TURKEY'S ACCESSION TO THE EUROPEAN UNION: IMPLICATIONS FOR AGRICULTURAL SECTORS

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Paper prepared for presentation at the 107th EAAE Seminar *"Modelling of Agricultural and Rural Development Policies"*. Sevilla, Spain, January 29th -February 1st, 2008

Abstract

In October 2005, the European Council, having determined that Turkey fulfilled the Copenhagen political criteria, opened accession negotiations with Turkey. Following this decision, the arguments on Turkish membership has become a priority for Turkey since Turkey's accession to the EU would have considerable impacts on Turkey and the EU. Therefore, the aim of this study is to investigate the potential economic impacts of Turkish membership to the European Union. Since much of the support and tariff protection in EU markets is associated with agriculture and food production, the study focuses principally on these sectors. In this context, to derive estimates of Turkey's accession a multiregional computable general equilibrium (CGE) model framework is employed. Using the standard Global Trade Analysis Project (GTAP) model and version 6 database, the paper looks into the impacts of the accession, sectoral reallocations and the welfare effects.

Key words: Turkey, European Union, Economic Integration, Agriculture and Food, Computable General Equilibrium Models, GTAP

1. Introduction

Turkey's integration with the European Union (EU) has a long history. Turkey made its first formal application to join the European Economic Community (later the EU) in 1959 just two years after its creation which resulted in an Association Agreement (Ankara Agreement) in 1963. In April 1987, Turkey submitted its application for full membership into the European Community (EC). The timing of this application was unfortunate in that the EC was redefining itself through the creation of the single market, whilst burgeoning expenditure on agricultural support rendered the assimilation of a 'large' agricultural economy such as Turkey's, politically infeasible. Following this in January 1996, progress was made in the form of a Customs Union, whereby Turkey and the EU have mutually abolished all quotas and tariffs on imports of industrial goods. Interestingly, agricultural products were not included in this agreement, although a significant part of agricultural trade takes place under preferential agreements.

On October 3, 2005 the European Council having determined that Turkey fulfilled the Copenhagen political criteria decided to began accession negotiations with Turkey. This decision provoked some uncertainties in both sides. Some of these uncertainties are political (e.g., the fulfillment of the political criteria, geographical location, free movement of labour, religion difference etc.) in nature and some are economic, the latter of which form the basis of this study.

The amount of the studies that explore the economic implications of market integration between Turkey and the EU recently has grown and includes a variety of analyses using partial equilibrium models (e.g., Çakmak and Kasnakoglu, 2002; Grethe, 2003) as well as general equilibrium models (e.g., Acar, 1999; Bekmez, 2002; Lejour *et al*., 2004; Zahariadis, 2005; Sulamaa and Widgrén, 2007). Although partial equilibrium models are usually quite detailed in the commodity disaggregation, they do not consider inter-linkages to other sectors and economic agents of an economy through factor markets and intermediate input use. On the other hand, Computable General

Equilibrium (CGE) models contain detailed support and protection data on both agricultural products and industrial trade and with a CGE framework it is possible to generate a comprehensive welfare measure for the EU and the accession countries (Hertel et. al. 1997).

The reviewed CGE studies can be grouped into two. The first group includes studies that investigate the economic effects of the possible Turkish membership (e.g., Bekmez, 2002; Lejour *et al*., 2004; Sulamaa and Widgrén, 2007) and the second group includes studies that assess the effects of a possible extension of the customs union to cover all agricultural products (e.g, Acar, 1999; Zahariadis, 2005). Bekmez (2002) analyse the sectoral effects of Turkish accession constructing a CGE model of the Turkish economy with 22 sectors (including a single agricultural sector and a single food processing sector). Having covered various trade policy options, the results of the study suggest that the full membership is the most beneficial scenario for the Turkish economy in which the EU compensates a proportion of the losses of the Turkish government caused from the reduction of the import tariff rates. Lejour *et al*. (2004) analyse three main issues linked with Turkish membership; accession to the internal European Market, institutional reform in Turkey initiated by the EU-membership; and migration in response to the free movement of workers. The authors utilised a CGE model for the world economy called 'Worldscan', calibrated to the Global Trade Analysis Project (GTAP) v6 database including only one agriculture and one food sector. The main findings of this study indicate that Turkey's accession to the internal market results in a welfare (in terms of EV) increase by US$ 4.4 billion in Turkey whilst also having a small positive effect on the EU (welfare increases by US$ 3.9 billion in the EU-25). Under the improvements in national Turkish institutions scenario, welfare in Turkey increases by US$ 28.2 billion whilst the EU also benefits (welfare increases by US$ 8.7 billion). The results of the migration scenario show that per capita income in Turkey rises between 0.9% to 1.4% whilst declines slightly in the EU-15 by -0.1%. Of the three different scenarios the improvements in institutions bring the greatest gains to Turkey. Zahariadis (2005) investigates the economic impacts of a deep integration in the CU between Turkey and the EU by employing the standard GTAP model. The author aggregates the v5 database into 20 sectors including 4 agricultural sectors. The results indicate that traditional integration can have a strong positive effect on Turkey's welfare whilst a small negative effect on EU's welfare. On the other hand, the results of the deep integration reveal that the abolishment of all the technical barriers to the trade with the EU can have a positive effect on both sides although the effect is very small for the EU. Finally, in a recent study Sulamaa and Widgrén (2007) impacts of Turkish membership is also investigated by employing a modified version of the GTAP model (imperfect competition is introduced). They aggregated the GTAP v6 database into 15 sectors only including one agricultural sector. Their findings indicate that Turkey's accession is beneficial for Turkey (under the imperfect competition Turkey's welfare increases by US$ 700 million whilst under the perfect competition increases by US$ 300 million) and it does not have significant negative effect for the EU.

