

T.R.

GEBZE INSTITUTE OF TECHNOLOGY

INSTITUTE OF SOCIAL SCIENCES

**IMPACTS OF AGRICULTURAL SUPPORTS
ON EXPORTS OF INDIVIDUAL
AGRICULTURAL COMMODITIES
IN TURKEY**

ZEYNEP AKTAŞ KORAL

MASTER THESIS

DEPARTMENT OF ECONOMICS

ADVISOR

PROF. DR. HALİT YANIKKAYA

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**GEBZE YÜKSEK
TEKNOLOJİ
ENSTİTÜSÜ**

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İMZA/MÜHÜR

SUMMARY

Agricultural sector is probably the most distorted sector in most economies. Especially industrial countries intervene heavily in their agricultural sectors with worldwide repercussions. International organizations such as OECD, WTO and the World Bank have developed many indicators in order to monitor and evaluate the levels of agricultural supports and distortions. Thus, it can be assessed that even if the producers are subsidized by governments, whether these subsidies are enough or not to mitigate negative effects of general policies on producers' income through the inclusively measured agricultural subsidies and border measures. However, these indicators do not evaluate the effects of agricultural supports; they only measure the efforts of governments' agricultural supports. With this motivation, our study empirically investigates the effects of agricultural supports on the exports of eighteen Turkish agricultural commodities to 72 countries over the 1962-2010 period. We also investigate the effects of real exchange rate and its volatility with some other control variables on the exports of Turkish agricultural commodities. Since we employ PSE and NRA as indicators of agricultural supports, our study considers not only agricultural subsidies but also all the efforts of government to support agricultural through both domestic and border measures. Our empirical investigation implies that agricultural supports along with border measures have mixed effects on the export of Turkish agricultural commodities and that agricultural supports are as important as exchange rates in the determination of the export patterns of Turkish agricultural commodities.

Keywords: Agricultural support, agricultural commodity exports, panel data analysis

ÖZET

Tarım sektörü devlet müdahalesinin en yoğun şekilde görüldüğü sektörlerin başında gelmektedir. Sanayileşmiş ülkeler tarım sektörüne diğer ülkelere kıyasla çok daha fazla destek vermektedirler. OECD, Dünya Bankası, Dünya Ticaret Örgütü gibi kuruluşlar tarımdaki bu desteklerin boyutunu ölçmek için çeşitli sayıda göstergeler geliştirmişlerdir. Böylece kapsamlı bir şekilde ölçülebilen tarımsal destekler yoluyla üreticiye teşvik veriliyor olsa bile bu desteklerin, genel politikaların üretici geliri üzerindeki olumsuz etkisini gidermekte yeterli olup olmadığı görülebilmektedir. Bununla birlikte, söz konusu göstergeler tarımsal desteklerin etkilerini değil, devletlerin tarıma destek sağlama konusundaki çabalarını ölçmektedir. Buradan hareketle, çalışmamız tarımsal desteklerin Türkiye tarımsal ihracatı üzerindeki etkisini ampirik olarak incelemektedir. Çalışmamız, on sekiz tarım ürününün 1962 - 2010 periyodu boyunca 72 ülkeye yapılan ihracatını kapsamaktadır. Çalışmamızda tarımsal desteklerin yanı sıra diğer kontrol değişkenleriyle birlikte döviz kuru ve döviz kuru oynaklığının da Türkiye'nin tarımsal ihracatına olan etkisi araştırılmaktadır. Tarımsal destekleri ölçmek için Üretici Desteği Tahmini (ÜDT - PSE) ve Nominal Destek Oranı (NDO- NRA) göstergeleri kullanıldığından dolayı, sadece tarımsal teşvikler değil; aynı zamanda hükümetin yerel destekler ve sınır politikaları aracılığıyla tarıma destek sağlama çabalarının tamamı dikkate alınmaktadır. Çalışmadan elde edilen ampirik sonuçlar, sınır önlemleri ile birlikte tarıma sağlanan tüm desteklerin Türkiye tarımsal ihracatı üzerinde karmaşık etkiye sahip olduğunu göstermiştir. Tarımsal desteklerin tüm malları benzer yönde ve oranda etkilemedikleri görülmüştür. Ayrıca, sonuçlarımız Türkiye'nin ihracat modelinin belirlenmesinde tarımsal desteklerin döviz kuru ve oynaklığı kadar önemli olduğunu ortaya koymaktadır.

Anahtar Kelimeler: Tarımsal destek, tarım malları ihracatı, panel veri analizi

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ABBREVIATIONS

EU: European Union

OECD: Organization for Economic Co-operation and Development

IMF: International Monetary Fund

WB: World Bank (International Bank for Reconstruction and Development (IBRD))

WTO: World Trade Organization

FAO: Food and Agriculture Organization of the United Nations

TEAE: Agricultural Economic and Policy Development Institute (Tarımsal Ekonomi Araştırma Enstitüsü)

DPT: State Planning Organization (Devlet Planlama Teşkilatı)

GATT: General Agreement on Tariffs and Trade

LDC: Least Developed Countries

GDP: Gross Domestic Product

VEC: Vector Error Correction

PPML: Poisson Pseudo-Maximum Likelihood

MENA: Middle East and North Africa

CIS: Commonwealth of Independent States

PSE: Producer Support Estimate

NRA: Nominal Rate of Assistance

ARIP: Agricultural Reform Implementation Project

DIS: Direct Income Support

CAP: Common Agricultural Policy

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1. INTRODUCTION

Regardless of the development level of countries, agricultural sector plays a vital role in the economy since it meets the nourishment needs of society, provides raw materials to industrial production, and creates employment. In recent years, suspicions on whether agricultural production will be able to meet the needs of increasing world population have taken an important place in the agenda of international organizations and individual countries that have increased their concerns on self-sufficiency policies in agricultural production. Moreover, international agenda is not only interested in the suspicions about nourishment needs, but also the exhaustion of fossil fuels. Indeed this has also increased the importance of agricultural production since some of agricultural products such as sugar, wheat and corn are used in the production of bio-fuels. In addition to these issues, international institutions such as the OECD (Organization for Economic Co-operation and Development), the World Bank, IMF (International Monetary Fund) accentuate on the agricultural sector due to its role in reducing poverty, alleviating income inequality and achieving economic growth, especially in low income countries.

Agricultural trade has also gained great importance in both international trade negotiations and literature since the second half of the 20th century. Main issues related to agricultural trade are about protections or other border measures that prevent the free trade, and government supports to agricultural sectors. Although barriers to international trade in manufactures have significantly been reduced or regulated under international rules through the establishment of GATT (General Agreement on Tariffs and Trade) in 1947, agricultural issues, particularly subsidies and quantitative restrictions, were treated differently or excluded from this agreement since 1995. But agricultural subsidy wars among industrial countries, increased domestic stocks of their agricultural commodities and so willingness of them to export their production surpluses through free access to foreign markets were some of important answers of why agricultural trade gained importance in international trade negotiations after 1970s. The most important negotiations about agriculture were conducted in the Uruguay Round, at the end of which AoA (Agreement on Agriculture) was signed and also the WTO (World Trade Organization) was established in 1995. AoA brings regulations on agricultural policies about three issues composed of market access, domestic subsidies and export supports. Moreover, the WTO developed an indicator, namely Aggregate

Measurement of Support (AMS), in order to measure and evaluate whether countries are adhering to negotiated rules or commitments. The WTO is not the only institution developed an agricultural support measurement. Both the OECD and the World Bank also developed such indicators, namely Producer Support Estimate (PSE) and Nominal Rate of Assistance (NRA), respectively. Although each of them has their own calculation techniques, PSE and NRA are more similar to each other relative to AMS, which has different purpose. According to OECD (2010), AMS does not cover or measure all the supportive efforts of governments and it covers only domestic policies that are considered as trade-distorting.

A large number of studies investigate the effects of agricultural supports on output, employment, export, consumption, income distribution, patterns of international agricultural trade, commodity prices, global welfare and global resource allocation. Studies that examine the changing impacts of several support instruments on all the possible economic agents and events such as input providers, agro-industry, consumers, farmers, resource allocation, production and international trade take also important place in the literature. Although both PSE and NRA are used in the evaluation of agricultural supports in the literature, the PSE is the most commonly used one since it has a longer time span. But these indicators are generally employed in order to compare the efforts of governments for supporting agriculture across countries or to evaluate the efforts of any government for supporting agriculture in an historical context.

The main contributions of our study are as follows. First, this study investigates the effects of agricultural supports on the exports of eighteen Turkish agricultural commodities to 72 countries over the 1962 – 2010 period. Although there are some studies in the literature to work with disaggregated data at commodity levels, there is no study that considers so many commodities and trading partners at the same time for a so long period of time¹. Second, although there are important studies in the literature investigating the effects of agricultural supports on international trade, they generally consider export subsidies. As we utilize PSE

¹ Besides, some studies in the literature claim that it is useful to work with disaggregated data in order to explain both exchange rate and its volatility; by adding NRA to them, now we can say that even if it is useful to work with disaggregated data, every commodity should be considered by its own features and in its own market conditions.

and NRA as indicators of agricultural supports, our study considers not only export subsidies but all the efforts of governments to support agricultural sectors through both domestic and border measures. Lastly, as our study employs both PSE and NRA in estimates, it gives us the possibility of comparing the effects of these indicators. Since the calculation of the each indicator is different, it is important to compare them to reach finer results.

The rest of the thesis is organized as follows. Chapter 2 explains the importance of an agricultural sector and provides an overview of changing structure of both agricultural production and agricultural trade in the world and Turkey. In Chapter 3, we discuss the purposes and impacts of agricultural supports and then we explain the indicators that measure the efforts of governments' agricultural supports. Chapter 4 reports the agricultural policies in Turkey in an historical context and evaluates recently implemented agricultural reforms. Chapter 5 reviews the literature on agricultural trade, impact of agricultural supports, effects of exchange rate and its volatility on agricultural exports. In Chapter 6, methodology and the data are briefly explained. In Chapter 7 and 8, we present the results of our empirical investigation and some concluding remarks, respectively.

2. THE IMPORTANCE OF AGRICULTURE AND AGRICULTURAL TRADE OVERALL THE WORLD AND TURKEY

The importance of agricultural sector is growing parallel with the needs of world population. Anything an human being eats, is the output of agriculture or agricultural production - milk or cheese, eggs, macaroni or bread from wheat, wine from grapes, etc. Agriculture is not necessary only for basic human needs but also necessary for industrial production due to its role in providing raw materials. Most of the clothes or shoes are based on agricultural outputs mostly in their initial stages of production processes - yarn or clothes from cotton, shoes from leather, etc. Debates about whether agricultural production will meet the needs of increasing world population have increased in recent years and brought the agricultural sector to the top of the international agenda. According to reports of FAO (Food and Agriculture Organization of the United Nations), the number of people with under nutrition was about 864 million in 2004, and it reached 923 million by increasing 7 percent in three year. Global food production should double in order to feed more than 9 billion people in 2050. Thereby all these have gradually increased the importance of sustainability of global food resources, combating with climate changes, production of renewable resource and food security (TEAE (Tarımsal Ekonomi Araştırma Enstitüsü - Agricultural Economic and Policy Development Institute), 2009). On the other hand, suspicions about the exhaustion of fossil fuels, which bring together the efforts of finding new or renewable fuel resources, also increase the importance of agricultural products such as sugar, wheat, corn etc. that are used in the production of biofuels.

The economic impact of agricultural sector is vital for all countries regardless of their level of developedness. It provides employment and makes an important contribution to GDP (Gross Domestic Product), especially in less developed countries. Although its share in GDP has been decreasing in developed and some developing countries, agricultural sector keeps its importance in political and economic decisions. With this regard, self-sufficiency in agricultural products occupies many countries' agenda, especially developed ones.

Agricultural sector and trade have attracted a great attention in the literature since the second half of 20th century. In addition the above-mentioned topics, some scholars are

interested in WTO issues about agricultural trade and subsidies, which with border measures are thought to distort agricultural markets and prices. Besides, both scholars and international institutions such as OECD, World Bank, IMF usually emphasize the agriculture as a tool for reducing poverty, alleviating income inequality and achieving economic growth, especially in low income countries. Josling et al. (2010) argue that empirical studies related to the agricultural trade are more diversified nowadays, while some of them are interested in environmental issues, consumer, animal welfare and climate change, some are investigating the issues endemic to developing countries, and most of the researches are conducted by international institutions such as OECD and WTO.

2.1. World Agricultural Production

World GDP has increased almost nine fold from 1950 to 2011, while production volume of agriculture, manufacturing and fuels and mining have increased 0.44, 13.2 and 4.64 fold, respectively. In parallel with these changes, share of agricultural production in world GDP decreased and that of manufactures increased.

Figure 2.1 shows the regional gross agricultural production value over 1960-2011 period (Data is retrieved from the World Bank, World Development Indicators Database in 2013). Although there is an increasing trend in all regions, the difference between the regions' agricultural production is very clear. Indeed, not only agricultural production differs among regions or countries, agricultural employment, arable land endowments, fresh water, and farm technologies, etc. also differ across regions, all of which affect the production, in turn (Anderson, 2010).

Agricultural production in East Asia & Pacific countries is six times more than that in Sub-Saharan Africa countries in 2011. In fact, this also shows the difference in agricultural production between middle/high and low income economies. Considering the share of agricultural production in GDP, the situation mentioned above is reversed (Figure 2.2). While Sub-Saharan Africa has the least agricultural production value among all regions, its share in GDP is the highest in this region and agriculture plays a vital role for these economies.

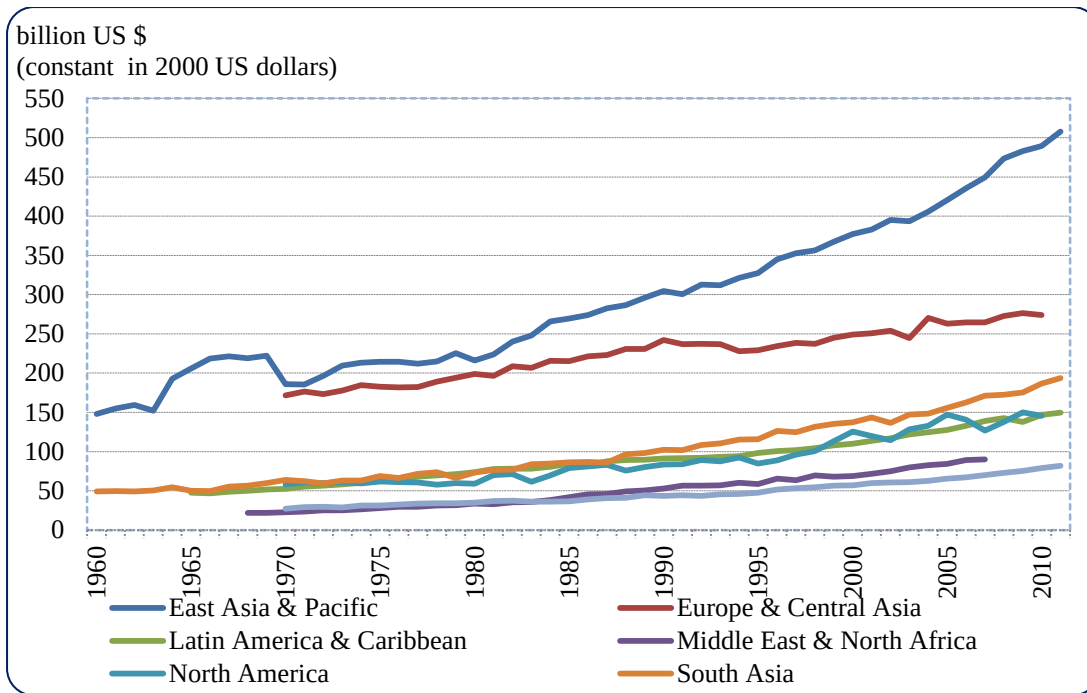


Figure 2.1: Regional Gross Agricultural Production Value

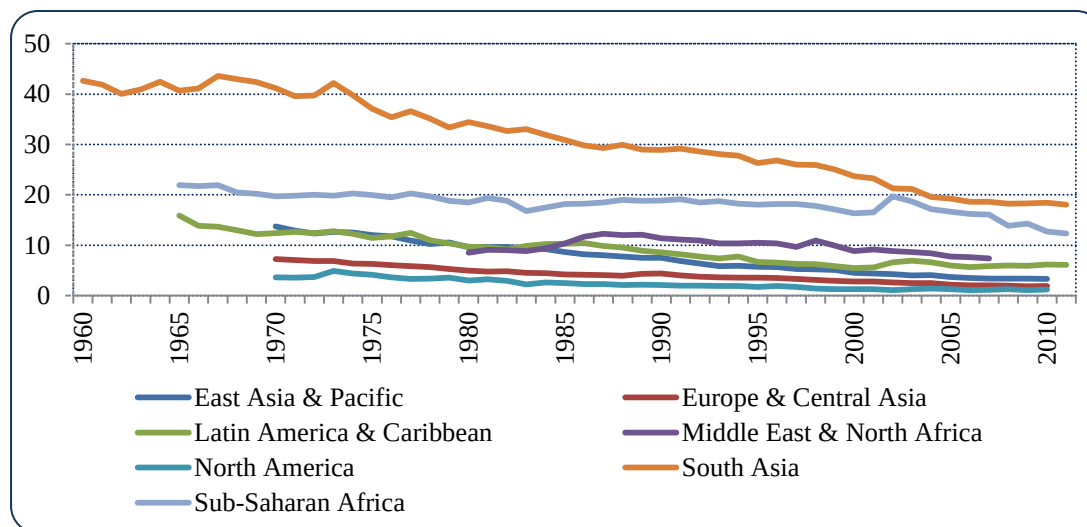


Figure 2.2: Regional Agricultural Value Added (% of GDP)

However, we can surely claim that share of agricultural sector in GDP decrease as a country develops, although its production value increases. Decrease in share of agricultural sector in the economy can also be explained by other factors. For example; as industrialization progresses or any one sector in the economy experiences an export-led growth, agricultural sector shrinks and loses its comparative advantage in international markets (Anderson, 2010). Therefore, it also loses its importance in the economy and may expose to the foreign competition even in the domestic markets.

2.2. World Agricultural Trade

World exports have grown faster than world output. However, the gap between the growth rates of world production (GDP) and world exports has reached its highest levels in 1990s (Anderson, 2010). Indeed, this situation is clearly seen from Figure 2.3 (Data is retrieved from the World Bank, World Development Indicators Database in 2013).

According to Maddison (2001), share of world merchandise exports in world GDP was 5 percent in 1870 and 8 percent in 1913 at 1990 prices. However, its share reached 50 percent in 2011, indicating how global economy has been integrated over years.

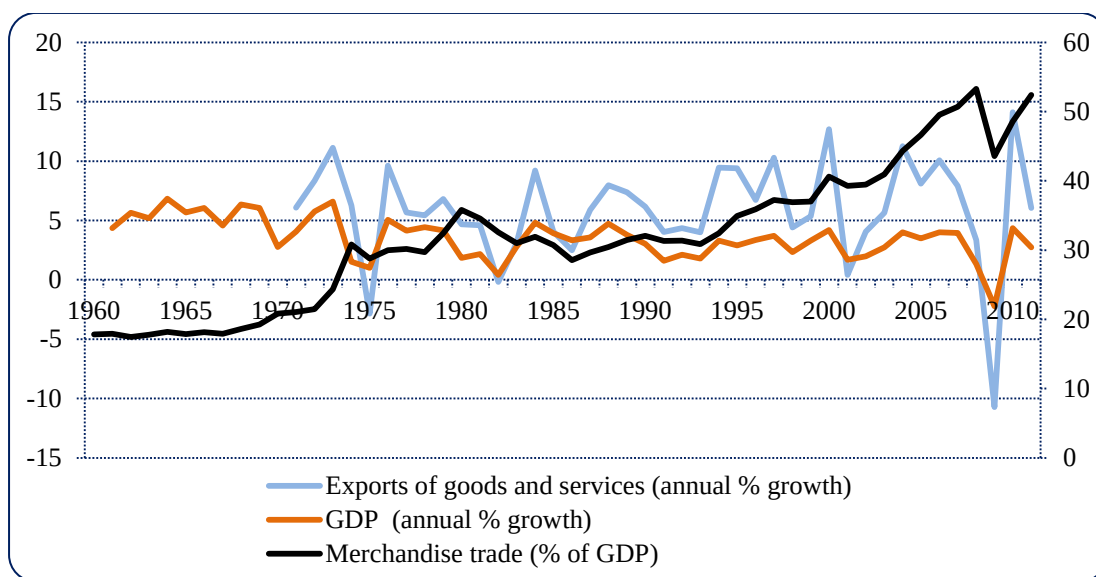


Figure 2.3: Growth of World Trade

Agricultural trade has historically an important share in world merchandise trade, which gives it a superior advantage in the design of foreign policies. At the beginning of 20th century, since protectionist movements had risen and globalization process had slowed down, international trade including trade in agricultural products began to decline. In those years, governments didn't intervene in the agricultural markets as much as they do in recent years and also there was not too much border measures impeding the trade of agricultural products. But, after the World War I, these conditions began to change, especially with the governments' aim of increasing rural income and thereby its intervention in the agricultural markets. The Great Depression also increased the protectionism in world trade. After the World War II, agricultural trade has received more attention in international agenda and

gained more significance. In fact, international concerns about agricultural sectors and especially trade originated from high levels of protection in industrialized countries during the 1960s. These countries have also extensively supported their farmers and production, in turn, which leads domestic supply surpluses. These surpluses depress the world agricultural commodity prices. Thus, developing countries whose exports generally consist of agricultural and primary products suffered from these developments. They cannot access freely to domestic markets of industrialized countries and they have experienced a decrease in their export earnings due to low prices (Josling et al., 2010).

As seen from the Figure 2.4 - whose data is retrieved from the World Bank, World Development Indicators Database in 2013, while the share of manufactures exports in total merchandise trade fluctuates between 60-80 percent with an increasing trend from 1960 to 2011, the share of both agricultural raw materials and food exports have decreased from 8 and 22 percent to 1 and 8 percent, respectively. The decrease in agricultural raw materials exports relative to food exports can be explained through synthetic substitutes of these commodities.

