

ROLE OF POLITICALLY LINKED AGRICULTURAL POLICY AND TRADE ON THE  
PERFORMANCE OF TURKISH AGRICULTURE

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**Title**

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North Dakota State University's regulations and meets the accepted  
standards for the degree of

**MASTER OF SCIENCE**

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## **ABSTRACT**

Turkey has seen a rise in its gross domestic products (GDP), a fall in the share of agriculture percentage of GDP and a contributive role of politically connected development plans that introduce agricultural policies and trade as regional trade agreements (RTAs). It is necessary to gauge the contribution of policy and trade changes to the performance of the Turkish agriculture sector. The primary objective of this thesis is to estimate the performance of the Turkish agriculture sector between 1961 and 2016 using data envelopment analysis (DEA). The secondary objective is to evaluate the impact of politically connected development plans that introduce agricultural policies and trade as regional trade agreements (RTAs) on the performance of Turkish agriculture production. As one of the results, the performance of Turkish agriculture production shows decreases in the following a rise in the number of regional trade agreements.

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## LIST OF ABBREVIATIONS

BSEC.....	The Organization of the Black Sea Economic Cooperation
DSI .....	The State Hydraulic Works
EC.....	The European Communities
ECO.....	The Economic Cooperation Organization
EEC .....	The European Economic Community
EU .....	The European Union
GAP.....	The Southeastern Anatolia Project
GATT .....	The General Agreement on Tariffs and Trade
GDP.....	Gross Domestic Product
GNP.....	Gross National Product
IMF.....	The International Monetary Fund
LCU.....	Local Currency Unit
NAFTA.....	The North American Free Trade Agreement
RCD.....	The Regional Cooperation for Development
SOE.....	A State-owned Enterprise
SPO .....	The State Planning Organization
TMO .....	The Turkish Grain Board
TUIK .....	The Turkish Statistical Institute
WTO.....	The World Trade Organization

## CHAPTER 1. INTRODUCTION

### 1.1. General and Agricultural Economy of Turkey

The Republic of Turkey is the 18<sup>th</sup> largest economy in the world with a Gross Domestic Product (GDP) of nearly US \$770 billion in 2018. As shown in Figure 1.1, the logarithmic (log) of GDP in Turkish Lira has been increasing annually from 1960 to 2018. During the 1980s and 1990s, there was a sharp increase in GDP, while the increase was reduced by almost half after 2000 compared to previous years. The world bank classifies Turkey as an upper-middle income country while it is considered a developing country by some organizations based on the per capita GDP. Based on World Bank data, the per capita GDP increased from US \$4,200 in 2000 to US \$9,945 in 2018.

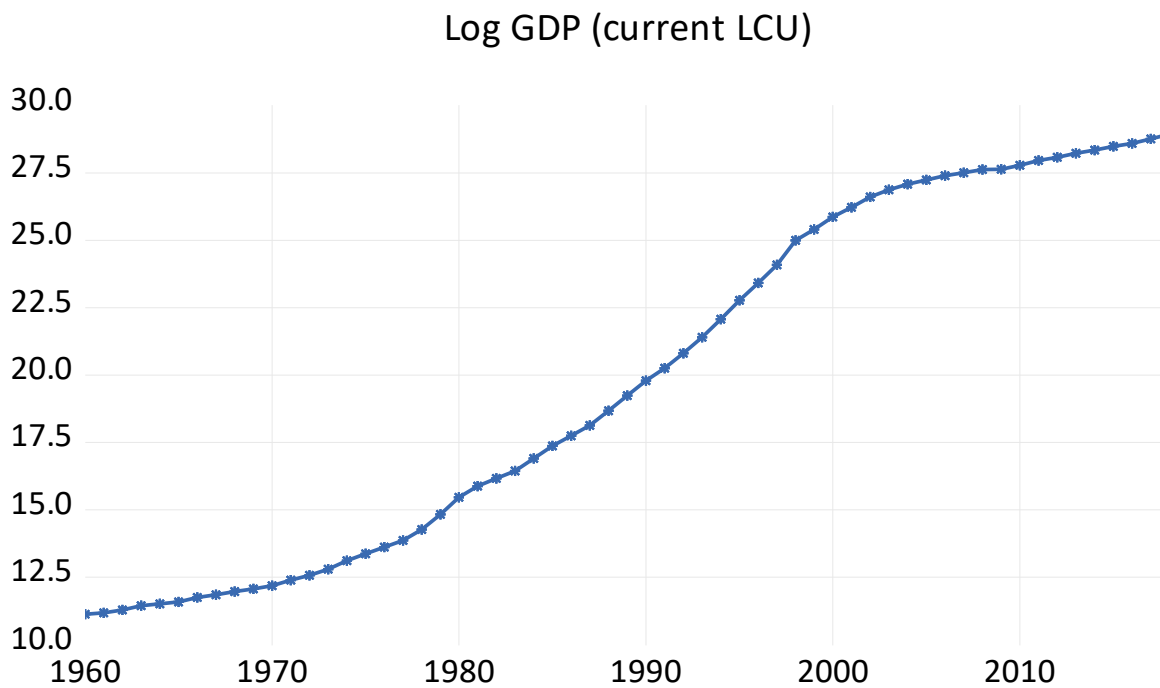


Figure 1.1: Log GDP for current Turkish Lira (Computed from World Bank Data)

One of the most important components of a developing economy like Turkey is the agricultural sector. Turkey has favorable climate conditions and geographical advantages, productive cultivable lands, and plenty of water supply. Turkey is considered one of the

considerable countries in the world due to its agriculture production. Turkey is the world's largest producer and exporter of hazelnuts, cherries, figs, and apricots, according to a statement released by the Ministry of Agriculture and Forestry in Turkey (FAO). It is possible to gauge the level of development of a country by looking at the share or contribution of the agricultural sector to the GDP of a country. For example, the agricultural sector in Turkey contributes to the country's development by contributing to food security and a supply of raw materials to the industrial sector and creates export demand for agricultural and industrial products.

### Agriculture (% of GDP)

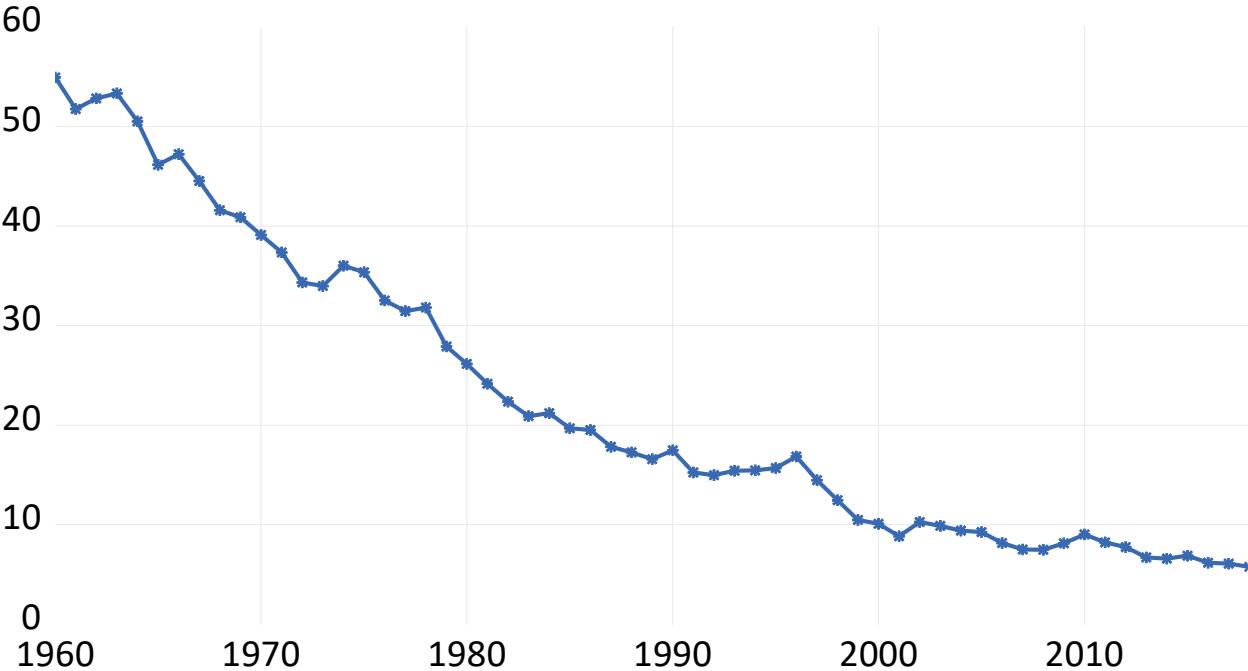


Figure 1.2: Percentage of Agricultural Share of GDP in Turkey (Computed from World Bank Data)

Figure 1.2 shows the percentage of agriculture share of GDP in Turkey. The percentage of GDP from agriculture from 1960 to 2018 shows a declining trend. The percentage of agriculture share of GDP dropped from 54.9 in 1960, to 39 in 1970, to 26.1 in 1980, to 17.5% in 1990, to 10.1% in 2000, to 9% in 2010, and to 5.8% in 2018.

The share of agriculture's contribution to GDP has declined, but due to its strategic importance, agriculture has established itself as an organized, highly competitive, sustainable and efficient sector. We believe that the increase in the performance of agriculture production has been through the efficient use of input resources, politically linked agricultural policies introduced through time and trade and trade agreements. Seldom are agricultural policies and trade independent of the political party system and Turkey is no exception.

## **1.2. Research Objectives**

Turkey has seen an increase in GDP, a fall in the percentage of agriculture share of GDP and the contributing role of politically linked development plans that introduce agricultural policies and trade. It is important to evaluate the contribution of these changes to the performance of the Turkish agriculture sector. The main objective of this thesis is to empirically evaluate the impact of agricultural policy and trade on the performance of Turkish agriculture from 1961 to 2016. The non-parametric linear programming data envelopment analysis (DEA) is used in the empirical estimation of production efficiency. These production efficiency measures are explained by politically linked agricultural policies and trade. These form the two major objectives:

- 1) Estimating the performance of Turkish agriculture production using DEA; and
- 2) Evaluating the importance of Turkish agricultural policies and trade on the performance of Turkish agriculture production.

## **1.3. Agricultural Policies and Trade linked to Political Party system**

The agricultural policies and trade linked to political parties have been introduced as part of development plans. During the early 1960s, the agricultural policies introduced in the development plan were assisted generally of a price support policy and providing guidance (Acar

2006). An increase in the quantity of output in the agriculture sector and efficiency on agriculture production was the first objective of agricultural policies from the 1960s to 1980. Neo-liberal policies that have been effective in the world since the 1980s have been effective in determining agricultural policies of Turkey (Ari 2006). The actors of this process include the International Monetary Fund (IMF), World Bank (WB), World Trade Organization (WTO) and European Union (EU). Intervention by international organizations was to provide stabilization measures to support Turkey affected by the oil crisis in the 1970s. The stabilization measures introduced were supportive of market mechanisms and minimizing the support to the public sector. Within the scope of these measures; fertilizer prices were increased, and then the state support for other agricultural inputs was gradually abolished. The terms of use of agricultural loans have become more market-oriented, while agricultural support prices were reduced and the scope of the number of supported products was halved.

The number of crops receiving support was reduced in the 1980s, however, the number has been increasing since the beginning of the 1990s. The number of agricultural loans increased, and a product linked premium system was introduced in 1993. Increasing subsidies in agricultural products ensured the stability of agricultural supply, i.e., regular and continuous availability of food for consumers and income/price stability for producers. Due to the agricultural policies introduced in Turkey, the development of agriculture including the creation of the Dairy Institute Association (SEK), Food Factories, Meat and Fish Institution (EBK), and Turkey Agricultural Equipment Corporation (TZDK) to address price fluctuations. However, the withdrawal of these institutions leads to price instability in the market and fluctuations in the supply of meat and dairy products (Oral 2004).

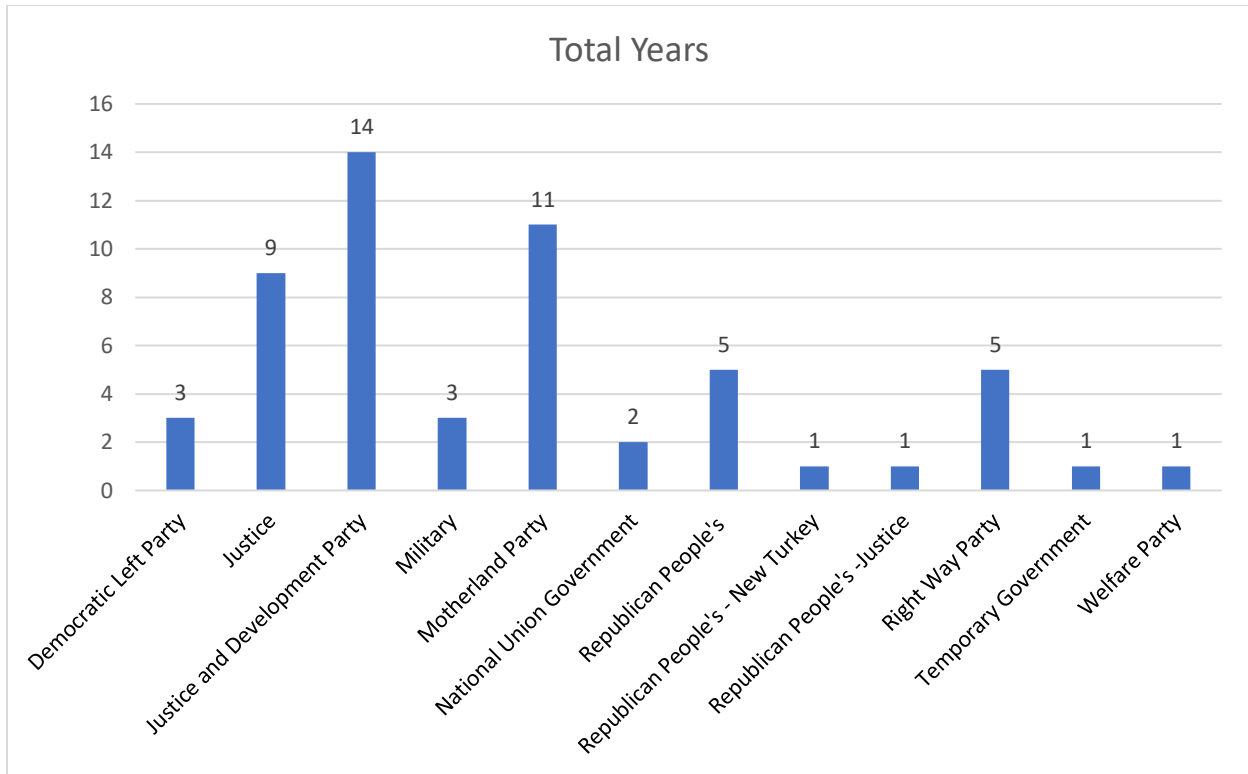


Figure 1.3: Frequency of Political Party Governments Over the Years

The Agriculture Agreement was signed within the scope of the World Trade Organization (WTO) in 1995 and the Customs Union Agreement was signed with the EU in 1996. The Agricultural Agreement with the WTO leads to a reduction in input subsidies and price support, and tariffs have been reduced to take care of agricultural products and producers from price fluctuations in international markets and to promote domestic production. (Esturk and Oren 2014). All these agriculture or farm policies introduced as part of the development plans are linked to ideologies of the political party system.

Since 1961, different political parties have governed the Republic of Turkey. As shown in figure 1.3 the Justice and Development Party (AKP), which is currently the governing party since 2002, is operating Turkey for more than 14 years. Motherland Party was in charge of governing Turkey for 11 years with nine years in a row between 1983 and 1991. Justice Party was in power for nine years with five years in a row between 1966 and 1970. Between 1992 and

1996 the Right Way Party was the ruling party. The Military of Turkey was in charge three years after coup attacks in 1961, 1981 and 1982.

#### 1.4. Agricultural Trade of Turkey

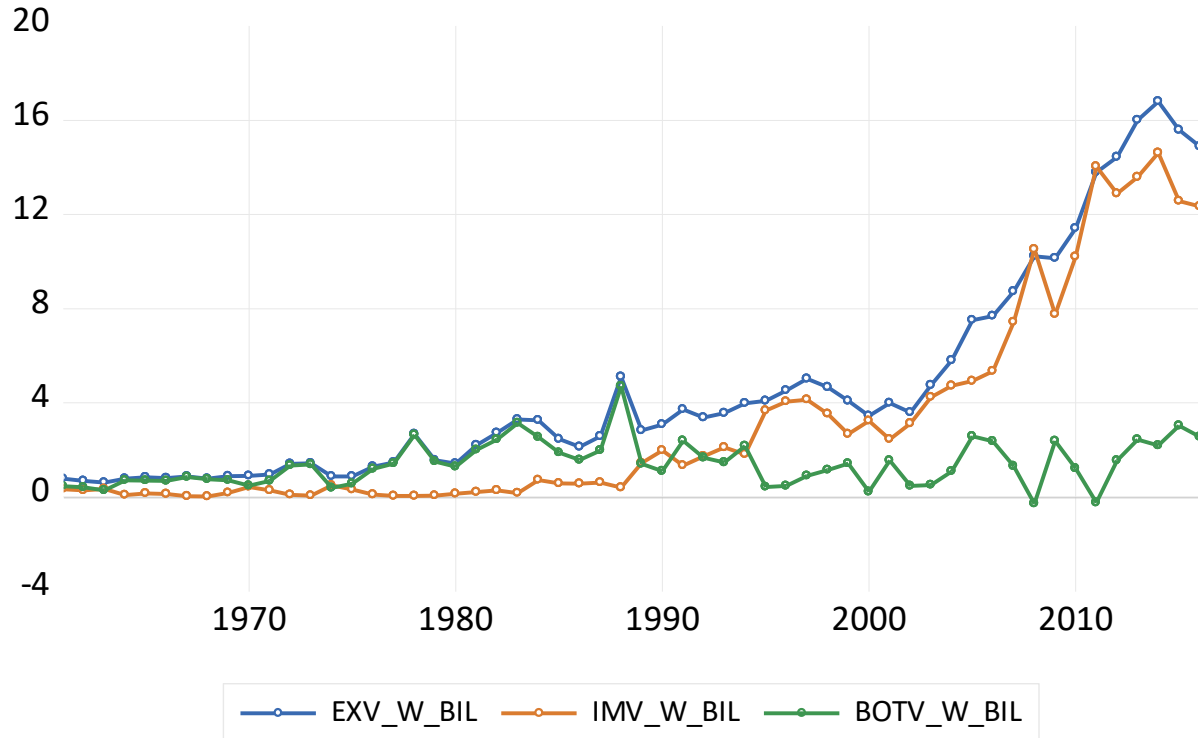


Figure 1.4: Agricultural Trade Trends Over Years

Figure 1.4 shows Turkish agricultural trade value which includes exports (EXV\_W\_BIL), imports (IMV\_W\_BIL), and balance of trade (BOTV\_W\_BIL) in billions of US\$. Overall trade shows an increase over the years. In 1961, Turkish agriculture imports, and exports are valued at 333 and 773 million US\$, respectively; while the imports and exports are valued at 12.3 and 14.9 billion US\$, respectively in 2016. After showing a downward trend between 2000 and 2002, import and export values rose for the next 12 years and were highest in 2014. The balance of trade is showed an increasing trend, with 2.6 billion US\$ in 1978, 3.1 billion US\$ in 1984 and 4.7 billion US\$ in 2008. As can be seen in the figure, the agriculture balance of trade is negative in 2008 and 2011.

## CHAPTER 2. HISTORY AND DEVELOPMENT PLANS IN TURKEY

### 2.1. History of Turkey

The Republic of Turkey occupies a unique geographic position, lying partially in Asia and partly in Europe. Throughout its history, it has acted as each a barrier and a bridge between the two continents. Turkey is situated at the crossroads of the Balkans, Caucasus, Middle East, and the eastern Mediterranean. It is among the larger countries of the region in terms of territory and population, and its land area is larger than that of any European state. Nearly all of the country is in Asia, comprising the oblong peninsula of Asia Minor and also known as Anatolia (Anadolu) and, in the east, part of a mountainous region sometimes known as the Armenian Highland. The remainder as called Turkish Thrace (Trakya) lies in the extreme southeastern part of Europe, a tiny remnant of an empire that once extended over much of the Balkans.



Figure 2.1: Map of Turkey (<https://www.cia.gov/library/publications/resources/the-world-factbook>)

Turkey is bounded on the north by the Black Sea, on the northeast by Georgia and Armenia, on the east by Azerbaijan and Iran, on the southeast by Iraq and Syria, on the



southwest and west by the Mediterranean Sea and the Aegean Sea, and on the northwest by Greece and Bulgaria. The capital is Ankara, and its largest city and seaport is Istanbul. Turkey was founded in 1923 on the ruins of the Ottoman Empire and one of the main problems was the development of the economy of the Republic of Turkey. The founder of the Republic, Mustafa Kemal, knew political independence could only be sustained by a sound and powerful economy. However, the foundations for economic development were very weak: industry seemed almost absent in the country; entrepreneurial mentality and talent were not developed; and since per capita income was even below minimum subsistence standards, savings were extremely insufficient.

## 2.2. Politically linked Agricultural Policy and Trade to Development Plans in Turkey

Table 2.1: Political Party, Development Plans and Farm Policy Shifts (Authors Calculation Based on the Data from SPO, <http://www.sbb.gov.tr/kalkinma-planlari>)

Political Party	Development Plan Overlapping Agriculture Policy shifts (dummies)	List of Years
Democratic Left	FYP7, FYP8	2000 - 2001 - 2002
Justice	FYP1, FYP2	1966 - 1967 - 1968 - 1969 - 1970 - 1974 - 1975 - 1978 - 1980
Justice and Development	FYP8, FYP9, FYP10	2003 - 2004 - 2005 - 2006 - 2007 - 2008 - 2009 - 2010 - 2011 - 2012 - 2013 - 2014 - 2015 - 2016
Military	FYP0, FYP4	1961 - 1981 - 1982
Motherland	FYP0, FYP4, FYP5, FYP6, FYP7	1983 - 1984 - 1985 - 1986 - 1987 - 1988 - 1989 - 1990 - 1991 - 1998 - 1999
National Union Government	FYP2	1971 - 1972
Republican People's	FYP1, FYP3, FYP4	1964 - 1965 - 1976 - 1977 - 1979
Republican People's - Justice	FYP0	1962
Republican People's - New Turkey	FYP1	1963
Right Way	FYP0, FYP6, FYP7	1992 - 1993 - 1994 - 1995 - 1996
Temporary Government	FYP3	1973
Welfare Party	FYP7	1997

Since 1960, the idea of accelerating economic, social and cultural development, harmonizing the policies implemented, harmonizing the social and cultural transformation, and providing rational public intervention to the economy have been adopted in Turkey. The constitution of 1961 stipulates the preparation of Development Plans to achieve economic, social and cultural development through democratic means. For this purpose, the State Planning Organization (SPO) was established on 30 September 1960. The task of the SPO is to assist and advise the Government in the determination of economic, social and cultural policies and objectives and in the coordination of economic policy-related activities. Development plans overlap the political parties. In Table 1.1, the list of political parties through time and its overlap with development plans are presented. As seen in the table that each development plans overlap with more than one political party in some years. As a result of these overlaps, enforcing previous development plans in the agricultural sector is in run differently or as same as what it is by government political party in their in-power period in the government office.

### **2.2.1. First Five-Year Development Plan Model (1963-1967)**

The first development plan included fifteen-year targets based on balanced development between agriculture and industry. Even though Turkey's long-term development was more directed to industrialization, it is necessary to reach targets in agriculture as well. The Republican People's - New Turkey, Republican People's, Justice political parties contributed to the policies during this development plan. During this period, the major agricultural policies included:

- 1) Support to increase agricultural production and increase exports, and stabilization of raw material needed by industry.
- 2) Subsidies to increase the production of animal protein content to improve the nutritional level.

- 3) Support to eliminate income gap, unemployment and improve agriculture and community development.
- 4) Policies for long-term and best use of resources. (SPO, First Five-Year Development Plan)

### **2.2.2. Second Five-Year Development Plan Model (1968-1972)**

Since the economy is still largely dependent on the agricultural sector, economic development has been under the influence of agricultural production at every stage. The Justice, National Union Government political parties contributed to the policies during this development plan. During the second development plan, here are agricultural and trade policies introduced to support the agriculture sector.

- 1) Support modernization of agricultural production methods, increasing the use of fertilizers and high-yielding good seeds, improving product quality, expanding irrigation opportunities, expanding agricultural control, and improving marketing order to ensure production and productivity increase in the agricultural sector.
- 2) Support to supply of pesticides in enough quantities and at reasonable prices in a timely manner to use it in the fight against diseases and pests in agriculture.
- 3) Support irrigation for up to 400,000 additional hectares of land. (SPO, Second Five-Year Development Plan)

### **2.2.3. Third Five-Year Development Plan Model (1973-1977)**

The aim of the support policy is to maintain stability in agricultural prices and incomes, provide marketing facilities, and increase productivity in a production structure that is suitable for the characteristics of arable land and domestic-foreign demand. The Temporary Government, Justice, Republican People's political parties contributed to the policies during this development

plan. During the third development plan, here are agricultural and trade policies introduced to support the agriculture sector;

- 1) Low-cost input and necessary broadcasting service shall be provided, and enough credit will be used under favorable conditions and in a way that directly affects production.
- 2) Diversify the acreage allocation from few commodities to multiple commodities across all the regions of the country.
- 3) Providing direct subsidies to limit the supply of agriculture production to maintain the quantity, quality, and domestic and foreign prices.
- 4) Encourage the production of alternative commodities by providing price supports to encourage production. (SPO, Third Five-Year Development Plan)

#### **2.2.4. Fourth Five-Year Development Plan Model (1979-1983)**

The Republican People's, Justice, Motherland political parties and the Military contributed to the policies during this development plan. In order to sustain the development in agriculture during the fourth development plan, here are agricultural and trade policies introduced to support the agriculture sector;

- 1) Emphasis on increasing the quality and productivity in agricultural production.
- 2) Disseminating technologies that will minimize the dependence of agriculture on the weather conditions.
- 3) Encourage the production of the agricultural commodities that leads to balanced nutrition and also for export purposes.
- 4) Measures to avoid inflationary pressures that would hurt the supply of foodstuffs. (SPO, Fourth Five-Year Development Plan)

### **2.2.5. Fifth Five-Year Development Plan Model (1985-1989)**

During this development under Motherland political party discussions with the common agricultural policy of the European Economic Community (EEC) were initiated. Turkey began to adapt to the common market orders and initiate policies within the framework of regulations.

The policies initiated during this development plan include;

- 1) Policies to stability agricultural prices/revenues, provide marketing facilities and increase productivity in accordance with the characteristics of arable land and demand.
- 2) Support the export of agricultural products.
- 3) Non-price support instruments such as cheap and adequate inputs, agricultural education, agricultural organization, and technological development opportunities will be included in the promotion of agricultural production in the price policy.
- 4) Support to improve agricultural infrastructure, input usage, accelerate regional development and regulate the allocation of agricultural soils to non-agricultural purposes through physical planning decisions as well as implementation tools (SPO, Fifth Five-Year Development Plan)

### **2.2.6. Sixth Five-Year Development Plan Model (1990-1994)**

The Motherland and Right Way political parties contributed to the policies during this development plan. The development plan emphasized the integration of the common agricultural policy of the European Economic Community (EEC) into Turkish agriculture policy. Measures will continue to be taken to eliminate the negative effects of some Turkish agricultural products exports as a result of the full membership of Greece, Spain, and Portugal to the Community. To continue the necessary steps will be taken within the Plan period on economic integration with the EEC in agricultural support policy. (SPO, Sixth Five-Year Development Plan).

### **2.2.7. Seventh Five-Year Development Plan Model (1996-2000)**

Agricultural Policies shall be regulated in accordance with the obligations of Turkey and the expected developments in the EC Common Agricultural Policy within the framework of the agricultural provisions of the World Trade Organization Agreement signed at the end of the Uruguay Round. Agricultural support policies will be restructured on the basis of the development of production in accordance with market signals under free competition conditions and considering the more rational use of public resources allocated for this purpose. Encourage regional integration in the context of EFTA, BSEC, ECO, Islamic Countries, Turkish Republics, and customs union with EC. The Right Way, Welfare Party, Motherland and Democratic Left political parties contributed to the policies during this development plan. The policies included;

- 1) Support the free movement of goods,
- 2) improve the institutional arrangements for the free movement of agricultural goods, capital, services, and persons excluded from the scope of the customs union
- 3) to develop other matters regulated by the partnership regime, which will accelerate the process of integration with the EU policies. (SPO, Seventh Five-Year Development Plan)

### **2.2.8. Eighth Five-Year Development Plan Model (2001-2005)**

During the Eighth Plan period with Democratic Left and Justice and Development political parties, the policies included:

- 1) Implement direct income support for farmers in 2000,
- 2) Supports to manage product prices,
- 3) Evaluate the importance of agricultural policies or stipulated by The World Trade Organization Agreement, the European Community Common Agricultural Policy, and

other international obligations to the Turkish agriculture sector. (SPO, Eighth Five-Year Development Plan)

### **2.2.9. Ninth Development Plan Model (2007-2013)**

During the ninth plan period with the Justice and Development Party, the policies emphasized increasing productivity by creating a competitive agricultural structure;

- 1) Double the rate of certified seed use in grain production.
- 2) Increase the share of cross-breeding and cattle breeding.
- 3) Increase organic farming production.
- 4) Create investment opportunities, to increase State Hydraulic Works (DSI) irrigation areas and afforestation activities. (SPO, Ninth Development Plan)

### **2.2.10. Tenth Development Plan Model (2014-2018)**

During the tenth plan period with Justice and Development political party, the policies included:

- 1) Continue supporting area and product-based payments due to the end of the Direct Income Support program in 2009.
- 2) Develop agricultural subsidies in agricultural sector-specific to commodities and regions to address the difference across the country.
- 3) Ensure income stability and enterprise based structure.
- 4) Support the establishment of agricultural information systems that will serve as the basis for the implementation of these policies continued. (Ministry of Development, Tenth Development Plan)

### CHAPTER 3. LITERATURE REVIEW

Political stability could one of the most important factors affecting the economic performance of a country including agriculture. In simple terms, it is possible to define the continuity of political authority and the fact that the political system changed. Even though a total of 41 governments were in charge in a government office, and they linked to agricultural policies and trade to run them that were introduced as part of the development plans between January 5, 1961, and July 31, 2018. (TBMM) These, if not the most obvious indicator of political importance in Turkey, provide important clues not only for political scientists but also for economists. For example, to understand and analyze macroeconomic inconsistencies in Turkey, a political party is one of the most important variables that must be taken into account.

Turkey could have experienced productivity growth in agriculture as other countries, that were in the same position in the 1960s and 1970s with Turkey. These countries; Greece, Spain, and Portugal with the fastest rate of growth, the percentage of employment in agriculture would have descended much more immediately and the overall per capita gross domestic product would have increased more sharply. However, Turkey stayed behind them in these developments. As seen in previous studies that policies that discriminated against agriculture deserve special attention to explaining the lack of concentration in the agricultural policies in the economy of Turkey. (Imrohoroglu 2012)

Agricultural production ought to be planned during a route attributable to environmental requirements, long production period and restricted and lack of inputs. To obtain production, the increase has to be compelled to improve in each traditional and trendy input source. Extended tractors usage, irrigation, and fertilizer were the foremost vital beginnings of production growth with all inputs. The indication of land input supply on common productivity growth was



neutralizing between 1961 and 1970, indicating that the producers had not used land efficiently. Additions in machinery instrumentality input utilization can have very little impact on agricultural productivity except it raises land productivity. Like past years, complementary policies of the Turkish government have remarkably improved agricultural production. (Basarir 2006)

It is discovered that some opportunist policies had been originated between 1964 and 1998 supported the studies of the policies on agriculture in Turkey. Agricultural credits every year control out by Agricultural Bank of the Republic of Turkey had been enlarged considerably before election years. Some subsidized prices of agricultural products had been declared simply a couple of months before the election dates. Annual growth rates for the subsidized prices of agricultural products had been discovered higher than those of non-election dates before and within the election dates. (Gezgin 2014)

In normal democratic countries, the military has vital functions, particularly in protecting the country from external threats. However, representing the General Staff of the Republic of Turkey to take decisions that deeply affect Turkish political life, can take certain decisions. From 1945 until today the introduction of multi-party democratic political life in various sizes and levels of military coups and interventions have been many times in Turkey. The military coup is the forced dismissal of the civilian administration by the armed forces and taking over the country's administration (such as the 27 May 1960 military coup and the 12 September 1980 military coup). Power is, of course, responsible for the crisis, but institutions that contribute to the formation of this power are as responsible. The political institutions, especially the opposition parties, remained in the audience for such a process and prepared the basis for non-

political institutions to intervene in politics by not acting responsibly. (Ozsagir 2013) As a matter of fact, the military council making a coup also includes the power-opposition dispute/tension.

## CHAPTER 4. THEORY OF PRODUCTION FUNCTION: EFFICIENCY AND AGRICULTURAL & TRADE POLICY

The estimation of efficiency using data envelopment analysis (DEA) is built on the primal production function is defined by  $i$  inputs  $\mathbf{x}=(x_1, x_2, \dots, x_i) \in \mathfrak{R}_+^I$  and  $j$  outputs  $\mathbf{y}=(y_1, y_2, \dots, y_j) \in \mathfrak{R}_+^J$ . The technology that transforms inputs into outputs can be represented by an input set  $L(\mathbf{y})$ . The input set satisfying constant returns to scale and strong disposability of output and input is defined as

$$L^T(\mathbf{y}) = \left\{ \mathbf{x} : \mathbf{y} \text{ is produced by } \mathbf{x} \text{ in year } T; \quad \mathbf{x} \in \mathfrak{R}_+^I \quad \mathbf{y} \in \mathfrak{R}_+^J \right\} \quad (\text{Eq. 1})$$

The input set  $L(\mathbf{y})$  denotes the collection of input vector that yield output vector and the input reference sets form the basis in the estimation of non-parametric DEA efficiency measures.

### 4.1. Nonparametric Data Envelopment Analysis (DEA)

The non-parametric programming approach to the study of efficiency has had a history in the agriculture sector, known familiarly as Data Envelopment Analysis (DEA). M.J. Farrell (1957) discussed the empirical estimation of efficiency for multiple outputs and multiple inputs to U.S. agriculture. In 1978, DEA was introduced by Charnes et al. (1978) and popularized in a more informative and easily applied way by Fare et al. (1994).

Following Shaik 2013, the input set defined in equation (1) forms the underlying assumption of primal production function and the estimation of efficiency measures using nonparametric data envelopment analysis (DEA). The input distance function is defined in terms of scalar shrinkage of observed inputs with output held fixed. An input distance function can represent this concept as:

$$D(y, x)^{-1} = \min \{ \lambda : \lambda x \in L^T(y) \}$$

*or*

$$\min_{\theta, z} \text{ st. } \begin{array}{ll} y \leq Yz & Y = y_1, \dots, y_T \\ \lambda x \geq Xz & X = x_{i,1}, \dots, x_{i,T} \\ z \geq 0 & \end{array} \quad (\text{Eq. 2})$$

Here, the second expression of equation (2) identifies the linear program used to calculate the distance function, with  $z$  being a  $T \times 1$  vector of intensity variables. Hence,  $z$  identifies the constant return to scale (CRS) boundaries of the reference set. Under the variable return to scale (VRS), the intensity variable,  $z=1$ . In addition, the scale efficiency measure is computed as the ratio of the efficiency measure estimated under CRS over pure technology estimated under VRS. The technology or time trend cannot be accounted for in the DEA models as these are linear programming model.

#### 4.2. Second Stage Efficiency Regression Model

The efficiency measures estimated using non-parametric DEA will be used in the second stage efficiency regression model. In the second stage, the importance of politically linked agricultural policies and trade on Turkish agriculture efficiency will be estimated. This is represented as:

$$\text{efficiency} = g(z; \gamma) + \varepsilon \quad (\text{Eq. 3})$$

where *efficiency* denotes production efficiency explained by a vector of  $z$  politically linked agricultural policies and trade,  $\gamma$  is the associated vector of parameter coefficients, and  $\varepsilon$  the error term.

## **CHAPTER 5. DATA COLLECTIONS AND DESCRIPTION OF THE DATA WITH SUMMARY STATISTICS AND GRAPHS**

### **5.1. Input, Output and Related of Agriculture Sector Data for Turkey**

The study of the thesis is based on the Food and Agricultural Organization (FAO) data from 1961 to 2016. The study includes five inputs and an output quantity index computed from individual commodity price and quantity.

Five categories of inputs and outputs are used to estimate the primal production function. The five inputs include; a) land variable, sum of the harvested acres, b) labor variable, represented by economically active population in agriculture as employees who are over 15 years old (=1000), c) capital variable as gross fixed capital stock (GFCS) (Agriculture, Forestry and Fishing) in US\$, d) fertilizer variable which is a sum of nitrogen (N), phosphorus (P) and Potassium (K) expressed in thousands of metric tons, and e) energy variable used in agriculture production and defined in unit of terajoules (TJ). The output used in this analysis is the output quantity index (OQI) computed as an Ideal Fisher Index based on individual commodity price and quantity produced in the agriculture sector.

Turkish agricultural policy shifts data set was created by using a five-year development plan published by the State Planning Organization (SPO). The time period of the development plans is used to create dummy variables as; FYP0 represents years not covered as part of development plans, FYP1 is from 1963 to 1967, FYP2 is from 1968 to 1972, FYP3 is form 1973 to 1977, FYP4 is from 1979 to 1983, FYP5 is from 1985 to 1989, FYP6 is from period 1990 to 1994, FYP7 is from 1996 to 2000, FYP8 is from 2001 to 2005, FYP9 is from 2007 to 2013, FYP10 is from 2014 to 2018. Political Parties from 1961 and 2016 is collected from the Grand

National Assembly of Turkey (TBMM). The political party and development plans overlap representing agricultural policy shifts during this period.



Figure 5.1: Map of Preferential Trade Agreements with Turkey (WTO)

An alliance between two or more states define the regulations of trade for all the undersigned governments' agreements called a regional trade agreement (RTA). The North American Free Trade Agreement (NAFTA) and the European Union (EU) could examples of regional trade agreements. The Trade Agreements are represented by the Regional Trade Agreements (RTAs) data and defined as cumulative notifications of RTAs in force and inactive RTAs from the World Trade Organization (WTO) for Turkey. This variable that shows a similar trend with imports and exports value in the agriculture sector, is the number of agreements by year between 1961 and 2016.

Apart from regional trade agreements, the trade data included export and import values and export and import quantities between Turkey and World, US, EU and Rest of the World between the years 1961 and 2016. However, due to missing and inconsistent data set these were not used in the analysis to evaluate the importance of trade on Turkish agriculture efficiency.

## 5.2. Summary Statistics of the Variables

### 5.2.1 Output and Input Variables

Table 5.1: Summary Statistics of Output and Input Variables

Variable	Unit	Mean	Std Dev	Sum	Minimum	Maximum
<b>Output</b>	OQI	146.1	22.8	8183.0	100.0	198.6
<b>Land</b>	Acres	19206263.0	1428853.0	1075550706.0	17136338.0	21326230.0
<b>Labor</b>	1000s	6942286.0	1171327.0	388768020.0	4871543.0	9356000.0
<b>Capital</b>	GFCS	5763.0	10494.0	322754.0	11.6	38790.0
<b>Fertilizer</b>	Metric Ton	1436021.0	727278.0	80417157.0	74278.0	2807280.0
<b>Energy</b>	TJ	83539.0	65246.0	4678197.0	84.1	227779.0

Table 5.1 represents the summary statistics of the inputs and output from 1961 and 2016. To reflect the difference in the use of input resources and the output produced, the minimum and maximum by a political party are presented graphically.

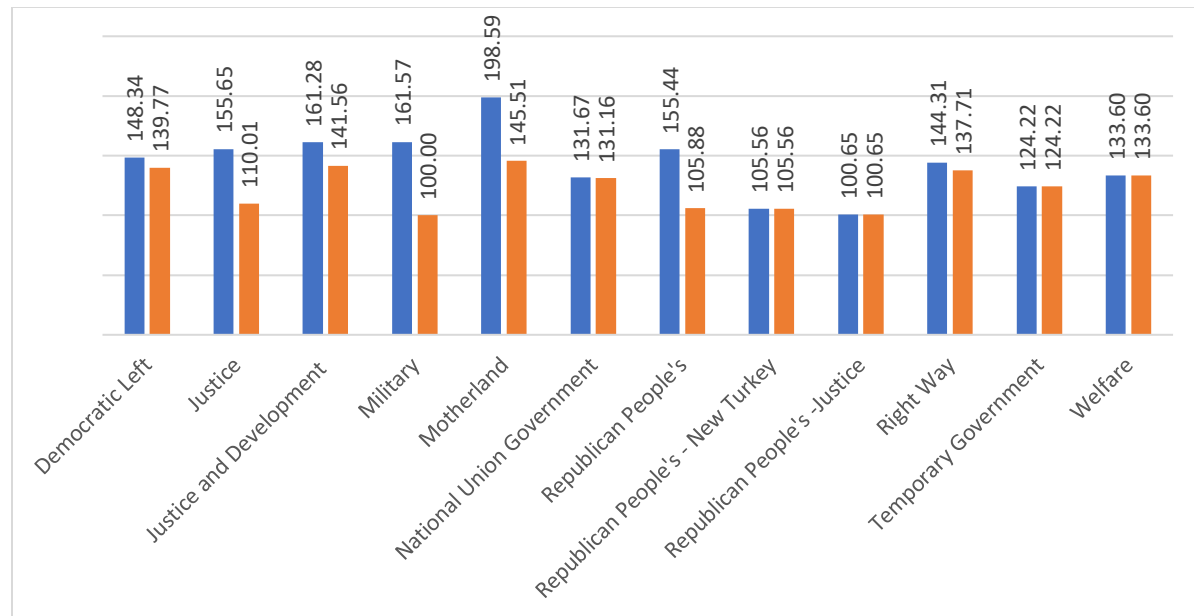


Figure 5.2: Output Max and Min by Political Party

The maximum and minimum agricultural output in Turkey is presented in figure 5.1. Republican People's – Justice Party, Republican People's - New Turkey Party, Temporary

Government, Welfare Party, and National Government Party shows the same output max and min in the period as they served for one or a couple of years.

