Potential impacts of a Turkish EU-membership on agri-food markets[1]

Petra Salamon*, Myrna van Leeuwen**, Andrzej Tabeau**, Ali Koç***, Gülden Bölük*** and Thomas Fellmann****

Abstract

This paper examines possible impacts of a Turkish accession to the EU on the agricultural markets in Turkey and the EU. AGMEMOD, an econometric, dynamic, multi-market, partial equilibrium economic model for EU agriculture at Member State level, has been extended with a model for the Turkish agricultural sector and afterwards applied to gain quantitative insights into Turkish accession effects.

To establish a model for Turkey, the implementation of the model equations required parameter estimates, or the specification of synthetic model parameters. A database with time series on Turkish agricultural production, market balances and prices, macroeconomic variables and policy variables was developed in order to estimate such model parameters and to build an operational Turkish agriculture sector model.

Most results show that the dominant impact of the Turkish accession on Turkish agriculture is a reduction of domestic producer prices, which induces further market effects. The – mostly decoupled – CAP support payments will induce smaller incentives to increase production than those which Turkish farmers receive prior to the EU accession. In Turkey effects of accession to the EU will be mostly negative for crop producers (except for tobacco), whereas the consumers are expected to gain from lower market prices. In contrast, producers of sheep meat, broiler and dairy milk could gain from an accession due to lower feed costs.

Keywords: EU, Turkey, Agri-food markets, enlargement, CAP, PE-model

Zusammenfassung

Potentielle Auswirkungen eines türkischen EU-Beitritts auf die Märkte für Agrarprodukte und Nahrungsmittel

Das Papier untersucht mögliche Auswirkungen eines EU-Beitritts der Türkei auf die Märkte für Agrarprodukte und Nahrungsmittel. Hierfür wird AGMEMOD, ein ökonometrisch geschätztes, dynamisches Multi-Produkt-Multi-Markt-Gleichgewichtsmodell der EU- Landwirtschaft um ein türkisches Modell erweitert und damit anschließend die Auswirkung der Erweiterung quantifiziert.

Um das Modell für die Türkei zu etablieren, müssen Modellgleichungen geschätzt oder synthetische Parameter abgeleitet und kalibriert werden. Dies bedarf einer entsprechenden Datenbasis für die Türkei, die Zeitreihen über die Produktion, Marktbilanzen und Preise für Agrarprodukte sowie makroökonomische und politische Variablen enthält. Diese Daten bilden die Grundlage für die Schätzung der Modellparameter, die dann anschließend in ein Modellsystem für die Türkei integriert und so für Simulationen operationalisiert werden.

Ergebnisse einer Beitrittssimulation mit Hilfe dieses Modells zeigen, dass der dominierende Effekt in einem Preisrückgang auf vielen türkischen Agrarmärkten besteht, der dann weitere Anpassungsprozesse induziert. Die entkoppelten Zahlungen der EU-Agrarpolitik sind oftmals geringer als viele gekoppelte Zahlungen in der Türkei. Preissenkungen sowie vergleichsweise niedrigere Direktzahlungen wirken sich negativ auf die Landwirte in der pflanzlichen Produktion ausgenommen Tabak aus. Dagegen profitieren die Verbraucher durch niedrigere Marktpreise. Im Gegensatz zur pflanzlichen Produktion dämpfen niedrigere Futtermittelpreise die Effekte in der tierischen Produktion.

Schlüsselworte: EU, Türkei, Land- und Ernährungswirtschaft, Erweiterung, GAP, PE-Modelle

---

[1] This article is based on the study „Extension of the AGMEMOD model towards Turkey" that was carried out by the AGMEMOD Consortium, in cooperation with the European Commission's Joint Research Centre - Institute for Prospective Technological Studies (JRC-IPTS, Spain

* Johann Heinrich von Thünen-Institut (vTI),Braunschweig, Institute of Market Analysis and Agricultural Trade Policy, Germany

** Agricultural Economics Research Institute (LEI), The Hague, The Netherlands

*** Akdeniz University - Faculty of Economics and Administrative Sciences Department of Economics, Turkey

**** European Commission's Joint Research Centre - Institute for Prospective Technological Studies (JRC-IPTS), Sevilla, Spain. The views expressed are purely those of the writer and may not in any circumstances be regarded as stating an official position of the European Commission.

Introduction

Regional enlargements have been an ongoing and important policy issue for the European Union (EU). The EU saw its biggest enlargement in 2004 when ten new Member States acceded, while Romania and Bulgaria became the most recent members in January 2007. The enlargement process took a further step forward in October 2005, when formal accession negotiations were opened with Croatia and Turkey.

In the process of becoming an EU accession state, and possibly at some future date a full EU member, the relationship between Turkey and the EU has developed in phases. Endeavours between the EU and Turkey began as early as 1963 with the Ankara Agreement. Turkey subsequently applied for membership of the European Community (EC) in 1987, and on 1 January 1996 the EC-Turkey Customs Union agreement was implemented. The agreement aimed to eliminate trade barriers between Turkey and the EU in industrial goods and some processed agricultural products. However, the agricultural sector which is of key importance to Turkey, both in economic and social terms, was not included within the terms of the Customs Union agreement.

As in previous accession processes, Turkey will be required to change a considerable part of its national legislation to achieve conformity with the EU law. Such conformity implies rather fundamental changes for Turkish society, and will affect almost all areas, from the environment to the judiciary, from transport to agriculture, and will go across all sections of the population. Besides other measures, on the day of accession, Turkey would have to fully adopt the *acquis communautaire* of the EU, including the Common Agricultural Policy (CAP), border protection and processing standards, as these will stand at that time.

A possible Turkish accession to the EU is expected to have impacts on most sectors and factor markets, but on the agricultural sector in particular. Consequences arise from the large numbers of people employed in Turkish agriculture, who are often engaged in semi-subsistence farming generating low value added. If Turkey would join the EU today, the number of people working in agriculture within the EU would more than double. Impacts of such an accession on Turkish and EU agricultural production would differ for at least two reasons. Firstly, the level of protection afforded to Turkish farmers and the agricultural policy instruments used in Turkey are different from those applied in the EU under the CAP. Secondly, the balance of policy supports across Turkey's agricultural sectors diverges from that in the EU. Thus, there is a need to analyse the impact of Turkey's accession to the EU on the agricultural sectors of both Turkey and the EU27. Taking into account the importance of its agricultural sector and its intensive domestic agricultural support system, it is expected that a Turkish accession to the EU – and it's consequential adoption of the CAP – will influence the then enlarged EU agricultural commodity markets.

This paper aims to provide a quantitative analysis of the implications of a possible accession of Turkey to the EU on agricultural markets in Turkey and the EU27. The AGMEMOD (AGricultural Member States MODelling) tool capturing the diversity of European agriculture (via its multi-commodity approach), has been used to quantify the impact of a Turkish accession to the EU. Section two of this paper gives a short overview of the Turkish agriculture and its main policy instruments in so far as they differ from the agricultural sector and the CAP in the EU. Section three deals with AGMEMOD, the simulation tool used, and describes its extension with a Turkish country module. Section four presents the scenario narratives and section five provides the main simulation results for both Turkey and the EU. The main conclusions and qualifications are drawn in section six.

Turkish food and agriculture sector and its policy[1]

A Turkish accession would add about 41 million hectares to the agricultural area of the EU, and Turkey would account for one fifth of the agricultural area of a future EU28. In 2008, more than one quarter of the Turkish workforce was employed in agriculture, while the sector accounted only for 9.2 % of Turkish GDP (see Table 1). Vegetables and fruits together, with tomatoes ranked first, account for the majority of Turkish crops' output value (see Table 2). Cow milk is the most important product and amounts to 36 % of the livestock product output value.

Although Turkey is self-sufficient in most food items, its agricultural sector is relatively poorly structured and inefficient when compared with the EU average. The Turkish farm structure shows similarities with those of some of the Member States that acceded to the EU from May 2004 onwards. Most farms are family farms and only employ family labour. Turkish farm holdings are on average smaller than in the EU, with the size of the average holding in Turkey 6.5 ha, which is considerably smaller than the EU average of 15.8 ha. Small scale farming, partly via semi-subsistence and unspecialized production systems, is an important characteristic of Turkish agriculture, e.g. 60 % of Turkish dairy farms have less than four animals. Turkish agriculture also suffers from land erosion problems, water shortages and droughts, inadequate farm

[1] Detailed descriptions of Turkish agriculture in comparison to the EU can be found in Burrell and Oskam, 2005; Burrel and Kurzweil, 2007; and Pelikan et al., 2009

management and technology, and an inefficient rural credit system, high costs and diverse quality standards in Turkish food processing.

Table 1:
Agricultural indicators for Turkey and the EU27, 2008

	Turkey	EU27	Turkey compared to EU27 (%)
Agricultural land (1,000 ha)	41,207	183,156	22
- arable land (1,000 ha)	*23,868*	*109,980*	*22*
- permanent grassland (1,000 ha)	*14,617*	*59,755*	*24*
Share of agricultural land in total area (%)	52.6	43.9	120
Farms (million)	3	14.5	21
Average farm size (ha)	6.5	15.8	41
Agricultural trade volume (billion €)	14	139	10
Agricultural production value (billion €)	59	279	21
Share of agricultural labour in total labour (%)	27	5	540
Share of agricultural GDP in total GDP (%)	9.2	1.6	575

Sources: Turkish Statistical Institute, Eurostat

Table 2:
Agriculture production statistics for Turkey and the EU27, 2008

	Turkey	EU27	Turkey compared to EU27 (%)
Crops (1,000 tonnes)			
Cereals (including rice)	28,533	313,982	9
Sugar beets	15,448	110,409	14
Oilseeds	1,176	23,312	5
Fruits and vegetables	37,286	61,764	60
Livestock (1,000 head)			
Total cattle	10,069	88,837	11
- dairy cattle	*38 %*	*27 %*	*141*
Sheep and goats	31,811	104,406	30
- sheep	*81 %*	*87 %*	*93*
Pigs	4	153,067	0

Sources: Turkish Statistical Institute, Eurostat

Varied climatic and geographical conditions of Turkey permit a wide range of farming activities and almost all temperate and Mediterranean crops can be cultivated. Due to the country's close location to Europe, the Middle East, Russian Federation, Caucasian Countries, and North Africa it has easy access to large and growing markets. Due to high rates of population and income growth, Turkey's vast basic agricultural resources, namely fertile soil, access to sufficient water and varied climate, offer a considerable potential for expansion and development (Atakan, 2008). These conditions are reflected in Turkey's status as a major world producer of cereals, nuts, cotton, tobacco, fruits and vegetables. Productivity growth, government support (including tariff and non-tariff protection), irrigation projects and an increasing export demand are main drivers for a growing Turkish agricultural production. For a number of years the agricultural sector has been undergoing a modernisation process, with irrigation schemes supporting improvements in the productivity of agricultural land, with agricultural labour being replaced by capital (such as tractors) and other infrastructure improvements.

In the 1980s and 1990s, Turkish agricultural producer support measures were entirely based on commodity output and variable input subsidies. The Agricultural Reform and Implementation Project (ARIP) was launched in 2001 and aimed to implement reforms to Turkish agricultural programmes. The envisaged reforms should bring Turkish agricultural policy more in line with that of the EU and with Turkey's commitments as a member of the World Trade Organization (WTO). Price supports and subsidies were to be removed with farmers compensated by the provision of direct income supports. However, although the commodity output and variable input based subsidies have been reduced since 2001, the income impact of those reductions has been almost entirely offset by the direct income support payments to farmers and the newly introduced compensatory premium payments for production of cereals, oilseeds and industrial crops, pulses, milk and meat (see Table 3). Moreover, the most recent reform of Turkish agricultural policy, as set out in the Agricultural Strategy Paper 2006 to 2010 (MARA, 2005), does not correspond to developments in the EU CAP. Turkey is moving from decoupled direct support back to more coupled direct support and price support, while the EU is moving in the opposite direction. Significant premium payments are still coupled to production for a large number of arable crops and livestock production systems, and are stimulating Turkish agricultural production and contributing to increasing Turkish self-sufficiency levels. With the exception of direct income support payments, which were abolished in 2009, all other agricultural support types in Turkey will likely continue over the next ten years. Indications of such a policy intention can be found in the Agriculture Strategy Document, prepared by the Ministry of Agriculture and Rural Affairs and published by the Higher Planning Council in 2005.

Border measures (tariffs, tariff rate quotas, as well as other non-tariff barriers) are another significant source of protection for Turkish agriculture. On the one hand, import tariffs provide support for the country's domestic pro-

duction, while Turkey maintains a ban on imports of most live animals and animal products on the other hand. Given these high import barriers, a liberalisation of bilateral agricultural and food trade between Turkey and the EU would be highly asymmetrical.

Table 3:
Overview on border and domestic measures of Turkish agricultural policy

Measure	Commodity
Import tariffs (% rate)	zero for cotton; relatively high for cereals, sunflower seeds, vegetable oil, dairy products, poultry and meat, live animals
Tariff rate quota (tonnes)	cattle, beef meat, sheep meat (zero and low rate for TRQ)
Export subsidies (USD/ton)	fruits (frozen), vegetables (excluding potatoes), olive oil, poultry meat, eggs (per 1,000)
Export subsidies (% of exported quantity eligible)	fruits (frozen), vegetables (excluding potatoes), olive oil, poultry meat, eggs
Export taxes (% rate)	hazel nuts, animal hides
Premium payments (TL/tonne)	wheat, maize, barley, rye, oats, paddy rice, sunflower seed, soybean, canola, cotton, olive oil, pulses (bean, chickpea, lentils), tea, milk, beef, broiler meat
Compensation payments (TL/ha)	potatoes, citrus sap, apple sap
Direct, decoupled, income support payments (TL/ha, maximum area 50 ha) – abolished in 2009	cereals, oilseeds, potatoes, cotton, tobacco, fodder crops, pulses, tuber crops, vegetable and fruits, ornamental, private pasture-meadow, private forest areas
Diesel payments (TL/ha, maximum area 50 ha)*	cereals, oilseeds, potatoes, cotton, tobacco, fodder crops, pulses, tuber crops, vegetable and fruits, ornamental, private pasture-meadow, private forest areas
Fertiliser payments (TL/ha, maximum area 50 ha)*	cereals, oilseeds, potatoes, cotton, tobacco, fodder crops, pulses, tuber crops, vegetable and fruits, ornamental, private pasture-meadow, private forest areas
Production quota (tonnes)	sugar beets

*Not applied in 2006

Source: Turkish Official Gazette and Ministry of Agriculture and Rural Affairs, General Directorate for Production and Development Website.

AGMEMOD and Turkish country model

Given the importance of Turkey's agricultural sector and its intensive domestic agricultural support system, a Turkish accession to the EU and the concomitant adoption of the CAP by Turkey, is expected to affect both the Turkish and EU agricultural commodity markets. The AGMEMOD tool has been used to quantify the possible implications of the Turkish accession for these markets.

Specification of the AGMEMOD

AGMEMOD is a dynamic, partial, multi-country, multi-market equilibrium modelling system, which can provide significant detail on the main agricultural sectors in each EU Member State. The system has largely been econometrically estimated at the individual Member State level but it produces aggregated EU results as well. In the cases where estimations were neither feasible nor meaningful, the model parameters have been calibrated. The individual country models contain behavioural responses of economic agents on the agricultural markets due to changes in prices, policy instruments and other exogenous variables. These econometrically estimated, country specific, economic models of agricultural commodity markets provide a sound basis for analysing impacts of a future accession of current candidate countries. Commodity prices adjust so as to clear all the markets considered, while supply, use and prices of commodities are projected and simulated to a 10 years time horizon.

To solve the modelling system in prices, all commodity supply and utilisation balances at both the EU and Member State levels must hold and take into account the international trade and other commitments of the EU. The current model version regards the Rest of the World (non-EU region) in a stylized form as its imports and exports are represented by exogenous world market prices, import tariffs and export subsidies.

Projections are validated by standard econometric methods and through consultation with experts who are familiar with the agricultural markets in the regions under study. Both review types may result in a revision of model structures, parameter estimates and underlying policy assumptions.

Research based on AGMEMOD has been drawn on the expertise of an extensive network of economists working together across the EU. This growing network has been established over a number of years and has brought together a level of pan-national expertise that would otherwise be difficult to assemble. Their activities are supplemented by the assistance of national agricultural market experts

from the individual countries, who frequently review the model projections (Salamon et al., 2008).

AGMEMOD uses a bottom-up approach. Country level models have been developed based on a common country model template, reflecting the specific situation of the agricultural sectors in the individual countries. These country level models are then integrated into a composite EU model. This approach allows to capture the inherent heterogeneity of agricultural systems existing within the EU, while simultaneously maintaining analytical consistency across the estimated country models. The Turkish country model has been established along the same procedures and introduced in the overall AGMEMOD system. Besides Turkey and the EU Member States, the AGMEMOD model also captures the candidate countries Croatia and the Former Yugoslav Republic of Macedonia.[2]

Specification of the Turkish AGMEMOD sub-model

In our study, a detailed dataset and modelling structure for the main agricultural commodities in Turkey were integrated into the overall AGMEMOD modelling framework. Further, a detailed set of Turkish agricultural policy instruments such as direct payments, support prices and import tariffs was developed. In developing and estimating the Turkish AGMEMOD model the maintenance of analytical consistency was achieved via the adherence to the agreed common templates. The Turkish model consists of different supply and demand sub-models for the main agricultural commodities in Turkey. In general, cereal and oilseeds with their derived products (oils and cakes), industrial crops (sugar beet, cotton and tobacco), potatoes, livestock (cattle, beef, poultry, sheep and goats), dairy (raw milk, on farm consumption of whole milk, drinking milk, other fresh products, butter, milk powder and cheese), tomatoes, olives, olive oil, oranges and apples were modelled. For each of these commodities, production as well as supply, demand, trade, stocks and domestic prices have been derived by econometrically estimated or calibrated equations (Figure 1).

To complete the Turkish AGMEMOD commodity submodels, it was necessary to add an equation describing the equilibrium for each commodity market. This condition implies that production plus beginning stocks plus imports

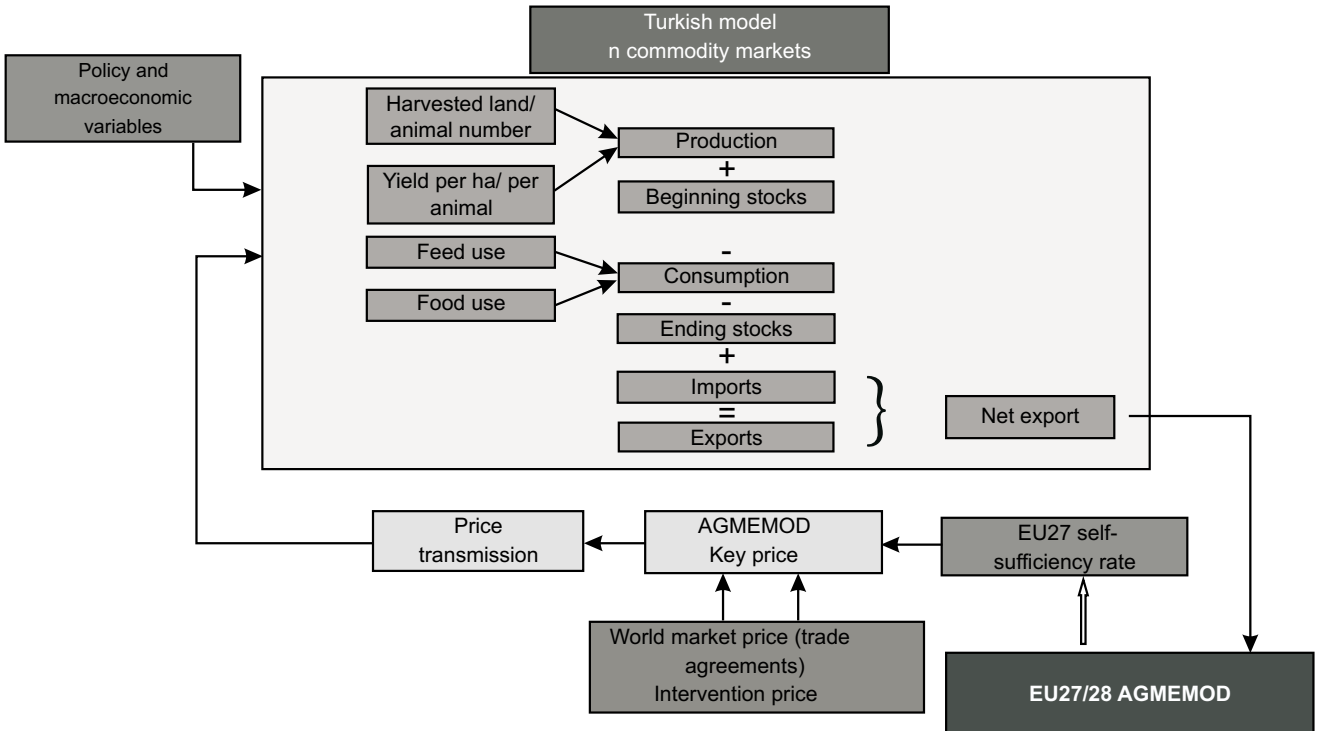

Figure 1:
AGMEMOD structure for Turkey

[2] The AGMEMOD 3.0 version includes also models of the cereal and oilseeds markets of Russia and the Ukraine, although these are not EU candidate countries. Both country models run as separate models.

must equal domestic use plus ending stocks plus exports. In a closed economy model (with no imports and exports), such a supply and use equilibrium condition is sufficient to endogenously determine the equilibrium country market prices. Given that Turkey does not represent a closed economy, the Rest of the World has an important impact on the market modelled. To account for such impacts price linkage equations are used to represent the inter-relationship between markets in Turkey, the EU and the Rest of the World. The price linkage equations in the model are written as:

$$p_{i,t} = \alpha_t \left[f\left(Wp_{i,t}, ssr_{i,t}, V\right)\right] + (1-\alpha_t)\left[f\left(Kp_{i,t}, ssr_{i,t}, Kssr_{i,t}\right)\right]$$

Where $p_{i,t}$ is the price of the Turkish commodity i in year t, $Wp_{i,t}$ is the world market price of commodity i in year t, $Kp_{i,t}$ is the AGMEMOD EU key price of commodity i in year t, $ssr_{i,t}$ is the Turkish self sufficiency rate (production divided by domestic use) for commodity i, $Kssr_{i,t}$ is the self sufficiency rate for the same commodity and year in the EU market and V is a vector of exogenous variables which could have an additional impact on the Turkish national price, such as the Turkish support prices and Turkish border protection measures.

For years including 2015 and thereafter, under the Accession scenario the dummy variable α_t is equal to zero. Under the baseline and under the Accession scenario before 2015 the Turkish price for commodity i is determined by Turkish supply and use balance, the world price of the commodity concerned and Turkish tariff rates and other exogenous variables that will affect the relationship between Turkish and external markets. However, from the moment Turkey enters the EU market (as a Member State), the dummy variable α_t is set equal to zero and the Turkish price is determined by the EU key price for the commodity concerned and the self sufficiency rates in Turkey and in the EU.

Baseline and Accession Scenarios

In order to examine the impact of a possible future accession of Turkey to the EU on Turkish and EU agriculture, AGMEMOD is used to generate projections under two sets of contrasting assumptions regarding the accession of Turkey to the EU. In the pre-accession projection period the current agricultural and trade policy structures in the EU27 and in Turkey remain different and in place. In modelling the impact of Turkish EU accession, the CAP is assumed to replace the Turkish agricultural policy during the accession period starting in 2015. This accession date is not regarded as a likely date, but was chosen for technical reasons with regard to the model's ability to adjust to changes in the political environment. In the post accession period, 2015 and onwards, the agricultural policies of Turkey are based on the agricultural policies in force in the EU and these are implemented within the AGMEMOD modelling framework following the policy harmonization approach that was developed and implemented under the FP6 study AGMEMOD 2020 (project number SSPE-CT-2005-021543). The baseline and accession scenario are described in more detail below.

The *EU27 baseline* situation assumes the following:

- the provisions of the CAP Health Check agreement of November 2008 remain in place for the projection period to 2020, including the abolition of milk quotas, the zero set aside rate from 2009, decoupled direct support (SPS and SAPS) and remaining coupled direct payments, and modulation rates that reach 14 % by 2012;
- EU agricultural trade policy measures will continue to be governed by the Uruguay Round Agreement on Agriculture (URAA);
- the macroeconomic projections per Member State, updated to capture financial crisis effects prevail;
- the US dollar weakens against the Euro over the next ten years (FAPRI, 2010);
- world prices develop as in FAPRI projections (FAPRI, 2010);
- the EU 10 % biofuels directive would be achieved in full by 2020.

The *Turkey baseline* situation assumes the following:

- the macroeconomic projections for Turkey, according to current knowledge, prevail over the projection period to 2020;
- specific Turkish agricultural policy instruments: input subsidies, premium payments, hectare payments and production quota continue over the projection period to 2020, however, as the Turkish government regularly adjusts policy measures to compensate for inflation rates or changes in market balances, the monetary values of the measures were fixed in Euro and then recalculated in Turkish Lira[3];
- direct income support is abolished from 2009;
- current trade policy that protects Turkish agriculture, i.e. import tariffs, import bans on most live animals and livestock products and export subsidies, is continued over the projection period to 2020.

[3] Same approach as for the non-Euro zone EU Member States.

In the accession scenario it is assumed that Turkey accedes to the EU on 1 January 2015. The *EU28 accession* scenario is based on the following:

- EU is enlarged to 28 members with the accession of Turkey from 1 January 2015;
- agricultural policy in the EU28 from 1 January 2015 onwards is that which prevails in the EU27 under the baseline (Health Check);
- the same trade assumptions apply to the EU28 as applied to the EU27 under the baseline scenario;
- the macroeconomic and world price projections used in the accession scenario are the same as in baseline scenario;
- EU budget allocated to support Turkey's agriculture from 2015 onwards, coupled and decoupled supports by commodity;
- the assumed implementation of the EU biofuels directive under the baseline scenario also occurs under the accession scenario, however such a directive was not built in for Turkey.

Commodity balance items such as production, domestic use, stocks, exports, imports as well as the associated prices are projected and simulated from year 2007 to 2020. Baseline projections and accession simulation results cover:

- the individual EU Member States and Turkey;
- EU27 as a whole (27 Member States from January 2007), respectively EU28 as a whole (EU27 and Turkey) from 2015 onwards.

Model results

Baseline outlook

The Turkish baseline results for cereals and oilseeds indicate that these markets will continue to be highly protected allowing projected cereal and oilseed prices to remain significantly above the EU and the world prices. At the same time yield growth per hectare is expected to be relatively low for wheat and barley due to limited irrigation possibilities. However, a higher yield growth is projected for maize due to the use of higher yielding seed varieties. A gradual growth in the area of cereals and oilseeds harvested is projected under the baseline.

Under the baseline in general, Turkish prices for other crops like root crops, tobacco and cotton are simulated to remain significantly above the EU prices. Price projections for Turkish oranges and apples see these continuing at levels in excess of those projected to prevail on EU markets, while Turkish prices for tomatoes and olive oil are projected to remain below EU market prices (Table 4).

Turkish yields per hectare for tobacco are projected to be stable under the baseline, with baseline yields of cotton projected to grow more over time. In contrast, the growth in yields for apples and tomatoes are assumed to be small due to poor access to financial services to modernize production systems combined with high interest rates for agricultural credit and the very limited farm sizes. Due to higher direct payment and subsidy support under the baseline, land use will switch from tobacco to cotton. Driven by support premiums, tomato and apple areas are also projected to grow.

In the animal sectors, the Turkish beef, sheep meat and eggs prices will remain significantly above EU prices, supported by the continuation of current tariff and non-tariff protection, while the Turkish broiler price is simulated to remain below the EU price level. The characteristics of highly dispersed production, low yields and semi-subsistence farming will limit market growth in the beef sector and lead to high Turkish beef and lamb prices under the baseline conditions. Large vertically integrated firms, with labour and land cost advantages, are stimulating Turkish broiler meat production and also consumption with low prices compared to other meat products. Therefore, broiler exports are expected to increase.

Due to continued tariff protection, the baseline projection indicates that Turkish prices for milk and dairy products will remain significantly above EU price level. However, in the course of the projection period Turkish prices are projected to decline due to increasing self-sufficiency rates and declining production costs. Currently, Turkish dairy farms are characterised by small average sizes and relatively low productivity combined with a relatively low share of deliveries to dairies. Those structural deficits are partly preserved by tariffs and coupled premiums; hence, productivity growth will lead to a moderate increase in production. Turkish dairy product markets are determined by domestic market forces, as they are largely isolated from world markets by high import tariffs. However, due to growing Turkish real per capita incomes and population, the dairy product consumption is simulated to rise under the baseline.

EU27 baseline projections indicate that wheat and oilseed prices will remain at relatively high levels, while the barley price won't reach the general cereals price level. Especially the additional demand for biofuels, based on the EU targets, is driving this development, while in contrast the reduced intervention and the limited demand increase for feed will affect prices of coarse grains. Total cereal area harvested in the EU27 is projected to slightly decline under the baseline compared to total oilseeds area harvested which remains constant or even increases. In the EU27 production levels of both cereals and oilseeds are projected to expand due to productivity gains. Thus, the

Table 4:
Selected baseline results for Turkey and EU27

	Baseline 2020			% change p.a. 2020 vs 2005		
	Production 1000 t	Domestic use 1000 t	Price €/100 kg	Production	Domestic use	Price
			Turkey			
Plant production						
Soft wheat	17192	23366	21.9	0.1	2.1	0.2
Maize	4712	7133	20.7	0.8	2.8	-0.4
Rapeseed	290	410	33.7	44.2	13.0	1.6
Potatoes	4962	4510	13.1	1.3	0.7	-3.5
Sugarbeets	15257	15272	8.9	0.0	0.0	1.9
Tobbaco	89	58	222.0	-2.8	-4.8	-1.1
Cotton	1206	1623	122.5	2.3	0.5	0.7
Tomatoes	14338	13689	23.5	2.4	2.3	-0.6
Oranges	2118	1579	23.6	2.6	1.2	-2.1
Apples	2966	2888	38.4	1.0	0.8	-1.6
Animal products						
Beef and veal	584	574	473.5	4.1	3.9	-0.2
Lamb meat	137	112	372.0	4.2	2.8	-2.2
Butter	233	247	306.3	2.6	0.7	-2.4
Cheese	637	648	470.0	2.7	1.9	-1.4
Other fresh products	2938	3090	117.7	1.8	2.2	0.0
			EU27			
Plant production						
Soft wheat	144087	136785	12.6	0.8	1.3	1.8
Maize	77240	81509	12.9	1.3	2.0	0.6
Rapeseed	20032	23599	32.5	1.9	2.0	3.6
Potatoes	63593	61886	13.3	0.5	0.1	-0.3
Sugarbeets	131340	130034	27.9	-0.2	-0.2	-0.5
Tobbaco	393	355	173.7	0.0	-0.5	-0.7
Cotton	781	173	46.3	0.7	2.2	0.4
Tomatoes	20013	18582	56.3	0.8	0.4	1.2
Oranges	6277	17596	23.5	0.1	0.3	0.0
Apples	11675	12502	28.6	0.7	0.6	-0.1
Animal products						
Beef and veal	7927	8942	324.3	-0.4	0.1	0.8
Pig meat	22477	22570	126.5	0.1	0.7	0.3
Broiler	6002	6134	166.3	1.2	0.9	2.9
Butter	2189	2097	254.7	0.1	-0.2	-0.8
Cheese	9914	9543	395.6	0.8	0.9	-0.6

Source: AGMEMOD, 2010

EU27 cereal production is projected to grow only due to increasing productivity per hectare in the Member States. In filling the mandatory belending rate requirements of the EU Renewable Energy Directive, the EU is projected to become more dependent on imports of rape oil and maize under the baseline.

The EU sugar price is projected to decline due to the 2005 EU sugar reform, and EU sugar prices are moving towards the world price over the baseline projection period. Thus, EU27 areas harvested for root crops will

decline. Furthermore land use for cotton and tobacco is projected to decline, while area cultivated with fruits and vegetables is projected to stabilize over the baseline projection period. The EU will remain a net importer of apples under the baseline.

In the livestock and meat markets, the main trends for the EU27 are projected: beef markets are driven by declining dairy cow herds will be characterized by declines in the dairy cow herds, which will result in a lower beef production while at the same time the demand will remain stable. As a consequence, the EU net imports for beef are expected to exist over the whole projection period. The overall effect will be stable beef prices. In the pig meat and poultry sector the baseline projections depict production and consumption increases leading to slight declines in net exports while prices remain quite stable.

With regard to the dairy sector, the projections indicate that the milk quota abolition will lead to a slight increase in milk production. Due to the phasing-in of the quota abolition in 2015 additional quotas will become available; hence not in all Member States the quota will remain binding, thus expansions in production are less than the quota increases granted. Milk prices are projected to remain relatively stable at 27 ct/kg. According to the baseline projections, cheese market prices are to remain firm over the period, as demand growth is higher than the projected production growth. Thus net trade is slowly declining. Under the baseline, the EU butter market price is expected to decrease slightly. EU skim milk powder market prices are expected to grow slightly over the baseline due to a projected small production decrease and a stable demand. The reallocation of milk fat and protein towards higher value products is to continue, e.g. production of cheese and fresh products production is projected to grow.

Accession impacts

Under the baseline, Turkish agricultural commodity prices are mainly driven by world market prices, import tariff rates and import bans, while under the accession scenario, prices converge towards the EU key prices over the course of time. Impacts of the Turkish EU accession on Turkish on the Turkish agri-food markets are presented relative to the outcome under the baseline (see Table 5).

The market effects of accession to the EU are projected to be mostly negative for the Turkish crop sectors because market prices are projected to decline under the accession scenario. With the lower prices and quantities produced, producers' income is reduced for almost all commodities. However, producers of tobacco (more support compared to baseline scenario), sheep meat, broiler and dairy milk (lower feed costs for livestock sectors relative to the baseline) could gain from an EU accession.

Table 5:
Impact of an EU accession on main Turkish agricultural markets, relative to the baseline in 2020, in percent

	Price	Production	Domestic use	Self-sufficiency rate
Soft wheat	-39.4	-11.2	4.7	-15.1
Barley	-40.5	-4.3	10.8	-13.6
Maize	-35.7	-21.5	10.0	-28.6
Rice	-15.7	-24.6	4.1	-27.6
Sunflower	-29.2	0.7	3.7	-2.9
Potatoes	-28.9	-53.1	-0.1	-53.0
Sugar	-55.2	-27.3	14.8	-36.7
Tobacco	-56.2	7.9	0.7	-36.6
Cotton	-38.0	19.6	3.5	15.5
Tomatoes	-6.0	7.7	0.2	7.5
Oranges	-19.5	0.3	4.5	-4.0
Apples	-18.7	0.9	1.2	-0.3
Beef	-31.6	0.04	20.5	-17.0
Poultry	30.8	9.6	-8.0	19.1
Sheep meat	-8.1	29.5	45.7	-11.1
Milk	-14.8	3.1		
Butter	-11.2	2.7	0.3	2.5
Cheese	-16.1	4.8	0.0	4.8
Other fresh products	-10.9	3.5	1.2	2.3

Source: AGMEMOD, 2010

The demand levels of most commodities would increase due to lower prices, thus Turkish consumers are expected to gain from an accession to the EU.

At the same time, the accession scenario also has impacts on EU agricultural commodity markets (see Table 6). In 2020, the EU now includes 28 Member States as Turkey is assumed to have entered in 2015. Percentage changes in the seft-sufficirncy rates of the commodities represented are calculated between rates of the EU27 under the baseline and EU28 under the accession scenario. When 27 and EU28 results are compared production of wheat, rice, tobacco, cotton, tomatoes, oranges, apples, poultry and sheep meat are projected to increase significantly in the event of Turkey joining the EU.

While under the baseline, EU prices were mainly driven by world market prices, EU trade measures and the self-sufficiency rates for the EU27, under the accession scenario, however, Turkey influences the self-sufficiency rates at the EU28 level and this influence leads to projected changes in the level of EU key prices. Those changed prices levels induce adjustments in commodity supply and use at the Member States level. Table 6 shows that, relative to the baseline, in particular the lower self-sufficiency rates for barley, maize, rice and cotton are projected to lead to

higher EU prices, while projected higher EU28 self-sufficiency rates for tomatoes, oranges, apples, and poultry are expected to generate lower EU prices.

Table 6:
Impact of the Turkish accession on EU agricultural markets, relative to the baseline in 2020, in percent

	Price	Self-sufficiency rate
Soft wheat	0.9	-6.2
Barley	2.1	-7.0
Maize	1.2	-4.1
Rice	17.4	-10.1
Sunflower	0.0	-10.6
Potatoes	-1.0	-3.5
Sugar beets	0.0	-4.4
Tobacco	-0.8	6.6
Cotton	6.6	-73.4
Olive oil	0.0	0.7
Tomatoes	-4.5	1.7
Oranges	-2.8	22.3
Apples	-0.5	1.8
Beef	0.0	0
Pig	-0.3	0.1
Poultry	-3.1	2.1
Milk	0.1	
Butter	0.2	-0.7
Cheese	0.1	0

Source: AGMEMOD, 2010

Qualification and conclusions

As with all policy simulations, the results described in this study are based on several explicit and implicit assumptions. Therefore the following points should explicitly be mentioned:

- Although the latest available projections concerning the macroeconomic variables have been used, considerable uncertainties concerning their future development remain. Major impacts can be ascertained by variations in exchange rates; hence, effects could be derived by simulating different sets of macroeconomic variables.
- Weather conditions are assumed to be normal, if weather deviates significantly from the average, e.g. during a drought, then prices are expected to increase above the projected level and vice versa. EU Bioenergy Mandates have been considered in AGMEMOD's baseline and scenario simulations. However it remains uncertain to which extent they will be fulfilled and by what approach they will be implemented in the different Member States. Furthermore, the use of second generation biofuels and an extra positive shock of biofuels demand arising from Turkey's accession have not been considered.
- Specific challenges are incurred in the projections for the milk market sector as the abolishment of the quota regime, which restricted milk quantities in the EU for 30 years, constitutes a structural break which is difficult to model and the level of quota rents imputed in the models has a significant impact on results.
- Turkish animal data is currently under revision with the aim to provide more harmonised information. When more consistent and harmonised data are made available from the Turkish Statistical Institute this should allow for an improved presentation of the Turkish animal sectors.
- