 \Delta \ln RER_{t-i} + \sum_{i=0}^n \beta_2 \Delta \ln Y_{t-i} + \\ & \sum_{i=0}^n \beta_3 \Delta \ln OP_{t-i} + \delta_0 \ln(FDI)_{t-1} + \delta_1 \ln RER_{t-1} + \delta_2 \ln Y_{t-1} + \delta_3 \ln OP_{t-1} + \\ & \varphi ECT_{t-1} + \varepsilon \end{aligned} \quad 1.27$$

$$ECT_t = \ln(FDI)_t - \alpha - \delta_1 \ln RER - \delta_2 \ln Y_d - \delta_3 \ln OP \quad 1.28$$

where, $\beta_1, \beta_2, \beta_3$ short term coefficients

$\delta_1, \delta_2, \delta_3$, long term coefficients

Where Δ is the first difference operator, in econometrics literature this methodology known as autoregressive-distributed lag (ARDL), show that long-run and short-run estimated simultaneously. Long run effects the independent variables on dependent variable are obtained by the estimates of $\delta_1, \delta_2, \delta_3$ that are normalized on δ_0 .

Consequently, to show whether the adjustment of variables is moving toward in long-term equilibrium, estimates of $\delta_0 - \delta_3$ are used to construct an error -correction term (EC). Therefore lagged -level variables in Eq.1.19 are changed by EC_{t-1} establishing a modified version of Eq. 1.21 as follows:

$$\begin{aligned} \Delta FDI_{LR} = & \alpha + \sum_{i=1}^{m1} \sigma FDI_{LR-i} + \sum_{i=0}^{m2} \pi \Delta GDP_{t-i} + \sum_{i=0}^{m3} \rho \Delta RER_{t-i} + \\ & \sum_{i=0}^{m4} \varepsilon \Delta OP_{t-i} + \lambda EC_{t-1} + \mu_t \end{aligned} \quad 1.29$$

Where λ is the speed of adjustment parameter. A significant negative coefficient EC_{t-1} support adjustment toward long run equilibrium.

2.7. Empirical results

Empirical analysis tested the order of integration of the series by employing unit root tests, this tests important because cointegration test requires the regressed variable to be I(1) and the repressors' to be I(0) or I(1). Meanwhile, the bounds cointegration test, Johansen-Juselius test is typically sensitive to the optimal lag order criterion, this study used the Akaike Information Criterion (AIC) to determine the optimal lag structure.

2.7.1. Unit Root Test

Table 1.4 reported the result of unit root for the following variables (openness degree, real exchange rate, FDI, domestic income) in our study. Results of Dickey- Fuller (ADF) unit root test suggest that all variable are non-stationary at level but become stationary at first difference, to summarize all the variables are integrated at order I(1). This result enable us to apply ARDL method.

Table 1.4 Unit root test results

Variable	Level			1st difference		
	ADF	Critic value	Result	ADF	Critic value	Result
OP	-1.46	-2.9	Non- stationary	-5.569	-2.9	Stationary
RER	-1.68	-2.9	Non- stationary	-7.53	-2.9	Stationary
FDI	1.357	-2.9	Non- stationary	-5.313	-2.9	Stationary
GDP	-0.284	-2.9	Non- stationary	5.222	-2.9	Stationary

Notes: OP= openness degree, GDP= gross domestic product, RER= real exchange rate, FDI= foreign direct investment.

The ADF test results show that all the variables are non-stationary at level at 5% significance level. However, all stationary at their first difference. This mean that all series are I(1).

2.7.2. Determination of lag length

Lag length considered one of the points to running the analysis, after unit root test, lag length test was determined, if the lag length set longer or shorter than it should be, variables will have higher or lower values in series than they are.

Table 1.5 Lag length

lag	LogL	LR	FPE	AIC	SC	HQ
0	-548.1046	NA	1.49e+09	32.47674	32.65631	32.53789
1	-455.4943	157.9821*	16640334*	27.97026*	28.86811*	28.27645*
2	-444.3528	16.38458	23119585	28.25605	29.87220	29.80720
3	-433.1127	13.88484	34216256	28.53604	30.87048	29.33215
4	-420.0986	13.01414	53172938	28.71168	31.76440	29.75275
5	-396.1192	18.33720	49582784	28.24230	32.01331	29.52833

Notes: * indicates lag order selected by the criterion.

LR: sequential modified LR test statistics (each test at 5% level), FPE: final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hanna-Quinn information criterion.

As a result of the constructed model, appropriate lag length for the LR, FPE and AIC is 1 therefore, (1 lag) is determined via lag criteria test as the appropriate lag length.

2.7.3. Cointegration test results

Bound Cointegration test

In order to ascertain the presence of a long run relationship among the variables, the bound tests are conducted; results of the bound tests are presented in Table1.6.

Bound test results reveal that the computed F -statistics based on the Wald test is 5.26 this exceeded the upper bound of 4.66 at the 1% significance level, suggesting that the null hypothesis of no cointegration relation is rejected. Therefore, the long run

relationship is confirmed among the trade openness, real exchange rate, foreign direct investments, GDP, the result implies that these variables move together and so cannot move ‘too far away’ from each other independently. Indirectly, we can conclude that any disequilibrium among them is a short run phenomenon.

Table 1.6 F-statistics for testing the existence of long-run cointegration

F-statistics	k	Significance level	Bound Critical Values	
			I(0)	I(1)
5.2654	3	1%	2.37	3.2
		5%	2.79	3.69
		10%	3.65	4.66

Notes: From Persaran et al (2001) Critical values are obtained.
Source: extracted from estimation output using Eviews 11.

Our result shows that there is a long run relationship between foreign direct investment, trade openness, Real exchange rate, GDP. This indicates that the series in long run move together.

Johansen-Juselius Cointegration test

Johansen's cointegration procedures were employed to determine the number of cointegration vectors. The lag was set at one depend on selection made by several criterion. The results from trace statistic indicate that the null hypothesis of zero is rejected at 95% critical value that means one cointegration vector exists. However, Maximal Eigen value Test revealed that no cointegration exists. In this case, the trace statistic result was chosen. The outputs for Johansen's cointegration test are depicted in Table 1.7.

Table 1.7 Johansen-Juselius maximum likelihood cointegration test

Trace test				Maximal Eigen value Test			
Null	Alternative	Statistic	0.05 Critical Value	Null	Alternative	Statistic	0.05 Critical Value
$r = 0$	$r = 1$	50.92*	47.85	$r = 0$	$r = 1$	23.89	27.58
$r \leq 1$	$r = 2$	27.03	29.79	$r \leq 1$	$r = 2$	18.71	21.13
$r \leq 2$	$r = 3$	8.31	15.49	$r \leq 2$	$r = 3$	8.21	14.26
$r \leq 3$	$r = 4$	0.09	3.84	$r \leq 3$	$r = 4$	0.09	3.84

Notes: (i) r stands for the number of cointegrating vectors.

(ii) * denotes rejection of null hypothesis of no cointegration at 5% significance level.

Breusch-Godfrey Serial Correlation LM Test

Table 1.8 Breusch-Godfrey serial correlation *LM* Test of FDI

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.9168	Prob. F(2.31)	0.451
Obs*R-squared	1.902	Prob. Chi-Square (3)	0.936

Based on Breusch-Godfrey Serial Correlation LM Test, which shows the F-statistics 0.918 with prob (0.05) equal 0.451 more than 0.05 that means no serial correlation at up to 2 lags.

2.7.4. Long run estimation

Once we found the long run cointegration relationship among the variables of our study, results obtained by FDI as a (dependent variable) in the long run are reported in Table 1.9.

Table 1.9 Long run coefficients

variable	coefficient	St. Error	t-statistic	Prob.
Log(GDP)	1.775	0.283	6.259	0.000
Log(OP)	0.783	0.868	0.902	0.373
Log(RER)	-0.338	0.961	-0.352	0.726
c	-10.594	4.444	-2.383	0.023

Long run equation,

$$LnFDI = \alpha + \beta_1 lnGDP + \beta_2 lnOP + \beta_3 lnRER + \hat{u} \quad 1.30$$

$$Log(FDI) = -10.59 + 1.77log(GDP) + 0.78log(OP) - 0.338log(RER) \quad 1.31$$

Table 1.9 shows that the estimated coefficient of the long-run relationship reveals that GDP has a positive long-run effect on the inflow of foreign direct investment in Turkey. This signifies that an increase in GDP will lead to an increase in the inflow of FDI. A 1% increase in GDP increases FDI inflows to Turkey by 1.77%. Interestingly, *T*-statistics display that the variable is significant at a 5% level of significance as the probability value (p-value 0.05). From the statistical results, it is confidently assumed that GDP has a positive and significant effect on FDI inflow to Turkey over 1980-2018. Our result was consistent with Tari and Bidirdi (2009).

Considering the effect of openness degree as a trade liberalization indicator on FDI, it has a positive impact on FDI. The results indicate that an increase in openness of 1% leads to an increase of 0.78% in FDI, but the result is insignificant, based on the probability value greater than ($P\text{-value} \geq 0.05$). Moreover, the coefficient of trade

openness is less than 1, which indicates that trade openness is not followed by FDI inflow significantly. The result is consistent with Koyunca and Cinar (2009).

However, the relationship between currency depreciation as one of the trade liberalizations features and FDI is negative. This result refutes the apriori expectation (currency depreciation attracts FDI. The depreciation of the Turkish currency by 1% will decrease FDI inflow to Turkey by 0.33%. T-statistics displays that the variable is insignificant at a 5% level of significance as the probability value ($p\text{-value} \geq 0.05$). From the statistical results, it is confidently assumed that currency depreciation has a negative and insignificant effect on FDI inflow to Turkey over 1980-2018. The result was not consistent with Cambazoğlu and Güneş (2016). Our result explains that a currency depreciation leads a decline FDI inflow into the Turkish market in 2019. FDI decreased by 0.30%. This result indicated that foreign investors prefer macroeconomic stability rather than other variables. Globally, FDI in 2019 grew sharply by 59%. (Source: www.Worldbank.org).

Based on the above results, the only factor impacting attracting FDI is GDP. Trade liberalization programs can't significantly attract foreign direct investments.

2.7.5. Short Run Results

The error correction model obtained from ARDL test, provides knowledge about short run effects of variables on exports, Table 1.10 contains the estimation results from the error correction model, results explain that the short run effects of GDP, on FDI is significantly positive.

Table 1.10 Short run coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob*.
DLn(GDP)	1.152	0.6306	3.196	0.0252
DLn(OP)	0.509	0.563	0.904	0.372
DLn(RER)	-0.220	0.634	-0.346	0.731
CointEq(-1)*	-0.649	0.119	-5.43	0.000
R-squared	0.3889	Mean dependent var		0.1736
Adjusted R-squared	0.3889	S.D. dependent var		0.5606
S.E. of regression	0.4382	Akaike info criterion		1.213
Sum squared resid	7.105	Schwarz criterion		1.256
Log likelihood	-22.06	Hannan-Quinn criter.		1.229
Durbin-Watson stat	1.688			

Table 1.10 shows that an increase of 1% in the GDP of Turkey will increase foreign direct investment inflows by 1.15% in the short run. Concerning openness degree as a trade liberalization indicator, results show that an increase in openness degree of 1% in the short run attracts foreign direct investments by 0.51%. However, an increase of 1% in the real exchange rate (currency depreciation) led to a decline in foreign direct investments by 0.22%. Based on the above results, trade liberalization in Turkey over the last period (1980-2018) was unable to attract foreign direct investments.

2.7.6. Granger causality test

Granger causality test shows that Turkey does not have a directional relationship between trade openness, real exchange rate and FDI, however, Turkey has a directional relationship from GDP to foreign direct investment. Our results are not consistent with Şahbaz et al. (2016).

Table 1.11 Granger causality test

Null Hypothesis	F- statistics	Probability
OP does not Granger cause FDI	2.709	0.0818
FDI does not Granger cause OP	0.763	0.4743
RER does not Granger cause FDI	2.707	0.0819
FDI does not Granger cause RER	0.856	0.4343
GDP does not Granger cause FDI	6.787	0.0035
FDI does not Granger cause GDP	0.502	0.6099

2.7.7. Stability Test

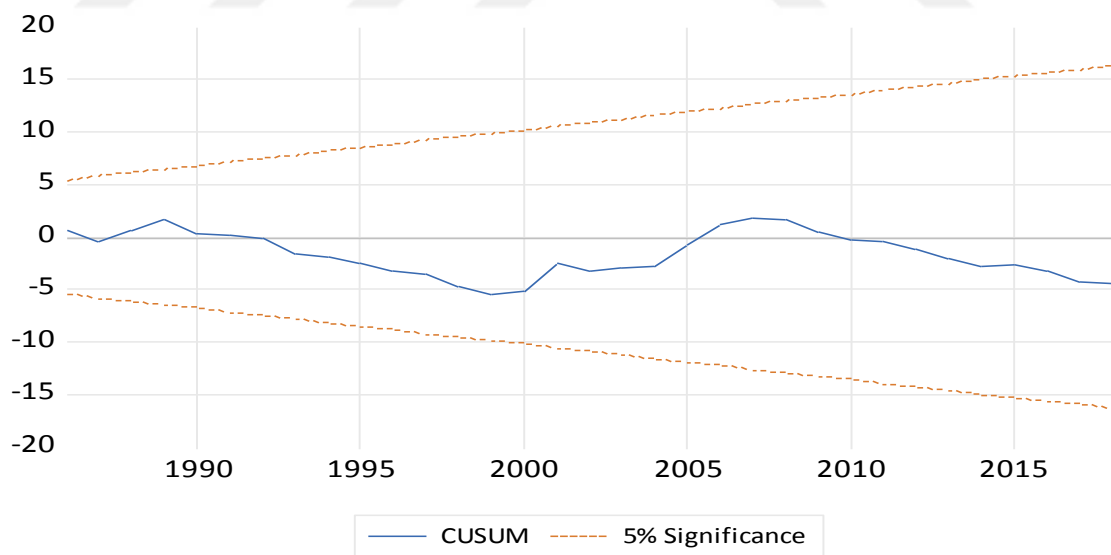
To see if the model's parameters are stable over time, it is necessary to investigate whether these variables show a structural change in their behavior over time stable or not, the CUSUM stability test is one of the most common tests in this field.

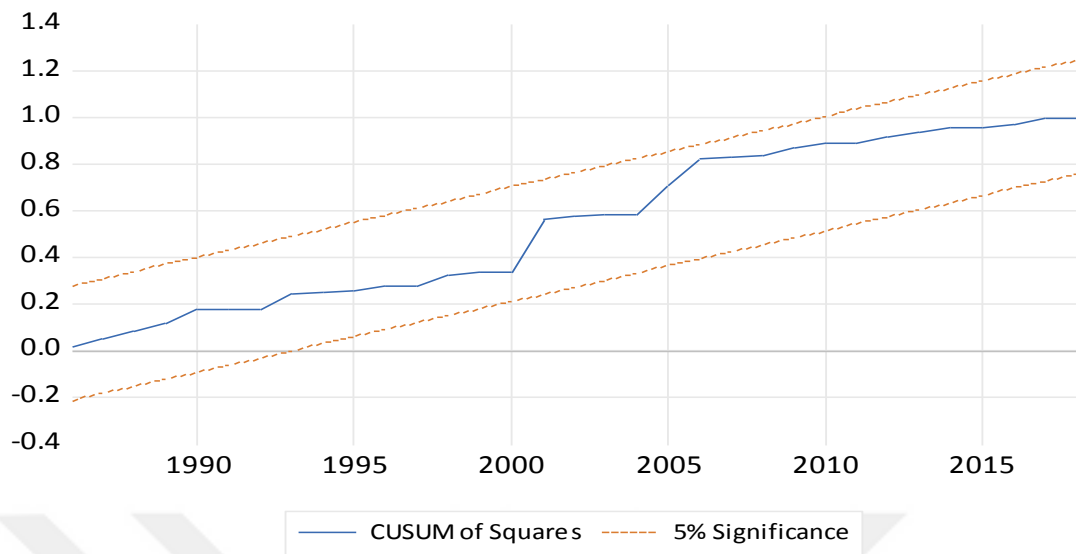
The results of this test are shown in the form of a curve for the errors of a model estimated by the usual least squares method (OLS), and a confidence domain with the

aim of testing the null hypothesis which states that the parameters of the typical least squares model are unstable. If the curve of errors is within the critical limits throughout the study period, the null hypothesis is rejected at a significant percentage (5%). This means that the parameters are stable throughout the study period, and therefore the ability to estimate constant parameters of the model along the study time period without having to split it for partial periods, if the null hypothesis is rejected, then the study period must be divided into partial periods in which the parameters are stable (Brown et al., 1975).

A graphical presentation of the test is provided in Figure 1.6. The CUSUM test indicates that the parameters are stable over time as the plot of cumulative sum of recursive residuals and cumulative sum of squares of recursive residuals lies within the critical bound at 5% significance level.

Figure 1.6 Stability test





2.8. Conclusion

Foreign direct investment is linked to trade liberalization and shows how countries integrated into the global economy, openness degree, and liberalized exchange rate play an important role in stimulating FDI. The trade liberalization environment represents an appropriate path which accelerates FDI inflow.

One of the main aims of Turkey's trade liberalization program is to attract foreign investments. Foreign direct investment inflow into Turkey's market since the trade liberalization program launched in 1980 is still small compared to advanced countries. However, the new stability era in Turkey collaborated with structural regulation and economic policy reforming. FDI increased sharply and reached 10.031 billion USD in 2005. The main important determinants of FDI inflow to Turkey are: exchange rate stability, openness, political stability, and economic growth.

In order to test the impact of economic openness on the flow of foreign investments, the study relied on the standard model that was developed by Bajo-Rubio and S. Sosvilla-Rivero (1994).

Various standard tests were carried out, study variables were stable to the first degree. The results of the integration test showed that the variables are integrated into the long term. The results show that in the long run, the growth of GDP has a positive impact on attracting foreign investments. An increase in GDP of 1% contributes to attracting foreign investments by 1.77%. The value of T-value is statistically significant. The impact of the trade liberalization index shows that an increase in economic openness of 1% contributes to attracting foreign investments by 0.77% and the value of T-value is not statistically significant. However, the depreciation of the Turkish currency accompanied by trade liberalization shows that a depreciation of 1% will lead to a decline in foreign direct investments by 0.33%.

As for the impact of variables (openness, real exchange rate, GDP) on attracting foreign direct investment in the short term, while the growth in GDP has a positive and statistically significant effect on foreign investments, the positive impact of trade liberalization on attracting foreign investments is uncertain, as does the depreciation of the currency, which leads to a reduction in foreign investments.

Accordingly, the main determinant of attracting foreign investments to the Turkish market is sustainable growth in GDP. This is what developed countries depend on to attract foreign investments. Trade liberalization in countries that lack large production capacity and large markets does not succeed in attracting foreign investments.

3. TRADE LIBERALIZATION, INNOVATION AND MANUFACTURING EXPORTS

Abstract

This study aims to examine the impact of technological competitiveness (innovation) on manufacturing exports in Turkey (1980-2018). The first section of this study covers descriptive statistics of Turkey's innovation indicators with a focus on patents. The second section of the study employs the Autoregressive Distributed lag bound test (ARDL) approach, unit root test, bound test for long run estimation, and Error Correction term (EC).

The descriptive statistics show that after trade liberalization, Turkey was unable to follow advanced countries in the innovation index, patent numbers were still low and the country's share of the world recorded 0.003 in 2018. Study findings show that all variables are stationary at the first difference, $I(1)$. The estimation bound test displays that the real exchange rate and foreign income have a statistically significant impact on manufacturing exports of Turkey over a period (1980-2018).

Estimated results show that the Turkey should export to the G7 more than the rest of the world: a 1% increase in technological competitiveness leads to increases in exports of 0.39% and 0.13% in the short and long runs, respectively, while exports to the rest of the world increased by 0.04% in the short run and 0.09% in the long run.

The study recommends that it is necessary to increase manufacturing export competitiveness. More investment in research and development will lead to more patents, as a result of which innovation will be achieved. The creation of domestic

advanced technology is the most effective strategy to achieve a competitive advantage in manufacturing exports.

Key words: Trade liberalization, innovation, manufacturing exports.



3.1. Introduction

Trade liberalization is an essential policy for export growth in many advanced countries. The competitive environment for the national industry is improved by the new techniques of production embodied by using production factors efficiently. Severe competition linked to trade liberalization will force domestic and foreign plants to abolish any waste of resources and attain economies of scale. High-tech imports and new production techniques lead firms toward more innovations.

Innovation is considered the benchmark in determining a country's export competitiveness and trade pattern. In most studies, the positive correlation between exports and innovation has been confirmed. Trade liberalization paves the way toward technology transfer as well as surviving innovation activities due to high competition.

Export competitiveness plays an important role in a country's competitiveness. Innovation agendas and raising competitiveness in the globalization era have become the critical sources of high performance.

Numerous studies have shown that trade liberalization could contribute significantly to adopting and fostering the innovation performance of the most productive industries (Baldwin & Gu, 2004). On the other hand, trade liberalization has a negative effect on growth unless the technological spillover and innovation base are strong enough to overwhelm the increase in the cost of generating a successful variety due to tougher selection.

In developed countries, technology transfer and innovation activities have shown an important effect on export performance in the short and long term (DiPietro & Anoruo, 2006). The importance of innovation in the economy is translated into an increasing

number of patents. In 1985, the world total of patents reached 455.973 thousand. Technological advances embodied by globalization have accelerated competition in innovation. In 2018, the number of patents reached 2.294881 million. Last years, Turkey increased investment in research and development (R&D) significantly. This was explained by the increasing number of patents, from 134 in 1980 to 7150 in 2018, (www.worldbankdata.com).

Moreover, new models of international trade focused on heterogeneous firms' propensity to enter foreign markets, display that investment in firm-specific assets will lead to increased firms' innovativeness and productivity, which allows them to reach foreign markets (Melitz 2003, Grossman et al. 2006).

3.2. Literature review

Innovation as one of the globalization pillars plays a significant role in long-term economic growth in both developed and developing countries, which is extensively observed as the engine of economic growth (Romer, 1990; Aghion and Howitt, 1992). Exporting activities are considered an important route for boosting innovation, so trade accounts for a major share of technological spillovers and innovative products (Keller, 2010).

Boermans and Roelfsema (2014) investigate the impact of internalization on innovation in transition economies at the firm level. The results confirm that internationalization increases a firm's tendency to innovate, while exports and FDI are connected with patenting.

Damijan et al. (2009) examined the relationship between exports and innovation in several transition countries. The results showed that exporting to advanced economies led to more organizational learning and the maintenance of innovation capabilities.

Golovko and Valentini (2011) show that Spanish exports lead to higher innovation due to the complementarily relationship. Bustos (2011) investigates the impact of trade liberalization on R&D efforts in Argentinian firms. The results indicate that a declining tariff will lead to more R&D spending. According to Amable and Verspagen (1995), Wakelin (1998), and Wakelin (1999), R&D, innovation, and a number of patents play important roles in the OECD bilateral export market.

Grossman and Helpman (1991) noted that in global economic models of innovation and growth, the rise of exports motivated by innovation enables firms to make more investments in innovation activities, thus raising the endogeneity between innovation and exports.

Countries that pursued an export-led growth strategy through trade liberalization that focused on R&D and innovation collaborated in technological progress, resulting in high-technology exports (Van & Lewer, 2015).

Kılıç, et, al. (2014) use panel data to examine the relationship between R&D spending and high technology exports in G-8 countries from 1996 to 2011. According to the findings, R&D spending and the real effective exchange rate had a positive impact on high-technology exports. Karabulut (2015) examined the impact of the innovation strategy on Turkish firms' performance. Multiple regression was employed. The results showed that the innovation strategy forced firms to maintain learning and improve customer performance.

Kirim (1990) investigated the technology policy in Turkish manufacturing industries, the study sample included 659 major manufacturing firms from 1987 to 1988. The findings showed that trade policy is a key driver of in-house technology change. Firms, on the other hand, do not rely much on R&D.

Forrester (2000) entitles that if firms invest more in innovation, they can keep their competitive advantage against tough competition. Acemoglu (2003) notices that trade liberalization increases adopting superior technologies to maximize profits in tough competition.

Baldwin and Gu (2004) indicate that entering export markets after implementing a trade liberalization program in Canada leads to increased advanced technology, attracting more foreign advanced technology, and improving domestic technology. These achievements are associated with high improvements in innovation novelty and encourage Canadian plants toward more patents.

Shu and Steinwender (2019) argue that trade liberalization in emerging countries enhances productivity and innovation, while in developed countries, export opportunities and access to high-tech inputs allow for more innovation.

Gnangnon and Moser (2014) showed that free trade, innovation, growing GDP, and human capital skills lead to more diversification in exports and consequently shift the economy toward complexity.

Roper and Love (2002) proved that innovation plays a significant role in export performance in the UK and German manufacturing plants. However, innovative UK plants have the ability to exploit spillover from innovation activities more effectively.

Navas (2015) investigates the role of trade in innovation based on the Heckscher-Ohlin model with heterogeneous results, which confirm that trade liberalization leads to a different relative impact on innovation across plants. Furthermore, trade liberalization boosts prospective entrants' profits in industries, which leads to an additional increase in product innovation.

Rodriguez and Rodriguez (2005) studied the relationship between the firm's technological capacity developments and its export and revealed that the technological capacity of the firm (innovation) is a significant factor in its international competitiveness. Zhang et al. (2018) examined the impact of innovation on Chinese firms, employing a firm-level dataset of 14,065 high-tech firms over the period 2007–2013. The findings reveal that innovation efficiency and trade volume increase the opportunity for high-tech firms to grow rapidly.

Moreover, export growth in the globalization era is determined via extensive and intensive margins. Innovation plays a significant role in introducing new products into global markets, which may induce the extensive margins of export growth (Krugman, 1979). Furthermore, innovation collaborated with high competition leads to an increase in exports by shifting firms' productivity toward high levels, which increases intensive margins (Grossman et al. 1994).

This study contributes to the literature's three points. The first contribution is showing Turkey's innovation position compared to advanced economies; this portrayed the technological progress and its impact on manufacturing exports.

The second contribution is to test the impact of the trade-weighted income indicator and the technological competitiveness index on manufacturing exports. The third

contribution is to focus on the importance of trade with advanced economies rather than the rest of the world.

3.3. Innovation and Globalization

In the era of globalization, the important factor in economic success is continuous innovation to attain ever-higher productivity as well as enhanced competitiveness. New technologies unambiguously contribute to higher productivity by allocating resources. Therefore, technology innovation is pivotal for augmented competitiveness and economic and social development.

Globalization shaped by intensified trade dynamics has achieved rapid growth in capital flows and the enlargement of the digital economy. Digitalization calls for innovation to be worthwhile. Importing technology without new domestic inventions enables countries to benefit from globalization.

One of the main challenges in emerging countries is embodied by modern globalization processes. The technology of production in these economies has become very similar. This requires new types of innovations to succeed in global markets.

A new wave of economic globalization began in 1980, which was followed by an inflow of foreign direct investment, increasing the role of multinational corporations (MNCs). MNCs play a vital role in the diffusion of new knowledge. Those firms are also key actors in research and development (R&D).

According to Gordon (1994), globalization is characterized by the pursuit of system capability through global "R&D sourcing" and the orientation towards the brilliance of (national) innovation systems.

A national innovation system in industrial countries plays a central role in competitiveness, even in times of increasing globalization (Yusuf et al. 2003:141). A national system of innovation is defined as follows: "The network of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies may be described as the national system of innovation." (Freeman, 1992).

Through trade liberalization and free exchange, importers learn how to use imports efficiently and exporters learn how to make products more attractive in foreign markets. High exposure to foreign technology stimulates adaptation and innovative activities if a national absorptive and learning capability exists (Gehrels, 1983).

In an era of economic globalization and fierce global competition, it makes sense for governments to prioritize R&D activities in order to support and maintain international competitiveness.

Globally, competition in innovation has increased sharply, stimulating public and private sectors to become involved in innovation activities. Nowadays, public and private universities in developed countries consider the knowledge base of innovation, which enables industry sectors to adopt modern techniques.

Unquestionably, export growth in the globalization era depends heavily on the Schumpeterian idea of creative destruction. Modern innovations replace old products and techniques simultaneously. The greater the level of economic innovation, the greater the potential for export growth from global trade (DiPietro & Anoruo, 2006).

3.4. Turkey's Innovation

The globalization of technology has augmented both global trade and innovative projects in sectors related to electronics, aerospace, and pharmaceuticals at a world level. Recent innovations are progressively seen as a dynamic boost to export growth, job creation, and, essentially, the key goal of competitiveness.

Since the implementation of the trade liberalization program, the Turkish government has been working to increase innovation activities in productive sectors, especially manufacturing exports.

The novelty of this study is to show the importance of Turkey's technological competitiveness (innovation) in exporting to the G7 compared to the rest of the world.

Turkish innovation policy and modernization programs have faced many obstacles and challenges, including lack of financial resources and the absence of interdependence between sectors, as well as a weak foreign direct investment inflow, which is one of the most effective catalysts in the field of innovation. Table 2.1 shows the global innovation index in Turkey in recent years, compared to South Korea and Germany.

Table 2.1 Innovation index (Score= 100)

Year	Innovation Ranking	Turkey	S. Korea	Germany
2020	51	34.9	56.1	56.5
2019	49	36.9	56.6	58.2
2018	50	37.42	56.6	58.0
2017	43	38.90	57.7	58.4
2016	42	39.03	57.1	57.9
2015	58	37.81	56.3	57.1
2014	54	38.20	55.3	56.0
2013	68	36.03	53.3	55.8
2012	74	34.10	53.9	56.2
2011	65	34.11	53.7	54.9

Source: World Bank.

Table 2.1 shows that the innovation index in Turkey in 2011 was 34.11 out of 100, where Korea and Germany were 53.7 and 54.9 respectively. After ten years, Turkey is still in the same performance category as Korea and Germany. The slow progress in the innovation index is explained by low expenditure on research and development. Table 2.2 shows the research and development expenditure as a percentage of GDP in Turkey compared to the OCED, the G7, and the world.

Table 2.2 Research and development expenditure % of GDP

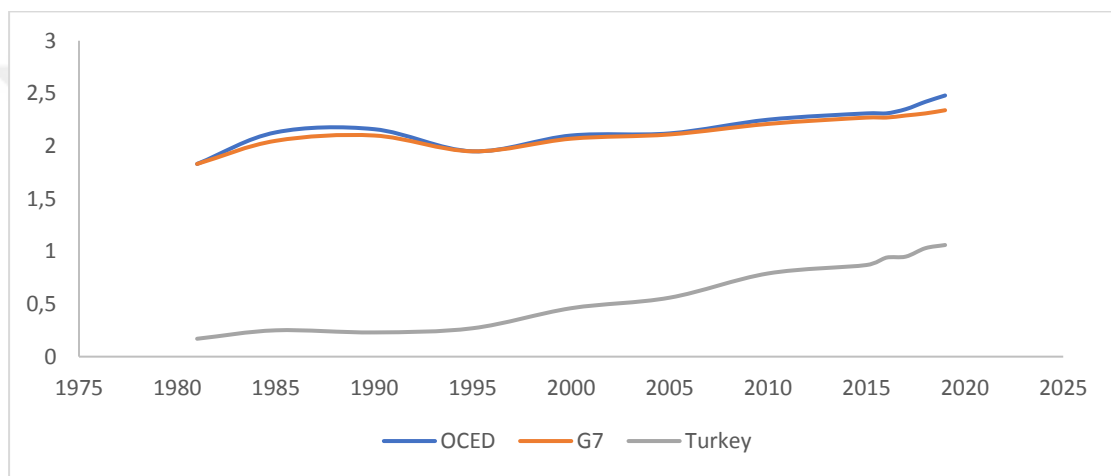
year	world	European Union	OCED	G7	Turkey
1981	NA	NA	1.83	1.83	0.17
1985	NA	NA	2.13	2.05	0.25
1990	NA	NA	2.16	2.10	0.23
1995	NA	1.957	1.95	1.95	0.27
2000	2.07	1.68	2.10	2.07	0.46
2005	1.98	1.68	2.12	2.11	0.56
2010	2.06	1.86	2.25	2.21	0.79
2015	2.11	2.01	2.31	2.27	0.87
2016	2.19	1.99	2.31	2.27	0.94
2017	2.3	2.03	2.35	2.29	0.95
2018	2.0	2.07	2.42	2.31	1.03
2019	2.37	2.10	2.48	2.34	1.06

Source: World bank. Calculated by researcher.

Concerning the share of research and development of GDP, Table 2.2 shows that Turkey invested only 0.17 percent in 1980, while the G7 spent 1.83 percent on research and development of GDP, and the OECD invested 1.83 percent. In 2000, this share increased to 0.46 percent in Turkey, G7 invested 2.07 percent, OCED's share amounted to 2.1 percent, the European Union was at 1.68 percent, and the world as a whole was at 2.07 percent. In 2018, Turkey's research and development share of GDP reached 1.06 percent compared to G7 2.34 percent, OCED 2.48 percent, European Union 2.1 percent, and the world's 2.37 percent. The increase in research and development expenditures in

developed countries is consistent with globalization era developments; innovation has become the driver of the economy and trade liberalization has become the vehicle of technology transfer.

Figure 2.1: R&D spending as a percentage of GDP



Source: Based on data in Table 2.2.

In the field of patents, Turkey has started to fall behind compared to the seven developed countries (G7). This is due to the weak investment in research and development, and the lack of national policy toward industrial facilities to develop other products depending on the development of its patents.

Table 2.3 Patents in selected advanced countries (Unit= Thousand)

Year	World	US	Germany	UK	France	Japan	Canada	China	Turkey
1980	404.422	62.098	28.683	19.612	11	165.73	1.648	NA	0.134
1985	455.973	63.673	32.202	19.672	12.05	274.348	2.092	4.065	0.132
1990	571.394	90.643	30.724	19.31	12.378	332.952	2.549	5.832	0.138

1995	664.314	123.962	38.103	18.63	12.419	333.77	2.431	10.011	0.170
2000	823.163	164.795	51.736	22.05	13.87	384.201	4.187	25.346	0.277
2005	965.511	207.867	48.367	17.833	14.327	367.96	5.183	93.485	0.928
2010	1160.9	241.977	47.047	15.49	14.748	290.081	4.550	293.066	3.180
2018	2294.83	285.095	46.617	12.865	14.303	253.63	4.349	1393.815	7.156

Source: World Bank.

Table 2.3 shows that the number of patents in the Republic of Turkey in 1980 was only 134. After twenty years, the number of patents did not increase significantly. In 2000, it reached 277, and in 2010, the number of patents reached 3.180, and in 2018 it reached 7.156. Compared to the seven countries and global growth in patents, Turkey has still stagnated significantly. The following table shows the share of Turkish patents globally.

Table 2.4 Some advanced economies patents share of the World patents

Year	Turkey	China	US	Germany	England	France	Japan	Canada
1980	0.0003	NA	0.1535	0.0709	0.0485	0.0272	0.4098	0.0041
1985	0.0003	0.0089	0.1396	0.0706	0.0431	0.0264	0.6017	0.0046
1990	0.0002	0.0102	0.1586	0.0538	0.0338	0.0217	0.5827	0.0045
1995	0.0003	0.0151	0.1866	0.0574	0.028	0.0187	0.5024	0.0037
2000	0.0003	0.0308	0.2002	0.0629	0.0268	0.0168	0.4667	0.0051
2005	0.001	0.0968	0.2153	0.0501	0.0185	0.0148	0.3811	0.0054
2010	0.0027	0.2524	0.2084	0.0405	0.0133	0.0127	0.2499	0.0039
2018	0.0031	0.6074	0.1242	0.0203	0.0056	0.0062	0.1105	0.0019

Source: Calculate by researcher based on WorldBank data.

Table 2.4 indicates that Japan's share of global patents in 1980 was 41%, while Turkey's share was only 0.03%. In 1985, Japan reached a high share, as it contributed 60%, while Turkey remained at only 0.03%. In 2010, the United States' share was 20%, Japan's 25%, China's 25%, and Turkey 0.027%, while in 2018, the share of the United States was 12%, Japan's 11%, and China's 1%. This indicates the importance of patents as a global indicator of innovation in stimulating economic performance and achieving sustainable competitive advantages.

Based on the above details, patents contribute significantly to the development of the industrial sector and its expansion, both horizontal and vertical. This enables the high economy to attain a high rate of high-tech exports, which are considered the backbone of developed economies. Advanced industries have a high share of intellectual capital, such as invention and innovation.

Globalization and economic openness have greatly increased the involvement of industrialized countries in developing and innovating high-tech goods, which are defined as products embedding R&D in line with the great developments in global technology. Specialization and competitive advantages that accumulated in previous periods strengthened the position of developed economies in innovation and development. This led to high levels of these industries. One of the emerging countries, except China, was unable to reach high rates of high-tech because it lacked technological readiness. The ability of countries to export high-tech goods depends on technological capacity in the first place and its ability to exploit appropriate opportunities globally. Globalization is the framework of innovation accessing and developing this technology to serve local industries. Because of innovation, many

countries focused on high-tech exports to overcome the recession. Table 2.5 shows the volume of high-tech exports in many developed countries and Turkey.

Table 2.5 High technology exports (2007-2018) (U.S. \$ billion)

Year	World	US	Germany	UK	Singapore	Japan	Korea	China	Turkey
2007	1988.925	268.313	129.368	68.539	108.610	128.727	106.540	342.721	1.885
2008	2102.643	271.755	142.154	67.601	122.799	130.664	110.797	390.994	1.930
2009	1754.078	173.774	183.678	49.242	99.3040	104.429	103.497	359.264	1.583
2010	2065.377	192.469	204.549	67.140	131.458	130.195	132.080	474.519	1.949
2011	2203.992	193.296	154.340	75.699	130.135	133.518	133.475	540.193	2.207
2012	2236.287	197.095	183.048	74.961	134.248	129.751	130.693	593.875	2.337
2013	2298.677	198.384	213.589	76.327	140.444	111.571	143.488	655.996	2.821
2014	2332.343	207.641	201.600	78.261	145.588	107.605	149.064	653.871	2.985
2015	2197.001	208.320	215.159	75.547	136.868	98.545	147.120	652.237	2.911
2016	2136.314	208.585	227.115	74.891	132.567	99.310	135.917	594.550	2.831
2017	2471.466	185.236	177.053	75.382	147.254	106.451	166.695	654.181	3.668
2018	2702.542	183.720	178.513	76.237	155.904	111.012	192.806	729.680	3.286

Source: World Bank.

Table 2.5 displays that the Turkish high technology exports in 2007 amounted to 1.88 billion USD, while South Korea's exports were 106 billion USD and China 342 billion USD. Compared with Japan, Singapore, Britain, Germany, and the United States, it is clear that Turkey still lacks the necessary technological infrastructure to join the club of high-tech exporting countries. This indicates that over the period 1980–2006, Turkey was unable to invest in the research and development sector and technology localization. Despite the great efforts in the technology sector, Turkey's exports were

unable to attain significant growth compared to other developed countries and recorded in 2018, they amounted to only 3.286 billion USD, while Korea's exports significant growth in technology exports is a result of its reliance on a strategy of investment in research and development since the implementation of the trade liberalization program in the early 1980s. Moreover, to show the share of high-tech exports in manufacturing exports, Table 2.6 portrayed these developments as follows.

Table 2.6 High-tech exports % of manufacturing exports

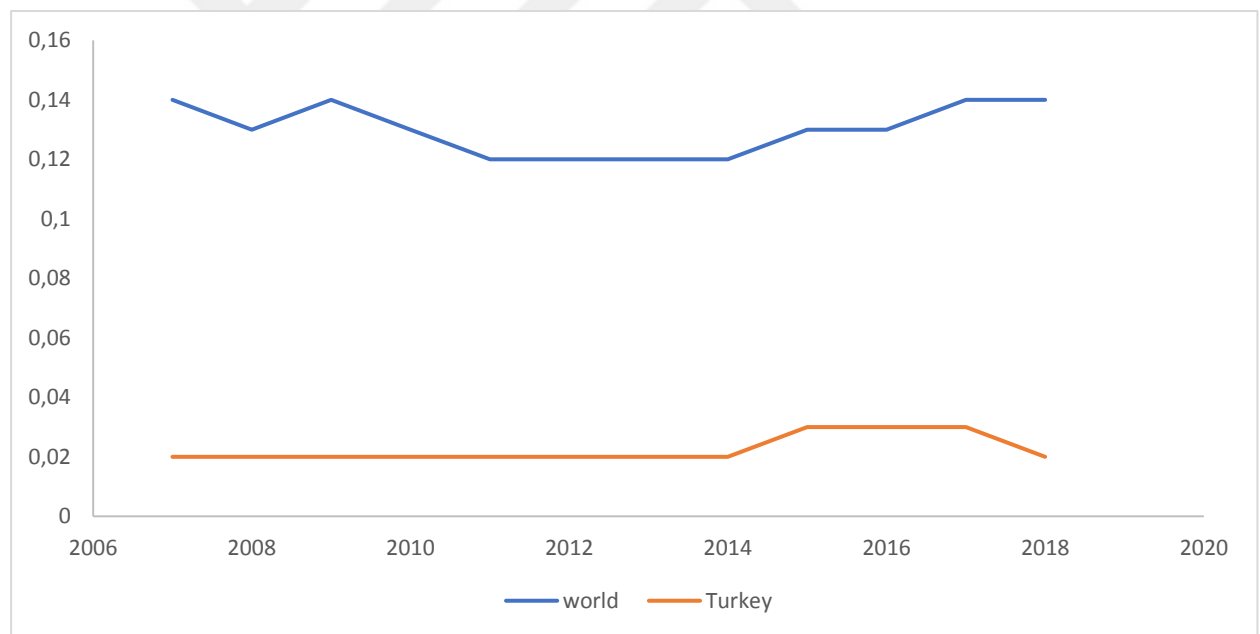
Year	World	US	Germany	UK	Singapore	Japan	Korea	China	Turkey
2007	0.14	0.30	0.14	0.21	0.49	0.20	0.29	0.30	0.02
2008	0.13	0.29	0.13	0.21	0.53	0.19	0.26	0.29	0.02
2009	0.14	0.25	0.15	0.21	0.51	0.21	0.28	0.32	0.02
2010	0.13	0.23	0.22	0.24	0.52	0.19	0.28	0.32	0.02
2011	0.12	0.21	0.15	0.24	0.48	0.18	0.24	0.30	0.02
2012	0.12	0.21	0.15	0.24	0.49	0.18	0.24	0.31	0.02
2013	0.12	0.21	0.18	0.24	0.50	0.18	0.26	0.32	0.02
2014	0.12	0.21	0.17	0.22	0.51	0.18	0.26	0.30	0.02
2015	0.13	0.22	0.17	0.23	0.52	0.18	0.28	0.30	0.03
2016	0.13	0.23	0.20	0.24	0.52	0.18	0.27	0.30	0.03
2017	0.14	0.20	0.16	0.23	0.53	0.18	0.29	0.31	0.03
2018	0.14	0.19	0.14	0.23	0.52	0.17	0.32	0.31	0.02

Source: Calculation based on WorldBank data.