None of the above mentioned studies solely focuses on agricultural sectors at a disaggregated level for the analysis of Turkey's accession. However, further integration of Turkey with the EU would imply changes in agricultural production in Turkey and considerable trade diversion flows between the EU and the rest of the world since the EU is an important trade partner of Turkey especially in agricultural products and much of support and tariff protection in EU markets (also

Turkey) is associated with agriculture and food production. Moreover, the current CU agreement between Turkey and the EU does not include agricultural products as mentioned before.

In this context, this study aims to investigate the potential economic effects of Turkey's accession to the EU on a fully disaggregated set of agro-food sectors within a CGE framework. The remainder of the paper is organised as follows: the next section provides information on the model, the data and the experimental design. The simulation results are presented in the section 3. Finally, section 4 concludes the paper with a brief discussion of the results.

2. The Model, the Data and Experimental Design

2.1. GTAP Model and the Data

The fundamental CGE framework used for this study is the GTAP standard regional static CGE trade model[1] and accompanying version 6 database[2]. The standard GTAP model used in this study assumes perfectly competitive markets, constant returns to scale technology, a non-homothetic private demand system and a foreign trade structure characterised by the Armington approach.

In the standard GTAP model there is a representative regional household which collects all available income from ownership of the factors of production and the collection of next tax revenues and distributes this income over three forms of final demands: private, government (public) and savings by employing neoclassical utilisation maximisation procedures (under a Cobb-Douglas (CD) utility function). Weak homothetic separability assumptions are employed to further partition aggregate private and public consumer decisions into 'nests' (multi-stage budgeting) based on conventional neo-classical behaviour (cost minimisation). Thus, at the second level of the nest, *private* expenditures are minimised subject to a non-homothetic constant difference in elasticities (CDE) function[3] to derive Hicksian demands for each commodity. At the third layer of the nest, private expenditure on each commodity is minimised subject to a constant elasticity of substitution (CES) function to yield Hicksian commodity demands by origin (i.e., domestic vs. 'composite' import demands). Finally, CES expenditure minimisation yields bilateral import demands by region of origin at the fourth level of the nest.[4] Public expenditure has the same nesting structure, although in the second level of the nest, the CDE function is substituted for a simpler CD treatment.

The production structure is also nested, where in the top nest, Hicksian cost minimisation apportions Leontief demands by composite value added and intermediate inputs. Cost minimisation also determines CES demands for factors of production within the value added nest, whilst the derivation of intermediate input demands into domestic and composite imports (nest level 2), and

[1] A full description of the GTAP model structure can be found in Hertel and Tsigas (1997).
[2] For further information on the GTAP database (i.e., components of the database, collection metods etc.) see Dimaranan (2006).
[3] The CDE function allows the modeller to calibrate differing price and income elasticities which offer a much richer characterisation of final demands than the standard Cobb-Douglas (CD) or CES functions.
[4] This level is also known as the Armington specification which permits two-way trade in otherwise homogeneous products through use of the elasticity of substitution between competing products.

imports by region of origin (nest level 3) follows the same CES treatment as the consumption nested structure. Finally, under the *zero profit* principle the income of the producers, (which is formed by the sales of final goods to private households, to the government (public sector), to abroad and to other producers), is spent on the intermediate input and primary factor purchases. Therefore, supply by each sector is demand driven.

To keep the model within computational limits and focus on the issues of interest the data is aggregated into 13 regions/countries and 21 sectors. Regional and sectoral aggregations are shown in Table 1. A number of EU countries based on their trade importance with Turkey are separated, whilst the remaining EU members are collapsed into composite regions (see Table 1). The non EU regions are made up of the USA and a ROW region to capture residual production and trade flows. Given the focus on the agro-food sectors in Turkey, we disaggregate all 18 agro-food sectors from the data, whilst the remaining non-food sectors are grouped into 'raw materials', 'manufacturing' and 'services'. To simplify the presentation of the results, aside from Turkey, results are presented for the 'old' EU members (EU15), the recent accession members (AC12) and the non EU regions (ROW).

Table 1. GTAP Data Aggregation

Sector	Description	Region	Description
1. Wheat		1. Turkey	
2.Ograins	Other Grains	2. France	
3. VegFruitNuts	Vegetables, Fruit and Nuts	3. Germany	
4. Oilseeds		4. Greece	
5. Sugar		5. Italy	
6. Plants	Plant Based Fibers	6. The Netherlands (NL)	
7. Ocrops	Other Crops	7.Spain	
8. Catshp	Cattle and Sheep	8. United Kingdom (UK)	
9. Pigspoultry	Pigs and Poultry	9. Rest of EU-15	Austria, Belgium, Denmark, Finland, Ireland, Luxembourg, Portugal, Sweden
10. Raw milk			
11. Oagric	Other Agriculture		
12. Meatpro	Meat Processing	10. AC-10	Czech Republic, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia
13. Omeatpro	Other Meat Processing		
14. Vegailsfats	Vegetable Oils and Fats		
15. Dairy			
16. Sugar processing		11. AC-2	Bulgaria, Romania
17. Ofoodpro	Other food processing	12. USA	
18. BevsTobac	Beverages and Tobacco	13. ROW	Rest of the World
19. RawMat	Raw Materials		
20. Mnfs	Manufacturing		
21. Svces	Services		

2.2. Experimental Design

In this study, a plausible long-run 'status quo' baseline projected from the benchmark year (2001) to 2025 is constructed against which the accession scenarios are compared. The assumptions

shaping the baseline are described in Figure 1. Projections for growth, the labour endowment and total factor productivity for all regions, except Turkey, are taken from Jensen and Frandsen (2003), whilst population growth rates are calculated from the UN World Population Division (2007). Capital endowment growth is determined endogenously within GTAP given knowledge of the exogenous shocks to the endowments, growth, productivity and population. In the case of Turkey, annual growth rate of GDP is obtained from a recent study by Bergheim (2005), whilst labour projections are based on the growth rates of the total skilled and unskilled labour stock in Turkey over the period 1995 to 2000 employing data on educational attainment provided by Barro and Lee (2000).[5]

Baseline Scenario Assumptions: 2001-2025

Projections
Shocks to GDP, total population, factor endowments, productivity
Trade Policy Shocks
Implementation of Uruguay Round and other commitments (including Chinese accession)
Import tariff reductions for developed and developing countries under the Doha Round.
Elimination of export subsidies for all products in all countries under the Doha Round.
Removal of all EU27-Turkish non agro-food Tariffs under the Customs Union agreement with the EU
EU Enlargement
Elimination of all border protection (i.e., import tariffs, export subsidies) between old and new member states (including Romania and Bulgaria)
Impose common external tariff for all 12 new EU member states (2004 and 2007 accessions)
Agricultural domestic support
Elimination of agricultural support (output - input subsidies and land – capital based payments) in all countries

Figure 1. Assumptions shaping the baseline 2001 – 2025

The baseline also features foreseeable policy changes as shown in Figure 1. One of these policy changes will be a possible Doha Round agreement. Although an agreement on tariffs has not yet been reached, recent work by Jean *et al*. (2005) provides a series of tariff harmonization formulas for developed and less developed countries which makes it possible to explore and enumerate a range of possible alternatives that are currently on the negotiating table. Two attractive policy features to this work are that (i) tariff reductions account for the tariff binding overhang between the bound rate and the applied tariff rates employed in GTAP, and (ii) the tariff liberalization shocks also account for concessions on 'sensitive' product tariff reductions[6]. Finally all export subsidies are eliminated following the agreement reached at the Hong Kong summit in December 2005.

Under the auspices of the WTO, domestic support is classified on the extent to which it is decoupled from domestic production, and consequently trade. The rhetoric on domestic support reform is clear in that Amber Box (trade distorting support) is to be reduced dramatically and blue box (partially decoupled support schemes) will face reduced ceiling limits, whilst the challenge to the EU and US will be to demonstrate that their support programs are completely decoupled from production (Green Box) and thereby exempt from WTO disciplines. In addition, within the current 'Common Agricultural Policy (CAP) Health Check' proposals, more domestic support is to be moved toward

[5] This data includes the stock of human capital for every schooling level for approximately one hundred countries. These levels are: no education, primary, secondary and higher education. Following the same approach used by Jensen *et al*. (1998) and CPB (1999) skilled labour is characterised as those who have secondary or higher education.
[6] For further information on the tariff harmonization formula see Jean *et al*., (2005)

non-market 'pillar two' funding through increased modulation. Thus, we remove all domestic support wedges in the GTAP database, where we implicitly assume that all domestic support will be decoupled.[7] In other words, the production and trade responsiveness of agriculture with all support payments removed is the same as that which would occur with purely decoupled payments imposed.[8]

In comparison with the baseline, two alternative accession scenarios are examined. Given the uncertainty surrounding Turkey's potential membership, we use a working assumption that by 2025, Turkey will be fully integrated into the EU. Thus, in *Scenario-1* all remaining tariffs between the EU and Turkey are abolished and all sectors in Turkey are given the same level of protection against third countries as found in the EU at the time of accession in order to mimic the EU common external tariff (CET). In *Scenario-2* migration flows from Turkey to the EU in the case of free movement of labour are also incorporated. According to the European Commission (2004), estimates in the literature range between 0.5 to 4.4 million persons. Here, we use calculations made by Lejour *et al*. (2004), which estimates potential migration at 2.7 million on the basis of the historical immigration patterns and the income differentials between the EU and Turkey. The migration flows are distributed across EU countries assuming that new migrants go to countries where previous migrants have settled (see Table 2).

