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Turkey's Agricultural Integration with the EU: Quantifying the Implications

Mustafa ACAR[*]
Burcu AFYONOGLU[**] **Savas KUS**[**] **Bengisu VURAL**[**]

ABSTRACT

After long-lasting efforts for more than four decades, Turkey and the EU started accession negotiations on October 3, 2005. Accordingly, as a serious candidate for membership, the economic impact of Turkey's accession to the EU has gained now special attention. The cost of integration is naturally one of the major issues of debate in both Turkey and the EU. Most of the economic effects for Turkey are expected to be felt notably in the agricultural sector. Therefore, during the process of negotiations, examination and detection of possible changes in agricultural sector while capturing general equilibrium effects is of particular importance. Such an evaluation will shed light not only on the determination of agricultural policies, but also on regional development and welfare issues. In addition, possible burden of absorbing Turkey's agriculture on the EU budget is a major concern.

In this context, this paper investigates the consequences of agricultural integration between Turkey and the EU in a multi-sector, multi-country computable general equilibrium framework. Using a modified version of standard GTAP model to address specifically budgetary implications and taxes, the paper looks into the impact of agricultural integration, sectoral reallocations and the welfare effects. One should stress that there is not a simple and clear-cut conclusion one can derive at this point. Depending on the sequence of integration steps, timing and the degree of harmonization, the results vary. The paper analyzes the effects of various possible integration scenarios.

Key Words: CGE Analysis, Agriculture, Turkey-EU Integration

[*] Assoc. Prof., Kirikkale University, Department of Economics, acar70@gmail.com
[**] Ph.D. student, Bilkent University, Department of Economics.

1. Introduction

Quantitative analysis has an important role in estimating the impacts of economic policy changes on the different sectors of the economy. Within a general perspective, quantitative analysis can be divided into two groups; partial equilibrium analysis and general equilibrium analysis. Partial equilibrium analysis works under the so called "ceteris paribus" assumption, disregarding the forward and backward linkages between the sectors, not taking the resource scarcity into consideration and not analyzing the bearer of the cost of subsidizing. Despite its limitations, partial equilibrium analysis is still an important tool, depending on the focuses of the studies. However, general equilibrium analysis is more preferable in the sense that it estimates the economy-wide implications of the policy changes on resource reallocation and welfare.

Parallel to the advancements in the computer technology which eases the quantitative analysis and the world-wide increase in the importance of regional economic integration, general equilibrium analysis has also gained a lot of importance. The studies initiated in Australia, USA and Europe has been used more frequently with the rising demand from the developing countries. The need for the general equilibrium analysis has also been increasing in Turkey, which has started its negotiations with the EU in the process of economic integration. The persuasive power of the arguments that are going to be put forward during the negotiations depends highly on the support of quantitative analysis. In this context, general equilibrium analysis provides a solid base for the management of the negotiation period, as well as it investigates the possible effects of Turkey's integration with the EU. Our study, which can be considered among the attempts of the same line, aims to examine the possible impacts of agricultural integration.

The era of globalization is an era during which there are reduced barriers to international trade and increased regional integration. Under these circumstances, quantitative models which enable us to asses the possible impacts of trade agreements have become important tools. Based on their solid microeconomic foundation, Computable General Equilibrium (CGE) models are considered as powerful tools in quantifying the impacts of political changes on the sectoral production, factor prices and inter-sectoral reallocation. For this reason, the CGE models, by which all agents, all flows and their interaction within the economy could be studied, are being frequently used by the decision makers. There are studies in the existing literature, which focuses on the different stages of the EU integration process through CGE models.

Firstly, Harrison, Rutherford and Tarr (1996) investigate the economical impacts of Turkey's Customs Union with the EU. Under a static CGE framework, the study indicates an increase in Turkey's welfare, which amounts to 1.2%-1.9% of Turkish GDP. Additionally, the reason for this increase in welfare is predicted as the advancement of Turkey's access to the regions other than the EU. Implementing an inter-temporal CGE framework, Mercier and Yeldan (1997) conclude that it is possible to have an increment in Turkey's welfare as long as Turkey abandons the non-tariff barriers that are present in its trade with the EU and continue with reforming its trade. Attaining similar results, Bayar and Yeldan (2000) also states that the advantageous outcomes of the Customs Union are conditional on the sustainability of a competitive economic environment. De Santis (2000) studies the effects of Customs Union on the income distribution in Turkey, through a static CGE model and finds this distributive effect to be negligible. Cakmak and Kasnakoglu (2003) investigate the impact of Turkey's membership to EU under different scenarios. Using a non-linear mathematical programming model of the agricultural sector, the study finds that membership is beneficial to consumers, but not to agricultural producers. Grethe (2004) examines consequences of extending Turkey's customs union to agricultural sectors by using a static partial equilibrium model. The study concludes that Turkey tends to be a net importer of cereals, processed products and animal products, and a net exporter of fruits, vegetables and plant products. Using a static CGE model called "Worldcan" Lejour, Mooij and Capel (2004) analyses the impacts of Turkey's integration with the EU under

three alternative scenarios: accessibility to the domestic market, advancement of the national institutions and free mobility of the labor force. This model anticipates a 0.8% increase in GDP, a 1.4% increase in production, an 8.1% increase in exports and a 12.2% increase in imports with the improved trade conditions as a result of the integration. Finally, Zahariadis (2005) tries to asses the economic impacts of the abolishment of the technical barriers to the trade with the EU by using an upgraded standard GTAP model. According to the results, Turkey's integration with the EU is beneficial to both parties. Also, Oskam and Burrel (2004) study the impacts of the integration through different focuses.[1]

None of the above mentioned studies focuses directly on the analysis of the impacts of agricultural integration. However, the crucial importance of the agricultural sector within the negotiation process which has started on October 3, 2005. Not only with it's anticipation of reform in Turkey's agricultural sector, but also with it's possible effects on the EU budget, the importance of agricultural integration has been on the rise for both Turkey and the EU. For these reasons, there is an increasing demand for quantifying the possible effects of agricultural integration.