Table 2.6 shows that the contribution of high-tech exports to manufacturing exports in Turkey in 2007 amounted to 2%, while in China it was 30%, Korea 29%, and Singapore 49%, respectively. While in the world it was 14%. In 2015 it recorded a slight increase

and reached 3%, whereas in Singapore it reached 52%, while in China it remained at 30%, the world 13%, and in Turkey it reached 52%. In 2018, the share in Turkey decreased to 2%, while it increased in China to 31% and South Korea to 32%, which is the first country in the field of research and development investments. In Singapore, it has stabilized at 52%. This indicates that investment in the advanced technology sector is of great importance in developing the export sector and injecting it with a global competitive advantage. Figure 2.2 shows the trend of high-tech exports as a share of manufacturing exports in Turkey and around the globe.

Figure 2.2: High-tech exports in Turkey and around the World as a percentage of manufacturing exports



Source: Based on WorldBank data.

Through trade liberalization, South Korea, Singapore, and China were able to acquire technology and develop it significantly to support the export sector. However, the Turkish experience in this field is still below the target level.

3.5. Theoretical framework

The export sector is one of the important sectors in the economy of any country. The majority of countries seek to develop their economy by developing strategic plans for economic development that respond to local and global demand. Trade liberalization enhances innovation activities via accessing diverse knowledge, information, and ideas about global competitiveness.

Innovation is the engine of industry dynamics. New technology impacts entirely on economic performance through the concept of "techno-economic paradigms". This is connected to Schumpeterian "creative destruction" (Perez, 2009).

Through competition, firm performance has improved, technology spillovers, overseas supplier-customer relations, widened markets, economies of scale, and export-related policy incentives, thus exporting manufactured products will become more competitive (Wagner 2002; Bernard and Jensen 2004; Kugler and Verhoogen 2009).

Technology spillover increased the share of manufactured goods in total exports. Opening domestic markets for imported inputs from advanced economies and high foreign investment were among the main success factors for China's exports (World Bank 2012).

Following traditional export demand function which was used by Houthakker and Magee in 1969. According to this function, export growth depends on income growth and changes in price competitiveness,

$$X = K \left(\frac{P_d}{EP_f} \right)^\eta Z^\varepsilon \quad 2.1$$

$$\hat{X} = -\eta(\hat{P}_d - \hat{P}_f - \hat{E}) + \varepsilon\hat{Z} \quad 2.2$$

Where X is national exports, K is constant, E is nominal exchange rate, P_d , P_f are domestic and foreign price level, respectively, Z foreign income, furthermore, η is the price elasticities of demand for exports, where ε is the income elasticity of demand for exports.

Trade liberalization encourage countries to enhance their trade performance and maintaining exports competitiveness via increasing growth rates and expanding the range of products, thus, traditional export demand function is augmented to involve technological competitiveness linked with improvements in product variety or quality level.

$$\hat{X} = -\eta(\hat{P}_d - \hat{P}_f - \hat{E}) + \varepsilon\hat{Z} + \mu(\hat{T}_d - \hat{T}_f) \quad 2.3$$

Where T represents the level of technological competitiveness and μ is the technology elasticity of exports. Turkey price competitiveness $PW_{it} = RER$ equal real exchange rate, if increased (currency depreciation) exports will be increased. Trade weighted income for country i (Turkey) was constructed as:

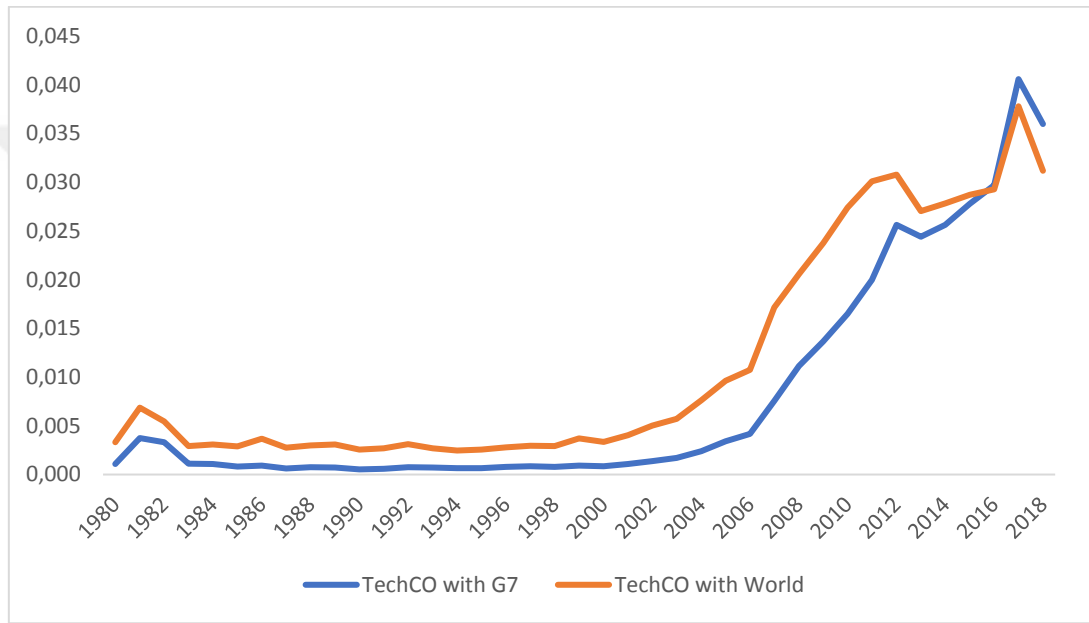
$$YW_{it} = \sum_{j=1}^n \frac{Xn_{jit}Y_{jt}}{Xn_{it}} \quad 2.4$$

Where Xn_{jit} is nominal exports from Turkey to (G7 countries, World) Xn_{it} is total exports of Turkey, both in same currency (US dollar), and Y_{jt} is real income of (G7 countries, world). The expected result indicated that if there is an increase in the (Trade weighted) income of the export destinations is accompanied by an increase in the export volume from Turkey. Technological competitiveness is calculated as follow:

$$TW_{it} = TSTK_{it} / \left(\sum_{j=1}^n \frac{Xn_{jit}TSTK_{jt}}{Xn_{it}} \right) \quad 2.5$$

Where $TSTK_{it}$ and $TSTK_{jt}$ are the stocks of patents of Turkey and (G7 countries, world) respectively, an increase in the index is related to an improvement in the technological competitiveness of Turkey. Figure 2.3 shows that the technological competitiveness indicator of Turkey has improved over time when Turkey was more involved in trade with highly advanced countries.

Figure 2.3 Turkey technological competitiveness (%)



Source: Based on WorldBank data.

Thus, based on equations 2.1-2.5 exports performance in term of innovation determined as follow:

$$X_{it} = f(YW_{it}, RER_{X_{it}}, TW_{it}) \quad 2.6$$

By taking logarithm equation 2.6 shown as:

$$\ln X_{it} = \beta_0 + \beta_1 \ln YW_{it} + \beta_2 \ln RER_{X_{it}} + u_{it} \quad 2.7$$

$$\ln X_{it} = \beta_0 + \beta_1 \ln YW_{it} + \beta_2 \ln RER_{X_{it}} + \beta_3 \ln TW_{it} + u_{it} \quad 2.8$$

Where X manufacturing exports, LR for long run, YW is gross domestic product of Turkey, RER is real exchange rate, TW is manufactured exports, u_{it} is the classical regression error term.

To dictate long -run relation according advances in econometric literature Eq.2.8 should include short run dynamic adjustment procedure. This will be achieved by articulating Eq. (2.8) in an error -correction model as proposed in Pesaran et al. (2001):

$$\begin{aligned} \Delta \ln(X_{LR}) = & \alpha + \sum_{i=1}^{m1} \sigma \Delta \ln X_{LR-i} + \sum_{i=0}^{m2} \pi \Delta \ln YW_{t-i} + \sum_{i=0}^{m3} \rho \Delta \ln RER_{t-i} + \sum_{i=0}^{m4} \varepsilon \Delta \ln TW_{t-i} \\ & + \delta_1 \ln X_{LR-1} + \delta_2 \ln YW_{t-1} + \delta_3 \ln RER_{t-1} + \delta_4 \ln TW_{t-1} + \lambda EC_{t-1} + v_t \end{aligned}$$

2.9

where, π, ρ, ε , short term coefficients

$\delta_2, \delta_3, \delta_4$, long term coefficients

In econometrics literature this methodology known as autoregressive -distributed lag (ARDL), show that long-run and short-run estimated simultaneously. Long run effects the independent variables on dependent variable are obtained by the estimates of δ_2, δ_3 and δ_4 that are normalized on δ_1 .

To determine whether the adjustment of variables is toward in long-term equilibrium, estimates of $\delta_1 - \delta_4$ are used to construct an error -correction term (EC). Therefore lagged -level variables in Eq. 2.9 are changed by EC_{t-1} establishing a modified version of Eq. 2.10 as follows:

$$\begin{aligned} \Delta X_{LR} = & \alpha + \sum_{i=1}^{m1} \sigma \Delta X_{LR-i} + \sum_{i=0}^{m2} \pi \Delta YW_{t-i} + \sum_{i=0}^{m3} \rho \Delta RER_{t-i} + \sum_{i=0}^{m4} \varepsilon \Delta PW_{t-i} + \\ & \lambda EC_{t-1} + \mu_t \end{aligned} \quad 2.10$$

Where λ is the speed of adjustment parameter. A significant negative coefficient EC_{t-1} support adjustment toward long run equilibrium.

3.6. Empirical results

Annual data over the 190-2018 period were employed to estimate ARDL cointegration procedure of Pesaran et al. (2001). To implement cointegration procedure aggressed and aggressor should I(1). Study including 39 observations, lag selection considers essential to achieve cointegration relationship among dependent variable (Xm) and (RER, TW, YW), Akaike information criterion (AIC) was utilized.

3.6.1. Unit Root Test

The result of unit root for the following variables (TW, YW, RER, EX) show in Table 2.7. Results of Dickey- Fuller (ADF) unit root test suggest that all variable are non-stationary at level but become stationary at first difference, to summarize all the variables are integrated at order I(1). This result enable us to apply ARDL method.

Table 2.7 Unit root result

Variable	Level			1st difference		
	ADF	Critic value	Result	ADF	Critic value	Result
TW	0.308	-2.9	Non- stationary	-5.569	-2.9	stationary
YW	1.550	-2.9	Non- stationary	-4.491	-2.9	stationary
RER	-1.68	-2.9	Non- stationary	-7.53	-2.9	Stationary
EX	-0.29	-2.9	Non- stationary	-7.06	-2.9	Stationary

Table 2.7 show that, *TW*, *YW*, *RER*, *EX*, are non-stationary at level at 5% significance level. However, these variable stationary at first difference.

3.6.2. Determination of Lag Length

Important points to be measured while performing the analysis is what the lag length in the analysis is. Due those reasons, after the unit root tests of the variables, the lag length of the model was chosen. Since the lag length to be used in the study is not known in real life, the lag length is chosen by an appropriate method. If the lag length is set to be longer or shorter than it should be, the variables will have higher or lower values than they are (Katos, Lawler and Seddighi, 2000: 300).

Accordingly, such tests like Likelihood Ratio Test (LR), Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC), Final Prediction Error (FPE) and Hannan-Quinn Information Criterion (HQ) are the most favored test to determine the appropriate lag length to avoid econometrics problems. The results obtained for the optimal lag length are given in Table 2.8.

Table 2.8 Lag length selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-253.8121	NA	29.39053	14.73212	14.90987	14.79348
1	-122.2165	225.5923	0.040076	8.12660	9.015430*	8.433463
2	-108.5537	20.29909	0.047641	8.260211	9.859998	8.812458
3	-79.40007	36.65028	0.024879	7.508575	9.819378	8.306264
4	-51.04607	29.16411*	0.012130*	6.802633*	9.824452	7.845764*

Notes: * Indicates lag order selected by the criterion. LR: sequential modified LR test statistics (each test at 5% level), FPE: final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hanna-Quinn information criterion.

As a result of the recognized model, the appropriate lag length depends on Schwarz information criterion is 1. Then, (1) is determined as the appropriate lag length with the most consensus.

3.6.3. Cointegration test

Bound cointegration result

In order to ascertain the presence of a long run relationship among the variables, the bound tests are conducted; results of the bound tests are presented in Table 2.9.

Bound test results reveal that the computed F -statistics based on the Wald test is 6.241 this exceeded the upper bound of 4.66 at the 1% significance level, suggesting that the null hypothesis of no cointegration relation is rejected. Therefore, the long run relationship is confirmed among the *TW*, *YW*, *RER*, *EX*, the result implies that these variables move together and so cannot move ‘too far away’ from each other independently. Indirectly, we can conclude that any disequilibrium among them is a short run phenomenon.

Table 2.9 F-statistics for testing the existence of long-run cointegration

F-statistics	k	Significance level	Bound Critical Values	
			I(0)	I(1)
		1%	2.37	3.2
6.241*	3	5%	2.79	3.69
		10%	3.65	4.66

Notes: From Persaran et al (2001) Critical values are obtained. (*) Significant at 5%. Source: extracted from estimation output using Eviews 11.

Our result show that there is a long run relationship between manufacturing exports, Real exchange rate, income weighted, technological competitiveness. This indicates that the series in long run move together.

Johansen-Juselius maximum likelihood cointegration tests

Cointegration results indicated that the trace and maximal eigenvalues suggest that the number of cointegrating vector is one ($r=1$), consequently, our annual data from 1980-2018 seem to support the hypothesis that there exists a unique long-run statistical relationship between manufacturing exports and exports price, Technological competitiveness, Trade weighted income. Table 2.10 shows the Johansen-Juselius maximum likelihood cointegration test (with World).

Table 2.10 Johansen-Juselius maximum likelihood cointegration test (with World)

Trace test				Maximal Eigen value Test			
Null	Alternative	Statistic	0.05 Critical Value	Null	Alternative	Statistic	0.05 Critical Value
$r = 0$	$r = 1$	45.04*	40.17	$r = 0$	$r = 1$	25.08*	24.15
$r \leq 1$	$r = 2$	19.95	24.27	$r \leq 1$	$r = 2$	13.84	17.79
$r \leq 2$	$r = 3$	6.11	12.32	$r \leq 2$	$r = 3$	5.76	11.22
$r \leq 3$	$r = 4$	0.34	4.12	$r \leq 3$	$r = 4$	0.34	4.12

Notes: (i) r stands for the number of cointegrating vectors. (ii) * denotes rejection of null hypothesis of no cointegration at 5% significance level.

Table 2.11 show that the Cointegration among variable estimation exports with G7, results indicated that the trace and maximal eigenvalues reveals that there are two cointegrating vectors using at least ($r=2$). According to this the null hypothesis rejected

and alternative accepted, there is a long -run relationship between manufacturing exports and exports price, Technological competitiveness, Trade weighted income.

Table 2.11 Johansen-Juselius maximum likelihood cointegration test (with G7)

Trace test				Maximal Eigen value Test			
Null	Alternative	Statistic	0.05 Critical Value	Null	Alternative	Statistic	0.05 Critical Value
$r = 0$	$r = 1$	54.05*	40.17	$r = 0$	$r = 1$	28.33*	24.15
$r \leq 1$	$r = 2$	25.72*	24.27	$r \leq 1$	$r = 2$	18.19*	17.79
$r \leq 2$	$r = 3$	7.52	12.32	$r \leq 2$	$r = 3$	7.32	11.22
$r \leq 3$	$r = 4$	0.20	4.12	$r \leq 3$	$r = 4$	0.20	4.12

Notes: (i) r stands for the number of cointegrating vectors.

(ii) * denotes rejection of null hypothesis of no cointegration at 5% significance level.

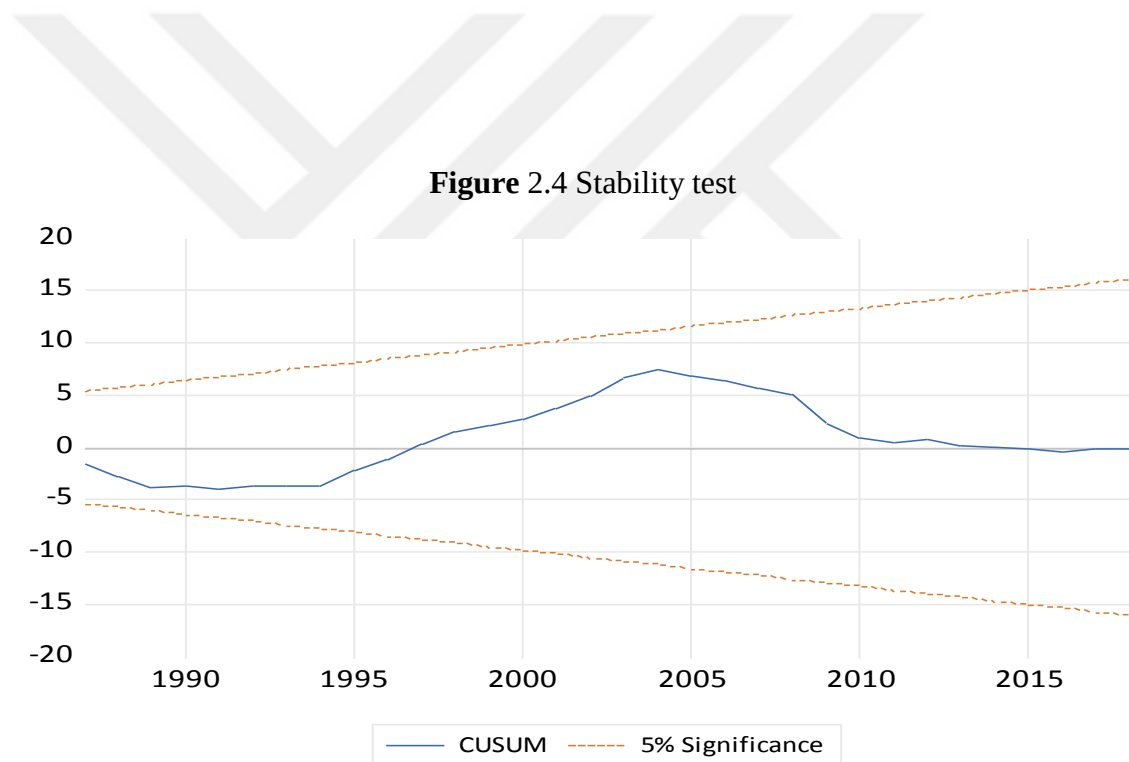
3.6.4. Stability Test

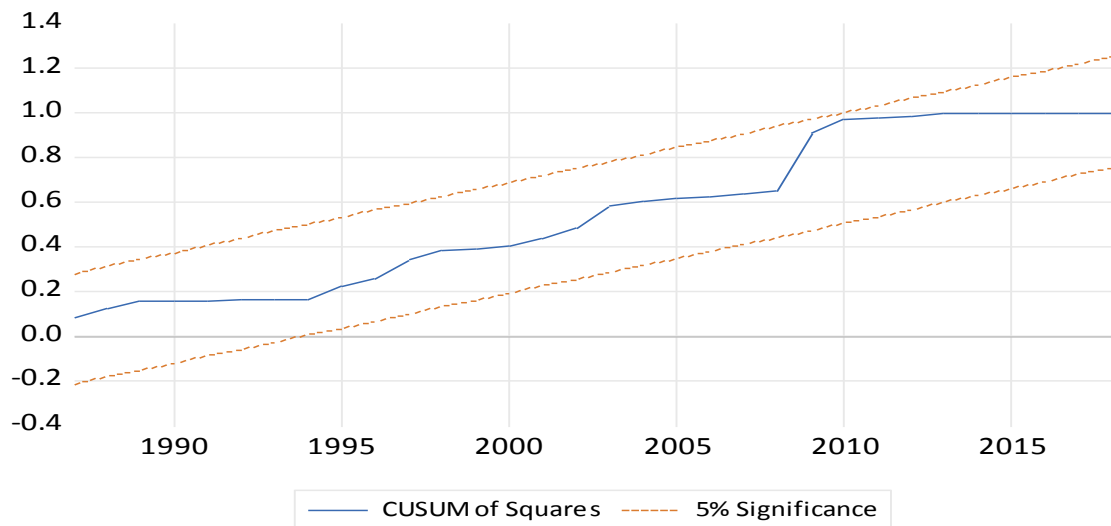
To see if the model's parameters are stable over time, it is necessary to investigate whether these variables show a structural change in their behavior over time stable or not, the CUSUM stability test is one of the most common tests in this field.

The results of this test are shown in the form of a curve for the errors of a model estimated by the usual least squares method (OLS), and a confidence domain with the aim of testing the null hypothesis which states that the parameters of the typical least squares model are unstable. If the curve of errors is within the critical limits throughout the study period, the null hypothesis is rejected at a significant percentage (5%). This means that the parameters are stable throughout the study period, and therefore the

ability to estimate constant parameters of the model along the study time period without having to split it for partial periods, if the null hypothesis is rejected, then the study period must be divided into partial periods in which the parameters are stable (Brown et al., 1975).

A graphical presentation of the test is provided in Figure 2.4 the CUSUM test indicates that the parameters are stable over time as the plot of cumulative sum of recursive residuals and cumulative sum of squares of recursive residuals lies within the critical bound at 5% significance level.





3.6.5. Long run results of Turkey's export to the World

Table 2.12 Long run coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob*.
Ln(RER)	0.80	0.32	2.48	0.018
Ln(TW)	0.09	0.07	1.27	0.212
Ln(YW)	1.50	0.10	14.3	0.000
c	-4.78	1.78	-2.67	0.0011

Long run equation,

$$\ln X_{it} = \beta_0 + \beta_1 \ln YW_{it} + \beta_2 \ln RER_{X_{it}} + \beta_3 \ln TW_{it} + u_{it} \quad 2.11$$

$$\ln X_{it} = -4.78 + 1.5 \ln YW_{it} + 0.80 \ln RER_{X_{it}} + 0.09 \ln TW_{it} + u_{it} \quad 2.12$$

Table 2.12 shows that the estimated coefficients of the long-run relationship impact on manufacturing exports. Price competitiveness has an essential impact on export volume in both developing and developed countries. Results show that an increase of 1% in RER (currency depreciation) leads to an increase in manufacturing exports by 0.8%. T-

statistics indicates the variable is significant at 5% as the probability value is less than 0.05. From this result, it is concluded that the currency depreciation has a positive impact on manufacturing exports.

Considering the impact of technological competitiveness when Turkey moves toward full liberalizing trade with world countries, results reveal that an increase of 1% in technological competitiveness leads to an increase of 0.09% in exports. The T-statistic is not significant and the positive impact is too tiny. Our result is consistent with Aghion and Jaravel (2015), that trading with advanced countries leads to increased technological competitiveness and vice versa.

Regarding the trade-weighted income of Turkey, the results show that an increase of 1% leads to an increase of 1.50% in manufacturing exports. Foreign income plays a significant role in surviving exports.

3.6.6. Short run results of Turkey's export to the World

Table 2.13 Short run coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob*.
$\Delta \text{Ln(RER)}$	0.351	0.140	2.50	0.0174
$\Delta \text{Ln(TW)}$	0.043	0.035	1.23	0.2257
$\Delta \text{Ln(YW)}$	1.508	0.311	4.84	0.000
c	-2.076	0.85	-2.43	0.020

CointEq(-1)* -0.434 0.073 -5.92 0.000

According to short-run results in Table 2.13, it shows that an increase of 1% in RER leads to an increase of 0.35% in manufacturing exports. Furthermore, for technological competitiveness as a trade liberalization proxy variable, results reveal that an increase of 1% in technological competitiveness leads to an increase of 0.04% in exports. For the trade-weighted income of Turkey, results show that an increase of 1% in RER leads to an increase of 1.50% in manufacturing exports.

The ECM value of -0.43 suggests a relatively high speed of adjustment from the short-run deviation to the long-run equilibrium of intermediate imports. Therefore, 43.4% of all errors or disequilibrium in the short term will be adjusted in the long term in the coming period. This indicates the disequilibrium percentage in the previous equilibrium, which corrected it in the next period as shocks happened in independent study variables that impacted dependent variables.

3.6.7. Long run results of Turkey's export to G7

Table 2.14 Long run coefficients of function to G7

Variable	Coefficient	Std. Error	t-Statistic	Prob*.
Ln(RER)	0.97	0.42	2.28	0.029
Ln(TW)	0.39	0.05	7.72	0.000

Ln(YW)	1.28	0.11	11.6	0.000
c	-.88	2.07	-0.42	0.67

Long run equation,

$$\ln X_{it} = \beta_0 + \beta_1 \ln YW_{Gt} + \beta_2 \ln RER_{X_{it}} + \beta_3 \ln TW_{Gt} + u_{it} \quad 2.13$$

$$\ln X_{it} = -0.88 + 1.28 \ln YW_{Gt} + 0.97 \ln RER_{X_{it}} + 0.97 \ln TW_{Gt} + u_{it} \quad 2.14$$

Table 2.14 shows that a 1% increase in RER (currency depreciation) leads to a 0.97% increase in exports to the G7, indicating that the positive impact of currency depreciation is greater when Turkey trades with the G7 than when Turkey trades with all countries. One of the main trade liberalization features is innovation. Technological competitiveness is considered the result of innovation. Results show that an increase of 1% in technological competitiveness leads to an increase of exports to the G7 by 0.39%. The T-statistics are significant. This result confirms that it is preferable to maintain trade with the G7 if Turkey is willing to diversify its exports by introducing products infused with advanced technology. Finally, results show that an increase of 1% in the trade-weighted income of Turkey will lead to an increase in exports of 1.28%. All the coefficients are significant. Our results are consistent with Damijan et al. (2009), Todaro, & Smith (2012), that exporting to advanced markets leads to more technical learning and more technology absorption.

3.6.8. Short run results of Turkey's export to G7

Table 2.15 Short run coefficients to G7

Variable	Coefficient	Std. Error	t-Statistic	Prob*.
$\Delta \text{Ln(RER)}$	0.34	0.152	2.240	0.0319
$\Delta \text{Ln(TW)}$	0.13	0.040	3.390	0.0018
$\Delta \text{Ln(YW)}$	0.45	0.123	3.642	0.0009
c	-0.30	0.718	-0.428	0.6709
CointEq(-1)*	-0.349	0.041	-8.39	0.000

As represented in Table 2.15, In the short run, Turkey's exports to the G7 show that a 1% increase in RER (currency depreciation) results in a 0.34% increase in exports. However, a 1% increase in technological competitiveness leads to a 0.13% increase in G7 exports, indicating that technological competitiveness is important in increasing exports to advanced economies. Exporting to advanced economies necessitates more innovation in Turkish products. Price competitiveness is important in low-income markets, but technological competitiveness is important in high-income markets. our result not consistent with Kirim (1990). Furthermore, results show that an increase of 1% in the trade-weighted income of Turkey leads to an increase of 0.45% in exports. All the coefficients are significant.

The ECM value of -0.34 suggests a relatively high speed of adjustment from the short-run deviation to the long-run equilibrium of intermediate imports. Therefore, 34.9% of all errors or disequilibrium in the short term will be adjusted in the long term in the

coming period. This indicates the disequilibrium percentage in the previous equilibrium, which corrected it in the next period as shocks happened in independent study variables that impacted dependent variables.

3.7. Conclusion

From the descriptive presentation of the impact of trade liberalization on innovation in Turkey, it was found that the innovation index is still low compared to developed countries, meaning that trade liberalization did not contribute to increasing innovation in the Republic of Turkey over (1980-2018). The index in 2020 reached 34.9, while it reached 56.1 in Korea and 56.5 in Germany. Unambiguously, innovation, as one of the features of globalization and trade liberalization, was not rapidly growing after the liberalization program was adopted in 1980.

Concerning the share of spending from GDP on research and development, this share amounted to 1.06% in 2019, while this share in the G7 reached 2.4%, in OCED it was 2.48%, in the European Union it was 2.10%, and finally in the world it was 2.37%. This indicates that although government spending on research and development is one of the biggest drivers of innovation in advanced economies, in Turkey it is still significantly low.

As for patents, which are the intellectual products of research and development, the number of patents in Turkey in 2018 reached approximately 7156, while in developed countries it reached astonishing numbers. In China it reached 1,393,810, in Japan it reached 253,630, in Germany it was 46,617, in the United States it was 285,095 and that the share of Turkish patents globally is still low, as in 1980 it was equal to 0.0003, while in 2018 it reached 0.003.

The weakness in the innovation field and investment in research and development, as well as the low number of patents, were largely reflected in Turkey's share in high-tech exports.

It was shown by the previous discussion that Turkey's share compared to developed countries is significantly low. In 2007, Turkish high-tech exports were 1.885 billion USD. In 2013, they reached 2.821 billion USD. Finally, in 2018, it reached only 3.286 billion USD, while China's high-tech exports reached 729.680 billion USD, South Korea's 192.806 billion USD, Singapore's 155,904 billion USD, Germany 178.513 billion USD, and finally the United States 182.720 billion USD.

Turkey's global share of high-tech exports in 2007 is 0.02%. This share in 2015, 2016, 2017 reached 0.03% respectively. However, it returned to decline and reached 0.02% in 2018. This shows that Turkey's efforts in the field of high-tech exports still face great difficulties. The most important one is the lack of interest in research and development, based on the stylized fact that innovation is one of the main features of trade in developed countries.

To test the hypothesis of this study, which revolves around the impact of trade liberalization via innovation on Turkish exports, the ARDL test was conducted to test the impact of innovation on Turkish exports to the world in general, based on the fact that Turkey completely liberalized its trade with the world. Furthermore, another test was conducted on Turkey's exports to the G7. The results reveal that an increase in the technology competitiveness index by 1% increases Turkey's exports to the G7 by 0.39%, with a statistically significant effect in the long run as well as in the short term, meaning that the increase in this indicator gives Turkish exports a strong boost. However, when exporting to the world under the trade liberalization program, results

showed that an increase in the index by 1% does not increase Turkish exports by more than 0.09%, *T*-value not statistically significant. This contribution confirms that in the case of countries like Turkey that have few export volumes compared to countries with large exports, the technological competitive advantage of exports is negatively affected by their involvement in global trade.

Based on these results, it can be said that trading with the G7 encourages Turkey to greater innovation in input production, which imports inputs from Turkey. As a result, this increases the share of Turkish exports in the long run.

Finally, the trade liberalization program associated with current trade policies will lead to a decrease in the competitiveness of Turkish exports, in the long run, depending on the erosion of the technological competitive advantages of Turkish products. Depending on the economic developments in the past years that accompanied globalization and openness among the world's countries, the relative and competitive advantages will change with the tremendous technological developments that accompanied globalization. Turkey should review all trade policies in terms of the domestic environment to avoid future negative consequences.

4. TRADE LIBERALIZATION AND EXPORTS

Abstract

This study aims to examine the impact of trade liberalization on Turkey's manufacturing exports over the periods (1962–1980) and (1980–2018). In the first section of the study, the data depends on descriptive statistics of Turkey's exports, with a concentration on manufacturing exports. In the second section, the study employs the autoregressive distributed lag bound test (ARDL) approach, unit root test, bound test for a long-run relationship, Johansen cointegration, long-run estimation, and error correction term (EC).

Study results show that Turkey's manufacturing exports benefited from trade liberalization and have grasped high growth during the study period post-liberalization. Manufacturing exports' share of total exports has increased significantly during the study period (1980-2018) and reached 84% in 2018. Study findings show that all variables are stationary at the first difference, $I(1)$. Long run estimation displays that price and foreign income elasticities impact statistically significantly on manufacturing exports of Turkey over the period (1980–2018). While comparing exports to the G7 and the rest of the world, the results confirm that exporting to the G7 is better than the rest of the world.

Based on econometric results, the study recommends that it is necessary to target high-income markets to expand exports and specialize in inputs that advanced economies require in final products, which is considered the most effective strategies to achieve the competitive advantage of manufacturing exports.

Keywords: Trade liberalization, manufacturing exports, Turkey.

4.1. Introduction

Globalization has been changing economic activities across the world to a striking extent. Advances in technology and integration waves into the world market have been changing production patterns, accelerating trade, and steering economies toward greater specialization.

Manufacturing expansion is portrayed as an "engine of growth". In emerging countries such as China and India, industrialization plays an imperative role in sustainable growth. Free trade leads to more labor division and efficiency in resource allocation in these countries.

Globally, the growth in manufacturing exports is driven by the accumulation of innovation, cheap intermediate and intra-trade, the reduced cost of transportation, and qualified industrial zones (QIZ).

Manufacturing activities have become the core of the economy in developed and developing countries since the 1960s, when manufacturing production grew largely. Manufacturing exports around the world were 76.5215 billion USD in 1962, or 57% of global exports. Over the 60th and 70th centuries, a significant growth in manufacturing products occurred. Manufacturing exports reached 1.18370 trillion USD in 1980. Remarkably, manufacturing exports doubled and reached 2.129849 trillion USD in 1991. Manufacturing exports grew sharply over the next 10 years and reached 4.728 trillion USD in 2000. Due to globalization and technological advancement, manufacturing exports reached 10.256 trillion USD in 2010, and finally, in 2018, manufacturing exports reached 13.148371 trillion USD this equals 66% of world total

exports. Unambiguously, this trend signifies the importance of industrialization in the globalization era. Turkey is not isolated from the world industrialization wave. Manufacturing exports were 782 million USD in 1980. In the post-liberalization period, manufacturing exports grew significantly and reached 140.995 billion USD in 2018, (www.worldbankdata.com)

Unambiguously, trade liberalization plays a crucial role in the expansion of manufacturing activities, enabling producer's access to a wide variety of intermediate inputs, cheap and advanced technology, which lead to producing static and dynamic benefits. Static benefits are achieved by removing protection and exposing domestic production to external competition. This effect stimulates domestic producers to cut costs and prices and improve quality, which does not require new investment (Lall, 2000). In dynamic effects, trade decreases resource use misallocation and facilitates the transfer and spillover of technological development.

The relationship between international trade theories and trade liberalization has become complementary. While the first supports specialization by using economic resources efficiently, the second enables countries to improve economic performance in the industrial sector by increasing productivity via resource allocation. Trade liberalization contributes to the exposure of the national economy to high external competition, which requires all production sectors to modernize their operations to enhance their competitiveness and achieve economies of scale based on shifting resources from low-productivity firms toward higher productivity that will lead them to reduce their costs on the one hand and work to achieve quality on the other hand through export diversification (Melitz, 2003).

In this essay, we study the impact of trade liberalization on Turkey's exports by focusing on manufacturing exports. Our study depends on the standard export function.

4.2. Literature review

Trade liberalization comprises the abolition of tariff restrictions, liberalizing the import sector, and export bias, which makes national exports vulnerable to global competition. This will induce countries to enhance their competitiveness through modern technology, diversification of exports, and paying more attention to managing economic resources in a way that achieves economies of scale, which leads to competitive prices of exports in international markets.

Rijesh (2020) investigated the role of trade liberalization in technology imports in Indian manufacturing exports over the period 1995–2016 by employing panel analysis through OLS, FGLS, and Tobit regression. The results showed that there is a significant impact of technology imports on the manufacturing sector. This technology plays an important role in diversification products, especially exports of intermediate goods.

Recently, Fan et al. (2019) examined the impact of trade liberalization on Chinese export performance in terms of imports, intermediate tariff reductions, and currency depreciation. Results show that the revealed comparative advantage (RCA) index raises the impact of imported intermediate input tariff reduction on the opportunity of entry into the export market by 16.33%. Additionally, the results show that a strong Chinese currency enables the export sector access to imported inputs at a low cost. This enables firms to produce at a low cost, which in the end improves China's export competitiveness in the global market.

Alessandrini et al. (2011) showed that trade liberalization supports India's improvement of its comparative advantage in industries with medium to high technology content. Bayar (2002) used panel data from 1974 to 1994 to investigate the impact of trade liberalization on industrial sector productivity in Turkey. The results show that productivity increased as well as a decrease in industrial markup following trade liberalization. In addition, the results reveal that post-liberalization, the return to scale has decreased.

According to Muftuler (1995), one of the key reasons for Turkish economic liberalization is access to the European market, which has resulted in a large growth in trade with the European Union. Akkemik (2011) examined the impact of the European Customs Union on the competitiveness of Turkish exports. Dynamic shift-share analysis over a period of 1987–2006 revealed that Turkey's competitive position had partially improved.

Neyapti et al. (2007) examined the impact of the European Union Customs Union (EUCU) on Turkey's trade over the period 1996-2001. The results showed that EUCU had a positive impact on Turkey's trade volume.

Ghatak et al. (1995) investigated the impact of trade liberalization on long-run economic growth in Turkey over 1950-1990. The results showed that there was a bi-directional Causality between the rate of growth of per capita income and trade liberalization. Arcanli and Rodrik (1990), citing the Turkish liberalization program carried out in 1980, boosted Turkish exports considerably.

Filiztekin (2019) scrutinizes the impact of trade liberalization on productivity in Turkish manufacturing. The results show that after liberalization, productivity growth has improved, but increased exports have not led to improved productivity.

Chaudhary and Amin (2012) specified that trade liberalization affected both import and export growth positively. However, import growth increased more than exports. Thus, trade liberalization played a limited role in economic growth through export expansion.

Bahtiyar et al. (2015) showed that free trade agreements have a positive effect on the exports of OECD countries. Furthermore, trade liberalization embedded in free trade agreements maintains bilateral trade and achieves an increase in exports. Osakwe et al. (2018) found that trade liberalization is the driver of export diversification both in the short and long term. Human capital, institutions, and infrastructure play important roles in export diversification.

Qayyum et al. (2018) confirmed that trade liberalization and gross fixed capital have a positive and significant impact on economic growth. Contrarily, inflation and interest rates hurt economic growth. The labor force has a constructive impact on economic growth. The confident correlation between trade liberalization and economic growth has been discovered in this study.

Trade liberalization, followed by tariff reductions that boost export productivity, and then high wages paid to skilled workers, have all contributed to innovation becoming an important tool in the modern economy (Linarello, 2018).

Countries liberalize trade aimed at discovering new markets. Meltiz and Ottaviawo (2008) indicted that trade liberalization augmented the domestic market. The larger market encompasses severe competition, producing lower average mark-ups and lower

costs that contribute to increasing productivity. Furthermore, Meltiz demonstrates that short-run productivity gains from asymmetric liberalization can be constrained by changes in patterns of entry into new markets.

Globalization contributes to shaping world countries into the new big market where any economic activity impacts directly on domestic activity. Through trade liberalization, home exports become more sensitive to global growth. Berument et al. (2014) examined the impact of foreign income shocks on Turkish exports in different sectors. Monthly data over the period 1996:1 to 2009:12 was used. Findings show that Turkey's exports are highly dependent on global income. Moreover, Karagoz (2016) shows that Turkish exports increased when the domestic currency remained depreciated after trade liberalization was adopted.

However, Ratnaike (2012) showed that trade liberalization is an insignificant determinant of export performance. On the other hand, he assures us that domestic competitiveness and world demand are the most consistent drivers of export performance in both forms of the model in the sample study.

Based on the above literature, trade liberalization has a positive impact on exports in the long run. On the contrary, some studies reveal that the impact is negative due to the rapid reform structure absorbed by trade liberalization opportunities that require enough time to move directly toward the export sector. However, Hong Kong and Singapore, after liberalizing trade, these countries' engagement in global competitiveness increased sharply. As a result, exports increased sharply.

Successful trade liberalization is required to modernize all economic sectors to gain comparative advantage, maintain efficiency in endowments aiming to achieve

economies of scale and expand investment in manufacturing firms in the long run. Moreover, trade liberalization led to attracting innovation into economic sectors through high competition. This supports efficiency in economic resource manipulation.

The novelty of this study is to show theoretically and empirically how Turkey's manufacturing exports influenced by trade liberalization program in short and long run compared with some advanced economies, moreover, this study showed that exporting to advanced economies will benefit Turkish exports in short run rather long run.

4.3. Development of Turkey's Exports Pre-Liberalization (1960-1980)

During the period between 1963-1979, the economy of Turkey was regulated by a planning process directed towards comprehensive economic development. This strategy was adopted to rebalance the public and private sectors, accelerate growth and development processes.

The government worked to reduce its involvement in public sector activities related to the production of consumer goods and allowed the private sector to do so. This led to the development of this sector on the one hand, and, on the other hand, a focus on producing production inputs. This strategy allows for cheap production inputs to be supplied to the private sector as a necessity for the development and encouragement of private investment.

ISI has adopted an appropriate strategy to develop domestic production and expand the production base, especially industrial goods. In this context, and to improve productivity in consumer goods, many protective measures have been taken, including high taxes on imports, a high exchange rate, and restrictions on the import of consumer goods. As a result of these procedures, the production sector witnessed a quick

response. This allowed the industrial sector to accumulate capital quickly. Moreover, the rapid growth in the productive sector was accompanied by an improvement in the productivity of the workforce, which allowed it to expand and continue.