Table 2. Expected number and destination of Turkish migrants

	In %	**S-2.1 (In 1000)**	**S-2.2 (In 1000)**	
Countries		**Unskilled**	**Skilled**	**Unskilled**
France	8	216	58	158
Germany	76	2052	554	1498
Greece	3	77	21	56
Italy	1	27	7	20
Netherlands	4	108	29	79
UK	2	54	14	39
Rest of the EU-15	6	166	45	121
Total	100	2700	729	1971

Source: Barro and Lee (2000), Lejour *et al*. (2004), OECD, (2007) and own calculations

Importantly, Borjas (1999) notes that the economic effect of the migration for the host countries and the countries of origin depends on the skill level of the migrants. Since it is difficult to know the skill composition of the migrants two simulations with different assumptions on migrant skill level are performed. Under the first simulation (*scenario 2.1*), it is assumed that all Turkish migrants are unskilled, whilst in the second simulation (*scenario-2.2*) it is assumed that the composition of Turkish migrants is equal to the composition of Turkish population in year 2000.

[7] Clearly, there are 'non-price' determinants which suggest that even payments which are independent of production can distort production through the impacts of wealth on risk aversion.

[8] Whilst we do not discount the possibility of some form of domestic payments to agriculture, in the context of our EU study, we do not include a CAP budget. Indeed, whilst it would have been interesting to include the EU budget into the simulations, in this study this is not done since the rules on the allocation of EU funds are likely to be reformed significantly before Turkey's accession to the EU and consequently, there is considerable uncertainty on the composition of the EU's budget framework.

3. Results

3.1. Baseline Impacts

In the baseline both an expansionary and a substitution effect determine the changes. The expansionary effect reflects the effects of growth and foreign demand shaped by income and population growth (and the assumed income elasticities). The substitution effect represents the changes in relative competitiveness shaped by changes in relative productivity, cost of production as well as of any policy changes assumed in the baseline period. During the period considered the impact of assumed policy changes is, in general, relatively small in comparison to the effects of the projections.

Table 3 provides key summary statistics from the GTAP data for Turkey, AC-2, AC-10, EU-15 and EU-27. Baseline impacts can be summarized by comparing the statistics obtained from the database created after the implementation of the baseline scenario (2025) with the original database (2001). Accordingly, due to the higher calibrated income elasticities for non-agricultural activities in the GTAP private demand function which implies that, as per capita income rises (from increases in endowments income) the consumption of agro-food products fall respectively, the relative importance of the agro-food sector falls across the EU-27 and Turkey.

Table 3. Comparative descriptive statistics for agriculture and food in 2001 and 2025

(%)	Turkey		AC2		AC10		EU15		EU27	
	2001	2025	2001	2025	2001	2025	2001	2025	2001	2025
Agric. share of national GDP	9,2	8,3	14,2	13,1	3,5	2,8	1,6	1,3	2	1,6
Food share of national GDP	6,7	5,7	13,5	11,2	9	7,1	5,1	3,9	5,4	4,2
Agro-food share of national GDP	15,9	14	27,8	24,3	12,5	9,9	6,7	5,2	7,4	5,7
Agro-food imports in total imports	5,9	4,2	7	5,9	6	5,6	7,6	5,9	7,5	5,8
Agro-food exports in total exports	8,6	7,4	5,4	15,3	5,5	7,6	6,9	7	6,8	7,1
Agric. share of production (EU-28 = 100)	6,9	9,8	11,2	9,6	8,7	10	73,2	70,7	93,1	90,2
Food share of production (EU-28 = 100)	1,9	2,8	4,1	3,3	8,5	10,3	85,5	83,6	98,1	97,2
Agro-food share of production (EU-28 = 100)	3,3	4,8	6	5,1	8,5	10,2	82,1	79,9	96,7	95,2

Source: Dimaranan, 2006 and own calculations

Due to relatively higher growth rates assumed in the baseline scenario for labour, Turkey's agro-food production share in the EU-28 increases whilst the EU membership leads to increases in the agro-food production in the AC-10. On the other hand, assumed negative growth rate for unskilled labour in the AC-2 leads to a decline in the agro-food production share in the EU-28. Finally, the abolition of all border protection between the EU-15 and the AC-12 in the baseline period leads to increases in AC-12's agro-food exports.

3.2. Sectoral Effects of the Accession Scenarios

Table 4 shows changes in Turkish output, market prices and trade balances after the accession to the EU relative to the baseline scenario. The results suggest that Turkey is relatively competitive in

the agro-food sectors, where Turkish accession to the EU, *scenario-1*, leads to increases in production in most agricultural sectors compared to the baseline, with concurrent falls in non-agricultural sectors (i.e., manufacturing and services). The largest increases in Turkish agricultural output occur in the meat processing (88,1%), other meat processing (60,6%) and vegetable oils and fats (44,7%) sectors, with market price increases due to the elimination of import tariffs imposed by the EU-27[9]. In the upstream cattle and sheep, oilseeds and sugar sectors production increases as a result of higher demand from downstream meat processing, other meat processing, vegetable oils and fats and sugar processing sectors. In some sectors, (other crops, wheat and plant-based fibers) the accession leads to production falls (-9,3%, -2,6%, -0,2% respectively). The production of other crops falls due to the reductions on import tariffs imposed by Turkey to USA products whilst the production fall in wheat is due to greater trade competitiveness in the EU.