In this context, this study aims to analyze the effects of agricultural integration of Turkey with the EU within a general equilibrium framework. The remainder of the paper is organized as follows: the next section introduces the characteristics of the model, the data set and the empirical design. The discussions on the simulation results are presented in the following section. The paper concludes with the evaluation of the empirical results.

2. The Model, the Data Set and the Methodology

The Model and the Data Set

As the advancements in computer technology enables us to work with more intense models, to constitute and preserve large data sets, general equilibrium analysis has been used in quantitative researches more frequently. This presented study uses the "Global Trade Analysis Project" (GTAP) general equilibrium model (Hertel, 1997) and the GTAP 6 database in analyzing the effects of Turkey's integration with the EU, focusing specifically on the agriculture sector implications.

The standard GTAP model which sets the base for our study, there is a representative household who collects all the created income. This representative household, who maximizes his utility under the Cobb-Douglas type utility function, spends his income on private consumption and government consumption, and he saves the remaining part. In the standard model which is formed under the Armington specification[2], consumption could be done through domestic or foreign markets. While the government consumption is modeled by using Constant Elasticity of Substitution (CES) utility function, private household consumption is defined as a Constant Difference of Elasticity (CDE)[3] expenditure function.

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[1] Oskam and Burrel (2004) also look into implications of Türkiye-EU integration from various fronts. In particular, the following 4 studies are evaluated in this book: Lejour, de Mooij and Capel (2004), Cakmak and Kasnakoglu (2003), Grethe (2004), and Zahariadis (2002).

[2] According to Armington specification, domestically produced and imported goods are regarded as imperfect substitutes. Within this specification, it is possible to differentiate imported and domestically produced goods.

[3] CDE type functions rely on the assumption of implicit additivity; although the substitution elasticities are not equal, there is a constant difference between the elasticities. Regarding the restrictions that are implied by the functional structure CDE type functions can be evaluated somewhere in between the highly restrictive functions such as Cobb-Douglas type functions which predicts a constant share in the income, and perfectly elastic functional forms. Using this functional type gives the advantage of using N parameters for substitution elasticities, in the presence of N commodities, rather than N(N-1)/2 parameters.

Firms are maximizing their profits in a perfectly competitive market setting. The production function is specified as a nested CES function with Constant Returns to Scale (CRTS) property (Tsigas and Hertel, 1997). In the model the optimal factor usage decision of the firms is assumed to be weakly separable from the prices of the intermediate goods. As the income of the producers is formed by the sales of the final goods to private households, to the government, to abroad and the sales of the intermediate goods to other firms, this income is spent entirely on the intermediate good usage and the factor payments under "zero profit" principle.

The data that is used in this study is the GTAP Database version 6, which includes 57 sectors, 87 regions and takes the year 2001 as its base year.[4] The GTAP database, which is based on the individual input-output tables of the countries, enables detailed analysis on international trade, environment and resource allocation through regional and sectoral aggregation.

For the purposes of this study, 87 regions are aggregated into 4 regions: Turkey (TUR), EU15 (representing the existing EU members, before the enlargement in 2004), EU10 (The new EU members in 2004) and finally ROW (consists of the remaining regions and the countries)[5]. Similarly, as represented in Table 1, 57 sectors of the GTAP database are aggregated into 15 sectors for the purposes of our study. Since the main reason for this aggregation is to analyze the agriculture sector in detail, 9 agricultural sectors (1-9) are specified and the rest of the sectors are grouped as the manufacturing sectors (10-14) and a services sector. The agricultural sectors are divided into groups of primary agricultural sectors (1-6) and processed agricultural sectors (7-9) among themselves.

Although, within the standard GTAP framework it is possible to drive a multi-regional, multi-sectoral model for the regional economic integration, in order to analyze the impacts of Turkey's integration with the EU on the budget some modifications to the standard model has to be done. Grounding the modification to Acar (2000), the EU budget is modeled in the following fashion.

Table 1: Sectoral Aggregation

1	VAF	Vegetables and Fruits
2	GRA	Cereal Grains
3	OSD	Oil Seeds
4	LVS	Live Stock
5	OPA	Other Primary Agriculture
6	FAF	Forestry and Fishing
7	MTP	Meat Products
8	DAP	Dairy Products
9	OFP	Other Food Products
10	TXT	Textile
11	ATM	Automotive
12	ISM	Metals and Mineral Products
13	ENG	Energy
14	OMP	Other Manufacturing Products
15	SVC	Services

[4] See Acar (2006a) for details about Turkey's data in the GTAP 6.
[5] Due to the lack of individual IO tables representing these countries, they are considered as an aggregated group.

Modeling the EU Budget

One of the main hesitations of the EU about Turkey's agricultural integration stems from the possible burden of this integration which the EU has to bear. For this reason, including the EU budget in models which investigate the agricultural integration is crucial. In this study the EU budget is designed as a financial institution to which the member countries contribute and through which the resources are redistributed among the member countries. The EU budget is assumed to be in balance. The EU budget for the year 2006 is represented in Table 2.