Table 3.1 Development of Turkey exports pre- liberalization (1960-1980)
(U.S. \$ million)

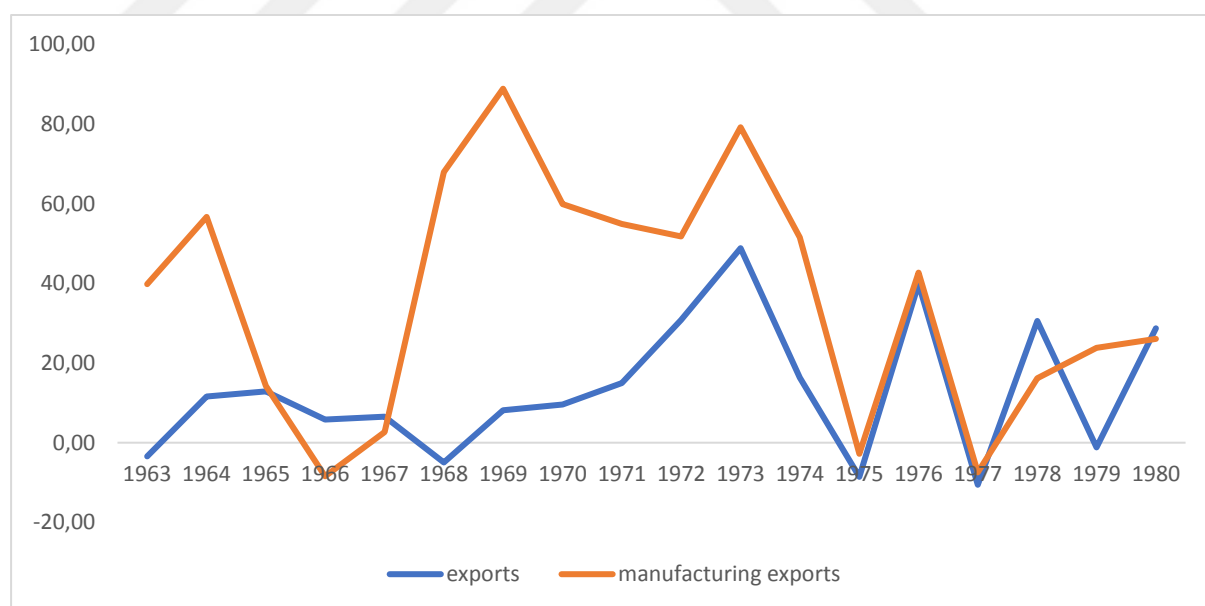
Year	Exports	Growth	Manufacturing exports	Growth	% Manufacturing exports
1960	320.731	-	NA	NA	NA
1961	346.74	8%	NA	NA	NA
1962	381.197	10%	4.408	-	0.012
1963	361.926	-4%	6.161	40%	0.017
1964	401.119	11%	9.652	57%	0.024
1965	452.711	13%	11.027	14%	0.024
1966	480.411	6%	10.097	-8%	0.021
1967	511.964	7%	10.370	3%	0.020
1968	479.003	-6%	17.416	68%	0.036
1969	503.942	5%	32.892	89%	0.065
1970	535.893	6%	52.583	60%	0.098
1971	595.145	11%	81.457	55%	0.137
1972	761.321	28%	123.648	52%	0.162
1973	1095.544	44%	221.539	79%	0.202
1974	1196.41	9%	335.772	52%	0.281
1975	1074.755	-10%	326.320	-3%	0.304
1976	1494.465	39%	465.749	43%	0.312
1977	1321.846	-12%	431.180	-7%	0.326
1978	1787.185	35%	500.978	16%	0.280
1979	1640.805	-8%	620.360	24%	0.378

Source: Central Bank of the Republic of Turkey- TCMB

Table 3.1 shows that the growth in industrial production in 1964 reached 57%. In the period from 1968-1974, the growth continued at a high level, reaching approximately 89% in 1969. This confirms that the Turkish economy can grow and has the potential to expand. The dynamics of the economy enable the sector to survive under inwardly oriented policies.

From Figure 3.1, it is evident that the growth in industrial exports during the period 1963-1980 was higher than the growth in total exports, which indicates that Turkish industrial production was growing significantly before integration into international trade, on the one hand, and the role of the state in adoption-oriented policies toward developing the industrial sector, on the other hand.

Figure 3.1: Trends of export and manufacturing export growth (1963-1980).
(Growth =100)

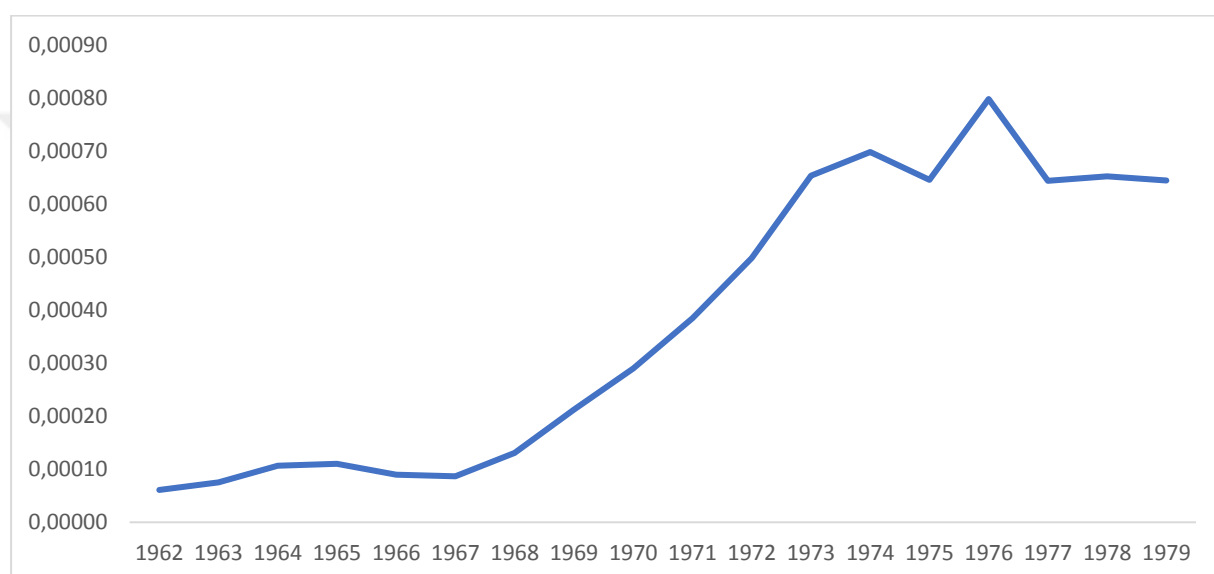


Source: Based on TCMB data.

According to Table 3.1, the share of manufacturing exports in total exports was 0.012 in 1962, gradually increasing to 0.378 in 1979. As a result, the Turkish manufacturing sector began to grow in the 1960s and 1970s, but the rate of growth remained low.

Furthermore, the Turkish manufacturing export share of global manufacturing exports was 0.0001 in 1964. However, during the oil crises of 1970-1974, Turkish manufacturing exports increased significantly and reached 0.0007 of global manufacturing exports. Figure 3.2 depicts the global trend of Turkish manufacturing exports from 1962 to 1979.

Figure 3.2 Turkey manufacturing exports share of World manufacturing exports (Share =1000)



Source: calculation based on International Financial Statistics, Statistical Yearbook, SIS, 1968, WorldBank data.

4.4. Development of Turkey's exports post-liberalization (1980-2018)

Turkey adopted economic reforms with a view to its access to international markets through the adoption of trade liberalization, reducing tariffs and attention to exports, which contributed to the growth of foreign trade significantly and doubled its size, where industrial products accounted for the highest percentage of total Turkish exports.

Table 3.2 Turkey exports (1980-2018) (U.S. \$ billion)

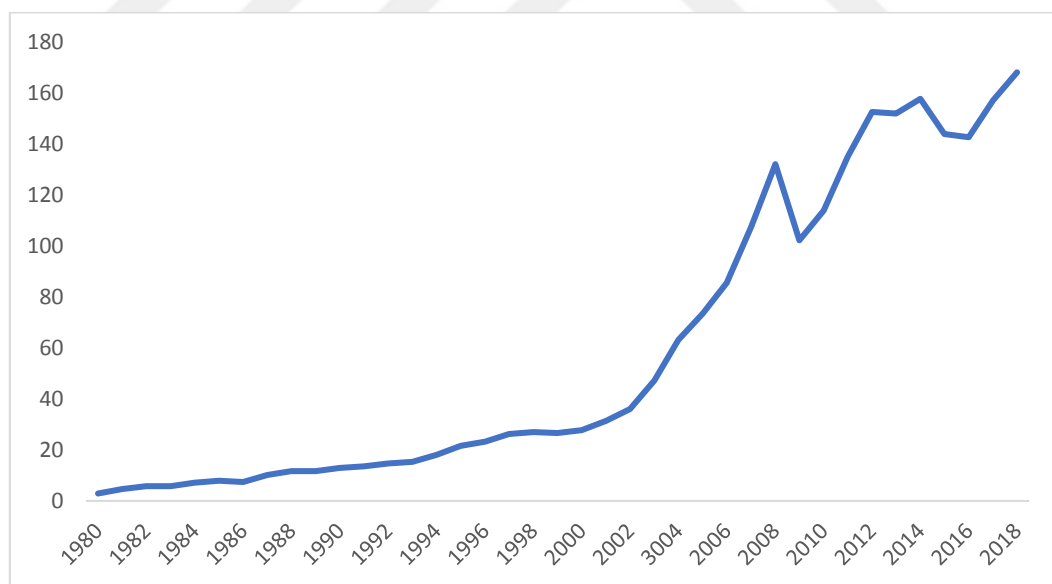
Year	Value	Growth of exports %	Year	Value	Growth of exports %
1980	2.910	28.7	2000	27.775	4.5
1981	4.703	61.6	2001	31.334	12.8
1982	5.746	22.2	2002	36.059	15.1
1983	5.728	-0.3	2003	47.253	31.0
1984	7.134	24.5	2004	63.167	33.7
1985	7.958	11.6	2005	73.476	16.3
1986	7.457	-6.3	2006	85.535	16.4
1987	10.190	36.7	2007	107.272	25.4
1988	11.662	14.5	2008	132.027	23.1
1989	11.625	-0.3	2009	102.143	-22.6
1990	12.959	11.5	2010	113.883	11.5
1991	13.593	4.9	2011	134.907	18.5
1992	14.715	8.3	2012	152.462	13.0
1993	15.345	4.3	2013	151.803	-0.4
1994	18.106	18.0	2014	157.610	3.8
1995	21.637	19.5	2015	143.839	-8.7
1996	23.224	7.3	2016	142.530	-0.9
1997	26.261	13.1	2017	156.993	10.2
1998	26.974	2.7	2018	168.023	7.1
1999	26.587	-1.4			

Source: Central Bank of the Republic of Turkey- TCMB

Table 3.2 shows that Turkish exports rose significantly after the announcement of economic reforms and trade liberalization in 1980. Exports rose by nearly 61% in 1981 and have fluctuated from year to year consistent with the global economy, in addition to the domestic economic environment. In 1999, after the Asian economic crisis,

Turkish exports fell by 1.1%, but the process of political reform initiated by the Turkish state at the beginning of 2000, Turkish exports returned to rising. Turkish exports increased during the years 2000-2008 by an average of 23%, but the impact of the economic crisis led to the highest decline in Turkish exports during the period 1980-2018. In 2009, Germany's export growth rate declined by 14.28% (data, worldbank.org), but soon the world economy began to recover. Turkish exports have decreased in 2015 and 2016 although the Turkish lira has depreciated. While in 2017 and 2018, Turkish exports increased and recorded a growth rate of 7.1% in 2018, this increase in exports was affected by the global economic growth and trade wars between China and America, as well as Turkish exporters benefited from the free trade agreement that opened new markets for Turkish exports.

Figure 3.3 Turkish export trends (1980-2018). (U.S. \$ billion)



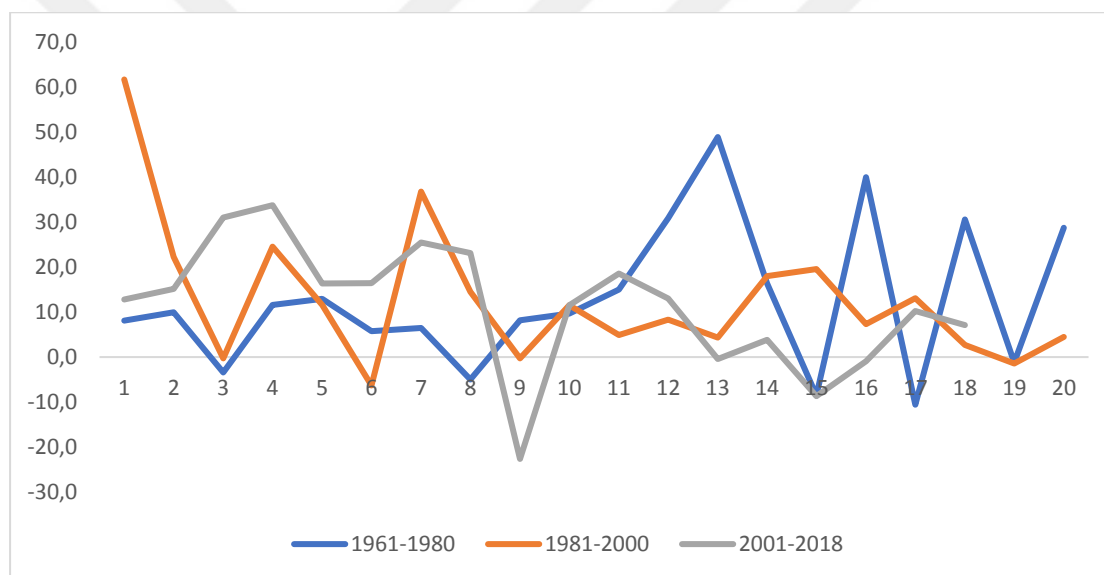
Source: Based on Central Bank of the Republic of Turkey.

Figure 3.3 shows the rise of Turkish exports during the period 1980-2018, where the increase was noticeable, indicating that there were new markets that opened to Turkish exports during this period. However, the economic crisis erupted in 2008 and this led to a decline in exports. In 2015 and 2016, they dropped respectively as a result of the

contraction of global markets. In 2017 and 2018, with the decline of the Turkish lira, exports returned to rise again.

The Turkish export sector experienced many policies, including planning policies before the stage of trade liberalization in 1980, free trade policies that the government tended to adopt as a result of integration into a global economy. Through figure 3.4, it appears that in the period from 1971-1979, there was a significant growth trend for Turkey's export sector compared to the period 1981-2018.

Figure 3.4 Trends of export growth over different periods



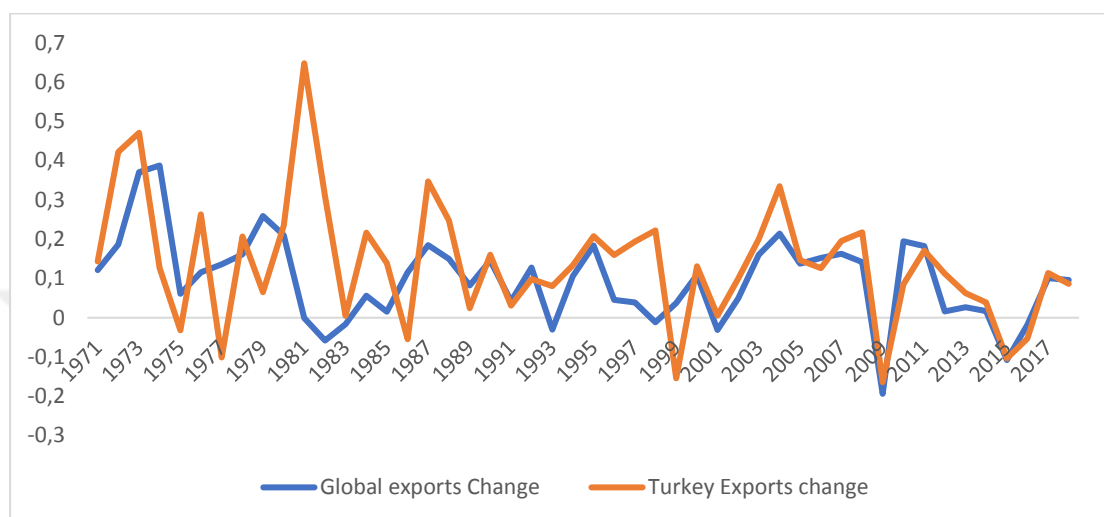
Source: based on TCMB data.

Since the end of World War II, international trade has gone through many developments, especially after the abolition of the gold rule and the shift towards open markets and trade openness between countries.

The global economic recovery during the last decades of the twentieth century contributed to a significant increase in the export sector, whether in developed or developing countries. Domestic markets had been narrowed, so expanding markets became necessary. The size of the market played a major role in accelerating the wheel

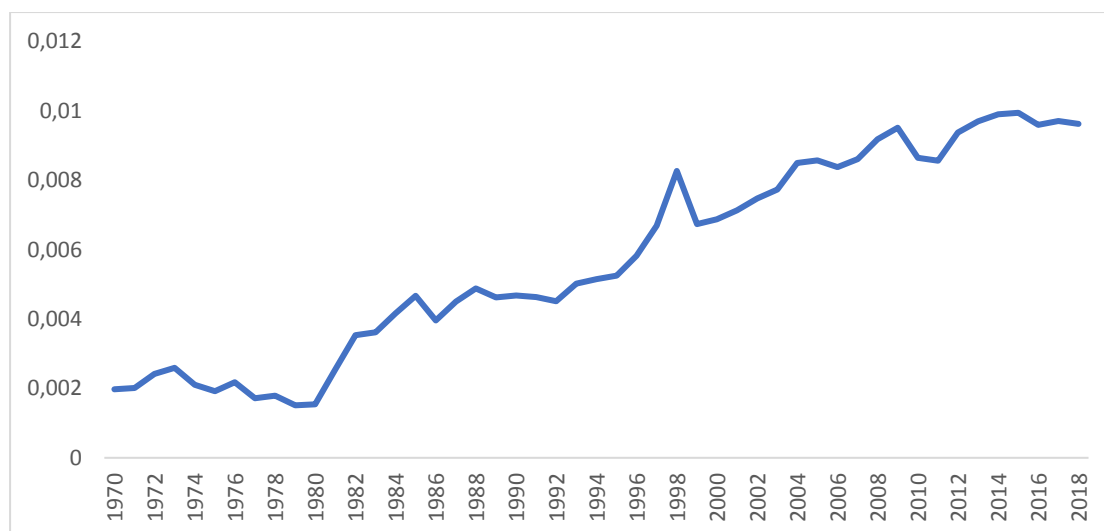
of trade liberalization. This motivated many countries to enhance their export activity as an engine of economic growth. Figure 3.5 shows the trend of change in Turkish exports compared to the change in world exports during the period 1963-2018.

Figure 3.5 Trends of Turkish and global exports from 1970 to 2018. (%)



Source: TCMB, WorldBank data.

Figure 3.6 Exports of Turkey % global exports (1970-2018)



Source: TCMB, WorldBank data.

4.5. Exports and GDP

Exports' share of GDP in many countries is an indicator of economic growth. Increasing exports means that the economic machine is working; export expansion is embedded with increasing demand, and more exports means more employment. As a result, economic growth is attained based on export growth. The following Table 3.3 shows the share of Turkish exports in GDP during the period (1980-2018).

Table 3.3 Turkey exports and GDP (1980-2018) (U.S. \$ billion)

Year	Exports	GDP	X/GDP	Year	Exports	GDP	X/GDP
1980	2.910	68.789	4.2	2000	27.775	272.979	10.2
1981	4.703	71.040	6.6	2001	31.334	200.252	15.6
1982	5.746	64.546	8.9	2002	36.059	238.428	15.1
1983	5.728	61.678	9.3	2003	47.253	311.823	15.2
1984	7.134	59.990	11.9	2004	63.167	404.787	15.6
1985	7.958	67.235	11.8	2005	73.476	501.416	14.7
1986	7.457	75.728	9.8	2006	85.535	552.487	15.5
1987	10.190	87.173	11.7	2007	107.272	675.770	15.9
1988	11.662	90.853	12.8	2008	132.027	764.336	17.3
1989	11.625	107.143	10.8	2009	102.143	644.640	15.8
1990	12.959	150.676	8.6	2010	113.883	771.902	14.8
1991	13.593	150.028	9.1	2011	134.907	832.524	16.2
1992	14.715	158.459	9.3	2012	152.462	873.982	17.4
1993	15.345	180.170	8.5	2013	151.803	950.579	16.0
1994	18.106	130.690	13.9	2014	157.610	934.186	16.9
1995	21.637	169.486	12.8	2015	143.839	859.797	16.7
1996	23.224	181.476	12.8	2016	142.530	863.722	16.5
1997	26.261	189.835	13.8	2017	156.993	851.102	18.4
1998	26.974	275.769	9.8	2018	168.023	766.423	21.9

1999	26.587	255.884	10.4

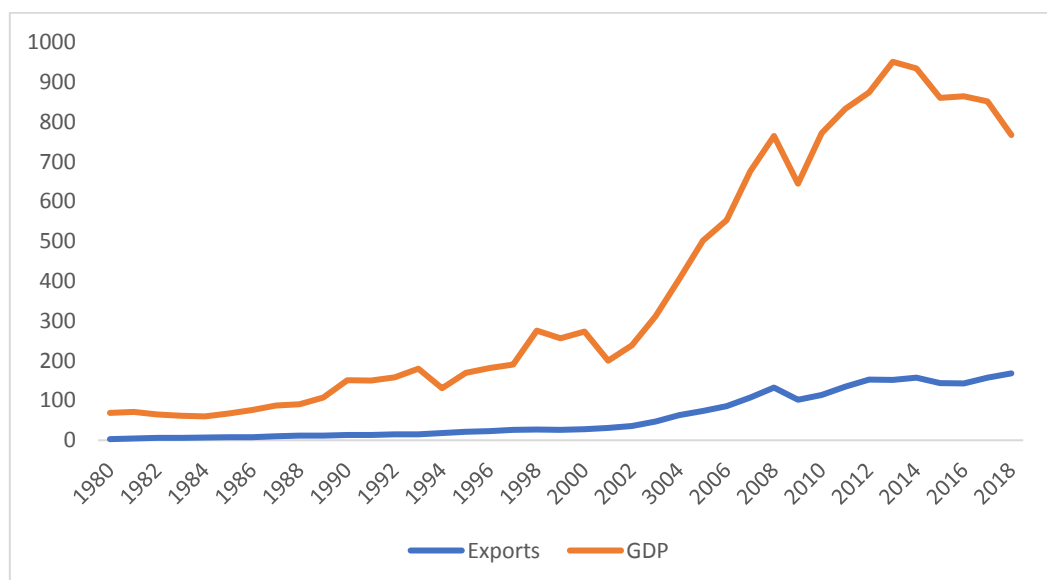
Source: Central Bank of the Republic of Turkey- TCMB.

Note: X= total exports

The above data indicates that the total Turkish exports' share of the GDP in 1980 was approximately 4%. With trade liberalization implementation, it gradually increased until it reached around 8.6% in 1990, which is a low percentage despite its rise compared to 1980.

In 2000, exports' share of GDP was approximately 10.2%. This indicates that exports to GDP after ten years remained at the same share as in 2010. The share of exports to GDP reached 14.8, meaning that it rose after ten years by 4% compared to 2000. In the period from 2011 to 2018, it increased moderately, until it reached 21.9% of GDP in 2018.

Figure 3.7 Exports and GDP (1980-2018) (U.S. \$ billion)



Source: Central Bank of the Republic of Turkey- TCMB

Figure 3.7 demonstrates the development of Turkish exports and GDP (1980-2018).

Exports and the GDP trend are different. While export trends are up and downward, the

GDP trend shows that the growth in GDP is independent of export growth. This is explained by the low share of exports in GDP first, and the export volume can't increase enough. Secondly, the composition of the Turkish economy depends largely on service activities, thirdly.

4.6. Manufacturing Exports (1980–2018)

The development of the industrial sector is considered one of the aspects of the modern economy. Since trade liberalization processes in many developing countries started in the early 1980s, countries have given importance to developing manufacturing exports due to their great importance in achieving real economic growth. Trade liberalization in light of the industrial sector must devote high intention to intermediate inputs so that the expansion of industrial output is achieved. Trade liberalization led Mexican firms to integrate by exchanging technology that resulted in manufacturing export growth (Bustos, 2011). Moreover, trade liberalization, followed by a reduction in tariffs on imported intermediate inputs, in China resulted in increased productivity for exporting and maintaining comparative advantage (Fan et al., 2015).

Erkan and Yildirimci (2015) examine Turkey's export competitiveness in two periods (1993-2002 and 2002-2013). The results show that the share of high-tech exports is still low compared with developed countries.

Moreover, Atiyas and Bakis (2013) indicate that although Turkey's manufacturing exports compared to total exports have improved over the last 20 years, they are still below China, Romania, Thailand, and Taiwan.

One of the main aims of the Turkish trade liberalization program is to achieve growth in industrial exports relative to total exports, as the free exchange rate was adopted and

customs restrictions on production inputs were abolished. Table 3.4 shows the developing industrial exports during the period (1980-2018).

Table 3.4 Turkey manufacturing exports (1980-2018) (U.S. \$ billion)

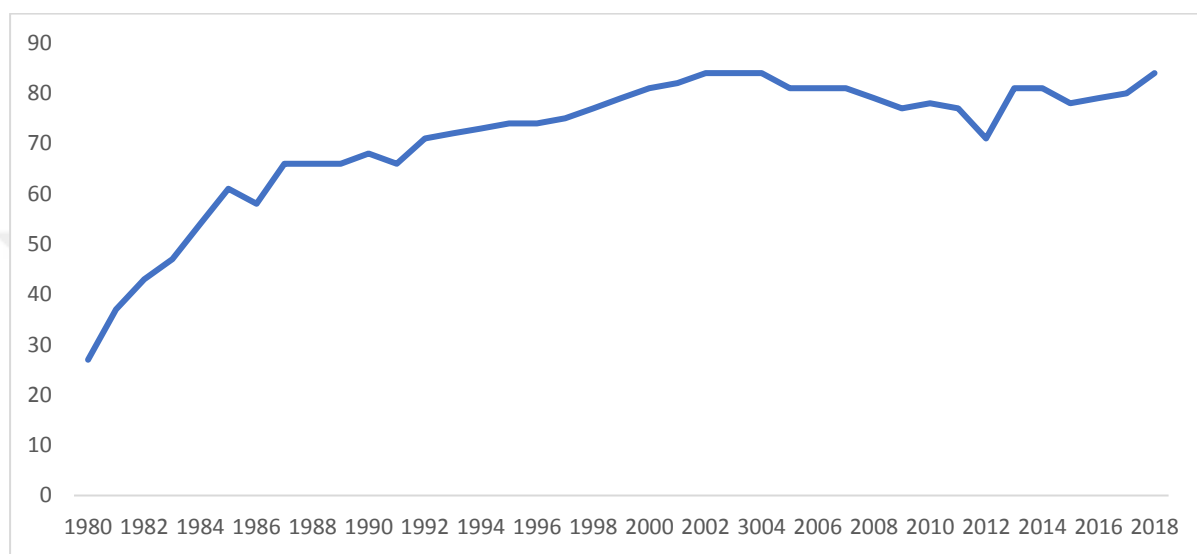
Year	Manufacturing exports	Export	M/E	Year	Manufacturing exports	Export	M/E
1980	0.782	2.910	0.27	2000	22.569	27.775	0.81
1981	1.748	4.703	0.37	2001	25.591	31.334	0.82
1982	2.474	5.746	0.43	2002	30.231	36.059	0.84
1983	2.670	5.728	0.47	2003	39.501	47.253	0.84
1984	3.849	7.134	0.54	2004	53.337	63.167	0.84
1985	4.855	7.958	0.61	2005	59.822	73.476	0.81
1986	4.337	7.457	0.58	2006	69.075	85.535	0.81
1987	6.730	10.190	0.66	2007	86.786	107.272	0.81
1988	7.697	11.662	0.66	2008	103.935	132.027	0.79
1989	7.625	11.625	0.66	2009	78.224	102.143	0.77
1990	8.783	12.959	0.68	2010	88.545	113.883	0.78
1991	8.942	13.593	0.66	2011	104.337	134.907	0.77
1992	10.500	14.715	0.71	2012	108.004	152.462	0.71
1993	11.020	15.345	0.72	2013	123.141	151.803	0.81
1994	13.136	18.106	0.73	2014	128.020	157.610	0.81
1995	16.054	21.637	0.74	2015	112.827	143.839	0.78
1996	17.282	23.224	0.74	2016	112.631	142.530	0.79
1997	19.794	26.261	0.75	2017	126.339	156.993	0.80
1998	20.816	26.974	0.77	2018	140.995	168.023	0.84
1999	21.067	26.587	0.79				

Source: Central Bank of the Republic of Turkey- TCMB

Based on the above-presented data in Table 3.4., it was found that in the years following the Turkish trade liberalization program, manufacturing exports as a% of total exports were 27% in 1980, and after ten years, manufacturing exports' share was 68% in 1990.

From 1999 to 2018, the share of manufacturing exports to total exports reached 84%. By accelerating trade globally, Turkish manufacturing exports grew significantly.

Figure 3.8 Trend of manufacturing exports % total exports (1980-2018)



Source: Central Bank of the Republic of Turkey- TCMB

Figure 3.8 shows that the manufacturing exports share of total exports increased at a steady rate, indicating that manufacturing exports have the potential capability to grow under global competition. Moreover, this trend signifies that the growth in manufacturing exports was higher than the growth in the rest of exports. The growth of manufacturing exports in Turkey is consistent with the industrialization wave embodied by globalization.

Manufacturing exports play a significant role in achieving sustainable economic growth. They are considered the main engine of economic growth in many countries, especially in light of trade liberalization. Globalization opportunities enable countries to access a variety of inputs and fit technology, thus manufacturing will grow significantly.

Many countries, such as China, South Korea, and Singapore, have resorted to modernizing and developing their industrial sectors in line with recent developments in the world of trade. Increasing production, raising efficiency and competitiveness is considered one of the advantages of industrial sector development in developed countries. The increasing growth in demand for industrial goods has made countries tend to increase their productivity in order to meet domestic demand first and to export the surplus to international markets. Since the beginning of the industrial revolution, industrial production has played an important factor in economic development and capital accumulation.

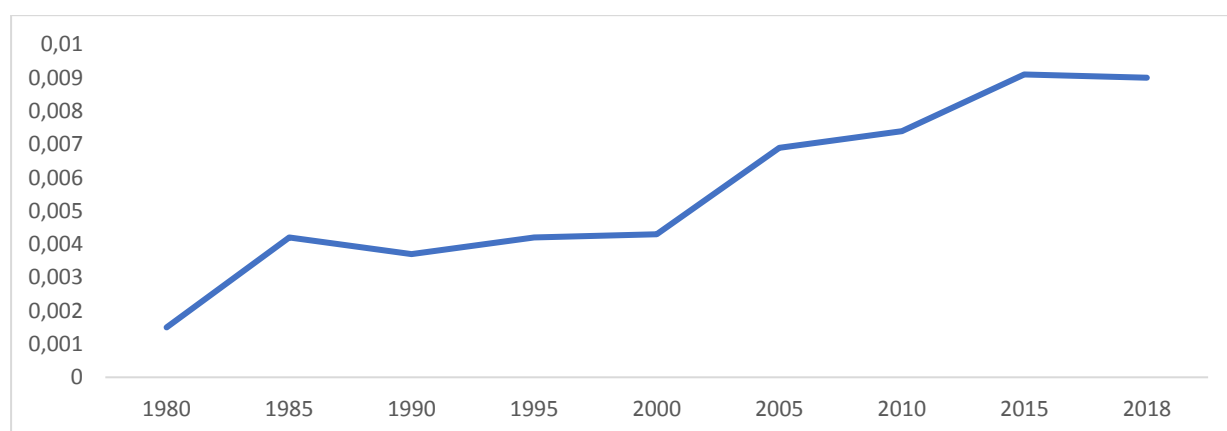
Countries that have been able to achieve a qualitative leap in their industrial production, like China after its opening to the world, have achieved great successes in the rest of the economic sectors. The industrial sector is the framework within the rest of the growth of the sector. Turkey is one of the countries that worked hard to develop its industrial sector before and after the liberalization of trade. In recent years, achievements have been made in the volume of industrial production despite the intensity of global competition. Globalization, with its benefits, brings great challenges. Table 3.5 shows that the ability of advanced industrial countries to increase their manufacturing exports is not an easy issue in the liberalization era. Therefore, the development of Turkish manufacturing exports has been gradual as shown.

Table 3.5 Turkey's manufacturing exports' share of World manufacturing exports compared to G7

Year	US	UK	Germany	France	Italy	Canada	Japan	China	Turkey
1980	0.114	0.056	0.097	0.058	0.039	0.034	0.066	0.009	0.0015
1985	0.115	0.053	0.096	0.053	0.040	0.048	0.093	0.014	0.0042
1990	0.113	0.053	0.121	0.062	0.049	0.036	0.082	0.017	0.0037
1995	0.112	0.045	0.100	0.058	0.045	0.037	0.085	0.028	0.0042
2000	0.120	0.043	0.085	0.050	0.037	0.042	0.073	0.038	0.0043
2005	0.085	0.037	0.091	0.043	0.035	0.034	0.056	0.072	0.0069
2010	0.083	0.027	0.081	0.034	0.029	0.025	0.050	0.102	0.0074
2015	0.090	0.028	0.079	0.030	0.027	0.024	0.037	0.136	0.0091
2018	0.084	0.024	0.079	0.029	0.026	0.023	0.037	0.126	0.0090

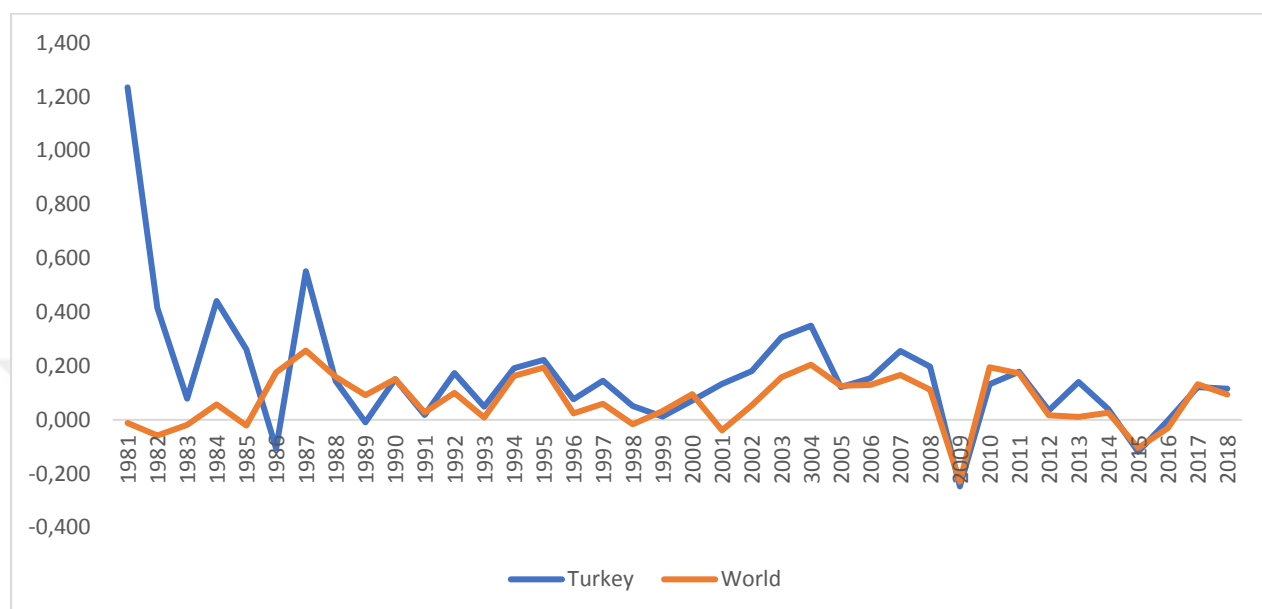
Source: calculation based on WorldBank data.

Figure 3.9 Turkey manufacturing exports % of World manufacturing exports



Source: Based on data in Table 3.5.

Figure 3.10 Trend of manufacturing exports growth in Turkey and the World (1981-2018)



Source: Based on WorldBank data.

4.7. Manufacturing Exports and GDP

Manufacturing exports in many countries have contributed to achieving economic growth as industry sectors expand. This is followed by increasing employment in the rest of the economy and providing the economy with the foreign currency needed to finance large capital projects. There is no doubt that the increase in the rate of Turkish manufacturing exports relative to GDP growth after trade liberalization is still below the required level, or it can be pointed out that it has declined if compared to the years of the 80th. This draws a clear vision of the effects of trade liberalization on the Turkish manufacturing sector. Table 3.6 shows manufacturing exports' share of GDP as follows:

Table 3.6 Gross domestic product and manufacturing exports (U.S. \$ billion)

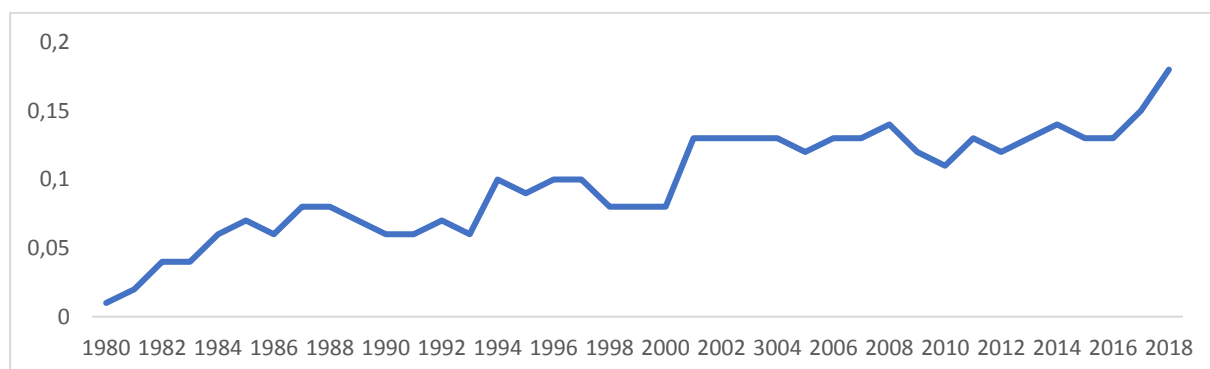
Year	Manufacturing exports	GDP	M/GDP	Year	Manufacturing exports	GDP	M/GDP
1980	0.782	68.789	0.01	2000	22.569	272.979	0.08
1981	1.748	71.040	0.02	2001	25.591	200.252	0.13
1982	2.474	64.546	0.04	2002	30.231	238.428	0.13
1983	2.670	61.678	0.04	2003	39.501	311.823	0.13
1984	3.849	59.990	0.06	2004	53.337	404.787	0.13
1985	4.855	67.235	0.07	2005	59.822	501.416	0.12
1986	4.337	75.728	0.06	2006	69.075	552.487	0.13
1987	6.730	87.173	0.08	2007	86.786	675.770	0.13
1988	7.697	90.853	0.08	2008	103.935	764.336	0.14
1989	7.625	107.143	0.07	2009	78.224	644.640	0.12
1990	8.783	150.676	0.06	2010	88.545	771.902	0.11
1991	8.942	150.028	0.06	2011	104.337	832.524	0.13
1992	10.500	158.459	0.07	2012	108.004	873.982	0.12
1993	11.020	180.170	0.06	2013	123.141	950.579	0.13
1994	13.136	130.690	0.10	2014	128.020	934.186	0.14
1995	16.054	169.486	0.09	2015	112.827	859.797	0.13
1996	17.282	181.476	0.10	2016	112.631	863.722	0.13
1997	19.794	189.835	0.10	2017	126.339	851.102	0.15
1998	20.816	275.769	0.08	2018	140.995	766.423	0.18
1999	21.067	255.884	0.08				

Source: Central Bank of the Republic of Turkey- TCMB

To show manufacturing exports as a percentage of GDP in Turkey, Table 3.6 showed that the percentage of manufacturing exports in 1980 was 1%. This share increased gradually and reached 6% in 1990. In 2001, this share reached 13%. From 2001-2018,

the increase in share shows the dynamic trend in manufacturing exports and reached 18% of GDP.

Figure 3.11 Manufacturing exports as % GDP (1980-2018)



Source: Central Bank of the Republic of Turkey- TCMB

Manufacturing export growth is one of the important factors in economic growth. In advanced economies, there is a strong relationship between growth in manufacturing exports and GDP growth. Table 3.7 shows the growth rate of Turkish manufacturing exports and the growth rate of GDP over the (1980-2018) period.