Table 4. Changes in output, market prices and trade balances, Turkey

	Output (%)			**Market Prices (%)**			**Trade Balance (€m 2001)**		
Sectors	**S-1**	**S-2.1**	**S-2.2**	**S-1**	**S-2.1**	**S-2.2**	**S-1**	**S-2.1**	**S-2.2**
Wheat	-2,6	-2,9	-2,5	0,5	-	-0,1	-170	-141	-132
Ograins	1,7	0,2	0,4	1,6	1,0	0,8	-48	-44	-44
VegFruitNuts	-	-1,6	-1,4	1,3	0,7	0,4	-57	-24	-10
Oilseeds	7,7	6,4	6,7	3,7	2,8	2,7	-74	-64	-64
Sugar	9,2	7,3	7,4	3,7	2,9	2,7	0	0	0
Plants	-0,2	-1,6	-1,4	0,7	0,3	0,2	-52	-30	-29
Ocrops	-9,3	-10,0	-9,4	-1,8	-2,1	-2,2	-303	-277	-266
Catshp	11,8	10,0	10,2	1,7	1,0	0,8	-29	-27	-26
PigsPoultry	6,6	4,8	5,1	0,6	-0,1	-0,2	-121	-111	-112
RawMilk	0,6	-1,1	-0,9	-0,2	-0,8	-0,9	0	1	2
Oagric	-	1,1	1,5	0,3	-0,3	-0,3	-27	-19	-19
Meatpro	88,1	85,9	86,3	0,5	0,7	0,7	1135	1126	1129
Omeatpro	60,6	56,6	57,5	0,4	0,6	0,6	534	513	519
Vegoilsfats	44,7	41,7	41,9	0,3	0,7	0,7	1013	986	989
Dairy	2,1	0,2	0,3	-0,1	0,1	+	135	132	134
Sugarpro	9,1	7,3	7,3	0,4	0,8	0,7	700	709	709
Ofoodpro	3,0	1,9	2,0	-1,4	-1,3	-1,3	46	55	57
BevsTobac	2,4	0,6	0,6	-7,7	-7,6	-7,6	7	13	13
RawMat	-	-0,1	-0,1	+	-0,3	-0,3	500	1860	1789
Mnfcs	-1,8	-4,5	-4,3	0,3	0,6	0,6	-2306	-3758	-3559
Svces	-0,2	-1,9	-2,0	0,7	1,3	1,4	-799	-1161	-1318
Total							**83**	**-260**	**-238**

Source: Simulation results and own calculations

Note: +/- indicates less than + or - 0,1 %

In *scenarios 2.1* and *2.2* where a migration flow of 2.7 million Turkish people is included, the production of all sectors falls relative to *scenario-1* as a result of lower supply of skilled (only for *scenario-2.2*) and unskilled workers in Turkey. The effects of migration are different in both scenarios since these two scenarios differ with respect to their assumptions on the skill composition of the

[9] The reader should, however, be aware that these percentage increases are calculated from a smaller base in the case of these three sectors.

migrants. If all migrants are unskilled (*scenario-2.1*) falls in the production of all sectors are bigger compared to *scenario-2.2* where migrants have the same skill composition as the Turkish population in year 2000. This is due to the relatively higher intensity of unskilled labour in all sectors especially in the primary agricultural sectors. The only exception occurs in the services sector, which is more intensive in skilled labour.

Table 5. Changes in Turkish factor prices

Sectors	**S-1**	**S-2.1**	**S-2.2**
Land	2,1	-4,3	-3,6
Unskilled Labour	1,2	5,4	4,1
Skilled Labour	1,0	0,5	3,5
Capital	1,0	0,4	0,5
Natural Resources	-0,2	-1,1	-1,0
Pfactor	1,0	1,6	1,6

Source: Simulation results and own calculations

Table 5 provides the percentage changes on returns to land, capital, natural resources and the regional index of factor prices (*pfactor*) in Turkey relative to the baseline. Expansion of the most agricultural sectors following the Turkish accession to the EU (*scenario-1*) causes minor increases in the primary factor prices. These price changes of primary factors outweigh the potential reductions in intermediate input costs through cheaper access to imports, resulting in increases in market prices (see Table 8 for changes in market prices of commodities). In *scenarios 2.1* and *2.2* overall contraction of all sectors relative to the *scenario-1* leads to reductions in the land and capital prices while wage rates for unskilled and skilled labour (only for the *scenario-2.2*) increase reflecting the fact that these factors become relatively scarce resources compared to the *scenario-1*. Given the high intensity of land usage in primary agriculture,[10] market prices in these sectors fall. In the remaining processed food, manufacturing and services sectors, market prices rise from increased labour costs. Accession with free movement of labour (migration) causes falls in the market prices in the primary agricultural sectors while in non-agricultural sectors the market prices increase relative to the *scenario-1*.