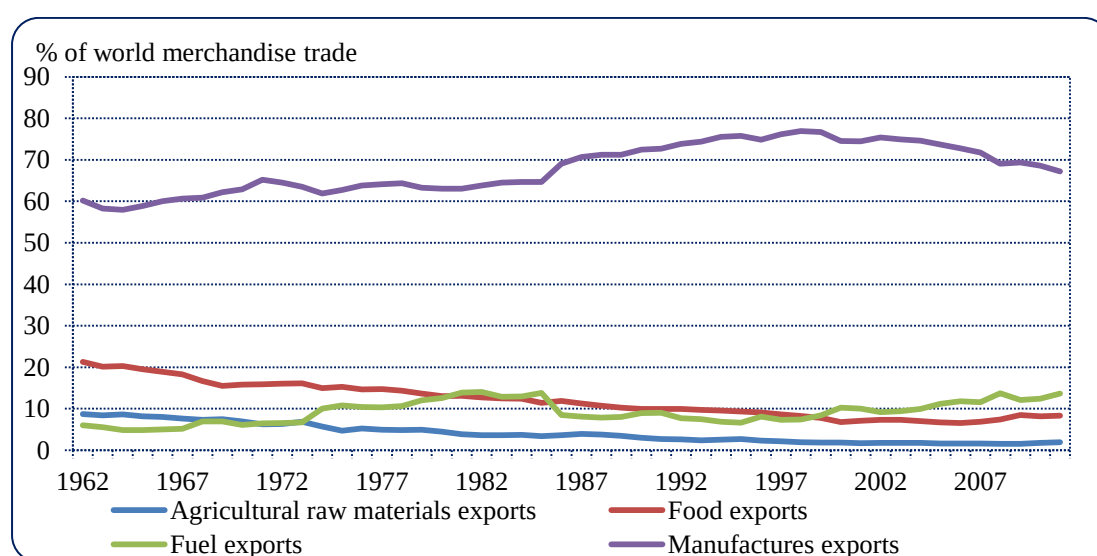


Figure 2.4: Components of World Merchandise Exports

Figure 2.5 shows regional agricultural export and import values from 1980 to 2011 according to FAO databases. While the share of agricultural production in GDP is very low in Europe and the Central Asia, they have the highest values both for agricultural exports and imports. Although the share of agricultural production in GDP is very high in South Asia and

Sub-Saharan Africa countries, they have the lowest values for agricultural exports and imports. This means that the latter regions are Least Developed Countries (LDCs) and they are not integrated to world markets as much as developed countries are.

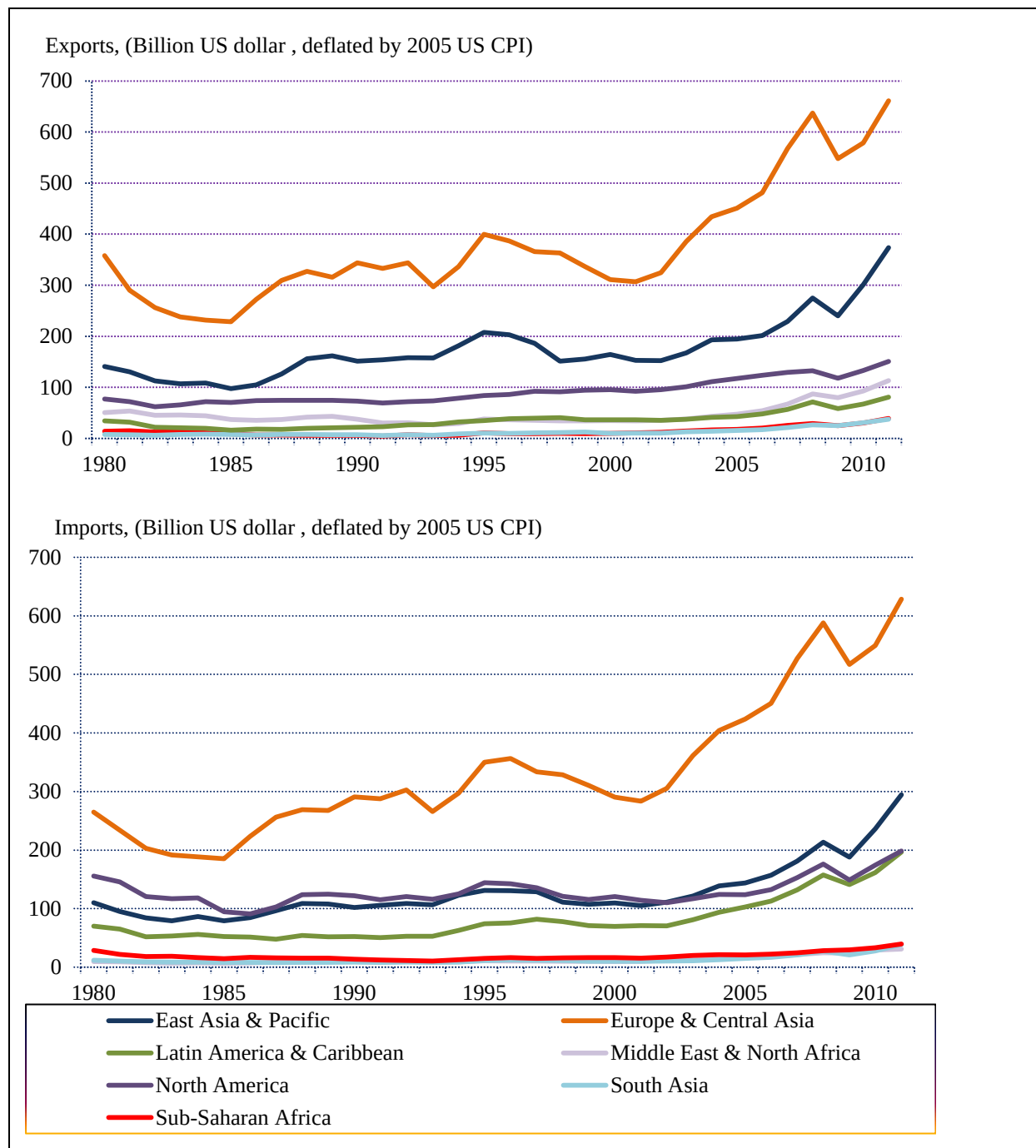


Figure 2.5: Regional Agricultural Trade

2.3. Agricultural Production and Trade in Turkey

Agricultural sector is always a prominent sector in Turkey due to rich land resources, biological diversity, favorable climate and geological conditions. As domestic agricultural production meets the most of domestic food needs, it prevents Turkey to become dependent on external resources. Turkey's self-sufficiency in food is expected to continue for the prudent future (FAO, 2001). Agricultural sector also plays an important role in the economic and social development of Turkey through supplying raw materials to agro-dependent sectors. Besides, Turkish agricultural sector attracts greater attention from the foreign investors, especially from Middle East, in recent years (T.C. Başbakanlık Yatırım Destek ve Tanıtım Ajansı, 2010).

Turkey has nearly 40 million hectares of farm land. While total planted area was about 13 million hectares in 1920s, it has increased to 25 million hectares in 1970s. After 1970s, it began to decrease and reached 20.5 million hectares in 2011. More than two-thirds of farm lands are smaller than five hectares in 2001 and also most of them are fragmented because of inheritance, which causes ineffectiveness in production. Indeed, this can be attributable to Turkish inheritance law. Therefore, we can safely conclude that there is a wide margin of improvement in agricultural production through certain policy changes.

There is secular decreasing trend in agricultural employment since 1920s. While the share of agricultural employment in total employment was about 90 percent in 1920s, it is 24 percent today.

As a developing country, Turkey experiences nearly the same fate with other developing countries regarding agricultural production. Share of agricultural value added in GDP was 50 percent in 1920s and decreased to 10 percent in 2011 (see, Figure 2.6). This means the much lower income for rural people, when considered their 24 percent share in total employment in 2011. However, subsistence and semi-subsistence farming still plays an important role in the Turkish agricultural sector. Most farms generally have low productivity and they sell only a small proportion of their production (Web 2, 2011).

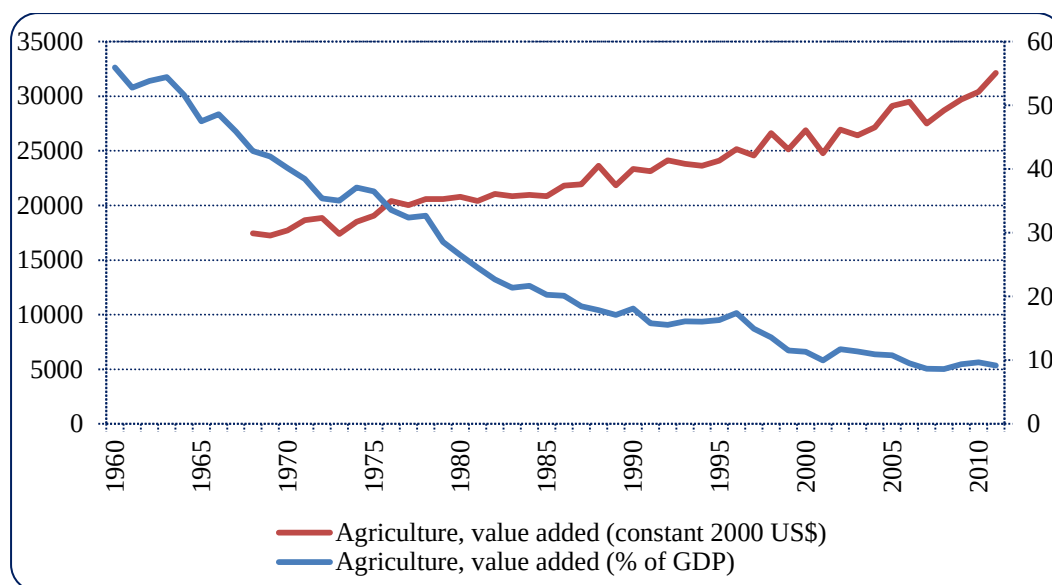


Figure 2.6: Agricultural Production in Turkey

According to FAO, top twenty agricultural products of Turkey by their production values in 2011 are cow milk, tomatoes, wheat, grapes, chicken meat, cattle meat, olives, cotton lint, apples, chilies and peppers, potatoes, sugar beet, hazelnuts, sheep meat, eggs, cherries, cottonseed, onions, strawberries and apricots. As seen from Table 1.1, Turkey is an important producer in many agricultural commodities in the world.

Table 2.1: Ranking of Turkey in the World by Agricultural Commodity Production in 2011

Rank	Commodity
1	Apricots, Quinces, Hazelnuts, Figs, Cherries
2	Poppy seed, Sheep milk, Chestnuts, Leeks, other alliaceous veg, Sour cherries, Honey
3	Cucumbers and gherkins, Pistachios, Spices (nes), Other melons (inc. cantaloupes), Strawberries, Chillies and peppers (green), Watermelons
4	Apples, Vetches, Olives, Tomatoes, Spinach, Chick peas, Beans (green), Lentils, Walnuts, Beeswax
5	Eggplants (aubergines), Vanilla, Berries (nes), Sugar beet, Tangerines, mandarins, clem., Stone fruit (nes), Tea
6	Peaches and nectarines, Pears, Grapefruit (inc. Pomelos), Safflower seed, String beans, Grapes, Indigenous Sheep Meat, Cottonseed
7	Onions (dry), Almonds, Cotton lint, Sunflower seed, Lettuce and chicory, Lemons and limes, Plums and sloes

Source: Web 4, FAO

While share of agricultural products in Turkish total exports was 77.7 percent in 1963, it was only 4.4 percent in 2009. In recent years, however, agricultural exports constitute only five percent of Turkish agricultural production, indicating high domestic agricultural product and food demand. Further, share of agricultural imports in Turkish total imports is also about five percent in recent years, indicating balance in agricultural trade. But as seen from Figure 2.7, agricultural imports rose above agricultural exports in some years after 2000, causing a trade balance deficit in agricultural trade (Data is retrieved form WTO in 2013).

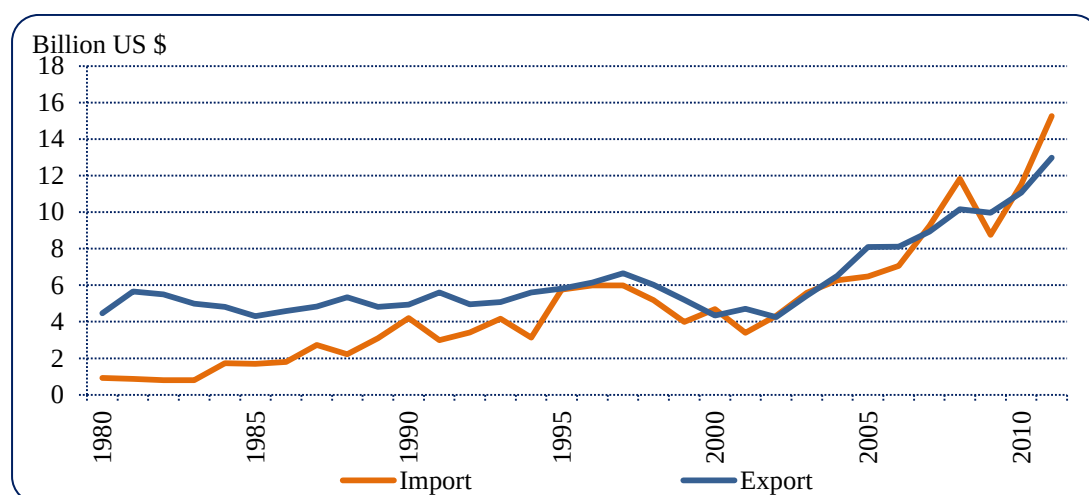


Figure 2.7: Turkish Total Agricultural Trade

Turkey is a top producer of hazelnut and meets the 74 percent of world hazelnut demand in 2008. This is also true for dried figs and apricots. Most of these commodities' exports go from Turkey to the EU countries. Raisin is also important or Turkish agricultural exports and Turkish raisin exports meet nearly 30 percent of world demand. Nonetheless, fruit and vegetables exports constitute nearly 40 percent of Turkish agricultural exports. While lemon constitutes more than half of fruit exports, tomato has an important share in vegetables exports and one-third of it generally goes to Russia (T.C. Başbakanlık Yatırım Destek ve Tanıtım Ajansı, 2010).

Although Turkey has been an exporter country in cereal products until 1980s, it has been an importer country since then (T.C. Başbakanlık Yatırım Destek ve Tanıtım Ajansı, 2010). In recent years, main agricultural commodity imports of Turkey consists form cereals, oilseeds and cotton (lint).

3. AGRICULTURAL SUPPORTS

Before explaining the purposes of agricultural supports or support policies, it is useful to understand the concept of “subsidy” since it is most commonly used instrument of support policies overall the world.

“Subsidy is conceptualized as a payment by the government to producers or distributors in an industry to prevent the decline of that industry (e.g., as a result of continuous unprofitable operations) or an increase in the prices of its products or simply to encourage it to hire more labor (as in the case of a wage subsidy). Examples are subsidies to encourage the sale of exports; subsidies on some foodstuffs to keep down the cost of living, especially in urban areas; and subsidies to encourage expansion of farm production and achieve self-reliance in food production.” (Todaro and Smith, 2009, p.839)

“In public discussion, words such as support, subsidy, assistance, and aid to producers are often used interchangeably to describe the transfers provided to farmers or the agricultural sector as a whole, which result from government policies that raise farmers’ revenues or reduce their costs.” (OECD, 2004, p.2)

“Agricultural subsidies have been defined as a government induced change of relative prices of goods, services and factors of production in the agricultural sector. These agricultural price changes may result from a large number of different government measures varying from direct cash transfers to government trade policy.” (Bosch, 1985, p.12)

3.1. Reasons for Agricultural Supports

The reasons behind why governments provide supports to agricultural sectors can be found in the both importance of the sector in the economy and the production structure of them. Regardless of the development level of countries, agriculture sectors are received substantial attention since countries care about provision of the nutritional requirements of their citizens. As stated in the second chapter, an agricultural sector also plays some important roles in the economy. So, whatever policy a government directs to agriculture will affect not only agriculture or farmers but directly or indirectly the whole economy. In

addition to domestic reasons, no one country wants its agricultural sector to encounter international competition in a unilaterally liberalized trade environment.

Also, some idiosyncratic characteristics of the agricultural sector lead governments to follow supportive or protective policies about the sector. First of all, agricultural production is heavily dependent on natural conditions. The adverse impacts of this dependency do not appear only in the production, price and income fluctuations, but also appear in regional distribution of the production and the type and quality of arable products. However this dependency precludes agricultural production to continue all the year, and leads concentration of the planting, harvesting and even marketing activities in a specific time of the year. Actually seasonal concentration can also be seen in the demand of agricultural commodities that are used as inputs. The dependency on natural conditions leads agricultural production to incorporate more risk and uncertainty than other sectors. The major factors that cause uncertainty in agricultural production can be called as aridity, flood, frost, soil borne disease and anticrop pest etc. Although technological advances provide opportunity to cope with some of these uncertainties, some of them can still generate big losses of production. However, it is harder for agriculture to increase production relative to non-agricultural sectors such as manufacturing. All these conditions are also reflected in agricultural prices, which in turn determine farmers' income. While formation of prices is basically similar in different sectors or for most of commodities, the reflection of producers to prices or demand is not so similar due to inelastic feature of agricultural production or storability of commodities. In addition, agricultural output is generally produced by a lot of farmers which are also unaware from each other and farmers can generally give response to price movements in the seeding period, not at any other time. All of these difficult conditions and also their social effects on rural people necessitate governments to intervene agricultural sector (Oren, 1994).

In Gaytancıoglu (2009), general purposes of agricultural policies are stated as following;

- Providing stability of income and eliminating income inequality between the employees working in agricultural and other sectors
- Achieving self-sufficiency in agricultural production and removing regional imbalances in the production
- Reducing seasonal employment
- Increasing productivity

- Increasing the export of strategic products (for example; tobacco, cotton, tea etc. for Turkey), which also increases the employment and inflows of foreign currency
- Preserving the environment and achieving sustainability.

Similarly and briefly, WTO (2011) explains the objectives of governments' support policies to agriculture and summarizes them such as providing enough food to meet the country's needs, protecting farmers from the adverse effects of the natural conditions and fluctuations in prices and securing rural public. However, objectives can vary among developed and developing countries. While developing countries generally may care about food security, poverty alleviation, rural development, and stabilization of export revenues, developed countries may give more attention to food self-sufficiency/security and environmentally sustainable agriculture. Nonetheless, these objectives may not remain the same over time. For example, environmental value of agriculture is more important today than past. Indeed the important thing is that although the expectations of governments from agriculture can vary by the level of development of countries, some of the countries agree that their objectives cannot be achieved through market forces alone. So governments intervene to agricultural sectors in order to achieve these objectives via different policies that also include the use of subsidies (WTO, 2006).

Besides these purposes, Bosch (1985) claims that subsidies in agriculture can be used in order to overcome various domestic distortions such as monopoly power, pollution and other externalities through moving in the opposite direction of distortion.

Regarding the agricultural support policies in Turkey, most of these objectives can easily be seen under the different support issues. But also, priority of some objectives can be considered by looking at the shares of support payments for different activities or issues.

3.2. Measurements of Agricultural Supports

International trade policies have exhibited a changing structure (sometimes protective and sometimes liberal) for centuries. Most of these changes are explained through political and economic concerns and even technological improvements in the literature. Countries have not detached agricultural trade from these developments and agricultural trade has also undergone policy changes. After the World War II, however, countries began to seek the ways of structuring a more liberal world through establishing some supra-state organizations

and multilateral trade negotiations. GATT was signed in 1947 in order to regulate international trade, especially eliminating the obstacles to trade such as import tariffs. But agricultural issues, particularly subsidies and quantitative restrictions, were operated differently under the GATT. Indeed this can show the uniqueness of agriculture in economy. According to FAO (2000), agricultural policies in major trading countries and domestic political/social pressures should be taken into account while considering the exemptions of agriculture in GATT. However, the increased disorder in world agricultural market in 1970s and 1980s took the agriculture top of world agenda in 1980s. To take an example, between 1980 and 1990, more than fifty percent of trade conflicts presented to the GATT dispute settlement process were related to agriculture (FAO, 2000) and several important commitments agreed at 1982 OECD Ministerial Council of reforming agricultural policies. Besides, the most important negotiations about agriculture were conducted in Uruguay Round, at the end of which AoA signed and also WTO established in 1995. AoA brings regulations on agricultural policies about three issues composed of market access, domestic subsidies and export supports.

In addition to these evolvments in agricultural negotiations or trade, international organizations began to measure the level and nature of agricultural supports, which made possible to compare the agricultural support efforts and dependence on commitments between countries and across time.

3.2.1. Producer and Consumer Support Estimates (PSE and CSE)

Producer Support Estimate (PSE) was firstly called as Producer Subsidy Equivalent, and defined as “the payment that would be required to compensate farmers for the loss of income resulting from the removal of a given policy measure “(OECD, 2010, p. 21: OECD, 1987). However, the PSE was redefined in 1990 and still prevents the same defining such as “the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm-gate level, arising from policy measures that support agriculture, regardless of their nature, objectives or impact on farm production or income” (OECD, 2010, p. 22).

OECD (2010) states that these measurements serve for three activities;

- ✓ Monitoring and evaluating developments of agricultural policies

- ✓ Creating a common base for policy dialogues in international negotiations
- ✓ Enabling researchers to investigate the impacts of policies through using these measurements as an input in their analyses.

Currently, the PSE includes all policies into agricultural supports if they provide transfers whose incidences occur at farm level, and if they are directed to particularly farmers or act farmers in a different way they do others. Price supports, direct payments based on production or area, payments which reduce the price of any inputs, compensatory payments, and credit concessions for farmers can be listed as examples. Not only the definition of the PSE changed over time, but also sub-categories of it, their labels changed as well. But the most important changes made in 2007² such that calculation of PSE for individual commodities ceased (OECD, 2010). However, commodity specific transfers are now found under the sub-groups of the total PSE with the name of Producer Single Commodity Transfers (Producer SCT) that is the indicator we use in our analysis. The Producer SCT values are calculated in both monetary and percentage values. We are interested in its percentage values since we would compare it with NRA. The percentage SCT measures that how much of the production of commodities is supported by policy measures. A 20% of SCT means that the estimated value of transfers to producers represents 20% of gross receipts from related commodity. However, a 20% of PSE means that twenty percent of gross farm receipts come from transfers due to policy measures supporting producers. A percentage PSE measure cannot be higher than 100%, at which level all farm receipts come from policy measures, with no returns from the market. An interpretation of SCT is very similar with the interpretation of the PSE; the only difference is that the numerator includes transfers from policy measures that are specific to that commodity (Web 1, 2013).

More importantly, we should interpret the indicators in the PSE database such that all of these indicators reflect the provision of support. They only measure the level of governments' efforts for supporting agriculture. But they don't measure the impact of these

² The latest revision of Names and Definitions of the OECD Indicators of Agricultural Support can be found in the Appendix.

policy efforts on production, income and trade or any other concept (OECD, 2010). Thus, this is main point of this study.

3.2.2. Nominal Rate of Assistance (NRA)

Other important and recently developed indicator is Nominal Rate of Assistance (NRA). NRA is developed under the World Bank's research project on Distortions to Agricultural Incentives in 2006. NRA is defined as "the percentage by which government policies have raised gross returns to farmers above what they would be without the government's intervention (or lowered them, if NRA is negative / below zero)" (Anderson et al, 2009, p.5). As evident from the title of the project, NRA reveals how the incentives are distorted. WTO (2011) explains the distortions such that if prices are higher or lower than normal (normal = no government intervention or under competitive market conditions), and also if quantities produced, bought, and sold are higher or lower than normal, then trade can said to be distorted. Several policies can cause such distortions such as import barriers and domestic subsidies. These lead to increases in domestic agricultural commodity prices and stimulate over-production and increased exports, in turn.

The purposes of the estimation of distortions are stated in Anderson et al. (2006a) as following;

- ✓ Providing a long annual time series of indicators those show to what extent price incentives faced by farmers and food consumers is directly or indirectly distorted by own-government policies
- ✓ Attributing the price distortion estimates for each agricultural commodity to specific border/domestic measures, which can be used as inputs into models for investigating the impacts of those various policies.