As can be clearly seen from Table 2, the largest contribution to the EU budget comes from the GNP based resources and agricultural expenditures constitute the largest share of the expenditures. In this paper the resources of the EU budget is modeled as the sum of GNP based resources and customs duties. If one considers that these two items account to the 83.5% of the EU budget in total, this simplification can be thought of as a good approximation. According to the model, 75% of the customs duties are transferred to the EU budget, whereas the GNP based resources adjust endogenously, in order to balance the budget. On the other hand, on the expenditure side, the expenses of the EU budget are modeled in such a manner that it covers the agricultural export and production subsidies of the member countries.

Table 2: EU Budget (Million Euros, 2006)

Revenues			**Expenditures**		
Revenue Sources	**Value**	**Share (%)**	**Expenditure Items**	**Value**	**Share (%)**
Agricultural Duties and Sugar Levies	1 319.70	1.2	Agriculture	50 991.02	45.5
Customs Duties	12 905.40	11.5	Structural Operations	35 639.60	31.6
VAT based resources	15 884.32	14.2	Internal Policies	8 889.22	7.9
GNI based resources	80 562.50	72.0	External Action	5 369.05	4.8
Other	1 297.69	1.2	Administration	6 656.37	5.9
			Reserves	458.00	0.4
			Pre-accession Strategy	2 892.85	2.6
			Compensation	1 073.50	1.0
Total	111 969.61	100	**Total**	111 969.61	100

Source: EU Commission*

2.3 Experimental Design

The aim of this study is to investigate sectoral reallocation, welfare and budgetary effects of Turkey's integration with the EU. Regarding this aim, two different scenarios are formed. In the first scenario (Scenario-1), the impacts of the Turkey's integration with the EU are compared to the case in which the customs union between Turkey and the EU, and the integration of ten new EU members (EU10) with EU15 is completed. In the other scenario (Scenario-2), the effects of Turkey's integration with the EU are examined under the assumption that it takes place simultaneously with the integration of EU10 with EU15

* http://eur-lex.europa.eu/budget/data/D2006_VOL1/EN/index.html

2.3.1. Scenario-1

Before applying the simulations, it is necessary to constitute the base case to which the effects of integration are compared. Since GTAP database's base year is 2001, it does not include the changes that have occurred in the world following the year 2001. From the Turkey-EU perspective, this means that the database does not cover the conditions of the completion of customs union between Turkey and the EU, and the integration of EU10 with EU15. As regards to this, the base case for the first scenario is formed by completing the customs union and making EU10 a member of the EU. [6]

In this regard, in order to implement the integration of EU10 with EU15, import and export duties are mutually removed, and EU10's external tariffs and output subsidies are synchronized with that of EU15. Moreover, EU10 is included in the EU budget. In order to complete the customs union between Turkey and the EU, export and import tariffs are mutually removed and a common external tariff is implemented to the third parties for industrial goods except for food products. For the processed food sectors, the import duties are removed only for industrial share of the sector.

After the adaptation of the original database, alternative policy simulations for the process of the EU integration are carried out. There are different ways in which agricultural integration can be realized: the extension of customs union to the agricultural goods without a full membership, agricultural integration with full membership, full membership and the removal of import duties for agricultural goods without utilizing agricultural subsidies. In the first part of this study, three of these different scenarios are analyzed.

The first simulation (sim-1.1a) analyzes the effects of the partial agricultural integration which implies the extension of customs union to the agricultural goods without full membership. In this context, partial integration involves the removal of import duties between Turkey and the EU, and the synchronization of common external tariff for agricultural goods. Since Turkey does not become a full member of the EU, it neither contributes to the EU budget, nor receives subsidy from the budget.

The next simulation (sim-1.1b) investigates the effects of completion of the agricultural integration by synchronization of output subsidies of Turkey with that of the EU. In this simulation, Turkey is incorporated into the EU budget.

The last simulation (sim-1.2) explores the impacts of both full agricultural integration and participation to the EU budget at the same time. The reason for the investigation of agricultural integration in two steps is to be able to observe comparative effects of different stages of the integration.

Prior to proceeding with the empirical results of the simulations, it would be enlightening to assess the current situation in order to interpret the results more thoroughly. For this purpose, import duties and output subsidies are reported in Table 3 and 4 for selected sectors and regions. In other words, these numbers refer to the import duties and output subsidies which are attained after the completion of customs union and EU15-EU10 integration.

It can be seen from Table 3 that Turkey applies high import tariffs, especially in vegetables and fruits (VAF), grains (GRA), oil seeds (OSD) and dairy products (DAP). For meat products (MTP), Turkey executes high import duties against EU10, but not against EU15. EU10's import duties for agricultural goods are higher than EU15's tariffs against Turkey for

[6] The integration of Bulgaria and Romania with the EU in 2007 is not taken into account.

some sectors, such as meat products (MTP), dairy products (DAP) and forestry and fishing (FAF).