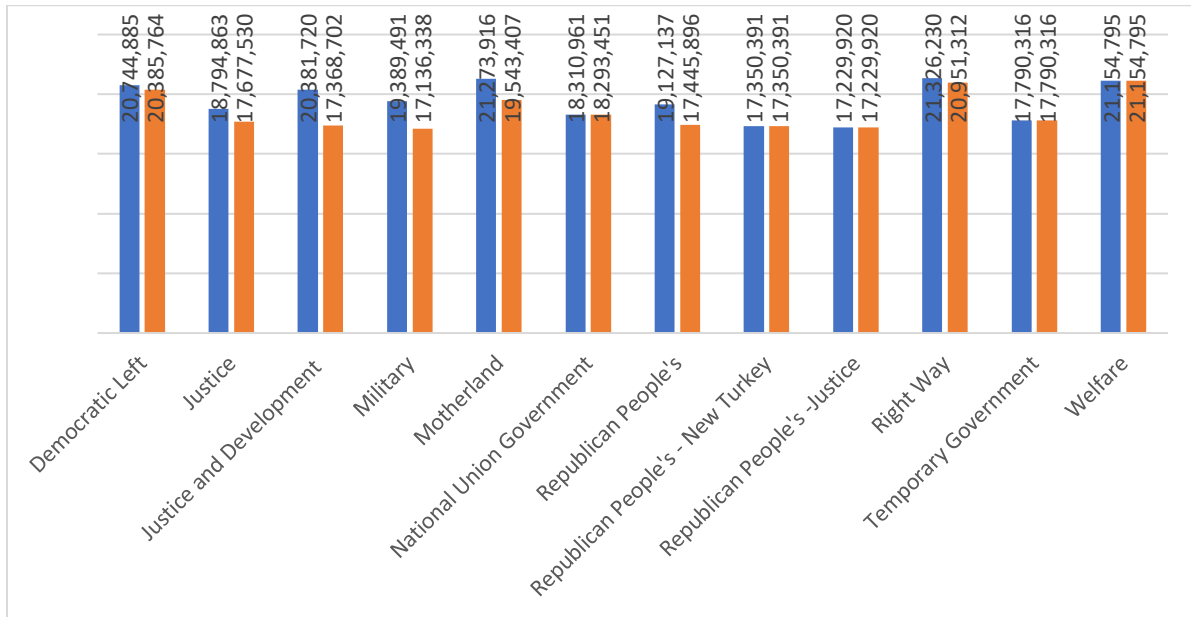


Figure 5.3: Land Max and Min by Political Party

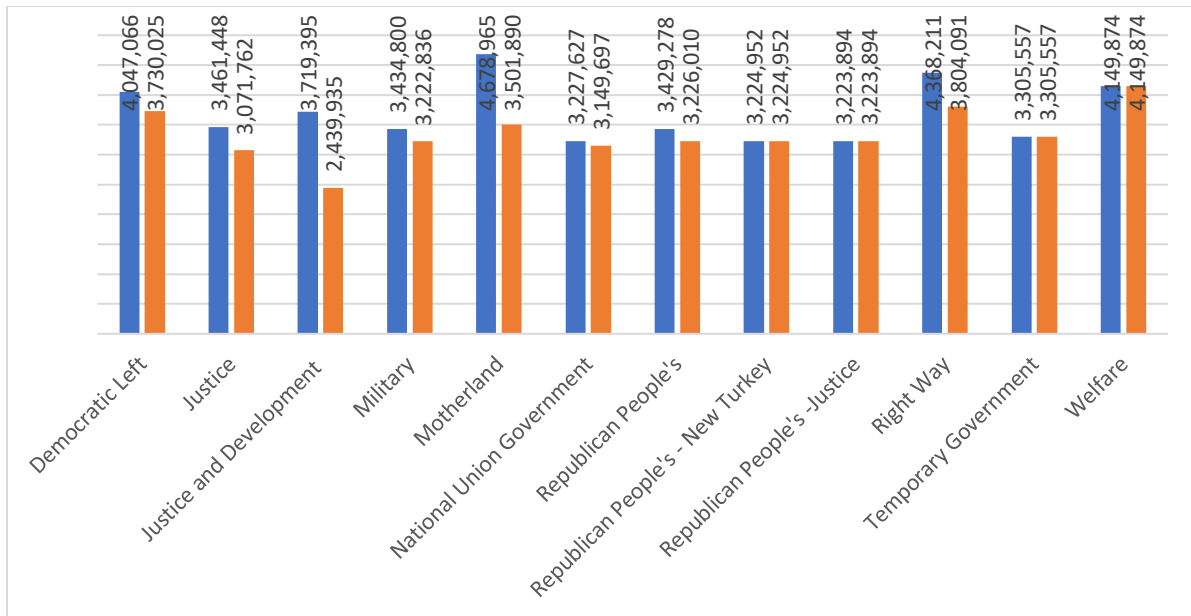


Figure 5.4: Labor Max and Min by Political Party



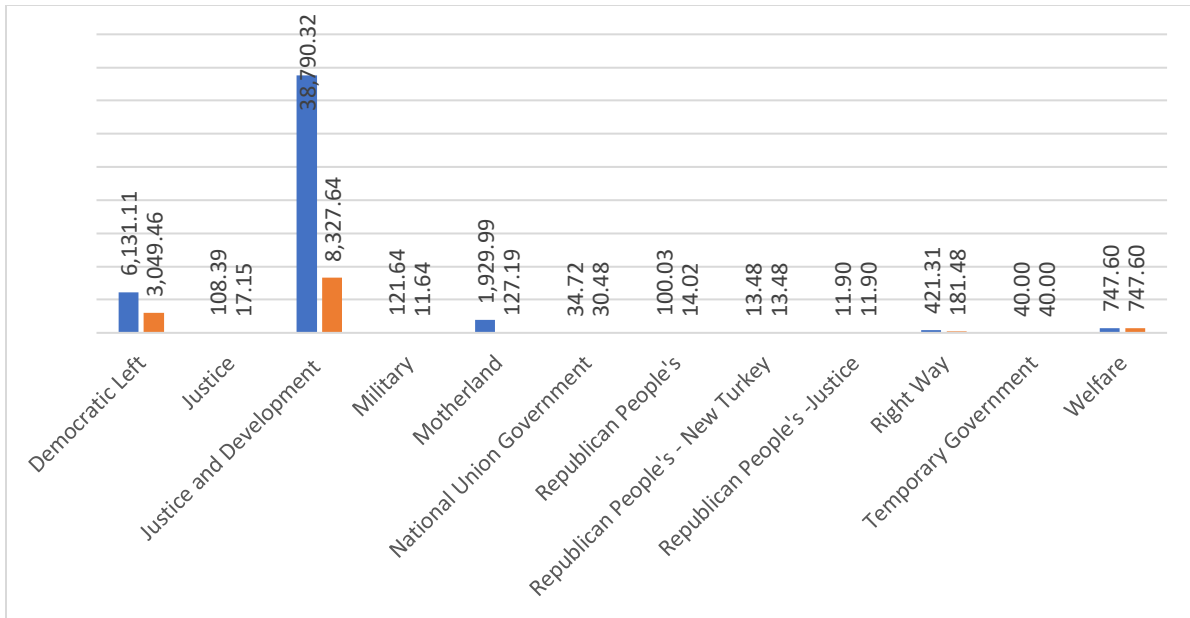


Figure 5.5: Capital Max and Min by Political Party

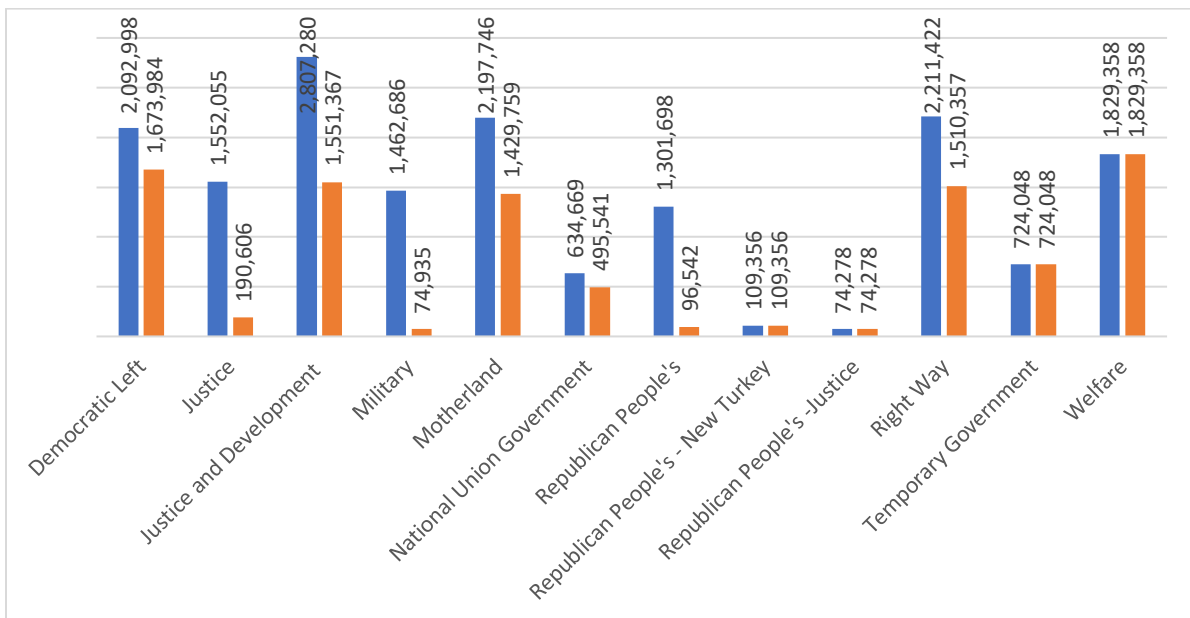


Figure 5.6: Fertilizer Max and Min by Political Party

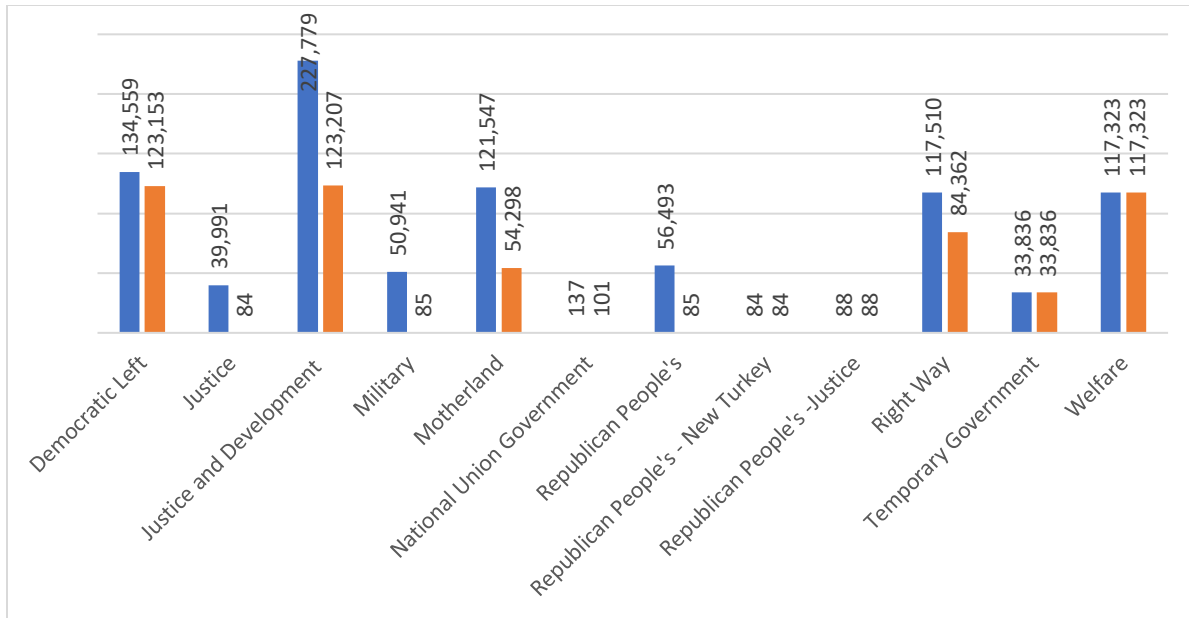


Figure 5.7: Energy Max and Min by Political Party

The maximum and the minimum number of inputs - land, labor, capital, fertilizer, and energy used in the production of output by political parties are presented in figures 5.2 to 5.6. There is hardly any big change in land usage over the years, but it seems the Justice and Development Party, Military, Republican People's Party, Motherland Party, and Justice Party used less harvested acres to produce agricultural output in some years.

Based on the maximum and minimum labor use numbers (1000s person) presented in figure 5.3, there were employment changes in agriculture during the Justice and Development Party and Motherland Party. The maximum capital, fertilizer, and energy usage were observed in the Justice and Development Party as they served the country for the number of years. Similar to the summary statistics presented in Table 5.1, the appendix has summary statistics by political parties. The table shows the number of observations, mean, standard deviation, summarize, maximum and minimum of the inputs and output variables as the variations in the input used by political parties.

### 5.2.2 Policy

The agricultural policies introduced from 1961 to 2016 by a political party are presented in the table. As seen in table 5.2, political parties determined agricultural policy shifts. The only outlier was the Military political party in charge during the years of 1961, 1981 and 1982.

Table 5.2: Five-Year Development Plan Which Governed by a Political Party Over Years

<b>Political Party</b>	<b>Agriculture Policy shifts (dummies)</b>	<b>Coup Attack</b>	<b>Financial Crisis</b>
<b>Democratic Left Justice</b>	FYP7, FYP8		2000 - 2001
<b>Justice and Development</b>	FYP1, FYP2		
<b>Military</b>	FYP8, FYP9, FYP10		2008 -2009
<b>Motherland</b>	FYP0, FYP4	1961 - 1981 -1982	
<b>National Union Government</b>	FYP0, FYP4, FYP5, FYP6, FYP7		1998
<b>Republican People's</b>	FYP2		
<b>Republican People's - Justice</b>	FYP1, FYP3, FYP4		
<b>Republican People's - New Turkey</b>	FYP0		
<b>Right Way</b>	FYP1		
<b>Temporary Government</b>	FYP0, FYP6, FYP7		1994
<b>Welfare Party</b>	FYP3		
	FYP7		1997

### 5.2.3 Trade

Regional trade agreements are a boost in the number and changing of their qualifications. 50 trade agreements in 1990 and more than 280 in 2017 were in force all over the world. As can be seen in figure 5.7, regional trade agreements (RTAs) which are actualized by political parties in their government periods show changes between 1961 and 2016. The most (17 of total) RTAs are obtained by the Justice and Development Party in their over 14 years of government period. Motherland Party is the second place with 7 RTAs. Democratic Party is in third place with 4 RTAs. As expected; period of Military, National Union Government Parties, Republican

People's – Justice and New Turkey Parties have not had obtained RTAs in their government period.

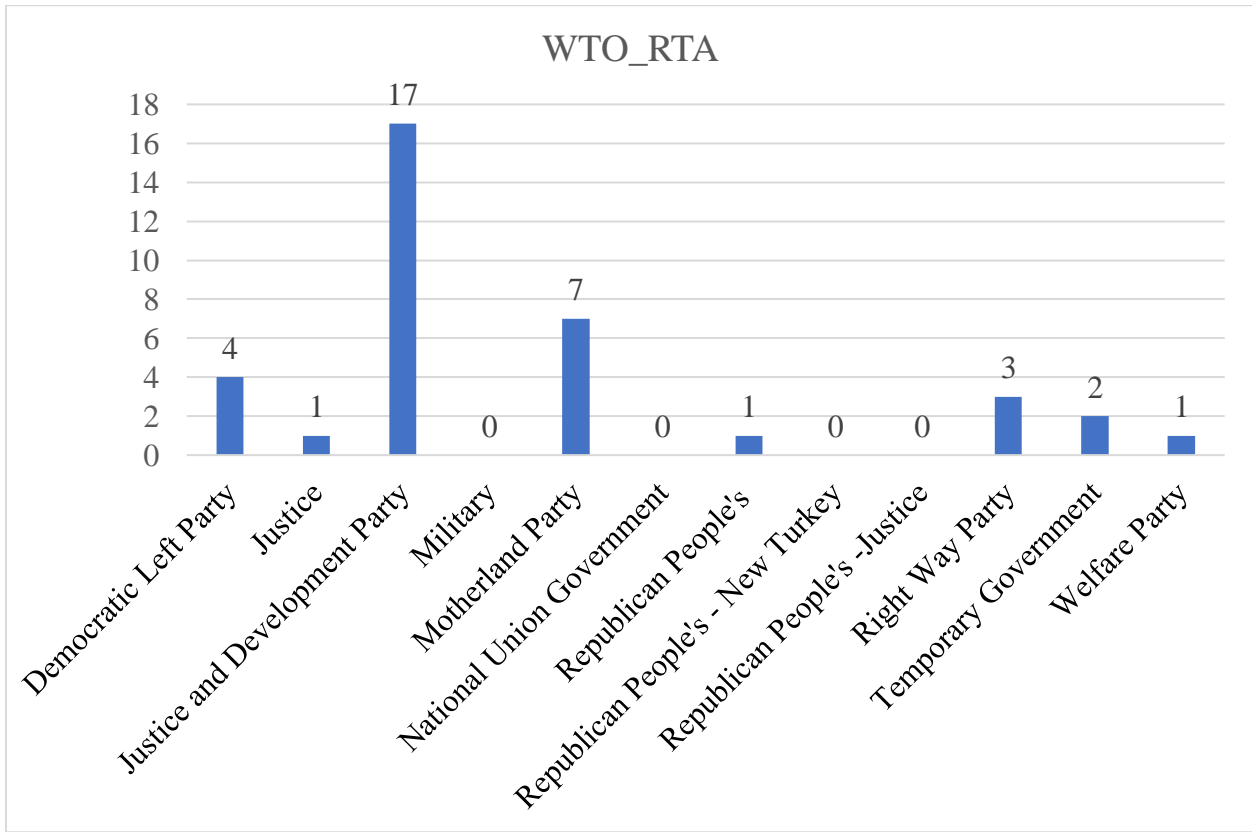


Figure 5.8: Regional Trade Agreements (RTAs) Actualized by Political Party

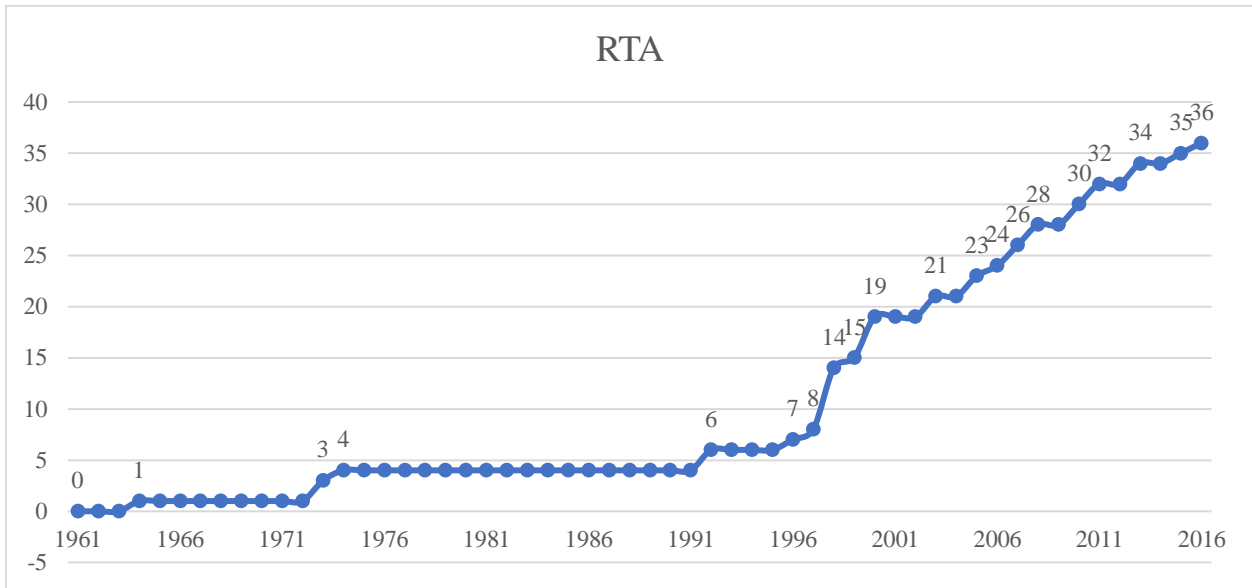


Figure 5.9. The Number of Regional Trade Agreement Introduced by Years.