The NRA estimations include the domestic price measures, price effects of all border measures (tariff and non-tariff), and also an adjustment for the output-price equivalent of direct interventions in farm input markets. All of them are included in the NRA estimations by calculating domestic to border price or distorted to undistorted price ratios. However, the distortions created by multiple exchange rate system are also included in the estimations of NRA (Croser and Anderson, 2010). As can be seen in the PSE database, different

measurements or sub-indicators are calculated under the NRA database such as NRA to output, input, exportables and importables (Anderson et al., 2006a).

Global Agricultural Distortions database also includes some other sets of indicators such as Consumer Tax Equivalents and Relative Rates of Assistance. Besides them, another supplementary database was also developed under the name of Global Agricultural Trade and Welfare Reduction Indexes³.

3.2.3. Differences Between PSE and NRA Measures

The differences between these indicators can be ranged as;

- ✓ While PSE is available from 1986, NRA goes back to 1960 with some missing values due to data unavailability.
- ✓ PSE is calculated for OECD countries and Brazil, China, Russia, Ukraine, South Africa and Indonesia. NRA is calculated for 75 countries. Since these 75 countries account for over 90 percent of the world's population, farmers, agricultural GDP and total GDP.
- ✓ While percentage PSE is explained as a fraction of the distorted (domestic) prices due to the national policies, NRA is explained as a fraction of undistorted values. However, the maximum score that PSE can take is 100 (=100 percent or 1), but that of NRA is not limited to 100. In fact, PSE takes generally positive values and they are also smaller than NRA⁴.

Percentage NRA and PSE is briefly calculated as;

$$\text{NRA} = \frac{\text{Domestic prices} - \text{World Prices}}{\text{World Prices}}$$

³ For more information, see Croser and Anderson (2011), Anderson and Valenzuela (2009), and Lloyd, Croser and Anderson (2010).

⁴ This difference in the calculations leads these measures to create different effects on the Turkish agricultural commodity exports. While NRA has generally negative effects both in short and the long run, PSE has generally positive effects in the short run and some negative effects in the long run. NRA and PSE values in five year averages for our sample products can be found in the Appendix Table A.3.

$$PSE = \frac{\text{All support payments (including Market Price Supports)}}{\text{Total value of production (at the farm gate)}} + \text{All support payments} - \text{Market Price Supports}$$

- ✓ Although both PSE and NRA cover nearly 70 percent of agricultural production in countries (by product), NRA database only publishes the guesstimation for other 30 percent of production, PSE assumes the not-measured part has the same average of the measured one (Anderson, 2009).

3.2.4. Aggregate Measurement of Support (AMS)

Aggregate Measurement of Support (AMS) is used for monitoring and evaluating the reduction commitments of WTO members on agricultural supports. AMS is a technically calculated version of agricultural support policies which are considered in Amber Box in AoA and subject to reduction commitments.

Although AMS is conceptually developed from the PSE, its scope is narrower than PSE and it doesn't consider all supports to agricultural producers (OECD, 2010). In sum, AMS serves some specific purposes defined in AoA and is a legal tool for negotiating on domestic support commitments. Thus it is not of interest to our empirical analyses.

3.3. Impacts of Agricultural Supports

Governments can provide support to agricultural sectors through both domestic policies and/or border measures. In regard to domestic policies, there are several ways or instruments for a government to support agriculture, each serves for different purposes. For example, input use supports, crop insurance supports, direct income supports, etc. While each instrument can have different impacts on all the possible economic agents and events such as input providers, agro-industry, consumers, farmers, resource allocation, production and international trade,⁵ even if only one instrument can have different effects on different or

⁵ For instance, Sahinoz et al., (2007) analyze the difference between deficiency payments and other support instruments such as input support or tax, consumer support or tax, direct income supports etc. through considering their effects on several markets and economic agents such as input market, commodity market,

unexpected beneficiaries. To take an example, consider an output subsidy for milk producers. This subsidy will increase the milk production and it will cause a decrease in domestic milk prices. However, the downstream industry of milk such as cheese production will also benefit from these prices or subsidy through decreased input costs. Besides, if subsidized milk production becomes subject to international trade, the effect of this subsidy will spread to abroad. In fact, this small scenario shows how the effects of a subsidy diffuse over the economic agents. In addition to the effects of domestic supports, effects of border measures also vary by applied instruments such as commonly used export subsidies and import tariffs.

Given the diversity of support instruments, it is actually hard to examine all the possible impacts of them here. The overall impacts may be determined by detailed macroeconomic models such as computable general equilibrium models which consider the links between different markets and agents.

Thus it is not incorrect to say that in order to take an overall evaluation, all agricultural support policies can be considered as to be aimed at increasing or maintaining agricultural production and increasing welfare of rural society. For instance, if we consider Turkish agricultural support policies, it can be easily seen that most of agricultural supports is related to the production. With this regard, we will briefly investigate the effects of some of most commonly used support policies in terms of production and especially international trade.

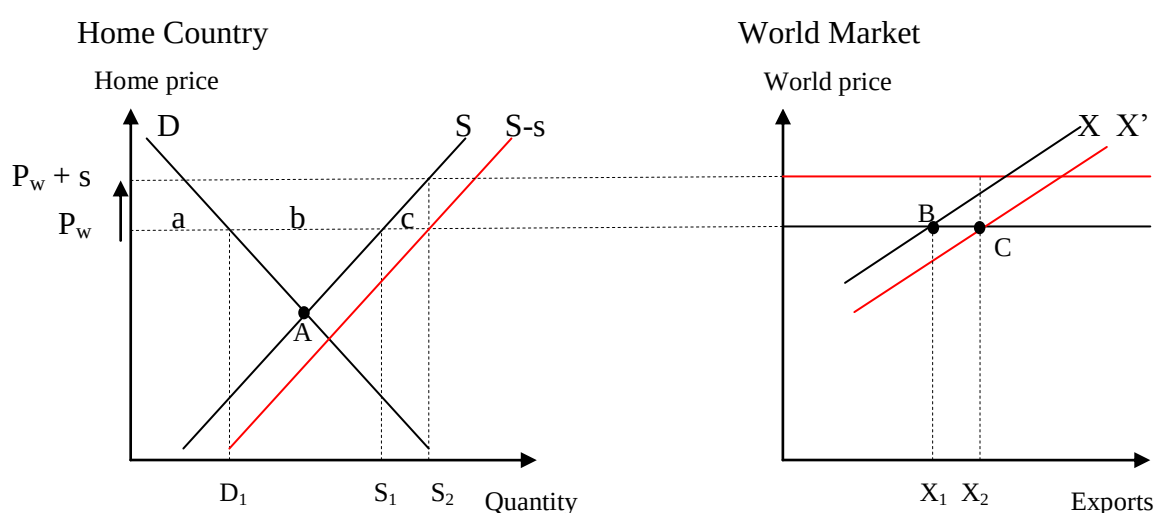


Figure 3.1: Effect of a Production Subsidy in a Small Country Case

world market, land usage, consumers, producers etc. Also, more theoretical and detailed information can be found in Bosch (1985) "The Economics of Agricultural Subsidies".

This being the case, we can start with the investigation of the effects of production subsidies. Figure 3.1 shows the effects of a production subsidy on production, trade, price and export regarding both domestic and world markets. Production subsidies can be given directly or occurred through for example a minimum price application. Also a government can provide subsidies to users of any agricultural commodity to purchase it, etc. In Figure 3.1, the first market equilibrium demand and supply in Home country is seen in the point A, indicating a closed economy.

After Home country opens its domestic market to international competition, the country begins to export (the amount of export equals to $S_1 - D_1$) and domestic price increases. If the government provides a production subsidy of s dollars per unit of commodity say every tons of wheat, it increases the supply of wheat (from S_1 to S_2) in the small country case. But it doesn't affect the domestic demand curve of wheat since consumers still pay the world price (P_w). Although consumers pay the price of P_w , wheat producers get the price of $P_w + s$. However this subsidy increases the quantity of Home country exports (from X_1 to X_2). Since this is a small country, world price of wheat is not affected from increased exports (Feenstra and Taylor, 2008).

If we assume that Home country is large enough to affect the world market, first of all, we must consider an elastic or downward sloping world demand curve. As in the small country case, the quantity of export rises again from S_1 to S_2 . Since domestic demand doesn't change, export increases by entirely the same with the amount of increase in quantity supplied by domestic producers. Thus, export supply curve shifts down by an amount less than s . (If it was an export subsidy, export supply curve would shift down by entirely the amount of s .) While the quantity of exports increases, world price begins to decrease. But world price doesn't decrease too much since there is no difference between selling domestic market or abroad.

An important and more trade related support instrument in agriculture is export subsidies. Export subsidies can include export refunds, officially supported export credits, some types of food aids and exporting STEs. The general feature of all these is their effects on prices such as a lower price for foreign buyers than domestic consumers. Indeed the market distortive effects of these supports lead them to be ruled in international trade negotiations (WTO, 2006).

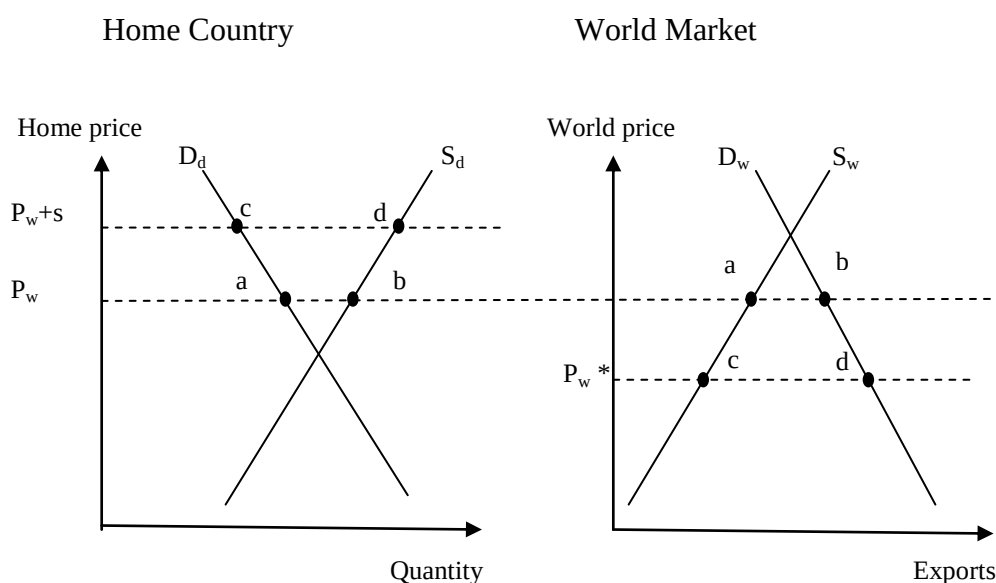


Figure 3.2: Effects of an Export Subsidy in a Large Country Case

Figure 3.2 shows briefly how an export subsidy affects domestic and world markets in a large country case. At the initial world price (P_w), in Figure 9, the quantity of exports equals to the distance between points a and b. After the government provides an export subsidy - assume that provided for every unit of a commodity's export (say every tons of wheat again) - it firstly increases the wheat exports of Home country (from distance ab to distance cd). Since wheat producers choose to export rather than selling domestically, the supply of wheat in Home market decreases along with increasing prices (from P_w to P_w+s). However, the increased exports decrease the world price from P_w to P_w^* , if Home country is large enough to affect the prices (WTO, 2006).

The important thing is that while domestic consumers pay a higher price for the commodity to which export subsidy is provided, other consumers in world market pay a lower price for the same good. On the one hand, foreign producers also suffer from losses due to decreased prices. On the other hand, net importer countries of subsidized commodity are the gainers along with Home or domestic producers.

As seen from Figures 3.1 and 3.2, export subsidies can be more harmful than production related subsidies since they affect or distort both consumer and producer prices.

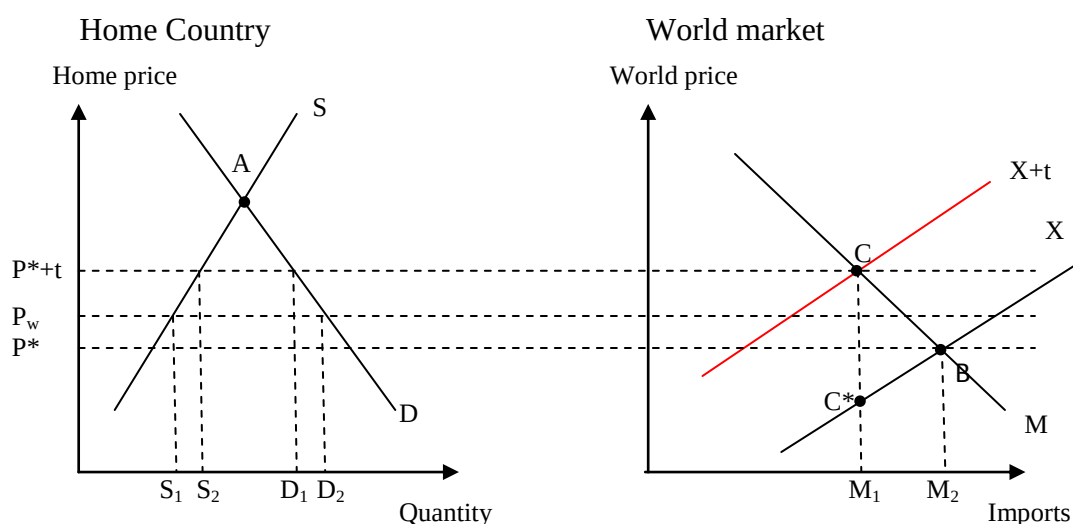


Figure 3.3: Effects of a Tariff in a Large Country Case

In addition to export subsidies, import tariffs are also important instruments used to support or protect the agricultural sector. Figure 3.3 shows the effects of a tariff on Home and World markets in a large country case. Point A represents the no-trade equilibrium in Home market. After the liberalization of trade in Home country, domestic prices become equal to world equilibrium P_w . When Home country applies an import tariff of t dollars, the cost for foreign producers of selling to Home market increases by the amount of t . So foreign export supply curve (X^*) shifts to X^*+t and domestic price increases from P_w to P^*+t . But the foreign exporters receive only P^* as the net-of-tariff price (Feenstra and Taylor, 2008).

In the small country case, an applied import tariff by that country doesn't affect the world price of the product on which the tariff is applied. However, the price of the product in Home market increases since the tariff is applied at the border. Indeed we will not explain the distribution of cost of tariff on domestic and foreign consumer and producer. The important issue is to explain how tariffs distort the markets and production pattern. This is the issue in what international agenda and organizations are interested since all these supportive policies are thought to affect especially international trade, resource allocation and global welfare.

4. HISTORY OF AGRICULTURAL POLICIES IN TURKEY

History of agricultural policies in Turkey should be evaluated along with major general economic policies and milestones in the economy. With this regard, we examine the agricultural policies in Turkey regarding four different periods.

1923 – 1963 Period: After the foundation of the Turkish Republic, the government generally implemented etatistic agricultural policies until 1950s and then these policies began to be replaced with more liberal ones (Burrell and Kurzweil, 2007).

First of all, dime levy that was an important component of agricultural policies inherited from the Ottoman State was abolished in 1925. Then property rights of farmers were redefined with the Civil Law that was put into force the in 1926. In addition, government undertook the mission of providing credits to agricultural sector and thus farm credits rose highly in that period. All of these pro-farmer developments actually increased both land ownership and agricultural production. Besides, the most important structural change in agricultural sector was the transition of subsistence production to market-oriented one (Yeni and Dolekoglu, 2003).

The Great Recession in 1929 affected Turkish agricultural sector and policies, such that the Wheat Protection Law enacted in 1932 in order to prevent farmers from the adverse effects of low world prices (Yavuz, 2000). Although Ziraat Bank was firstly responsible from the wheat purchases; Toprak Mahsulleri Ofisi (TMO- Turkish Grain Board) was founded in 1938 so as to deal with wheat affairs and to provide producers market-guarantee by support purchases. TMO was/is also responsible to prohibit wheat prices from high fluctuations, to regulate wheat industry and foreign wheat trade, etc. However TMO's these duties were extended to agricultural products other than wheat in the following years. In point of fact, after the foundation of TMO, the number of State Economic Enterprises (SEE) increased in the following three decades – for example TSFAS-sugar, TEKEL-tobacco and beverages, EBK- meat and fish, CAYKUR- tea, etc. On the other hand, Agricultural Sales Cooperatives Unions (ASCU) and Agricultural Credit Cooperatives (ACC) were also other

important foundations in the implementation of agricultural policies and had an important role in the agricultural product market regulations.

Agricultural support and price policies were very common and were usually used in order to extend both the production and export of important products such as sugar beet, tea, hazelnut, raisin, dried fig and olive oil. The imposition of price floor started in 1947 through government purchases of 13 percent of domestic tobacco production. Export subsidies also started in 1950s due to the decrease in world prices or relatively high domestic prices (Yavuz, 2000).

1963 – 1980 Period: The planned economy period in Turkey started in 1963 with the first Five-Year Development Plan. This period is generally mentioned with famous import substitution policies. Indeed, great attention was paid to the improvement of agricultural sector in early development plans. Structure and instruments of state supports to the agricultural sector, price regulations and import/export of agricultural commodities were important issues. But government intervention to the agricultural sector and also structural failures in the delivery of support payments would highly been criticized then and the most common feature of following development plans would have been about decreasing the role of government in agricultural markets.

Until 1960s, most of the increase in agricultural production was achieved through bringing new lands into use for cultivation. But thereafter the agricultural production increased through productivity growth that was achieved with effective inputs and mechanic equipment use. Foreign aids as result of the Marshall Plan were important sources of agricultural mechanization and adaptation of modern technologies in that period (Atac, 2011). Scope of support purchases also extended to thirty products in 1970s (Kiymaz, 2000).

1980 – 1995 Period: Due to the economic crises in 1969, 1974 and 1978, the 1980s characterized with economic rehabilitation programs with a 3-year military government. Economic policies were generally aimed at curbing high inflation and reducing public sector borrowing requirements (Burrell and Kurzweil, 2007). Besides, import substitution policies were changed with more market-oriented and export-led policies at the beginning of 1980s and agriculture sector got its share of these developments. Price policies on agricultural products, especially applied via SEEs were repealed. While the number of agricultural products that were supported via price policies or support purchases was 30 in the late of

1970s, it decreased to 3 product group or 8 individual products in 1994 (Kiymaz, 2000). Similar to the earlier period, using of high quality and fertile seeds and new crop rotations was the source of the increases in agricultural production during this period (Cakmak, 2003).

1995 – so on: Turkey experienced a deep economic crisis and a massive currency devaluation in 1994 and then a number of measures were taken in order to overcome economic problems. However, the IMF was effective in the design of these new and contractionary economic policies. Some of these policies were related to the agricultural supports due to their burden on the government budget. Government decided that support purchases could continue only for some strategically and socially important agricultural products such as grain, sugar beet and tobacco. About the support purchases of other products, SEEs could use their own resources but both types of these support purchases were agreed to cap off over time. Nonetheless, agricultural clauses in the IMF stand-by agreement contained that existing agricultural policies should be changed with Direct Income Supports that aimed at small farmers and paid on an area basis, credit incentives should be gradually eliminated and also fertilizer and other input subsidies should be pegged in nominal terms and then should be eliminated (Yeni and Dolekoglu, 2003).

Apart from domestic regulations on agricultural policies, Turkey acceded to two important agreements about international trade in 1995 and 1996. One of them is Customs Union (CU) and the other is Agreement on Agriculture (AoA). Although CU is not directly related to the trade of primary products and agricultural product components, it is an important step in the accession of Turkey to EU which also necessities adjustments in agricultural policies. Actually, AoA has a significant role in the regulations about agricultural supports and commodity markets in Turkey. AoA brings three arrangements about agricultural trade those are related to market access, export subsidies and domestic supports. The targeted purposes in AoA are to determine and bring under control the protective policies that impede agricultural trade, and to phase out protectionism in agriculture rather than to provide a full liberalization in international agricultural trade (Ay and Yapar, 2005).

Other than AoA, the most important evolution in agricultural sector after the 2000s was arisen through Agricultural Reform Implementation Project (ARIP) that was funded from the World Bank loans and cost more than 600 million US dollar. The ARIP was implemented over 2001-2009 period. It was a pre-condition for getting support from the IMF and also was a tool for alignment of Turkish agricultural policy to the EU's CAP (OECD, 2011).

The purposes of the Turkish government with this project are stated as;

- ✓ Eliminating distortionary subsidies for fertilizer, credit and price supports and determining the prices in the consideration of world markets,
 - ✓ Stimulating farmers to stop the production of currently over-produced crops by compensating their production switching costs with one-time payments,
 - ✓ Restructuring and privatizing the ASCUs so as to reduce the government intervention to market,
 - ✓ Lastly, the project enables the government to continue support for the whole program through sharing her knowledge about the program with the public or farmers.⁶
- (World Bank, 2002).

Under the ARIP, National Farmers' Registry System was set up in order to form appropriate agricultural support policies and monitor and develop them. Then it became a pre-condition for benefiting agricultural support payments.

4.1. A Historical Glance at Main Agricultural Support Instruments Implemented in Turkey

4.1.1. Price Supports

Although price supports have been used in Turkey since 1930s with intervention buying of wheat, its usage intensified over the period of the mid-1980s-2000s (Burrell and Kurzweil, 2007 and OECD, 2011). The government determined the purchase prices for agricultural products and also assigned the institutions, especially SEEs and ASCUs that would buy them. The support purchase prices were determined by considering production costs, stock prices, world prices, supply and demand conditions and inflation outturn. Supported products via price interventions generally had some common characteristics. These were such that the product should have strategic importance in terms of the

⁶ More detailed components and results of the ARIP is stated in the Appendix Table A.4 of the World Bank Report No: ICR00001155, 2009

size/number of producers, price fluctuations should be important on the production decision of farmers, also it should be storable (Yeni and Dolekoglu, 2003).

One of the important adverse effects of price supports emerged due to the announcing of support prices after the planting. On the other hand, farmers or beneficiaries usually took the payments after harvesting which caused the depreciation in the value of payments due to inflation. Although support prices were announced before the plantation after 1980, they were not adjusted according to inflation then. This was again caused farmers not to wholly benefit from these supports (Uysal, 1993). The negative impacts of support purchases on the buyer or the SEE side were also important. After the announcing of support prices, it was not possible to adjust them parallel with the changing market conditions. However, in the situation of excess production, and purchases in turn, the SEEs usually made distress selling to world markets. In the situation of domestic selling of these products, they couldn't reflect the transport, handling and storage costs to domestic buyers. All of them generated substantial burden on government budget since the Treasury compensated the operating or duty losses of the SEEs (Burrell and Kurzweil, 2007).

Although number of the supported products varies by years and economic conditions, application of price supports ended in 2001 with the stating of Direct Income Support (DIS) payments.

4.1.2. Input Supports

This type of support contains the fertilizer, pesticides, mixed feed, seed and certificated sapling, irrigation and electricity supports and cheap farm credits. However, application of the most of these support instruments ceased in the 2000s.

Farm Credit Supports: Since farm enterprises were generally small, they couldn't easily accumulate capital for their investments and government provided them cheap credit possibilities directly through Ziraat Bank and indirectly through the ACCs and the ASCUs. Also Support and Price Stabilization Fund (DFIF-SPSF) was used as another source of farm credits. Small enterprises couldn't sufficiently benefit these supports since credits were given on the land property basis and very existence of bureaucratic barriers. Repayments of these credits were also problematic and actually this application ended in 2000 (Yeni and Dolekoglu, 2003 and Burrell and Kurzweil, 2007).

