On the Dynamics of the Agricultural Trade of Turkey

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Abstract

In this study, the dynamics of the agricultural trade of Turkey are empirically analyzed within a gravity model framework. Using a panel of 33 countries over the period 1993-2015, we found that the economic magnitude of the partner country, the real exchange rate volatility and common borders are significant factors determining the agricultural trade of Turkey. Furthermore, after the global crisis in 2008, the agricultural trade volume of Turkey exhibits a positive shift unlike the decline in the world agricultural trade. The results also indicate that Turkey's agricultural trade with the European Union tends to decrease after 2008 although the EU countries are still important trade partners.

Keywords: Agricultural Trade of Turkey, Gravity Model, 2008 Crisis, Panel Data Analysis
JEL classification: C3, F14, Q17

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Türkiye'nin Tarımsal Ticaretinin Dinamikleri Üstüne

Öz

Bu çalışmada Türkiye'nin tarım ürünleri ticareti, çekim modeli kullanılarak analiz edilmiştir. 33 ülkenin 1993-2005 dönemi gözlemleriyle oluşturulan panel veri seti kullanılmıştır. Ampirik analiz sonucunda Türkiye'nin tarım ürünleri dış ticaretindeki değişimin, ilgili ülkenin ekonomik büyüklüğü, reel döviz kuru oynaklığı ve ortak sınır sahipliğiyle ilişkili olduğu görülmüştür. Bunun ötesinde, 2008 küresel krizinin ardından, dünya tarım ürünleri ticaretindeki düşüşün aksine, Türkiye'nin tarım ürünleri dış ticaretinde pozitif bir kayma olduğu tespit edilmiştir. Ayrıca, Avrupa Birliği (AB) üyesi ülkeler Türkiye için önemli birer ortak olma özelliğini korumakla beraber, 2008 krizinden itibaren Türkiye'nin tarım ürünleri dış ticaretinde AB üyesi olmayan ülkelere doğru artan bir yönelim olduğu görülmektedir.

1. Introduction

Agriculture is a noteworthy sector in Turkish economy with an annual production volume of 60 billion USD. The sector has a foreign trade volume of 13 billion USD with a 3.7 percent share in Turkey's total foreign trade. Besides, Turkey is one of the most important actors in trade of many agricultural goods in the world such as nuts and dried fruits. In the last two decades, the volume of the agricultural trade of Turkey has shown an enormous growth of about 330 percent (Figure 1). In recent years, the agricultural trade with the two leading partners, the Russian Federation and the United States of America constitute almost 34 percent of the total volume of the agricultural trade of Turkey. Beyond them, the European Union (EU) is a significant partner of Turkey with a share of 28 percent.

Figure 1. The Agricultural Trade of Turkey in last two decades
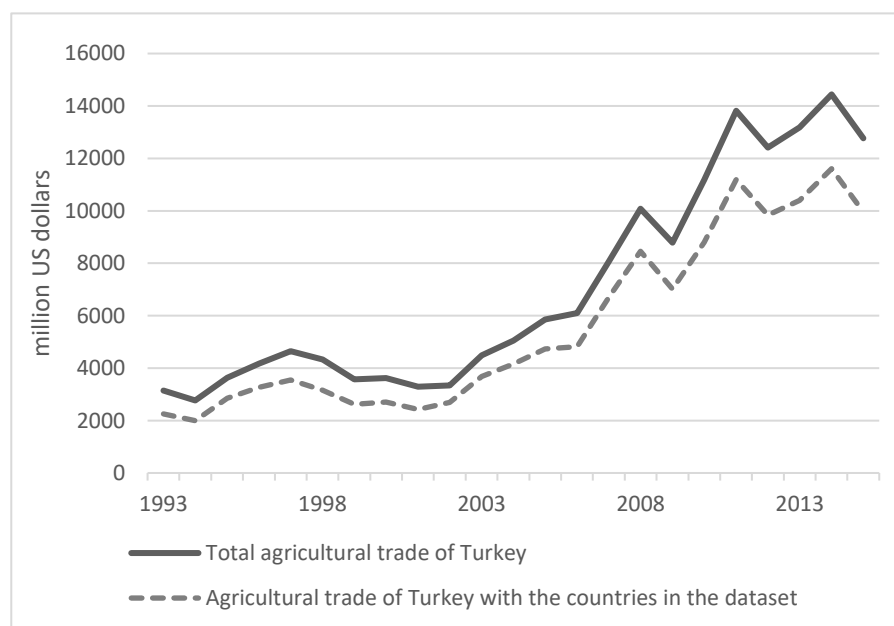
Source: Turkish Statistical Institute, Database of Foreign Trade Statistics.