## CHAPTER 6. EMPIRICAL APPLICATION

The contribution of politically linked agricultural policy and trade on the performance of Turkish agriculture from 1961 to 2016 is accomplished in two stages. In the first stage, the performance of Turkish agriculture or agriculture production efficiency is estimated using non-parametric DEA measures under constant and variable returns to scale assumption. In the second stage, the importance of politically linked agricultural policy and trade on agriculture production efficiency is estimated using regression analysis. These represent the two objectives presented in the introduction and presented again here.

- 1) Estimating the performance of Turkish agriculture production using DEA; and
- 2) Evaluating the importance of Turkish agricultural policies and trade on the performance of Turkish agriculture production.

### 6.1. Estimating the Performance of Turkish Agriculture Production Using DEA

An input-oriented DEA model is adopted in the estimation of the production efficiency of Turkish Agriculture from 1961 to 2016. Using the output quantity index and five inputs, the DEA model (equation 4) is estimated under constant returns to scale (CRS) and variable returns to scale (VRS). The DEA models are estimated using a Benchmarking package in the R language. The DEA efficiency measures estimated using the DEA model defined in equation (2) is used in the cluster analysis.

Figure 6.1 presents the summary statistics of the DEA efficiency measures estimated under CRS by a political party that is liked to agricultural and trade policies.

As can be seen in table 6.1 the Right Way Party with five years served shows the highest mean (0.9394) of the maximum and the minimum efficiency of Turkish agricultural production.

Table 6.1: Summary Statistics of Agriculture Production Efficiency by Political Parties

<b>Political</b>	<b>N</b>	<b>Mean</b>	<b>Minimum</b>	<b>Maximum</b>
Democratic Left	3	0.8296	0.8159	0.8459
Justice	9	0.8137	0.6154	0.9999
Justice and Development	14	0.9243	0.8127	0.9991
Military	3	0.8540	0.8385	0.8761
Motherland	11	0.8631	0.6371	1.0000
National Union Government	2	0.9090	0.8335	0.9844
Republican People's	5	0.7948	0.6366	1.0000
Republican People's - New Turkey	1	0.8883	0.8883	0.8883
Republican People's -Justice	1	0.9365	0.9365	0.9365
Right Way	5	0.9394	0.8324	1.0000
Temporary Government	1	0.5472	0.5472	0.5472
Welfare	1	0.8466	0.8466	0.8466

The second place is taken by the Republican People's – New Turkey Party with one year served. The Justice and Development Party is in third place with 14 years served by 0.9243 means of maximum and minimum efficiency. Remarkably, the Justice Party with nine years served and Republican People's Party with five years served show low efficiency with means of 0.8137 and 0.7948, respectively. As expected, political parties that served fewer years show less efficiency. Surprisingly, the Temporary Government showed the least efficiency with one year served in 1973.

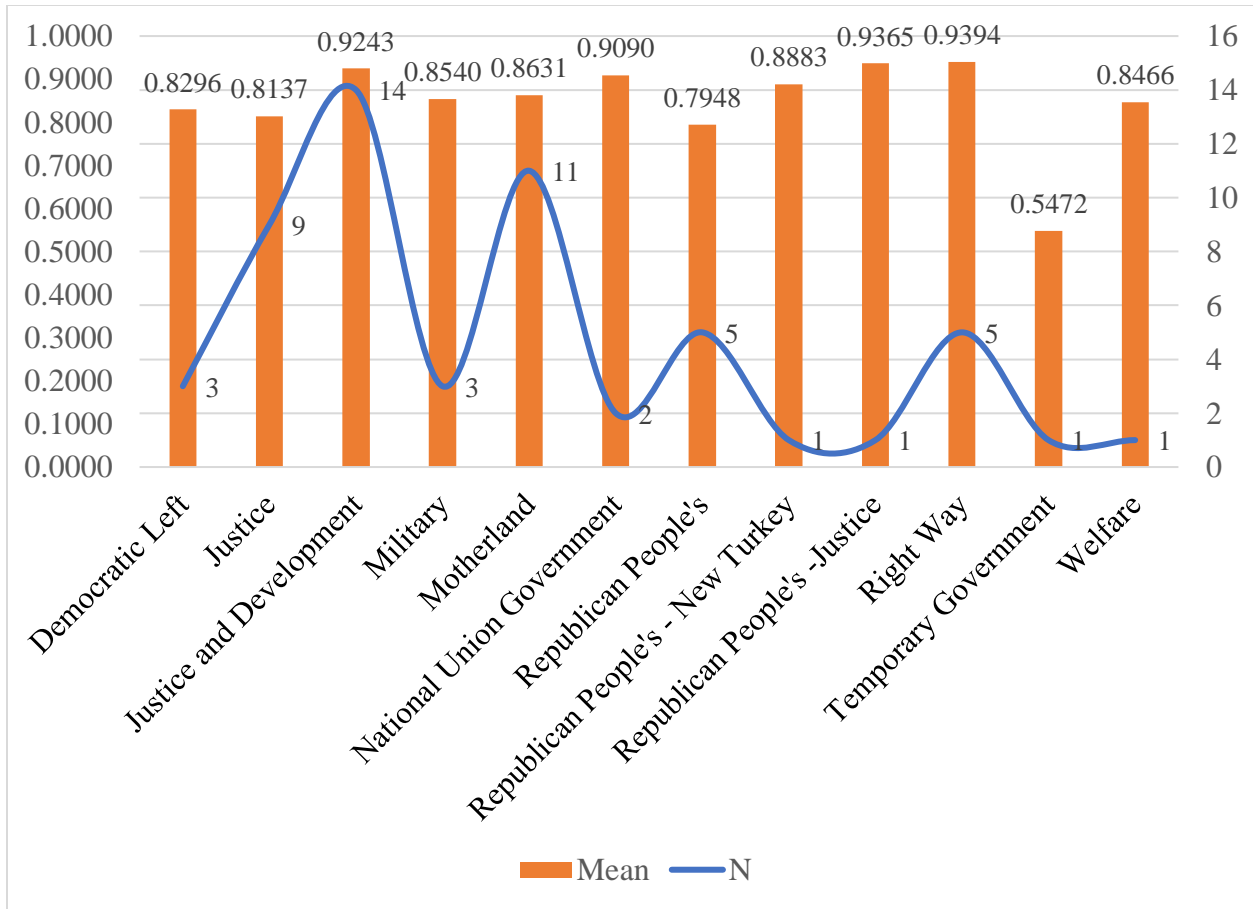


Figure 6.1: Mean of Agriculture Production Efficiency and Year Frequency by Political Party

Figure 6.1 shows the mean of the Turkish agriculture production efficiency with the number of years political parties served in the government office. Right Way Party which has the highest mean, served for years, between 1992 and 1996, and the party overlapped with the sixth five-year development plan and seventh five-year development with a one year no planned year. Turkish agriculture was supported by the European Economic Community (EEC) in these years in the path of integration of the common agricultural policy.

Since the eighth five-year development plan period, the Justice and Development Party showed a mean agricultural production efficiency of 0.9293. Turkish agriculture could have more dynamic positive agreements with the World Trade Organization Agreement (WTO), the

European Community Common Agricultural Policy, and other international obligations. In the plan periods, increasing irrigation areas and afforestation activities could assist to be more efficient in agricultural production.

As can be seen in figure 6.1, the Republican People's – New Turkey and Justice, Democratic Left, National Union Government, Welfare Parties, and the Military could not have a serious effect on Turkish agriculture production efficiency considered over their served years that for just a couple years. However, the Temporary Government showed importantly low agricultural production efficiency in the year 1973. This result could not be the only fault of the party on agriculture production. Having looked at the policy shifts at that time period, we have seen that new policy steps include encouraging the production of alternative commodities and providing direct subsidies to limit the supply of agriculture production occurred.

At the time period of the Motherland and the Justice and Republican People Parties, they were in government office over five years. The Republican People and the Justice Parties have started the planned period with the first development plan. Experienced and previously planned periods for the Motherland Party could be the same in the fourth, fifth and sixth development plans in which they were in a government office. At that time in 1981-1982, Turkey was under control by the Military, and it could be an effect on agriculture production efficiency the next years in negative ways.

As seen in figure 6.2, the agriculture production efficiency shows the same level of maximum and minimum efficiency by political parties as they were in power for one or two years. The parties include Republican People's – Justice, Republican People's - New Turkey, Temporary Government, Welfare Party, and National Government Party. This did not allow these parties to introduce new policies and explore trade agreements.



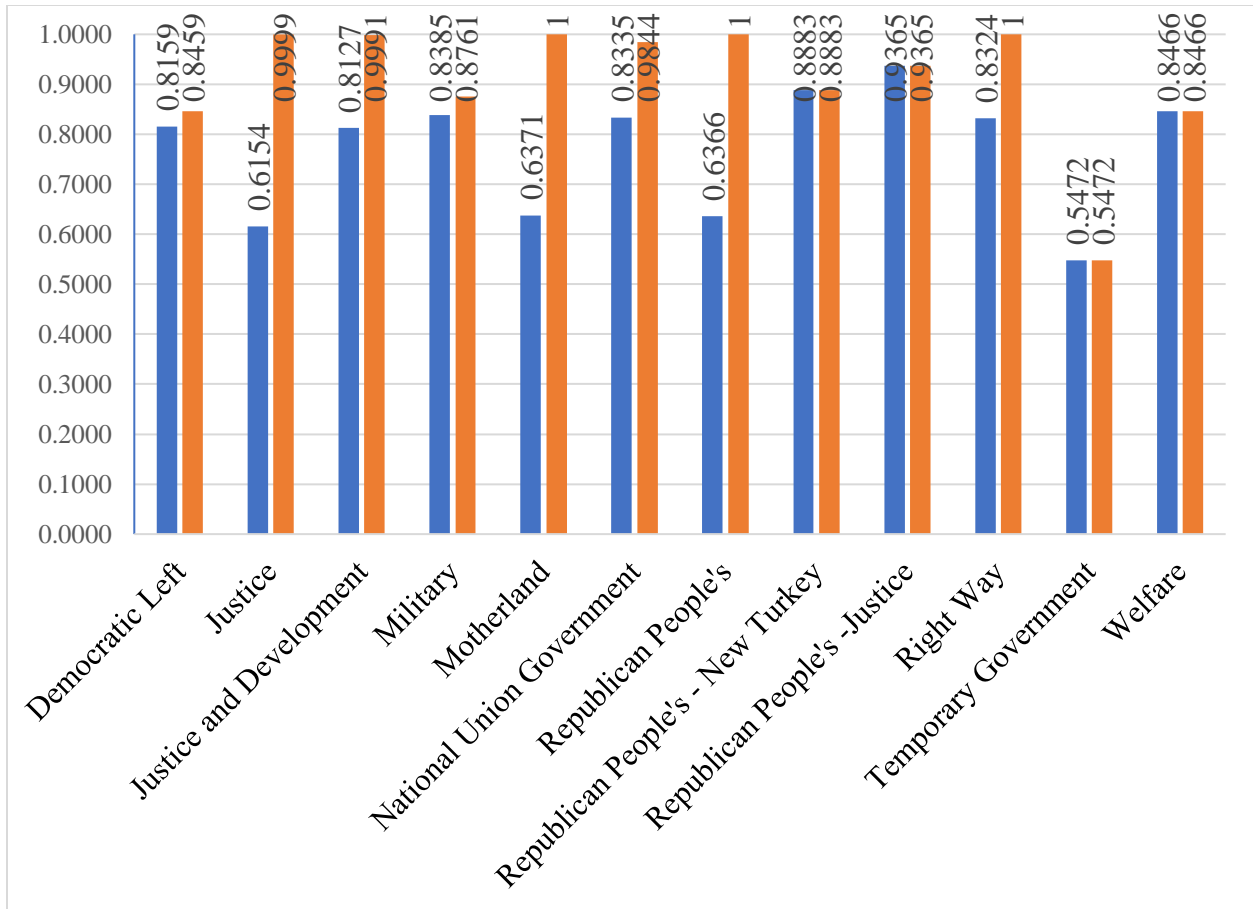


Figure 6.2: Maximum and Minimum Agriculture Production Efficiency by Political Party

This could mean they were not able to truly affect or contribute to the Turkish agriculture production efficiency. In contrast, the political parties like Justice and Development Party, Motherland Party and Justice Party were in power for 14, 11, and 9 years, respectively. This meant, they had time to manage and introduce new policies and explore trade and trade agreements to bolster Turkish agriculture production due to improved efficiency. Comparing the result between these three parties shows that, the currently serving Justice and Development Party represented more consistent outcomes. The gap between maximum and minimum agriculture production efficiency is relatively less in the Justice and Development Party compared to the Justice Party and the Motherland Party.

## 6.2. Evaluating the Importance of Politically Linked Agriculture and Trade Policies on the Agriculture Production Efficiency

To evaluate the importance of politically linked agriculture and trade policies on Turkish agriculture production efficiency, a regression model is estimated as:

$$Efficiency = \alpha + \gamma_k z_k + \varepsilon \quad (\text{Eq. 4})$$

where *efficiency* denotes production efficiency explained by a vector of  $z$  represented by the political parties in Turkey through time and also the linear and quadratic terms of the number of regional trade agreements between Turkey and rest of the world,  $\gamma$  is the associated vector of parameter coefficients, and  $\varepsilon$  the error term.

In this stage, using a simple linear regression analysis as statistical methods. The model has relating one dependent variable as the performance of Turkish agriculture production, and several independent variables as political parties for policy and regional trade agreements for trade, to evaluate their importance on Turkish agriculture between 1961 and 2016.

A predictor variable specified as the Welfare Party is represented in the model by a set of design or class variables created using a generalized linear model (GLM) parameterization. The parameter estimates for the last level of the class variable to zero. In other words, the linear effect of the Welfare Party on efficiency is zero.

In table 6.2, the p-value ( $p < 0.0002$ ), therefore it can be concluded that the RTA has a significant linear effect on the performance of Turkish agriculture production. The RTA estimate (-0.8632) is the estimated difference in the mean of efficiency between political parties. The highest estimate (9.1441) can be seen in the Justice and Development Party and the party has a significant linear effect on the performance of Turkish Agriculture production (since  $p < 0.0047$ ).

Table 6.2: Summary Statistics of Agriculture Production Efficiency and RTAs by Political Parties

<b>Solution for Fixed Effects</b>						
<b>Effect</b>	<b>Political</b>	<b>Estimate</b>	<b>Standard Error</b>	<b>DF</b>	<b>t Value</b>	<b>Pr &gt;  t </b>
<b>Intercept</b>		94.8842	2.673	42	35.5	<.0001
<b>Political</b>	<b>Democratic Left Party</b>	5.5467	2.8926	42	1.92	0.062
<b>Political</b>	<b>Justice</b>	6.7476	2.5703	42	2.63	0.012
<b>Political</b>	<b>Justice and Development Party</b>	9.1441	3.063	42	2.99	0.0047
<b>Political</b>	<b>Military</b>	6.469	2.7622	42	2.34	0.024
<b>Political</b>	<b>Motherland Party</b>	5.8109	2.3904	42	2.43	0.0194
<b>Political</b>	<b>National Union Government</b>	5.9569	3.0243	42	1.97	0.0555
<b>Political</b>	<b>Republican People's</b>	7.2607	2.6259	42	2.77	0.0084
<b>Political</b>	<b>Republican People's - New Turkey</b>	5.1158	3.499	42	1.46	0.1512
<b>Political</b>	<b>Republican People's -Justice</b>	5.1158	3.499	42	1.46	0.1512
<b>Political</b>	<b>Right Way Party</b>	-0.6352	2.4893	42	-0.26	0.7998
<b>Political</b>	<b>Temporary Government</b>	7.5062	3.3009	42	2.27	0.0281
<b>Political</b>	<b>Welfare Party</b>	0	.	.	.	.
<b>RTA</b>		-0.8632	0.2112	42	-4.09	0.0002
<b>RTAsq</b>		0.02214	0.004622	42	4.79	<.0001

Parties, that have a significant effect on the performance of Turkish Agriculture production, are the Temporary Government Party, the Republican People's Party, the Justice Party, the Military, and the Motherland Party estimate 7.5062, 7.2607, 6.7476, 6.469 and 5.8109, respectively. The Democratic Left, the National Union Government, the Republican People's – New Turkey and the Justice Parties, and the Right Party are not significant in the linear model.

In figure 6.3 shows that the average efficiency of DEA on the Turkish agriculture production and regional trade agreements change by political parties and development plans periods. After the 1985-1989 development plan period, it can observe that there is a remarkably decrease in efficiency on Turkish agriculture production. Between 1979-1983 and 1996-2000 development plan years, there are many changes that many political parties are in the government office.

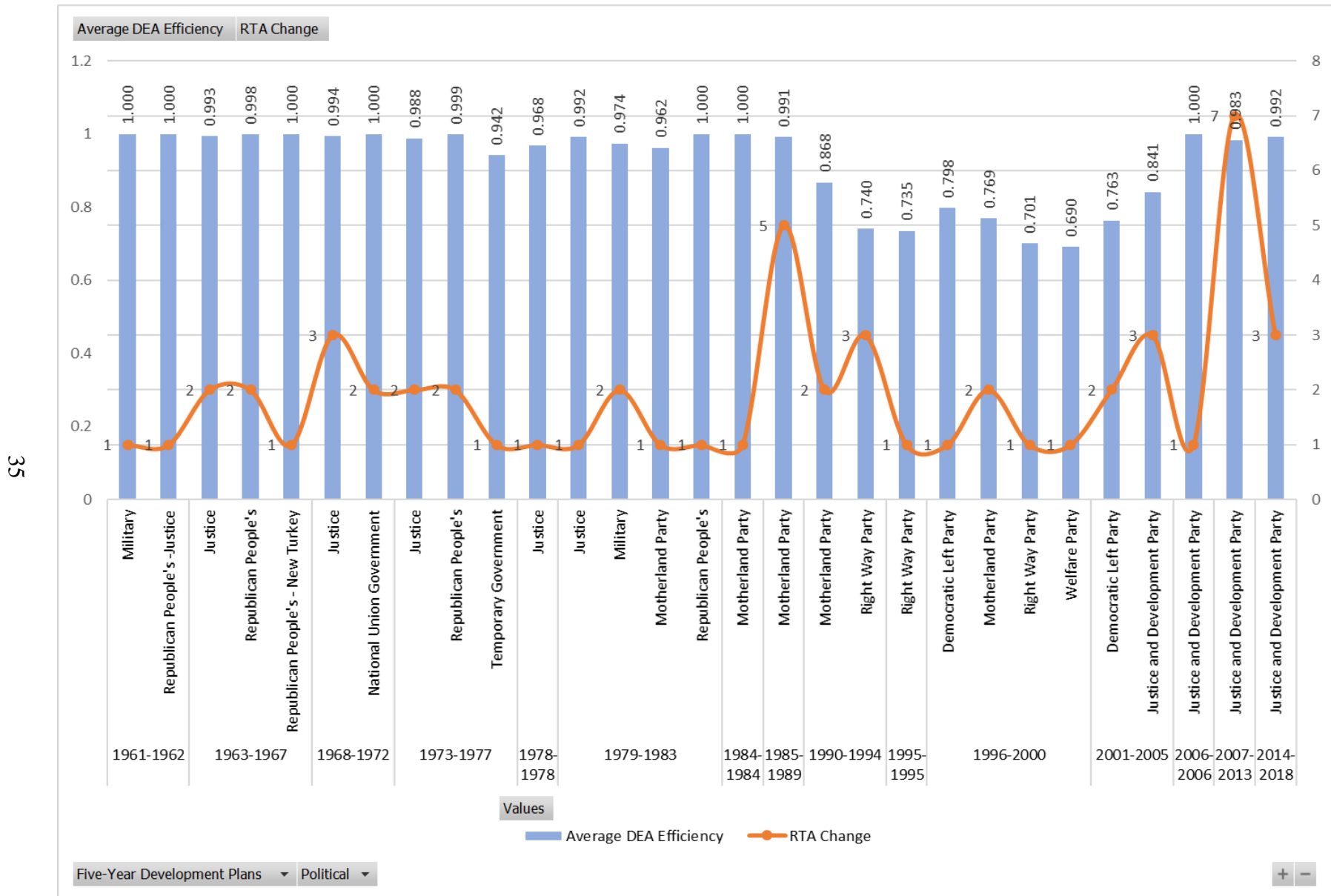


Figure 6.3: Average DEA Efficiency & RTA Changes by Political Parties & Development Plans in the Period

## CHAPTER 7. CONCLUSION

We investigated the performance of Turkish agriculture production under the control of different political parties during the different time periods. It could be concluded that the parties which serve in a government office for longer than two years had more authority to make changes in the performance of Turkish agriculture production, Turkish agriculture policy, and Turkish agriculture trade. It could be said that when many government changes take place in a development plan year, a decrease in the performance of Turkish agriculture production occurs. The parties which serve more years, show continuous efficiency as can be seen in the empirical results section graphs. The party which serves from 2002 to 2016, over 14 years, showed a rise in a number of regional trade agreements and the performance of Turkish agriculture production over the time period. It is important to say that this consequence could be the result of having an evolution of agriculture inputs.