Fertilizer Supports: Fertilizer supports began in 1961 and most effective institution in the distribution of fertilizer was Türkiye Ziraat Donatım Kurumu (TZDK) and Türkiye Şeker Fabrikaları A.Ş. (TSFAŞ for sugar beet producers). Fertilizer subsidies began to be applied in 1974. Fertilizer prices pegged until 1980s and the cost of price increases covered (defrayed) by government as a subsidy. All border measures (but not tariffs) on fertilizer imports were removed in 1986 and prices determined in a market structure. Although fertilizer subsidies were given to fertilizer distributors after 1986; it was given directly to farmers by considering sales invoices only between the years of 1994 and 1997 (Burrell and Kurzweil, 2007).

Although the scope and shape of fertilizer supports was highly changed over the years such as other support measures, its application was ended in 2001.

Pesticide Supports: Government supported the use of pesticides in two different ways. First of them is that the government undertook the task of struggling against crop diseases and all of its costs. Second is that government paid to farmers 20 percent of pesticides purchases of them. This application was used between the years of 1987 and 2001 (Yeni and Dolekoglu, 2003 and OECD, 2011).

Seed and Sapling Supports: After 1985, the government supported the producers of certified seeds. Also producers of certified sapling were supported after 1987 and these applications were ceased in 2001 (Yeni and Dolekoglu, 2003). But they began to be used in 2005 (certified seed and sapling consumption support) and 2009 (certified seed production support) again (Republic of Turkey Ministry of Food, Agriculture and Livestock, 2012).

Other Input Supports: Starting in 1985, the government paid to farmers 20 percent of their mixed feed purchases. Although amount of feed subsidies had changed over years, it only continued 4 years and was ceased in 1989. Government also applied electricity support through reduced electricity pricelist in culture fishing and poultry raising farms between the years of 1997 and 2001. However, the government provided to farmers the opportunity of consuming electricity at low prices for the irrigation purposes (Yeni and Dolekoglu, 2003). Besides, the government made significant investments in irrigation since 1960s. Irrigation schemes were generally undertaken the responsibility of State Hydraulic Works (DSI - SHW) and farmers made only small payments to SHW in return for their services which actually generate the irrigation supports (Burrell and Kurzweil, 2007). Although SHW transferred

some of its schemes to semi-public bodies, its share in irrigation activities is still very high - 60 percent in 2011 (Web 3, 2013).

4.1.3. Deficiency Payments

Deficiency or premium payments are firstly provided in 1993 for seeded cotton and continued only one year (Sahinoz, et al., 2007). Then it was put into force again in 1998 for cotton, wet silk cocoon and olive oil, and the number of supported products is 17 (under 11 commodity groups) in 2012 (Republic of Turkey Ministry of Food, Agriculture and Livestock, 2012). When determining the amount of premium supports, executives generally consider the domestic and world prices, government budget, yield value and production costs. Indeed this system is different and more effective than support purchasing system⁷. Even if the Treasury made the same amount of support payment, producers can obtain the targeted payment and consumers or industrialists can be able to pay less. In addition, since the whole price of products was not paid by the Treasury, it runs into less debt (Yeni and Dolekoglu, 2003).

However, the government started a basin-based support program for deficiency payments in 2010, and differentiated the supported products according to 30 agriculture basins. In 2013, 17 commodities are declared to be supported by deficiency payments. When we analyze which products are supported in which basin, it is clear that regional production concentration is considered. For example, a tea production is only supported in Black Sea Regions, while a olive production is not supported there (Official Gazette, dated 8 May 2013).

4.1.4. Direct Payments and Livestock Supports

Direct payments involving milk incentive premiums that were applied first in 1987, and meat incentive premiums that were applied between the years of 1990 and 1994. Indeed, milk

⁷ See Sahinoz et al., (2007) for more details about the different effects of support purchases and deficiency payments.

incentive premiums began to be given under the livestock supports in 2001, not under direct payments anymore. However, the government provided various incentives for a livestock farming in order to increase both meat and milk production. Supports in the import of breeding and cultivated race dairy and artificial insemination incentives began to be applied in 1987 and 1990, respectively (Yeni and Dolekoglu, 2003).

4.1.5. Compensation Payments and Natural Disaster Aids

Compensation payments involved pruning compensation premium for tea and quota compensation for tobacco. Both of them started to be applied in 1993 (Yeni and Dolekoglu, 2003). In order to improve the quality of tealeaf, the government necessitated farmers to prune some of (1/10 in 2011) their tea cultivation areas. The government compensated the decreases in tea growers' income, which occurred due to this pruning. Although the pruning compensation premium has still been implementing, a quota compensation for tobacco was ceased in 1997 (Yukseler, 1999). If farmers incurred any losses due to natural disasters, the government compensated their losses. In 2010 and 2011 government made payments to farmers due to frost disaster. Also government made payments to farmers due to exsiccation between 2007 and 2010 (with the highest amount in 2008).

Besides all of them, the government provides some general services to farmers so as to develop agricultural sector as a whole. These are agricultural research, education and extension services, supervision and laboratory services and infrastructure services, etc.

4.2. Changing Structure of Agricultural Support and Its Instruments Since 2000

As stated above, the most important evolution in agricultural supports in 2000s occurred with the ARIP - most of agricultural support instruments were shaped through it- and other agreements (such as AoA and structural adjustment programs) signed with the international organizations. However, AoA generally contains quantitative regulations on agricultural trade and support policies, while the ARIP contains qualitative ones. In addition, since the amount of domestic agricultural supports in Turkey is below the 10 percent of production value (de minimis rule), Turkey didn't make any reduction commitment on

agricultural supports within the context of AoA. In addition to de minimis rule, all the investment and input supports given to agricultural sector were lived out of the scope of reduction commitments in AoA, since they were thought to have no or minimal distortionary effect on both trade and production (Ay and Yapar, 2005). On the other hand, Turkey accepted WTO suggestions about the reductions in price supports and the usage of DIS. Indeed, this situation increases the importance of the ARIP in the evolution of agricultural supports. Direct income supports and alternative crop program are the most significant components of the ARIP, so it is useful to firstly mention from them.

4.2.1. Direct Income Supports

Direct income support has been actually applied as a result of the radical policy shifts in agricultural supports. Letters of Intent given to the IMF in 1999 and to the Bank in 2000 and the ARIP have played active roles in the design of this new system (Yilmaz et al., 2008). Indirect support policies such as price and input subsidies were gradually ceased in 2002 and DIS payments took the place of them in the Turkish agricultural support system. DIS payments were not expected to compensate the farmers' all income loss due to removing of old support system, but it was expected to alleviate the short term losses (World Bank, 2002). Besides, DIS payments are not related to the production or product type and given to farmer in the land-basis, which leads it to be characterized as decoupled payments. Since DIS is decoupled from production, it is generally claimed that it doesn't distort production pattern and agricultural commodity markets.

4.2.2. Alternative Crop Program

The objective of the alternative crop program is to reduce the excess production or supply in some special products, and encourage the farmers to switch the production pattern away from these products towards alternative crops (net imported crops). Although the program firstly intended to include the costs of switching from producing hazelnuts, tobacco, tea and sugar beet to the production of oilseeds, feed crops and maize, it has been applied only for tobacco and hazelnut (OECD, 2011). TUSIAD (2008) highly criticizes both the application of DIS and alternative crop program and claims that the emphasis in this program is not intensified on the alternative products but on the problematical products and government has not paid enough attention to the market of these alternative crops. It is also

suggested that government should determine the alternative products instead of leaving farmers to choose it from a list on a purely volunteer basis way. This actually imputes the whole risk of producing this alternative crop on farmers.

On the other hand, the minimal payments under the alternative crop program actually present both the farmers' unwillingness to switch the production and the failure of the program.

4.2.3. Other Policies and Supports

Despite a new agricultural support system has been shaped since the 2000s, an application of old (even ceased) instruments is also continued (re-applied). But there are radical differences in the application of the same support issues. For example, although a fertilizer support was ceased in 2001, its application started in 2005 again. But the way that government provides support in 2005 is based on land area, which is actually different from an early support system as explained above. Not only fertilizer supports but also recently provided supports are generally more market-friendly or less distortive and payments have usually been made based on land area. Basically this can be seen as the most important structural change in the agricultural support system.

When the structure of agricultural support system is analyzed through numerical considerations, important changes can easily be noticed. Area based agricultural supports, DIS, deficiency payments, and livestock farming supports are the most important items in the agricultural support system since 2002. In addition to DIS, area based agricultural supports involve diesel support, fertilizer support and land-based income supports to hazelnut producers since 2003, 2005 and 2010, respectively.

Although the share of area based agricultural supports and DIS payments were more than 80 percent in the total agricultural support in 2002, it was only 28 percent in 2011. Indeed the initial high share of area based supports arose through DIS payments. DIS payments alone captured about 80 percent share of total supports in 2002, 19 percent (or 1.14 billion TRL) in 2008 and nearly zero (only 318.000 TRL) in 2011. Apart from the ending of the ARIP, this change is explained in the OECD report such that "Agricultural Strategy Paper and the 2006 Agriculture Law appeared to re-couple part of the DIS payment, and support linked to production was defined as a key instrument of agricultural policy" (OECD, 2011, p.

47). Result of this a new strategy or a Law can also be considered in the increasing share of deficiency payments and livestock farming supports in total support payments, and also in the decreasing share of DIS. Indeed payments of these two support items has been increased more than five and eight fold since 2002.

Table 4.1: Support Payments of Turkey since 2002⁸ (Index, 2007=100)

SUBJECT OF SUPPORT	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Area-Based Agricultural Supports and DIS	116	134	131	115	118	100	72	37	59	60
Deficiency Payment Supports	19	22	26	63	79	100	84	96	91	104
Livestock Farming Supports	21	21	46	59	102	100	167	106	130	176
Services Related to the ARIP	0	16	8	3	7	100	125	33	0	0
Agricultural Insurance Services					7	100	158	162	202	559
Supports As Part of Compensatory Pay.	90	68	7	67	94	100	86	77	71	79
Other Agricultural Supports				1	44	100	93	94	108	118
Supports Aimed at Rural Development						100	137	308	355	311
TOTAL	62	71	73	80	93	100	96	70	83	94

Source: Republic of Turkey Ministry of Food, Agriculture and Livestock, 2012

Table 4.2: Share of Agricultural Support Payments by Subject in Total

SUBJECT OF SUPPORT	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Area-Based Agricultural Supports and DIS	.83	.84	.80	.64	.56	.44	.33	.24	.32	.28
Deficiency Payment Supports	.10	.10	.11	.25	.27	.32	.28	.44	.35	.35
Livestock Farming Supports	.04	.04	.08	.10	.14	.13	.23	.20	.20	.24
Services Related to the ARIP	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00
Agricultural Insurance Services	.00	.00	.00	.00	.00	.01	.01	.01	.01	.03
Supports As Part of Compensatory Pay.	.02	.01	.00	.01	.02	.02	.01	.02	.01	.01
Other Agricultural Supports	.00	.00	.00	.00	.01	.02	.02	.02	.02	.02
Supports Aimed at Rural Development						.01	.02	.05	.05	.04

Source: Republic of Turkey Ministry of Food, Agriculture and Livestock, 2012

⁸ Arranged in regard to the Agricultural Law.

Deficiency payments include the supports for seeded cotton, sunflower for oil, soy bean, canola, safflower, maize, olive oil, tea, wheat, unshelled rice, other cereals and legumes supports. But seeded cotton, sunflower for oil and wheat are the most supported ones. The share of seeded cotton, sunflower for oil supports in deficiency payments was 75 and 21 percent in 2002, but they decreased to 32 and 10 percent in 2011, respectively. The wheat supports began in 2004 with 22 percent share in deficiency payments and its share increased to 34 percent in 2011.

Components of livestock supports vary between 5 and 22 supported activities by years. Milk incentives and forage plant breeding supports are the most continues ones and they also have the highest shares in the livestock supports. In addition, ovine and bovine breeding supports are the other important supported activities that started to be applied in 2006 and 2009, respectively. As seen from Tables 2 and 3, the government also provides some other agricultural supports. But rest of them has very little shares in total agricultural support payments.

4.3. Trade Barriers in Agricultural Products and Export Promotions

Import Policies: Before 1980, agricultural imports were substantially restricted in Turkey. In addition, the SEEs imported the most of agricultural products that were permitted to enter Turkey. Although a more transparent import regime was put into force in 1980, a quota system continued until 1984 in the import of some sensitive products such as wheat, sugar etc. and imposition of several new taxes on agricultural imports started after the first half of 1980s. Indeed, these taxes -among which Housing Development Fund (TKF) was the most important one-, were used in the agricultural input (such as fertilizer) and export supports. At the beginning of 1990s, import restrictions on several agricultural products were ceased and import permits on sensitive products were annulled (Kiymaz, 2000). In the second half of the 1990s, Turkish agricultural trade policies have been arranged in accordance with international agreements, especially AOA. Third part of the AoA dealt with the market access commitments and it was not hard for Turkey to adapt these commitments. Because she had no non-tariff barriers in the import of agricultural products and so Turkey didn't make any tariffication. Indeed this situation was the result of highly liberalized foreign trade policies in

1980s and also an emergence of undefined new commodities with the implementation of harmonized system in the commodity classification in 1986. On the other hand, Turkey couldn't make any commitment about minimum and current access quotas since Turkey didn't make tariffication and so lost the opportunity of applying special protection measures. Turkey committed to reduce the tariff rates in each agricultural product by 10 percent and average tariff rate of all agricultural products by 24 percent in the 1994-2004 period. Since Turkey was qualified as a developing country, Turkey obtained the opportunity of using the base tariffication rate for the reduction commitments such as the highest tariffication rate would be used for primary and/or sensitive products (Turkey would determine the highest rate by its own) and the prevalent rate in 1986 would be used for other agricultural products (Cakmak and Akder, 1999).

For the year of 2013, applied import tariffs on agricultural products are issued in the Official Gazette in 31.12.2012. Initial twenty-four chapters of Customs Tariff Statistics Position list deal with agricultural products. Instead of explaining the tariffs on all agricultural products stated in these 24 chapters, we will consider only those in the interest of our analysis. Firstly, import of live cattle, sheep and goat is exposed to 135 percent of import tariff, while it is only 49 percent in live poultry imports. Meat imports are generally exposed to 225 percent import tariff, while it is generally 65 percent in poultry meat imports. However import tariffs on other edible meat and offal are above 100 percent. Almost all of the milk, cream, yoghurt, cheese and butter imports are also exposed to 180 percent import tariff. It is nearly 80 percent in poultry egg imports. When we consider the tariffs on tea, coffee and spices imports, high tariffs on tea imports (135 percent) remark our attention for this group of products. The same situation is also considered in the wheat flour imports. Although the import of milling products is exposed to 30-45 percent import tariff, tariff on wheat flour import is more than 100 percent. Import tariffs on cereals are generally about 100 percent with the exception of rice (varying at 30-45 percent). In the chapter about preparations of vegetables, fruit, nuts, etc., import tariffs on tomato preparations remark our attention with 135 percentage tariff rate. However, sugar and tobacco imports are exposed to 135 and 25 percentages tariff rates. In addition, most of animals and products such as breeding animals, seeds, eggs - which can be used in the production process but not as an intermediate product- are exposed to zero tariffs (Official Gazette, dated 31 December 2012). This is actually consistent with support policies and also shows the government's attempts on increase the agricultural production.

As seen above, high tariffs are generally applied for meat, dairy products, sugar and some of the cereals. In sum, all of these policies display that domestically supported products are also protected with border measures. However, Cakmak (2007) argues that these commodities are vital for the survival of the small farmers. Besides, food security - which policy makers consider as self-sufficiency in all commodities - can be regarded as another important factor in these high levels of protection.

Export Policies: Although the export of many agricultural products was subject to several restrictions such as license and registration requirements until 1980, after then, most of these restrictions were ceased with the new export regime. Besides, export of some agricultural products was taxed at varying rates, and both the number of taxed products and the tax rate were reduced over time (Kiyamaz, 2000). For example, export levies on angora wool, dried fruit and nuts were gradually abolished, and completely ceased in 1995 (Burrell and Kurzweil, 2007).

Export refund supports in agricultural products have been regulated within the framework of the WTO agreements since 1994⁹. Turkey was responsible to make reductions in export subsidies such that supported number of products should be reduced by 14 percent and an amount of support payment in budget expenses should be reduced by 24 percent in a ten-year period. Actually there was a circumvention in the countries' reduction commitments about export subsidies, which is called as front-loading mechanism. In this system, countries and also Turkey had the opportunity of making support reductions from the 1991-92 support levels if higher than the 1986-90 average. Thus, Turkey increased export subsidies from the 1986-90 levels and obtain the ability of beginning the reductions from a higher support level (Gorter et al., 2002). Besides, Turkey committed to not include any new agricultural product into the scope of export supports (Ay and Yapar, 2005). Although Turkey declared to the WTO to support 44 agricultural products by export refunds, the government generally has declared 16-18 items of agricultural products to support with varying support rates. The list

⁹ "Export Oriented Government Supports Decree" Number 94/6401, dated 27 December 1994.

of products subject to export refund supports has been issued in every year (DPT, 2004)¹⁰. Some of the supported products are fruits, vegetables, fruit juices, poultry meat, honey, processed fishes, macaroni and olive oil etc.

¹⁰ See Official Gazette Number 28256, dated 21 June 2013 for the last issued list.

5. LITERATURE REVIEW

5.1. Agricultural Subsidies/Distortions and Agricultural Trade

A large number of studies investigate both the determinants and the effects of agricultural trade. Most of them are especially focus on the distorted international market conditions, agricultural trade policies and protectionism/liberalization in addition to volatility of agricultural production and food prices.

The history of agricultural trade barriers or subsidies lies back to the 18th century with the British Corn Laws that aimed to protect British farmers from an import of foreign grains. Although it has a rich history, the evaluation of the agricultural policies' changing structure and the examination of their effects on the economic activities and units have attracted a great deal of attention in the literature since the second half of 20th century. Mccalla (1969) reviews the agricultural protectionism in the world for the period from 1850s to 1960s and explains why agriculture sectors have been protected during that period. He emphasizes the nationalistic policies and social objectives. He argues that problems with income distribution and the political power of interest groups that would be affected from the implementation of these policies are influential in the pattern of agricultural protectionism. He also claims that economically and politically dominant nations in international trade generally lead and shape the changes in international trade policies such as they were leaded by the UK in the seventeenth, eighteenth, and first half of the nineteenth centuries, and the US in the post-World War II period. Josling et al. (2010) evaluate the policies, market conditions, and other issues regarding the international agricultural trade and describe the most important factors that affect it over the past 100 years. Indeed, they explain how the pattern or the model of agricultural trade changed over years by focusing on commodity prices, exchange rates, market structure, agricultural policies that governments apply, and the role of international organizations in trade. Sumner et al. (2010) evaluate the causes and the consequences of agricultural policies, especially in the US, via analyzing the related economic researches published in the last 100 years. They draw attention to the changing interests of researchers from different eras and point out nine important implications from initial farm problems occurred in the transition of agricultural resources, employment and income, price supports

and its welfare effects, quota and price discrimination programs, price stabilization and increased stocks, subsidized crop insurance and agricultural R&D policies. They claim that modeling problems and immeasurable policy-relevant relationships still cause unresolved and conflicting empirical issues in agricultural economics.

Anderson (2010) explains how the structure of agricultural markets and trade are affected from the trade-related improvements of globalization process over 1960 - 2010 period and what are the key issues that are expected to affect those in the next forty years. He states that the decline in the trade costs mainly due to the improvements in information, communication and transportation technologies, the growth in productivity of farm production and the policies of national and/or international institutions that reduce the distortions on agricultural trade are the most important factors in the changing structure of agricultural trade since 1960s. Among those factors, the occurrence process of distortionary policies and the effects of them on agricultural prices, production, trade and in turn, poverty and/or inequality are highly emphasized. Aksoy and Ng (2010) evaluate the pattern of global agricultural trade during the past two decades among countries which can be classified regarding their level of developedness, income and also integrations or trade blocs among them. They argue that developing countries couldn't achieve an important increase in their export share in agriculture, although they could in manufacturing. Besides, they assert that most of the world agricultural trade takes place between industrial countries especially within trade blocs or integrations. Panagariya (2005) asserts that more liberal agricultural trade regimes in both developed and developing countries can be beneficial for each party. He claims that developed countries don't hurt the LDCs or developing countries due to the agricultural subsidies or protectionist border measures that they apply. Indeed, developing countries have some more crucial problems with their own policies, and anti-liberalization is not good for them in the long-run. By using a Computable General Equilibrium (CGE) model, and GTAP database, Tsakiridou et al. (2010) estimate the impacts of liberalization in agricultural trade between the EU and the MENA countries. They use three different scenarios for alternative trade reforms, and conclude that EU-Med trade agreements can be beneficial for both sides. By utilizing gravity equations and data for 18 food industry sectors, Olper and Raimondi (2009) assert that trade liberalization can generate an increase in food exports, particularly of developing countries. Kiymaz (2008) investigates the effects of world agricultural trade liberalization on prices and farm income in Turkey by using Agricultural Trade Policy Simulation Model (ATPSM) for the data of sugar, cereals and dairy products.

Although he claims that prices of the aforementioned products are reduced as a result of liberalization and so general welfare is raised, but some political measures should be taken in order to compensate the losses of the producers. Serrano and Pinilla (2010) empirically examine the factors that are thought to affect the growth of agricultural trade by utilizing a demand function for world exports of agricultural and food products over 1951 to 2000 period. They argue that increased world income is the most significant factor in the growth of agricultural trade, while changes in the price of agricultural products and the exchange rate volatility are also significant, but less important. They emphasize the difference between the impacts of variables, namely distance and the level of protectionism, on the trade patterns of agricultural and manufacturing products. And they argue that distance between countries and protection measures on agricultural commodities restrain the growth of agricultural trade. Liefert et al. (2012) criticize agricultural export bans in developing countries for special products namely; Cambodia (rice), Egypt (rice), India (wheat and rice, other than basmati), Indonesia (rice), Kazakhstan (sunflower seed and vegetable oils), Serbia (wheat), Ukraine (wheat), and Vietnam (rice). Although their analysis and assumptions have some complications, they show that alternative less-market distortive policy instruments would allow both domestic producers and consumers to gain more than compared to the situation under export bans.

Rosset (undated, draft paper) argues that current agricultural support programs in the EU, the US, and other major agro-exporting countries are damaging international trade, especially export of developing countries. Also he claims that current agreements on agricultural trade are not enough to eliminate the unbalanced results of global agricultural trade pattern and to protect developing countries from these results. So he suggests that visible and hidden export subsidies should be eliminated, all countries should be permitted to protect any key agricultural or food product, over-production of agricultural commodities should be got under control and the market concentration of agribusiness conglomerates which can affect prices and also use political power easily should be reduced. In conclusion, he proposes that subsidy is a not a bad thing, but the problem with this concept is about the kind of subsidies, the purposes and the beneficiaries of them. Indeed, the WTO is highly interested these issues through AoA (Agreement on Agriculture).