Table 3: Import Duties (Base Case for Scenario-1)

	Turkey			**EU15**			**EU10**		
	EU15	EU10	ROW	TUR	EU10	ROW	TUR	EU15	ROW
VAF	42.8	42.8	37.0	2.5	0.0	18.6	2.5	0.0	15.7
GRA	22.8	22.8	45.2	0.8	0.0	3.2	0.8	0.0	3.1
OSD	10.2	10.2	8.0	0.0	0.0	0.0	0.0	0.0	0.0
LVS	3.3	3.3	0.2	0.0	0.0	1.8	0.0	0.0	1.7
OPA	0.0	0.0	0.9	0.2	0.0	11.0	0.2	0.0	9.9
FAF	0.7	0.7	0.4	0.0	0.0	1.3	3.3	0.0	1.2
MTP	2.3	10.6	8.7	0.6	0.0	23.6	9.0	0.0	19.0
DAP	11.1	11.9	73.0	7.1	0.2	37.4	17.5	0.0	27.2
OFP	2.3	6.2	17.9	1.7	0.0	14.6	5.1	0.0	12.8
TXT	0.0	0.0	5.3	0.0	0.0	5.5	0.0	0.0	5.3
ATM	0.0	0.0	3.6	0.0	0.0	3.7	0.0	0.0	3.6
ISM	0.0	0.0	1.2	0.0	0.0	1.2	0.0	0.0	1.2
ENG	0.0	0.0	0.2	0.0	0.0	0.2	0.1	0.0	0.2
OMP	0.0	0.0	1.2	0.0	0.0	1.2	0.0	0.0	1.2
SVC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: The GTAP 6 database.

Table 4: Output Agricultural Output Subsidies (Base Case for Scenario-1)

	TUR	**EU15**	**EU10**	**ROW**
VAF	3.2	0.4	0.4	-1.1
GRA	1.2	1.3	1.3	1.5
OSD	0.0	35.7	35.7	6.3
LVS	0.4	0.4	0.4	-0.2
OPA	2.7	5.8	5.8	1.4
FAF	0.0	3.7	3.7	-1.8
MTP	0.0	0.0	0.0	-0.8
DAP	0.0	0.0	0.0	-0.3
OFP	0.0	-2.9	-2.9	-4.3

Source: The GTAP 6 database.
Note: Positive values show subsidies, whereas negative ones are for taxes.

As can be seen from Table 4, agricultural output subsidies are generally lower than the ones applied in EU. Turkey has higher output subsidies for vegetables and fruits (VAF) and other food products (OFP) only.

2.3.2. Scenario-2

Under this scenario, we try to assess the impacts of Turkey's integration with the EU under the assumption that it takes place simultaneously with the integration of EU10 with EU15. This is a fictitious scenario in the sense that the simulations are based on the hypothetical case which demonstrates the economical environment that could have occurred if both parties (i.e. Turkey and the EU) mutually set the suitable conditions for the integration of Turkey with the EU at the same time as EU10 become EU members. In this context, the database which has been used in the base case is the original GTAP database which was not subject to any adjustments. All the simulations regarding the integration of Turkey with the EU are interpreted in comparison to this case.

Following a structure which is similar to the structure of the simulations in scenario-1, we investigate the impacts of three alternative policies: partial agricultural integration (sim-2.1a), completion of agricultural integration (sim-2.1b) and full agricultural integration (sim-2.2).

The first simulation (sim-2.1a) explores the impact of partial agricultural integration. This simulation has two main parts. Firstly, EU10 countries are fully integrated with the EU15. At the same time, customs union in both industrial and agricultural sectors is established between Turkey and the EU. As regards to customs union, import and export duties are mutually removed. In addition, Turkey's external tariffs (imposed on the ROW) are synchronized with that of the EU. In this simulation, similar to sim-1.1a, since Turkey is not a full EU member, it neither contributes to the EU budget, nor receives subvention payments from the budget.

As an extension to the previous simulation (sim-2.1a), the next simulation (sim-2.1b) investigates the effect of completion of agricultural integration by adapting output subsidy rates of the EU. Turkey is included in the EU budget at this stage.

Finally, the last simulation (sim-2.2) examines the impacts of completion of customs union, full agricultural integration which is assumed to take place at the same time as the full membership of the EU10 countries.

In order to have a better understanding of the empirical results of the simulations, we present the existing import duties and output subsidies in the base case scenario in Table 5 and 6.

Table 5: Import Duties (Base Case for Scenario-2)

	Turkey			**EU15**			**EU10**		
	EU15	EU10	ROW	TUR	EU10	ROW	TUR	EU15	ROW
VAF	42.8	43.3	37.0	2.5	4.1	18.6	18.5	10.5	10.2
GRA	22.8	29.2	45.2	0.8	3.8	3.2	35.0	17.4	10.0
OSD	10.2	15.5	8.0	0.0	0.0	0.0	10.6	3.5	2.3
LVS	3.3	0.0	0.2	0.0	25.6	1.8	0.0	1.0	5.1
OPA	0.0	0.0	0.9	0.2	0.9	11.0	0.0	1.0	0.2
FAF	0.7	11.6	0.4	0.0	0.7	1.3	146.2	4.1	1.1
MTP	7.0	41.9	8.7	4.5	14.9	23.6	86.3	16.5	18.5
DAP	83.4	74.7	73.0	34.1	40.4	37.4	115.4	39.0	27.6
OFP	9.0	29.2	17.9	14.9	10.3	14.6	45.5	19.2	18.6
TXT	0.0	2.7	8.9	0.0	0.0	5.5	7.1	3.0	10.8
ATM	0.0	5.3	1.9	0.0	0.0	3.7	6.4	3.8	6.4
ISM	0.0	9.9	4.2	5.4	3.4	1.2	3.0	2.1	4.0
ENG	0.0	0.2	0.1	0.0	0.0	0.2	2.1	2.8	1.0
OMP	0.0	2.2	2.7	0.0	0.0	1.2	5.8	1.8	4.8
SVC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: The GTAP 6 database.