In Turkey, the barriers to marketing in the EU countries have rapidly decreased as a result of the common practices brought by the harmonization policies implemented in the EU candidacy process and the Customs Union membership in 1996. Moreover, - although the Customs Union does not impose a specific exemption to the trade of agricultural products- the overall increase in the trade volume with the EU is also reflected in the trade of agricultural products with the block. Thus, beyond the

advantages of its geographical location, Turkey has gained a competitive advantage in the trading of agricultural products with the EU indirectly.

In a dynamic perspective, Turkey's agricultural trade has exhibited a consistent increase in the last two decades in contradiction with the temporary recessions in the Turkish economy and the adverse effects of the global crisis in 2008 on the global agricultural trade. In Peters et al. (2010), the effects of the 2008 world economic crisis on the trade of agricultural products is investigated. They suggested that there was a 20 percent short-term decrease in the value of global agricultural trade after the crisis.

At this point, some questions on the dynamics of Turkey's agricultural trade come forward: To what extent has the integration of Turkey to the CU been effective on its agricultural trade? Moreover, as a crucial factor that caused a recession in Turkey's economy, has the 2008 global crisis made any changes in the pattern of the agricultural trade of Turkey? These questions form the motivation of this paper. In this context, using the gravity model framework, we aim to examine the recent trends in the agricultural foreign trade of Turkey within the scope of partnership with Customs Union countries and the effects of the 2008 global crisis.

2. Literature Review

The significant growth of the agricultural trade of Turkey is investigated in some recent articles, analyzing the dynamics of agricultural foreign trade of Turkey in different aspects. For example, Atıcı and Güloğlu (2006) investigated fresh and processed fruit and vegetable exports of Turkey to the 13 EU countries using a gravity model. They found significant positive effects of GDP, population, whether the Turkish population in the partner country is larger than 2 percent and being a non-Mediterranean country. If the Turkish population in a partner country is larger than 2 percent, the tastes and preferences of the consumers in that country are accepted to be more similar to those of Turkish consumers. This is assumed to increase the volume of trade between two countries. Moreover, being a non-Mediterranean partner country might increase the volume of trade as there will be exchange of dissimilar agricultural goods. It is noteworthy that there is insignificant negative effect of distance between partner countries. The distance between partner countries is important as it can be used as a proxy of the cost of trade.

In their study investigating the effect of the exchange rate and its uncertainty on the agricultural trade of Turkey, Erdem et al. (2010) have utilized panel cointegration analysis for the period of 1980-2005. They have found that (i) the depreciation of domestic currency does not improve the agricultural trade balance and (ii) the exchange rate uncertainty is associated with a small improvement in the agricultural trade balance.

In another study analyzing the effect of the exchange rate volatility on trade by Johansen cointegration test, Erdal et al. (2012) found a positive long-term relationship between the exchange rate volatility and agricultural export, and a negative relationship between the exchange rate volatility and agricultural import. This study was based on the data between 1995 to 2007. They also found that the volume of agricultural exports and imports did not affect the exchange rate volatility.

Sever (2012) studied the effect of the real exchange rate volatility on the performance of the agricultural trade of Turkey. He found that the volatility of real exchange rate has a negative impact on both exports and imports of agricultural products in Turkey for the period of 1989-2011.

In Atıcı et al. (2011), the impact of Turkey's full integration into the EU on its agricultural exports is investigated and it is seen that Turkey's integration yields only moderate gains in agricultural exports. In the case of European Union membership, tariffs and thus, transaction costs would be lower. They found that a 1 percent increase in the rate of tariff would decrease the total volume of exports by 0.47 percent. They also suggested that Turkey had not been using the advantages of having neighborhood countries sufficiently.

3. Model Specification and Estimation

For the last half century, the gravity model has been the workhorse of numerous applied studies on international trade. Conceptually, the volume of international trade is determined by the incentives and the deterrences on it. Moving from this point, the typical gravity model links the trade flow between two countries to the economic magnitudes of the countries and the trade costs between them, which is commonly proxied by the geographical distance (Shepherd, 2012). The gravity model is specified as follows (Kepaptsoglou et al., 2010):

$$F_{ij} = O_i D_j R_{ij} \tag{1}$$

where F_{ij} is the trade flow between countries i and j. O_i and D_j refer to the characteristics of the origin and the destination countries respectively. R_{ij} is the measure of impedance between them. As the typical specification of the gravity model considers the distance between the countries as the main measure of impedance, many other structural factors affecting the trade flows are often included in the model in applied studies. Some examples are common language, common borders, common economic area membership

or free trade agreements, trade barriers, past colonial ties, common currency, real exchange rates (and/or real exchange rate volatility)[2].