Increased multilateral market access under the *scenario-1* increases Turkish exports relatively to imports in meat processing, other meat processing, vegetables oils and fats, dairy, other food processing and beverages and tobacco sectors, which results in improving sectoral trade balances (see Table 4). The trade balance contractions in the case of oilseeds, cattle and sheep and pigs and poultry sectors is a result of higher demand for imported intermediate inputs from expanding downstream sectors. Although Turkey's aggregate agricultural and food trade balance improves by € 2688 m compared to the baseline the aggregate trade balance only improves by € 83 m due to declining trade balances in manufacturing and services sectors as a result of the reallocation of resources from these sectors to agricultural sectors. Under the *scenarios 2.1* and *2.2* Turkish imports fall relative to *scenario-1* due to lower productive capacity and subsequently regional income owing to migratory outflows from Turkey to the EU. Due to large falls in manufacturing and services sectors exports Turkey's aggregate trade balance declines between -€ 238 m to -€ 260 m (see Table 4) compared with the baseline.

[10] Note that in GTAP, the land factor is specific to the primary agricultural sectors.

Table 6 shows changes in output and market prices in the EU-15 and the AC-12 after the Turkey's accession to the EU relative to the baseline scenario. Under the *scenario-1* the production in most agricultural sectors falls in the EU-15 and AC-12 compared to the baseline while in non-agricultural sectors increases are observed as a result of reallocation of resources from agricultural sectors to non-agricultural sectors. In wheat, other crops, other agriculture and plant-based fibers sectors Turkish accession leads to production increases in the EU-15 and the AC-12. Under the *scenarios 2.1* and *2.2* production in all sectors increases in the EU-15 relative to the *scenario-1* while production level remains unchanged in the AC-12 as assumed migration flows in these scenarios do not include migrants to the AC-12 countries. If all immigrants are unskilled (*scenario-2.1*) increases in the production of all sectors are bigger compared to the *scenario-2.2.* This is due to the relatively higher intensity of unskilled labour in all sectors.

Table 6. Changes in output and market prices, EU-15 and AC-12

	Output (%)						Market Prices (%)					
	EU-15			AC-12			EU-15			AC-12		
Sectors	**S-1**	**S-2.1**	**S-2.2**	**S-1**	**S-2.1**	**S-2.2**	**S-1**	**S-2.1**	**S-2.2**	**S-1**	**S-2.1**	**S-2.2**
Wheat	0,4	0,8	0,6	0,2	0,3	0,3	+	-0,1	-	-	-0,2	-0,1
Ograins	0,0	0,9	0,7	-	-	-	-	-0,2	-0,1	-0,1	-0,2	-0,2
VegFruitNuts	+	0,8	0,7	0,1	0,1	0,1	-	-0,4	-0,3	-0,2	-0,4	-0,3
Oilseeds	-2,3	-1,9	-2,0	1,5	1,8	1,7	-0,3	-0,3	-0,3	0,1	+	+
Sugar	-3,4	-2,4	-2,6	-1,0	-1,0	-1,0	-0,2	-0,9	-0,7	-0,6	-0,7	-0,6
Plants	0,9	1,0	0,8	0,2	0,0	+	-	-0,3	-0,2	-0,1	-0,2	-0,1
Ocrops	-	1,2	0,9	-	-0,3	-0,2	-	-0,6	-0,4	-0,1	-0,3	-0,2
Catshp	-0,3	0,4	0,3	-1,1	-1,1	-1,1	-	-0,3	-0,2	-0,3	-0,5	-0,4
PigsPoultry	-	0,8	0,7	-0,5	-0,5	-0,5	-0,1	-0,4	-0,3	-0,4	-0,5	-0,4
RawMilk	-0,1	1,2	1,0	-0,1	-0,1	-0,1	-	-0,7	-0,5	-0,2	-0,3	-0,3
Oagric	0,2	0,5	0,3	1,4	1,0	1,1	-	-0,2	-0,1	0,1	-0,1	-0,1
Meatpro	-0,4	0,4	0,3	-10,0	-10,0	-10,0	-0,1	-0,3	-0,2	-0,9	-1,0	-0,9
Omeatpro	-0,2	0,7	0,5	-2,0	-2,0	-2,0	-	-0,3	-0,2	-0,4	-0,5	-0,5
Vegoilsfats	-1,9	-	-0,3	-0,1	-0,1	-0,1	-0,1	+	+	-0,2	-0,3	-0,2
Dairy	-0,1	0,9	0,8	-0,4	-0,3	-0,3	-	-0,2	-0,2	-0,2	-0,3	-0,2
Sugarpro	-3,7	-2,9	-3,0	-1,2	-1,1	-1,1	-0,1	-0,2	-0,1	-0,2	-0,3	-0,2
Ofoodpro	-	0,7	0,6	-	0,1	0,1	-0,1	-0,2	-0,2	-0,1	-0,2	-0,2
BevsTobac	0,0	1,0	0,8	0,1	0,1	0,1	-0,1	0,1	0,1	-0,1	-0,2	-0,2
RawMat	0,0	+	+	+	+	+	-	0,1	0,1	-0,1	0,1	+
Mnfcs	+	1,6	1,3	0,2	-	+	-	-0,4	-0,3	-0,1	-0,2	-0,1
Svces	+	1,0	0,8	+	0,1	0,1	-	0,0	-	-0,1	-0,2	-0,1