Table 3.7 Manufacturing exports and economic growth (1980-2018)

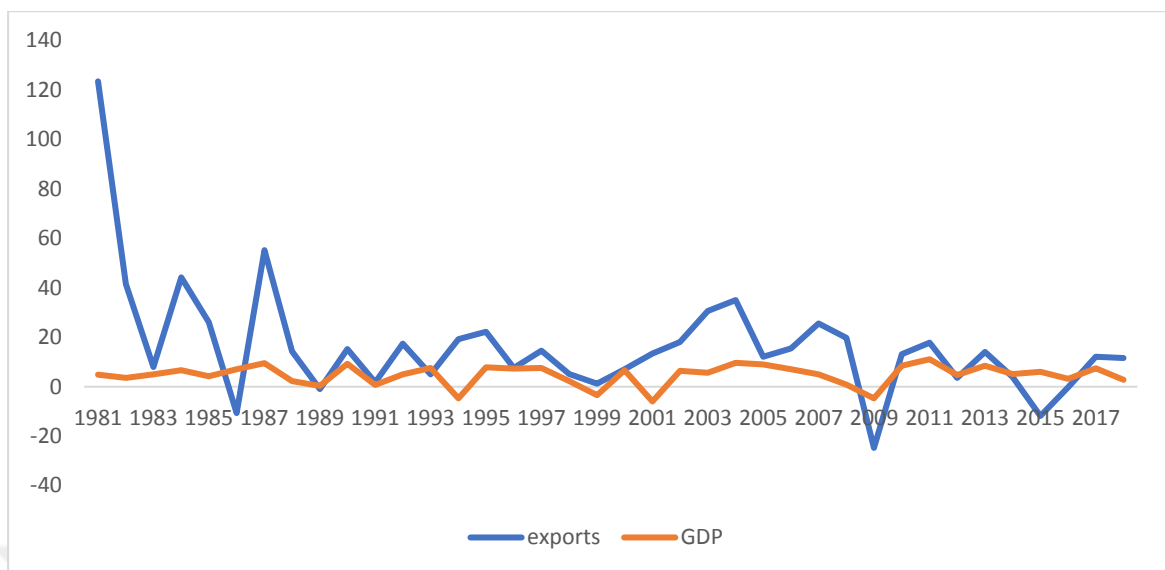
Year	Manu exports%	GDP %	Year	Manu exports%	GDP%
1980		-2.44	2000	7.1	6.64
1981	123.5	4.86	2001	13.4	-5.96
1982	41.5	3.56	2002	18.1	6.43
1983	7.9	4.97	2003	30.7	5.61
1984	44.2	6.71	2004	35.0	9.64
1985	26.1	4.24	2005	12.2	9.01
1986	-10.7	7.01	2006	15.5	7.11
1987	55.2	9.49	2007	25.6	5.03

1988	14.4	2.32	2008	19.8	0.85
1989	-0.9	0.29	2009	-24.7	-4.70
1990	15.2	9.27	2010	13.2	8.49
1991	1.8	0.72	2011	17.8	11.11
1992	17.4	5.04	2012	3.5	4.79
1993	5.0	7.65	2013	14.0	8.49
1994	19.2	-4.66	2014	4.0	5.17
1995	22.2	7.88	2015	-11.9	6.09
1996	7.7	7.38	2016	-0.2	3.18
1997	14.5	7.58	2017	12.2	7.47
1998	5.2	2.31	2018	11.6	2.83
1999	1.2	-3.39			

Source: Central Bank of the Republic of Turkey- TCMB.

Based on Table 3.7, where growth in manufacturing exports reached 44.71% in 1984, after 5 years since liberalization launched, growth in GDP was recorded at 6.71%. In 1995, export growth reached 22.22%, while GDP growth touched 8%. A sharp increase in manufacturing exports was recorded in 2005 by 35%, which GDP growth was 9.6%. However, manufacturing export growth fell by 0.17% in 2016, while GDP increased slightly to 3.18%.

Certainly, there is a mutual relationship between GDP and manufacturing exports. If Turkey experiences a high rate of growth associated with increased demand, more producers enter the market, output expansion, prices decrease, and export competitiveness increases globally, the exports of Turkey will be among the most competitive in the world.

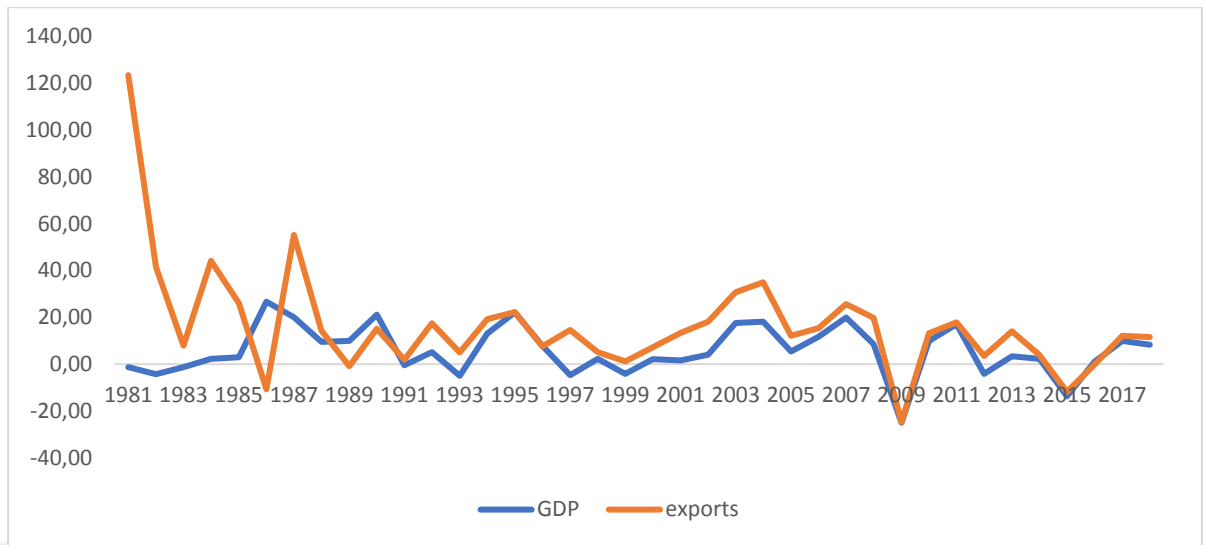
Figure 3.12 Growth in manufacturing exports and GDP

Source: Based on TCMB data.

Figure 3.12 shows that the trend of manufacturing exports and GDP in Turkey move together. According to the GDP trend, manufacturing exports are sensitive to GDP growth.

Under liberalization of trade, the growth of manufacturing exports has become the main motive in the country's relationship with the external world. The expansion of production and market size under globalization have led to more interdependence between manufacturing exports and global growth.

Based on classical economic theory in international trade, foreign income is considered the most important determinant of export demand in an open economy (Goldstein and Khan (1985). Economic globalization enhanced this vision and contributed to linking national economies with the international economy, The dynamic of globalization did not stop at making the world a small village, but has worked on globalizing home prosperity. Figure 3.12 shows the globalized trend of Turkish manufacturing exports in terms of world GDP.

Figure 3.13 Growth in Turkish manufacturing exports and global GDP

Source: Based on WorldBank data.

4.8. Theoretical Framework:

This essay depends on standard export function, to derive export function; the start begins in nominal terms. Value of exports in national currency terms, X equal to price index of exports time the volume, exports volume can be expressed as a share of world GDP, where the share function σ (sigma) depends positively on competitiveness and world GDP (Y).

$$X = P_x \cdot x_{volume} \quad 3.1$$

$$X = P_x \cdot \sigma\left(\frac{P^*e}{P}\right) \cdot Y^* \quad 3.2$$

Exports in real term, after divided each side by home price level:

$$x = \sigma\left(\frac{P^*e}{P}\right) \cdot Y^* \quad 3.3$$

$$x = \sigma\left(\frac{P^*e}{P}\right)^{\alpha_1} Y^{*\alpha_2} \quad 3.4$$

$$\text{Where } \alpha_1 = \frac{\Delta X/X}{\Delta P/P} = \frac{P}{X} * \frac{\Delta X}{\Delta P} \quad 3.5$$

Price elasticity (α_1) measure the percentage change in exports demanded from one percent (increase, decrease) in relative price¹.

$$\alpha_2 = \frac{\Delta X/X}{\Delta Y^*/Y^*} = \frac{Y^*}{X} * \frac{\Delta X}{\Delta Y^*} \quad 3.6$$

Foreign income elasticity (α_2) measure the percentage change in exports demanded from one percent (increase, decrease) in foreign income.

Where $\theta = \frac{P^*e}{P}$, rea exchange rate.

Accordingly, standard exports function in open economies:

$$x = \sigma(\theta)^{\alpha_1} Y^{*\alpha_2} \quad 3.7$$

By taking logarithm 3.7 become

$$\log(x) = \sigma + \alpha_1 \log(\theta) + \alpha_2 \log(Y^*) \quad 3.8$$

4.8.1. Study Variables definition:

Manufacturing exports: final products that manufactured by raw material and intermediate inputs.

Foreign income: foreign income is the total monetary or market value of all goods and services produced within a world during a year.

Real exchange rate: Real exchange rate (RER) defined according to Purchasing power parity (PPP) as the nominal exchange rate (e) that is adjusted by the ratio of the foreign price level (P_f) to the domestic price level (P_d). According to Krugman (2012) real

¹The first policy in Turkish trade liberalization is flexible exchange rate.

exchange rate defined in term of nominal exchange rate a price level. Mathematically, it can be shown as:

$$RER = \frac{e * \text{Foreign price}}{\text{Domestic price}} \qquad RER = \frac{e P^*}{P} \qquad 3.9$$

Where: P = domestic price, P^* = foreign price (in foreign currency), e = nominal exchange rate, foreign currency per unit of domestic currency. According to this definition when real exchange rate (appreciate, rise) its mean currency depreciation. The real exchange rate is sometimes called the terms of trade and rate can be defined as the nominal exchange rate that takes the inflation differentials among the countries into account.

Moreover, RER defined on the basis of the tradable and non-tradable goods, that it is the ratio of the prices of non-traded goods to the prices of the traded goods. If we consider that the non-traded goods and the tradable goods, then the real exchange rate is:

$$r_r = \frac{P_t}{P_n} \qquad 3.10$$

Under the pressure of international competition, the domestic price of traded goods P_t will close to the foreign price of traded goods P_t^* , expressed in the same currency. That is, this is specified by the law of identical price. The decrease of r shows the real appreciation of the domestic currency and vice versa.

International trade theory specifies that exports are determined essentially within the real exchange rate and foreign income, based on equation 3.8 in the theoretical framework. In an open economy, currency depreciation plays a competitive engine to increase exports globally (the domestic currency price in terms of foreign currency

should be cheap). The interaction between the domestic currency price and foreign income determines Turkey's manufacturing exports.

According to Equation 3.9, an appreciation of the home currency against a foreign country's yields a decline in total exports. However, to increase exports, the home currency should be depreciated and stable to gain from trade liberalization.

To estimate manufacturing exports, the real exchange rate is frequently used in numerous studies. Thorbecke (2018), Dornbusch (1980), Mohsen and Khan (1985), adopted the real exchange rate to estimate exports, while Houthakker and Magee (1969), introduced the idea that foreign income has a high influence on exports in an open economy. Standard manufacturing export's function can be estimated as:

$$\text{So, } X_m = f(RER, GDP_f) \quad 3.11$$

Where X_m = Real exports (manufacturing Exports)

RER = real exchange rate

GDP_f = foreign income.

4.8.2. Specifications for the model

In the trade liberalization literature, Goldstein and Khan (1985), Doyle (1998), Bahmani-Oskooee (1998), Sing (2002), and Melitz and Ottaviano (2008), manufacturing exports are based on two assumptions. First, with regard to small open exporting countries, export prices are determined under a free market mechanism (demand and supply). Second, demand for exportable production is perfectly price elastic.

Trade liberalization, as one of the main globalization tools, has led to the shaping of countries into small villages, exposing domestic economic activities to foreign shocks, foreign demand for domestic products influenced directly by foreign income, as well as international markets' relative prices. So real exports in the trade liberalization era were specified as an increasing function of foreign income, and a decreasing function in terms of real exchange rate in domestic currency (currency depreciation-exports rising).

By taking the log of equation 3.15, it becomes as follows:

$$\ln X_m = \alpha + \beta_1 \ln GDP_f + \beta_2 \ln RER + \hat{u} \quad 3.12$$

Based on results of Unit roots, we based on Autoregressive Distributed Lag (ARDL) to test the cointegration among variables as following:

$$\begin{aligned} \Delta \ln X_{mt} = & \alpha + \sum_{j=1}^n \beta_1 \Delta \ln X_{mt_i} + \sum_{j=1}^n \beta_2 \Delta \ln GDP_f + \sum_{j=1}^n \beta_3 \Delta \ln RER + \gamma_1 \ln X_{mt_i} + \\ & \gamma_2 \ln GDP_{ft-i} + \gamma_3 \ln RER_{t-i} + \varepsilon \end{aligned} \quad 3.13$$

where, $\beta_1, \beta_2, \beta_3$, short term coefficients, $\gamma_1, \gamma_2, \gamma_3$, long term coefficients.

Eq. 3.12 is unrestricted error correction model. Therefore, to understanding more:

$$\ln X_m = \alpha + \beta_1 \ln GDP_f + \beta_2 \ln RER + \hat{u}$$

$$-\hat{u} = \alpha + \beta_1 \ln GDP_f + \beta_2 \ln RER - \alpha \ln X_m$$

$$-\hat{u}_{t-1} = \alpha + \beta_1 \ln GDP_{ft-1} + \beta_2 \ln RER_{t-1} - \alpha \ln X_{mt-1} \quad , \quad \hat{u}_t = ECM$$

$$\begin{aligned} \Delta \ln X_{mt} = & \alpha + \sum_{j=1}^n \beta_1 \Delta \ln X_{mt_i} + \sum_{j=1}^n \beta_2 \Delta \ln GDP_f + \sum_{j=1}^n \beta_3 \Delta \ln RER + \mu ECM(-1) + \\ & v_t \end{aligned} \quad 3.14$$

Where $\mu < 0$.

4.9. Empirical Findings

4.9.1. Unit Root Test

Table 3.8 reported the results of the unit root for the following variables: (real exchange rate, manufacturing exports, foreign income), in our study. Results of the Dickey-Fuller (ADF) unit root test suggest that all variables are non-stationary at level but become stationary at first difference. To summarize, all the variables are integrated at order I(1). This result enables us to apply the ARDL method.

Table 3.8 Unit root test results

Variable	Level			1st difference		
	ADF	Critic value	Result	ADF	Critic value	Result
RER	-1.68	-2.9	Non- stationary	-7.53	-2.9	Stationary
X_m	-0.29	-2.9	Non- stationary	-7.06	-2.9	Stationary
GDP_f	-1.41	-2.9	Non- stationary	-4.55	-2.9	Stationary

Notes: GDP_d = gross domestic product, RER = real exchange rate, X_m = manufacturing exports, GDP_f = foreign income.

The ADF test results show that all the variables are non-stationary at level at 5% significance level. However, all stationary at their first difference. This mean that all series are I(1).

4.9.2. Lag length selection test

Such tests like Likelihood Ratio Test (LR), Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC), Final Prediction Error (FPE) and Hannan-Quinn Information Criterion (HQ) are the most favored test to determine the appropriate lag

length to avoid econometrics problems. The results obtained for the optimal lag length are given in Table 3.9.

Table 3.9 Lag length selection

lag	LR	FPE	AIC	SC	HQ
0	NA	8.57e+29	77.43690	77.57022	77.48292
1	180.4603*	4.26e+27	72.12989	72.66315*	72.31397*
2	14.62442	4.28e+27	72.12187	73.05508	72.44402
3	14.83612	4.09e+27	72.04271	73.37587	72.50292
4	16.28929	3.47e+27*	71.81658*	73.54968	72.41484

Notes: * Indicates lag order selected by the criterion.

LR: sequential modified LR test statistics (each test at 5% level), FPE: final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hanna-Quinn information criterion.

As a result of the recognized model, the appropriate lag length for the LR, FPE and AIC is 1, 1 for Schwarz information criterion SC and 1 for HQ. Then, (1) is determined as the appropriate lag length with the most consensus.

4.9.3. Breusch–Godfrey Serial Correlation LM

To show that there is no correlation among errors we follow Breusch-Godfrey serial correlation *LM* Test. The Breusch–Godfrey serial correlation *LM* test is a test for autocorrelation in the errors in a regression model. It makes use of the residuals from the model being considered in a regression analysis, and a test statistic is derived from these. The null hypothesis is that there is no serial correlation of any order up to p .

LM test, is in fact a general test for autocorrelation of any order (ie residuals may be correlated over more than one period) Breusch–Godfrey Correlation Lagrange Multiplier test useful test since: a) generalizes to any order autocorrelation wish to test.

b) is robust to inclusion of lagged dependent variables. However, since this is a test of joint significance may not be able to distinguish which lagged residual is important Test is only valid asymptotically (i.e in large samples).

Table 3.10 Breusch-Godfrey serial correlation *LM* Test

Breusch-Godfrey Serial Correlation <i>LM</i> Test:			
F-statistic	0.227	Prob. F(2,31)	0.7979
Obs*R-squared	0.5493	Prob. Chi-Square (4)	0.7598

Based on Breusch-Godfrey Serial Correlation *LM* Test which shows the F-statistics 1.289 with Prob (0.05) equal 0.29 more than 0.05 that means no serial correlation at up to 4 lags as shown in Table 3.10. So, we accept the null hypothesis that there is no autocorrelation in the residuals generated from the regression model. By this we understand that the test is valid because it is not victimized by serial correlation throughout the series. This result enables us to run our estimation.

4.9.4. Cointegration test

Bound Test Result

In order to ascertain the presence of a long run relationship among the variables, the bound tests are conducted, results of the bound tests are presented in Table 3.11.

Bound test results reveal that the computed F -statistics based on the Wald test is 16.64 this exceeded the upper bound of 5 at the 1% significance level, suggesting that the null hypothesis of no cointegration relation is rejected. Therefore, the long run relationship is confirmed among the real quantities of real exports, real exchange rate, foreign GDP, the results implies that these variables move together and so cannot move ‘too far away’

from each other independently. Indirectly, we can conclude that any disequilibrium among them is a short run phenomenon.

Table 3.11 F-statistics for testing the existence of long-run cointegration

F-statistics	K	Significance level	Bound Critical Values	
			I(0)	I(1)
		1%	2.37	3.2
16.64367*	2	5%	2.79	3.69
		10%	3.65	4.66

Notes: From Persaran et al (2001) Critical values are obtained.

Source : extracted from estimation output using Eviews 11. (*) Significant at 5% .

Our result show that there is a long run relationship manufacturing exports, Real exchange rate, Foreign GDP. This indicate that the series in long run move together, these results consistent with Çelik, S., & Kaya, H. (2010).

Johansen-Juselius maximum likelihood cointegration tests

To investigate the long run relationship Johansen-Juselius maximum likelihood cointegration test performed, trace and maximal value are higher than critical value at significant 5%, null hypothesis rejected and alternative accepted, there is at least one cointegrating vector.

Table 3.12 Johansen-Juselius maximum likelihood cointegration test

Trace test				Maximal Eigen value Test			
Null	Alternative	Statistic	0.05 Critical Value	Null	Alternative	Statistic	0.05 Critical Value
$r = 0$	$r = 1$	26.624*	24.275	$r = 0$	$r = 1$	21.832*	17.797
$r \leq 1$	$r = 2$	4.791	12.320	$r \leq 1$	$r = 2$	3.345	11.224
$r \leq 2$	$r = 3$	1.445	4.129	$r \leq 2$	$r = 3$	1.445	4.129

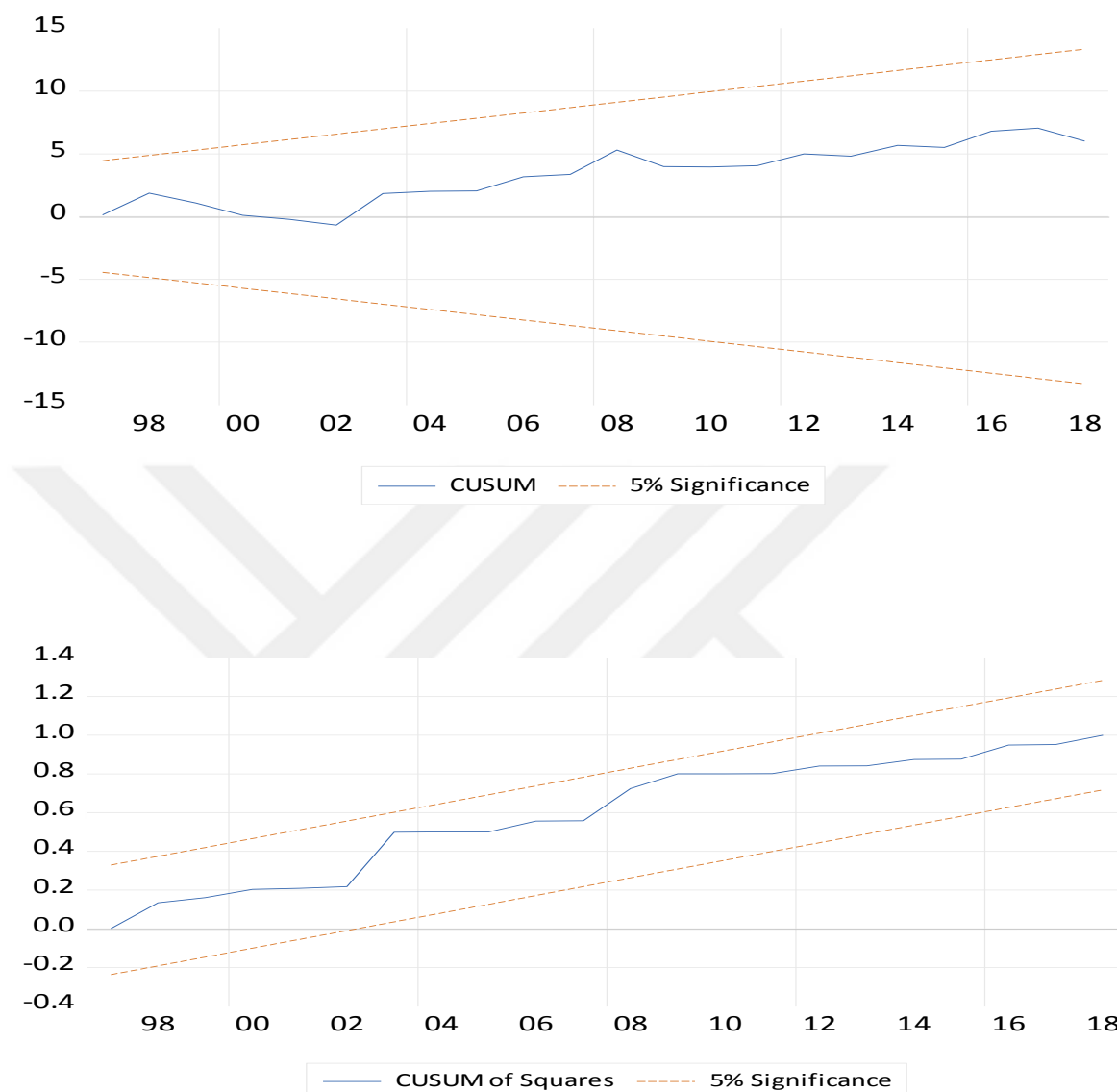
Notes: (i) r stands for the number of cointegrating vectors.
(ii) * denotes rejection of null hypothesis of no cointegration at 5% significance level.

4.9.5. Stability Test

After running the unit root test to see if the model's variables are static over time, it is necessary to investigate whether these variables show a structural change in their behavior over time stable or not, the CUSUM stability test is one of the most common tests in this field (Brown et al., 1975).

The results of this test are shown in the form of a curve for the errors of a model estimated by the usual least squares method (OLS), and a confidence domain with the aim of testing the null hypothesis which states that the parameters of the typical least squares model are unstable. If the curve of errors is within the critical limits throughout the study period, the null hypothesis is rejected at a significant percentage (5%). This means that the parameters are stable throughout the study period, and therefore the ability to estimate constant parameters of the model along the study time period without having to split it for partial periods, if the null hypothesis is rejected, then the study period must be divided into partial periods in which the parameters are stable (Brown et al., 1975).

A graphical presentation of the test is provided in Figure 3.14. The CUSUM test indicates that the parameters are stable over time as the plot of cumulative sum of recursive residuals and cumulative sum of squares of recursive residuals lies within the critical bound at 5% significance level.

Figure 3.14 Export model stability test

The CUSUM and CUSUM of Squares test suggest that the parameters were stable over the study time. These tests indicate no evidence of any significant structural instability, our result consistent with Ketenci and Uz (2010) they used CUSUM and CUSUMSQ stability tests in Turkey and authorize the stability of estimated coefficients in most cases.

4.9.6. Long Run Coefficients of Manufacturing Exports

Once we found the long run cointegration relationship among the variables of our study, results obtained by export as a (dependent variable) in the long run are reported in Table 3.13.

Table 3.13 Long run coefficients of manufacturing export's function

Variable	Coefficient	Std. Error	t-Statistic	Prob*.
C	-32.2774	1.4154	-22.8039	0.0000
Ln(GDP _f)	1.8605	0.1073	17.332	0.0000
Ln(RER)	0.7449	0.3355	2.220	0.0334

Long run equation:

$$\ln X_m = \alpha + \beta_1 \ln GDP_f + \beta_2 \ln RER + \hat{u} \quad 3.15$$

$$EC = \ln(X_m) - (0.7449 * \ln(RER) + 1.860 * \ln(GDP_f) - 32.277) \quad 3.16$$

The estimated coefficient of the long-run relationship shows that GDP_f has a positive impact on export growth in Turkey under the study review. This signifies that an increase in GDP_f will lead to an increase in export growth in Turkey. An increase of 1% in GDP growth leads to an increase of 1.86% in manufacturing export growth. Remarkably, *T*-statistics shows the variable is significant at a 5% level of significance as the probability value is less than 0.05 (p-value 0.05). From the statistical results, it is confidently concluded that GDP_f has a positive and significant impact on the export growth of Turkey. Findings by Gururaj et al. (2016) show that foreign gross domestic product impacts exports positively.

Moreover, the real exchange rate has a positive long-run impact on exports in Turkey at a statistically significant level of 5%. This indicates that a 1% increase in the real

exchange rate (depreciation currency) leads to 0.744 % in manufacturing export growth in Turkey, but the price elasticity of exports is less than 1, which means that currency depreciation can't lead to real growth in manufacturing exports. Our findings were consistent with those of Karagöz (2016). Turkish exports increased due to currency depreciation. Additionally, our results consist of Lohrmann (2000), who ensured that trade liberalization had a positive impact on exports in Turkey.

Moreover, Bahmani-Oskooee and Kara (2005) estimated income and price elasticities of trade in 28 countries, including Turkey, over 1973–1999, and the majority of them advanced. The results show that the income and price elasticities of Turkey's exports are 1.29 and 0.68, respectively. By comparing our results with Bahmani-Oskooee and Kara (2005), our results confirm that trade liberalization has an impact positively on Turkey's exports.

4.9.7. Short Run Results

The error correction model obtained from ARDL test, provides knowledge about short run effects of variables on exports, Table 3.14 contains the estimation results from the error correction model, results explain that the short run effects of GDP_f and exchange rate on manufacturing exports is significant and positive.

Table 3.14 Short run coefficients of manufacturing export's function

Variable	Coefficient	Std. Error	t-Statistic	Prob*.
DLn(RER)	0.317799	0.128220	2.478540	0.0185
DLn(GDP _F)	1.814169	0.399896	4.536598	0.0001
CointEq(-1)*	-0.426581	0.050056	-8.522143	0.0000
R-squared	0.656507	Mean dependent var		0.136701

Adjusted R-squared	0.646965	S.D. dependent var	0.175043
S.E. of regression	0.104005	Akaike info criterion	-1.637568
Sum squared resid	0.389410	Schwarz criterion	-1.551379
Log likelihood	33.11379	Hannan-Quinn criter.	-1.606902
Durbin-Watson stat	1.796590		

In contrast to the long-run, real exchange rate having no effect on manufacturing exports, a 1% increase in the real exchange rate (currency depreciation) leads to a 0.317% increase in manufacturing exports in the short run, consistent with Toraganli and Yalçin (2016).

However, foreign income has a statistically significant impact, indicating that an increase of 1% in foreign income will lead to an increase in manufacturing exports by 1.81%. In the short run, the growth in foreign income collaborated with temporary global demand as well as foreign importers' not having enough time to look for new suppliers (Berument et al. 2014).

To show the difference in export income elasticity before and after trade liberalization, Bairam (1988) displays that the income elasticity export of the Republic of Turkey (1970-1985) is 3.75. This indicates that trade liberalization decreases the positive impact of foreign income on home exports. But our result is different because Bairam depends on constant exchange rate and mix period.

In the short run, the real exchange rate does not have a significant impact on manufacturing export volume, as shown in Table 3.14. This leads us to investigate how disequilibrium in the short run moves to equilibrium in the long run. ECM Investigates the short-run and long-run cointegration over time, the negative sign of the ECM

coefficient and significant shows the existence of disequilibrium in the short run and convergence in the long run.

This value indicates the disequilibrium percentage in the previous equilibrium, which was corrected in the next period as shocks happened in independent study variables that impacted dependent variables. This percentage equals 42.6% in the real model equation. In other words, errors are corrected in the present period and tied to long-run equilibrium with 42.6%. In other words, ECM notifies us that 42.6% of all errors or disequilibrium in the short term are adjusted for in the long term.

The statistical value of the Durbin Watson is 1.79, which indicates that no autocorrelation exists between the variables. The value of R^2 is 0.65, which suggests that 65.0% of the change in variation in the dependent variable is due to changes in independent variables.

In order to grasp a robust result about the impact of trade liberalization on Turkish manufacturing exports, a comparison between foreign income and price elasticities of exports regards to pre-liberalization and post-liberalization on the one hand, and on the other hand the impact of exporting to developed countries and exporting to the rest of the world.

Interestingly, the performance of exports in the short term is better than in the long run during the period 1960-1980. Unambiguously, Turkish manufacturing exports' share of the world market in the short term is not much different after trade liberalization.

Table 3.15 shows that it's better for Turkey to export to developed countries. Definitely, the penetration of Turkish manufacturing exports to developed markets avoids crises that occur in global growth, especially since these countries enjoy sustainable economic

growth on the one hand, and on the other hand, these exports can increase the degree of specialization by exporting inputs. When the price and income elasticities of exports to the G7 and exports to the rest of the world are compared, the results show that exports to the G7 have a higher income elasticity than exports to the rest of the world.

Table 3.15 Turkey manufacturing export's elasticity's (1960-1980), (1980-2018)

Turkey (1960-1980) 4 lag		Turkey (1980-2018) 1 lag	
Long- run		Long- run	
Ln(RER)	0.17	Ln(RER)	0.74*
Ln(Y ^f)	0.24	Ln(Y ^f)	1.86*
Intercept	4.47	Intercept	-32.27
Short -run		Short -run	
Error correction term	-0.73	Error correction term	-0.42
$\Delta \ln(\text{RER})$	0.34	$\Delta \ln(\text{RER})$	0.31
$\Delta \ln(Y^f)$	1.70*	$\Delta \ln(Y^f)$	1.81*
Intercept	3.29	Intercept	-5.91

Exports to G7 (1980-2018)		Exports to the rest of World (1980-2018)	
Long- run		Long- run	
Ln(RER)	.850*	Ln(RER)	0.890*
Ln(Y ^f)	1.77*	Ln(Y ^f)	1.390*
Intercept	-6.34	Intercept	-4.41
Short -run		Short -run	
Error correction term	-0.262*	Error correction term	-0.583*
$\Delta \ln(\text{RER})$	0.224	$\Delta \ln(\text{RER})$	0.519*

$\Delta \ln(Y^f)$	1.586*	$\Delta \ln(Y^f)$	0.813*
Intercept	-1.667	Intercept	-2.573

Notes: * significance at 0.05.

According to Table 3.16, most advanced industrial countries focus on the short term, depending on the fact that the long term carries major changes in global economic trend. Therefore, for Turkey, it's better to penetrate global markets in the short run.

By making a comparison between the foreign income elasticity of Turkish exports and advanced economies' exports Table 3.16 shows that Japan, France, Britain, Germany, and the United States of America exports benefit from the short term, while China focuses on the long term. This indicates that Turkey and China are similar in the global export market, but consequently, in a small open economy such as Turkey, exports may be exposed to risks if the global economy witnesses a new recession.

Table 3.16 Exports price and income elasticities in some advanced economies (1980-2018)

China (1980-2018) 1 lag		Japan (1980-2018) 1 lag	
Long- run		Long- run	
$\ln(RER)$	-2.56	$\ln(RER)$	0.52
$\ln(Y^f)$	2.25	$\ln(Y^f)$	0.78
Intercept	5.16	Intercept	-10.20
Short -run		Short -run	
Error correction term	-0.027	Error correction term	-0.58
$\Delta \ln(RER)$	-0.07	$\Delta \ln(RER)$	0.30
$\Delta \ln(Y^f)$	1.35	$\Delta \ln(Y^f)$	1.53
Intercept	0.142	Intercept	-5.99

France (1980-2018) 1 lag		UK (1980-2018) 1 lag	
Long- run		Long- run	
Ln(RER)	-6.604	Ln(RER)	-7.28
Ln(Y^f)	0.22	Ln(Y^f)	-0.036
Intercept	34.02	Intercept	39.89
Short -run		Short -run	
Error correction term	-0.02	Error correction term	-0.05
$\Delta \ln(\text{RER})$	0.63	$\Delta \ln(\text{RER})$	0.54
$\Delta \ln(Y^f)$	1.43	$\Delta \ln(Y^f)$	1.48
Intercept	0.78	Intercept	2.00
Germany (1980-2018) 1 lag		USA (1980-2018) 1 lag	
Long- run		Long- run	
Ln(RER)	-0.004	Ln(RER)	-4.52
Ln(Y^f)	1.11	Ln(Y^f)	0.47
Intercept	2.26	Intercept	25.39
Short -run		Short -run	
Error correction term	-0.40	Error correction term	-0.07
$\Delta \ln(\text{RER})$	0.44	$\Delta \ln(\text{RER})$	1.04
$\Delta \ln(Y^f)$	1.91	$\Delta \ln(Y^f)$	1.58
Intercept	0.911	Intercept	1.80

Table 3. 17 Price and income elasticities over period 1980-2018

Long run							
	Turkey	China	US	UK	France	Germany	Japan
Price elasticity	0.74	2.56	4.52	7.28	6.6	0.004	0.52
Income elasticity	1.86	2.25	0.47	-.04	0.22	1.11	.78
Short-run							
Price elasticity	.31	.07	1.04	.54	.63	.44	.30
Income elasticity	1.81	1.35	1.58	1.48	1.43	1.91	1.53

According to table 3.17, Turkey's income elasticity of exports is higher than advanced countries except China. As shown in Table 3.17, the income elasticity of exports is 1.86 in the long run, higher than Japan's 0.78 and the UK's -.04. Furthermore, in the short run, income elasticity of exports is higher than advanced economies except Germany. In the short run, Turkey's price elasticity of exports is less than advanced economies. This confirms that Turkey's exports are influenced positively by world income rather than currency depreciation over the 1980–2018 period.

4.10. Conclusion

Turkey's foreign trade has witnessed many developments since the beginning of the economic liberalization program in early 1980. followed by an increase in exports, particularly manufacturing. Based on the descriptive section, the manufacturing sector grew at a low rate and the share of GDP is still low. While manufacturing exports' share of total exports in 1980 was 27%, by integration into the global economy, manufacturing exports increased significantly and reached 84% of total exports in 2018.

In this essay, this study examined the impact of trade liberalization on manufacturing exports. Many other studies estimate the total exports. However, this study focuses on manufacturing exports after the trade liberalization program.

This study depends on the standard export function. In an open economy, the main determinants of exports are real exchange (RER) and global income. The study employed ARDL methodology.

According to the findings of the study, real exchange rate appreciation (currency depreciation) and foreign income have a significant long-term impact on manufacturing exports. However, in the short run, results show that currency depreciation does not have an impact on manufacturing exports, but foreign income has a significant impact. Consequently, real depreciation will lead to strengthened Turkish manufacturing competitiveness in the long run. Our results are consistent with Karagoz (2016), Utkulu and Özdemir (2004), and Bayar (2002).

Clearly, by comparing the price and income elasticities of manufacturing exports over 1960-1980 and 1980-2018, the results show that in the short run, there is no significant difference between pre-trade liberalization and post-liberalization.

Furthermore, the results show that it is better to export to the G7 rather than the rest of the world in the long and short run, as exporting to the G7 avoids any disruptions in Turkey's exports, particularly during global crises.

To summarize, trade liberalization via currency depreciation opened new international markets for Turkish manufacturing exports, as well as numerous export entry activities.



5. TRADE LIBERALIZATION AND IMPORTS

Abstract

This study aims to examine the impact of trade liberalization on Turkey's imports over the period (1980-2018). In the first part, the study relies on descriptive statistics of Turkey's imports by focusing on intermediate imports due to their importance in production growth. In the second part, the study employs the autoregressive distributed lag bound test (ARDL) approach. Descriptive data shows that total imports increased steadily over the study period (1980-2018). Intermediate imports' share of total imports from 1989 to 2018 hovered around 78% of imports in 1981, the first year after trade liberalization, but in 2018, the percentage was 32%.

Moreover, the intermediate imports' share of the GDP was 8.95%. After 39 years since trade liberalization was carried out, the share of GDP was 9.44% in 2018. Long run estimation shows that the increase in manufacturing exports by 1% leads to a decrease in intermediate imports by 0.10%. However, the real exchange rate and gross domestic product (GDP) are statistically significant for intermediate imports. An increase in GDP by 1% leads to an increase in intermediate imports by 1.13%, whereas a depreciation in the currency by 1% increases intermediate imports by 1.19%.

In the short run, estimation reveals that an increase of 1% in manufacturing exports leads to an increase in intermediate imports by $0.97\% \approx 1$. This result opens the door toward more future studies to prove that trade liberalization is a short-term phenomenon on one hand, and the cointegration between exports and imports could be achieved in the short term.

This essay examines the impact of trade liberalization on intermediate imports relative to total imports, as well as their ratio to gross domestic product (GDP). The impact of the real exchange rate, manufacturing exports, and domestic income on intermediate imports (largely influenced by trade liberalization) are examined.

Keywords: Trade liberalization, intermediate imports, Turkey.



5.1. Introduction

Globalization has been associated with a higher increase in global imports, integration into the global economy, and tariff reductions, which have led to an accelerated exchange among countries. Trade liberalization would give domestic industries better access to foreign inputs, increase productivity, and improve quality, thus large exports and high growth. Importing quality inputs enables the producer to produce high-quality final goods. Sophisticated inputs induce domestic innovators to imitate them. Positive spillover occurs among industries as a whole.

Globally, the trend of imported goods has increased sharply in the last thirty years. In 1988, imports of goods were 671.216 billion USD. By merging world countries into globalization, trade across the globe has augmented and imports of goods recorded 18.875.24 trillion USD in 2018. Moreover, intermediate imports were 178.284 billion USD in 1988. In 1990, manufacturing grew significantly, and intermediate input demand around the world increased and reached 3.927.057 trillion USD in 2018. Openness in the global market enables producers in Turkey to access intermediate imports. In 1980, intermediate imports were 6.158 billion USD, equaling 78% of total imports. After liberalization, some intermediate products were produced domestically. Intermediate imports reached 72.330 billion USD in 2018, which equaled 32% of total imports, (www.worldbank.data.org).

Theoretically, importing intermediate inputs can improve export quality through two channels. The first is the "variety effect." Imperfect substitution between domestic and foreign inputs, foreign inputs can increase the variety of new products. The second channel "innovation effect" occurred through the absorption of advanced technology that is embedded in intermediate imports.

Recently, countries such as China (depending on the phenomena of imports for export), Singapore, Hong Kong, Taiwan, and Canada have increased manufacturing exports, depending heavily on foreign intermediate inputs. Imported inputs cause firms to diversify their products and develop new ones. More firms that use domestic inputs (Shepherd and Stone, 2011).

Additionally, liberalization of intermediate inputs could cause an expansion of both downstream and upstream industries. When trade costs for intermediate inputs fall, downstream industries (for example, auto plants) can access cheaper intermediate imports, lowering their average and marginal costs. Subsequently, their output and profits will increase. Higher profits will stimulate new firms' entry into the industry. Downstream expansion leads to increased demand for intermediate inputs domestically. Higher demand for domestic inputs has an expansionary effect on the domestic intermediate input industry. This is denoted as a 'demand linkage.' A larger downstream industry will lead to augmenting demand for intermediate inputs.

Consequently, an increase in demand for domestic inputs equals, among other things, increased upstream firms' profits. This stimulates more domestic firms' entry into the intermediate industry. This will lead to increased competition between these firms, so domestic inputs will become cheaper than imported ones, leading to more expansion of the downstream industry. This cost linkage is a result of access to a wider range of intermediate inputs. Unambiguously, input liberalization facilitates more specialized production art (Amiti, 2001).

5.2. Literature review

One of the most important factors behind integration into the global economy and liberalizing the import sector is access to cheap and high-quality production inputs. Through trade liberalization, the industrial sector can import a variety of production inputs from several regions around the world.

Thus, globalization and trade liberalization enable many emerging countries to diversify their production and their foreign markets. This has led to a large accumulation of productive knowledge and the exploiting of the forces of globalization for the national economy's benefits.

Thomas (1989) examined the impact of liberalization on trade and imports. He found that more than half of developing countries' imports are intermediate inputs, which shows that integrating into the global market will lead to easy access to intermediate inputs. As a result, productivity will improve and economic growth will be sustained.

Romer (1990) employed a model to examine the relationship between open trade and economic growth. In his model, more openness brings countries to more specification in intermediate inputs based on comparative advantage. The liberal market encompasses many choices of inputs at low cost, which results in high productivity and leads to more economic growth in the long run.

Ostry (1991) ensures that if trade liberalization is followed by tariff reduction on imported intermediate inputs, it will either improve or deteriorate the trade balance, depending on the structure of the economy and initial trade deformation.

According to Devereux and Connally (1996), import liberalization accompanied by depreciation, specifically in small open countries, leads to expensive imports and exports becoming competitive in international markets. Cimolie et al. (2010) and Thirlwall (2003) ensure that although trade liberalization supports the export sector, the static and dynamic gain from exports may be less than expected if export growth is outpaced by import growth.

Amiti and Kanings (2007) indicate that abolished import barriers stimulate investment via paving the way for access to intermediate imports. The findings also show that productivity in Indian and Indonesian manufacturing firms increased as input tariffs declined. Kara (2009) explores that the biggest losers from liberalization of trade are developing countries. He found a reduction in US tariffs by 1% led to a decline in imports from developing countries by 2.6%. The reason behind it was that the developing countries' products did not fulfill our quality standards.

Bas (2012) found a positive impact of access to foreign inputs on firms' performance. Furthermore, there is a probability of Argentina's firms producing in industries moving into the export market which has experienced greater input tariff liberalization.