In this study, we investigate the dynamics of the agricultural trade of Turkey using the following specification based on a gravity model framework:

$$ln\,TRADE_{it} = \alpha_0 + \alpha_1 \ln GDP_{it} + \alpha_2 \ln rerV_t + \alpha_3 Dist_i + \alpha_4 Border_i + \alpha_5 EU_{it} +$$
$$\alpha_6 D2008_t + \alpha_7 (EU_{it} D2008_t) + \varepsilon_{it} \qquad\qquad\qquad (2)$$

where, $TRADE_{it}$ is the bilateral agricultural trade between Turkey and country i in period t (million USD), GDP_{it} is the gross domestic product of country i in period t (in 2005 prices), $rerV_t$ is the real exchange rate volatility index in period t, $Dist_t$ is the distance (thousand kilometers) between the capitals of Turkey and the country i. The dummy variables in the model are $Border_i$ (=1 if the country i and Turkey has common border), EU_{it} (=1 if the country i is an EU member in year t) and D2008 (=1 after 2008). In addition, the structural change in the agricultural trade between Turkey and the EU member countries after the 2008 crisis is also investigated by an interaction dummy variable ($EU_{it} D2008_t$).

The bilateral agricultural trade data are constructed by the sum of sectoral exports to and imports from the selected countries, in which the sectoral data are based on the ISIC REV3 standard.

The exchange rate volatility is mostly considered as an important factor in determining the trade volume, but with a serious controversy. On one hand, the exchange rate volatility is accepted as a risk that reduces the trade volume. On the other hand, this effect is supposed to be ameliorated by futures markets (Cho et al., 2002). Also, some studies suggest that firms may benefit from the increased volatility in the exchange rates and increase their exports, which will lead to an increase in the aggregated volume of the trade[3]. In order to construct the real exchange rate volatility data, we use the formula suggested by Perée and Steinherr (1989). The derived volatility series exhibits two peaks after the crises in 1994 and 2001 (see figure 2).

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[2] A review of recent empirical studies on international trade modeling can be found in Kepaptsoglou et al. (2010)

[3] A detailed discussion on the interaction between exchange rate volatility and international trade can be found in Bahmani-Oskooee and Hegerty (2007)

Figure 2: Real Exchange Rate Volatility in Turkey
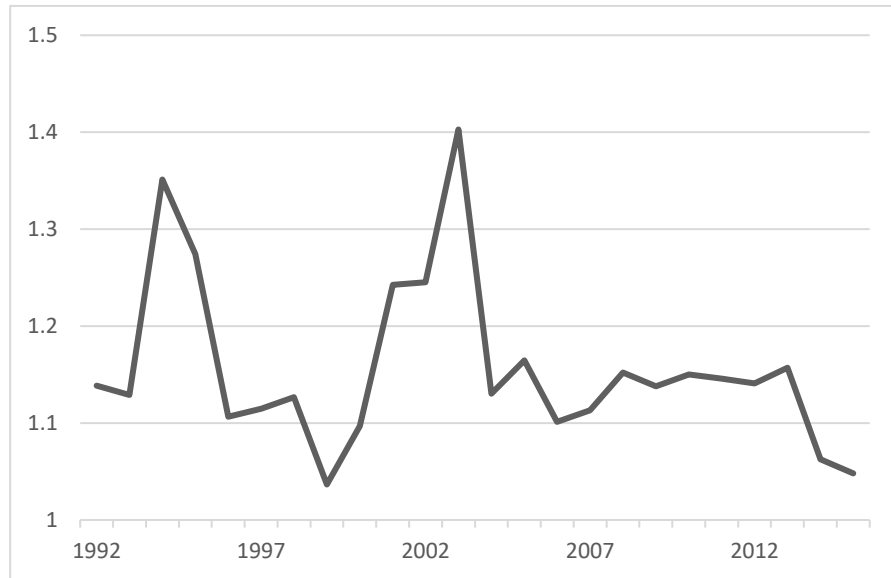
Table 1. The Agricultural Trade and The Distances Between Turkey and The Countries in The Dataset.