Table 6: Agricultural Output Subsidies (Base Case for Scenario-2)

	TUR	EU15	EU10	ROW
VAF	3.2	0.4	-1.1	-1.1
GRA	1.2	1.3	1.2	1.5
OSD	0.0	35.7	-0.6	6.3
LVS	0.4	0.4	0.4	-0.2
OPA	2.7	5.8	0.6	1.4
FAF	0.0	3.7	-1.5	-1.8
MTP	0.0	0.0	-0.2	-0.8
DAP	0.0	0.0	-0.2	-0.3
OFP	0.0	-2.9	-0.6	-4.3

Source: The GTAP 6 database.
Note: Positive values show subsidies, whereas negative ones are for taxes.

3. Simulation Results

3.1. Results of Scenario 1

3.1.1. Impacts on Sectoral Output

The impact of agricultural integration on sectoral output by region under alternative simulations is shown in Table 7 below.

Table 7: Impact on output, by sector, by region, % change

	Sim-1.1a			Sim-1.1b			Sim-1.2		
	TUR	EU15	EU10	TUR	EU15	EU10	TUR	EU15	EU10
VAF	0.55	-0.1	-0.17	-7.91	0.83	0.36	-7.4	0.73	0.19
GRA	-3.43	-0.1	-0.31	-31.16	0.12	0.27	-33.52	0.02	-0.04
OSD	-0.13	0	0.12	2.06	-0.19	-0.56	1.93	-0.19	-0.44
LVS	2.86	-0.1	-0.58	-13.87	0.13	0.73	-11.41	0.03	0.14
OPA	2.28	0.6	0.14	2.45	0.61	-0.04	4.78	1.22	0.1
FAF	3.55	0	-0.12	-4.54	0.02	0.02	-1.14	0.03	-0.11
MTP	14.35	-0.02	-0.24	-26.64	0.1	0.48	-16.12	0.08	0.23
DAP	14.1	-0.18	-2.32	-10.13	0.17	2.86	2.54	-0.01	0.47
OFP	1.81	-0.03	-0.01	-8.49	0.11	0.14	-6.84	0.08	0.12
TXT	-1.3	0.03	0.17	-53.36	1.16	1.31	-53.96	1.19	1.48
ATM	-1.09	0.01	0.08	-35.08	0.05	0.09	-35.79	0.06	0.17
ISM	-1.45	0.01	0.16	-1.23	-0.06	-0.44	-2.66	-0.05	-0.28
ENG	-0.68	0.01	0.06	283.33	-2.42	-2.74	280.72	-2.41	-2.69
OMP	-0.94	0.01	0.11	-30.76	-0.01	-0.02	-31.41	0	0.1
SVC	-0.14	0	0.01	-5.34	0.04	0.04	-5.47	0.04	0.05

Source: Simulation Results.

As can be seen from Table 7, under partial agricultural integration (Sim-1.1a) positive output responses are observed in most of the agricultural sectors whereas contractive output responses are found in manufacturing and services sectors. The results indicate that the output of primary and manufactured food sectors other than cereal grains (GRA) and oil seeds (OSD) sectors expand in response to the integration scenario where Turkey extends customs union agreement to the agriculture sector without being a member of EU. The largest output expansions are realized in meat products (MTP) and dairy products (DAP) sectors. The changes in output can be decomposed into the contribution of domestic demand and the contribution of

export demand. According to the Table 8, the increase in output can be attributed to the increase in exports. The distribution of the increased demand in exports among the regions EU15, EU10 and ROW is 1.22%, 59.02% and 39.76% for meat products (MTP) sector and 6.39%, 71.08% and 22.53% for dairy products (DAP) sector respectively. As can be seen from these numbers, the output increases in the corresponding sectors are driven by the increase in export demand from EU10 countries. The main reason behind this is the higher protection rates imposed by the EU10 region. Although there are not considerable differences among regions in terms of output subsidies, import duties are significantly high in the EU10 region.

Table 8: Decomposition of Output Response between Export and Domestic Demand, by sector, % change

	Sim-1.1a		**Sim-1.1b**		**Sim-1.2**	
	Export contribution	Domestic demand contribution	Export contribution	Domestic demand contribution	Export contribution	Domestic demand contribution
VAF	1.07	-0.52	-8.04	0.13	-7.01	-0.39
GRA	7.32	-10.75	-14.77	-16.39	-6.94	-26.58
OSD	0.28	-0.41	2.12	-0.06	2.40	-0.47
LVS	0.13	2.73	-1.41	-12.46	-1.32	-10.09
OPA	-0.12	2.40	-1.07	3.52	-1.21	5.99
FAF	0.62	2.93	-1.14	-3.40	-0.55	-0.59
MTP	12.61	1.74	-15.92	-10.72	-5.60	-10.52
DAP	13.85	0.25	-13.62	3.49	-1.68	4.22
OFP	0.98	0.83	-6.08	-2.41	-5.21	-1.63
TXT	-0.85	-0.45	-34.37	-18.99	-34.77	-19.19
ATM	-0.85	-0.24	-26.42	-8.66	-26.98	-8.81
ISM	-0.79	-0.66	-12.54	11.31	-13.12	10.46
ENG	-0.29	-0.39	199.47	83.86	197.84	82.88
OMP	-0.55	-0.39	-15.23	-15.53	-15.63	-15.78
SVC	-0.14	0.00	-4.96	-0.38	-5.09	-0.38

Source: Simulation Results.