Feng et al. (2016) examined the connection between imported intermediate inputs and the impact on export growth in manufacturing Chinese firms. The results show that there is a strong relationship between imported intermediate inputs and firm export growth. Chinese firms benefit from liberalization from access to upgrading facilitated by technology embodied in imported intermediate inputs from higher-income G7 countries.

Castellani and Fassio (2019) examined the impact of imported new inputs on exporting new products in Swedish firms. The study sample consisted of 14,000 Swedish manufacturing firms over a period (2001-2012). The results revealed that importing new intermediate inputs induces manufacturing firms to combine them with other domestic inputs and export new products. The results also confirm that imported new inputs will enable SMEs to sustain production and export, avoiding trade liberalization challenges.

Recently, Fu et al. (2021) investigated the impact of trade liberalization of intermediate input imports on Chinese firm profitability. Trade liberalization induced manufacturing sector access to intermediate inputs embodied in high technology, which grew at a rate of 58.3% more than export growth. Two types of data were used: firm-level production data, which came from the Annual Survey of Industrial Firms (ASIF) from 1998 to 2007, and industry-level tariff data. Robust results show that trade liberalization collaborated with input tariff reduction, enhancing firm profitability significantly. In addition, the quality upgrading of intermediate inputs and the decrease in inventory costs are the main motives for the profit-maximizing effect of the input tariff decline.

However, some studies indicate that the depreciation of the national currency as a result of trade liberalization may not facilitate easy access to appropriate production inputs, a surplus in imports will lead to dampened domestic production, and Ibarra (1995) indicates that trade liberalization harms aggregate investment. After Mexico's trade liberalization, trade liberalization collaborated with tariff reduction as a mechanism to support the production sector by increasing the share of imported inputs in domestic production.

According to Özatay (1997), the main determinants of the import demand function are income, relative prices, and the exchange rate in the short and long term. However, national income is the sole determinant of imports. To be more specific, the real depreciation rate and changes in domestic income can have a significant impact on import demand (Kotan& Saygl,1999). One of the consequences of trade liberalization in the field of imports is the reduction of monopoly operations that the economy suffered during the period of protection, particularly sophisticated intermediate inputs.

Without a doubt, trade liberalization contributes to preventing monopolies, especially in importing licenses for necessary production inputs. Krueger and Michealy (1978) ensure that devaluation following trade liberalization is a significant factor in the elimination of quantitative constraints, with real devaluation accumulated rent reduced to those with their own import license.

Consequently, Durmaz and Lee (2015) examine the long relationship between import demand and GDP in Turkey. Annual data covered the period 1980-2011. Autoregressive distributed lag (ARDL) is employed. Findings show that there is a statistically significant long-run relationship between import demand and GDP in the Republic of Turkey.

Aker (2008) examined the major determinants of imports in Turkey in the post-liberalization, study period 1980–2006. The OLS method was employed to test the impact of factors such as real effective exchange rates, economic growth, fixed capital investments, the Customs Union with the European Union, and exports on imports. The results show that the Customs Union Agreement has had no impact on imports in Turkey. Turkey's imports are price inelastic. Therefore, the relationship between exports and imports is not strong enough.

In summary, it must be emphasized that trade liberalization contributes to increasing imports, especially in countries that do not pursue an import substitute strategy. To benefit from trade liberalization, it is necessary to focus on importing production inputs that are hard to manufacture locally. Furthermore, in the event of increased income from trade liberalization, decision-makers should work to depreciate the domestic currency in the event of increased income to curb imports.

The novelty of this study is to show the long and short run relationship between Turkey's intermediate imports and manufacturing exports after trade liberalization program, as well as the impact of flexible exchange rate on intermediate imports.

5.3. Development of Turkey's Imports (1980-2018)

In the Turkish experience, imports are targeted as one of the macroeconomic variables to be controlled. The Turkish economy has moved through a transition from a planned economy to a more liberal economy in the last four decades. This has brought many changes in economic policy and the trade balance. Growing imports dramatically have become a source of concern for Turkish economists and policymakers in recent years. Understanding the composition of imports is necessary to design trade strategies based on accurate econometric predictions in the coming years.

Liberalization of trade has greatly affected the consumption pattern in many countries, especially in light of easy access to products at cheap prices, contributing to an increase in imports compared to exports as a result of the mechanisms of free trade. The Turkish economy in the 1980s, like other economies, has faced many obstacles in delivering liberalization toward maintaining the production process. During the period of the economic crisis, the Turkish economy faced serious problems in curbing high prices of

imports. Consumption patterns and government spending had a significant impact. Nevertheless, relative prices are no longer the sole determinant of Turkish imports in recent years (Gulha, 2019).

In Turkey, trade liberalization has been followed by tariff reductions. The global market has opened for sectors to increase imports, especially inputs for production and raw materials. The liberalization of Turkish trade contributed to the increase in the volume of imports, which calls for studying the development of imports during the past years, especially since the volume of trade is gradually growing and Turkey's integration into the global economy is rising. Table 4.1 shows the development of Turkish imports over 1980-2018.

Table 4.1 Development of Turkey imports (1980-2018) (U.S. \$ billion)

Year	Imports Value	Growth of imports %	Year	Imports Value	Growth of imports %
1980	7.909	56.0	2000	54.503	34.01
1981	8.933	12.95	2001	41.399	-24.04
1982	8.843	-1.02	2002	51.554	24.53
1983	9.235	4.44	2003	69.340	34.50
1984	10.757	16.48	2004	97.540	40.67
1985	11.343	5.45	2005	116.774	19.72
1986	11.105	-2.10	2006	139.576	19.53
1987	14.158	27.49	2007	170.063	21.84
1988	14.335	1.25	2008	201.964	18.76
1989	15.792	10.16	2009	140.928	-30.22
1990	22.302	41.22	2010	185.544	31.66
1991	21.047	-5.63	2011	240.842	29.80
1992	22.871	8.67	2012	236.545	-1.78
1993	29.428	28.67	2013	251.661	6.39

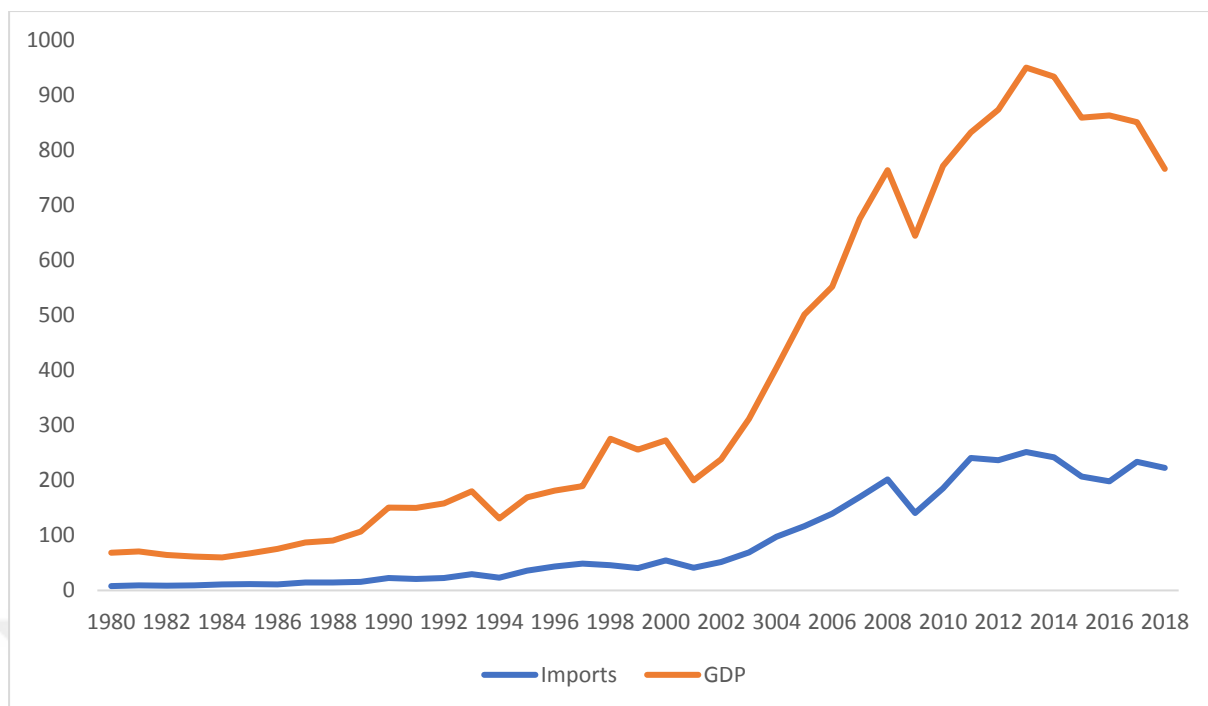
1994	23.270	-20.93	2014	242.177	-3.77
1995	35.709	53.46	2015	207.234	-14.43
1996	43.627	22.17	2016	198.618	-4.16
1997	48.559	11.31	2017	233.800	17.71
1998	45.921	-5.43	2018	223.046	-4.60
1999	40.671	-11.43			

Source: Central Bank of the Republic of Turkey- TCMB

As represented in Table 4.1, Turkish imports decreased by 1% in 1982 through a primary stage of liberalization of Turkish trade, but continued to rise until they rose by 41% in 1990. In 1995, after Turkey's accession to the World Trade Organization, Turkish imports recorded the highest percentage increase, reaching 53.5%. Turkey's imports rose to 11%, but in 2000, with political stability, social and economic reforms, imports rose rapidly by 34%.

The period 2002-2008 saw an increase in imports collaborated with increased exports, but the international economic changes and the global crisis led to the contraction of Turkish export markets, which led to a decline in imports in 2009 by 30%. In the period 2014-2016, neglected the decline in the Turkish lira, imports fell by varying degrees, but in the year 2017 they rose by 17.7%, and finally in 2018, imports fell by 4.6%.

Figure 4.1 Trends of Turkey imports and GDP (1980-2018) (U.S. \$ billion)



Source: Based on Central Bank of the Republic of Turkey- TCMB

As shown in Figure 4.1, the dynamic of imports indicates that openness leads to increased imports, which can be noted that the growth in Turkish imports is a natural reflection of the growth in GDP.

5.4. Imports of Intermediate Goods (1980-2018)

Trade liberalization programs in many countries have contributed to enabling the industrial sector to access inputs after removing trade barriers. By importing inputs, the industrial sector can be developed and achieve real growth in industrial exports. This will lead to substituting imports for exports and sustaining real growth.

In many countries, access to intermediate inputs was extremely difficult due to trade liberalization reforms aimed at enhancing the mechanism of production and import substitution target by exploiting imported production inputs to improve productivity. This was linked to access to advanced technology, which enabled the introduction of substantial improvements in production art as a result of open markets (Fan et al., 2015).

Trade liberalization enables countries to access quality and cheap inputs, which pave the way toward growth in industrial production, which leads to achieving the import-substitution strategy and, thus, total import decrease.

Trade liberalization may have adverse effects on the situation in which the consumption sector dominates the production sector, and this is one of the great dilemmas that developing countries went through after implementing the trade reform program, which caused the deterioration of the trade balance and the move into what is called "fake economic growth." Table 4.2 below shows the development of imports and intermediate inputs after the trade liberalization program.

Table 4.2 Intermediate imports share of imports (U.S. \$ billion)

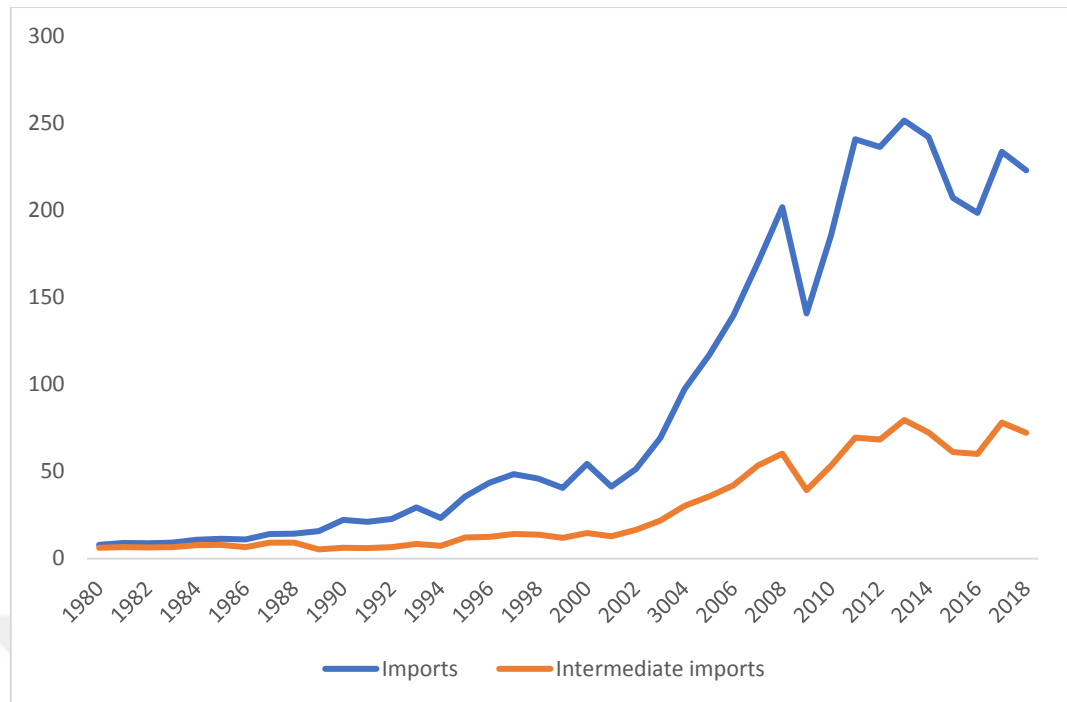
Year	Imports	Intermediate inputs	%	Year	Imports	Intermediate inputs	%
1980	7.909	6.158	78%	2000	54.503	14.669	27%
1981	8.933	6.547	73%	2001	41.399	12.782	31%
1982	8.843	6.332	72%	2002	51.554	16.440	32%
1983	9.235	6.675	72%	2003	69.340	21.852	32%
1984	10.757	7.624	71%	2004	97.540	30.236	31%
1985	11.343	7.836	69%	2005	116.774	35.713	31%
1986	11.105	6.673	60%	2006	139.576	42.044	30%
1987	14.158	9.180	65%	2007	170.063	53.489	31%
1988	14.335	9.250	65%	2008	201.964	60.300	30%
1989	15.792	5.304	34%	2009	140.928	39.381	28%
1990	22.302	6.224	28%	2010	185.544	53.289	29%
1991	21.047	6.045	29%	2011	240.842	69.462	29%
1992	22.871	6.647	29%	2012	236.545	68.369	29%
1993	29.428	8.433	29%	2013	251.661	79.627	32%
1994	23.270	7.262	31%	2014	242.177	72.520	30%

1995	35.709	12.047	34%	2015	207.234	61.143	30%
1996	43.627	12.476	29%	2016	198.618	60.157	30%
1997	48.559	14.212	29%	2017	233.800	78.124	33%
1998	45.921	13.801	30%	2018	223.046	72.330	32%
1999	40.671	11.945	29%				

Source: Central Bank of the Republic of Turkey- TCMB

The data in Table 4.2 indicated that the ratio of import inputs to total imports was 78% under protection before trade liberalization in 1980, but it declined until it reached 0.65 in 1989 after implementing the liberalization program. During the period 1989-1999, Turkey witnessed great economic openness by joining the WTO Organization and this required many flexible economic policies. This was negatively reflected on its imports of production inputs until they reached 29% of total imports in 1999. This decrease is a result of the inability of Turkish products to achieve high competitiveness in foreign markets. In the period 2000-2018, Turkish intermediate imports remained at an average of 27-32%, which is a low percentage if compared to the period of the 1980s. This indicates that the Turkish manufacturing export base can't be expanded enough to import more intermediate inputs, post-liberalization compared with many advanced countries such as Korea and Singapore.

Figure 4.2: Imports and intermediate imports from 1980 to 2018. (U.S. \$ billion)



Source: Based on Central Bank of the Republic of Turkey- TCMB, ISE, Annual Statistical Bulletin, 1977-88.

Figure 4.2 shows that the up and downward trend of imports and intermediate imports over time is not constant but the movement of imports and intermediate is close to each other.

5.5. Turkey's Intermediate Imports and GDP

The structure of imports plays a significant role in achieving economic growth in the long run. If import inputs' share of GDP is high, this will have a positive impact on real growth, depending on the fact that these inputs are used in real manufacturing sectors. Based on the classical growth model of Solow (1956), which is dependent on the assumption that technological change is exogenous, and that it is a public good if developing countries' access to technology as intermediate imports and nationalizing its production process will yield real growth in the long run.

A Keynesian approach based on demand theory as a policy to achieve growth, national income, and relative prices are significant determinants of import growth. The elimination of trade policy distortions has a strong, positive impact on import growth (Santos, 2002).

Contrary to many countries, trade liberalization failed to stimulate demand growth. Demand in India fell after trade liberalization, according to Dutta and Ahmad (2004). Import prices that are low play an important role in demand in middle-income countries such as Turkey (Yavuz & Güriş, 2006).

According to Kalyoncu (2007), relative import price and real GDP are significant descriptive variables in Turkey's import demand function, but the price elasticity of the import is greater than the income elasticity of the import (Turkey imports are sensitive to price more than domestic income).

Saygili et al. (2012) examined the import dependency over the period 1998–2007 using input-output tables (IOTs) as well as survey-based data. Official IOTs show that the import content of manufacturing increased five points during this period. By employing survey data for the periods 2002 and 2007, at the sectoral level, results confirm that import dependency has grown in most of the products.

Aldan (2012) examined the short-run dynamics of Turkish imports over the period 2003–2011 by employing the Kalman filter to find time-varying parameters for the exchange rate and income. The findings show that income is more imperative in determining import growth in the majority of sectors. However, there is heterogeneity among sectoral responses.

The Turkish trade liberalization program has focused on import substitution and achieving economic growth since 1980. This requires access to high levels of imported intermediate inputs relative to GDP and limiting final imports in a way that contributes to achieving economic growth in the long term. Table 4.3 shows the share of imports and import intermediate inputs to GDP during the period (1980-2018).



Table 4.3 Imports, intermediate imports and GDP (U.S. \$ billion)

Year	Imports (IM)	Intermediate Imports (INM)	GDP	IM/GDP	INM/GDP
1980	7.909	6.158	68.789	11.50	8.95
1981	8.933	6.547	71.040	12.58	9.22
1982	8.843	6.332	64.546	13.70	9.81
1983	9.235	6.675	61.678	14.97	10.82
1984	10.757	7.624	59.990	17.93	12.71
1985	11.343	7.836	67.235	16.87	11.65
1986	11.105	6.673	75.728	14.66	8.81
1987	14.158	9.180	87.173	16.24	10.53
1988	14.335	9.250	90.853	15.78	10.18
1989	15.792	5.304	107.143	14.74	4.95
1990	22.302	6.224	150.676	14.80	4.13
1991	21.047	6.045	150.028	14.03	4.03
1992	22.871	6.647	158.459	14.43	4.19
1993	29.428	8.433	180.170	16.33	4.68
1994	23.270	7.262	130.690	17.81	5.56
1995	35.709	12.047	169.486	21.07	7.11
1996	43.627	12.476	181.476	24.04	6.87
1997	48.559	14.212	189.835	25.58	7.49
1998	45.921	13.801	275.769	16.65	5.00
1999	40.671	11.945	255.884	15.89	4.67
2000	54.503	14.669	272.979	19.97	5.37
2001	41.399	12.782	200.252	20.67	6.38
2002	51.554	16.440	238.428	21.62	6.90
2003	69.340	21.852	311.823	22.24	7.01
2004	97.540	30.236	404.787	24.10	7.47
2005	116.774	35.713	501.416	23.29	7.12
2006	139.576	42.044	552.487	25.26	7.61
2007	170.063	53.489	675.770	25.17	7.92
2008	201.964	60.300	764.336	26.42	7.89

2009	140.928	39.381	644.640	21.86	6.11
2010	185.544	53.289	771.902	24.04	6.90
2011	240.842	69.462	832.524	28.93	8.34
2012	236.545	68.369	873.982	27.07	7.82
2013	251.661	79.627	950.579	26.47	8.38
2014	242.177	72.520	934.186	25.92	7.76
2015	207.234	61.143	859.797	24.10	7.11
2016	198.618	60.157	863.722	23.00	6.96
2017	233.800	78.124	851.102	27.47	9.18
2018	223.046	72.330	766.423	29.10	9.44

Source: Central Bank of the Republic of Turkey- TCMB, ISE, Annual Statistical Bulletin, 1977-88.

What can be observed from Table 4.3 is that the ratio of total imports to the gross domestic product in Turkey has been increasing gradually since the beginning of the trade reforms in 1980. Until now, the share of imports in GDP in 1985, after four years of the implementation of the liberalization program, was 16.87%. In the same year, Turkey joined the WTO. The share of imports to GDP reached nearly 17.81%. The intermediate inputs of imports recorded 5.56% of the GDP, which indicates that the production sector in the mid-nineteenth century suffered from the increasing price of imports.

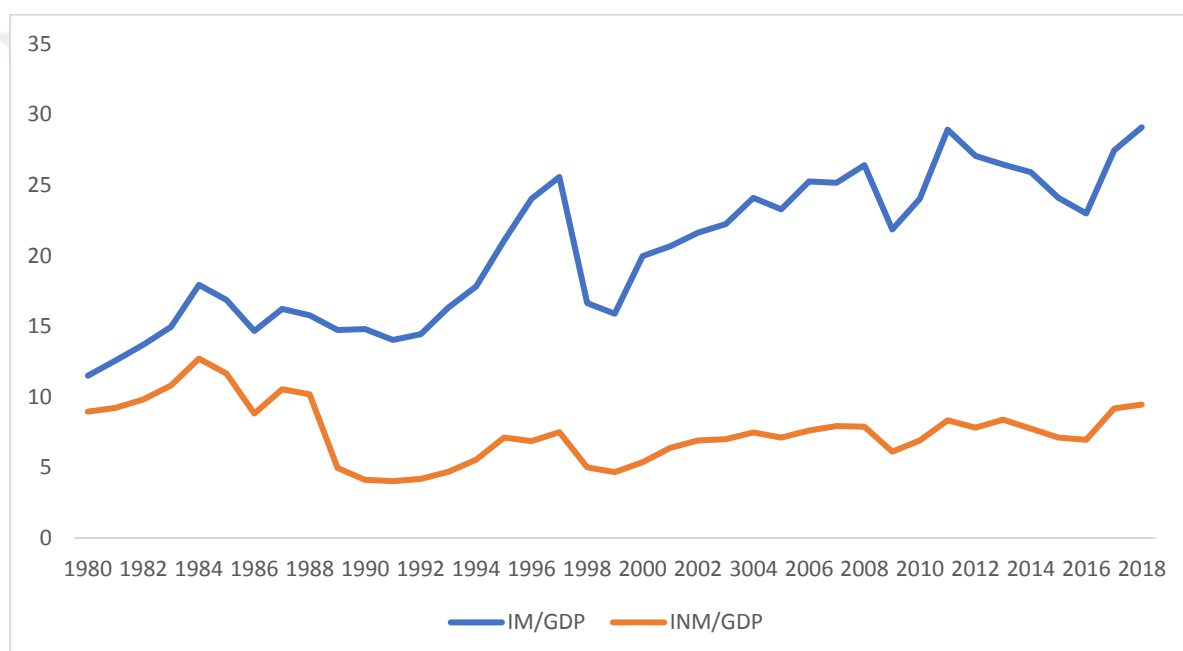
In 2005, Turkey moved toward a new era of reforms based on strengthening the Turkish lira. Imports shifted dramatically and reached approximately 23.29%, while intermediate inputs were 7.12%. This indicates that modern reforms have embodied imports more than intermediate inputs.

Depending on economic theory, by reducing the value of the national currency, countries can control imports. In Turkey, the opposite happened. In 2015, after the Turkish lira's value declined, total imports relative to GDP reached 24%, and imports

from intermediate inputs reached 7.11%, indicates that Turkey's imports are not affected by the exchange rate (imports of oil, sophisticated manufacturing equipment, intermediate imports inputs that cannot be produced domestically).

Finally, in 2018, despite a decline in the Turkish lira, imports reached 29.1% of GDP and intermediate import inputs hovered around 9.44%, meaning an improvement in the industrial base.

Figure 4.3: Imports, intermediate imports as % GDP from 1980 to 2018.



Source: Central Bank of the Republic of Turkey- TCMB, ISE, Annual Statistical Bulletin, 1977-88.

from Figure 4.3, imports, intermediate imports, and GDP move together over time. This indicates that demand is necessary for Turkey's growth. Through trade liberalization, intermediate imports played a major role in economic growth as they were used heavily in the export sector.

In countries that we're able to obtain high-tech intermediate imports at competitive prices, we're able to build a wide industrial base by achieving diversification in exports on the one hand and increasing the degree of specialization, on the other hand. Thus,

economic growth has gained, Table 4.4 shows the growth rate of intermediate imports relative to the Turkish economy over (1980-2018).

Table 4.4: Intermediate import and GDP growth (1980-2018).

Year	Intermediate import	GDP growth	Year	Intermediate import	GDP growth
1980		-2.44	2000	22.81	6.64
1981	6.32	4.86	2001	-12.87	-5.96
1982	-3.28	3.56	2002	28.62	6.43
1983	5.42	4.97	2003	32.91	5.61
1984	14.22	6.71	2004	38.37	9.64
1985	2.78	4.24	2005	18.11	9.01
1986	-14.84	7.01	2006	17.73	7.11
1987	37.57	9.49	2007	27.22	5.03
1988	0.76	2.32	2008	12.73	0.85
1989	-42.66	0.29	2009	-34.69	-4.7
1990	17.33	9.27	2010	35.32	8.49
1991	-2.87	0.72	2011	30.35	11.11
1992	9.96	5.04	2012	-1.57	4.79
1993	26.87	7.65	2013	16.47	8.49
1994	-13.89	-4.66	2014	-8.93	5.17
1995	65.90	7.88	2015	-15.69	6.09
1996	3.56	7.38	2016	-1.61	3.18
1997	13.92	7.58	2017	29.87	7.47
1998	-2.89	2.31	2018	-7.42	2.83
1999	-13.45	-3.39			

Source: Calculation based on Central Bank of the Republic of Turkey.

It can be seen from Table 4.4 that the growth in intermediate imports increased in the years after implementing trade liberalization reforms. In 1984, the growth in import

inputs reached 14.22%, while Turkey witnessed economic growth of 6.71%. In 1990, the growth in gross domestic product reached 9.2%, and imports grew by 17.3%. In 2000, the growth in intermediate imports increased and reached 22.81%, while the growth in the gross domestic product reached 6.64% after the Turkish government introduced new economic and political reforms (exchange rate stability, democracy, fighting corruption). In 2003, the growth in the gross domestic product reached 9.64% in 2004, accompanied by a soar in intermediate imports recorded at 38.37%. In 2015, the growth in intermediate imports decreased to 15.69%, with a 6.09% growth in GDP.

Finally, in 2018, intermediate imports decreased to 7.42%, and economic growth in GDP was only 3.83%. Accordingly, it is clear that economic growth in Turkey is directly related to intermediate imports, meaning that there is a reciprocal relationship: if intermediate inputs are imported, there is economic growth. While in Germany, intermediate imports play an important role in economic growth, cheap foreign intermediate imports enable the economy to more directly devote savings to new investment (Vogel and Wagner, 2010).

5.6. Intermediate Imports and Manufacturing Exports (1980-2018)

Access to intermediate imports at cheap prices is one of the determinants of manufacturing exports developing in many countries that have adopted the import substitution strategy. Through imports, the manufacturing sector can access a variety of technical patterns as well as upgrade technology. This allows manufacturing to make new intermediate imports similar to what has been imported and export new products (Castellani and Fassio, 2019). This depends on the ability of the production sector to expand horizontally, that is, increase the number of products and, expanded vertically, increase the degree of specialization.

In Turkey, one of the major obstacles that faced the manufacturing sector after trade liberalization was its inability to expand exports significantly (for instance, in Singapore after liberalization, the manufacturing base grew sharply). Tuncer (2002) examined the causality relationships between exports, imports, investment, and GDP in Turkey. This study depends on the employed vector autoregressive model. The quarterly period data from 1980-2000 was used. The findings indicate that there is a two-way and robust relationship between imports and GDP, as well as a one-way relationship between imports and exports from imports to exports.

Based on input-output Tables, Erduman et al. (2019) examined the import content of production and exports in Turkey over the period 2002–2017. The study used a vast data set of production regarding foreign trade for 20 sectors. The results show that import dependency increases for exports. Table 4.5 shows the ratio of Turkey's manufacturing exports to intermediate imports in the period (1980-2018).

Table 4.5 Intermediate imports and manufacturing exports (1980-2018)

(U.S. \$ billion)

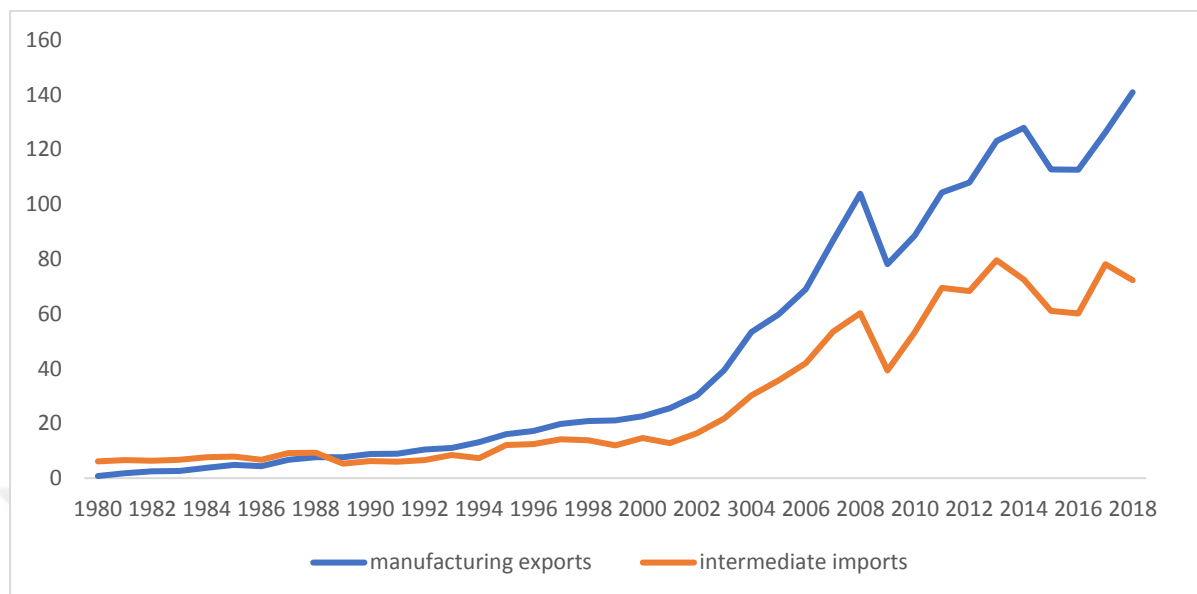
Year	Manufacturing exports (M)	Intermediate imports (INM)	M/INM	Year	Manufacturing exports (M)	Intermediate imports (INM)	M/INM
1980	0.782	6.158	0.13	2000	22.569	14.669	1.54
1981	1.748	6.547	0.27	2001	25.591	12.782	2.00
1982	2.474	6.332	0.39	2002	30.231	16.440	1.84
1983	2.670	6.675	0.40	2003	39.501	21.852	1.81
1984	3.849	7.624	0.50	2004	53.337	30.236	1.76
1985	4.855	7.836	0.62	2005	59.822	35.713	1.68
1986	4.337	6.673	0.65	2006	69.075	42.044	1.64
1987	6.730	9.180	0.73	2007	86.786	53.489	1.62

1988	7.697	9.250	0.83	2008	103.935	60.300	1.72
1989	7.625	5.304	1.44	2009	78.224	39.381	1.99
1990	8.783	6.224	1.41	2010	88.545	53.289	1.66
1991	8.942	6.045	1.48	2011	104.337	69.462	1.50
1992	10.500	6.647	1.58	2012	108.004	68.369	1.58
1993	11.020	8.433	1.31	2013	123.141	79.627	1.55
1994	13.136	7.262	1.81	2014	128.020	72.520	1.77
1995	16.054	12.047	1.33	2015	112.827	61.143	1.85
1996	17.282	12.476	1.39	2016	112.631	60.157	1.87
1997	19.794	14.212	1.39	2017	126.339	78.124	1.62
1998	20.816	13.801	1.51	2018	140.995	72.330	1.95
1999	21.067	11.945	1.76				

Source: Central Bank of the Republic of Turkey- TCMB, ISE, Annual Statistical Bulletin, 1977-88.

Turkey's manufacturing exports and intermediate imports data in Table 4.5 indicated that the share of manufacturing exports to intermediate imports during the study period (1980-2018) tended to be stable around 50%. This indicates a significant deterioration in the industrial export sector, meaning that 50% of the intermediate imports have been used in production. To cover domestic consumption, this ensures that the strategy of import substitution has failed after trade liberalization, on the one hand, and the manufacturing sector has failed to achieve significant growth in industrial exports or even to manufacture production inputs needed for domestic production. The production capacity in the manufacturing sector in Turkey can't be expanded enough to achieve the scale of an economy. The ratio of industrial exports to intermediate imports was 54% in 1980, and after 36 years, it reached 57%. This indicates that the Turkish industrial export sector did not achieve a real breakthrough towards strengthening the mechanism of supply and limiting the mechanism of demand.

Figure 4.4: Manufacturing exports and intermediate imports from 1980 to 2018.
(U.S. \$ billion)



Source: Based on TCMB, ISE, Annual Statistical Bulletin, 1977-88.

Figure 4.4 displays that manufacturing exports and intermediate imports in Turkey over the last (1980-2018) move together. This explains the simultaneity between manufacturing exports and intermediate imports. Growth in manufacturing industries in Turkey depends largely on foreign intermediate imports, particularly inputs from an advanced economy, similar to Korea, Singapore, and Germany. Turkey injects manufacturing industries with more varieties of intermediate imports, which leads to an expansion in the industry base.

5.7. Theoretical Framework

Following Findlay and Rodriguez (1997), the gross output of the economy is a function of the inputs of capital, labor, and an intermediate good. Nevertheless, based on the neoclassical production function, capital and labor may be substituted for each other with regard to value added that is used in fixed proportions to gross output. These assumptions lead to the specification of the production function as followed:

$$Q = \text{Min}[F(K, L), \alpha R] \quad 4.1$$

Where Q is gross output, K the capital stock, L employment, R the quantity of the intermediate input used up in production. $\alpha = 1$ by suitable choice of units, and regard K as being fixed in the short run.

Let P , P_R and W denote the nominal prices of Q , R , and L in terms of domestic currency. It is readily seen that profit maximization by producers results in equating the net marginal product of labour to the wage, giving us

$$(P - P_R)F'(L) = w \quad 4.2$$

Equation 4.2 can be transformed to

$$P(1 - eP^*)F'(L) = w \quad 4.3$$

by defining $P_R = E \cdot P^*$ and $E/P = e$, where E denotes the nominal exchange rate, p^* the price of the imported intermediate input in terms of foreign currency, and e the nominal exchange rate deflated by the domestic price level, or the 'real exchange rate' as it is often called. Dividing both sides of (3) by P it follows of course that the real net marginal product of labour is equated to the real wage.

By diminishing returns to labour, $F''(L) < 0$, it follows from (3) that

$$\frac{\partial Q}{\partial P} > 0; \quad \frac{\partial Q}{\partial e} < 0; \quad \frac{\partial Q}{\partial P^*} < 0,$$

The net output of the economy is defined as the gross output less the real cost of the imported intermediate input (there is no domestic production of the intermediate good) so that we have

$$q = Q - eP^*R = (1 - eP^*)Q,$$

As well as, since Q depends on P and eP^* , so that

$$q = q(P, eP^*), \quad 4.4$$

with

$$\frac{\partial q}{\partial P} = (1 - eP^*) \frac{\partial Q}{\partial P} > 0, \quad 4.5$$

$$\frac{\partial q}{\partial P^*} = (1 - eP^*) \frac{\partial Q}{\partial P^*} - eQ < 0, \quad 4.6$$

$$\frac{\partial q}{\partial e} = (1 - eP^*) \frac{\partial Q}{\partial P} - p^*Q < 0, \quad 4.7$$

Real national income (which is equal to value added) is net output q as defined above and for equilibrium in the goods market use must have

$$q(P, eP^*) = C(q) + I(r) + X(e) - M(q, e) - IM(q, eP^*), \quad 4.8$$

where C is total consumption, I is investment, r is the domestic real rate of interest, X is exports, M is imports of consumer goods, and IM is imports of the intermediate input. Assuming that future changes in the exchange rate and the domestic price level are expected to be static. When associated with the assumption of perfect international capital mobility under free trade, the domestic interest rate equals the fixed world interest rate, resulting in

$$\frac{\partial C}{\partial q} > 0, \quad \frac{\partial X}{\partial e} > 0, \quad \frac{\partial M}{\partial q} > 0, \frac{\partial M}{\partial e} < 0$$

From previous section

$$IM = Q - q = \frac{eP^*}{(1 - eP^*)} q, \quad 4.9$$

With

$$\frac{\partial IM}{\partial q} > 0, \quad \frac{\partial IM}{\partial e} > 0, \quad \frac{\partial IM}{\partial P^*} > 0$$

Based on Eq 4.9, standard import's function under flexible exchange rate as

$$IM = F(RER, Y) \quad 4.10$$

Where, IM intermediate imports, RER real exchange rate, Y Gross domestic product.

After trade liberalization was carried out, trade volume grew significantly. Thus, Husted (1992) proposes a basic theoretical framework that predicts a long-run link between exports and imports due to the dependency relationship between imports and exports in an open economy. He begins with individual current-period budget constraint assumed by

$$C_0 = Y_0 + B_0 - I_0 - (1 + r)B_{-1} \quad 4.11$$

Where C_0 is current consumption; Y_0 is output, I_0 is investment, r is the one-period world interest rate, B_0 is the international borrowing, and $(1 + r)B_{-1}$ is the historically given initial debt.

The economy's inter temporal budget constraints are produced by integrating these period-by-period budget constraints, as shown in Eq. 4.11. Husted (1992) then proposes many assumptions in order to obtain a testable equation, including that imports and exports follow a random walk with drifts and that the world interest rate is stationary with mean r . The testable equation is as follows:

$$M_t = a + bX_t + e_t \quad 4.12$$

where M_t denotes goods and services imported, and X_t denotes goods and services exported. The null hypothesis asserts that the country's intertemporal foreign budget limitation is satisfied. This indicates that $b = 1$ and e_t are stationary processes, or in

other words, if M_t and X_t are integrated; they are cointegrated with the cointegrating vector (1,-1). Nevertheless, if b is less than 1, the economy will fail to satisfy its budget constraint.

Countries have been chosen trade liberalization as a strategic program to expand exports base particularly in manufacturing, access to competitive intermediate imports enable industries to reduce costs and increasing output.

The Turkish intermediate import share of total imports is significant, reaching 32% in 2018. These inputs are used in manufacturing exports. Consequently, the ratio of manufacturing exports to intermediate imports was 0.13 in 1980. After liberalization, the ratio increased significantly and reached 1.41 in 1990. Interestingly, this ratio gradually increased and recorded 1.95 in 2018. The growth in manufacturing exports was higher than the growth in intermediate imports. This makes investigating the relationship between intermediate imports and manufacturing exports of interest to many scholars, as it allows them to explore the effect of trade liberalization on intermediate imports.

Sastre (2012) examined the simultaneity between export and import in the Spanish case by employing exports as a determinant of import demand in an open economy owing to the dynamic optimization process.

Krugman (1995) indicated that in new industrial economies imports depend on exports and defined it as "slicing up the production process" in the liberalization era. He assumed import function as where x is exports and Z other determinants such as real exchange and domestic income. In Turkey, Aker (2008) examined the essential

determinants of imports and introduced exports as one of them. The results show that there is a significant relationship between imports and production stock.

Based on the role of trade liberalization in intermediate imports in a theoretical framework, manufacturing productivity increases via high technology up-grading embodied by inputs as well as price, the standard import function reveal that imports determined by the real exchange rate and home income, recently in industrial countries manufacturing exports play a significant role in determining the volume of intermediate imports, relied on the simultaneity between imports and exports in a modern open economy, moreover, manufacturing exports specified as a proxy of embodied high technology, according to Turkish statistics, the high-technology products' share of total exports increased and reached 3.4% in the first eight months of 2020, more than 3.2% during 2019. This confirms that the increase in manufacturing exports collaborated with high technology embodied by intermediate imports as a result of trade liberalization and integration in the global economy. Following Krugman (1979), Bergin and Freenstra (2000), Fung and Siu (2008), and Ibarra (2011), Sastre (2012), based on Equations 4.9, 4.12 intermediate import input functions can be expanded by including exports as follows:

$$IN = F(RER, GDP_d, EXP) \quad 4.13$$

Specifications for the model

Since the real exchange rate acts as a proxy of trade liberalization's impact on intermediate imports, if the real exchange rate declines (currency depreciation), imports decline and vice versa. Since manufacturing exports involve a high portion of

intermediate imports, the impact of currency depreciation on the volume of intermediate imports is low.

In advanced countries like Turkey, the income elasticity of demand for imports is positive. That means high domestic income will lead to high saving and result in new investment. In a new industrial country like Turkey, intermediate imports depend on manufacturing exports (more manufacturing exports, more intermediate imports). This specifies the simultaneity between exports and imports in global trade. Based on a theoretical framework, trade liberalization in intermediate imports is embodied by upgrading technology which enhances domestic manufacturing productivity. The increase in Turkey's manufacturing exports is explained by involving high technology content due to trade liberalization.