The regional trade agreement (RTA) has a significant linear effect on the performance of Turkish agriculture production since each new agreement creates new opportunities/risks for agricultural policy and trade. It appears that the performance of Turkish agriculture production shows decreases in the years following a rise in the number of regional trade agreements. As a result, we could say that the agricultural sector in Turkey has a fluctuation after new trade agreements in order to adjust these changes.

In this study, we empirically evaluated the impact of agricultural policy and trade on the performance of Turkish agriculture production from 1961 to 2016. In conclusion, political parties, trade agreements, and development plans have been used in this study. To be able to have more accurate results and to evaluate these results, more detailed studies could be needed for representing results more consistent.

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## APPENDIX A. POLICY SHIFTS BY YEARS

Year	Political Party	Agriculture Policy shifts (dummies)	5-Year Development Plans	Coup Attack	Financial Crisis
1961	Military	FYP0	1961-1962	1	0
1962	Republican People's - Justice	FYP0	1961-1962	0	0
1963	Republican People's - New Turkey	FYP1	1963-1967	0	0
1964	Republican People's	FYP1	1963-1967	0	0
1965	Republican People's	FYP1	1963-1967	0	0
1966	Justice	FYP1	1963-1967	0	0
1967	Justice	FYP1	1963-1967	0	0
1968	Justice	FYP2	1968-1972	0	0
1969	Justice	FYP2	1968-1972	0	0
1970	Justice	FYP2	1968-1972	0	0
1971	National Union Government	FYP2	1968-1972	0	0
1972	National Union Government	FYP2	1968-1972	0	0
1973	Temporary Government	FYP3	1973-1977	0	0
1974	Justice	FYP3	1973-1977	0	0
1975	Justice	FYP3	1973-1977	0	0
1976	Republican People's	FYP3	1973-1977	0	0
1977	Republican People's	FYP3	1973-1977	0	0
1978	Justice	FYP0	1978-1978	0	0
1979	Republican People's	FYP4	1979-1983	0	0
1980	Justice	FYP4	1979-1983	1	0
1981	Military	FYP4	1979-1983	0	0
1982	Military	FYP4	1979-1983	0	0
1983	Motherland	FYP4	1979-1983	0	0
1984	Motherland	FYP0	1984-1984	0	0
1985	Motherland	FYP5	1985-1989	0	0
1986	Motherland	FYP5	1985-1989	0	0
1987	Motherland	FYP5	1985-1989	0	0
1988	Motherland	FYP5	1985-1989	0	0
1989	Motherland	FYP5	1985-1989	0	0
1990	Motherland	FYP6	1990-1994	0	0
1991	Motherland	FYP6	1990-1994	0	0
1992	Right Way	FYP6	1990-1994	0	0
1993	Right Way	FYP6	1990-1994	0	0
1994	Right Way	FYP6	1990-1994	0	1
1995	Right Way	FYP0	1995-1995	0	0
1996	Right Way	FYP7	1996-2000	0	0
1997	Welfare Party	FYP7	1996-2000	0	1



<b>Year</b>	<b>Political Party</b>	<b>Agriculture Policy shifts (dummies)</b>	<b>5-Year Development Plans</b>	<b>Coup Attack</b>	<b>Financial Crisis</b>
1999	Motherland	FYP7	1996-2000	0	0
2000	Democratic Left	FYP7	1996-2000	0	1
2001	Democratic Left	FYP8	2001-2005	0	1
2002	Democratic Left	FYP8	2001-2005	0	0
2003	Justice and Development	FYP8	2001-2005	0	0
2004	Justice and Development	FYP8	2001-2005	0	0
2005	Justice and Development	FYP8	2001-2005	0	0
2006	Justice and Development	FYP0	2006-2006	0	0
2007	Justice and Development	FYP9	2007-2013	0	0
2008	Justice and Development	FYP9	2007-2013	0	1
2009	Justice and Development	FYP9	2007-2013	0	1
2010	Justice and Development	FYP9	2007-2013	0	0
2011	Justice and Development	FYP9	2007-2013	0	0
2012	Justice and Development	FYP9	2007-2013	0	0
2013	Justice and Development	FYP9	2007-2013	0	0
2014	Justice and Development	FYP10	2014-2018	0	0
2015	Justice and Development	FYP10	2014-2018	0	0
2016	Justice and Development	FYP10	2014-2018	0	0

**APPENDIX B. STATISTICS BY POLITICAL PARTY**

<b>Political</b>	<b>Total Year in Duty</b>	<b>Variable</b>	<b>Mean</b>	<b>S.D.</b>	<b>Minimum</b>	<b>Maximum</b>
<b>Democratic Left</b>	<b>3</b>	<b>Output</b>	144.2	4.3	139.8	148.3
		<b>Land</b>	20,536,820.0	186,224.3	20,385,764.0	20,744,885.0
		<b>Labor</b>	7,771,333.3	315,506.5	7,457,000.0	8,088,000.0
		<b>Capital</b>	4,258.0	1,644.8	3,049.5	6,131.1
		<b>Fertilizer</b>	1,837,882.4	223,905.1	1,673,983.7	2,092,997.6
		<b>Energy</b>	126,987.1	6,557.9	123,153.0	134,559.3
<b>Justice</b>	<b>9</b>	<b>Output</b>	131.7	16.6	110.0	155.7
		<b>Land</b>	18,192,645.3	465,771.6	17,677,530.0	18,794,863.0
		<b>Labor</b>	6,484,378.3	278,191.8	6,143,506.7	6,922,786.8
		<b>Capital</b>	47.1	33.8	17.2	108.4
		<b>Fertilizer</b>	684,118.6	505,259.2	190,606.2	1,552,054.8
		<b>Energy</b>	16,953.5	20,045.1	84.1	39,991.0
<b>Justice and Development</b>	<b>14</b>	<b>Output</b>	151.5	7.3	141.6	161.3
		<b>Land</b>	18,493,895.1	1,102,579.8	17,368,702.0	20,381,720.0
		<b>Labor</b>	5,733,800.0	790,951.4	4,871,542.7	7,400,000.0
		<b>Capital</b>	21,575.6	10,124.6	8,327.6	38,790.3
		<b>Fertilizer</b>	2,105,705.5	274,524.2	1,551,367.0	2,807,280.0
		<b>Energy</b>	169,713.4	32,365.6	123,206.5	227,779.2
<b>Military</b>	<b>3</b>	<b>Output</b>	139.1	34.0	100.0	161.6
		<b>Land</b>	18,610,248.0	1,277,143.8	17,136,338.0	19,389,491.0
		<b>Labor</b>	6,683,481.9	216,610.0	6,445,660.4	6,869,479.4
		<b>Capital</b>	82.3	61.3	11.6	121.6
		<b>Fertilizer</b>	945,713.3	758,516.4	74,934.9	1,462,686.1
		<b>Energy</b>	30,604.9	26,913.8	85.3	50,940.6
<b>Motherland</b>	<b>11</b>	<b>Output</b>	174.6	19.3	145.5	198.6
		<b>Land</b>	20,703,252.4	645,751.3	19,543,407.0	21,273,916.0
		<b>Labor</b>	8,275,498.1	853,887.8	7,003,652.9	9,356,000.0
		<b>Capital</b>	446.1	653.7	127.2	1,930.0
		<b>Fertilizer</b>	1,764,717.8	251,598.4	1,429,759.3	2,197,746.1
		<b>Energy</b>	79,291.4	21,837.9	54,298.4	121,547.4

Political	Total Year in Duty	Variable	Mean	S.D.	Minimum	Maximum
National Union Government	2	Output	131.4	0.4	131.2	131.7
		Land	18,302,206.0	12,381.4	18,293,451.0	18,310,961.0
		Labor	6,377,290.8	110,206.8	6,299,362.7	6,455,218.8
		Capital	32.6	3.0	30.5	34.7
		Fertilizer	565,105.1	98,378.5	495,541.0	634,669.2
		Energy	118.8	25.5	100.8	136.8
Republican People's	5	Output	135.4	26.6	105.9	155.4
		Land	18,374,904.0	832,384.6	17,445,896.0	19,127,137.0
		Labor	6,644,833.9	188,349.7	6,452,005.2	6,858,455.9
		Capital	56.3	39.8	14.0	100.0
		Fertilizer	798,077.0	618,113.2	96,542.1	1,301,698.2
		Energy	26,898.3	25,950.7	85.3	56,493.2
Republican People's - New Turkey	1	Output	105.6	.	105.6	105.6
		Land	17,350,391.0	.	17,350,391.0	17,350,391.0
		Labor	6,449,890.3	.	6,449,890.3	6,449,890.3
		Capital	13.5	.	13.5	13.5
		Fertilizer	109,355.7	.	109,355.7	109,355.7
		Energy	84.1	.	84.1	84.1
Republican People's - Justice	1	Output	100.6	.	100.6	100.6
		Land	17,229,920.0	.	17,229,920.0	17,229,920.0
		Labor	6,447,775.3	.	6,447,775.3	6,447,775.3
		Capital	11.9	.	11.9	11.9
		Fertilizer	74,277.5	.	74,277.5	74,277.5
		Energy	87.5	.	87.5	87.5
Right Way	5	Output	140.5	2.7	137.7	144.3
		Land	21,144,206.4	138,919.3	20,951,312.0	21,326,230.0
		Labor	8,390,800.0	450,796.2	7,608,000.0	8,736,000.0
		Capital	236.8	103.4	181.5	421.3
		Fertilizer	1,831,979.0	262,002.6	1,510,357.4	2,211,422.4
		Energy	103,717.2	12,604.0	84,362.4	117,510.0

<b>Political</b>	<b>Total Year in Duty</b>	<b>Variable</b>	<b>Mean</b>	<b>S.D.</b>	<b>Minimum</b>	<b>Maximum</b>
<b>Temporary Government</b>	<b>1</b>	<b>Output</b>	124.2	.	124.2	124.2
		<b>Land</b>	17,790,316.0	.	17,790,316.0	17,790,316.0
		<b>Labor</b>	6,611,074.8	.	6,611,074.8	6,611,074.8
		<b>Capital</b>	40.0	.	40.0	40.0
		<b>Fertilizer</b>	724,048.0	.	724,048.0	724,048.0
		<b>Energy</b>	33,836.0	.	33,836.0	33,836.0
<b>Welfare</b>	<b>1</b>	<b>Output</b>	133.6	.	133.6	133.6
		<b>Land</b>	21,154,795.0	.	21,154,795.0	21,154,795.0
		<b>Labor</b>	8,299,000.0	.	8,299,000.0	8,299,000.0
		<b>Capital</b>	747.6	.	747.6	747.6
		<b>Fertilizer</b>	1,829,358.4	.	1,829,358.4	1,829,358.4
		<b>Energy</b>	117,323.2	.	117,323.2	117,323.2

**APPENDIX C. DEA EFFICIENCY BY POLITICAL PARTY OF TABLE**

<b>Political Party</b>	<b>Variable</b>	<b>N</b>	<b>Mean</b>	<b>Minimum</b>	<b>Maximum</b>
<b>Democratic Left</b>	DEA	3	0.7748	0.7466	0.7980
<b>Justice</b>	DEA	9	0.9896	0.9685	1.0000
<b>Justice and Development</b>	DEA	14	0.9559	0.8169	1.0000
<b>Military</b>	DEA	3	0.9825	0.9685	1.0000
<b>Motherland</b>	DEA	11	0.9264	0.7357	1.0000
<b>National Union Government</b>	DEA	2	1.0000	1.0000	1.0000
<b>Republican People's</b>	DEA	5	0.9988	0.9969	1.0000
<b>Republican People's - New Turkey</b>	DEA	1	1.0000	1.0000	1.0000
<b>Republican People's -Justice</b>	DEA	1	1.0000	1.0000	1.0000
<b>Right Way</b>	DEA	5	0.7312	0.7013	0.7424
<b>Temporary Government</b>	DEA	1	0.9420	0.9420	0.9420
<b>Welfare</b>	DEA	1	0.6905	0.6905	0.6905

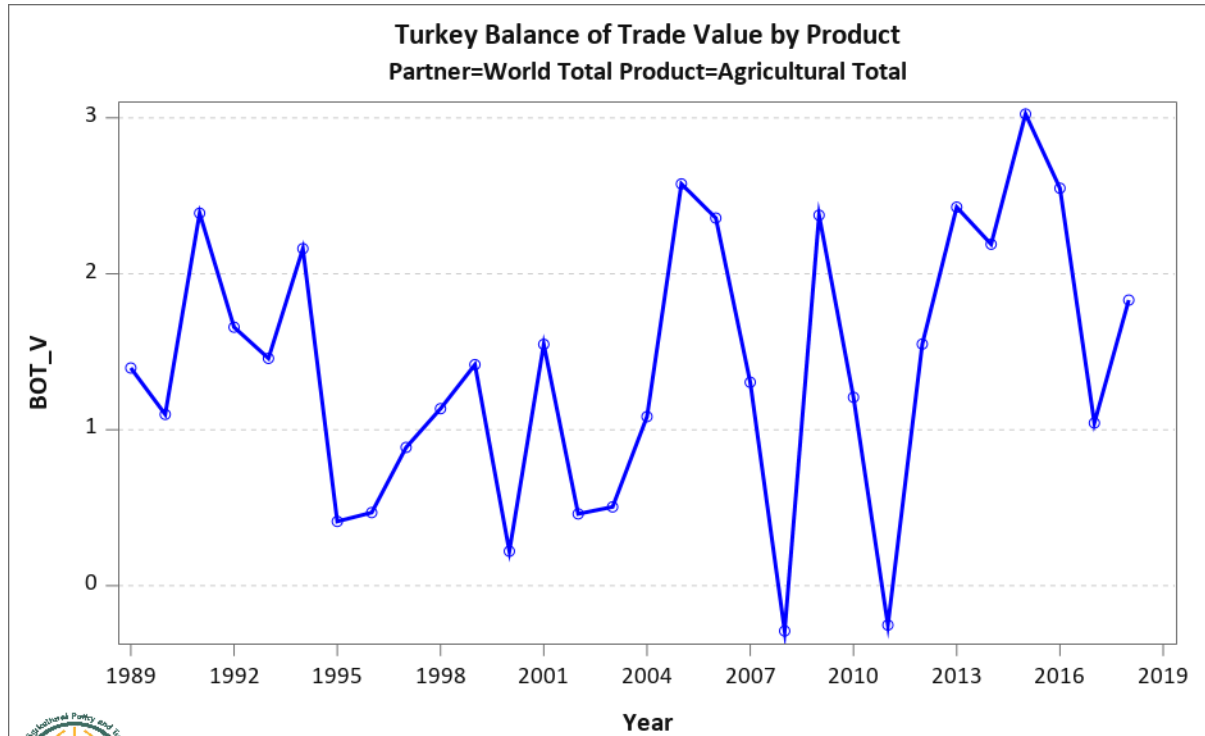
## APPENDIX D. GOVERNMENTS IN TURKEY

<b>Governments in Turkey (1961-2016)</b>				
<b>No.</b>	<b>President</b>	<b>Term of Office</b>	<b>Party</b>	
1	25 Cemal Gürsel	5 January 1961 – 27 October 1961	Military Republican	
2	26 İsmet İnönü	20 November 1961 – 25 June 1962	People's Republican	
3	27 İsmet İnönü	25 June 1962 – 25 December 1963	People's Republican	
4	28 İsmet İnönü	25 December 1963 – 20 February 1965	People's	
5	29 Suat Hayri Ürgüplü	20 February 1965 – 27 October 1965	Justice	
6	30 Süleyman Demirel	27 October 1965 – 3 November 1969	Justice	
7	31 Süleyman Demirel	3 November 1969 – 6 March 1970	Justice	
8	32 Süleyman Demirel	6 March 1970 – 26 March 1971	Justice	
9	33 Nihat Erim	26 March 1971 – 11 December 1971	National Union Govern.	
10	34 Nihat Erim	11 December 1971 – 22 May 1972	National Union Govern.	
11	35 Ferit Melen	22 May 1972 – 15 April 1973	Justice	
12	36 Naim Talu	15 April 1973 – 26 January 1974	Justice Republican	
13	37 Bülent Ecevit	26 January 1974 – 17 November 1974	People's Temporary Government	
14	38 Sadi Irmak	17 November 1974 – 31 March 1975	Government	
15	39 Süleyman Demirel	31 March 1975 – 21 June 1977	Justice Republican	
16	40 Bülent Ecevit	21 June 1977 – 21 July 1977	People's	
17	41 Süleyman Demirel	21 July 1977 – 5 January 1978	Justice Republican	
18	42 Bülent Ecevit	5 January 1978 – 12 November 1979	People's	
19	43 Süleyman Demirel	12 November 1979 – 12 September 1980	Justice	
20	44 Bülend Ulusu	21 September 1980 – 13 December 1983	Military	
21	45 Turgut Özal	13 December 1983 – 21 December 1987	Motherland	
22	46 Turgut Özal	21 December 1987 – 31 October 1989	Motherland	
23	47 Yıldırım Akbulut	9 November 1989 – 23 June 1991	Motherland	
24	48 Mesut Yılmaz	23 June 1991 – 20 November 1991	Motherland	
25	49 Süleyman Demirel	20 November 1991 – 16 May 1993	Right Way	
26	50 Tansu Çiller	25 June 1993 – 5 October 1995	Right Way	
27	51 Tansu Çiller	5 October 1995 – 30 October 1995	Right Way	
28	52 Tansu Çiller	30 October 1995 – 6 March 1996	Right Way	
29	53 Mesut Yılmaz	6 March 1996 – 28 June 1996	Motherland	
30	54 Necmettin Erbakan	28 June 1996 – 30 June 1997	Welfare	

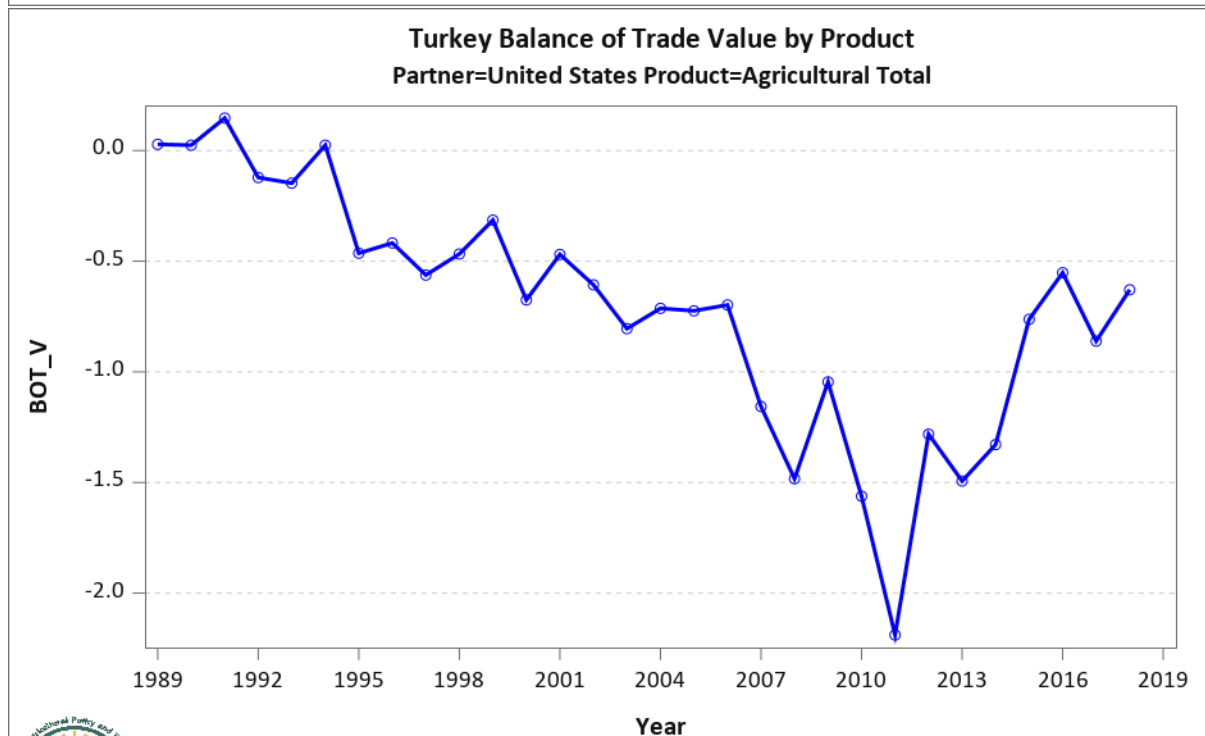
<b>No.</b>	<b>President</b>	<b>Term of Office</b>	<b>Party</b>
32	56 Bülent Ecevit	11 January 1999 – 28 May 1999	Democratic Left
33	57 Bülent Ecevit	28 May 1999 – 18 November 2002	Democratic Left
34	58 Abdullah Gül	18 November 2002 – 14 March 2003	Justice and Development
35	59 Recep Tayyip Erdoğan	14 March 2003 – 29 August 2007	Justice and Development
36	60 Recep Tayyip Erdoğan	29 August 2007 – 6 July 2011	Justice and Development
37	61 Erdoğan	6 July 2011 – 29 August 2014	Justice and Development
38	62 Ahmet Davutoğlu	29 August 2014 – 28 August 2015	Justice and Development
39	63 Ahmet Davutoğlu	28 August 2015 – 24 November 2015	Justice and Development
40	64 Ahmet Davutoğlu	24 November 2015 – 24 May 2016	Justice and Development
41	65 Binali Yıldırım	24 May 2016 – 9 July 2018	Development