Mayrand et al. (2003) state that domestic support policies, export subsidies and liberalization of agricultural trade have been the most important issues in international trade

since agriculture is included in the multilateral negotiations conducted under the WTO or its Uruguay Round. They strongly emphasize that export subsidies along with the coupled payments to output or price can raise the production over the free market levels and with the other export supportive programs, this situation can generate a reduction in the commodity prices and distort the world market or trade flows. In addition to the impacts of support programs on production or trade, it is stated that these support programs can damage the environment or degrade the land through pesticides and fertilizers. Swain (2009) also evaluates the agricultural subsidies, regulations about them in the WTO agreements and effects of them regarding both developed and developing countries. As different from other studies, he argues that since most of the agreements on agriculture cannot meet the needs of developing countries about international agricultural trade, they should ally with themselves in order to protect their own rights in negotiation rounds and eliminate the negative effects of agricultural subsidies provided in the industrialized countries. Anderson (2010) evaluates the role of WTO in reducing agricultural trade distortions. He argues that although the WTO achieved some reductions in these distortions, many countries still apply protectionist agricultural policies and there remain many reform areas for the WTO regulations. Indeed TUSIAD (1999) discusses examples of how countries support agricultural exports without breaking the AoA rules. They assert that countries whose export subsidies get restricted, find the indirect ways of giving supports. For example, through adding some clauses in Inward Processing Regime, the EU starts to give export subsidies to the commodities made of cheese and but not to processed cheese.

Besides these general or trade/market related critics on agricultural subsidies, another important issue in the literature on agricultural subsidies is about their welfare effects. Bale and Lutz (1981) show that agricultural pricing policies/price distortions in developed and developing countries generate global welfare losses due to the misallocation of resources although these policies are significantly different in those countries. For the developing country cases where agricultural commodities generally taxed, it is stated that these distortions can cause underemployment in agriculture, more consumption of agricultural commodities by the nonagricultural population, and a reduction in the agricultural exports. Also the reverse of these situations are stated for the developed countries. Anderson et al. (2006b) claim that when all forms of support to farmers are taken into account, market access barriers constitute 75% of total global supports while domestic subsidies account for only 19%. In their back-of-the-envelope estimations, they claim that 86% of world total cost of

protection in agriculture arises from market price supports, 8% from export subsidies and 6% from domestic supports. So they argue that agricultural market access barriers are much more important than domestic subsidies in terms of global agricultural trade and welfare issues. Hoekman et al. (2002) make another important contribution to literature on the welfare effects of subsidies. They overemphasize that a fifty percent reduction in agricultural tariffs generates greater welfare gains than a fifty percent reduction in agricultural subsidies. They also argue that although a reduction in support can cause a welfare loss in developing countries and a small welfare gain in the LDCs; a reduction in tariffs can have a positive impact on welfare in both groups of countries. However, they claim that tariffs can affect the world prices more than subsidies can. Tokarick (2003 and 2005) argue that removing agricultural supports in OECD countries can generate welfare gains for both themselves and developing countries but can hurt the net food-importing countries due to the increased food prices. He also claims that agricultural support tools such as import tariffs, export, production, and input subsidies mostly harm the countries that apply them. He concludes that although the general effect on all countries is positive, it varies by both the model used and the liberalization level of countries. Koo and Kennedy (2006) assert that agricultural domestic supports and export subsidies have negative effects on social welfare in both support providing and other exporting countries, but have positive effects on social welfare in importing countries. They argue that although these two types of support programs distort agricultural trade flows, export subsidies are found to be more distortive.

Besides the welfare effects of agricultural subsidies, their effects on output, employment, export, consumption, income distribution and also inflation are analyzed. Spittler et al. (2011) claim that agricultural support policies have been generally directed not to all agricultural products but to some specific ones such as wheat, corn and soybeans in the US. They are interested especially in the impacts of corn support programs. They state that corn subsidies not only increase the production and push the prices down but also change the production decisions in the direction of using mainly corn and corn derivatives as intermediate goods or ingredients due to their cost benefit. Hertel (1989a) argues that different types of support instruments have different effects on output, export, employment and factor returns across countries, although these different instruments have same costs or generate equal Producer Support Estimate value. On the other hand, he emphasizes that the structure of aggregate technology and the factor mobility in agriculture have significant roles in assessing the effects of changing support policies. Koo et al. (1994) investigate factors

affecting meat trade flows by utilizing augmented gravity type trade model. They concentrate especially on the effects of meat export promotion and import restriction policies. They claim that producer subsidies have no impact on trade flows, and importer countries' policies are more influential than that of exporter countries on international meat trade. Bakay and Huang (2010) powerfully conclude that there is a positive relationship between agricultural subsidies and exports from the US to Mexico and Canada by using the data about six agricultural products for 1996 to 2005 period. Torayeh (2011), as a result of his cointegration and ECM analysis that depends on the data for nineteen developing countries over the period of 1995 to 2005, insistently claims that small (f.e.1%) reductions in the US and the EU agricultural subsidies can generate only fractional increases in developing countries' agricultural exports. He asserts that it could be beneficial for developing countries if the US and the EU make big reductions on the overall trade distorting agricultural subsidies by more than 75-80 percent, respectively. Whitaker (2009) examines the effects of government support policies on consumption in the US by using dynamic pseudo-panel method for farm-level data covering 1998-2004 period. He concludes that regular support payments that are decoupled from production and so, not volatile as much as subsidies linked to the market conditions have a greater effect on farm household consumption than more volatile kinds of subsidies. Abay et al. (2001) investigate the inflationary effects of agricultural subsidies in Turkey. They conclude that the most important factor that affects the inflation is the self-feeding inflationary expectations.

Indeed, the concept of direct support payments to farmers or decoupled payments has received a great deal of attention in recent literature. However, we will consider here studies that investigate relationships between direct support payments and production or trade and also studies that investigate distortive effects of DISs. Dewbre et al. (2001) present the importance of the direct payments' effects on distortions to trade and income transfer efficiency by comparing them with market price supports. They use different types of direct payments such as payments to output, input use and land area. They argue that mostly distortive support policies in production or trade are also the least efficient ones in providing income benefits and vice versa. However, they stress that payments based on area are both most efficient and least distortive ones relative to the others studied, while the payments based on input use are most distortive and least efficient. Also they conclude that market price supports are not as distortive and inefficient as regarded in the literature. However, Weber and Key (2011) emphasize that decoupled payments to farmers have little effect on

the production by considering the provisions in the US 2002 Farm Act and therefore they claim that these payments don't cause excess production in agriculture and distortions in world markets. Dogruel et al. (2003) assert that although replacing some special agricultural support instrument with DISs can generate modest welfare gains, it can also generate deflationary effects on the rural economy and GDP in Turkey. Nonetheless, Bayaner and Bor (2006) and Turkmen (2010) find that this support system is not as efficient as expected due to the structural and institutional failures in Turkey.

Furthermore, some studies evaluate the agricultural subsidies from the perspective of beneficiaries and politicians. Through using the PSE as a measure of support in their model, Park and Jensen (2007) empirically investigate the relationship between electoral systems and agricultural support, and they find out that if the targeted part of constituencies is relatively small, the level of agricultural support will be high. Civan (2010) explicitly focuses on the agricultural support or protection systems through the beneficiaries' perspective by utilizing data about 12 subsectors of Turkish agriculture. He claims that there is a non-linear relationship between the protection level and the sector size. He claims that after a sector has reached an optimum level, the support or protection level could be reduced since the power of the sector could decrease due to the lack of coordination, freeloading, etc. He also asserts that as long as a country becomes wealthier and election time gets closer, agricultural sector becomes more protected.

By utilizing data about corn producers, Rejesus et al. (2009) investigate factors, especially usage of crop insurance programs that influence producers' attitudes toward government support programs. They find that two groups of producers give more importance to government support programs. While the first group is comprised of producers with lower age, larger farmland, higher business risk, no farm animal production and no off-farm income, the second group is comprised of producers using crop insurance products. Therefore, the authors suggest that the crop insurance programs and the direct government support programs are seen as complementary tools rather than substituting each other's.

The literature about the agricultural support policies and the changing structure of them from past to present in Turkey is very rich. In recent years, especially after 2000s, studies generally have focused on the effects of the transformation in support policies, with great attention paid to direct income supports, due to the agreements signed with international institutions, structural adjustment programs and ongoing negotiations with the EU on

agricultural issues. After the evaluation of agricultural policies in 1980s, Uysal (1993) claims that Turkish agricultural sector is not able to assort with free market conditions in those years and government is unsuccessful in the evaluation of the structure of Turkish agricultural sector while designing these liberal policies. But the more importantly, he emphasizes that the Turkish agricultural sector needs structural arrangement rather than some financial supports. Yavuz (2000) evaluates the agricultural policies in Turkey from the late Ottoman periods to the 2000s. With emphasizing on the instability of the support policies in Turkey, he recognizes that farmers have not been supported in an efficient and adequate way, which in turn has negatively affected the general success of the policies and development of agricultural sector. Yeni and Dolekoglu (2003) present a highly detailed report on the agricultural policies, support instruments, and all the current and changing structural situation of agricultural sector with special attention given to general economic conditions in Turkey. OECD (2011) highly criticizes agricultural policies and support instruments applied in Turkey. Some of them are found financially unsustainable while some of them ambitious. But more importantly, it states that implementation of the reforms after 2000 encountered difficulties and their focuses are not sufficiently clear. However, it suggests that enhancing R&D activities and improving human capital can be helpful for the development of Turkish agricultural sector. Kasnakoglu and Cakmak (2000) and Cakmak (2003) analyze the instruments of agricultural supports in Turkey and compare them with other countries regarding the PSE and sub-parameters of it. These studies state that wealthy farmers with big farmlands benefit from agricultural supports more than poor farmers and also most of the subsidies classified as consumer transfers come from low income group rather than higher ones. Furthermore, they indicate that supports tend to rise as the election time gets close, and so support policies are seen as a distribution policy or an instrument used with the purpose of increasing political power. Burrell and Kurzweil (2007) emphasize that there are important institutional and structural disorders in the agricultural sector in Turkey and note that it is impossible for this sector to improve without government intervention. However, they assert that due to the institutional failures, an important portion of the subsidies are wasted, and little benefit has reached to poor farmers. On the other hand, they remark that agricultural support programs in Turkey have trade distortive effects. They claim that distortive agricultural policies are not the main cause of unimproved situation of agriculture sector, but they still propose that elimination of these policies is necessary for achieving macroeconomic stabilization and providing sectoral policy liberalization.

Empirical studies on agricultural policies in Turkey are highly concentrated on the evaluation of the both contents/clauses and the effects of the ARIP, AoA, and negotiations with EU (i.e. Cakmak and Akder, 1999; TUSIAD, 1999, and 2005; Dogan, 2002; Cakmak, 2004 and 2007; and Ay and Sapar, 2005). Cakmak (2007) evaluates the effects of changing structure of Turkish agricultural policies through mostly focusing on the effects of trade liberalization in the light of recent agricultural agreements and reforms. He asserts that if the adjustment ability of the agricultural sector is not improved through agricultural reforms, even small decreases in the protection levels can easily damage the whole sector. TUSIAD (2005) reviews the agricultural policies in Turkey by considering the developments in the WTO agreements and the EU negotiation process. It gives the most of attention to the institutional failures in Turkey, and claims that before changing or applying new policies, institutional structure should be changed in order to achieve the goals of policies. Ay and Yapar (2005) evaluate the effects of Agreement on Agriculture (WTO) and the negotiations with the EU on Turkish agricultural policies and trade. They state that it is not hard for Turkey to apply Agreement on Agriculture rules about liberalization because Turkey has moved forward on the liberalization process since the 1980s. But they note that it is hard to adapt the Common Agricultural Policy (CAP) into our agricultural policies due to the structural and especially financial differences.

Saracoglu and Bulut (2004) argue that although the WTO rules on agricultural subsidies and trade liberalization and the policies such as applied under the CAP are appropriate for developed and agriculturally self-sufficient countries such as the US and the EU, they are not appropriate for Turkey. Tekinel and Deniz (2001) is another important study that forwards some suggestions for the success of agricultural policies in Turkey. They argue that subsidies are not distributed efficiently enough due to the structural coordination failures and political problems, which brings a burden to government budget more than the amount of subsidy payments. They conclude that, the CAP system is appropriate for the improvement of Turkish agriculture, so that Turkish agricultural policies should be adapted to this system. Susam and Bakkal (2008) analyze the effects of the transformation process of Turkish agricultural policies on the government budget and overall economy regarding the GATT-Uruguay Round, the CAP of EU and structural adjustment programs of IMF and the World Bank. They claim that since there are structural differences between Turkish and the EU agricultural systems, not only the share of support payments in Turkish government budget have been decreasing but also the effectiveness of them due to this transformation. They also

emphasize that the amount of support payments in the EU is much higher than those provided in our country. Kandemir (2011) evaluates the harmonization process of Turkish agricultural policies with that of the EU, and asserts that total amount of support payments in Turkey is less than what is stated in Agricultural Law No. 5488. He concludes that direct income supports leads to a decrease in the production of various agricultural products and makes the farmers lazy. He claims that this system negatively effects both the agricultural development and the balance of agricultural trade. He concludes that although our country was the net exporter of some agricultural products in past, now it is a net importer of many products as a result of agricultural policies. Oren and Bahadır (2005) evaluate the agricultural policies in Turkey and compare them with those implemented in OECD countries at the agricultural subsector level, namely livestock, by using the PSE database. They claim that although the total agricultural support as share of GDP in our country is higher than the OECD average, the amount of subsidies per hectare is lower. They also argue that the share of livestock supports in total agricultural supports is low compared to the crop oriented supports, besides most of the livestock subsidies are provided through the border measurements or protection policies which create a tax-like effect on consumers due to high domestic prices.

Erdal and Erdal (2008) examine the relationship between premium payments and the production of cotton, sun flower, soybean, canola, aspire and maize in Turkey for the period of 1980-2006 by using the Granger causality test. They report that there is not any relationship between production areas and premium payments for cotton, sunflower and soybean products. However, there is a unidirectional relation between canola production area and premium payment, and a bidirectional relation between those of maize. They also note that there is a causality relationship between production areas and product prices of sun flower, soybean, canola and aspire, indicating that commodity prices affect the production decision of farmers.

Since Turkey recently launched several structural reforms in agricultural policies addressing the replacement of producer price subsidies and with direct income transfers, the studies about the Turkish agricultural system or subsidies tend to concern with macroeconomic effects of these new policies and especially direct income supports. Yılmaz et al. (2008) investigate how farmers benefit from direct income supports and which factors influence the farmers' utilization from this support through a case study for Isparta province. They state that farmers with big farmland utilize from DIS more than small farmland owners

due to the failures occurred in the application process of DIS, and so they claim that this support distorts income distribution in agriculture sector further. However, they find that the farmers' age, membership to agricultural cooperatives, gross value of yields and some specifications of farmland are related with the farmers' utilization from this support.

Aslan and Boz (2005) investigate whether farmers spend DIS payments to agricultural activities and factors that influence their use for agricultural purposes by utilizing a face to face survey with 112 farmers in Pazarcık, a district of Kahramanmaraş. They find that 67 percent of received DIS payments are spent for agricultural purposes, while 33 percent of them are spent on non-farm activities. They conclude that the socio-economic characteristics of farmers and the communication behaviors or channels used by farmers affect their decisions about spending this payments for agricultural purposes. Moreover, in a case study for Tokat, one of the Central Anatolian province of Turkey, Bor (2005) argues that 77 percent of DIS payments spent for agricultural input purchases. Therefore, the author deduces that the DIS is actually as a substitute for input subsidies.

The structure and nature of agricultural subsidies and their effects attracted a great attention not only from scholars but also international organizations such as the WTO, the OECD and the World Bank. Because agricultural subsidies and protectionist border measures cause distortions in agricultural trade, and in turn world welfare, the WTO develops the Aggregate Measurement of Support (AMS) in order to use it as a base for disciplining and monitoring the domestic supports in the negotiations. Moreover, the OECD develops PSE (Producer Support Estimate) database in order to measure the efforts of governments to support agricultural sector but not the effects of subsidies. Similarly, the WB has recently conducted a project to calculate distortions in agricultural sectors through a measure so called, Nominal Rates of Assistance (NRA). Although there are some differences between NRA and PSE, they are the measures used in the literature to evaluate the effects of agricultural distortions. Our study employs both PSE and NRA in order to measure the effects of agricultural subsidies/distortions on the exports of Turkish agricultural commodities.

5.2. Exchange Rates and Agricultural Trade

Impacts of the exchange rate level and exchange rate volatility or variability especially on exports, bilateral trade flows and volume of trade have been empirically and theoretically discussed in the literature. The effect of exchange rate on agricultural trade first is considered by Edward Schuh in 1974 and then investigated in many empirical studies (i.e. Chambers and Just (1979), Orden 2002). Kristinek and Anderson (2002) review the literature on the role of exchange rates on agricultural trade. They claim that most of empirical studies are well grounded on the basic economic theory. They argue that there is no consensus on the best method to measure the impact of exchange rates on trade. They also point out that the more important issues are; the size of the exchange rate's effects on agricultural pricing and in turn, trade and the existence of other variables that influence the agricultural trade in a way such as an exchange rate does.

Kargbo (2006) finds a negative relationship between the exchange rate volatility and South Africa's agricultural trade by using VEC model with the data over the 1960-2004 period. He emphasizes on the significant impacts of price, domestic agricultural production capacity and real income of partner countries on the agricultural trade of South Africa. Baek and Koo (2009) find that bilateral exchange rates have significant roles on the agricultural bilateral trade (export/import) between the US and its ten major trading partners over 1975-2004 period. They emphasize that in the long run while bilateral exchange rates have negative impacts on the US agricultural exports in all cases, they have a positive impact on imports in only one case.

Conclusions based on disaggregated data at sectoral or commodity levels can differ from the results of aggregated data. Bahmani-Oskooee and Hegerty (2008) examine the effects of the real exchange rate volatility on the trade between Mexico and the U.S by using annual export and import data for 102 industries from 1962 to 2004 period. They claim that although the exchange rate volatility has both positive and negative short-run impacts on most of the sectors; in the long run, most industries are not affected from the increased exchange rate volatility and however the number of negatively affected industries is more than the positively affected ones. They also emphasize that the export or trade of agricultural goods and textile products are clearly reduced due to the increased volatility.

Cho et al. (2002) examine whether the impact of exchange rate volatility is similar for different sectors by using a gravity model and separating the aggregate data into agriculture, machinery, chemicals, and other manufacturing based on bilateral trade flows between ten developed countries from 1974 to 1995. They find that the effect of exchange rate uncertainty on trade is significantly negative and the most adversely affected sector is the agriculture among others. Kandilov (2008) analyzes the relationship between exchange rate volatility and agricultural exports by extending the study of Cho, Sheldon and McCorriston (2002) in a way to include developed, emerging and developing countries and also agricultural export subsidies as an explanatory variable in the gravity model. According to Kandilov, agricultural trade of developing countries is affected more by the volatility of exchange rates compared with that of developed countries and agricultural export subsidies which are correlated with volatility reduce these effects by half. Awokuse and Yuan (2006) claim that using aggregated data in examining the impact of exchange rate volatility on trade could be the very reason of the inconclusive empirical evidence in the literature since the elasticity of price, income and exchange rate are different among sectors or commodities. After investigating the data for 49 poultry importers from the US over two sub periods of 1976-1985 and 1986-2000 by using a fixed-effect estimator, they find out that there is a positive relationship between exchange rate volatility and the US poultry exports. Since they use three different measurements of exchange rate risk in their study, they emphasize that conclusions are sensitive to the choice of exchange rate volatility measurements. Karemera et al. (2011) and Sheldon et al. (2013) also undertake commodity (fruit and vegetable) specific analyses about the impacts of exchange rate volatility on trade flows. Karemera et al. (2011) investigate the trade data among OECD countries for 1996-2002 period. According to the authors, although there is a negative relationship between exchange rate volatility and trade for most of the commodities, the relationship is positive for some specific ones in both short and long run. Sheldon et al. (2013) use a gravity type trade model for the US bilateral fresh fruit and fresh vegetable trade data over the periods of 1976-1999 and 1976-2006, respectively. They argue that while there is a negative relationship between medium-to-long run exchange rate uncertainty with the US fresh fruit bilateral trade, the same relationship is seen only on the export model for the fresh vegetables. Giorgioni and Thompson (2002) argue that sources of uncertainty other than exchange rate could be an important determinant of the export decision. Based on the data of the US exports of wheat for the 1980-1996 period, the authors find that if taken into the model, an export demand and its volatility could be more significant than exchange rate volatility in determining the level of exports.

Nonetheless, there is a considerable amount of studies describing the effects of both exchange rate and its volatility on trade flows of Turkey. Gul and Ekinçi (2006) argue that there isn't any causality from real exchange rate to neither import nor export of Turkey, but a unidirectional causality from export and import to the exchange rate. While Ozturk and Acaravcı (2002) find a negative relationship between the exchange rate volatility and the real export flows of Turkey, Solakoglu et al. (2008) claim that the exchange rate volatility has no significant effect on the real exports of Turkey.

Erdem et al. (2010) argue that agricultural trade is more related to exchange rate volatility than to the level of exchange rate and more importantly they emphasize that the effects of exchange rate and its volatility can be different for different agricultural commodities. However, Erdal et al. (2012) find a significant positive unidirectional relationship between real effective exchange rate volatility and agricultural exports of Turkey and a negative relationship for imports over the 1995-2007 period by using the Granger causality and Johansen cointegration tests.

Yanikkaya (2001) undertakes a commodity-specific analysis by using the export data of citrus fruit, nuts, tobacco and cotton from Turkey to twenty five countries over 1971-1994 period and claims that exchange rate plays an important role in determining the export of tobacco and cotton but not for other commodities. Although he groups the countries as European Community, European Free Trade Area, North America and Middle East in order to examine regional differences, he reports that the results don't vary across regions. In another commodity-specific study that utilize an error correction model based on the quarterly data for dried figs, grapes and tobacco over the 1982-1998 period, Buguk et al. (2003) find that there is no significant relationship between exchange rate or its volatility and the exports of aforesaid commodities in the case of Turkey. Yanikkaya et al. (2013) examine the effect of real exchange rate and its volatility on agricultural export flows of Turkey at the commodity level by utilizing gravity model and panel data for 46 countries over the period of 1971-2010. They argue that although the real exchange rate has an important effect on Turkish agricultural commodity exports, exchange rate volatility hasn't. They find that the effects of real exchange rate and its volatility on trade differ among the agricultural commodities.