By transforming equation 4.13 into a log, it becomes:

$$\ln(IN_{LR}) = \alpha + \pi \ln GDP_d + \rho \ln RER + \epsilon \ln EXP + \omega_t \quad 4.14$$

Where *IN* intermediate import and *LR* for long run, *GDP* is gross domestic product of Turkey, *RER* is real exchange rate, *EXP* is manufactured exports, ω_t is the classical regression error term.

To dictate long -run relation according advances in econometric literature Eq.4.12 should include short run dynamic adjustment procedure. This will be achieved by articulating Eq. 4.13 in an error -correction model as proposed in Pesaran et al. (2001):

$$\begin{aligned} \Delta \ln(IN_{LR}) = & \alpha + \sum_{i=1}^{m_1} \sigma \Delta \ln IN_{LR-i} + \sum_{i=0}^{m_2} \pi \Delta \ln GDP_{t-i} + \sum_{i=0}^{m_3} \rho \Delta \ln RER_{t-i} + \\ & \sum_{i=0}^{m_4} \epsilon \Delta \ln EXP_{t-i} + \delta_1 \ln IN_{LR-1} + \delta_2 \ln GDP_{t-1} + \delta_3 \ln RER_{t-1} + \delta_4 EXP_{t-1} + \\ & \lambda EC_{t-1} + v_t \end{aligned} \quad 4.15$$

where, π, ρ, ε , short term coefficients, $\delta_2, \delta_3, \delta_4$, long term coefficients.

In econometrics literature this methodology known as autoregressive -distributed lag (ARDL), show that long-run and short-run estimated simultaneously. Long run effects the independent variables on dependent variable are obtained by the estimates of δ_2, δ_3 and δ_4 that are normalized on δ_1 .

To determine whether the adjustment of variables is toward in long-term equilibrium, estimates of $\delta_1 - \delta_4$ are used to construct an error -correction term (EC). Therefore lagged -level variables in Eq.4.14 are changed by EC_{t-1} establishing a modified version of Eq. 4.16 as follows:

$$\begin{aligned} \Delta IN_{LR} = & \alpha + \sum_{i=1}^{m_1} \sigma INT_{LR-i} + \sum_{i=0}^{m_2} \pi \Delta GDP_{t-i} + \sum_{i=0}^{m_3} \rho \Delta RER_{t-i} + \\ & \sum_{i=0}^{m_4} \varepsilon \Delta EXP_{t-i} + \lambda EC_{t-1} + \mu_t \end{aligned} \quad 4.16$$

Where λ is the speed of adjustment parameter. A significant negative coefficient EC_{t-1} support adjustment toward long run equilibrium.

5.8. Empirical Findings

This study uses annual time series data for the Republic of Turkey over 1980–2018. The Central Bank of Turkey and the World Bank collected this data, and the analysis begins with the unit root test (ADF) to determine whether the time series data are stationary at levels or the first difference, lag selection test based on the Schwarz information criterion (SIC).

The Johansen cointegration test is employed to determine whether there is any long-run or equilibrium relationship between the dependent and dependent variables, the bound test is computed, and long and short run estimation are employed.

5.8.1. Unit Roots Test

The result of unit root for the following variables (intermediate imports, domestic income, real exchange rate, manufacturing exports) is shown in Table 4.6. Results of the Augmented Dickey-Fuller (ADF) unit root test suggest that all variables are non-stationary at level but become stationary at first difference. To summarize, all the variables are integrated at order I(1). This result enables us to apply the ARDL method.

Table 4.6 Unit root results

Variable	Level			1st difference		
	ADF	Critic value	Result	ADF	Critic value	Result
IN	-0.23	-2.9	Non- stationary	-6.48	-2.9	stationary
GDP _d	-0.28	-2.9	Non- stationary	-5.22	-2.9	stationary
RER	-1.68	-2.9	Non- stationary	-7.53	-2.9	Stationary
X _m	-1.04	-2.9	Non- stationary	-5.47	-2.9	Stationary

Notes: Where, *IN* are intermediate imports, *GDP_d* is domestic income, *RER* is real exchange rate, *X_m* are manufacturing exports.

Table 4.6 show that all the variables are non-stationary at level at 5% significance level. However, all stationary at their first difference. This mean that all series are I(1).

5.8.2. Lag length selection test

lag length selection achieved by the Schwarz information criterion (SC) in which the maximum lag was lag 1 were determined for the dependent and independent variable.

Table 4.7 Lag selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1070.43	NA	5.42e+21	61.396	61.574	61.457
1	-965.673	179.59	3.43e+19	56.324	57.212*	56.631
2	-950.126	23.098	3.66e+19	56.350	57.949	56.902
3	-918.162	40.184*	1.63e+19*	55.437	57.748	56.235*
4	-907.709	10.750	2.75e+19	55.754	58.776	56.797

*Notes: indicates lag order selected by the criterion

LR: sequential modified LR test statistics (each test at 5% level), FPE: final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hanna-Quinn information criterion.

As a result of the recognized model, the appropriate lag length for the LR 4, FPE and AIC is 1, 1 for SIC and 1 for HQ. Then, (1) is determined as the appropriate lag length with the most consensus.

5.8.3. Breusch-Godfrey Serial Correlation LM Test

Table 4.8 Breusch-Godfrey serial correlation *LM* Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.093	Prob. F(2.29)	0.910
Obs*R-squared	0.279	Prob. Chi-Square (3)	0.869

Based on Breusch-Godfrey Serial Correlation LM Test which shows the F-statistics 0.093 with prob (0.05) equal 0.910 more than 0.05 that means no serial correlation at up to 2 lags.

5.8.4. Cointegration results

Bound Test Results

In order to determine the presence of a long run relationship among the variables, the bound tests are conducted, results of the bound tests are presented in Table 4.9.

Bound test results reveal that the computed F-statistics based on the Wald test is 6.527 this exceeded the upper bound of 4.66 at the 1% significance level, suggesting that the null hypothesis of no cointegration relation is rejected. therefore, the long run relationship is confirmed among, intermediate imports, real exchange rate, manufacturing exports, GDP of Turkey, the result implies that these variables move together and so cannot move ‘too far away’ from each other independently.

Table 4.9 F-statistics for testing the existence of long-run cointegration

F-statistics	K	Significance level	Bound Critical Values	
			I(0)	I(1)
		1%	2.37	3.2
6.527	3	5%	2.79	3.69
		10%	3.65	4.66

Notes: From Persaran et al (2001) Critical values are obtained.

Source: extracted from estimation output using Eviews 11.

Our result show that there is a long run relationship between intermediate imports, Real exchange rate, manufacturing exports, domestic GDP. This indicate that the series in long run move together, these results consistent with Durmaz and Lee (2015).

Johansen-Juselius maximum likelihood cointegration tests

The presence of cointegration relationships between the series is performed by using Johansen's test approach, results are presented in Table 4.10.

Table 4.10 Johansen-Juselius maximum likelihood cointegration test

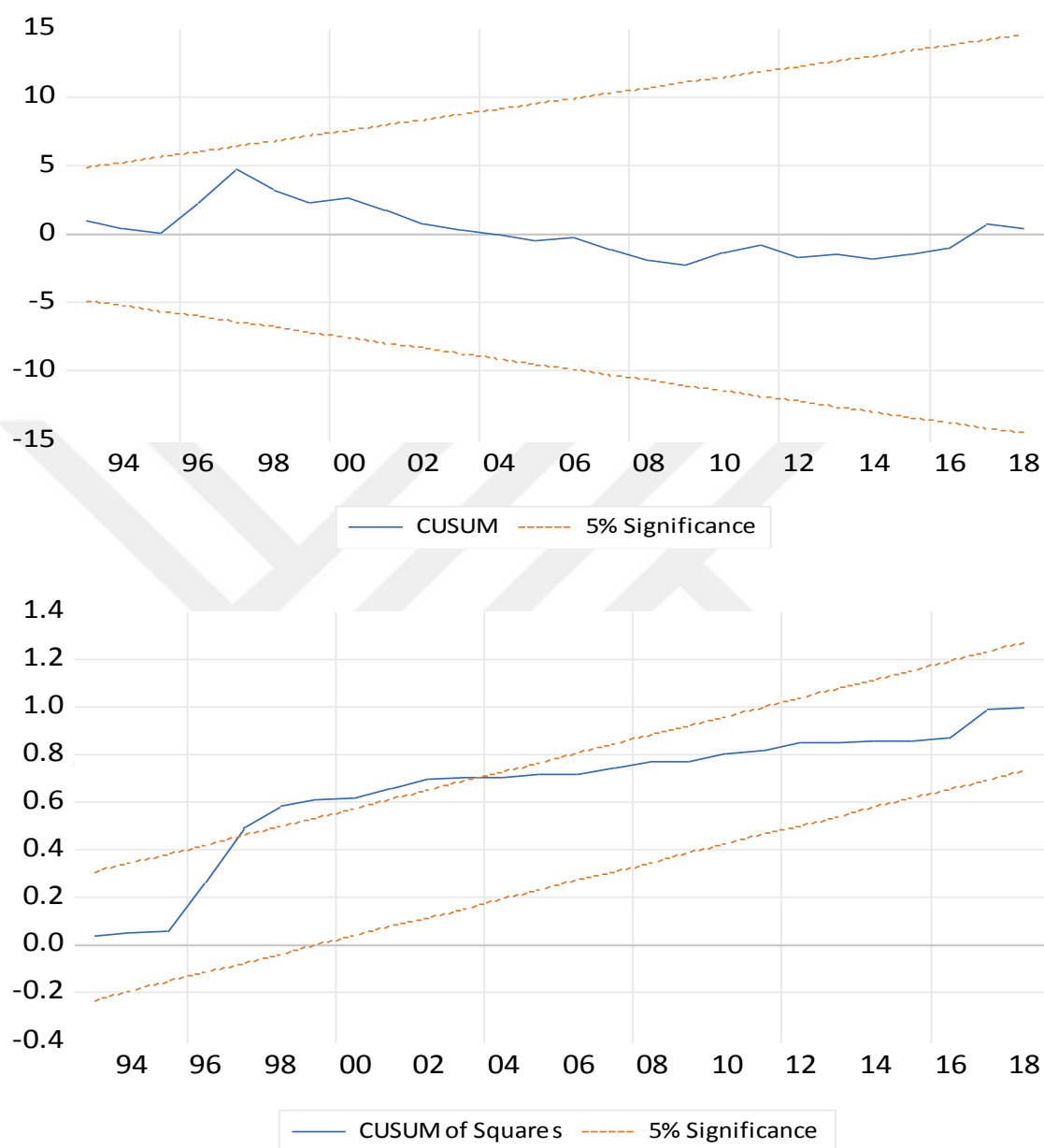
Trace test				Maximal Eigen value Test			
Null	Alternative	Statistic	0.05 Critical Value	Null	Alternative	Statistic	0.05 Critical Value
$r = 0$	$r = 1$	40.927*	40.174	$r = 0$	$r = 1$	24.087	24.159
$r \leq 1$	$r = 2$	16.840	24.275	$r \leq 1$	$r = 2$	12.807	17.797
$r \leq 2$	$r = 3$	4.032	12.320	$r \leq 2$	$r = 3$	3.245	11.224
$r \leq 3$	$r = 4$	0.787	4.129	$r \leq 3$	$r = 4$	0.787	4.129

The result in Table 4.10 shows that there is at least one cointegration vector, thus, null hypothesis "no cointegration" rejected and alternative hypothesis accepted. According to this result, the series of IN, RER, EX, GDP, move together in the long run.

5.8.5. Stability Test

To test the stability of the long-run parameters, cumulative sum (CUSUM) and the cumulative sum of square (CUSUMQ) is used. A graphical representation of CUSUM and CUSUMQ statistics are provided in panel 1 and panel 2 of the Figure 4.5 respectively.

The CUSUM test indicates that the parameters are stable over time as the plot of cumulative sum of recursive residuals and cumulative sum of squares of recursive residuals lies within the critical bound at 5% significance level.

Figure 4.5 Intermediate import's function stability test

5.8.6. Long Run Coefficients

Once we found the long run cointegration relationship among the variables of our study, results obtained by estimate intermediate imports as a (dependent variable) in the long run are reported in Table 4.11.

Table 4.11 Long run coefficients of intermediate imports function

Variable	Coefficient	Std. Error	t-Statistic	Prob*.
Ln(EX)	-0.104	0.334	-0.312	0.757
Ln(GDP _d)	1.139	0.505	2.256	0.032
Ln(RER)	1.193	0.444	2.681	0.012
C	-9.451	4.591	-2.059	0.049

Long run equation:

$$IN_{LR} = \alpha + \pi GDP_d + \rho RER + \varepsilon EXP \quad 4.17$$

$$EC = \ln(IN) - (-0.104 \cdot \ln(EXP) + 1.139 \cdot \ln(GDP_d) + 1.193 \cdot \ln(RER) + (-9.451)) \quad 4.18$$

The estimated coefficient of the long-run relationship shows that an increase in manufacturing exports by 1% leads to a decrease in intermediate imports by 0.10%. In the long run, some industries substitute intermediate imports with domestic inputs. Unambiguously, in the long run, many industries specialize in some inputs, so intermediate inputs decrease.

The estimation of the long-run relationship between income and intermediate shows that an increase of each percent in the growth rate of GDP leads to an increase in demand for intermediate imports by 1.135%. Our result is consistent with Durmaz and Lee (2015) and Tuncer (2002).

The results indicate that a depreciation of the currency by 1% will lead to an increase in intermediate imports of 1.19 %. *T*-value is significant. The explanation for this is that

during currency depreciation, exports will be increased, thus intermediate imports will increase.

5.8.7. Short Run Results

The error correction model obtained from ARDL test, provides knowledge about short run effects of variables on exports, Table 4.12 contains the estimation results from the error correction model, results explain that the short run effects of GDP_d and exchange rate, manufacturing exports on intermediate imports.

Table 4.12 Short run coefficients of intermediate import's function

Variable	Coefficient	Std. Error	t-Statistic	Prob*.
DLn(EX)	0.973	0.110	8.786	0.0000
DLn(GDPd)	0.526	0.169	2.681	0.0004
DLn(RER)	0.028	0.207	0.136	0.9328
CointEq(-1)*	-0.461	0.075	-6.136	0.0000
R-squared	0.798	Mean dependent var		0.067
Adjusted R-squared	0.765	S.D. dependent var		0.215
S.E. of regression	0.104	Akaike info criterion		-1.531
Sum squared resid	0.326	Schwarz criterion		-1.267
Log likelihood	33.57	Hannan-Quinn criter.		-1.439
Durbin-Watson stat	1.915			

In the short run, Table 4.12 shows that there is a statistically significant relationship between manufacturing exports and intermediate imports. For each 1% increase in manufacturing exports, there is an increase in intermediate imports by 0.97%. This

result confirms the simultaneous relationship between manufacturing exports and intermediate imports. Our result not consistent with Aker (2008).

Moreover, there is a statistically significant relationship between GDP in Turkey and intermediate imports. For each 1% increase in GDP in the short run, there is a 0.52% increase in intermediate imports. Our results are consistent with Erduman et al. (2019).

Finally, results show that the impact of currency depreciation on intermediate imports in the short run is not observed. For each 1% increase in currency depreciation in the short run, leading to only 0.028% in intermediate imports, our result is consistent with Aldan et al. (2012).

The difference between the long and short-run leads us to investigate how disequilibrium in the short-run moves to equilibrium in the long run, where ECM shows how the short-run and long-run cointegration over time, the negative signs of the ECM coefficient and significant shows the existence of disequilibrium in the short run and convergence in the long run. The ECM value of -0.46 suggests a relatively high speed of adjustment from the short-run deviation to the long-run equilibrium of intermediate imports. Therefore, 46.1% of all errors or disequilibrium in the short term will be adjusted in the long term in the coming period. This indicates the disequilibrium percentage in the previous equilibrium which corrected it in the next period as shocks happened in independent study variables that impact dependent variables.

The statistical value of the Durbin Watson is 1.915, which indicates that no autocorrelation exists between the variables. The value of R^2 is 0.79, which suggests that 79.0% of the change in variation in the dependent variable is due to changes in independent variables.

5.9. Conclusion

Since 1980, Turkish imports have increased and decreased, affected by many internal and external factors. The implementation of the trade liberalization program has not contributed to limiting these imports. As a share of total imports since 1989, intermediate imports as a share of total imports have remained within the ratio of 25-35%, and this is a signal that the real exchange rate has no effect on the mechanism of demand on one hand, and the economic capacity has not expanded enough to use more intermediate imports.

With regard to the total import share of the gross domestic product, it was equivalent to an average of 20.5%, while the intermediate imports were recorded at only 7.5% during the study period (1980-2018). In most of the countries that have implemented trade liberalization programs, manufacturing exports have increased as a share of intermediate imports, depending on the fact that these inputs will go to oriented manufacturing exports. However, in the Turkish experience, this share remained at 56.5% of the average import during the study period. The study model follows (Ibarra, 2011), who introduced manufacturing exports into the intermediate import function.

This study employed autoregressive distributed lag (ARDL). The results indicated that manufacturing exports have a statistically significant effect. However, GDP and real exchange rate have no statistically significant effect in the long run. Our results are consistent with Özatay (1997). In the short run, manufacturing exports and GDP have a statistically significant impact on intermediate imports. This result is consistent with Kotan & Saygılı (1999). Nevertheless, the real exchange rate does not have a significant impact on intermediate imports. Based on long and short-run results, Turkey's intermediate imports are price inelastic.

Overall, trade liberalization provides Turkish industries with access to high-technology intermediate imports that help to develop manufacturing sectors.



6. TRADE LIBERALIZATION AND TRADE BALANCE

Abstract

This study aims to examine the impact of trade liberalization on Turkey's trade balance over a period (1962-2018). In the first section, the study shows descriptive statistics of the trade balance, the share of total trade in the GDP, deficit rate, and GDP rate. In the second section, the study depends on the elasticity approach and traditional function adopted by Bahmani Oskooee (1999) and Onafowora (2003). A dummy variable was introduced to catch up on the impact of trade liberalization.

The trade balance in Turkey over the period 1962-2018 is still suffering from a chronic deficit, although numerous reforming policies were adopted to decrease this deficit after the trade liberalization program's implementation. The share of trade volume compared to GDP has steadily increased in the last ten years, and the average trade share of GDP during the study period is 33.55%.

To examine the long-run impact of the real exchange rate, domestic income, and foreign income on the trade balance, autoregressive distributed lag (ARDL) was employed. The bound test result shows that there is a long-run relationship between the trade balance and the explanatory variables. Long run estimation indicates that the real exchange rate, increased real exchange rate (currency depreciation), as well as foreign income, have a negative impact on the trade balance. Domestic income has a positive impact on the trade balance. An increase in domestic income of 1% will lead to an improvement in the trade balance by 0.45%. To catch up on the impact of trade liberalization on the trade balance, a dummy variable was introduced. The results show that trade liberalization has a positive and statistically significant impact on the trade balance. An

increase of 1% integration into the global economy will improve the trade balance by 0.76%.

This essay discussed trade liberalization and the trade balance. In the first part, descriptive statistics displayed trade balance deficit, trade volume, and gross domestic product in Turkey, as well as growth rate and deficit rate. The second part is trade balance estimation based on the popular model adopted by Bahmani Oskooee (1999), Onafowora (2003). Following Thirlwall and Paulino (2004), the standard trade balance function was extended by introducing a dummy variable to capture the impact of trade liberalization.

Keywords: Trade liberalization, trade balance, Turkey.

6.1. Introduction

While the trade balance portrays the relationship between the volume of exports and imports, the imports suffer from a deficit while the exports suffer from a surplus. Contrarily, if exports are more than imports, the trade balance witnesses a trade surplus.

There is a strong debate among international economic scholars about whether trade liberalization improves or deteriorates the terms of trade. Globalization has depressed societies toward hyper-consumption; trade liberalization advances more variety; technological communication enables people to be closer to global markets. In the last year, consumption has been globalized; people consume more than they need.

One of the main concerns attributed to countries that liberalize trade is the possible deterioration of the trade balance. UNCTAD (1999) indicates that trade liberalization leads to a deep trade deficit if it is not followed by an increase in exports that exceeds imports.

Unambiguously, a country's trade performance is affected by a large number of endowments. A sharp decline in growth is associated with a worsening of the trade balance.

In the globalization era, growth in the short run cannot be sustained if the trade deficit continues. Trade liberalization enables new countries to enter the global market by exporting. Comparative advantage is changed dramatically by new technological advances. Countries such as Mexico, Canada, Brazil, and Japan lose this comparative advantage, and the trade balance worsens.

Accordingly, the trade balance can be improved depending on two strategies. The first is through supply-side policies by improving productivity and reducing inflation, which leads to an efficient labor market. The second is through currency depreciation. This strategy will succeed based on the extent to which relative prices of imports and exports change after depreciation. On the other hand, depreciation improves the trade balance if a country does not suffer from a long-run deficit (Krueger, 1983; Kurtovic et al. 2017).

Investigating the impact of trade liberalization on the trade balance has been an important field of study in recent years, particularly in emerging economies. Empirical literature shows that trade liberalization affects the trade balance significantly (Santos-Paulino and Thirlwall, 2004).

6.2. Literature review

The trade balance is the economic mirror to judge whether the economy is experiencing growth or not. The economic literature has shown that the trade balance equilibrium is achieved when exports are equal to imports, but in light of trade liberalization, many countries are negatively affected by import competition compared to their exports. This leads to violating terms of trade and reducing economic growth in the long run. According to Balassa (1975), openness is followed by tariff reduction. Once a reduction in import tariffs is implemented, there will be an imbalance in the current account as a result of the increasing demand for imports. In turn, this induces the need to generate depreciation in the real exchange rate to bring a balance between exports and imports to keep the trade balance in balance.

The findings of the study support the endogenous growth theory in Turkey, as well as the joint causality between the per capita growth rate and a set of trade liberalization indicators. Openness and growth relationships are plausible. Trade distortions to growth are consistent with regard to trade policy in endogenous growth theory. However, the increase in imports more than exports keeps trade deficits in Turkey.

Santos-Paulino and Thirlwall (2004) show that trade liberalization led to deteriorating terms of trade and had a negative impact on the trade balance. In countries that suffer from low economic growth, trade liberalization promotes growth in most cases, but growth itself has a negative influence on trade balances and adverse terms of trade (Parikh, 2006).

The trade liberalization program was adapted as a package to maintain the export sector by using an import substitution strategy, but if imports increase more than exports, this will lead to a worsening trade balance (Ju and Zeng, 2010).

While Qayed (2013) investigates the impact of liberalization on terms of trade, the results reveal that both the trade liberalization and the terms of trade variables are negatively statistically significant; implying that trade liberalization worsens the balance of payments. Furthermore, the exchange rate has an important impact on the trade balance, especially in advanced economies. Currency depreciation is critical to export competitiveness.

The study carried out by Doroodian et al. (1994) examined the impact of trade liberalization between the U.S. and Mexico. The sample comprised 15 industries. The results ensure that trade liberalization will lead to benefits for the overall trade balance of the U.S.

Yazici and Klasra (2010) tried to explore the impact of the devaluation of the Turkish lira on intermediate import prices, manufacturing industries, and J-curve phenomena after trade liberalization held. Monthly data from 1986:1 to 1998:3 was used. results show that J-curve phenomena are not confirmed due to high imported inputs used by the manufacturing sector, which deteriorate the J-curve.

Tandon's (2014), testing the impact of the real exchange rate by focusing on some OECD countries, results show that RER changes did not affect the trade balance in the case of Germany. Sezer (2017) studied the impact of the real exchange rate and income on the trade balance in transition economies, including Turkey. The results support the extended Marshall-Learner condition.

The study sample consists of 28 countries in the European Union. Panel data over 1998-2018 was employed. The econometric analysis used included the ordinary least square method (OLS) and multivariate regression analysis with fixed effects. The findings propose that economic growth is influenced negatively when countries suffer from large trade deficits.

The authors examined the impact of the exchange rate on the foreign trade imbalance during the economic crisis in the new EU member states and the Western Balkan countries. The analysis was based on a strongly balanced panel database of 18 countries from 1990 to 2016, with pooled ordinary least squares (POLS) employed. The results show that the exchange rate is working to reduce trade imbalances when the economic situation is stable. The balance of payments deficit is not affected by exchange rate variations in the presence of a global recession.

Study findings show that the Marshall Learner condition is satisfied in the majority of the study sample, which indicates devaluation may improve the trade balance in the long run.

In other studies, Bahmani-Oskooee and Mohammadian (2019) studied the short and long run of euro appreciation and depreciation on the trade balances of twelve members of the euro zone. Linear and non-linear estimations were conducted, ARDL employed, and quarterly data over the period 1999Q1-2016Q4. Findings showed that seven countries benefited from the euro's depreciation, while Germany benefited from appreciation. This was linked to inelastic demand for German exports.

Bahmani-Oskooee and Ratha (2004) studied the impact of the depreciation currency on the improved trade balance. The results indicate that in the long run, the relationship holds. In the short run, the relationship is not approved.

Durmaz (2015) scrutinized the validity of the J-Curve at the Turkish industry level. Monthly data was employed over the period 1990-2012 in 58 industries. The ARDL methodology was used. The results indicated that J-Curve only holds in 13 industries. This ensures that the exchange rate tool is not effective in the Turkish case.

The study sample encompasses 18 European Union members over the period from 1990Q1-2017Q3. Study results regarding the nonlinear ARDL model show the validity of the J-curve phenomenon compared to a linear model. This indicates that there is an asymmetrical effect of depreciation and appreciation of the Turkish currency on Turkish bilateral trade.

Consequently, with the continuous deficit in the trade balance in many developed and developing countries, and the exchange rate mechanism unable, in light of trade

liberalization, to adjust this deficit depending on the fact that the relative prices, in the long run, are constant, countries must pay more attention to monetary policy to restore the economy toward balance.

The political and economic authorities have set a fitting tool that can be used when forming their economic policy to achieve equilibrium in the economy. The trade balance shows the economic relations and trends with partners on one hand and on the other hand, as an indicator of economic growth.

The trade balance is one of the most important components of the balance of payments. The surplus in the balance of trade reflects the wealth of the factors in the economy concerned, such as high GDP growth, high employment levels, low poverty, and exchange rate stability. This is considered as an indicator of the economic strength of the state, and the achievement of economic welfare and efficiency. However, the deficit in the trade balance reveals the weaknesses in the economy of the country that suffers it.

For countries with a structural trade deficit, appreciation of the currency becomes a barrier to limiting imports and increasing exports. This depreciation can lead to restoring balance in the long run, but this mechanism can't work right if the economy encompasses historical distortions in the production process, as it can lead to inflation without being able to raise the volume of exports due to the high prices of imported raw materials and equipment that are embedded in the production process. The economy is being pushed into recessionary inflation, and prices are conveyed by sluggishness in production and high unemployment rates.

Clearly, the impact of trade liberalization on the trade balance mirrored the important factor in the economy through external exposure. Many countries doubt that free trade has negative effects on the trade balance due to low prices of exports. Krueger (1978) indicates that during trade liberalization, if exports grow less than imports, this leads to an imbalance in the trade balance in the short run if a country faces a continuous deficit based on the structural system of economic capacity.

To conclude, trade liberalization exposes the national economy to foreign competition, this means that the economy must look for potential powers in sectors that support the economy in achieving strategic aims of bringing products into global markets, thus maintaining exports and limiting imports, which results in an improving trade balance.

The originality of this study is that it uses a dummy variable as a proxy for trade liberalization to illustrate the impact of trade liberalization on Turkey's trade balance for the period 1962-2018, in both the long and short term.

6.3. Turkey's Trade Balance

The trade balance is considered the most sensitive economic indicator in Turkey and the most affected by economic fluctuations, whether it is internal or external because it is directly related to the exports and imports of any country. Trade liberalization increased the sensitivity of this indicator to economic shocks, whether minor or otherwise making countries more cautious about designing future economic policies that leads to attaining a surplus in the global market.

On the Turkish side, Halicioglu (2008) found the positive effect of currency depreciation on the trade balance in Turkey. Celik and Kaya (2010) investigated the impact of the devaluation currency on Turkey's bilateral trade dynamics with regards

to seven countries, study period 1985Q1 to 2006Q4, panel cointegration tests were employed. The results showed that there is no evidence to support the J-curve effect in Turkey.

Yurdakul and Cevher's (2015) results revealed that a real effective exchange rate has a significant impact on the current deficit/GDP. On the contrary, Selcuk and Yardmc(2015) found that trade liberalization has a negative impact on the trade balance on one hand, but on the other hand, this impact is insignificant on the current account balance. MügeT and Vurala's (2016) results provide some support for the existence of the J-curve effect. Yet, no single pattern of the exchange rate-trade balance relationship is found to exist.

Ari and Cergibozan (2016) show that in the long run, an increase in the real effective exchange rate improves the trade balance, while an increase in Turkish (foreign) income improves (deteriorates) the trade balance. In the short run, a real effective exchange rate has no impact on the trade balance, while an increase in domestic and foreign income negatively affects the Turkish trade balance. The Turkish case does not hold for the J-curve hypothesis.

Turkey employed a liberalization program in 1980 after a deterioration in the balance of payments on one hand and a new change in global vision toward liberalizing the economy on the other hand. Turkey's liberalization program focused on improving trade terms by supporting the import substitution industry (ISI) and implementing major structural reforms in both the public and private sectors. This program embodied the following:

First, fighting the high inflation rate gradually without damaging the growth dynamics in the economy (to ensure price stability). Second, formation of an export-led growth model by abandoning the import substitution model, providing export motivations and subsidies, and ensuring import liberalization within this framework, reestablishing the balance of payments. Third, guaranteeing financial liberalization maintains the market economy, liberalizes foreign capital movements, limits the intervention of the government in the economy, and accelerates privatization efforts (Bayrak and Kanca, 2013). Fourth, tight monetary policy collaborated with positive real interest rate policy and liberalization of interest rates. Finally, liberalize foreign trade by eliminating interventions by the public sector, including removal of quotas on imports and continuing export promotion. Moreover, Aktas (2010) concludes that real exchange rates do not have a significant effect on the foreign trade balance in Turkey, although this tool is used by other countries to improve terms of trade.

Turkey, like other emerging countries, faced many economic challenges during the implementation of the economic reform program and the orientation towards trade liberalization during the period 1980-1995. Turkey joined the WTO in 1995, which helped it to start negotiations with the EU on the tariff system. In 1997, Asian countries were hit by the economic crisis. In 2000, the world economy shrank significantly, which contributed significantly to the increase in the Turkish trade balance deficit. Table 5.1 shows the development of the Turkish trade balance deficit during the period 1980-2018:

Table 5.1 Deficit of trade balance of Turkey (1980-2018) (U.S. \$ billion)

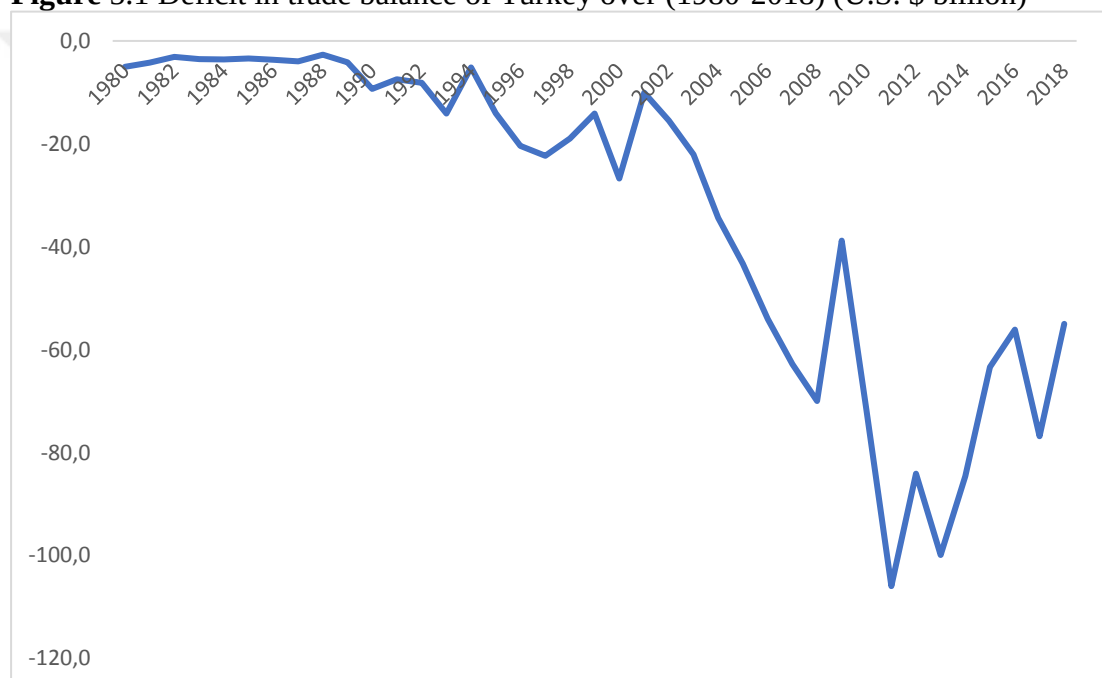
Year	Value	Growth rate %	Year	Value	Growth rate %
1980	-4.999		2000	-26.728	89.77
1981	-4.230	-15.38	2001	-10.065	-62.34
1982	-3.097	-26.80	2002	-15.495	53.95
1983	-3.507	13.26	2003	-22.087	42.54
1984	-3.623	3.31	2004	-34.373	55.62
1985	-3.385	-6.57	2005	-43.298	25.97
1986	-3.648	7.76	2006	-54.041	24.81
1987	-3.968	8.76	2007	-62.791	16.19
1988	-2.673	-32.62	2008	-69.936	11.38
1989	-4.167	55.89	2009	-38.786	-44.54
1990	-9.343	124.19	2010	-71.661	84.76
1991	-7.454	-20.22	2011	-105.935	47.83
1992	-8.156	9.43	2012	-84.083	-20.63
1993	-14.083	72.67	2013	-99.859	18.76
1994	-5.164	-63.33	2014	-84.567	-15.31
1995	-14.072	172.49	2015	-63.395	-25.04
1996	-20.402	44.98	2016	-56.089	-11.53
1997	-22.298	9.29	2017	-76.807	36.94
1998	-18.947	-15.02	2018	-54.946	-28.46
1999	-14.084	-25.67			

Source: TCMB

According to Table 5.1, the Turkish trade balance indicator shows that the deficit is the inherent characteristic of the trade balance in the period 1980-2018. The deficit rate decreases or increases depending on external economic factors such as imports and exports, on one hand, and the dynamism of the global economy, on the other hand.

Liberalization of Turkish trade has pros and cons. In 1982, the deficit decreased by 26%, and in 1990 the deficit increased by 124% due to the political conditions in the Middle East. With Turkey's accession to the WTO in 1995, the deficit reached the highest level by reaching 172.5%. In 2010, the trade balance deficit grew sharply and reached 84.7%. In 2017, the deficit grew by 37%, but in 2018 the trade balance deficit decreased and reached 28.5%. Figure 5.1 shows the Deficit in Trade Balance of Turkey Over (1980-2018).

Figure 5.1 Deficit in trade balance of Turkey over (1980-2018) (U.S. \$ billion)



Source: TCMB.

The trade balance deficit trend shows that over 1980-1988, the deficit fluctuated slowly, while in 1989 the deficit increased by 55%. In 1990, the Middle East experienced the Second Gulf War; oil prices increased by 31%; trade with Iraq stopped; sanctions were imposed on Iraq. All these changes had a negative impact on Turkey's trade balance.

The world witnessed the Asian financial crisis in 1997, which greatly affected the volume of international trade as well as Turkish trade. Furthermore, the high currency depreciation significantly impacted the trade balance; the trade deficit increased.

In 2001, the trade balance slightly improved, but it returned and recorded a sharp increase in the deficit from 2002 to 2008. In 2009, the deficit decreased to 44.5%. This decrease was accompanied by the global mortgage crisis.

From 2010 to 2011, the trade balance witnessed a sharp deterioration that was accompanied by a significant increase in international oil prices. From 2012 to 2014, the trade balance fluctuated, but the deficit did not drop a lot.

From 2014 to 2016, the Turkish lira lost more than 50% of its value. This limited imports and increased exports, so that the trade deficit decreased. But in 2017, with high government expenditures linked to home elections and economic disturbances in Europe, the deficit increased. Finally, with more depreciation in the Turkish lira, exports increased and imports decreased, resulting in a decrease in the trade deficit.

6.4. Trade and Growth

Trade policy formulation is considered one of the important axes to achieving economic growth in many countries that have worked to liberalize their trade, willing to attain a surplus in the trade balance and expand the export base.

Some countries, such as South Korea, have benefited from trade liberalization by being able to produce their high-tech intermediate inputs locally. This has contributed to increasing the trade share of the gross domestic product, which has contributed to achieving the required economic growth.

Cevik et al. (2019) investigated the impact of trade openness and economic growth in Turkey, using a Granger-causal relationship between economic growth and trade openness. The results show that there is no longer a Granger-causal relationship between economic growth and trade openness after 2008.

Zestos and Toa (2002) found that the foreign sector and GDP have a statistically weaker relationship in the United States, while Canada is more dependent on trade. Moreover, in another study conducted by Zestos and Toa (2002) that examined the sources of growth in South Korea and Japan via causality tests, the results showed that the Japanese trade share of GDP has remained low, at approximately 15-20%. However, South Korea's economy grew associated with the external sector, and the share of trade was approximately 70-80% of GDP. Granger causality confirms that there is causality in the Korean economy. In Japan's case, causality is not clear. In the Turkish case, the volume of trade still faces many obstacles and has not achieved significant growth in exports. Imports increased more than exports in Table 5.2, which shows the share of foreign trade in the gross domestic product.

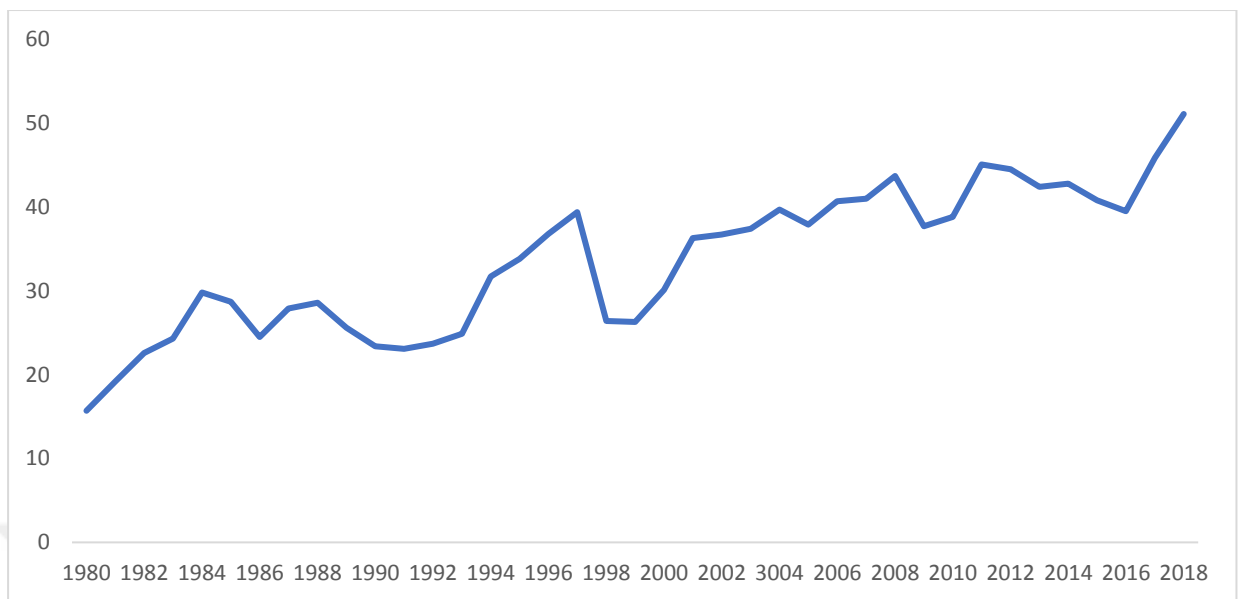
Table 5.2 Trade volume share of GDP (1980-2018) (U.S. \$ billion)

Year	Total Trade	% GDP	Year	Total Trade	% GDP
1980	10.819	15.7	2000	82.278	30.1
1981	13.636	19.2	2001	72.733	36.3
1982	14.589	22.6	2002	87.613	36.7
1983	14.963	24.3	2003	116.593	37.4
1984	17.891	29.8	2004	160.707	39.7
1985	19.301	28.7	2005	190.251	37.9
1986	18.562	24.5	2006	225.111	40.7
1987	24.348	27.9	2007	277.334	41.0
1988	25.997	28.6	2008	333.991	43.7

1989	27.417	25.6	2009	243.071	37.7
1990	35.261	23.4	2010	299.428	38.8
1991	34.640	23.1	2011	375.749	45.1
1992	37.586	23.7	2012	389.007	44.5
1993	44.773	24.9	2013	403.464	42.4
1994	41.376	31.7	2014	399.787	42.8
1995	57.346	33.8	2015	351.073	40.8
1996	66.851	36.8	2016	341.148	39.5
1997	74.820	39.4	2017	390.793	45.9
1998	72.895	26.4	2018	391.565	51.1
1999	67.259	26.3			

Source: Central Bank of the Republic of Turkey- TCMB

As can be seen from Table 5.2, the total trade volume share of the GDP was 19% in 1981. After the implementation of trade liberalization, it reached 23% in 1990, which is still low. This indicates that after the trade liberalization program was carried out, the capacity of the Turkish economy remained the same. From 2000 to 2010, the share was 30%, then increased to 38% in 2010, and from 2011 to 2018, it gradually increased to 51% by 2018. This indicates that the role of foreign trade strengthens its position in economic growth, although the share of imports and exports of the gross domestic product remained low. Compared to South Korea, the trade share of GDP was 70% in 2018.

Figure 5.2 Trade share of GDP (1980-2018)

Source: Based on Central Bank of the Republic of Turkey- TCMB

From Figure 5.2, we see that the Turkish foreign trade share of GDP trend is not constant and suffers from up and downward movement. This confirms that internal and external imbalances play a crucial role in growth in Turkey.