Accomplishment of full harmonization of the output and export subsidy structure between Turkey and the EU, following the partial integration (Sim-1.1b), leads to the contraction of the agricultural sectors except oil seeds (OSD) and other primary agriculture (OPA) sectors. While the positive output response in oil seeds (OSD) sector can be attributed to the increased export demand, the positive output response in other primary agriculture (OPA) is more likely to be driven by domestic demand contributions. On the other hand, the sources of the contraction in remaining agricultural sectors are observed to be different. In cereal grains (GRA), the meat products (MTP), forestry and fishing (FAF), live stock (LVS) and other food products (OFP) sectors both domestic and foreign demand is decreasing. However, in vegetables and fruits (VAF) and dairy products (DAP) sectors while export demand is declining, domestic demand rises. In this context, the full harmonization of the output and export subsidy structure between Turkey and the EU creates a negative effect on the agricultural sector.

Under the scenario where full agricultural integration is established at once (Sim-1.2), all agricultural sectors other than the oil seeds (OSD), dairy products (DAP) and other primary agriculture (OPA) sectors experience contractions in their output. The contribution of domestic demand to overall output response is higher in (DAP) and other primary agriculture (OPA) sectors where the contribution of export demand is higher in oil seeds (OSD) sector. In the shrinking agricultural sectors not only domestic but also export demand is observed to fall. In line with the import duties data that is reflected by the database, when we compare partial

agricultural integration with the full agricultural integration we find that both policies have a negative effect on output yet full integration's effect is larger in magnitude.

3.1.2. Impact on the EU Budget

One of the main concerns of EU regarding the integration of Turkey with the EU is the cost of agricultural integration on the EU budget. As partial agricultural integration only involves the elimination of border protections there is no additional burden of integration to the EU budget. However, when the full agricultural integration is sustained Turkey will have both revenue and expenditure driven effects on the EU budget. The budgetary cost of Turkey's completion of full agricultural integration after partial agricultural integration, is estimated to be around 118 million US $ per year as compared to only 73 million US $ in full integration at once.

Turkey contributes to the EU budget mainly in the form of import duties whereas the transfers from the EU budget to Turkey are basically in the form of output subventions.

Table 9: Impact on the EUB, full vs. partial harmonization, US $ million

	Sim-1.1a			Sim-1.1b			Sim-1.2		
	TUR	EU15	EU10	TUR	EU15	EU10	TUR	EU15	EU10
Import tax contribution	0.00	-37.64	-79.76	434.07	177.82	17.55	476.97	140.12	-59.43
GDP tax contribution	0.00	78.45	3.90	-3.09	-102.81	-5.11	0.00	-69.75	-3.46
Total contribution (revenue)	0.00	40.81	-75.86	**430.98**	75.00	12.44	**476.97**	70.37	-62.89
Export subsidy cont.	0.00	-39.16	4.96	22.96	-15.56	-10.99	47.765	-55.02	-6.03
Output subsidy cont.	0.00	-0.07	-0.79	525.91	-4.54	0.65	502.48	-4.60	-0.14
Total cont.(expenditure)	0.00	-39.22	4.17	**548.87**	-20.10	-10.34	**550.24**	-59.62	-6.17
Net EUB transfers	**0**			**117.89**			**73.27**		

Source: Simulation Results.

3.1.3. Impact on Regional Welfare

Table 10 shows the welfare gains (or losses) as measured by the regional equivalent variation. Money metric equivalent of welfare changes indicate that all simulations generate welfare gains for Turkey. Under partial integration welfare gains in Turkey is expected to be 49 million US $ and welfare losses in EU10 and ROW are expected to be 16 million US $ and 115 million US $ respectively. Moreover, no significant welfare changes are expected for EU15 in this setting. The findings point out that with full agricultural integration welfare in Turkey is expected to increase about 10 billion US $, whereas EU15 and EU10 will experience an increase about 2.3 billion US $. For the EU10 region, partial integration is expected to cause welfare losses, while full integration is expected to create welfare gains. Conversely, for the ROW welfare gains are experienced with partial integration and losses are incurred with full integration.

Table 10: Impact on regional welfare (EV, US $ million)

	Sim-1.1a	Sim-1.1b	Sim-1.2
TUR	49.1	9953.9	9989.4
EU15	0.1	2299.6	2300.5
EU10	-16.4	51.7	35.2
ROW	115.0	-2815.6	-2698.9

Source: Simulation results

Table 11 gives the decomposition of regional welfare changes into its major sources. It appears that allocative efficiency component is the major contributor to the overall welfare changes for all of the regions under all simulations.

Table 11: Decomposition of Welfare Changes (EV, US $ million)

	Sim-1.1a			Sim-1.1b			Sim-1.2		
	alloc.eff.	tot	other	alloc.eff.	tot	Other	alloc.eff.	Tot	Other
TUR	27.9	28.0	-6.9	9198.7	1127.0	-371.7	9275.6	1091.3	-377.5
EU15	28.7	-31.2	2.7	1520.2	666.1	113.3	1532.0	652.0	116.5
EU10	55.9	-68.2	-4.0	10.2	47.9	-6.4	17.8	27.9	-10.3
ROW	35.5	71.4	8.1	-1212.6	-1889.2	286.1	-1177.1	-1817.8	295.9

Source: Simulation results

Finally, Table 12 presents the impact of agricultural integration on real growth rates with respect to different simulations. As indicated in Table 12, partial agricultural integration is not expected to bring about significant changes in real growth rate. However, full agricultural integration will result in a 6% increase in real growth rate. Although the real growth rates in EU10, EU15 and ROW will decline, these negative effects are considerably small.