6. METHODOLOGY

6.1. The Gravity Model

In our study, frequently used gravity model is applied in order to investigate the determinants of export flows of eighteen Turkish agricultural commodities. Although the origin of gravity model in international trade flows goes back to Tinbergen (1962), it attracts a great deal of attention in the recent literature. Indeed this model works in a way similar with Newton's universal gravity equation. In its basic form, gravity model explains bilateral trade flows between two countries as being directly proportional to both countries' economic sizes and inversely proportional to distance between them. Tinbergen (1962) uses countries' GNP (Gross National Product) as an indicator of economic size and he states that exporter's GNP affects the supply side while that of importer determines the demand for exportable goods. It is claimed that income or GDP is the most important determinant of agricultural trade flows. However, any growth in GDP can affect the agricultural trade less, since most of agricultural products have low income elasticities (Coyle et al., 1998, Cranfield et al., 2003: cf. Serrano and Pinilla, 2010). Linnemann (1966) supplements the trading countries' population in gravity model (Ilijani, 2006). In Atici and Guloglu (2008), they distinguish the trade effects of GDP and population such that while GDP affects economic capacity of trade, population impacts market size. Also they claim that larger population in home country can lead less export due to the domestic consumption. Geographical distance between countries is usually seen as an impediment to international trade because of transportation costs. In brief, the gravity type trade model can basically be written as;

$$EXP_{ijt} = \beta_0 GDP_{it}^{\beta_1} POP_{it}^{\beta_2} GDP_{jt}^{\beta_3} POP_{jt}^{\beta_4} DIST_{ij}^{\beta_5} \quad (1)$$

$$i = Turkey^{11} \quad j = 1, 2 \dots 72 \quad \text{and} \quad t = 1962, 1963 \dots 2010.$$

¹¹ As seen from the equation, subscript "i" identifies the exporter country, Turkey. Because there is only one exporter country, we drop it in the next equations. In addition, since there is a high correlation (almost 1) between the countries' GDP and population series, we take only the GDP series into our model. If we use only population variable, our results do not change in any significant way.

EXP_{ij} : exports of country i to country j,

GDP_i / GDP_j : GDP of country i and country j,

POP_i / POP_j : population of country i and country j,

$DIST_{ij}$: distance between country i and country j.

Nevertheless, Tinbergen (1962) and other early studies regarding gravity model (e.g. Linneman (1966)) are criticized as they weren't based on a theoretical foundation. But Anderson (1979), Bergstrand (1985 and 1989), Deardorff (1998), Feenstra (2002) and Anderson and van Wincoop (2003) account for the theoretical background of this model. Anderson (1979) utilizes the properties of trade share expenditure system and he bases his model on constant elasticity of substitution (CES) preferences (=hypothesis of identical homothetic preferences across countries). He also assumes that products were differentiated by country of origin. He states that, for any country, the share of budget devoted to trade depends on the country's income and population. Although he criticizes the intension of policy-related variables into this model at the beginning of the study, he concludes that the use of gravity model is at the widest limited to countries where the preferences for traded-goods, the structure of trade tax and transport cost are similar. Bergstrand (1985) approaches the foundations of gravity model at microeconomic level and claims that since aggregated trade flows are differentiated by place of origin, a typical gravity equation is likely to be misspecified due to omitted price variables. In this regard, he adds both price and exchange rate variables in gravity model. There is a rich literature using exchange rate as an explanatory variable in their gravity models (Eger (2002), Martinez-Zarzoso and Nowak-Lehmann (2003), Serrano and Pinilla (2009), Jafari et al. (2011), Yanikkaya et al. (2013)). In addition to exchange rate, most of studies also investigate whether exchange rate volatility has an important effect on trade flows. Serrano and Pinilla (2010) emphasize that stability of exchange rate is an important factor in the growth of international trade and argue that instability of exchange rate can reduce the international trade flows, especially in agricultural products.

Bergstrand (1989) extends the microeconomic foundations of gravity model stated in Bergstrand (1985) through including factor-endowment differences and non-homothetic preferences. Deardorff (1998) derives the gravity equation -regarding two models

with/without trade barriers- from the Heckscher-Ohlin framework and also argues that gravity equation can easily be justified from standard trade theories. Anderson and van Wincoop (2003) emphasize the effects of national borders or border-related variables on international trade flows with theoretical foundations. They criticize the use of remoteness variable¹² in gravity models as not capturing any of trade barriers and refer to average trade barriers through an index, namely multilateral resistance. In this regard, it is seen that not only explanatory variables in gravity model but also dummies are grounded in theoretical backgrounds. In our gravity model, the use of NRA and PSE can be considered from both political and border related perspectives.

There are plenty of extra and/or dummy variables in the literature that thought to be determining trade flows between countries. For example, share of agriculture in GDP and rural population density are used as explanatory variables in Paiva (2008) and Hai-xia and Hai-ying (2008) that analyze aggregated agricultural bilateral trade using gravity model. On the other hand, dummy variables are generally related to the political, historical and geographic factors such as whether trading countries speak same languages, share a common border, had a colonial tie in their history, have a free/regional trade agreement and are landlocked, etc.

Regarding our analysis, after integrating other variables, the augmented gravity model forms as follows;

$$EXP_j = \beta_0 GDP_t^{\beta_1} GDP_{jt}^{\beta_2} DIST_{jt}^{\beta_3} RER_{jt}^{\beta_4} VOL_{jt}^{\beta_5} SUP_t^{\beta_6} D_{jt,k}^{\beta_7} \varepsilon_{jt} \quad (2)$$

RER_j : real exchange rate,

VOL_j : exchange rate volatility,

SUP_t : agricultural supports, proxied by Nominal Rate of Assistance or Producer Support Estimate

¹² Remoteness is simply GDP-weighted average distance of home country to all of its trading partners or world.

D_j^k : denotes a set of dummy variables.

In our empirical investigation, the following dummies are used; *contiguity*: 1 for contiguous countries and 0 for others, *gatt* : 1 if partner country is GATT/WTO member and 0 for others and *rta/fta*: 1 if the the countries are part of a regional/free trade agreement with Turkey in force and 0 for others. ε_{jt} is error term.

6.2. Data

In this study, exports of eighteen Turkish agricultural commodities to 72 countries¹³ are empirically investigated by using yearly data for 1962-2010 period. The commodities are beef and veal, sheep meat, poultry meat, milk, egg, wheat, barley, rice, maize, potato, tomato, apple, cotton, refined sugar, sunflower seed oil, hazelnut, grape-raisin and unmanufactured tobacco. Bilateral trade data at commodity level are obtained from UN COMTRADE database regarding 3, 4 and 5 digit Standard International Trade Classification (SITC) Revision 1. Although number of importer countries and available observations vary across commodities, bilateral export data covers 70-98 percent of aforementioned commodities' exports in last twenty years.

Data about GDPs (constant in 2000 US dollar values) and consumer price indices are taken from World Bank *World Development Indicator Database*. Monthly and yearly average exchange rates against US dollar are retrieved from IMF *International Financial Statistics Database*. Also, in order to convert the Euro values of EU member countries into their own currencies, Euro conversion rates are collected from Central Bank of the Republic of Turkey. The list of GATT member countries are obtained from WTO and FTAs of Turkey are obtained from Ministry of Economy. As mentioned earlier, data on NRA and PSE are collected from the World Bank and OECD databases, respectively. Bilateral distance between

¹³ See, the list of countries in the Appendix Table A.5.

two capital cities of the trading partners is measured by using great circle formula and utilizing CEPII database for longitudes and latitudes of the capital city of countries.^{14 15}

6.3. Estimation Method

Nominal data about bilateral exports of commodities in US dollars are converted into real values by deflating them with US CPI (2005=100). In order to calculate bilateral real exchange rates, yearly nominal data on exchange rates are converted as following;

$$\text{Bilateral Real Exchange Rate: } \left(\frac{\text{LCU per US dollar}}{\text{TL per US dollar}} \right) * \left(\frac{\text{CPI of Turkey}}{\text{CPI of partner country}} \right)$$

Although there are different methods in the literature for measuring exchange rate volatility, in this study the proxy for exchange rate volatility is obtained by utilizing commonly used standard deviation of the first difference of logarithm of the monthly exchange rate over a one-year period for short-run and also it is measured over a five-year period for long run (Byrne et al. (2008) and Yanikkaya et al. 2013). The equations for the measurement of exchange rate volatilities are;

$$VOL_{ijt}^{short} = st.dev[\ln RER_{ijt,m} - \ln RER_{ijt,m-1}], m=1,2,\dots,12 \quad (3)$$

$$VOL_{ijt}^{long} = st.dev[\ln RER_{ijt,m,k} - \ln RER_{ijt,m-1,k}], \quad (4)$$

$$m = 1,2,\dots,12; k = t-1, t-2,\dots,t-5.$$

In the long run analyses, all variables are used in non-overlapping five-year averages.

Log linearization of equations has a long history in empirical studies. Although log-linearized equations in gravity type trade models are mostly estimated with ordinary least

¹⁴ For more information, see http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=6

¹⁵ Descriptive statistics on all variables can be found in the Appendix Table A.6.

squares (OLS) method, it also differs across studies¹⁶. Since recently however, the usage of log-linearized equations especially with OLS in gravity models has been highly criticized. The most important study about this issue is conducted by Santos Silva and Tenreyro (2006). They begin their argument with Jensen's inequality which emphasizes the differences between expected value of the logarithm of a random variable and the logarithm of its expected value. Then they argue that if there is heteroscedasticity in residuals, to interpret the parameters of log-linearized models estimated through OLS as elasticities can be specious. So, they assert that multiplicative form estimation technique is appropriate for constant elasticity models such as gravity, and they also suggest to using Poisson Pseudo-Maximum-Likelihood (PPML) that is presented by Gourieroux et al. (1984). They consider the appropriateness of PPML from two aspects. It provides consistent estimates under the presence of both heteroscedasticity and excessive zero values in dependent variable, say trade data in gravity models, without any necessity to transform related variable. However, they find that PPML is more successful and consistent than OLS via their Monte Carlo simulation results.

Before initializing the estimation process, stationarity of variables are controlled through utilizing LLC (Levin, Lin, Chu), IPS (Im, Pesaran, Shin) and Fisher Augmented Dickey Fuller (Maddala & Wu and Choi) panel unit root tests. All variables are found stationary at their levels. In addition, we controlled whether there is heteroscedasticity in the residuals since our panel data covers agricultural commodity exports of Turkey to 72 countries. Panel level heteroscedasticity test is conducted with log-linearized model by using iterated generalized least square (GLS) with heteroscedasticity and GLS without heteroscedasticity. Then the log-likelihoods of the models estimated with and without heteroscedasticity are compared by employing a likelihood ratio (LR) test. Our results show that while twelve of commodities suffer from heteroscedasticity, eight of them don't. Since PPML considers heteroscedasticity as stated in Santos Silva and Tenreyro (2006), there is no need to correct the heteroscedasticity of residuals.

¹⁶ For more detail see, Kepaptsoglou et al. (2010) that reviews literature about gravity model specifications and estimation techniques and also Herrera (2010) that reviews and compares estimation methods for gravity models of bilateral trade flows.

7. EMPIRICAL RESULTS

Our dataset consists of exports of various Turkish agricultural commodities to 72 developed and developing countries. First, our study investigates the determinants of commodity exports for the full sample. Then, we divide the recipient countries into sub-groupings to examine whether the effects of our variables of interest in our models differs by the region and/or the stage of development of countries¹⁷. These regions are namely Middle East and North Africa (MENA), Commonwealth of Independent States (CIS), Europe, Asia, America and Sub-Saharan Africa.

Table 7.1: Distribution of Turkish Agricultural Commodity Exports Based on the Regional Location and Development Level of Countries (%)

	MENA	CIS	Europe	Asia	America	Sub-Saharan Africa	Developed Countries	Developing Countries
Beef	69.58	11.90	15.86	0.00	2.67	0.00	39.55	60.45
Sheep Meat	94.83	0.28	4.89	0.01	0.00	0.00	46.69	53.31
Poultry Meat	35.36	24.38	18.28	21.64	0.00	0.33	26.31	73.69
Milk	58.13	12.09	16.01	10.87	2.90	0.00	49.16	50.84
Egg	66.89	30.35	2.73	0.02	0.01	0.00	19.74	80.26
Wheat	53.62	11.59	27.56	7.10	0.15	0.00	32.28	67.72
Rice	37.64	13.04	45.57	0.09	3.66	0.00	51.07	48.93
Barley	76.10	2.86	21.04	0.00	0.00	0.00	59.24	40.76
Maize	22.47	3.59	67.86	1.74	4.33	0.00	83.78	16.22
Potato	74.75	17.50	7.56	0.00	0.18	0.00	24.03	75.97
Tomato	56.97	29.96	13.08	0.00	0.00	0.00	49.89	50.11
Cotton	3.78	10.80	74.49	8.44	2.49	0.00	85.27	14.73
Refined Sugar	56.44	23.32	18.36	0.30	1.58	0.00	27.73	72.27
Apple	90.21	2.39	7.41	0.00	0.00	0.00	39.31	60.69
Sunflower Seed Oil	72.51	12.33	12.93	2.03	0.18	0.02	21.31	78.69

¹⁷ We have also tried to divide our sample commodities into sub-groups such as exportable and importable. However, we have not seen any consistent pattern based on the commodities' trading status.

Hazelnut	6.96	4.29	75.82	1.56	11.37	0.00	93.29	6.71
Grape Raisin	3.90	5.65	82.66	4.19	3.60	0.00	91.76	8.24
Tobacco Unman.	1.84	7.01	25.27	9.78	56.10	0.00	92.38	7.62

Source: Authors' own calculation with the data taken from the UNCOMTRADE database

Table 7.1 reports how the exports of commodities vary across regions over the 1962-2010 period. MENA, CIS and Europe regions are relatively the most important destinations for the Turkish agricultural exports. America (except for the export of unmanufactured tobacco) and Asia have very small shares. Finally, Sub-Saharan Africa has almost zero percent of share in all commodities' exports from Turkey.

Table 7.1 also shows that exports of barley, maize, cotton, hazelnut, grape-raisin and unmanufactured tobacco generally go to developed countries while exports of the other commodities generally go to developing countries.

7.1. Regression Results

Table 7.2 shows the PPML estimates for full sample. Before discussing the coefficients on the variables of interest, we briefly present our estimations on the control variables. The estimated coefficient on the partners' GDP indicates that larger economies are more likely to import Turkish agricultural commodities due to their larger market sizes. Actually this situation is correct in the increased exports of half of the analyzed commodities. However, it has not any significant effect on the exports of remained commodities with the exception of wheat (with negative sign). With regard to the unexpected results, the insignificant coefficients of importing countries' GDP could be explained due to the fact that most agricultural products have low income elasticities (Coyle et al., 1998, Cranfield et al., 2003: cf. Serrano and Pinilla, 2010). The size of Turkish GDP has a negative impact on the exports of sheep meat, cotton and unmanufactured tobacco; and has a positive impact on the exports of poultry meat, milk, egg, wheat, barley, maize and tomato. While positive coefficients may be regarded as the increased export potential due to the higher GDP, the negative coefficients on Turkish GDP could indicate that domestic production is aimed to meet domestic demand in those commodities.

The estimated coefficients on the GATT membership are generally negative and significant. Kim (2010) states that in order to accurately appreciate the importance of any trade organization (GATT, in our case) in promoting trade, commodities under the influence of that organization should be considered. Given this, the contradictory coefficients should be understandable because agricultural commodities are not included in the GATT system until the year of 1995. The estimated effects of the existence of any free or regional trade agreements between Turkey and partner countries on the agricultural exports leads to a decrease in the export of sheep meat, milk, wheat and tomato, and an increase in the export of poultry meat, barley, maize, cotton, refined sugar, hazelnut, grape-raisin and unmanufactured tobacco. This situation can also be attributable to the content of agreement again. The relationship between sharing a common border with a partner country and agricultural exports exhibits mixed results. While it is positive and significant as expectedly for six commodities (poultry meat, milk, egg, rice, maize and refined sugar), the signs of this relationship are negative for sheep meat and cotton. These mixed and unexpected results could be the conclusion of similar climatic conditions with neighbor countries which enables them to produce similar agricultural commodities. This situation could also be the result of political conditions between Turkey and its neighbor countries.

The last dummy variable our study employed that measures the geographical distance between Turkey and the partner country has generally negative effects on the exports of agricultural commodities except rice and refined sugar. It means that the larger the distance between Turkey and the partner country which causes more transportation costs, the smaller export of agricultural commodities from Turkey to these partner countries, and vice versa.

As seen from Table 7.2, agricultural supports measured by NRA significantly affect the export of six commodities. While they reduce the exports of milk and tomato, they raise the exports of sheep meat, barley, cotton and refined sugar. Note that NRA shows the difference between domestic and border price of individual commodities. The domestic price used in NRA calculations is determined by not only market forces but also government interventions to markets such as support or protection policies. So a positive signed NRA value for a commodity means that domestic price of a commodity is higher than the border or world price of that commodity, indicating the government is subsidizing or protecting it. Thus, it is expected that higher NRA leads to decreasing exports such as seen in the milk and tomato exports.

However, some of the estimated coefficients on NRA exhibit unexpected results indicating that there are positive relationships between the NRA and the exports sheep meat, barley, cotton and refined sugar. These can be explained by several factors. First, if the domestic demand elasticities of these products are low, then the higher NRA can increase export flows of them, after the domestic demand has been met. Second, it also can be related to the relative NRAs between Turkey and trading countries. It means that domestic prices of these products are lower in Turkey than those in partner countries, so it increases Turkish exports of these commodities. However, the insignificant estimated coefficients on NRAs can also show that government interventions to agricultural sector through price related policies such as supports and/or border measures do not affect the agricultural exports much.

If we use PSE instead of NRA in our estimates, our results show that the effects of NRA and PSE, measures of the agricultural supports, on Turkish agricultural exports have both similarities and differences¹⁸. But they are generally important as much as exchange rates in the determination of the export pattern of Turkish agricultural commodities. However, the reason behind the changing effects of these indicators on different agricultural commodity exports could be attributable to the government's using of different support tools for different agricultural commodities. For example, we can consider the effect of a reduction in any one component of PSE such as stated in Hertel (1989b). He asserts that decreasing subsidies on an input such as fertilizer could lead to greater long-run reductions in output, exports etc. than would decreasing output subsidies in an equal magnitude. Thus, the reverse should be true regarding our analysis. Since our entire sample of commodities are not supported with the same mix of support instruments, the difference in the effects of NRA or PSE on individual commodity exports should be seen understandable. More importantly, the Turkish government provides exports refunds for some commodities in addition to production supports and there are some differences between the effects these two types of support instruments, especially on the exports. In brief, changing effects of agricultural supports on different commodity exports could be attributable to the difference of the policy instruments used to support them.

¹⁸ Results with PSE variable for full sample can be found in Appendix Table A.7.

Table 7.2: PPML Estimation for Full Sample¹⁹

	NRA	EXC	LVOL	GDP	TRGDP	GATT	FTA	CONT	DIST	CONS	N	R²
Beef	-4.545	-0.109	-0.689	-0.247	-1.811	-3.534**	3.387	0.423	1.574	21.23	35	0.35
	(-1.33)	(-0.52)	(-0.7)	(-0.46)	(-0.55)	(-1.96)	(1.59)	(0.54)	(0.82)	(0.55)		
Sheep Meat	47.523**	0.004***	-0.29	4.456***	18.717***	-0.53	-7.715***	-5.922***	19.814***	0.003***	27	0.71
	(2.33)	(2.9)	(-0.48)	(4.58)	(-3.56)	(-0.43)	(-3.66)	(-3.51)	(-4.61)	(3.01)		
Poultry Meat	-10.221	0.255	-0.921*	-0.25	0.001***	-0.519	0.004***	1.644***	1.218	0.001***	97	0.46
	(-0.85)	(1.61)	(-1.79)	(-0.97)	(3.42)	(-1.38)	(-2.84)	(3.67)	(1.16)	(-3.4)		
Milk	16.228***	0.003***	-3.866**	-0.17	4.897**	0.194	-1.181*	0.006***	-1.555	-58.454**	146	0.51
	(-3.53)	(3)	(-2.26)	(-0.46)	(2.24)	(0.49)	(-1.73)	(2.73)	(-1.55)	(-2.28)		
Egg	-6.81	0.371**	-1.474**	-0.444	0.001***	-1.024**	-1.313	0.002***	-4.685**	0.001***	82	0.71
	(-1.21)	(2.06)	(-2.25)	(-0.76)	(3.26)	(-2.23)	(-1.38)	(3.17)	(-2.17)	(-3.3)		
Wheat	0.541	0.412***	-0.628	-0.279*	0.005***	0.697	-0.813*	-0.324	-0.609*	0.003***	178	0.2
	(0.28)	(4.7)	(-1.41)	(-1.86)	(-2.83)	(1.53)	(-1.68)	(-0.9)	(-1.7)	(3.01)		
Rice	2.206	0.341	-0.418	0.005***	-0.565	-0.307	0.217	0.005***	0.002***	-8.085	86	0.47
	(0.84)	(1.61)	(-0.66)	(2.8)	(-0.17)	(-0.69)	(0.38)	(2.81)	(-3.11)	(-0.21)		
Barley	0.009***	0.154	-1.135	0.437*	2.999**	-0.02	0.001***	-0.123	-0.336	-37.769**	70	0.36
	(-2.61)	(1.2)	(-1.31)	(1.95)	(2.18)	(-0.04)	(-3.44)	(-0.33)	(-0.54)	(-2.28)		
Maize	3.265	0.224**	0.002***	1.811***	5.45***	0.001***	0.007***	1.283**	-5.209***	-80.482***	124	0.78
	(1.1)	(2.15)	(3.15)	(4.79)	(3.77)	(-3.32)	(2.68)	(2.4)	(-3.91)	(-4.85)		

¹⁹ What we present here, is the result of our long run estimations. Moreover, if we use yearly, short run estimates, our results are not much different from the long-run estimates. Short run estimates are available from authors upon request.