Source: Simulation results and own calculations

Note: : +/- indicates less than + or - 0,1 %

Falls in agricultural production relative to the baseline in the EU-15 and the AC-12 under the *scenario-1* lead to lower demands for primary factors which causes minor falls in the primary factor prices in both regions. These price changes of primary factors with reductions in import prices of the intermediate inputs from Turkey lead to small falls in market prices in nearly all sectors. In *scenarios*

2.1 and *2.2* lower wages for unskilled labour outweigh increases in the other primary factor prices leading to falls in market prices in most sectors fall compared with the *scenario-1*.

3.3. Welfare Effects of the Accession Scenarios

Changes in welfare are measured using a regional equivalent variation (EV)[11] summary statistic. The welfare results of accession *scenarios 1* and *2* for Turkey, EU-15, AC-12 and ROW are shown in Table 7. In the table the total EV is decomposed into allocative efficiency effects, terms of trade (ToT) on tradables effects, terms of trade on capital account goods effects and other effects.

Table 7. Changes in welfare, Turkey, EU-15, AC-12 and ROW

S-1		**Turkey**	**EU-15**	**AC-12**	**ROW**
Per capita utility (%)		0,243	-0,001	0,004	0,000
Equivalent variation	(€ m)	752	-204	22	760
Of which:					
Allocative efficieny	(€ m)	-72	215	338	160
ToT on tradables	(€ m)	445	-308	-283	125
ToT capital account	(€ m)	2	24	-19	-20
Other effects	(€ m)	381	-135	-14	370
S-2.1		**Turkey**	**EU-15**	**AC-12**	**ROW**
Per capita utility (%)		1,445	0,462	0,072	0,013
Equivalent variation	(€ m)	-5018	158422	663	6579
Of which:					
Allocative efficieny	(€ m)	129	45486	312	-35
ToT on tradables	(€ m)	2073	-10103	371	8717
ToT capital account	(€ m)	-98	854	-27	-876
Other effects	(€ m)	-7122	122185	7	-1227
S-2.2		**Turkey**	**EU-15**	**AC-12**	**ROW**
Per capita utility (%)		1,515	0,240	0,071	0,010
Equivalent variation	(€ m)	-4811	128119	531	5317
Of which:					
Allocative efficieny	(€ m)	197	30755	313	-78
ToT on tradables	(€ m)	2050	-8342	247	6923
ToT capital account	(€ m)	-96	713	-23	-719
Other effects	(€ m)	-6962	104993	-7	-809

Source: Simulation results and own calculations

Under the *scenario-1*, Turkey is estimated to make a welfare gain of € 752 m, which is equivalent to an increase of 0,243 % in per capita utility. A large part of this economic welfare gain originates from increased terms of trade on tradables (€ 445 m). This is due to the bilateral elimination of import tariffs which leads to falls in import prices (for the EU products) in Turkey and increases in export prices due to enhanced foreign demand (it is important to note that Turkey trades primarily with

[11] The equivalent variation (EV) is a measure of welfare change which is the income given (or taken away) measured in '*pre-shock*' regional prices (i.e., money metric measure) which is equivalent ti the utility in national welfare that follows from the Turkey's accession.

the EU). A reallocation of resources away from relatively high social marginal value sectors leads to a deterioration of allocative efficiency in Turkey (-€ 72 m).

Examining the results of the *scenario-1* from the European perspective, the Turkish accession has a very minor effect on welfare. The bilateral elimination of import tariffs causes higher falls in exports prices than import prices in the EU-15 and the AC-12 to ensure their balance of payments leading to the deterioration in terms of trade on tradables in both regions (-€ 308 m and -€ 283 m respectively). On the other hand, both EU regions witness efficiency gains as subsidised agricultural activity contracts, with concurrent increased resource usage in non-food sectors (manufacturing and services), relative to the baseline. Higher losses in terms of trade on tradables and lower increases in allocative efficiency in the EU-15 result in an EV loss of -€ 204 m whilst the AC-12 records an EV gain of € 22 m. These changes in welfare correspond to a minor loss of utility per capita of -0.001 % in the EU-15 and to an increase of 0,004 % in the AC-12. As expected, for the remaining non-member regions (ROW) included in this analysis, *scenario-1* has very small welfare effects (results in a welfare gain of € 760 m for ROW). This is because Turkey is a 'small country' on global trading markets.