Countries	Agricultural Trade (USD)	Distance (kilometers)	Countries (cont.)	Agricultural Trade (USD)	Distance (kilometers)
Argentina	59388973	12465	Italy	746989249	1726
Australia	55376819	14491	Kazakhstan	21968446	3221
Austria	66368015	1605	Mexico	112478811	11771
Belgium	106837183	2519	Moldova	209216796	853
Brazil	445360565	10357	Netherlands	191625676	2541
Bulgaria	170343764	855	Paraguay	128947390	11807
Canada	404615434	8182	Poland	187750233	1644
China	125983049	6849	Romania	293013213	750
Ivory Coast	214120015	5320	Russian Fed.	1974763698	1795
Ecuador	73666041	11836	Saudi Arabia	122440516	2134
France	430335749	2605	Spain	65003709	3092
Germany	608936478	2042	Thailand	97630825	7142
Ghana	73071751	5044	Turkmenistan	242268312	2218
Greece	215322785	820	Ukraine	599129047	1183
Hungary	83151893	1391	United Kingdom	116706491	2839
India	159828538	4225	USA	1383164260	8746
Indonesia	177484673	9097			

The model is estimated using a balanced panel of 33 countries over the 1993-2015 period. The panel consists of the data belonging to the most dominant agricultural trade partners of Turkey which accounted for the 78 percent of the total agricultural foreign trade of Turkey in 2015. Agricultural trade and GDP data are obtained from Turkish Statistical Institute (TÜİK) and exchange rate volatility is derived by the method explained above, using the real exchange rate series which is compiled and published by the Central Bank of the Republic of Turkey (TCMB). Table 1 lists the agricultural trade volume and the distances between Turkey and the 33 countries included in the dataset, and Table 2 represents the random effects model estimates of equation 2.

Table 2. The Panel Regression Estimates for the Total Agricultural Trade of Turkey

Random Effects Model Estimation			
Dependent variable: ln(TRADE)			
Variable	**Coefficient**	**Standard Error**	**p-value (marginal significance level)**
constant	12.86111	1.115711	~0.0000
ln(GDP)	0.388175	0.089759	~0.0000
ln(rerV)	-1.366300	0.614260	0.0264
Dist	-0.036943	0.047843	0.4403
Border	1.118151	0.324728	0.0006
EU	0.782854	0.115911	~0.0000
D2008	1.437549	0.111783	~0.0000
EU.D2008	-0.969015	0.096716	~0.0000
R^2:	*0.3540*		
F-statistic:	*58.8137 (p-value: 0.0001)*		
Hausman test statistic:	*6.8928 (p-value: 0.0754)*		
Number of observations:	*759*		

4. Results and Discussion

In this study, the dynamics of Turkey's agricultural trade is investigated within the gravity model framework. The panel data analysis shows that, Turkey's agricultural trade during the 1993-2015 period has been significantly determined by the GDPs of the partner countries, the real exchange rate volatility, the existence of common borders and whether the partner country has an EU membership.

The results of the study indicate that the GDP of the partner country, reflecting the economic magnitude of her, has positive and significant effect on the agricultural trade,

and having common border significantly increases the agricultural trade. As it is discussed above, theoretically and empirically the effect of exchange rate volatility on international trade can be positive or negative. In our study, the real exchange rate volatility is found to have a negative impact on the agricultural trade of Turkey parallel to the results of Sever (2012). This inference supports the view that the volatility leads to uncertainty and, as a risk factor, demotivates trade. Accordingly, in order to prevent the adverse effects of the volatility on trade, the decision makers have the options of i) implementing the policies intended for the stability of exchange rates and ii) supporting the mechanisms that are supposed to reduce the risks of exchange rate volatility (i.e. futures markets).

Although the 2008 crisis led to a broad-based decline in the world agricultural trade and a serious recession in Turkey's economy, our results show that the agricultural trade volume of Turkey experienced a positive shift after the global crisis in 2008. The dummy variable for the EU membership points out that Turkey's agricultural trade with EU member countries are significantly higher than the non-EU countries. Besides the inference derived from the individual dummies for the EU membership and the 2008 crisis, our interaction dummy (EU*D2008) gives interesting results about the structural change of Turkey's agricultural trade with the EU countries. We see that the trade with the EU countries tends to be more than non-member countries before 2008. This composition has reversed after the crisis. It can be argued that this trend in the agricultural trade from EU to non-EU countries, may have helped Turkey to mitigate the possible adverse effects of the 2008 crisis.

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