6.5. Growth and Trade Deficit

The deficit in the trade balance is considered one of the unhealthy conditions that the economy suffers from, consequently declining growth, increasing unemployment, and the inability of the state to achieve a surplus in its revenues. This results in many problems for countries that have adopted development programs in light of trade liberalization. Sustaining growth becomes constrained by the trade balance surplus. Nevertheless, a continuous deficit leads to credit crises in the long run.

Countries that suffered from trade deficits were unable to finance new projects, and thus unemployment increased and low economic growth was low, meaning that the deficit in the trade balance contributed to feeding the deficit in the budget indirectly

(Stiglitz,2010). According to Salvatore (2020), despite a trade deficit of \$854.00 billion in 2019, the United States recorded a growth rate of 3.0%, the highest since 2006, when it reached 2.8%.

With regard to the Turkish case, the deficit in the trade balance is accompanied by periods of growth and contraction. However, restructuring the composition of the production sectors and acceleration of economic growth can lead to a limited trade deficit, depending on the fact that economic growth is the output of an expanding production sector. Table 5.3 shows the Turkish growth rate and the trade deficit growth rate during the period (1980-2018).

Table 5.3: Turkey's trade deficit and GDP growth (1980-2018).

Year	Deficit %	GDP %	Year	Deficit %	GDP %
1980		-2.44	2000	89.77	6.64
1981	-15.38	4.86	2001	-62.34	-5.96
1982	-26.80	3.56	2002	53.95	6.43
1983	13.26	4.97	2003	42.54	5.61
1984	3.31	6.71	2004	55.62	9.64
1985	-6.57	4.24	2005	25.97	9.01
1986	7.76	7.01	2006	24.81	7.11
1987	8.76	9.49	2007	16.19	5.03
1988	-32.62	2.32	2008	11.38	0.85
1989	55.89	0.29	2009	-44.54	-4.7
1990	124.19	9.27	2010	84.76	8.49
1991	-20.22	0.72	2011	47.83	11.11

1992	9.43	5.04	2012	-20.63	4.79
1993	72.67	7.65	2013	18.76	8.49
1994	-63.33	-4.66	2014	-15.31	5.17
1995	172.49	7.88	2015	-25.04	6.09
1996	44.98	7.38	2016	-11.53	3.18
1997	9.29	7.58	2017	36.94	7.47
1998	-15.02	2.31	2018	-28.46	2.83
1999	-25.67	-3.39			

Source: Central Bank of the Republic of Turkey-TCMB

As can be seen from Table 5.3, Turkey's trade deficit growth has occurred chronically with economic growth. Following the trade liberalization program, the deficit decreased by 26.8% in 1982, associated with a growth rate of 3.56%. Then, the deficit increased sharply and reached 172.5% in 1995, after Turkey joined the WTO, the trade deficit collaborated with 7.88% of growth. Furthermore, over 2002-2006, the deficit increased by 18.7%, while economic growth was 8.49%. Finally, it should be noted that in Turkey, growth and deficit go hand in hand, especially during times of global expansion.

Globally, globalization has contributed to integrating world countries in the international economy, trade liberalization, and World Trade Organization (WTO) charter in freeing trade, leading to globalizing the development of trade globally.

Specialists in international economics have assumed that globalization has not only united countries in small villages but also led to globalizing economic growth in these countries. From Table 5.4, it is possible to see the change in the net trade of goods

within China, Turkey, and G7. This indicates that the net trade in any economic bloc is globalized, whether it is a surplus or a deficit.



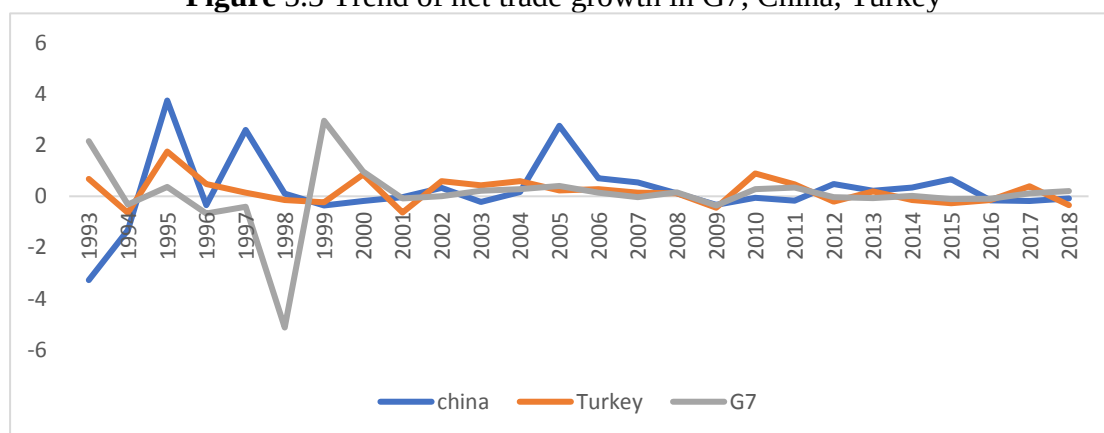
Table 5.4 Net Trade growth in China, Turkey, and the G7 countries

Year	China	Turkey	G7
1993	-3.27	0.68	2.15
1994	-1.32	-0.64	-0.32
1995	3.74	1.75	0.36
1996	-0.35	0.47	-0.67
1997	2.59	0.14	-0.41
1998	0.10	-0.15	-5.13
1999	-0.35	-0.24	2.95
2000	-0.19	0.86	0.97

2001	-0.04	-0.64	-0.08
2002	0.33	0.59	0.00
2003	-0.22	0.43	0.22
2004	0.17	0.59	0.28
2005	2.75	0.23	0.40
2006	0.70	0.27	0.14
2007	0.54	0.14	-0.04
2008	0.12	0.12	0.15
2009	-0.34	-0.45	-0.36
2010	-0.05	0.89	0.28
2011	-0.17	0.46	0.34
2012	0.48	-0.21	-0.03
2013	0.21	0.20	-0.07
2014	0.34	-0.15	0.01
2015	0.67	-0.27	-0.11
2016	-0.16	-0.15	-0.10
2017	-0.18	0.39	0.11
2018	-0.08	-0.34	0.20

Resource: WorldBank data.

Figure 5.3 Trend of net trade growth in G7, China, Turkey



Resource: Based on WorldBank data.

6.6. Currency Depreciation and Trade Balance

Based on economic reform programs, countries aim to increase their exports and reduce their imports in order to improve the trade balance, sustain growth, recover internal economic conditions, stimulate the national economy, and achieve high growth rates. Devaluation of the currency is used by countries as an economic tool to rebalance the national economy. Assuming the trade balance is in the balance based on the Marshall-Lehrer condition, devaluation of the national currency will lead to a change in relative prices for both exports and imports so that exports become cheaper from the importers' view and import prices become high, which will lead to an increase in exports and a decrease in domestic demand for imports, thus improving the balance of trade.

According to Aizenman (1981), if devaluation is large enough, imports decline sharply and produce a transitory balance of trade surplus toward long-run equilibrium, trade liberalization would accompany devaluation as an appropriate economic policy. The devaluation mechanism makes the adjustment immediate. This adjustment is almost avoided by the balance of payments.

Trade liberalization exposes the economy to foreign markets, allowing the domestic price of tradable goods to directly respond to devaluation. Therefore, disequilibrium in the home money market, as well as the necessity for a cumulative trade deficit, are avoided. Devaluation plays an important role in prohibiting unemployment during the period of adjustment.

However, devaluation in some countries may not improve the balance of trade directly due to: higher exports producing higher incomes may lead consumers to spend part of it on imports; more export demand may need more intermediate inputs when exports

have a high share of imports; deteriorating the balance of trade; devaluation may inspire higher investment by rising profits and, therefore, investment requires imported from foreign markets (Cline and Williamson, 2009).

6.7. Theoretical Framework

Trade liberalization collaborated with currency devaluation and declining barriers. The trade balance in some countries does not respond directly to these policies. Currency depreciation does not cause a change in domestic prices. Consequently, domestic demand for home exports should rise and foreign demand for imports must decline. This adjustment mechanism must be followed by a higher surplus in exports, which leads to an improvement in the trade balance and a decline in the trade deficit.

To investigate the impact of currency depreciation, foreign income, and domestic income on the trade balance in Turkey over the period 1980-2018, a study following Onafowora (2003), Gupta-Kapoor, and Ramakrishnan (1999), Bahamani-Oskooee and Brooks (1999), Haynes and Stone (1982) trade balance, has defined the ratio of export volume to import volume. Bahmani-Oskooee (1991, 404) presented two justifications for using this ratio: This ratio is not sensitive to units of measurement. (2) Normally, when a trade balance is known as the difference between exports and imports, this difference is deflated through the domestic price index to obtain the real trade balance.

The demand for imported goods depends on the relative price of imports and domestic real income.

$$M_d = M_d(RP_m, Y) \quad 5.1$$

Where M_d represent the domestic demand for imports, RP_m indicates the relative price of imported goods to domestically produced goods, and Y related to domestic real income.

Let e be the nominal exchange rate, defined as the domestic price of foreign currency, the relative price of imported goods can be expressed as:

$$RP_m = \frac{eP_x^*}{P} = (e \cdot P^*/P)(P_x^*/P^*) = (Q)RP_x^* \quad 5.2$$

Where P_x^* is the foreign currency price of foreign exporters, P and P^* are the domestic and foreign price indexes of all goods, Q is the real exchange rate, defined as $Q \equiv e \cdot P^*/P$, so that an increase in e signifies a depreciation of the home currency, and RP_x^* is the relative price of foreign exports to foreign-produced goods, respectively. By substituting RP_m from Equation 5.2 into Equation 5.1 gives the following equation

$$M_d = M_d(RP_x^*/Q, Y) \quad 5.3$$

Likeness, foreign country's demand for imports relied on foreign income and domestic relative export prices

$$M_d^* = M_d^*(RP_x \cdot Q, Y^*) \quad 5.4$$

Where the asterisk specifies the variable for foreign country, given that domestic exports are foreign imports in open economy and vice versa, that is

$$X_s = M_d^*, X_s^* = M_d \quad 5.5$$

So that, trade balance as following ratio

$$TB = X_s/M_d = M_d^*/M_d = M_d^*(RP_x \cdot Q, Y^*)/M_d(RP_x^*/Q, Y) \quad 5.6$$

By assuming stationary values of RP_x and P_x^* , equation (5.6) rewrite as following in general form

$$\ln\left(\frac{X}{M}\right) = f(RER, Y_d, Y^*) \quad 5.7$$

Equation 5.7 expresses the trade balances as a function of real exchange rate and the levels of domestic and foreign income. Where $\frac{X}{M}$ trade balance², RER; real exchange rate, Y_d ; national income, Y^* foreign income.

According to the elasticity approach, the trade balance can be improved according to devaluation, which improves the trade balance by changing the relative prices between domestically and foreign-sourced goods (expressed in the RER).

Moreover, with regard to the absorption approach, an exchange rate change can only affect the trade balance if it induces a decrease in total domestic expenditure.

Specifications for the model

Trade balance improvement depends on three approaches. The elasticity approach (Robinson, 1937), the absorption approach (Alexander, 1952), and the monetary approach (Johnson, 1976). According to the elasticity approach, the influence of trade liberalization on the trade balance depends on the extent to which import and export duties change and on the price elasticities of imports and exports. Measuring the trade balance in terms of foreign currency, export earnings will increase if the price elasticity of demand is higher than unity, and import payments will decrease if the price elasticity is greater than zero (Santos-Paulino & Thirlwall, 2004). The absorption approach claims

² See appendix 5.1

that the effect of trade liberalization on the trade balance depends on how real income is affected relative to real absorption.

Finally, monetary policy and trade liberalization outcomes depend on how the real demand for money changes relative to the real supply. Generally, the effect of tariff liberalization on the trade balance depends on the behavior of exchange rates and the values of various elasticities.

Based on basic theory, it is predicted that the coefficient of the real exchange rate is positive, showing that currency depreciation improves the trade balance. The coefficient of foreign income is positive, indicating that a rise in foreign income will lead to increasing demand for home exports. According to this specification, in an open economy, the coefficient of domestic income is expected to be negative. Trade liberalization contributes to facilitating trade, indicating that an increase in domestic income will lead to more imports from abroad, deteriorating the trade balance in the long run.

Following Parika (2006) and Paulino and Thirlwall (2004), a dummy variable introduced to catch up the impact of trade liberalization on Turkey's trade balance. The value of the dummy variable is zero before the liberalization period and one after trade liberalization. A dummy variable takes (0) for 1962-1979 and (1) for 1980-2018.

Eq. 5.7 can be written as a log-linear form:

$$\ln\left(\frac{X}{M}\right) = \alpha + \delta_1 \ln RER + \delta_2 \ln Y_d + \delta_3 \ln Y^* + \delta_4 Du + \varepsilon \quad 5.8$$

Where; $\ln\left(\frac{X}{M}\right)$ is the log of exports to imports, $\ln RER$ log of real exchange rate, $\ln Y_d$ log of domestic income, $\ln Y^*$ log of foreign income. And $\delta_1 < 1$, $\delta_2 > 1$, $\delta_3 > 1$, $\delta_4 > 1$.

$$\Delta \ln\left(\frac{X}{M}\right) = \alpha + \sum_{i=1}^n \beta_0 \Delta \ln\left(\frac{X}{M}\right)_{t-i} + \sum_{i=0}^n \beta_1 \Delta \ln RER_{t-i} + \sum_{i=0}^n \beta_2 \Delta \ln Y_{d,t-i} + \sum_{i=0}^n \beta_3 \Delta \ln Y_{t-i}^* + B_4 Du + \delta_0 \ln\left(\frac{X}{M}\right)_{t-1} + \delta_1 \ln RER + \delta_2 \ln Y_d + \delta_3 \ln Y^* + \varphi ECT_{t-1} + \varepsilon \quad 5.9$$

$$ECT_t = \ln(X/M)_{t-1} - \alpha - \delta_1 \ln RER - \delta_2 \ln Y_d - \delta_3 \ln Y^* - \delta_4 Du \quad 5.10$$

where, $\beta_1, \beta_2, \beta_3, B_4$ short term coefficients, $\delta_1, \delta_2, \delta_3$, long term coefficients.

6.8. Empirical Results

6.8.1. Unit Root Test

The result of unit root for the following variables (trade balance, domestic income, real exchange rate, foreign income) is shown in Table 5.5. Results of Dickey- Fuller (ADF) unit root test suggest that all variable are non-stationary at level but become stationary at first difference, to summarize all the variables are integrated at order I(1). This result enable us to apply ARDL method.

Table 5.5 Unit root result

Variable	Level			1st difference		
	ADF	Critic value	Result	ADF	Critic value	Result
X/M	-3.341	-2.9	Stationary	-10.262	-2.9	Stationary
GDP_d	0.3427	-2.9	Non- stationary	-6.350	-2.9	Stationary
RER	-2.565	-2.9	Non- stationary	-8.879	-2.9	Stationary

GDP _f	3.134	-2.9	Non- stationary	-4.996	-2.9	Stationary

Table 5.5 shows that, GDP_d, GDP_f, RER are non-stationary at level at 5% significance level, $\frac{x}{M}$ stationary at level, however, all stationary at their first difference. This mean that all series are I(1).

6.8.2. Determination of Lag Length

For robust results to be achieved, the lag is an important element. For those reasons, after the unit root tests of the variables, the lag length of the model was chosen. Since the lag length to be used in the study is not known in real life, the lag length is chosen by an appropriate method. If the lag length is set to be longer or shorter than it should be, the variables will have higher or lower values than they are (Katos, Lawler and Seddighi, 2000: 300).

Accordingly, such tests like Likelihood Ratio Test (LR), Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC), Final Prediction Error (FPE) and Hannan-Quinn Information Criterion (HQ) are the most favored test to determine the appropriate lag length to avoid econometrics problems. The results obtained for the optimal lag length are given in Table 5.6.

Table 5.6 Lag length selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-721.6014	NA	15498564	27.90775	28.05784	27.96859
1	-499.5129	401.467	5609.067*	19.98126*	20.73174*	20.26898*
2	-490.1246	15.5266	7318.310	20.23556	21.58642	20.75345

3	-472.0069	27.1766	6945.894	20.15411	22.10536	20.90217
4	-462.4566	12.8561	9417.449	20.40218	22.95381	21.38041
5	-452.4586	11.927	13051.19	20.63302	23.78503	21.84143

Notes: (*) It represents the most appropriate lag length determined according to the relevant criteria.

As a result of the recognized model, the appropriate lag length for the LR, FPE and AIC is 1, 1 for SIC and 1 for HQ. Then, (1) is determined as the appropriate lag length with the most consensus.

6.8.3. Breusch–Godfrey Serial Correlation LM

To show that there is no correlation among errors we follow Breusch-Godfrey Serial Correlation LM Test, the Breusch–Godfrey serial correlation LM test is a test for autocorrelation in the errors in a regression model. It makes use of the residuals from the model being considered in a regression analysis, and a test statistic is derived from these. The null hypothesis is that there is no serial correlation of any order up to p .

LM test, is in fact a general test for autocorrelation of any order (i.e. residuals may be correlated over more than one period) Breusch–Godfrey Correlation Lagrange Multiplier test useful test since: a) generalizes to any order autocorrelation wish to test. b) is robust to inclusion of lagged dependent variables, but (1) Since this is a test of joint significance may not be able to distinguish which lagged residual is important (2) Test is only valid asymptotically (i.e. in large samples).

Table 5.7 Breusch-Godfrey serial correlation LM

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.893	Prob. (2.46)	0.162
Obs*R-squared	4.258	Prob. Chi-Square (2)	0.118

Based on Breusch-Godfrey Serial Correlation LM Test which shows the F-statistics 1.893 with Prob. (0.05) equal 0.162 more than 0.05 that means no serial correlation at up to 2 lags as shown in Table 5.7 So, we accept the null hypothesis that there is no autocorrelation in the residuals generated from the regression model. By this we understand that the test is valid because it is not victimized by serial correlation throughout the series. This result enables us to run our estimation.

6.8.4. Cointegration test

In order to ascertain the presence of a long run relationship among the variables, the bound tests are conducted; results of the bound tests are presented in Table 5.8.

Bound test results reveal that the computed F -statistics based on the Wald test is 4.08 this exceeded the upper bound of 3.49 at the 5% significance level, suggesting that the null hypothesis, is rejected. Therefore, the long run relationship is confirmed among the trade balance, Real exchange rate, Foreign GDP, domestic income, the result implies that these variables move together and so cannot move ‘too far away’ from each other independently. Indirectly, we can conclude that any disequilibrium among them is a short run phenomenon.

Table 5.8 F-statistics for testing the existence of long-run cointegration

F-statistics	K	Significance level	Bound Critical Values	
			I(0)	I(1)
		1%	3.29	4.37
4.084*	4	5%	2.56	3.49
		10%	2.3	3.2

Notes: From Persaran et al (2001) Critical values are obtained.

Source: extracted from estimation output using Eviews 11. (*) significant at 5%.

Our result shows that there is a long run relationship between trade balance, real exchange rate, domestic income, foreign income. This indicate that the series in long run move together, this results consistent with Sezer (2017).

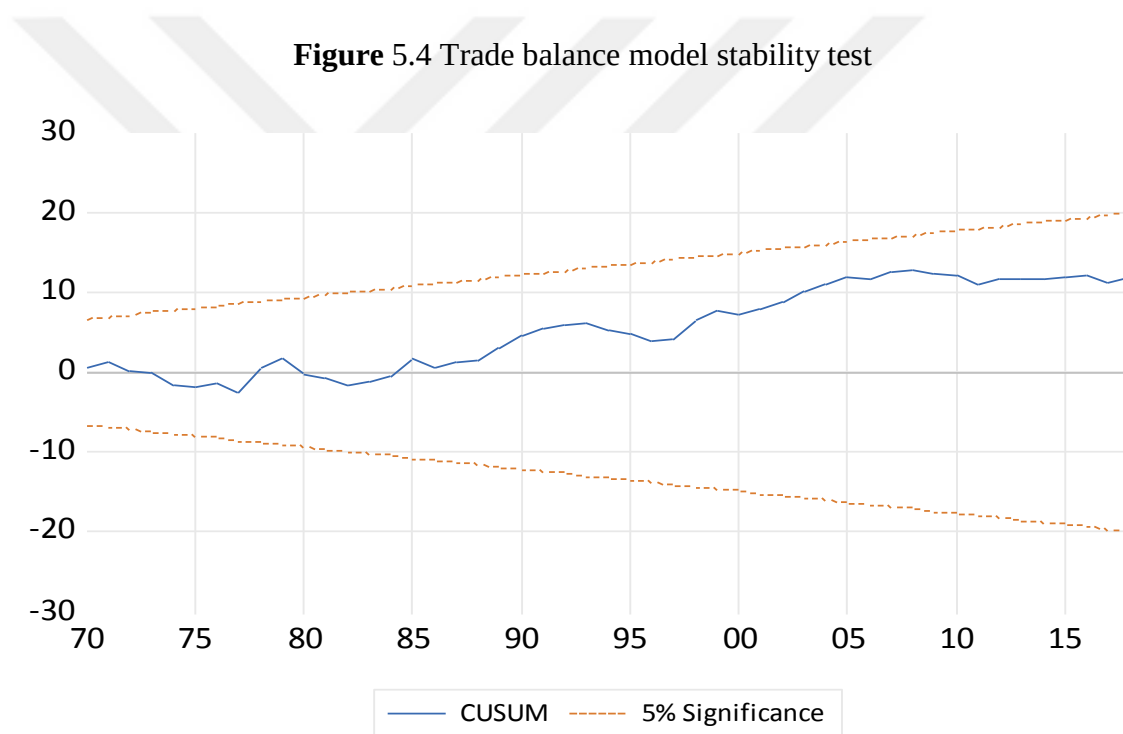
6.8.5. Stability Test

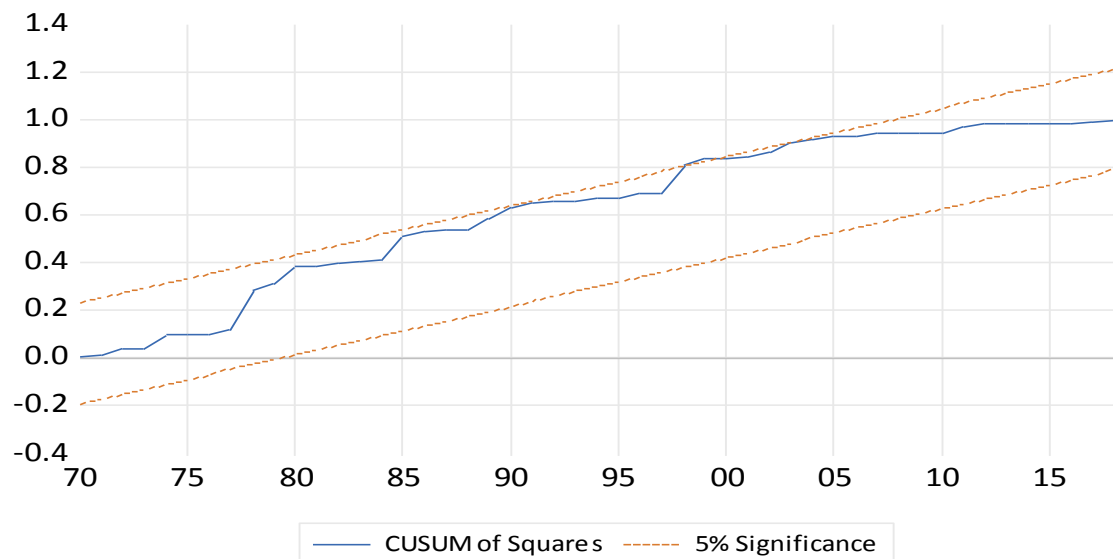
To see if the model's parameters are stable over time, it is necessary to investigate whether these variables show a structural change in their behavior over time. The CUSUM stability test is one of the most common tests in this field.

The results of this test are shown in the form of a curve for the errors of a model estimated by the usual least squares method (OLS), and a confidence domain with the aim of testing the null hypothesis which states that the parameters of the typical least squares model are unstable. If the curve of errors is within the critical limits throughout the study period, the null hypothesis is rejected at a significant percentage (5%). This means that the parameters are stable throughout the study period, and therefore the ability to estimate constant parameters of the model along the study period without having to split it into partial periods is therefore compromised. If the null hypothesis is

rejected, then the study period must be divided into partial periods in which the parameters are stable (Brown et al., 1975).

A graphical presentation of the test is provided in Figure 5.4. The CUSUM test indicates that the parameters are stable over time as the plot of cumulative sum of recursive residuals and cumulative sum of squares of recursive residuals lies within the critical bound at 5% significance level.





The CUSUM and CUSUM of Squares test suggest that the parameters were stable over the study time. These tests indicate no evidence of any significant structural instability, our result consistent with Ketenci and Uz (2011) they used CUSUM and CUSUMSQ stability tests and authorize the stability of estimated coefficients in most cases.

6.8.6. Long Run Coefficients

Once we found the long run cointegration relationship among the variables of our study, results obtained by trade balance as a (dependent variable) in the long run are reported in Table 5.9.

Table 5.9 Long run coefficients of trade balance

Variable	Coefficient	Std. Error	t-Statistic	Prob*.
$\ln(\text{GDP}_t)$	-0.744	0.421	-1.766	0.083
$\ln(\text{GDP}_d)$	0.456	0.320	1.426	0.160
$\ln(\text{RER})$	-0.093	0.438	-2.12	0.832

DU	0.762	0.263	2.892	0.0057*
C	-0.608	1.624	-0.374	0.709

Long run equation:

$$LnTB = \alpha + \beta_1 \log GDP_f + \beta_2 LnRER + \beta_3 LnGDP_d + \beta_4 Du + \hat{u} \quad 5.11$$

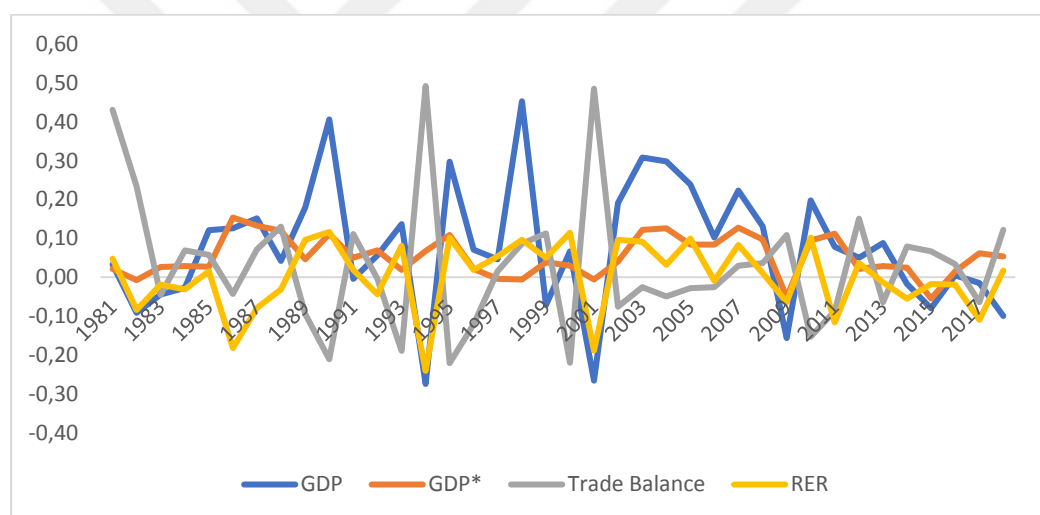
$$EC = LOG(TB) - 0.7446*LOG(GDPF) - 0.4569*LOG(GDPD)-0.093*LOG(RER) \\ 0.76Du-0.6081)$$

The estimated coefficient of the long-run relationship shows that foreign income's impact on Turkey's trade balance is negative. An increase in foreign income (GDP_f) by 1% leads to a deterioration in Turkey's trade balance by 0.74%. In the global recovery, global demand increased, import prices rose, and Turkey's import bill increased, thus the trade balance deteriorated. This is consistent with Kale (2001).

An increase in 1% of GDP_d leads to improving Turkey's trade balance by 0.45%. As GDP in Turkey increased, saving also increased. As a result, investment increased, particularly in the exporting sector. Moreover, an increase in the real exchange rate (currency depreciation) impacts negatively on the trade balance. A 1% increase in the real exchange rate (depreciation currency) leads to a deteriorating trade balance by 0.09%. Our results are consistent with Durmaz (2015), which indicate that the exchange rate is not an effective tool in improving Turkey's trade balance. Our results are consistent with those of Yazici and Klasa (2010), who show that currency devaluation impacts negatively on Turkey's trade balance. On the other hand, our results are not consistent with Sezer (2017) that currency devaluation will lead to an improvement in Turkey's trade balance in the long run.

Finally, to show the impact of trade liberalization on trade balance after liberalizing trade, the results show that the impact is positive and statistically significant. An increase of 1% in Turkish openness toward the world will lead to an improvement of 0.76% in the trade balance. To benefit considerably from trade liberalization, trade liberalization (Du) elasticity should be exceeded by 1%. Figure 5.5 shows the trend between the real exchange rate, the trade balance, foreign income, and domestic income over (1981-2018).

Figure 5.5 Trends growth of real exchange rate, trade balance, foreign income, domestic income (1981-2018).



Source: Central Bank of the Republic of Turkey- TCMB

6.8.7. Short Run Results

The error correction model obtained from ARDL test, provides knowledge about short run effects of variables on exports, Table 5.10 contains the estimation results from the error correction model, results explain that the short run effects of GDP_t and Exchange rate on manufacturing exports is significantly positive.

Table 5.10 Short run coefficients of trade balance

Variable	Coefficient	Std. Error	t-Statistic	Prob*.
Ln(RER)	-0.399	0.108	-2.651	0.01
Ln(GDP _f)	-0.310	0.1772	-1.754	0.085
Ln(GDP _d)	-0.287	0.108	-2.651	0.010
Du	0.318	0.113	2.801	0.0073
CointEq(-1)*	-0.417	0.080	-5.201	0.000
R-squared	0.481	Mean dependent var		0.0045
Adjusted R-squared	0.462	S.D. dependent var		0.1840
S.E. of regression	0.134	Akaike info criterion		-1.115
Sum squared resid	0.965	Schwarz criterion		-1.0067
Log likelihood	34.227	Hannan-Quinn criter.		-1.0732
Durbin-Watson stat	2.2368			

In the short-run, currency depreciation, foreign income, and domestic income harm the trade balance. Table 5.10 reveals that a 1% appreciation in the Turkish currency leads to a deteriorating trade balance by 0.39%. *T*-value is significant. Results indicate that an increase in foreign income by 1% leads to a decrease in Turkey's trade balance by 0.31%. Furthermore, domestic income has an impact negatively on the trade balance. Findings show that an increase in domestic income by 1% leads to a deteriorating trade balance by 0.28%. *T*-value is significant. Our results are consistent with those of Ari and Cergibozan (2016).

For trade liberalization's impact on the trade balance, results show that an increase in openness of 1% will lead to an improvement in the trade balance of 0.31%, and the *T*-value is significant.

These results suggest that to investigate how disequilibrium in the short run moves to equilibrium in the long run, ECM investigates the short-run and long-run cointegration over time, the negative sign of the ECM coefficient and significant shows the existence of disequilibrium in the short run and convergence in the long run. This value indicates the disequilibrium percentage in the previous equilibrium, which was corrected in the next period as shocks happened in independent study variables that impacted dependent variables. This percentage equals 41.74% in the real model equation. In other words, ECM notifies us that 41.7% of all errors or disequilibrium in the short term are adjusted for in the long term.

The statistical value of the Durbin Watson is 2.2, which indicates that no autocorrelation exists between the variables. The value of R^2 is 0.48, which suggests that a 48.0% change in variation in the dependent variable is due to changes in independent variables.

6.9. Conclusion

This essay scrutinizes the impact of trade liberalization on Turkey's trade balance. The trade balance has suffered from a continuous deficit for a long period. Although the export sector has grown significantly post-liberalization, the deficit continues as embodied by the increase in imports bill.

As presented in descriptive statistics, a large deterioration in the trade balance was recorded in 2011, when the deficit was 106 billion US dollars. In the same year, imports grew by 28%. This confirms that the trade balance deficit is influenced significantly by import growth.

The study is based on the popular model used by Onafowora (2003), Gupta-Kapoor and Ramakrishnan (1999), and Bahamani-Oskooee and Brooks (1999) to examine the

impact of trade liberalization on the trade balance in the post-liberalization world, which was extended by introducing a dummy variable to account for the impact of trade liberalization.

Autoregressive distributed lag (ARDL) is employed. The results show that time series free from serial correlation, bound tests display that trade balance, real exchange rate, foreign income, and domestic income cointegrated in the long run, while the Cusum and Cusum square tests reveal that parameters are stable over time.

Long-run estimation results show that currency depreciation, foreign income, and deteriorated trade balance have a negative significant impact on the trade balance; however, domestic income and trade liberalization have a positive significant impact on the trade balance.

Consequently, short-run results reveal that currency depreciation, foreign income, and domestic income have a negative impact on the trade balance. Nevertheless, trade liberalization has a positive impact on the trade balance.

7. TRADE LIBERALIZATION AND GOVERNMENT SIZE

Abstract

This study aims to examine the impact of trade liberalization on government expenditure over a period of (1980-2018). The first section of the study shows descriptive statistics of government expenditure and openness. The second section of the study employs autoregressive distributed lag bound test (ARDL) approach, unit root test, Johansen cointegration, Bound test for long run estimation, and error correction term (EC).

Study results show that an increase in openness of 1% will lead to a decrease in government expenditure by 0.26% in the long run. Furthermore, in the short run, an increase in openness of 1% will lead to a decrease in government expenditure by 0.05%.

Once the impact of growth in per capita on government expenditures is positive, results indicate that an increase in per capita of 1% will increase government expenditures by 1.37% in the long run, while in the short run, an increase in per capita of 1% leads to an increase in government expenditures by 0.28%.

The study recommends that it is necessary for the Turkish government to increase expenditures on health, education, and social protection to minimize the negative effects of openness on inequality as well as on welfare.

Keywords: Trade liberalization, government size, welfare.

7.1. Introduction

Trade liberalization proliferation and free trade zone establishment, the successful completion of Uruguay round (GATT), is testimony to increasing faith in trade as an engine of growth in developed and developing countries. The emergence of globalization forces countries to move toward more free trade by concentrating on innovation in technology and increasing public expenditures on research and development.

International trade plays a crucial role in a nation's economy, although it has some negative effects, particularly on wages and employment. The impact of trade liberalization on economic indicators is not limited to foreign trade and FDI, but the impact on macroeconomic variables as a whole, Agnenor and Aizeman (1995) assert that trade liberalization will lead to new economic activities as a result of the sectoral composition of output being changed in the long run.

Trade liberalization as an economic tool of globalization has certainly impacted the size and growth of the government. Nowadays, many countries are unable to provide social insurance to people and compensate them for trade liberalization policy risks.

Rodrik (1998) argued that greater national economic exposure led to more demand for public spending to compensate for growing external risk. This process is known as the compensation hypothesis. Greater capital openness, on the other hand, led to more tax factor mobility, limiting governments' capacity to support bigger public sectors. The efficiency theory applies in this scenario.

Governments in developed economies work to maintain a role in people's social life by providing social insurance to limit the negative impact of free trade (Rodrik, 1997).

According to Alesina and Wacziarg (1998), two facts are linked to the effect of a country's size on government expenditures: the first, the bigger a country, the lower its per capita government expenditures due to economies of scale; the second, the larger a country, the more its economy will look like a closed economy due to productivity.

7.2. Review of the Literature

Recent governments unable to deliver social needs and organize markets, public expenditures, and welfare have become a hot controversy among researchers based on new indicators showing that more trade openness means fewer government expenditures.

Alesina and Wacziarg (1998) examined the relationship between openness, country size, and government. Their findings indicated that smaller countries have a higher share of public consumption in GDP. Kimakova (2009) shows that not only does trade liberalization impact on government size positively but also financial liberalization. Therefore, the author suggests that poorer, financially open economies tend to have bigger governments and vice versa.

Rodrik (1996) suggests that there is a different relationship between openness and government size. He suggests that openness exposes countries to external shocks embodied in high competition, and therefore they need a greater public sector to deliver a stabilizing role in the short and long term.

Gadea (1993) used the cointegration test of Engle and Granger to study the relationship between openness policies and public expenditure in Spain. The results specified a positive relationship between openness policies and public expenditure during 1964-1991.

Benarroch and Pandey (2008) scrutinized the relationship between trade liberalization and government size, using panel data for 96 countries from 1970 to 2000. The results showed that larger governments were willing to provide more protection. Balle and Vaidya (2002) tested whether the relationship between government size and openness on the national level exists on the state level in the United States of America. Robust findings show that public welfare and health spending are positively correlated with openness.

A number of subsequent studies extend the investigation of the relationship between openness and government size in a few directions. Using a large panel dataset, Ram's (2009) findings that the economy-size effects government size are consistent with the direct link between openness and government size. His results are consistent with the direct link between openness and government size.

According to Katzenstein (1985), integration into the global economy increases specialization within an economy. Highly specialized operations, in turn, imply less diversification and, later, greater exposure to the risks embodied by global economic volatility. To hedge against these risks, states that are open to the global economy increase public expenditures to limit unfavorable problems.

Results show that an increase in foreign direct investment as an indicator of trade openness on government expenditures will lead to government expenditures towards social spending.

Jiang (2016) analyses the impact of trade openness on government size based on the factor intensities of production of tradable and non-tradable sectors, he certifies that if the production of the non-tradable sector is highly capital-intensive, a positive

relationship between trade openness and government size will be observed. However, if the production of the tradable sector is highly capital-intensive, a negative correlation between trade openness and government size will arise.

Epifani and Gancia (2009) tested trade openness, government size, and the terms of trade in a cross-section of 143 countries. The findings displayed that there is a positive association between openness and government size, which means that globalization and trade liberalization will lead to inefficiently big governments.

Turan and Karakas (2016) examined the impact of trade liberalization and economic growth on government size in Korea and Turkey. Findings show that GDP per capita has a positive impact on government size in the long run for both nations. However, trade liberalization has a negative impact on government size for Turkey but not in the case of Korea. Turkey's government focuses on investing in big projects rather than small ones.

Liberatt (2007) examined trade openness, capital openness, and government size in European countries plus the United States, Japan, Australia, and Canada. The outcomes indicated that after trade liberalization, governments lose capital control, capital movement may weaken the ability of governments to sustain larger public sectors, and trade liberalization significantly impacts negatively on the volume of government expenditures.

However, Iversen and Cusack (2000) display that trade openness does not have any effect on government expenditures. Shelton (2007) reveals that the positive effect of trade openness on government size is linked essentially to other expenditures than those for social insurance. Fujii (2017) scrutinizes the relationship between government size,

trade openness, and output volatility in Japan. The results show that trade openness will lead to a smaller size of the government. As small open economies began to liberalize their trade, as a result, the size of government decreased.

7.3. Liberalization of trade and government size

Trade liberalization policies linked with economic globalization have reconfigured the role of the state in economic and social activities, raising the role of the private sector and dismantling government duties in terms of social protection.

Market reforms force states to adopt internal restructuring (public expenditures, privatization, etc...). The state's role in the liberalization era has been shifted from provider to regular.

To achieve these requirements, government expenditures in modern open economies have focused on large projects (airports, roads, tunnels, parks). In line with these policies, government size in regards to social protection declined. The role of the state in the liberalization era changed gradually from a state of welfare to a state of capitalization.

7.4. Government Expenditures and Openness in Turkey

After the trade liberalization program in 1980, the Turkish government started to lose a specific role in public life, like many other small open economies. Integration into the global market, freeing trade, and privatization contributed to the exit from providing basic services and directing spending on projects associated with globalization.

In the majority of OCED members, trade liberalization was followed by maintaining government size to lessen the negative external risk associated with open trade. Although Turkey gained from trade liberalization in trade, many social difficulties emerged as a result of government expenditures declining.

Nowadays, there are many debates among Turkish people about why government expenditures per capita have declined since the implementation of the trade liberalization program and will become more integrated into the global economy. However, big projects such as new airports, new marine tunnels, and infrastructure projects attract government attention. On the other hand, spending on education, research and development, insurance, and social activities decreased with trade liberalization.

The originality of this study is to demonstrate the impact of trade liberalization on government size and that last year's health, education, and social protection services decreased.

Table 6.1 shows Turkey's government expenditures as a share of GDP during the years 1980-2018.

Table 6.1 Turkey government expenditures as a share of GDP during (1980-2018).