Under the *scenarios 2.1* and *2.2* migration from Turkey results in significant aggregate EV welfare losses in Turkey of -€ 5018 m and -€ 4811 m respectively. These losses stem from relative population falls compared to the baseline and *scenario-1* which appear in the 'other effects' category in Table 7[12]. Lower market prices in the EU-15, as a result of the expansion of sectors, lead to falls in import prices in Turkey resulting in an improvement in Turkey's terms of trade on tradables. Interestingly, the EV (aggregate) welfare losses are outweighed by the exodus of the labour (and subsequent population decrease). As a result, per capita utility in Turkey rises by 1,445 % (*S-2.1*) and 1,515 % (*S-2.2*). In the EU-15, migratory flows from Turkey, under the *scenarios 2.1* and *2.2*, lead to long run estimated welfare gains of € 158422 m and € 128119 m respectively, relative to the baseline. These estimates are equivalent to 0,462 % and 0,240 % increases in utility per capita respectively. Clearly, the marginal value product of migrating Turkish labour is higher (i.e., greater sectoral production) in the EU-15 resulting in a Pareto per capita utility gain in both Turkey and the EU-15. The overall welfare changes for the AC-12 and ROW remains very small under the *scenarios 2.1* and *2.2* as it is assumed that migration flows of labour in these scenarios do not go to the AC-12 countries or to ROW. These scenarios result in slight welfare gains for the AC-12 and ROW originating from improvements in terms of trade on tradables due to lower import prices for the EU-15 products.

4. Conclusions

Whilst there is a growing literature examining the likely economic impacts of Turkey's accession to the EU from a Turkey perspective, as mentioned before most studies merely focus on Turkish agricultural sectors at a disaggregated level as done in this study. Other distinguishing feature of this study is that we employ a realistic baseline scenario incorporating policy (e.g., Uruguay Round, Chinese Accession, Doha shocks incorporating tariff binding overhangs and sensitive product

[12] Changes in EV are calculated as the per capita income multiplied by the population change.

concessions) and projections (endowments, productivity, population) shocks to shift the global economy to 2025.

Simulation results suggest that accession to the EU without free movement of labour results in a welfare gain of € 752 m in Turkey while the accession scenarios with migration yield in welfare losses between -€ 4811 m to -€ 5018 m due to lower Turkish population compared to the baseline. Despite overall welfare declines after migration, utility per capita rises by 1,445 % to 1,515 % as the equivalent variation (real income) losses are smaller than the outflow of people from Turkey. In other words, on average, people will still be better off after migration, largely due to the improvement in wage rates from a reduced labour force. Estimates in the literature (see section 1) range between $ 300 m to € 28200 m. In this context, our estimate for the accession without migration would appear at the lower end of the estimates in the literature. The main reason of this is the implementation of different scenario assumptions in each study. For example, in addition to the tariff eliminations in this study, the high welfare gain estimates in Lejour et al. (2004) include exogenous technical change (i.e., productivity) shocks to characterise the elimination of administrative and technical barriers to trade, institutional reform in Turkey, and the removal of non tariff barriers. On the other hand, estimates done by the studies which implemented similar assumptions as *scenario-1* used in this paper are comparable with our results. In this context, Zahariadis (2005) estimated a welfare gain of € 480 m (under scenario E2) and Sulamaa and Widgrén (2007) found gains of welfare between $ 300 m (under perfect competition assumption) to $ 700 m (under imperfect competition assumption) in Turkey. Our estimates compared to these studies are slightly higher than theirs since we also incorporate projections to 2025, whilst the trade led gains to Turkish agro-food sectors are maximised in our study due to the abolition of agricultural domestic support by 2025. Lejour *et al*. (2004) also focus on the effects of free movement of labour after the accession of Turkey. They estimated increases in GDP per capita between 0,9% to 1,4% in Turkey which are comparable with our results of changes in utility per capita shown above.

The results from the European perspective suggest that accession of Turkey without migration will have very minor effects on welfare in the EU-27 whilst migration from Turkey will affect welfare positively. Under all accession scenarios applied in this study lead to falls in market prices which would be beneficial for EU consumers. In the case of the Turkish accession without free movement of labour, the EU-15 records a small EV loss whilst the AC-12 records a small EV gain. Thus, it can be said that the Turkish accession would not have very important economic impacts for an EU where the CAP is eliminated. On the other hand, the Turkish accession with migratory outflows from Turkey to the EU results in significant welfare gains in the EU-15 (utility per capita increases by 0,240 % and 0,462 %). These results also support the arguments made by Littoz-Monnet and Penas (2004) and Hughes (2004) which suggest that Turkish migration could have a positive economic impacts on the EU since the EU has an aging demographic profile. Following this, it can be commented that if the EU maintains a long run policy of restricting migratory flows, this will carry an opportunity cost in terms of real income and per capita income growth. Accordingly, perhaps the EU should revise its transition period policy for immigrants from new member states in the case of Turkish accession in order to increase its labour supply. It should however be noted that we are assuming that all immigrants are employed in the EU and that no ‘welfare shopping’ behaviour occurs. Moreover, in a comparative static characterization, we can only examine a ‘before’ and ‘after’ image of what has occurred in the

economy. In other words, the model has nothing to say about the 'adjustment' process from one equilibrium to another, where considerable 'frictional employment' and related structural adjustments in the economy should not be underestimated.

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