Potato	-0.645	0.015	0.087	-0.025	1.558	-1.587***	-0.501	0.083	-1.433	-16.795	168	0.12
	(-0.39)	(0.11)	(0.18)	(-0.07)	(1.09)	(-4.75)	(-0.82)	(0.2)	(-0.98)	(-0.93)		
Tomato	-9.259*	0.01***	-1.186**	1.813***	9.191***	-2.494***	-1.225**	-1.301	-6.841***	122.698***	175	0.81
	(-1.81)	(-2.59)	(-2.02)	(5.09)	(6)	(-3.5)	(-2.32)	(-1.15)	(-6.9)	(-6.07)		
Cotton	1.378*	0.15	0.905**	1.224***	-4.503***	-0.356	0.56**	-2.969***	-2.087***	40.791***	334	0.29
	(1.77)	(1.19)	(2.2)	(7.9)	(-7.38)	(-0.98)	(2.29)	(-8.62)	(-4.92)	(6.01)		
Refined Sugar	2.295*	0.089	-0.067	0.169	-1.492	-0.979*	0.001***	1.879***	0.008***	15.322	131	0.59
	(1.75)	(0.65)	(-0.24)	(0.49)	(-0.95)	(-1.75)	(-3.23)	(5.35)	(-2.66)	(0.82)		
Apple	-1.802	0.072	-1.4**	-0.002	-0.684	-1.141*	-0.764	0.24	-1.443	6.293	166	0.11
	(-0.48)	(0.25)	(-2)	(-0.01)	(-0.19)	(-1.78)	(-1.4)	(0.51)	(-1.29)	(0.15)		
Sunf. Seed Oil	0.963	0.004***	-0.827**	0.218	2.354	0.001***	0.209	0.486	-3.74***	-29.625	187	0.44
	(0.53)	(2.91)	(-1.98)	(0.89)	(1.45)	(-3.44)	(0.38)	(1.54)	(-5.45)	(-1.6)		
Hazelnut	-0.493	-0.113	0.209	2.712***	-1.041	-0.385	0.005***	-0.398	-5.025***	-14.866	261	0.68
	(-0.37)	(-1.05)	(0.55)	(8.76)	(-0.84)	(-1.14)	(2.81)	(-0.76)	(-6.68)	(-0.95)		
Grape-Raisin	2.754	0.003***	0.161	1.905***	-0.545	-1.12**	0.995***	-1.119	-2.693***	-12.339	358	0.5
	(1.03)	(-2.95)	(0.43)	(12.91)	(-0.44)	(-2.24)	(3.57)	(-1.31)	(-6.11)	(-0.86)		
Tob. Unm.	-0.289	-0.172**	-0.367	2.16***	-1.155*	0.008***	0.714**	0.437	0.423	-10.123	298	0.91
	(-0.62)	(-2.01)	(-1.15)	(20.28)	(-1.72)	(-2.63)	(2.28)	(0.91)	(1.29)	(-1.32)		

***, ** and * denote significance at 1, 5 and 10 per cent level respectively

z values in parenthesis

Theoretically, the depreciation of the Turkish Lira against a partner country's currency decreases the relative price of Turkish exportable commodities in international markets, so its expected effect is to increase Turkish agricultural exports. Although there are empirical findings in the reviewed literature consistent with this basic theory, there are also contradictory ones. However, our estimated coefficients on real exchange rates in our analysis exhibit some mixed results, although they are generally positive. While it increases the export of sheep meat, milk, egg, wheat, maize, tomato, sunflower seed oil and grape-raisin, the depreciation of the Turkish lira decreases the export of only unmanufactured tobacco regarding our full sample. These results especially support Kristinek and Anderson (2002) that reviews the literature and emphasizes the varying impact of exchange rate on agricultural trade. However, these findings are also consistent with Buguk et al. (2003) and Erdem et al. (2010) that also investigate the effects of exchange rate on Turkish agricultural trade at aggregate level. Erdem et al. (2010) answer the question of why the depreciated Turkish Lira doesn't increase agricultural exports through supply and demand elasticities. They propose that aggregate agricultural supply and demand could be inelastic. They also present an alternative explanation to such findings in the light of Irandoust et al. (2006) and suggest that exporters can price their products according to market conditions rather than exchange rate movements in order to sustain their sales. However, the decrease in the export of tobacco can be explained through its own characteristics. Tobacco is generally used in the production of cigarettes or any other tobacco products and it is generally exported to the Europe and America, and in recent years most of countries in these regions have begun to care their citizens' life and fight with the usage of tobacco products. So this may explain the some of decreased demand for Turkish tobacco.

Although estimated coefficients on exchange rate volatility provide both positive and negative relationship between exchange rate volatility and agricultural commodity exports, they don't present any significant relationship for ten commodities. It leads to a decrease in the export of poultry meat, milk, egg, tomato, apple and sunflower seed oil, while it leads an increase in the export of maize and cotton. Our results indicate that the effects of exchange rate volatility can differ not only between the sectors but also between the commodities within the same sector.

Since this issue is largely empirical (see, Kandilov, 2008), as reviewed in the literature review section, our results are also consistent with it.

7.2. Regression Results for Developed and Developing Countries and Regional Groups of Countries

We estimate the exactly same specifications employed above but classified countries into two groups based on their income levels²⁰. For the sake of brevity, we report the coefficients of three important variables namely NRA, exchange rate and its volatility. While there are significantly negative relationships between the levels of agricultural supports, measured by NRA, and the exports of five commodities (beef, milk, barley, potato and tomato) to the developed countries; the signs of these relationships are positive for the exports of poultry meat and cotton. For exports to developing countries, NRA negatively affects only the export of milk, and it positively affects the export of sheep meat, rice and refined sugar. Our results indicate that the effects of agricultural supports on Turkish commodity exports do not differ significantly by the development stage of importer countries.

The depreciation of the Turkish Lira decreases the exports of beef, tomato, grape-raisin and unmanufactured tobacco to the developed countries and the exports of only tomato to the developing countries. It also increases the exports of six commodities (sheep meat, milk, egg, wheat, maize and potato) to the developed countries, and the exports of sheep meat, milk, egg and sunflower seed oil to the developing countries. As seen from the results, the exchange rate is a more important determinant of exports to developed countries rather than that of developing ones.

The estimated coefficients on exchange rate volatilities show that while they lead to decreases in the exports of beef and apple, they lead to increase only in the export of refined sugar to developed countries. For developing country cases, the exchange rate volatility decreases the exports of seven commodities namely, poultry

²⁰ Our study uses the World Bank country classification.

meat, milk, egg, rice, tomato, apple and sunflower seed oil; it increases only the export of sheep meat.

Table 7.3: PPML Estimations for Developed and Developing Countries

	DEVELOPED COUNTRIES						DEVELOPING COUNTRIES				
	NRA	EXC	LVOL	N	R ²		NRA	EXC	LVOL	N	R ²
Beef	-13.849***	-2.685**	-4.19***	20	0.95		4.529	-0.399	0.953	15	0.37
	(-4.75)	(-2.33)	(-4.97)				(1.07)	(-0.84)	(0.79)		
Sheep Meat	61.436	5.948***	-0.617	16	0.99		40.947***	4.918***	1.162***	11	0.99
	(0.78)	(2.83)	(-0.5)				(21.45)	(21.67)	(7.29)		
Poultry Meat	16.498**	-0.253	0.154	37	0.26		-17.616	0.193	-1.025*	60	0.43
	(2.4)	(-0.75)	(0.18)				(-1.25)	(1.15)	(-1.88)		
Milk	-7.911***	0.99***	-1.598	67	0.56		-30.231**	0.432***	-6.652*	79	0.55
	(-3.13)	(2.9)	(-1.33)				(-2.25)	(2.67)	(-1.75)		
Egg	-3.545	0.875***	-0.305	38	0.71		-8.773	0.395**	-1.783**	44	0.88
	(-0.38)	(4.3)	(-0.26)				(-1.22)	(2.24)	(-2.28)		
Wheat	4.022	0.865***	0.944	90	0.51		0.007	-0.177	-0.504	88	0.27
	(1.17)	(5.99)	(1.23)				(0)	(-1.36)	(-1.05)		
Rice	-1.066	0.17	1.176	54	0.11		2.702*	0.349	-1.445***	32	0.85
	(-0.26)	(0.47)	(1.11)				(1.67)	(1.59)	(-3.91)		
Barley	-5.396*	0.634	-1.299	36	0.51		-1.047	-0.017	-0.312	34	0.6
	(-1.95)	(1.56)	(-0.99)				(-0.62)	(-0.07)	(-0.45)		
Maize	1.418	0.457***	0.846	82	0.87		2.715	0.05	1.22	42	0.91
	(0.34)	(5.75)	(1.06)				(0.93)	(0.16)	(1.53)		
Potato	-5.405***	0.441***	1.044	104	0.64		0.615	-0.339	0.036	64	0.14
	(-2.85)	(2.85)	(1.45)				(0.35)	(-1.47)	(0.06)		
Tomato	-4.505**	-0.278*	0.183	124	0.32		-12.241	-1.152**	-1.058*	51	0.79
	(-2.05)	(-1.88)	(0.2)				(-1.34)	(-2.18)	(-1.68)		
Cotton	2.099**	0.099	0.57	196	0.28		1.658	-0.047	0.806	138	0.38
	(2.21)	(0.67)	(1.24)				(1.39)	(-0.47)	(1.63)		
Refined Sugar	-0.639	-0.127	2.17**	72	0.19		2.377*	0.201	-0.114	59	0.58
	(-0.24)	(-0.49)	(2.06)				(1.81)	(1.52)	(-0.44)		
Apple	-5.833	-0.25	-1.784*	89	0.53		-1.841	-0.187	-1.538*	77	0.23
	(-1.48)	(-1.22)	(-1.83)				(-0.33)	(-0.5)	(-1.86)		
Sunf. Seed Oil	0.108	0.093	-0.622	109	0.24		1.532	0.517***	-0.905*	78	0.42
	(0.05)	(0.38)	(-0.74)				(0.71)	(2.58)	(-1.95)		
Hazelnut	-0.035	-0.106	0.157	159	0.69						
	(-0.02)	(-1.01)	(0.31)								
Grape-Raisin	1.188	-0.267***	0.422	222	0.50						
	(0.46)	(-2.99)	(1.04)								
Tob. Unm.	-0.061	-0.206**	-0.256	186	0.93						
	(-0.13)	(-2.22)	(-0.75)								

***, ** and * denote significance at 1, 5 and 10 per cent level respectively.

z values in parenthesis

Our results indicate that there is a generally negative relationship between the exchange rate volatility and the Turkish agricultural exports to developing countries, while the relationship for developed countries is not as strong as for developing countries. Therefore, the exchange rate volatility cannot be considered as an important determinant in the Turkish agricultural exports to developed countries. Because it is easier for traders in developed countries to avoid the negative effects of the exchange rate volatility through advanced forward markets, but it may not be the case in developing countries. In addition the insensitivity of commodity exports to the exchange rate volatility in developed countries could be attributable to the demand functions, market structures or features of the agricultural commodities. In brief, here we demonstrate that the effects of exchange rate volatility can differ by the stage of development of the partner country.

Since the size of the exports of Turkish agricultural commodities vary among different geographical regions²¹, it is important to run regressions for each region with the exact same specification used above. We divide the recipient countries into sub-groupings to examine whether the effects of our variables of interest in our models differs by the region. These regions are namely Middle East and North Africa (MENA), Commonwealth of Independent States (CIS), Europe, Asia, America and Sub-Saharan Africa. We run our regressions for the commodities whose export share in a region is above ten percent of the total exports of each commodity.

Tables 7.4 and 7.5 present estimation results for regions. Higher NRA leads to an increase in the exports of sheep meat and rice, and leads to a decrease in the exports of poultry meat, milk and egg to MENA countries. The depreciation of the Turkish Lira has not any significant effect on more than half of the commodities' exports; but the significant estimated coefficients on the real exchange rate have generally positive signs except for maize. The effect of exchange rate volatility on the export of agricultural commodities is also generally insignificant. While higher exchange rate volatility increases only the exports of rice, it decreases the export of milk and egg to this region.

²¹ See Table A.III for the Turkish bilateral trade by regional basis.

Table 7.4: PPML Estimations for MENA and CIS Countries

	MENA					CIS				
	NRA	EXC	LVOL	N	R ²	NRA	EXC	LVOL	N	R ²
Beef	-3.452	2.201	-2.148	12	0.89					
	(-0.47)	(0.62)	(-0.9)							
Sheep Meat	29.477***	1.39***	-0.221	14	0.99					
	(11.02)	(2.74)	(-1.5)							
Poultry Meat	-66.151***	-0.01	-0.788	29	0.99	137.424*	-2.592***	-0.225	30	0.9
	(-3.06)	(-0.03)	(-1.15)			(1.88)	(-4.91)	(-0.48)		
Milk	-20.271*	0.745**	-5.156**	48	0.91	2.829	0.661*	1.28	35	0.97
	(-1.92)	(2.18)	(-1.99)			(0.65)	(1.9)	(1.29)		
Egg	-15.011***	1.633***	-4.112**	33	0.96	10.199	-2.045***	-0.606	26	0.83
	(-2.78)	(2.8)	(-2.01)			(0.91)	(-3.35)	(-0.69)		
Wheat	-0.625	0.202	-0.435	62	0.17	-21.214	-0.292	-3.275**	29	0.66
	(-0.27)	(1.1)	(-0.76)			(-1.54)	(-0.44)	(-2.42)		
Rice	17.959***	-0.845	6.993*	11	0.99	-19.188***	0.559	0.45	26	0.79
	(2.56)	(-1.38)	(1.69)			(-2.92)	(1.39)	(0.74)		
Barley	-0.615	-0.229	0.09	42	0.56					
	(-0.37)	(-1.2)	(0.13)							
Maize	3.239	-1.171***	1.423	25	0.99					
	(1.32)	(-5.33)	(1.34)							
Potato	-0.12	0.009	-0.399	53	0.07	3.545*	-0.866*	-0.939	47	0.64
	(-0.06)	(0.02)	(-0.59)			(1.95)	(-1.65)	(-1.13)		
Tomato	1.973	2.172***	2.074	33	0.4	-3.356	0.543**	-1.388***	63	0.98
	(0.71)	(2.61)	(1.5)			(-0.75)	(2.14)	(-3.44)		
Cotton						-0.21	-0.318	-0.833	62	0.75
						(-0.12)	(-1.26)	(-1.09)		
Refined Sugar	1.521	0.849***	-0.046	37	0.71	-1.116	-0.788***	-1.915**	33	0.73
	(0.93)	(3.56)	(-0.14)			(-0.37)	(-2.69)	(-2.42)		
Apple	-2.705	0.18	-1.164	67	0.16					
	(-0.69)	(0.54)	(-1.13)							
Sunf. Seed Oil	2.144	0.931***	-0.729	60	0.65	0.289	-0.693*	-3.022***	33	0.85
	(0.9)	(3.79)	(-1.36)			(0.07)	(-1.9)	(-4.77)		

***, ** and * denote significance at 1, 5 and 10 per cent level respectively.

z values in parenthesis

CIS region is an important market for Turkish agricultural commodities with around 20 percent shares for many commodities. The estimated coefficients on NRA indicate that there are positive relationship between NRA and exports of beef and potato while there is a negative relationship between NRA and export of rice. The estimated coefficients on exchange rates imply that the depreciation of the Turkish Lira generally decreases the exports of agricultural commodities except milk and tomato. Most of tomato exports go to a single buyer in this region, namely Russian

Federation. Exchange rate volatility has a negative impact on the export flows of tomato, refined sugar, sunflower seed oil and wheat. These results show that Turkish agricultural commodity exports to the countries in the CIS region are generally negatively related to the depreciation of Turkish Lira and the higher exchange rate volatility. However, they are not much more related to the agricultural supports.

Table 7.5: PPML Estimations for Europe, Asia and America Countries

	EUROPE						ASIA				
	NRA	EXC	LVOL	N	R ²		NRA	EXC	LVOL	N	R ²
Beef	371.757***	-0.224	-	12	0.99						
	(5.17)	(-0.42)	(-6.73)								
Poultry Meat	-2.845	-0.56*	1.33***	19	0.99		-237.129***	1.951***	-1.128	13	0.95
	(-0.7)	(-1.75)	(5.55)				(-3.15)	(3.07)	(-1.45)		
Milk	-8.976**	-0.474	-3.218***	35	0.99		-31.782*	0.145	-5.743	23	0.7
	(-2.34)	(-0.75)	(-2.56)				(-1.83)	(0.88)	(-1.16)		
Wheat	1.251	0.861***	0.168	59	0.58						
	(0.33)	(5.34)	(0.19)								
Rice	-1.954	1.358**	4.024**	40	0.33						
	(-0.48)	(2.13)	(1.98)								
Barley	-9***	-0.322	-3.925**	25	0.72						
	(-3.84)	(-0.81)	(-2.31)								
Maize	3.685	0.498***	0.806	59	0.88						
	(0.46)	(4.55)	(0.74)								
Tomato	1.665	-0.564***	1.439	79	0.71						
	(0.59)	(-3.64)	(1.62)								
Cotton	2.558**	0.068	0.441	114	0.3						
	(2.2)	(0.43)	(0.85)								
Refined Sugar	45.635**	-0.311	-2.33	47	0.34						
	(1.99)	(-1.3)	(-0.84)								
Sunf. Seed Oil	1.527	-0.384*	-1.345	65	0.36						
	(0.65)	(-1.92)	(-1.47)								
							AMERICA				
Hazelnut	0.293	-0.163*	-0.046	84	0.73		4.822***	-1.175	0.435	18	0.91
	(0.14)	(-1.65)	(-0.08)				(2.75)	(-0.9)	(1.1)		
Grape-Raisin	1.674	-0.288***	0.269	122	0.61						
	(0.71)	(-4.08)	(0.66)								
Tob. Unm.	0.542	-0.157*	-0.33	118	0.28		-0.099	-1.029**	-0.216	23	0.98
	(0.74)	(-1.76)	(-0.63)				(-0.75)	(-2.42)	(-0.91)		

***, ** and * denote significance at 1, 5 and 10 per cent level respectively.

z values in parenthesis

Europe region has the largest shares in the exports of maize, cotton, hazelnut and grape-raisin. Thus, similar to the manufactures exports, Europe region is

extremely important destination for some Turkish agricultural commodities. Our estimates show that larger NRA leads to an increase in the exports of beef, cotton and refined sugar to this region. Nonetheless, it leads to a decrease in the exports of milk and barley. The effects of depreciation of the Turkish Lira generally decrease the exports of Turkish agricultural commodity exports to Europe. These negatively affected commodities are poultry meat, tomato, sunflower seed oil, hazelnut, grape-raisin and unmanufactured tobacco. However, depreciated Turkish Lira increases the exports of wheat, rice and maize exports. Compared to the other regions, exchange rate also has a more negative effect on the export flows of Turkish agricultural commodities to Europe and CIS countries. Similar to the previous results, most of the estimated coefficients on exchange rate volatility are insignificant.

For Asia region, there are only two commodities (poultry meat and milk) that we investigate. While the exchange rate has a positive impact, higher NRA has a negative impact on the exports of poultry meat to Asia region. And all three variables have not any significant effects on the exports of milk. Moreover, in the cases of tobacco and hazelnut exports of Turkey to America; NRA has a positive impact on the export of hazelnut and the depreciation of the Turkish Lira has a negative effect on the export of tobacco.

8. Conclusions

Our study empirically investigates the effects of agricultural supports or distortions, measured with PSE and NRA, on the Turkish exports of beef and veal, sheep meat, poultry meat, milk, egg, wheat, barley, rice, maize, potato, tomato, apple, cotton, refined sugar, sunflower seed oil, hazelnut, grape-raisin and unmanufactured tobacco to 72 countries over the 1962 – 2010 period. We conduct our analyses with panel data and use the gravity equation for modeling the Turkish agricultural commodities export by utilizing the Poisson Pseudo-Maximum-Likelihood (PPML) estimation method. Using the gravity equation in modeling of international trade has a long tradition. However, we add the exchange rate, its volatility and some commonly used dummy variables to the pure gravity equation. Actually, no study in the literature has focused on the analysis of all these variables over such a lengthy period for the exports of individual agricultural products. We first examine the determinants of commodity exports for the full sample, we then divide the recipient countries into sub-groupings to examine whether the effects of our variables of interest in our models differs by the region and/or the development stage of countries.

Agricultural supports, proxied by NRA (or PSE), are as important as exchange rates in the determination of the export pattern of Turkish agricultural commodities. Although we have very diverse results, most of the estimated coefficients on NRA imply that our results on the exports of agricultural commodities are sensitive to the commodities considered, measurements of support, regions and the stage of development of partner countries, and short/long run estimates. We are able to obtain some general conclusions for the effects of agricultural supports on exports. Regardless of the measurement of agricultural supports, wheat, maize, apple and grape-raisin exports obviously don't exhibit any sensitivity to the agricultural supports. There could be many explanations for these weak results. For example, on the exporter side, as stated in Buguk et al. (2003), exporter firms do not consider only the factors that we analyzed, but they also consider relative prices, marketing margins, promotion, political environment, and supply and demand conditions of the products. On the importer side, as stated in Koo et al. (1994), producer subsidies may

not have any impact on trade flows, and importer countries' policies could be more influential than those of exporter countries on agricultural trade such as seen in their sample meat trade.

If we put aside the insignificant results and exceptional cases for the sake of generalization, we can conclude that the depreciation of Turkish Lira generally increases the Turkish agricultural commodity exports especially to the developed countries. More importantly, however, there are three commodities in our sample, namely tobacco, hazelnut (in the case of exports to Europe which constitute 76% of total hazelnut exports) and grape-raisin, which have important shares in Turkish agricultural exports. The depreciation of Turkish Lira affects their exports negatively. Although the negative relationship between exchange rates and exports of hazelnut, grape-raisin and tobacco can be attributable to the monopoly power of Turkish producers in these commodities as stated in Yanikkaya et al. (2013), their consistent insensitivity to the domestic supports or border measures is interesting since hazelnut and tobacco have been subjected to heavy government interventions. On the effects of exchange rate volatility, our analysis show that although there are mixed results, general effect of it on the Turkish agricultural exports is negative. However, as expectedly, exchange rate volatility generally doesn't affect the agricultural export flows from Turkey to developed countries.

Since we conduct our study at disaggregated commodity levels in order to cope with an aggregation bias, we show that every commodity has its own features and should be evaluated in its own market conditions. However, governments should consider that their interventions to agricultural sector do not affect only the production but also exports of the commodities those are subject to interventions.

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APPENDIX

Table A.1: Exports of agricultural products of by regional destination (Billion dollars and percentage)

	Value	Share in region's exports		Share in world exports		Annual percentage change		
	2011	2005	2011	2005	2011	2005-11	2010	2011
World	1660	100.0	100.0	100.0	100.0	14	16	21
Europe								
World	670	100.0	100.0	46.8	40.4	11	8	17
Europe	520	80.9	77.7	37.9	31.3	10	5	16
Asia	47	5.3	7.0	2.5	2.8	17	26	30
North America	26	5.1	3.9	2.4	1.6	5	12	14
Africa	25	2.7	3.8	1.3	1.5	18	17	22
CIS	24	2.7	3.6	1.2	1.4	18	26	19
Middle East	19	2.2	2.9	1.0	1.2	17	17	25
South and Central America	7	0.8	1.0	0.4	0.4	15	19	19
Asia								
World	382	100.0	100.0	18.4	23.0	20	29	30
Asia	226	58.0	59.2	10.7	13.6	20	33	30
Europe	52	15.4	13.6	2.8	3.1	17	22	28
North America	43	14.2	11.3	2.6	2.6	14	22	27
Middle East	23	4.9	6.1	0.9	1.4	25	14	32
Africa	22	4.0	5.7	0.7	1.3	29	23	43
CIS	9	1.9	2.3	0.4	0.5	24	33	27
South and Central America	7	1.2	1.7	0.2	0.4	28	64	28
North America								
World	251	100.0	100.0	16.0	15.1	13	19	18
Asia	96	29.9	38.2	4.8	5.8	19	24	20
North America	95	46.4	37.7	7.4	5.7	8	14	16
Europe	24	12.1	9.5	1.9	1.4	8	22	13
South and Central America	17	5.8	6.9	0.9	1.0	17	16	18
Africa	9	2.7	3.7	0.4	0.6	20	26	23
Middle East	7	1.9	2.8	0.3	0.4	23	7	27
CIS	3	1.1	1.1	0.2	0.2	13	0	22
South and Central America								
World	206	100.0	100.0	10.6	12.4	18	17	25
Asia	54	20.2	26.4	2.1	3.3	24	22	29
Europe	52	31.7	25.3	3.4	3.1	13	9	21
South and Central America	35	13.9	16.9	1.5	2.1	23	21	27
North America	28	18.7	13.5	2.0	1.7	10	11	23
Africa	15	5.5	7.4	0.6	0.9	25	23	55
Middle East	13	4.7	6.2	0.5	0.8	24	28	13
CIS	8	5.0	3.8	0.5	0.5	11	30	8
Africa								
World	59	100.0	100.0	3.2	3.6	17	17	18
Europe	25	50.1	41.7	1.6	1.5	12	11	21
Africa	12	19.2	20.2	0.6	0.7	18	14	12
Asia	11	16.9	17.7	0.5	0.6	18	31	24
Middle East	5	5.0	8.1	0.2	0.3	28	23	6
North America	4	5.9	5.9	0.2	0.2	17	22	35

South and Central America	2	0.4	3.4	0.0	0.1	84	14	9
CIS	1	1.7	2.0	0.1	0.1	20	15	35
CIS								
World	59	100.0	100.0	3.0	3.6	18	11	31
CIS	21	32.5	35.6	1.0	1.3	20	31	22
Europe	14	25.4	23.5	0.8	0.8	16	16	36
Asia	12	26.6	20.3	0.8	0.7	12	-10	42
Middle East	4	5.6	7.2	0.2	0.3	24	-16	41
Africa	4	5.0	7.2	0.2	0.3	27	5	38
North America	1	2.4	0.9	0.1	0.0	-3	-12	-16
South and Central America	0	0.1	0.4	0.0	0.0	54	20	64
Middle East								
World	32	100.0	100.0	1.9	1.9	14	36	15
Middle East	15	33.2	46.8	0.6	0.9	23	20	17
Asia	6	9.7	18.6	0.2	0.4	30	96	25
Europe	3	13.0	8.3	0.2	0.2	5	21	2
Africa	2	4.7	6.0	0.1	0.1	20	17	22
CIS	1	2.6	4.1	0.0	0.1	26	37	25
North America	1	2.0	1.7	0.0	0.0	11	15	18
South and Central America	0	0.2	0.3	0.0	0.0	16	20	22

Source: World Trade Organization, authors' own calculation.