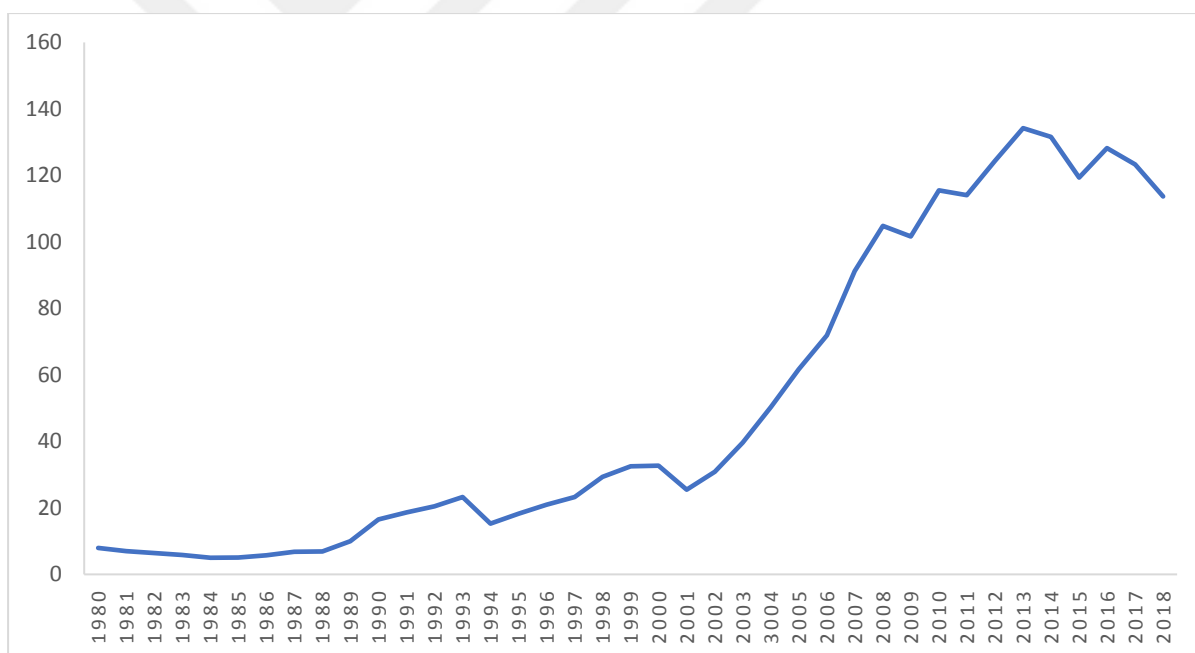
(U.S. \$ billion)

Year	Government expenditure	Share of GDP %	Year	Government expenditure	Share of GDP %
1980	7.945	11.55	2000	32.730	11.99
1981	6.990	9.84	2001	25.512	12.74
1982	6.416	9.94	2002	30.829	12.93
1983	5.792	9.39	2003	39.602	12.70
1984	5.003	8.34	2004	50.356	12.44
1985	5.056	7.52	2005	61.674	12.30
1986	5.748	7.59	2006	71.879	13.01
1987	6.817	7.82	2007	91.229	13.50
1988	6.914	7.61	2008	104.790	13.71
1989	10.007	9.34	2009	101.660	15.77
1990	16.514	10.96	2010	115.554	14.97
1991	18.634	12.42	2011	114.056	13.70
1992	20.489	12.93	2012	124.368	14.23
1993	23.224	12.89	2013	134.222	14.12
1994	15.239	11.66	2014	131.627	14.09
1995	18.288	10.79	2015	119.340	13.88
1996	20.997	11.57	2016	128.176	14.84
1997	23.274	12.26	2017	123.325	14.49
1998	29.287	10.62	2018	113.661	14.83
1999	32.472	12.69			

Source: World Bank

As given in Table 1.6, the Turkish government's expenditures in 1980 were equal to 7.945 billion USD. The share of the gross domestic product was 11.55%. With the application of the trade liberalization program, this percentage decreased to 9.84% in 1981 and decreased until it reached 7.61% in 1988. In 1989, it rose significantly, reaching 15.77%. This share remained at this rate until 2018 and recorded 14.83% of GDP. Confidently, indeed, this share is considered low compared to developed countries. Trade liberalization did not contribute significantly to increasing government expenditures during the study period 1980-2018. Figure 6.1 depicted the Government expenditures over 1980-2018.

Figure 6.1 Trend of government expenditures 1980-2018 (U.S. \$ billion)



Source: Based on OCED data.

The link between openness and government expenditure is a puzzling issue. Integration into global markets forces governments to reduce their role in economic activities and allow the private sector to become involved in the economy. As a result, government revenue declines, which contributes to decreased government expenditures, Table 6.2

shows the change in openness degree and per capita government expenditures in Turkey over the period (1980-2018).

Table 6.2: Changes in trade openness and government spending per capita from 1980 to 2018.

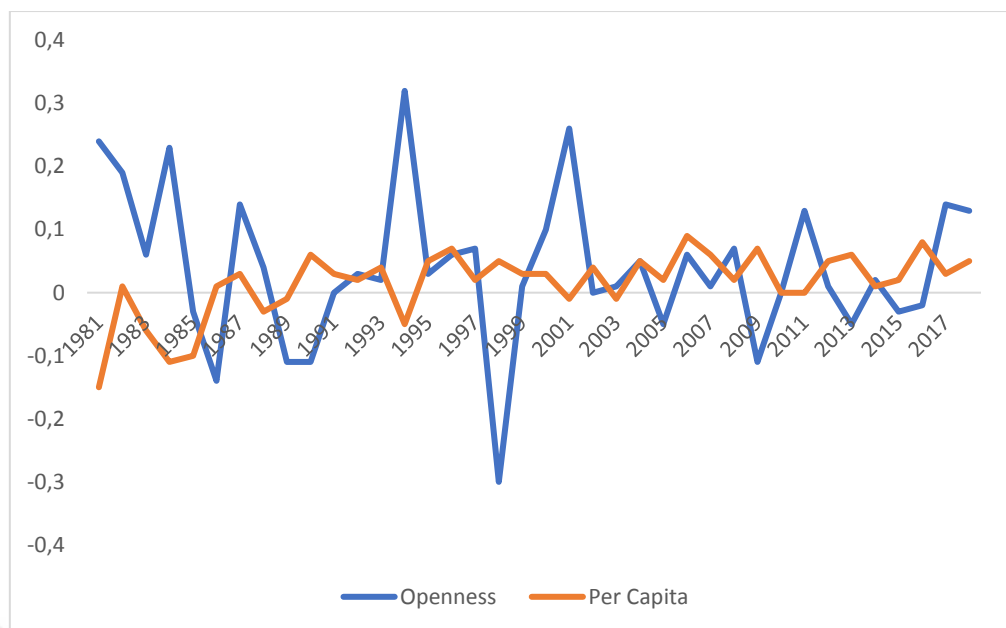
Year	Openness %	Per capita%	Year	Openness %	Per capita%
1980			2000	10%	3%
1981	24%	-15%	2001	26%	-1%
1982	19%	1%	2002	0%	4%
1983	6%	-6%	2003	1%	-1%
1984	23%	-11%	2004	5%	5%
1985	-3%	-10%	2005	-5%	2%
1986	-14%	1%	2006	6%	9%
1987	14%	3%	2007	1%	6%
1988	4%	-3%	2008	7%	2%
1989	-11%	-1%	2009	-11%	7%
1990	-11%	6%	2010	0%	0%
1991	0%	3%	2011	13%	0%
1992	3%	2%	2012	1%	5%
1993	2%	4%	2013	-5%	6%
1994	32%	-5%	2014	2%	1%
1995	3%	5%	2015	-3%	2%
1996	6%	7%	2016	-2%	8%
1997	7%	2%	2017	14%	3%

1998	-30%	5%	2018	13%	5%
1999	1%	3%			

Source: calculation based on Turkstat, WorldBank data.

Table 6.2 shows the changes in government expenditures in Turkey after the application of the openness of the economy. In 1981, the growing change in openness as an indicator of trade, liberalization was 24%, while government expenditures decreased by 15%. In 1994, the Turkish government was willing to join the World Trade Organization (WTO). This joint decrease government expenditures by up to 5%. Table 6.2 indicates that the decrease in trade openness in 2009 by 11% contributed to an increase in government expenditures by 7%. In 2016, the trade liberalization index decreased to 2%, which contributed to an increase in government expenditures by 8%. In 2018, the trade openness index rose to 13%. This only contributed to an increase in government spending by 5%. Based on the above data, trade openness had a negative impact on Turkish government expenditures during the study period 1980-2018.

Figure 6.2 Trends in openness and government spending per capita growth
(1981-2018)



Resource: Based on WorldBank data. Where OP: Openness Degree, per capita expenditures.

Although advanced economies have approved free trade, government expenditure is considered one of the main macroeconomic factors. Successful free trade programs are accompanied by government spending to compensate for the loss associated with openness.

The provision of social services such as health, education, and social security had a greater share of interest than large infrastructure projects. Economically, emerging countries such as Turkey focus on mega projects depending on the long-term economic returns they achieve. However, successful liberalization experiences focus on the short term in providing services. Table 6.3 shows the share of government spending of GDP in some advanced economies.

Table 6.3 Some advanced economies expenditures % of GDP (1980-2018).

Year	US	OCED	EU	Japan	World	Turkey
1980	15.9	17.0	19.1	14.5	16.0	11.5
1985	15.9	17.1	19.9	14.3	16.2	7.50

1990	15.9	16.8	19.4	13.5	16.2	11.0
1995	14.9	16.9	19.9	15.3	16.2	11.0
2000	14.0	16.5	19.4	16.8	19.1	12.0
2005	15.1	17.4	20.1	18.1	16.5	12.3
2010	16.7	18.9	21.6	19.5	17.6	14.9
2015	14.3	17.8	20.8	19.8	17.2	13.8
2018	14.0	17.6	20.6	19.8	17.0	14.8

Source: calculation based on WorldBank data.

As represented in Table 6.3, the share of government expenditure of GDP in Turkey compared to some advanced economies was lesser than the United States, OCED, European Union, Japan, and the world in 1980 was 15.9%, 17.0%, 19.1, 14.5, 16.0%, respectively. In 2000, this share was 14.0%, 16.5%, 19.4%, 16.8%, and 19.1% in the US, OCED, European Union, Japan, and the global average, respectively. Finally, in 2018, the share of government expenditures in Turkey was 14.8% compared to the world, which recorded 17%, while the European Union recorded the highest share of government expenditures of GDP, reaching 20.6%. Based on these figures, despite the increase in the share of government expenditures, Turkey was unable during the study period (1980-2018) to record higher rates or come close to advanced economies as well as the world average. However, Turkey's government expenditure share of GDP in 2018 was higher than the United States'.

7.5. Theoretical framework

Expectations from trade liberalization programs signify that the total benefits exceed total losses after free trade is delivered. According to Rodrik (1998) and Ram (2009),

redistribution of income is possible from winners to losers, so everyone has at least as much as they had before they implemented trade liberalization.

The theoretical model for this study, based on the work of Borcharding and Deacon (1972), Based on the Cobb-Dougals function, Borcharding and Deacon reached the demand equation for government expenditures in an open economy³.

$$\ln E = \ln A' + (\alpha + 1)\ln \omega^\beta + (\alpha - 1)(\alpha + 1)\ln N + \gamma \ln Y \quad 6.1$$

To show the impact of trade liberalization on government expenditures, the trade openness indicator is used as a trade liberalization variable, new version of openness is defined as

$$Op = (X + M) / ((GDP - (X - M))) \quad 6.2$$

Where X , M and GDP are exports, imports, and GDP, respectively.

Depending on Borcharding and Deacon (1972), and following Abizadeh (2003), Benarroch and Bandey (2008), Balle and Viadya (2002) equation 6.1 can be summarized as:

$$G_t = AOP_{t-i}^\alpha Y_{t-i}^\beta \varepsilon_t \quad 6.3$$

Where G , OP , Y respectively denote time, per capita government expenditures, openness as a proxy for trade liberalization, private per capita GDP, and error term, so that exponents A , and are parameters to be estimated, by taking the logarithm of equation 6.3, it can be written as:

³See appendix 6.1

$$\ln G_t = \ln A + \alpha \ln OP_{t-i} + \beta \ln Y_{t-i} + \varepsilon_i \quad 6.4$$

Equation 6.4 is the econometric model to be estimated by employing ARDL methods to show the impact of trade liberalization on government expenditures in the short and long run.

Model specification:

Integration into the global economy, trade liberalization agreements, foreign investments, government demands for expanding expenditures on infrastructural and logistical projects resulted in international trade growing, employment attained, and in small open economies, funding for large infrastructural projects may decline in basic services and social insurance. While in large economies, spending % of GDP on infrastructure does not have an impact on basic services.

$$\begin{aligned} \Delta \ln(G_t) = & \alpha + \sum_{i=1}^n \beta_0 \Delta \ln(G_t)_{t-i} + \sum_{i=0}^n \beta_1 \Delta \ln OP_{t-i} + \sum_{i=0}^n \beta_2 \Delta \ln Y_{t-i} + \\ & + \delta_0 \ln(G_t)_{t-1} + \delta_1 \ln OP_{t-1} + \delta_2 \ln Y_{t-1} + \varphi ECT_{t-1} + \varepsilon \end{aligned} \quad 6.5$$

$$ECT_t = G_t - \alpha - \delta_1 \ln OP - \delta_2 \ln Y \quad 6.6$$

where, β_1, β_2 , short term coefficients, δ_1, δ_2 , long term coefficients .

This methodology, known as autoregressive-distributed lag (ARDL), shows that long-run and short-run estimates are made simultaneously. The long-run effects of the independent variables on the dependent variables are obtained using normalized estimates.

To determine whether the adjustment of variables is toward long-term equilibrium, estimates are used to construct an error-correction term (EC). Therefore, lagged-level variables in Eq.6.5 are changed by establishing a modified version of Eq.6.7 as follows:

$$\Delta G_{LR} = \alpha + \sum_{i=1}^{m1} \sigma G_{LR-i} + \sum_{i=0}^{m2} \pi \Delta OP_{t-i} + \sum_{i=0}^{m3} \rho \Delta Y_{t-i} + \lambda EC_{t-1} + \mu_t \quad 6.7$$

Where λ is the speed of the adjustment parameter. A significant negative coefficient supports an adjustment toward long-run equilibrium.

7.6. Empirical results

First, the Unit Root test was examined to show that all variables were integrated at I(1).

Secondly, the Akaike information criterion (AIC) used to select the optimal lag.

7.6.1. Unit Root Test

Table 6.4 reported the results of the unit root for the following variables: openness degree, government expenditures, and per capita, in our study. Results of the Dickey-Fuller (ADF) unit root test suggest that all variables are non-stationary at level but become stationary at first difference. To summarize, all the variables are integrated at order I(1). This result enables us to apply the ARDL method.

Table 6.4 Unit Root Test Results

Variable	Level			1st difference		
	ADF	Critic value	Result	ADF	Critic value	Result
<i>G</i>	2.642	-2.9	Non- stationary	-4.998	-2.9	Stationary
<i>OP</i>	-1.455	-2.9	Non- stationary	-5.626	-2.9	Stationary
<i>Y</i>	1.752	-2.9	Non- stationary	-5.570	-2.9	Stationary

Notes: *G*= per capita government expenditures, *op*= openness, *y*= private per capita GDP.

The ADF test results show that all the variables are non-stationary at a level at a 5% significance level. However, all of them are stationary in terms of their first difference. This means that all series are $I(1)$.

7.6.2. Lag length selection test

Important points to be measured while performing the analysis is what the lag length in the analysis is. Due those reasons, after the unit root tests of the variables, the lag length of the model was chosen. Since the lag length to be used in the study is not known in real life, the lag length is chosen by an appropriate method. If the lag length is set to be longer or shorter than it should be, the variables will have higher or lower values than they are (Katos, Lawler and Seddighi, 2000: 300).

Accordingly, such tests like Likelihood Ratio Test (LR), Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC), Final Prediction Error (FPE) and Hannan-Quinn Information Criterion (HQ) are the most favored test to determine the appropriate lag length to avoid econometrics problems. The results obtained for the optimal lag length are given in Table 6.5.

Table 6.5 Lag length selection

Lag	LR	FPE	AIC	SC	HQ
0	NA	4.48e+12	37.64404	37.77600	37.69010
1	203.8302*	1.27e+10*	31.77435*	32.30219*	31.95858*
2	13.92523	1.31e+10	31.79417	32.71789	32.11657
3	4.170098	1.90e+10	32.13378	33.45338	32.59436

* Indicates lag order selected by the criterion

LR: sequential modified LR test statistics (each test at 5% level), FPE: final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hanna-Quinn information criterion.

As a result of the recognized model, the appropriate lag length for the LR, FPE and AIC is 1, 1 for SIC and 1 for HQ. Then, (1) is determined as the appropriate lag length with the most consensus.

7.6.3. Cointegration test

Bound cointegration test

In order to ascertain the presence of a long run relationship among the variables, the bound tests are conducted; results of the bound tests are presented in Table 6.6.

Bound test results reveal that the computed F -statistics based on the Wald test is 16.31 this exceeded the upper bound of 4.66 at the 1% significance level, suggesting that the null hypothesis of no cointegration relation is rejected. Therefore, the long run relationship is confirmed among the G , OP , Y , the result implies that these variables move together and so cannot move ‘too far away’ from each other independently. Indirectly, we can conclude that any disequilibrium among them is a short run phenomenon.

Table 6.6 F-statistics for testing the existence of long-run cointegration

F-statistics	K	Significance level	Bound Critical Values	
			I(0)	I(1)
		1%	2.37	3.2
16.31950*	2	5%	2.79	3.69
		10%	3.65	4.66

From Persaran et al (2001) Critical values are obtained.

Source: extracted from estimation output using Eviews 11

Our result show that there is a long run relationship between government expenditure, trade openness, and GDP. This indicate that the series in long run move together.

Johansen-Juselius Cointegration test result:

Johansen-Juselius cointegration test has been achieved, the comparison of computed trace and Maximal statistics value with the critical value at 5 % level of significance obviously indicates that the null hypothesis of zero cointegration vectors is rejected, while the alternative hypothesis of one cointegrating vector is accepted, results show that there are three cointegrating vectors.

Table 6.7 Johansen-Juselius maximum likelihood cointegration test

Trace test				Maximal Eigen value Test			
Null	Alternative	Statistic	0.05 Critical Value	Null	Alternative	Statistic	0.05 Critical Value
$r = 0$	$r = 1$	47.24*	29.79	$r = 0$	$r = 1$	28.53*	21.13
$r \leq 1$	$r = 2$	18.71*	15.49	$r \leq 1$	$r = 2$	14.06*	14.26
$r \leq 2$	$r = 3$	4.64*	3.84	$r \leq 2$	$r = 3$	4.64*	3.84

Notes: (i) r stands for the number of cointegrating vectors.

(ii) * denotes rejection of null hypothesis of no cointegration at 5% significance level.

Breusch–Godfrey Serial Correlation LM

To show that there is no correlation among errors we follow Breusch-Godfrey serial correlation *LM* Test. The Breusch–Godfrey serial correlation *LM* test is a test for autocorrelation in the errors in a regression model. It makes use of the residuals from

the model being considered in a regression analysis, and a test statistic is derived from these. The null hypothesis is that there is no serial correlation of any order up to p .

LM test, is in fact a general test for autocorrelation of any order (ie residuals may be correlated over more than one period) Breusch–Godfrey Correlation Lagrange Multiplier test useful test since: a) generalizes to any order autocorrelation wish to test. b) is robust to inclusion of lagged dependent variables. However, since this is a test of joint significance may not be able to distinguish which lagged residual is important Test is only valid asymptotically (i.e in large samples).

Table 6.8 Breusch-Godfrey serial correlation *LM* Test

Breusch-Godfrey Serial Correlation <i>LM</i> Test:			
F-statistic	2.009065	Prob. F(4,26)	0.1507
Obs*R-squared	4.239224	Prob. Chi-Square (4)	0.1201

Based on Breusch-Godfrey Serial Correlation *LM* Test which shows the F-statistics 2.00 with Prob (0.05) equal 0.15 more than 0.05 that means no serial correlation at up to 2 lags as shown in Table 6.8. So, we accept the null hypothesis that there is no autocorrelation in the residuals generated from the regression model. By this we understand that the test is valid because it is not victimized by serial correlation throughout the series. This result enables us to run our estimation.

7.6.4. Long run results

Once we found the long run cointegration relationship among the variables of our study, results obtained by estimating intermediate imports as a (dependent variable) in the long run are reported in Table 6.9.

Table 6.9 Long run coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob*.
Ln(Y)	1.375411	0.200022	6.876317	0.0000
Ln(OP)	-0.265968	0.220676	-1.205241	0.2364
C	-4.058714	1.267590	-3.201915	0.0030

Long run equation:

$$\ln G = \alpha + \beta_1 \ln OP + \beta_2 \ln y + \hat{u} \quad 6.8$$

$$EC = \ln(G) - 0.265 * \ln(op) + 1.375 * \ln(y) - 4.058 \quad 6.9$$

The estimated coefficient of the long-run relationship shows that Y has a positive impact on G in Turkey. This signifies that an increase of 1% in Y leads to an increase of g by 1.37%. For openness as a trade liberalization indicator, the results confirm that an increase of 1% in openness will lead to a decrease in per capita government expenditure by 0.26% in the long run. This means Turkey's government will gradually quit economic activities, revenue will decline, government expenditure will decrease, and ultimately, welfare will be influenced negatively by trade liberalization. Our results were consistent with Turan and Karakas (2016).

7.6.5. Short run results

The error correction model obtained from the ARDL test, provides knowledge about the short run effects of variables on G , Table 6.10 contains the estimation results from the error correction model. The results explain the short run effects of Y on G .

Table 6.10 Short run coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob*.
Ln(Y)	0.289690	0.045449	6.374022	0.0000
Ln(OP)	-0.056018	0.045190	-1.239608	0.2236
C	-0.854849	0.191908	-4.454460	0.0001
CointEq(-1)*	-0.210621	0.024989	-8.428394	0.0000
R-squared	0.987921	Mean dependent var		7.415211
Adjusted R-squared	0.986855	S.D. dependent var		0.293168
S.E. of regression	0.033612	Akaike info criterion		-3.848547
Sum squared resid	0.038413	Schwarz criterion		-3.676169
Log likelihood	77.12239	Hannan-Quinn criter.		-3.787216
Durbin-Watson stat	2.045607			

According to the short-run result, y has a positive impact on G in Turkey. This signifies that an increase of 1% in Y leads to an increase in G of 0.287%. With regards to openness as a trade liberalization indicator, results confirm that an increase in openness by 1% will lead to a decrease in per capita government expenditure by 0.05% in the short run. Our results were not consistent with Turan and Karakas (2016).

to investigate the difference between the long and the short-run. The ECM test indicates that the short-run and long-run cointegration over time, the negative sign of the ECM coefficient, and significant shows the existence of disequilibrium in the short run and convergence in the long run. ECM equals 21.0% of the real model equation. In other words, errors are corrected in the present period and tied to long-run equilibrium at

21%. In other words, ECM notifies us that 21% of all errors or disequilibrium in the short term are adjusted for in the long term.

7.6.6. Granger causality test

Previous studies such as Rodrick (1998), Alesina, and Wacziarg (1998), indicated that openness contributed to increase in the size of the government as a percentage of GDP to compensate for what was loses from trade liberalization. Granger causality test shows that openness does not cause an increase in government expenditures, nevertheless, an increase in government expenditures causes openness, this explains the existence of a direct relationship of expenditures towards openness. With regard to the per capita share of the GDP, the increase per capita leads to more spending, it has been found that there is a direct relationship.

Table 6.10 Granger causality test results

Null Hypothesis	F-Statistic	Prob.
OP does not Granger cause G	3.149	0.0564
G does not Granger cause OP	7.582	0.0020
Y does not Granger cause G	12.612	0.000
G does not Granger cause Y	0.4309	0.6536

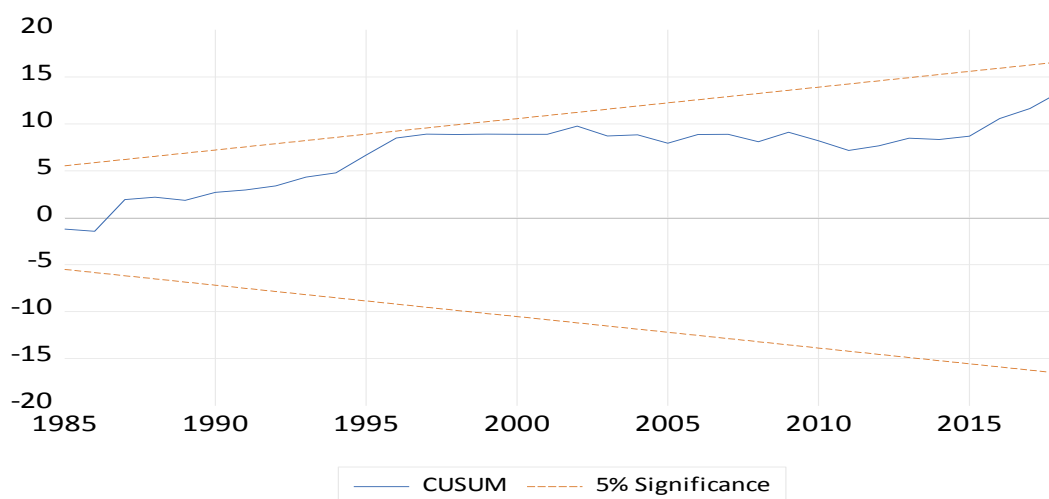
7.6.7. Stability Test

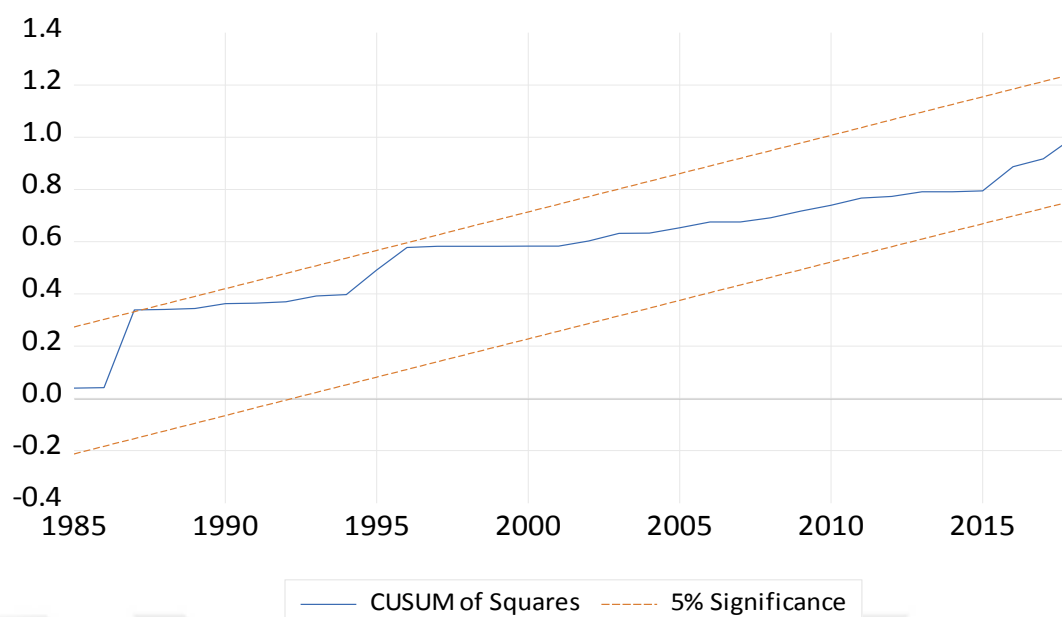
After running the unit root test to see if the model's variables are static over time, it is necessary to investigate whether these variables show a structural change in their behavior over time stable or not, the CUSUM stability test is one of the most common tests in this field (Brown et al., 1975).

The results of this test are shown in the form of a curve for the errors of a model estimated by the usual least squares method (OLS), and a confidence domain with the aim of testing the null hypothesis which states that the parameters of the typical least squares model are unstable. If the curve of errors is within the critical limits throughout the study period, the null hypothesis is rejected at a significant percentage (5%). This means that the parameters are stable throughout the study period, and therefore the ability to estimate constant parameters of the model along the study time period without having to split it for partial periods, if the null hypothesis is rejected, then the study period must be divided into partial periods in which the parameters are stable (Brown et al., 1975).

A graphical presentation of the test is provided in Figure 6.3. The CUSUM test indicates that the parameters are stable over time as the plot of cumulative sum of recursive residuals and cumulative sum of squares of recursive residuals lies within the critical bound at 5% significance level.

Figure 6.3 Stability test





The CUSUM and CUSUM of Squares test suggest that the parameters were stable over the study time. These tests indicate no evidence of any significant structural instability.

7.7. Conclusion

This study examined the hypothesis that the impact of trade liberalization on government expenditures over a period (1980-2018). The study employed the Autoregressive Distributed lag bound test (ARDL). This study depends on the theoretical model developed by Borchering and Deacon (1972) to incorporate the role of trade openness as an indicator of trade liberalization and its impact on government expenditures.

Long run estimation shows that an increase in openness of 1% will lead to a decrease in per capita government expenditure by 0.26% in the long run. Furthermore, an increase in openness of 1% will lead to a decrease in per capita government expenditure by 0.05% in the short run.

The Granger causality test confirms that there is an existing directional causality between openness and government expenditures. In other words, it can be said that trade liberalization granger causes government expenditures, as well as per capita granger causes government expenditures.

CONCLUSION

Hypothesis Testing:

In our study, the flexible exchange rate, openness degree, and other factors that represent trade liberalization in Turkey:

First Hypothesis: Trade liberalization has had a positive impact on foreign direct investment inflows into the Republic of Turkey over 1980 to 2018.

As reported in estimation results, the impact of trade liberalization on attracting investments is slightly low on one hand. On the other hand, currency depreciation is embodied by an open economy, which leads to a negative impact on foreign direct investment.

Second hypothesis: Is that Turkish manufacturing exports are significantly influenced by innovation performance after the trade liberalization program's implementation.

Based on previous results, the technological competitiveness index is unable to increase exports significantly to foreign countries, while exports to G7 have been increased if Turkey's technological competitiveness index improved.

Third Hypothesis: There is a positive impact of trade liberalization on manufacturing exports of the Republic of Turkey over the period (1980-2018).

Trade liberalization has a positive impact on manufacturing export volume. Integration into a global economy opens up new export markets. The results confirm that the price and income elasticities are positive. High foreign income elasticity compared to advanced economies explains the extent of integration in a global economy.

More specifically, the findings reveal that the price elasticity of Turkish exports is higher than the price elasticity of imports ($0.31 > 0.028$).

Foreign income Export elasticity is higher than domestic income import elasticity of income ($1.81 > 0.52$). As a result, trade liberalization benefits the export industry.

Fourth hypothesis: There is a positive impact of trade liberalization on import volume (decreasing imports) of the Republic of Turkey over the period (1980-2018).

Results indicate that trade liberalization has a positive impact on access to cheap and quality intermediate inputs. This has injected the export sector with a variety of sophisticated inputs. The results indicate that manufacturing exports impact significantly on intermediate imports. An increase of 1% in manufacturing exports leads to an increase in intermediate imports by 1%.

Moreover, the price elasticity of Turkish imports is lower than that of Turkish exports ($0.028 < 0.31$). Domestic income import elasticities are lower than foreign income export elasticities ($0.52 < 1.81$). As a result, trade liberalization has an impact positively on Turkish imports (imports increases less than exports).

Fifth hypothesis: Trade liberalization has had a positive impact on the trade balance of the Republic of Turkey over the 1980s to 2018.

Trade liberalization impacts positively on the trade balance. Integration into the global economy improves the trade balance. In last year's export growth, more than imports.

Sixth hypothesis: trade liberalization had a positive impact on government size from 1980 to 2018.

According to estimation results, trade liberalization impacts negatively on the Turkish government's size. Trade liberalization and openness stimulate public expenditures on big infrastructure projects, especially in a small open economy.

Conclusion

Depending on what has been studied above, the study came out with the following results:

Concerning the impact of trade liberalization on macroeconomic indicators, foreign direct investment, exports, imports, trade balance, and government expenditures, the Republic of Turkey, like any other country, is willing to integrate into the global economy in order to achieve stability and sustain growth.

During the first years of trade liberalization, since Turkey opened to foreign investment, Turkish manufacturing exports have achieved notable growth, indicating economic recovery. A new course of economic policy has been set up. Trade liberalization enables Turkish producers to access a variety of cheap and quality intermediate imports. Cheap inputs stimulate investors in industrialization.

Turkey's trade balance deficit continued through the study period (1980-2018). Turkey's efforts to achieve a surplus in the balance of trade were not seen. Imports still dominated the deficit, especially since Turkey depends on imported energy and intermediate inputs to sustain economic growth with the deficit still under investigation.

By employing econometrics tests based on ARDL methodology to examine the impact of trade liberalization on foreign direct investment, innovation and manufacturing

exports, manufacturing exports, intermediate imports, trade balance, government size, results as follows:

1-Trade liberalization impacts negatively on foreign direct investment inflow into the Turkish market. Although Turkey has modern and fit infrastructure, foreign investment inflow compared to other emerging countries is still low. Furthermore, the flexible exchange rate as the first pillar of Turkish trade liberalization does not lead to a stimulating environment for investors toward investing in Turkey.

2-One of the most important merits of globalization is technology advancement and innovation. Capability readiness enables countries to absorb technology and develop it. Improving Turkey's technological competitiveness index will lead to increased exports toward advanced economies more than the rest of the world.

3-There is a positive impact of trade liberalization on Turkish manufacturing exports, openness, and integration into the global economy, opening new markets, and maintaining trade ties between Turkey and the rest of the world. Furthermore, trade liberalization enables Turkey to penetrate advanced economic markets.

4-Access to a variety of quality and cheap inputs contributes significantly to the survival of the manufacturing sector. Openness and trade ties allow industrial agents in Turkey to catch up with technology embodied by inputs. Thus, trade liberalization impacts positively on imported intermediate inputs.

3-The impact of trade liberalization on the trade balance in the long run is positive; the trade balance grew under trade liberalization pressure. The dynamic of trade balance shows the health of the economy's trend over the last three decades (1980-2018).

6-Government expenditures will be influenced negatively by trade liberalization in the long run by financing big infrastructure projects to accelerate trade, accompanied with low education expenditures and low social protection.

Finally, the impact of trade liberalization on macroeconomic indicators varies from one to another. Based on the above results, foreign investment inflow is still low. Innovation compared to advanced economies is one of the biggest puzzles in the industrialization sector. Manufacturing exports expanded and grew significantly, intermediate inputs increased, the trade balance improved, and welfare decreased.

Implications of the Study

This study tried to investigate the impact of trade liberalization on manufacturing exports, intermediate imports, and the balance of payments. Based on the study's empirical results, decision-makers in Turkey should take these considerations in economic policy:

1-Macroeconomic stability is the vital determinant in attracting foreign direct investment.

2-Exporting to the G7 induces exporters toward more innovation and research and development.

3-Keep the real exchange rate at competitive levels to enable manufacturing exports to reap external competitiveness in the long run as well as increase productivity in firms. A stable exchange rate becomes an essential issue in sustaining growth in manufacturing sectors.

4-Manufacturing export diversification and complexity play an important role in global market expansion. Diversification in manufacturing exports will allow the country in the future to gain from externalities, specifically in medium and advanced technology products.

5-More attention given to research and development to attain advantages from spillover technology embedded within intermediate imports, which trade liberalization enables countries to access new and quality intermediate imports.

6-To reduce the trade balance deficit, decision-makers should work to increase exports more than imports after the devaluation of the currency.

7-Structural change in the composition of the economy collaborated with stable exchange rate policies which supported all economic sectors toward augmented export competitiveness, from price-competitiveness to non-price competitiveness, substituting intermediate imports with more research and development in the manufacturing sector, working to decrease the income elasticity of import demand, and exporting to high-income countries.

Limitations of the Study

This study examined the impact of trade liberalization on Turkey's macroeconomic indicators, particularly foreign direct investment, innovation, manufacturing exports, exports, liberalization, intermediate imports, trade balance, liberalization, and government expenditures. The study period was from 1980 to 2018. Previous studies did not examine these indicators during the same period. This study shed light on the positive and negative consequences of trade liberalization. Autoregressive distributed lag (ARDL) is employed. Although the exchange rate plays a significant role in

macroeconomic balance in many developed countries, this tool may be ineffective in Turkey.

Suggestions for Future Research

1-Foreign direct investment plays an important role in growth. Future studies should be focused on factors that attract foreign investments.

2-Innovation, research, and development have become the most important factors in the acceleration of the export boom.

3: The manufacturing sector plays a significant role in growth, so studying the main industry that has a competitive advantage and is affected positively by currency depreciation is very important.

4-Intermediate imports exhausted foreign reserves. It's necessary to study how to substitute them with home products.

5-For trade balance and currency devaluation, it's more logical to study bilateral trade impact on trade balance.

6- Social protection and loss from trade liberalization.

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Appendix 5.1

Trade balance = $X - M$ if $X=M$ this mean trade balance remain constant

where X = exports , M =imports , Y =income

$$\therefore \frac{\Delta X}{X} = \alpha \Delta \log Y; \quad \text{and} \quad \frac{\Delta M}{M} = \alpha \Delta \log Y$$

$$\therefore \Delta X = x(\alpha \Delta \log Y); \quad \text{and} \quad \Delta M = M(\alpha \Delta \log Y)$$

$$\therefore \frac{\Delta X}{\Delta M} = \frac{X(\alpha \Delta \log Y)}{M(\alpha \Delta \log Y)} = \frac{X}{M}$$

Appendix 6.1

Based on Cobb-Douglas constant return function:

$$X = \alpha L^\beta K^{1-\beta} \quad (1)$$

Where:

Depend on assumption of efficient production (cost minimization) we obtain:

$$\text{Where } w = \frac{\beta C_x X}{L} \quad (2)$$

W : the wage rate of L

r : the rental rate of k

C_x : the marginal cost of X

$$\text{And } r = \frac{(1-\beta)C_x X}{K}$$

$$L = \frac{\beta C_x X}{w} \quad (2')$$

$$\text{And } K = \frac{(1-\beta)C_x X}{r}$$

By substituting L and K of (4) into (1) we can show output as

$$\begin{aligned} X &= \alpha \left[\frac{\beta C_x X}{w} \right]^\beta \left[\frac{(1-\beta)C_x X}{r} \right]^{1-\beta} \quad (3) \\ &= \alpha C_x X \left[\frac{\beta}{w} \right]^\beta \left[\frac{(1-\beta)}{r} \right]^{1-\beta} \end{aligned}$$

This produce the following expression for marginal cost:

$$C_x = \left(\frac{1}{\alpha} \right) \left(\frac{w}{\beta} \right)^\beta \left(\frac{r}{1-\beta} \right)^{1-\beta} \quad (3')$$

Noting that the rental rate on capital is the same over all units, (3') can be rewritten:

$$C_x = a'w^\beta \quad (3'')$$

$$q = \frac{X}{N^\alpha} \quad (4)$$

Where: q = the quantity of X captured by the median voter

N= the number of citizens in a political unit

$$s = \frac{C_x X}{N q} = C_x N^{\alpha-1} \quad (5)$$

For suitability,

$$q = As^\eta y^\delta \quad (6)$$

Y= the income of the median voter

e= per capita expenditure in a particular category

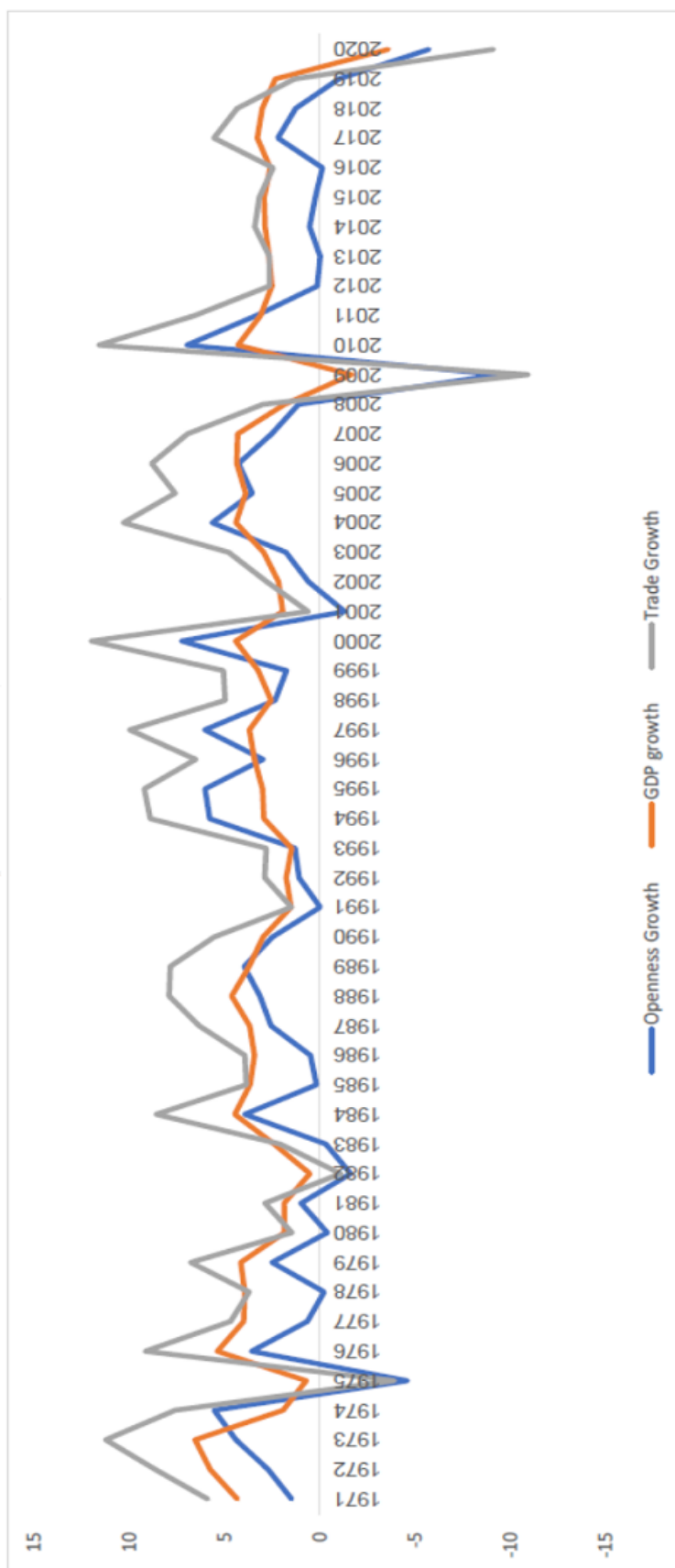
Using (3''), (4) and (5) this last equation can be expressed in term of per capita expenditure:

$$e = A'w^{\beta(\eta+1)}y^\delta N^{(\alpha-1)(\eta+1)} \quad (7)$$

By taking logarithm of (7) become as:

$$\ln E = \ln A' + (\eta+1)\ln \omega^\beta + (\alpha-1)(\eta+1)\ln N + \gamma \ln Y \quad (7')$$

World indicators: Openness, GDP, Trade (1971-2020)



Turkey indicators: Openness, GDP, Trade (1963-2018)