Table 12: Real Growth, % change

	Sim-1.1a	Sim-1.1b	Sim-1.2
TUR	0.02	6.05	6.11
EU15	0	0.02	0.02
EU10	0.02	0	0
ROW	0	-0.01	-0.01

Source: Simulation results

3.2. Results of Scenario 2

3.2.1 Impacts on Sectoral Output

The impact of agricultural integration on sectoral output by region under alternative simulations in the context of scenario 2 is presented in Table 13 below.

Table 13: Impact on output, by sector, by region, % change

	Sim-2.1a			Sim-2.1b			Sim-2.2		
	TUR	EU15	EU10	TUR	EU15	EU10	TUR	EU15	EU10
VAF	0.14	0.38	-2.27	-7.97	0.84	0.37	-7.23	1.21	-1.91
GRA	-4.54	0.19	0.31	-31.16	0.12	0.26	-33.03	0.31	0.56
OSD	0.47	0.11	-3.5	2.03	-0.19	-0.53	3.61	-0.08	-4
LVS	3.08	-2.26	20.76	-13.65	0.12	0.61	-10.02	-2.15	21.44
OPA	2.73	1.37	4.62	2.42	0.62	-0.03	6.29	1.95	4.59
FAF	4.5	0.06	-1.07	-4.17	0.02	0.03	1.15	0.08	-1.04
MTP	21.51	-0.58	12.35	-25.63	0.09	0.38	-7.68	-0.49	12.75
DAP	19.95	-2.85	55.66	-8.48	0.16	2.37	11.48	-2.71	59.08
OFP	4.66	0.01	0.51	-8.48	0.11	0.13	-3.3	0.12	0.64
TXT	-4.4	0.11	-0.69	-53.51	1.17	1.35	-54.37	1.26	0.64
ATM	-3.54	0.05	2.26	-35.22	0.05	0.11	-36.26	0.1	2.38
ISM	0.15	-0.28	1.15	-1.43	-0.06	-0.41	-0.49	-0.35	0.75
ENG	14.81	-0.06	-1.47	283.48	-2.42	-2.74	320.05	-2.34	-4.02
OMP	-3.58	0.07	-1.96	-30.89	-0.01	0.01	-31.85	0.06	-1.95
SVC	-0.48	0.02	-0.55	-5.37	0.04	0.04	-5.05	0.06	-0.52

Source: Simulation Results.

Similar to the presented impacts of partial agricultural integration under scenario 1, positive output responses also prevail in most of the agricultural sectors under the first simulation of scenario 2 (sim-2.1a). The results implicate that the output of primary and manufactured food sectors other than the cereal grains (GRA) expand where the largest output expansions are observed in the meat products (MTP) and dairy products (DAP). As can be seen from Table 14, the major contribution to the increase in output comes from the increase in exports. After the first simulations in both scenarios which have different base cases, the economy moves to a similar state leading to the same base cases for sim-1.1b and sim-2.1b. As the GTAP model utilized in this study does not involve transitional dynamics, we would expect small deviations in the results of second simulation under two different scenarios. The simulation results of the second simulations confirm our predictions.

Table 14: Decomposition of Output Response between Export and Domestic Demand, by sector, % change

	Sim-2.1a		Sim-2.1b		Sim-2.2	
	Export contribution	Domestic demand contribution	Export contribution	Domestic demand contribution	Export contribution	Domestic demand contribution
VAF	0.08	0.06	-8.09	0.12	-7.86	0.63
GRA	5.35	-9.89	-15.03	-16.13	-8.70	-24.33
OSD	-0.47	0.94	2.09	-0.06	1.91	1.70
LVS	-0.20	3.28	-1.44	-12.21	-1.65	-8.37
OPA	-0.42	3.15	-1.08	3.50	-1.46	7.75
FAF	0.46	4.04	-1.17	-3.00	-0.69	1.84
MTP	20.74	0.77	-14.58	-11.05	4.11	-11.79
DAP	20.01	-0.06	-12.12	3.64	6.53	4.95
OFP	3.40	1.26	-6.13	-2.35	-2.85	-0.45
TXT	-2.22	-2.18	-34.47	-19.04	-34.59	-19.78
ATM	-2.98	-0.56	-26.53	-8.69	-27.97	-8.29
ISM	3.17	-3.02	-12.62	11.19	-8.88	8.39
ENG	13.63	1.18	199.63	83.85	221.61	98.44
OMP	-1.38	-2.20	-15.31	-15.58	-15.74	-16.11
SVC	-0.86	0.38	-4.98	-0.39	-5.74	0.69

Source: Simulation Results.

Under full agricultural integration (Sim-2.2), all agricultural sectors other than the oil seeds (OSD), dairy products (DAP), forestry and fishing (FAF) and other primary agriculture (OPA) sectors shrink. Domestic demand contribution to overall output response is higher in forestry and fishing (FAF) and other primary agriculture (OPA) sectors where export demand contribution is higher in dairy products (DAP) and oil seeds (OSD) sector. Comparing the effects of partial agricultural integration with the full agricultural integration, it can be clearly seen from Table 13 that full integration has a larger negative effect on output than the negative effect of partial integration. In the full integration simulation under two scenarios, we expect the largest changes in outputs for the sectors of EU10 since regarding the base case scenarios, effects of full integration are analyzed in comparison to the cases where EU10 is not a member of EU for the scenario 2 and where the EU10 is already a member of EU for the scenario 1.