Source: TBMM ([https://www.tbmm.gov.tr/kutuphane/e\\_kaynaklar\\_kutuphane\\_hukumetler.html](https://www.tbmm.gov.tr/kutuphane/e_kaynaklar_kutuphane_hukumetler.html))

## APPENDIX E. EXPORT, IMPORT, AND BALANCE OF TRADE IN TURKEY

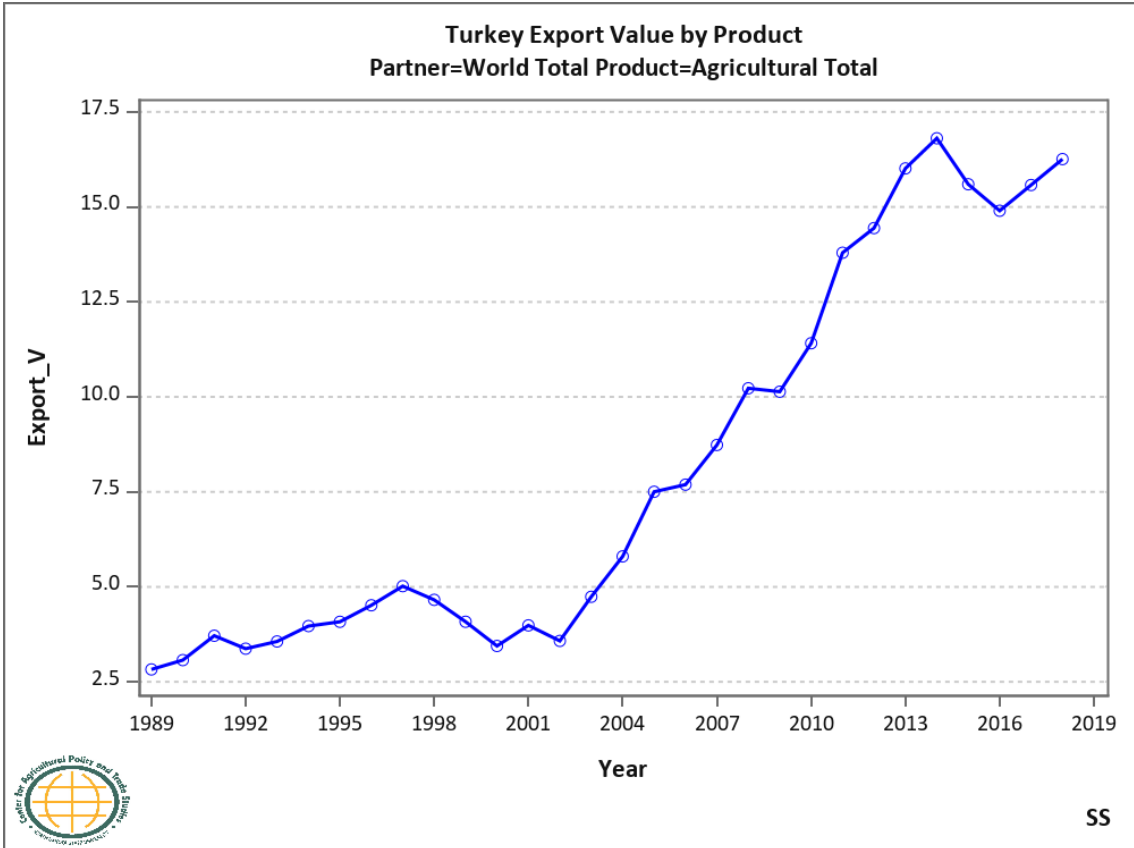
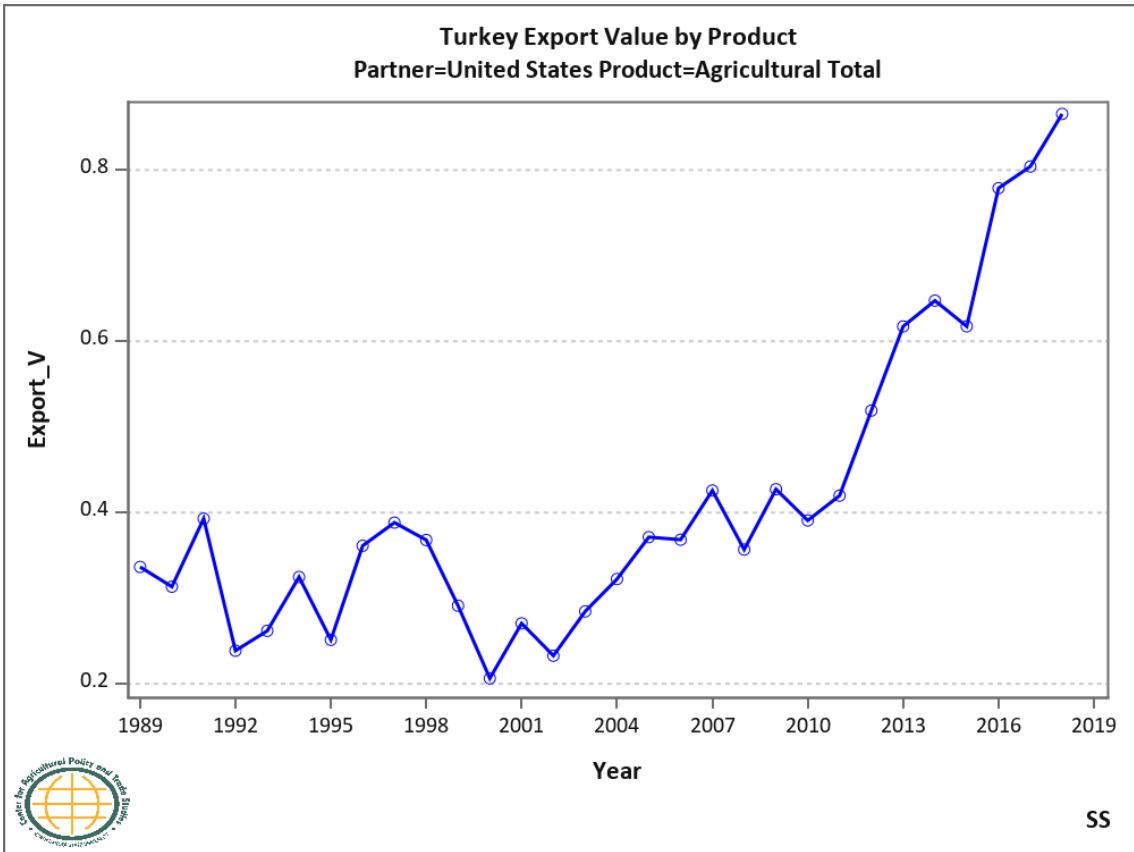


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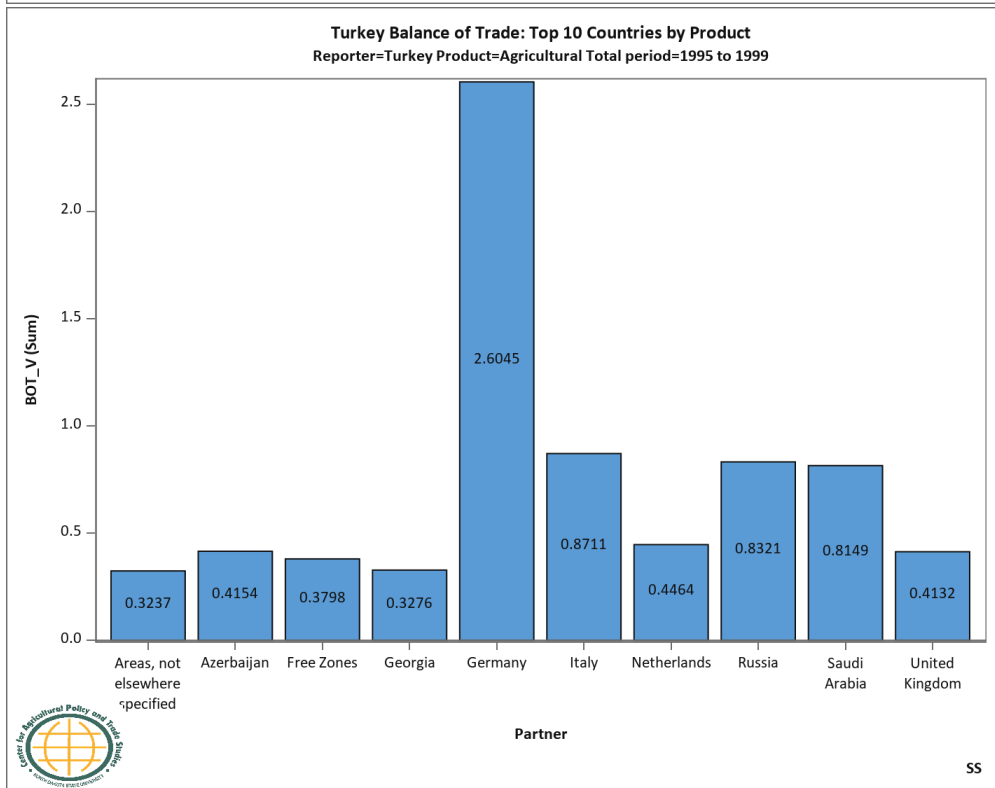
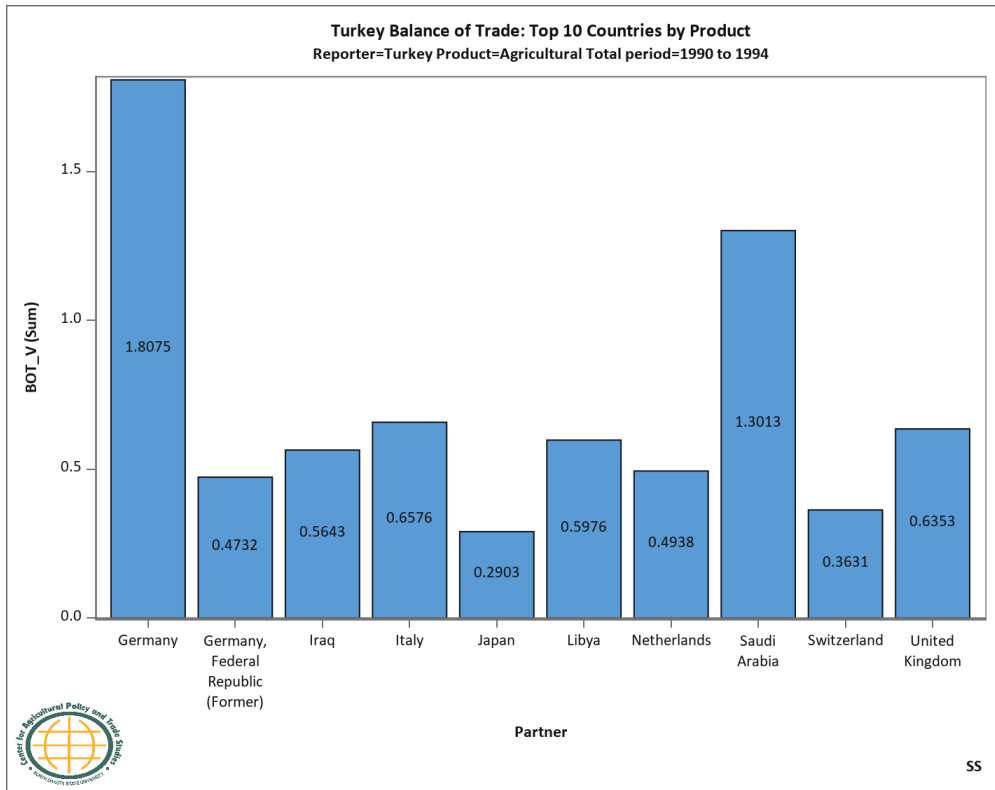
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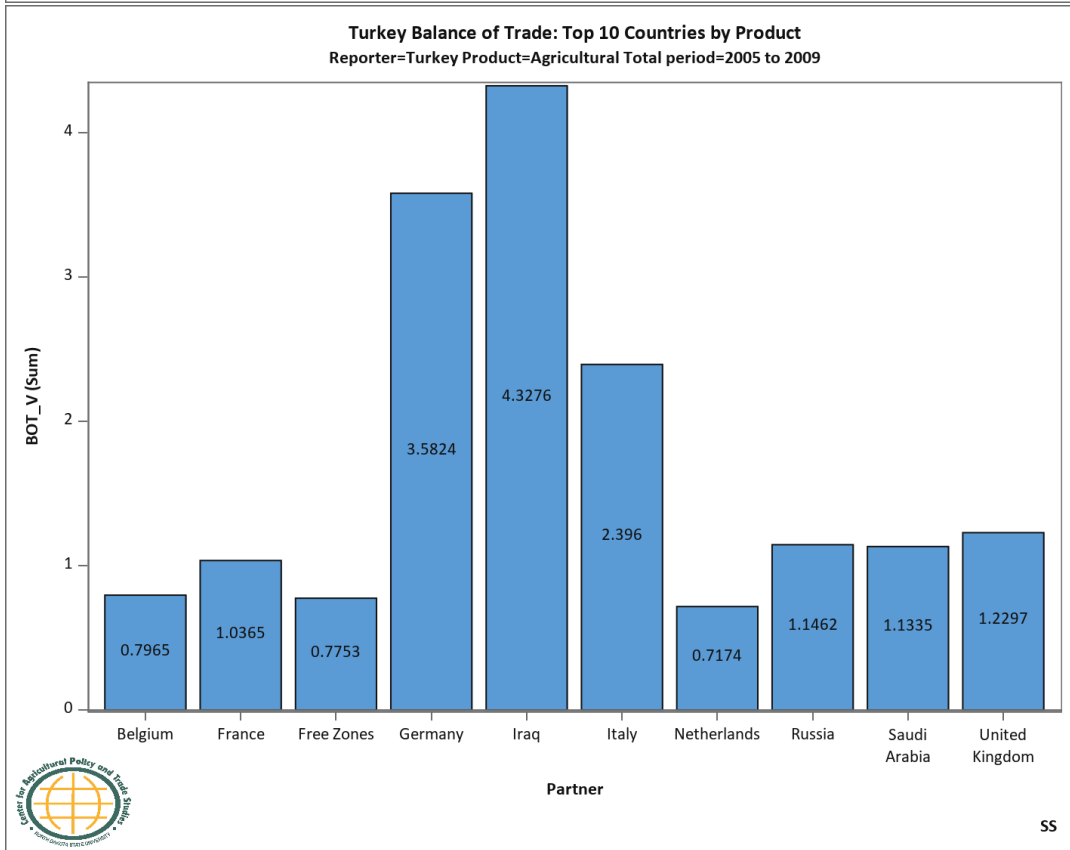
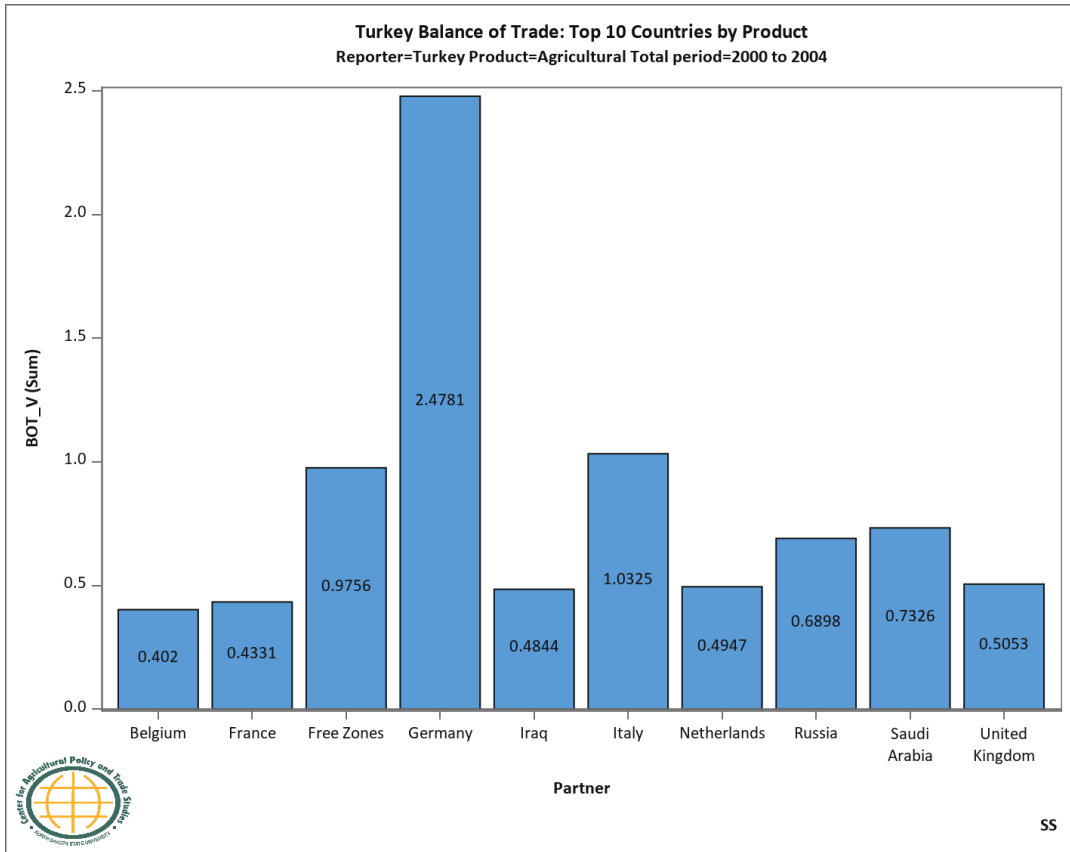


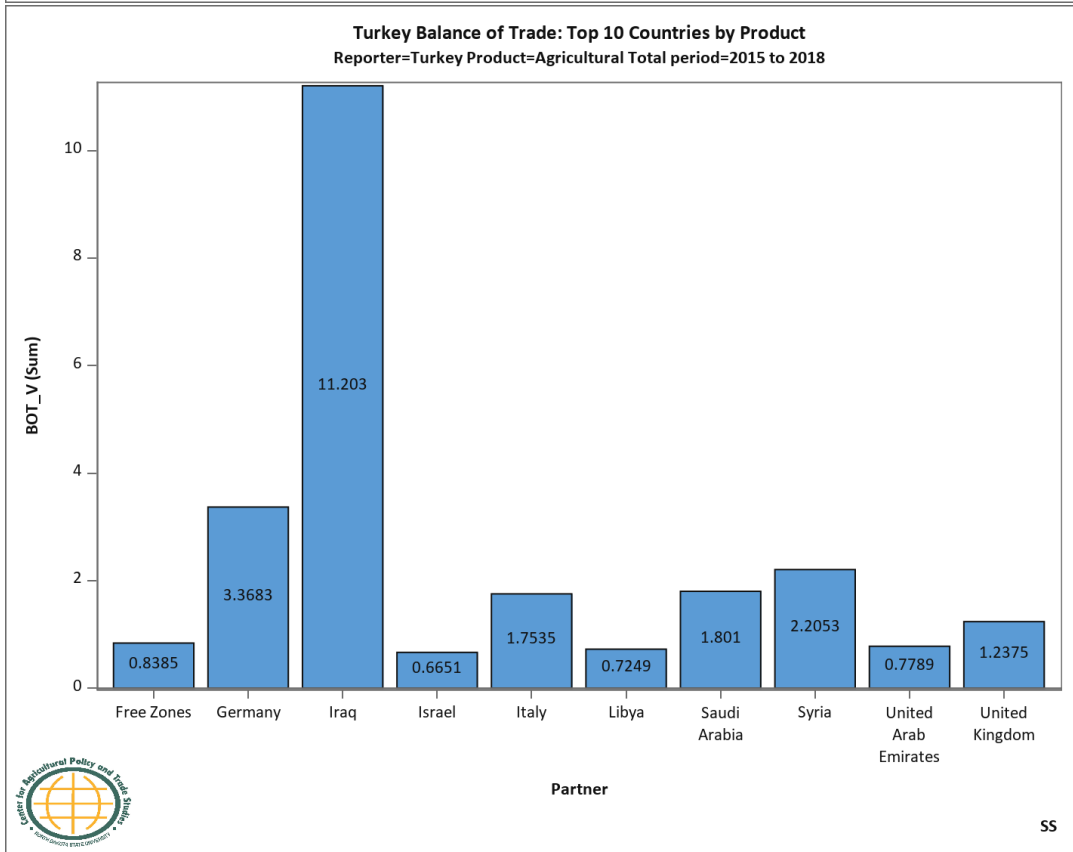
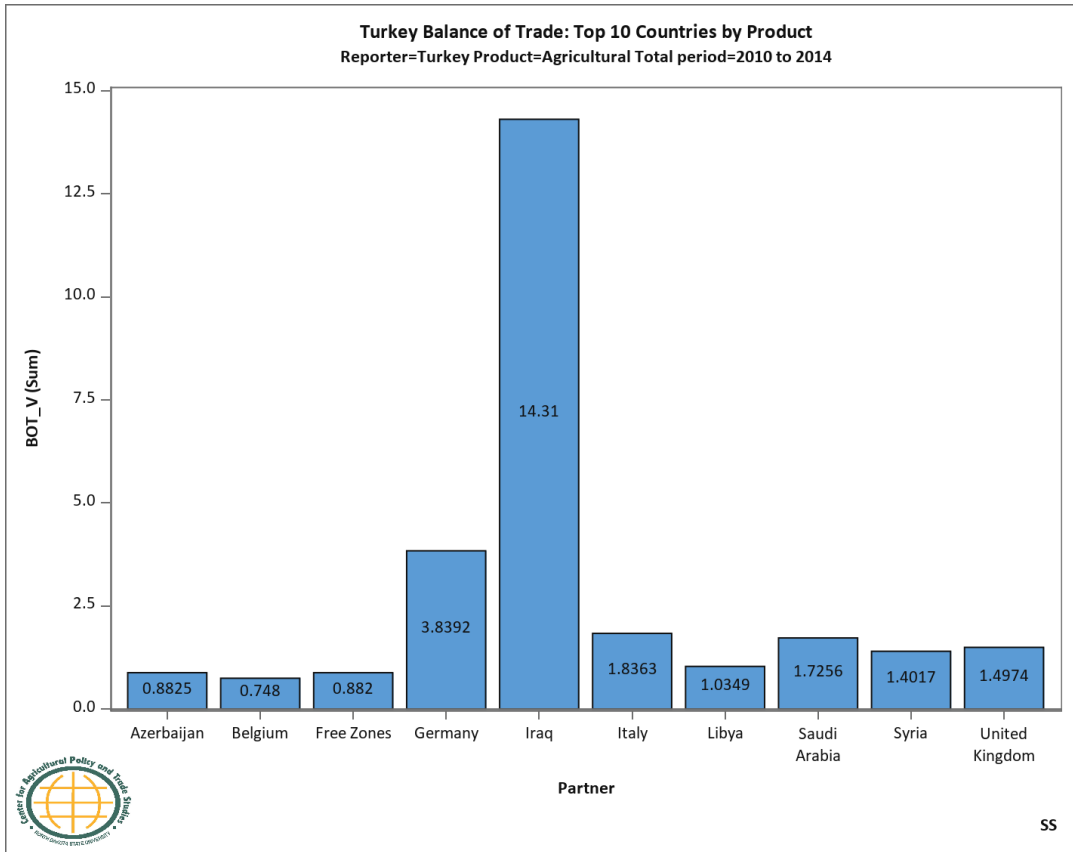