Table A.2: Names and Definitions of the OECD Indicators of Agricultural Support

Indicators of Support to Producers
Producer Support Estimate (PSE): the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm-gate level, arising from policy measures that support agriculture, regardless of their nature, objectives or impacts on farm production or income.
Percentage PSE (%PSE): PSE as a share of gross farm receipts (including support).
Producer Nominal Assistance Coefficient (producer NAC): the ratio between the value of gross farm receipts (including support) and gross farm receipts valued at border prices (measured at farm gate).
Producer Nominal Protection Coefficient (producer NPC): the ratio between the average price received by producers at farm gate (including payments per tonne of current output), and the border price (measured at farm gate).
Producer Single Commodity Transfers (producer SCT): the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policy measures directly linked to the production of a single commodity such that the producer must produce the designated commodity in order to receive the transfer.
Producer Percentage Single Commodity Transfers (producer %SCT): the commodity SCT as a share of gross farm receipts for the specific commodity.
Group Commodity Transfers (GCT): the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policy measures whose payments are made on the basis that one or more of a designated list of commodities is produced, i.e. a producer may produce from a set of allowable commodities and receive a transfer that does not vary with respect to this decision.
All Commodity Transfers (ACT): the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising

from policy measures that place no restrictions on the commodity produced but require the recipient to produce some commodity of their choice.
Other Transfers to Producers (OTP): the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policy measures that do not require any commodity production at all.
Indicators of Support to General Services for Agriculture
General Services Support Estimate (GSSE): the annual monetary value of gross transfers to general services provided to agricultural producers collectively (such as research, development, training, inspection, marketing and promotion), arising from policy measures that support agriculture regardless of their nature, objectives and impacts on farm production, income, or consumption. The GSSE does not include any transfers to individual producers.
Percentage GSSE (%GSSE): GSSE as a share of Total Support Estimate (TSE).
Indicators of Support to Consumers
Consumer Support Estimate (CSE): the annual monetary value of gross transfers from (to) consumers of agricultural commodities, measured at the farm gate level, arising from policy measures that support agriculture, regardless of their nature, objectives or impacts on consumption of farm products.
Percentage CSE (%CSE): CSE as a share of consumption expenditure (measured at farm gate) net of taxpayer transfers to consumers.
Consumer Nominal Assistance Coefficient (consumer NAC): the ratio between the value of consumption expenditure on agricultural commodities (at farm gate) and that valued at border prices (measured at farm gate).
Consumer Nominal Protection Coefficient (consumer NPC): the ratio between the average price paid by consumers (at farm gate) and the border price (measured at farm gate).
Consumer Single Commodity Transfers (consumer SCT): the annual monetary value of gross transfers from (to) consumers of agricultural commodities, measured at the farm gate level, arising from policy measures directly linked to the production of a single commodity.
Indicators of Total Support to Agriculture
Total Support Estimate (TSE): the annual monetary value of all gross transfers from taxpayers and consumers arising from policy measures that support agriculture, net of associated budgetary receipts, regardless of their objectives and impacts on farm production and income, or consumption of farm products.
Percentage TSE (%TSE): TSE as a share of GDP

Source: OECD, 2010, p. 17-18

Table A.3: NRA and PSE Values (%)

NRA for...	1970	1975	1980	1985	1990	1995	2000	2005	2010
Beef	.	.	.	0.2	0.65	1.2	1.33	0.79	0.86
Sheep Meat	.	.	.	0.14	0.22	0.31	0.11	0.25	0.7
Poultry Meat	.	.	.	0.34	0.57	0.62	0.5	0.5	0.67
Milk	0.47	0.73	0.07	0.62	1.25	1.27	0.57	0.4	0.43
Egg	.	.	-0.23	0.21	0.32	0.73	0.51	0.73	0.47
Wheat	-0.13	-0.07	-0.26	0.39	0.45	0.47	0.26	0.3	0.16
Rice	.	.	.	0.28	2.46	1.11	0.98	.	.
Barley	0.09	-0.22	-0.37	0.22	0.59	0.63	0.23	0.35	0.57
Maize	-0.13	.	-0.45	0.12	0.45	0.55	0.4	0.56	0.48
Potato	0.03	0.12	-0.07	0.23	0.27	0.32	1.18	1.82	1.26
Tomato	-0.41	-0.37	-0.36	0.33	0.09	-0.12	-0.1	-0.2	0.02
Cotton	-0.11	-0.07	-0.31	-0.54	-0.47	-0.49	-0.36	-0.02	0.13
Refined Sugar	.	.	.	0.15	0.36	1.13	1.16	0.82	0
Apple	-0.4	-0.52	-0.52	-0.13	-0.16	0.06	0	1.04	1.13
Sunf. Seed Oil	-0.2	-0.27	-0.61	0.15	0.37	0.54	0.19	0.33	0.24
Hazelnut	.	-0.22	-0.57	-0.47	-0.4	-0.31	-0.04	.	.
Grape	0.03	-0.07	-0.11	0.06	0.18	0.05	0.29	0.5	0.86
Tobacco	-0.38	-0.38	-0.68	0	0.37	0.49	-0.12	0.09	0.19
PSE for...	1970	1975	1980	1985	1990	1995	2000	2005	2010
Beef	.	.	.	0.07	0.28	0.38	0.53	0.42	0.48
Sheep Meat	.	.	.	0.13	0.15	0.07	0.03	0.06	0.32
Poultry Meat	.	.	.	-0.08	0.26	0.26	0.26	0.25	0.35
Milk	.	.	.	0.52	0.64	0.52	0.41	0.39	0.27
Egg	.	.	.	0.18	0.21	0.28	0.24	0.24	0.26
Wheat	.	.	.	0.18	0.32	0.24	0.24	0.29	0.14
Barley	.	.	.	0.18	0.32	0.26	0.16	0.24	0.36
Maize	.	.	.	0.14	0.26	0.25	0.25	0.36	0.32
Potato	.	.	.	0.19	0.22	0.2	0.49	0.62	0.56
Tomato	.	.	.	0.31	0.13	0.03	0.01	0	0.02
Cotton	.	.	.	0	0.06	0.03	0.11	0.21	0.11
Refined Sugar	.	.	.	0.11	0.26	0.48	0.51	0.41	0.01
Apple	.	.	.	0.03	0	0.04	0.03	0.49	0.53
Sunf. Seed Oil	.	.	.	0.14	0.2	0.28	0.25	0.28	0.2
Grape	.	.	.	0.11	0.17	0.07	0.21	0.29	0.46
Tobacco	.	.	.	0.09	0.26	0.28	0.09	0.07	0.17

Source: WB and OECD Databases, authors' own calculation.

Table A.4: Recorded Outputs and Expected Outcomes by Investment Components

Project Components	Recorded Outputs	Expected Outcomes
DIRECT INCOME SUPPORT	• Established a complete IT-based registry of farms in Turkey, hosted in MARA with high-capacity interfaces to all provincial agricultural offices • Registered almost 100% of 2.75 million eligible and registrable farms in Turkey, with annual updates • Established interfaces with the national population registration system (MERNIS) and the national land title registration system (TAKBIS), as well as to insurance and banking sector • Strengthened MARA-IT's capacity with regard to support program administration and control	• Enhanced efficiency in agricultural policy planning, execution, monitoring, and impact assessment • Contribution to the establishment of an Integrated Administration and Control System for future EU-funds administration purposes, assessed by the European Commission as “beyond the requirements” for respective CAP IACS systems Alternative Crops
National Registry of Farmers		
Support to TKGM	• Surveyed and titled 2.8 million parcels (4.7 million hectares) belonging to 400,000 owners in 24 provinces of Turkey • Leveraged national funding for survey and titling of another 3.8 million parcels across Turkey • Contributed to developing a private surveying industry to implement this large program • Strengthened TKGM's capacity with regard to land adjudication and registration	• Improved security of tenure for large numbers of the poorest rural residents in Turkey • Provided access to secure, transparent, tradable property titles and thus to collateral for rural credit and income generation purposes • Contribution to further activation of rural land markets country-wide
FARMER TRANSITION	• Provided financial support to farmers of 500ha of hazelnuts as income compensation after uprooting hazelnut trees for market stabilization purposes • Provided financial support to farmers of 5,522ha of tobacco as income compensation for discontinuation of tobacco production for market stabilization purposes • Replanting of former tobacco area with cereals and legumes	• Program was overtaken by significant world price increases due to international supply shortages
Alternative Crops		

Project Components	Recorded Outputs	Expected Outcomes
Land Consolidation	• Contracted land consolidation activities covering 65,662 ha including 1,094 km of field access roads in 77 villages • Land consolidation activities in about 50 villages fully completed; activities in remaining 17 villages will complete within a year under government financing • Reshaped 106,935 original parcels averaging 0.5 ha to 50,625 parcels averaging 1 ha • Provided road frontage to every single new parcel, whereas 70% of the old parcels had no frontage	• Increased efficiency of agricultural production due to more economic parcel shape/size, increase in yields, and reduction in tractor fuel use and tractor use time • Increased land value because of shape, road and irrigation canal frontages • Enhanced irrigation water use efficiency • Activated community cooperation required for democratic land allocation procedures • Strengthened capacity of GDAR to conduct the forthcoming national land consolidation initiative
Village Based Participatory Investments	• Completed 481 village-based investment projects and 767 investments in machinery and equipment in 16 provinces of Turkey • Contributed to upgrade of sewage and water supply systems and/or village roads in 135 villages • Financed 196 agro-processing and other agro-industry investments, and created 1,100 permanent jobs in investing enterprises • Financed procurement of quality-enhancing and/or water-saving on-farm equipment for 766 individual farms; provided 3,590 ha with watersaving irrigation benefiting 1,300 farm families • Strengthened MARA-TEDGEM's capacity for programming and implementation of integrated rural development programs and EU IPARD-type support programs • Catalyzed the scale-up of the program to all 81 provinces of Turkey under government financing	• Increased quality of life (sanitation, health, accessibility) in 135 villages through public investments; continuation as national KOYDES program • Enhanced competitiveness, value added generation, and creation of permanent jobs in rural areas • Increased water-use efficiency in an increasing drought environment

Project Components	Recorded Outputs	Expected Outcomes
Institutional Reinforcement (IRFO)	• Created joint venture of agricultural cooperative unions to administer program implementation and to strengthen stakeholder participation in policy programming and implementation • Provided 2,517 managers and board members of 750 Farmer Organizations with managerial support and training • Provided 37,760 members of Farmers Organizations with training and education services • Trained 959 trainers for future multiplication	• Strengthened stakeholder participation in policy programming and implementation • Improved business skills of Farmers Organizations in 21 provinces of Turkey • Enhanced capacity of Farmers Organizations to provide improved services (e.g. advise on funding applications, Project planning and implementation, representation) to their members
Environmental Set-Aside (CATAK)	• Supported adaptation of environmentally sound production techniques on over 4,000 hectares in four environmentally sensitive provinces of Turkey • Incentivized set-aside of over 800 ha adjacent to salt marsh areas to reduce land use intensity • Incentivized use of water-saving irrigation equipment, planting of wind breaking hedges, contour plowing, and reduced fertilization on about 2,000 ha • Incentivized meadow/pasture rehabilitation and reduced grazing intensity on about 1,200 ha • Catalyzed expansion of program to 5 new provinces under government funding in 2009; another 10 provinces planned for 2010	• Enhanced environmental sustainability of agriculture, reduction of erosion, and protection of salt marshes and wildlife sanctuaries in environmentally sensitive zones of Turkey • Inclusion of agri-environmental support scheme into programming for EC IPARD program
ASCU RESTRUCTURING	• Provided continuous advise and training to participating ASCUs; established and maintained records/databases for financial and administrative structures in 16 nation-wide operation ASCUs • Provision of continuous training to about 9,000 managers and staff Production of extensive printed and audio-visual materials for use in and beyond the participating ASCUs	• Improved managerial and operational skills of ASCU leaders and staff • Enhanced commercial performance of the agricultural marketing cooperative system
Cooperative Development		

Project Components	Recorded Outputs	Expected Outcomes
Restructuring Support	- Established a Restructuring Board (incl. government, ASCU, and Treasury delegates) overseeing and steering the entire ASCU restructuring process, to include provision of oversight of the DFIF revolving fund to finance working capital of the ASCU system (establishment of a stop-loss mechanism) - Provided severance payments to 12,601 permanent staff declared redundant as part of the ASCU restructuring process	- Avoidance of continued fiscal support to ASCUs previously averaging US\$ 1 billion annually - Scaling down permanent staffing of ASCU system to sustainable levels
Licensed Warehousing	- Installed grain quality testing and sampling systems in 18 grain storage facilities belonging to the Turkish Grain Board - Constructed two major olive processing and storage facilities in the Marmara Region	- Improved market integration providing fair pricing to about one million farmers and quality assurance to processors through professional grain grading Technologies - Enhanced revenue generation in olive sector through improved marketing and storage systems for 30,000 olive-producing family farms
PROJECT SUP. SERVICES		
Public Information Campaign	Conducted a full program of stakeholder and public information campaigns, to include brochures, national radio and television spots, and face-to-face events	Increased political acceptance of the fundamental policy reform program
Advisory Services	Provided intense advisory activities for participating implementation agencies	Enhanced understanding and acceptance of farmers, rural families, businesses, and the stakeholder community
Social Monitoring and Evaluation	Conducted a full program of stakeholder surveys and econometric studies of impact. In later years, Field Implementation Reviews of the sub-components added at restructuring	Absence of any serious concerns regarding procurement and receipt of DIS among 3 million participating farmers, thousands of participating businesses, and 12,000 redundant ASCU staff
Project Management	Conducted regular implementation (decentralized) and fiduciary (centralized) tasks	Creation of sustainable knowledge on program management in participating agencies

Source: World Bank, 2009

Table A.5: List of Countries used in Analysis

No	Partner	No	Partner
1	Albania	37	Kazakhstan
2	Algeria	38	Kuwait
3	Angola	39	Latvia
4	Australia	40	Libya
5	Austria	41	Malaysia
6	Azerbaijan	42	Malta
7	Bahrain	43	Mexico
8	Bangladesh	44	Morocco
9	Belarus	45	Netherlands
10	Belgium	46	New Zealand
11	Brazil	47	Norway
12	Bulgaria	48	Pakistan
13	Canada	49	Philippines
14	China	50	Poland
15	China, Hong Kong S.A.R	51	Portugal
16	Congo	52	Qatar
17	Croatia	53	Republic of Korea
18	Cyprus	54	Republic of Moldova
19	Czech Rep.	55	Romania
20	Dem. Rep. Congo	56	Russian Federation
21	Denmark	57	Saudi Arabia
22	Egypt	58	Singapore
23	Finland	59	Slovenia
24	France	60	Spain
25	Georgia	61	Sudan
26	Germany	62	Sweden
27	Greece	63	Switzerland
28	Hungary	64	Syria
29	Indonesia	65	Tajikistan
30	Iran	66	Thailand
31	Iraq	67	Tunisia
32	Ireland	68	Ukraine
33	Israel	69	United Kingdom
34	Italy	70	USA
35	Japan	71	Viet Nam
36	Jordan	72	Yemen

Table A.6: Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Beef Exports	52	0.86696	3.76291	0.00015	26.2515
Sheep Meat Exports	65	5.33768	9.31081	0.00019	56.9251
Poultry Meat Exports	110	1.32908	4.5476	0.00013	42.2798
Milk Exports	157	0.26604	1.28912	4.41E-06	15.2155
Egg Exports	94	2.52048	9.72061	0.00018	67.2759
Wheat Exports	207	6.41512	10.725	4.41E-06	61.1989
Rice Exports	130	0.20234	0.96016	0.00021	9.94896
Barley Exports	81	6.55751	8.45435	0.00055	38.4657
Maize Exports	131	0.57117	1.78812	8.8E-05	15.4575
Potato Exports	192	0.7854	2.22389	0.0004	25.0538
Tomato Exports	190	3.00155	13.9967	0.00015	176.585
Cotton Exports	407	7.55907	20.4982	0.00025	201.777
Sugar Exports	160	4.21851	12.4562	3.7E-05	124.466
Apple Exports	194	1.27106	3.38302	0.00017	24.1024
Sunflower Seed Oil Exports	202	1.3232	4.04126	0.00025	33.5472
Hazelnut Exports	447	8.65632	28.5574	0.00036	301.46
Grape-Raisin Exports	443	4.49001	10.8693	0.00133	83.9344
Tob. Unm. Exports	371	11.5777	41.2532	0.00028	345.021
Nominal Rate of Assistance					
Beef	360	0.25865	0.09796	0.10228	0.37464
Sheep Meat	360	0.08782	0.03726	0.02964	0.13601
Poultry Meat	360	0.18058	0.02306	0.14141	0.21019
Milk	648	0.20654	0.08549	0.06708	0.35198
Egg	432	0.13432	0.1107	-0.0989	0.22761
Wheat	648	0.0464	0.11298	-0.1166	0.18197
Rice	360	0.28917	0.14348	0.04003	0.48796
Barley	648	0.02872	0.1611	-0.25	0.22549
Maize	576	0.04303	0.15769	-0.2201	0.20214
Potato	648	0.13646	0.15357	-0.0055	0.43886
Tomato	648	-0.0924	0.11629	-0.2888	0.13392
Cotton	648	-0.1558	0.11997	-0.344	0.04057
Sugar	360	0.22112	0.11141	0.0671	0.35693
Apple	648	-0.0759	0.18916	-0.3291	0.31908
Sunflower Seed Oil	648	-0.0041	0.16541	-0.3201	0.18889
Hazelnut	432	-0.1862	0.10905	-0.3345	-0.0061
Grape-Raisin	648	0.03926	0.07642	-0.0544	0.19874
Tob. Unm.	648	-0.1005	0.20593	-0.5014	0.17009
Producer Support Estimate					
Beef	360	0.12869	0.04831	0.04456	0.18488
Sheep Meat	360	0.03921	0.02738	-0.0115	0.06476

Poultry Meat	360	0.08043	0.0422	-0.0032	0.10944
Milk	360	0.17147	0.028	0.13281	0.20297
Egg	360	0.09053	0.00886	0.07543	0.10232
Wheat	360	0.09763	0.0173	0.06768	0.11492
Barley	360	0.09293	0.0153	0.07163	0.11564
Maize	360	0.09885	0.02102	0.0675	0.12759
Potato	360	0.12957	0.05841	0.07485	0.20079
Tomato	360	0.0334	0.03978	0.00143	0.10798
Cotton	288	0.04447	0.02119	0.02655	0.07867
Sugar	360	0.1272	0.04989	0.04935	0.18312
Apple	360	0.05168	0.0664	0.00946	0.1815
Sunflower Seed Oil	360	0.09074	0.01805	0.06095	0.11369
Grape-Raisin	360	0.07148	0.03247	0.04449	0.13202
Tobacco Unmanufactured	360	0.06379	0.03357	0.02897	0.11946
Exchange Rates	532	0.84414	1.13617	-1.2133	4.05635
Long Run Volatility	534	-1.3349	0.29946	-3.4804	0.07593
Partners' GDP	554	10.7738	0.82168	8.79778	13.0605
Turkish GDP	648	11.2136	0.23011	10.8404	11.5683
GATT	648	0.27222	0.42962	0	1
FTA	648	0.11358	0.30685	0	1
CONT	648	0.09722	0.29649	0	1
DIST	648	0.43452	0.35032	-0.273	1.22703

Table A.7: PPML Regression Results for Full Sample with PSE Variable

	PSE	EXC	LVOL	N	R ²
Beef	-6.46	-0.127	-0.555	35	0.33
	(-0.51)	(-0.59)	(-0.6)		
Sheep Meat	31.126**	1.563*	-0.471	27	0.66
	(2.19)	(1.91)	(-0.47)		
Poultry Meat	-5.804	0.256	-0.85	97	0.46
	(-0.63)	(1.61)	(-1.6)		
Milk	-74.504*	0.45***	-3.467	144	0.5
	(-1.75)	(2.98)	(-1.62)		
Egg	25.617	0.374**	-1.285**	79	0.69
	(0.71)	(2.07)	(-2.29)		
Wheat	-1.819	0.384***	-0.655	160	0.13
	(-0.23)	(3.46)	(-1.41)		
Barley	11.364	-0.039	-0.425	57	0.26
	(1)	(-0.18)	(-0.5)		
Maize	-15.237	0.233**	1.716*	118	0.78
	(-0.33)	(2.29)	(1.71)		
Potato	-5.078	0.05	0.168	139	0.16
	(-1.14)	(0.28)	(0.35)		
Tomato	5.222	-0.289**	-0.822	152	0.87
	(0.38)	(-2.14)	(-1.15)		
Cotton	51.326***	0.362***	0.228	220	0.65
	(3.24)	(5.73)	(0.36)		
Refined Sugar	6.888**	0.095	-0.091	131	0.6
	(2.16)	(0.7)	(-0.33)		
Apple	-2.149	-0.534	-1.408**	137	0.16
	(-0.31)	(-1.25)	(-2.3)		
Sunf. Seed Oil	-21.067*	0.412***	-1.188***	175	0.5
	(-1.87)	(3.15)	(-2.81)		
Grape-Raisin	-1.073	-0.32***	-0.081	275	0.58
	(-0.16)	(-3.36)	(-0.19)		
Tob. Unm.	2.417	-0.203**	-0.914**	214	0.84
	(0.68)	(-2.16)	(-2.21)		

***, ** and * denote significance at 1, 5 and 10 per cent level respectively

z values in parenthesis

CURRICULUM VITAE

She was born in 1985, in Izmit, Kocaeli. In 2003, she graduated from Kocaeli Anatolian Trade High School (department of Foreign Trade). In 2005, she graduated from Import - Export department of Süleyman Demirel University, Isparta Vocational High School with the highest degree. In 2009, she graduated from International Trade department of Celal Bayar University, School of Applied Sciences with the highest degree as well. After short sectoral working experiences, she began to work at Gebze Institute of Technology as a research assistant in Economics department in 2011. She is married.