3.2.2. Impact on the EU Budget

Similar to scenario 1, partial agricultural integration has no additional cost of integration on the EU budget. The budgetary cost of Turkey's completion of full agricultural integration after partial agricultural integration, is estimated to be around 164 million US $ per year. However, Turkey is a net contributor to the EU budget in one step full integration simulation.

Import tariffs are the main source of Turkey's contribution to the EU budget, and the transfers from the EU budget to Turkey are mainly in the form of output subventions.

Table 15: Impact on the EUB, full vs. partial harmonization, US $ million

	Sim-2.1a			Sim-2.1b			Sim-2.2		
	TUR	EU15	EU10	TUR	EU15	EU10	TUR	EU15	EU10
Import tax contribution	0.00	-973.74	3381.76	431.46	213.92	-9.23	677.93	-766.93	3371.72
GDP tax contribution	0.00	-2354.62	0.00	0.00	-66.16	-3.29	0.00	-2708.31	0.00
Total contribution (revenue)	0.00	-3328.36	3381.76	431.46	147.76	-12.52	677.93	-3475.25	3371.72
Export subsidy cont.	0.00	-401.57	324.02	92.10	-15.76	-9.59	51.33	-417.75	322.80
Output subsidy cont.	0.00	2.56	128.40	503.95	-4.58	0.57	491.75	-2.21	128.49
Total cont.(expenditure)	0.00	-399.02	452.42	596.05	-20.34	-9.01	543.08	-419.96	451.29
Net EUB transfers	**0.00**			**164.60**			**-134.85**		

Source: Simulation Results.

3.2.3. Impact on Regional Welfare

Table 16 indicates that all simulations generate welfare gains for Turkey. Under partial integration welfare gains in Turkey and EU15 are expected to be 1621 million US $ and 707 million US $, respectively. In addition, welfare losses in EU10 are expected to be 363 million US $. As can be seen in Table 16, with full agricultural integration welfare in Turkey and EU15 are expected to increase about 12 billion US $ and 2.8 billion US $, whereas welfare in EU10 will decrease by an amount of 353 million US $.

Table 16: Impact on regional welfare (EV, US $ million)

	Sim-2.1a	Sim-2.1b	Sim-2.2
TUR	1621.64	9951.82	12360.94
EU15	707.56	2301.9	2804.59
EU10	-363.39	30.3	-353.52
ROW	1026.89	-2823.46	-1763.09

Source: Simulation results

As in scenario 1, the major contribution to the overall welfare changes for all of the regions comes from the allocative efficiency components under all simulations.

Table 17: Decomposition of Welfare Changes (EV, US $ million)

	Sim-2.1a			Sim-2.1b			Sim-2.2		
	alloc.eff.	tot	other	alloc.eff.	tot	other	alloc.eff.	tot	other
TUR	1406.22	248.15	-32.72	9206.20	1118.19	-372.57	11395.11	1339.66	-373.82
EU15	887.95	-203.60	23.21	1525.31	662.85	113.74	2275.64	396.43	132.51
EU10	155.39	-477.37	-41.41	-28.47	66.10	-7.33	45.42	-349.37	-49.57
ROW	545.92	430.50	50.47	-1215.94	-1895.04	287.53	-644.40	-1438.86	320.18

Source: Simulation results

When the impact of agricultural integration on real growth rate, which is presented in Table 18, is examined, partial agricultural integration is not expected to bring about significant changes in real growth rate. However, full agricultural integration will result in a 7.7% increase in real growth rate which is about 1.6 % points above the percent change in real growth rate indicated by the full integration simulation under the first scenario.

Table 18: Real Growth, % change

	Sim-2.1a	Sim-2.1b	Sim-2.2
TUR	0.95	6.06	7.69
EU15	0.01	0.02	0.03
EU10	0.04	-0.01	0.01
ROW	0.00	-0.01	0.00

Source: Simulation results

4. CONCLUSION

In this study, the effects of Turkey's agricultural integration with the EU are analyzed. The agricultural integration is investigated under the partial and full agricultural integration. Using a modified version of standard GTAP model; the paper looks into the impact of agricultural integration under various possible scenarios.

Simulations show that different scenarios about the integration of Turkey and the EU have different implications. The results indicate that agricultural integration does not have a remarkable burden on the EU budget. Although partial agricultural integration does not create a considerable welfare increase, there is a serious welfare gain under the full integration, especially for Turkey and EU15.

It is necessary to mention some constraints which affect the results of the study. Especially problems about the database are important and should be highlighted. First of all, Turkey's data is based on 1996 Input-Output table (SIS, 2001). The most up-to-date IO table is

based on 1998. Moreover, there are only six agricultural sectors in Turkish IO table.[7] However, there should be more agricultural sub-sectors in the IO table to get better results. Finally, the customs duties and other protective measures presented in the database do not seem to fit the de facto rates. One should be aware of these limitations when interpreting the results of this study. The agenda for driving more reliable results from these models can be summarized as follows.

First of all, as emphasized in Acar (2006), a new IO table which is based on one of the prosecuting years of the 2001 financial crisis. Secondly, the agricultural sector should be represented in detail in the IO tables. Finally, by establishing the cooperation with all of the related government institutions, especially with the Undersecretaries of the Prime Ministry for Foreign Trade, the Ministry of Finance and the Ministry of Agriculture, taxes, subventions, border protection and domestic subsidy rates have to be integrated in the database reflecting the levels which are consistent with the effective levels. With a more realistic database which is set forward for the disposal of the researchers, the studies along the line of our study would be useful guidelines for policy makers.

[7] Agricultural sectors are disaggregated using a representative table while arranging Turkish IO table for the GTAP.6 database.

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