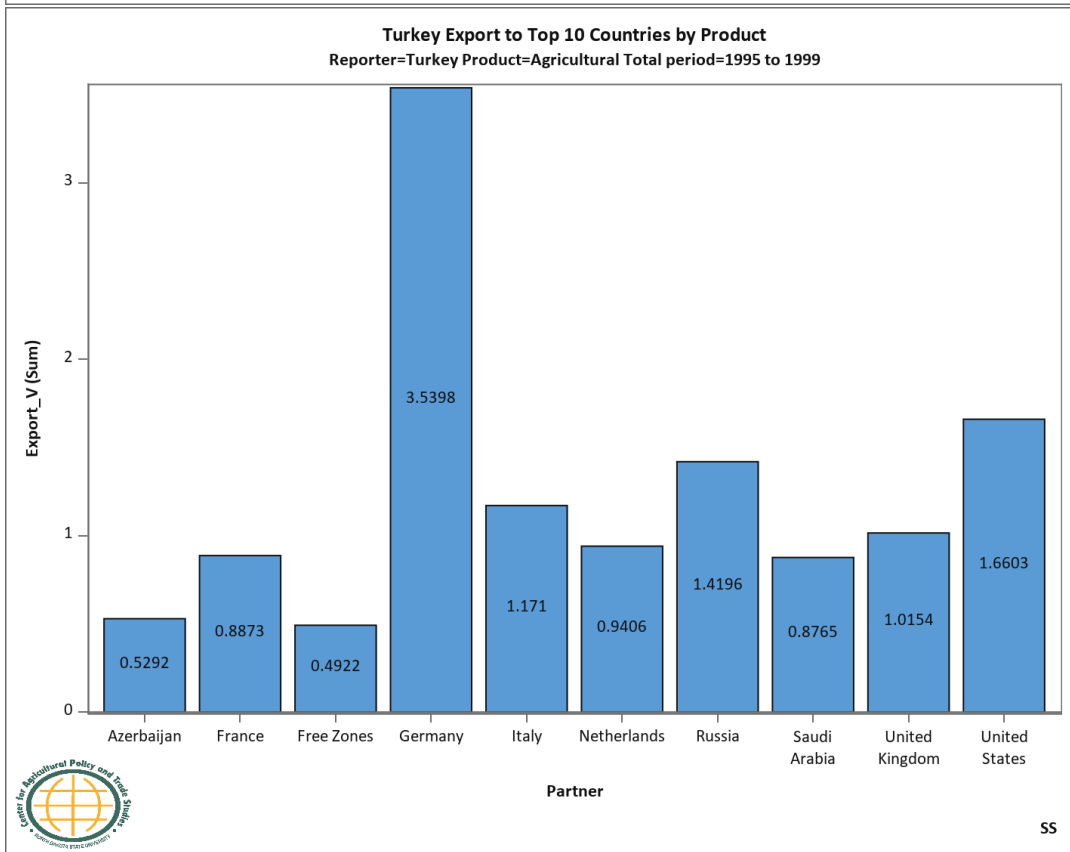
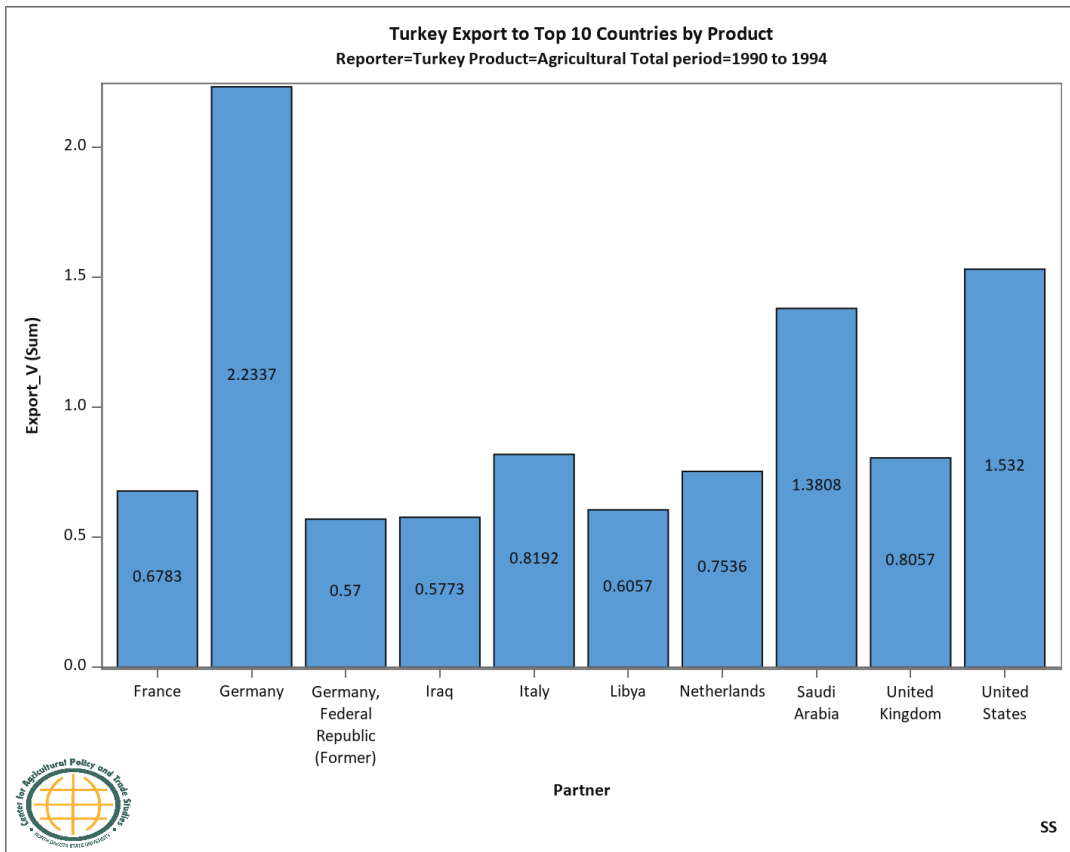
# APPENDIX F. EXPORT, IMPORT AND BALANCE OF TRADE IN TURKEY: TOP 10

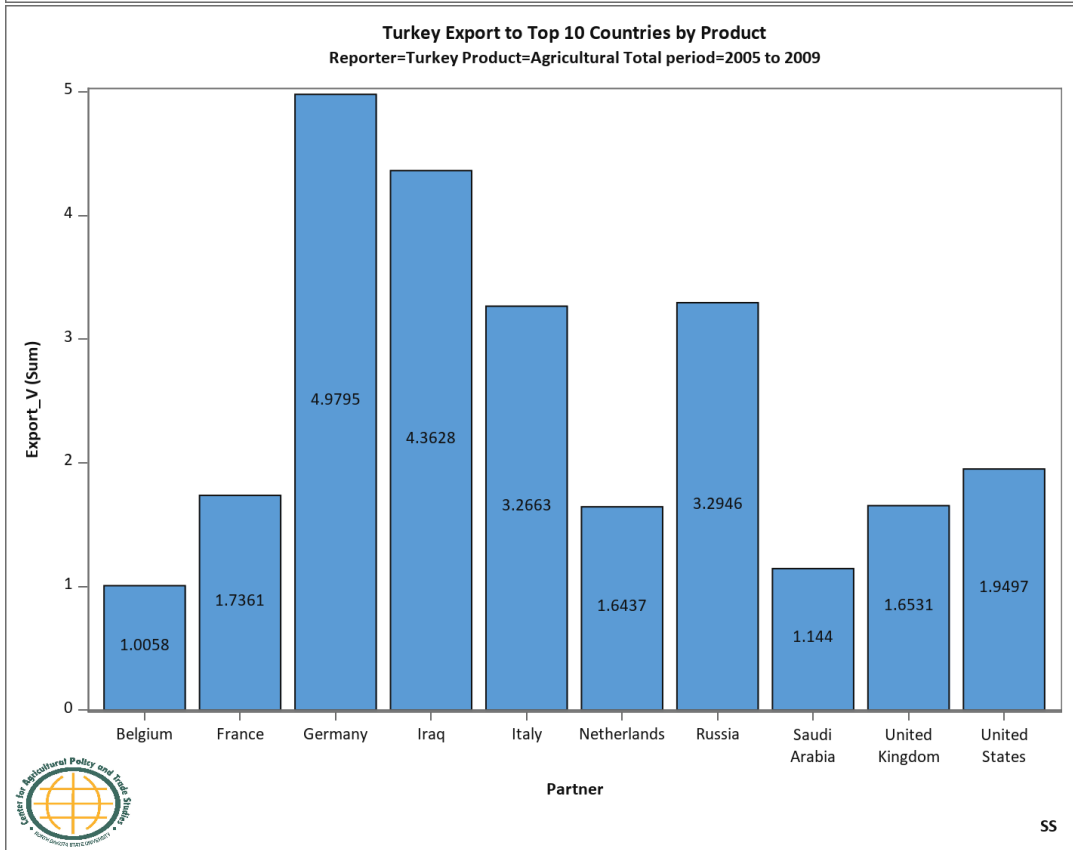
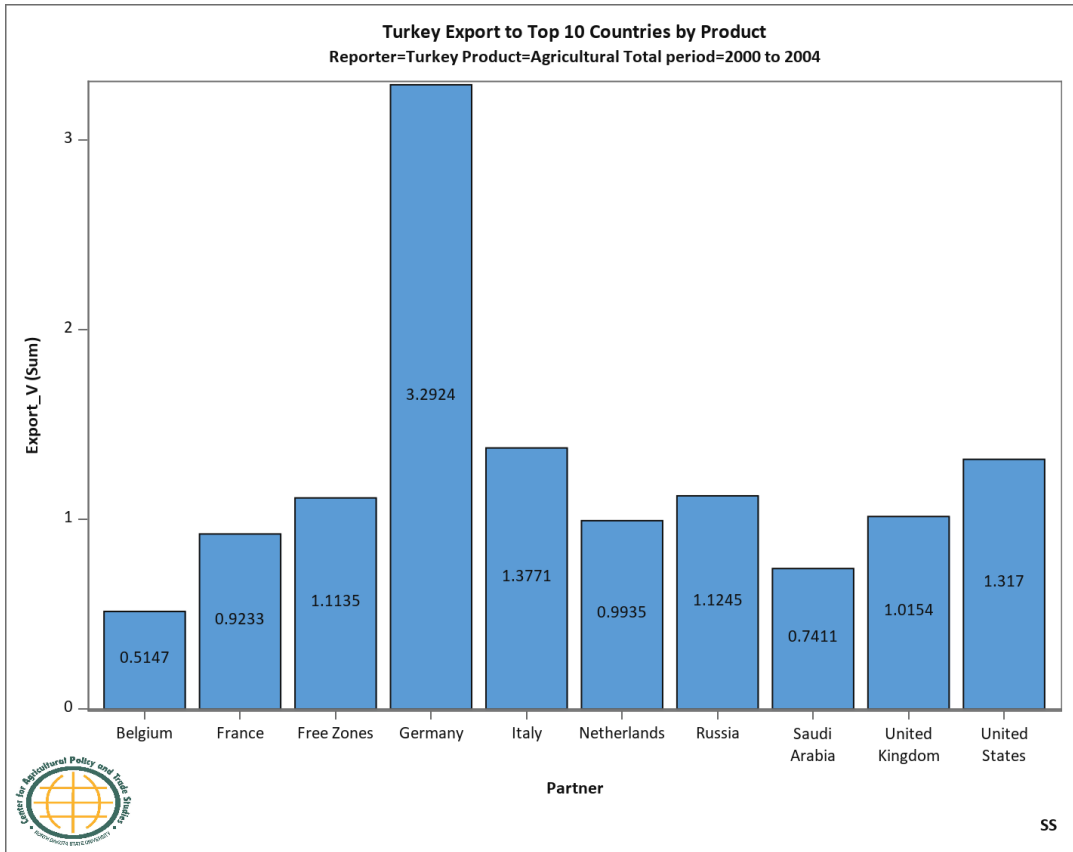
## COUNTRIES

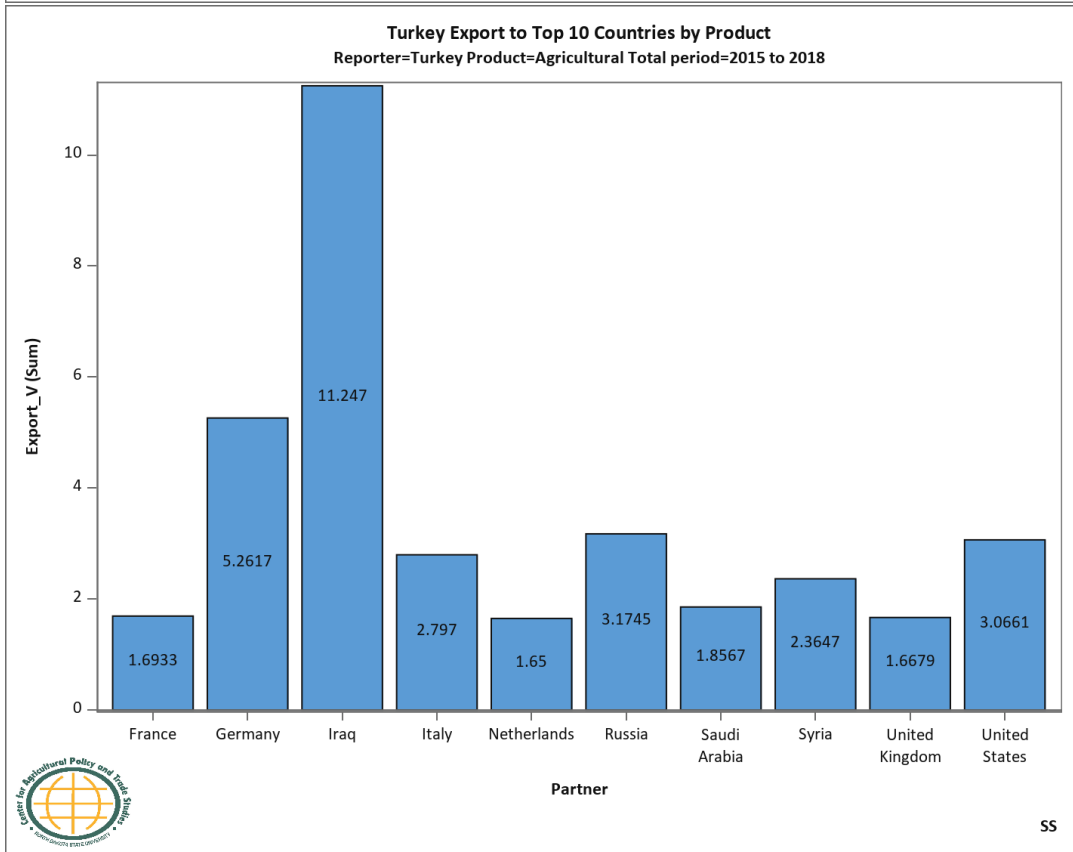
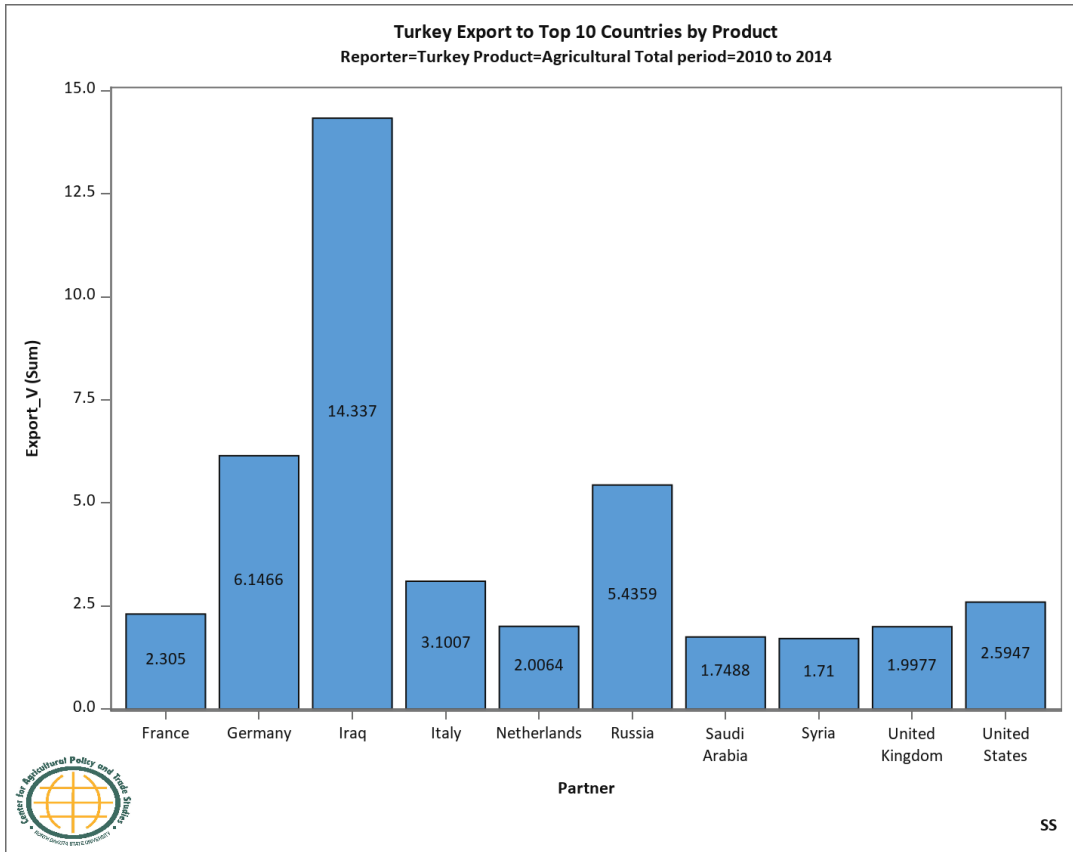


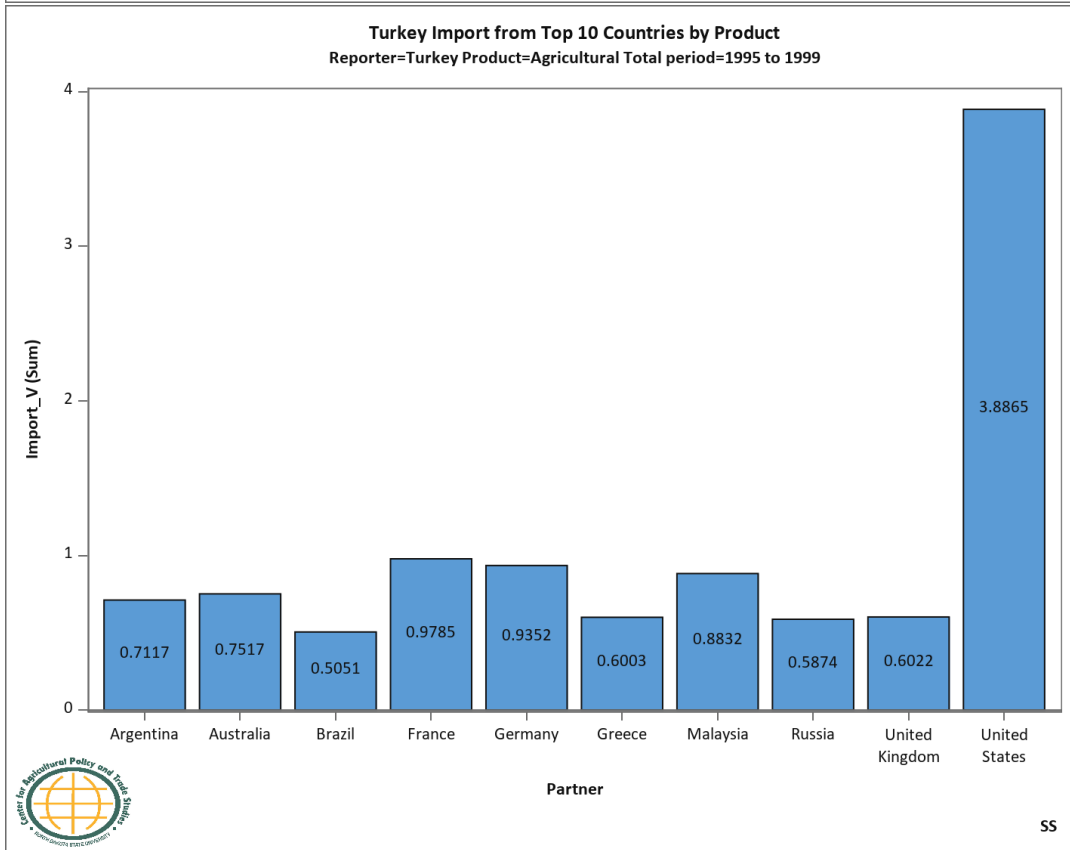
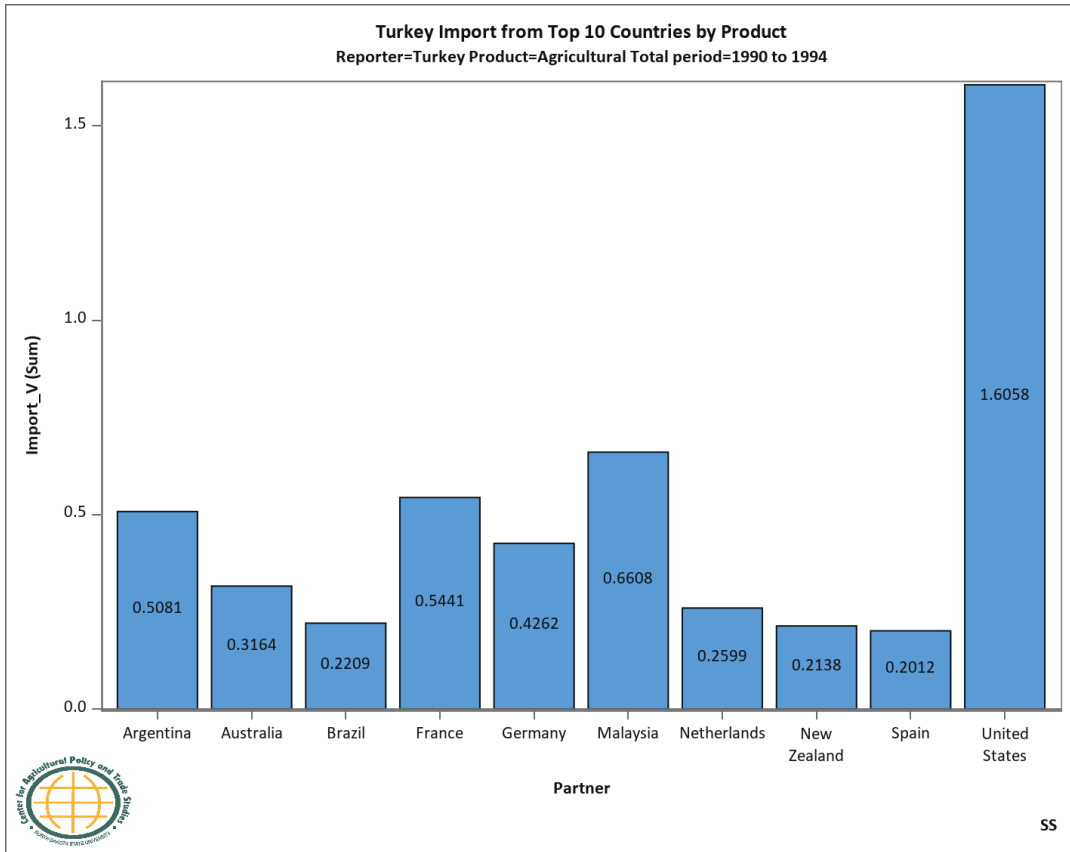




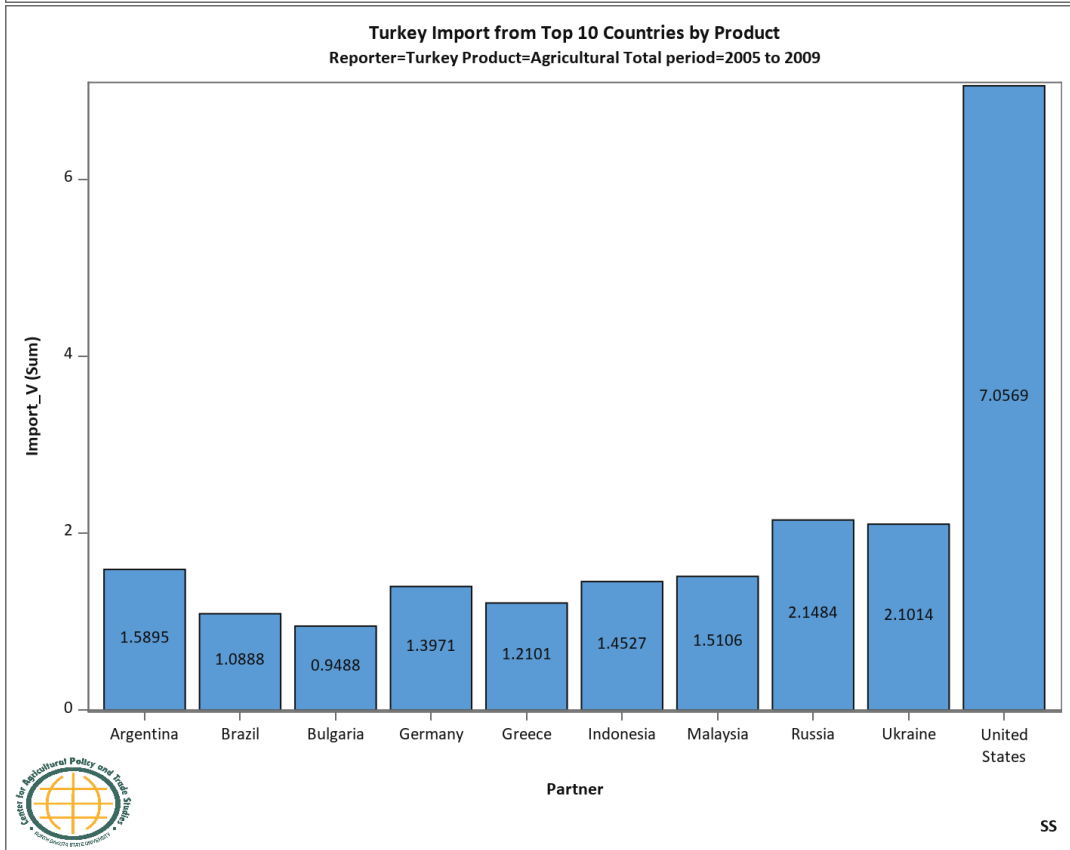
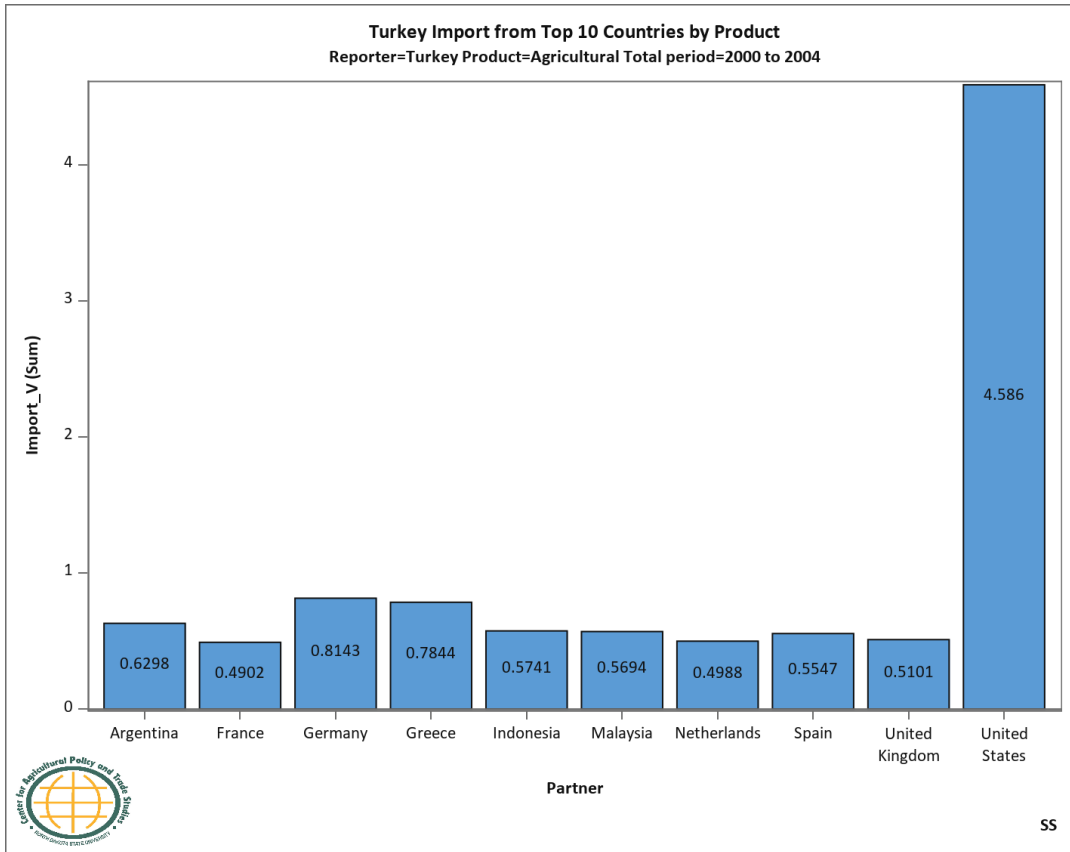


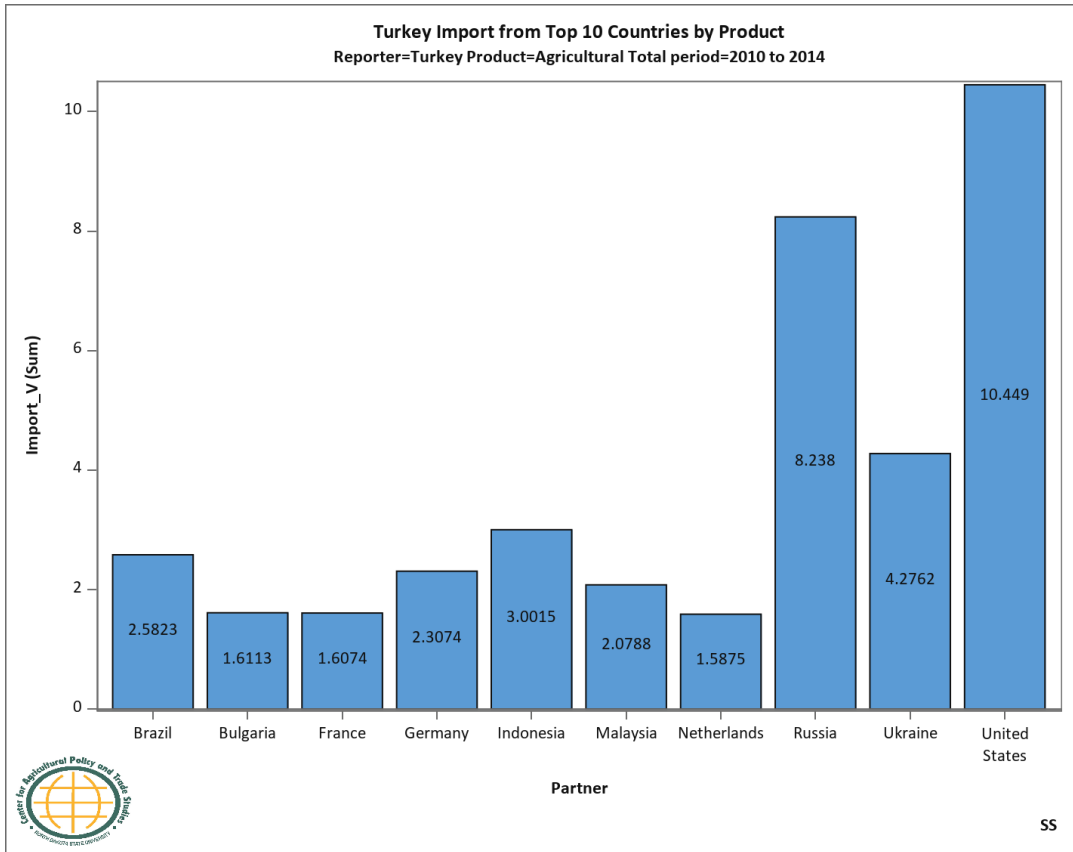




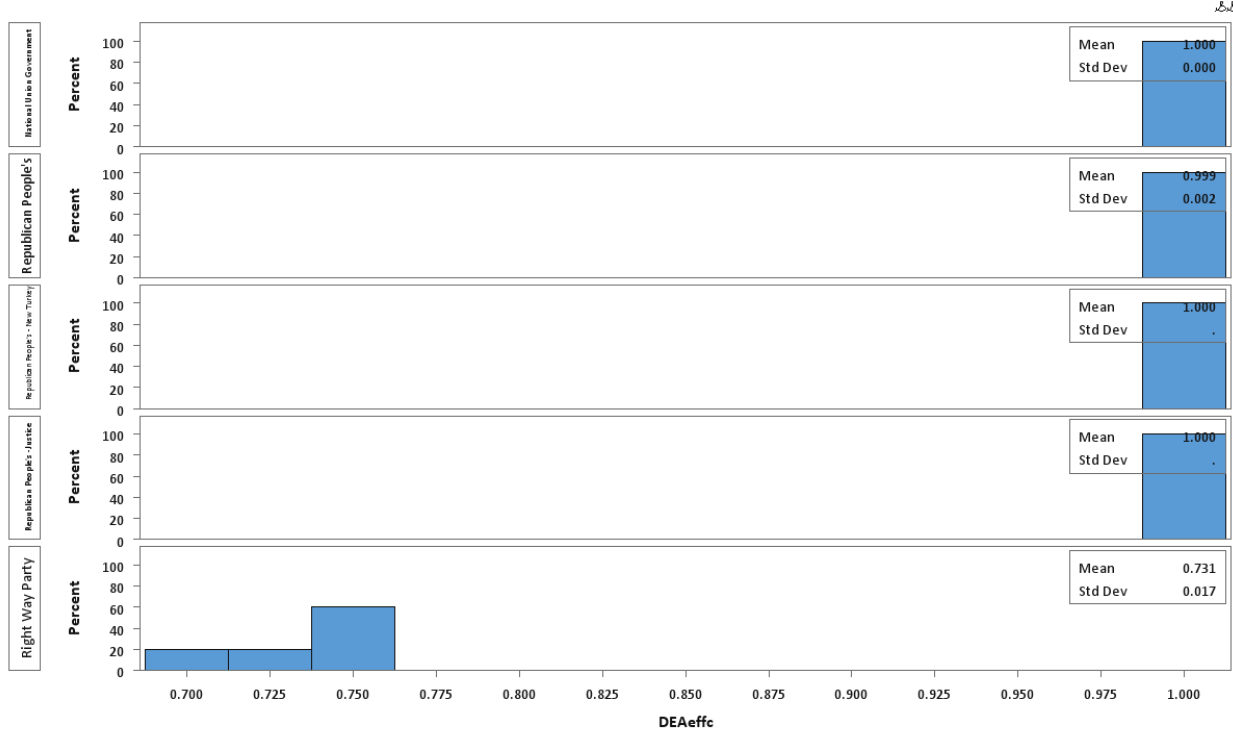
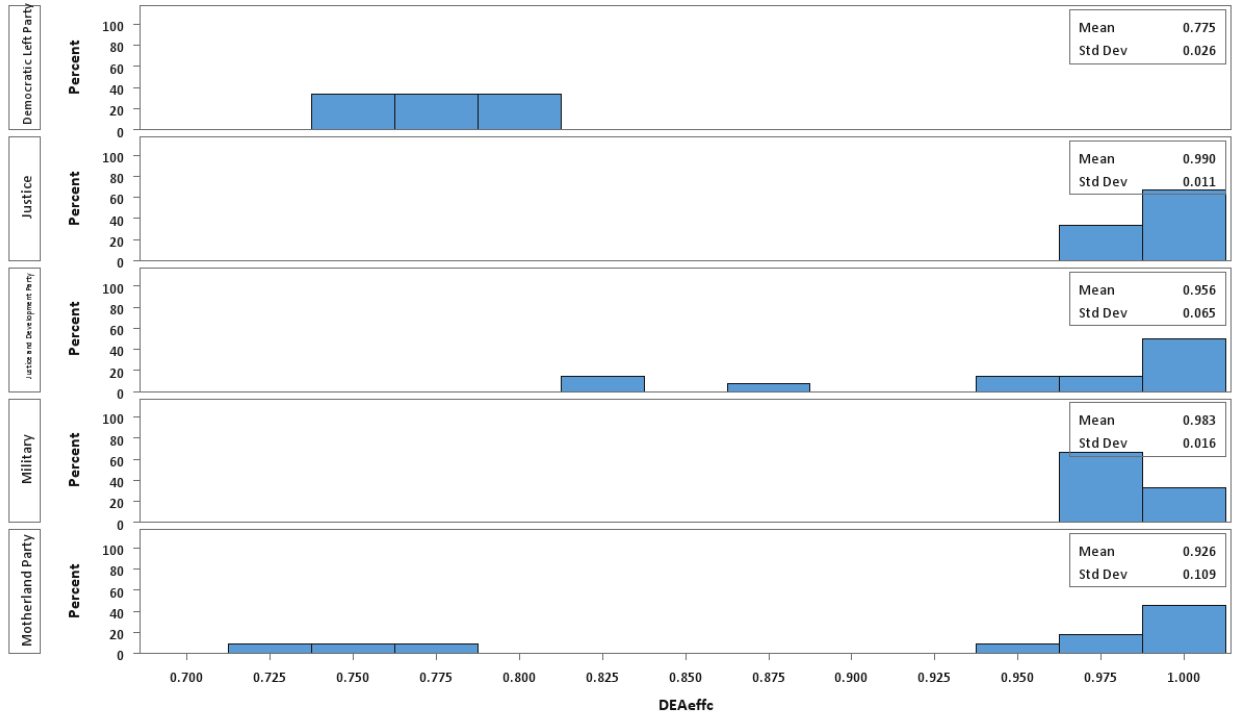


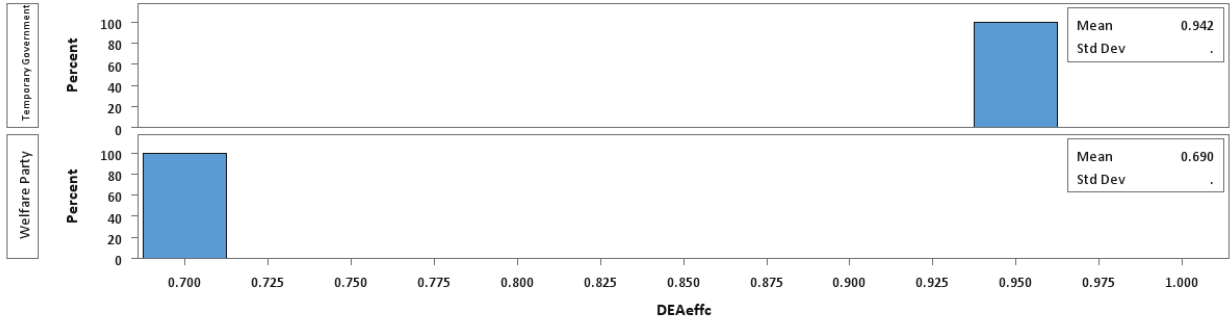






## APPENDIX G. DEA EFFICIENCY BY POLITICAL PARTY





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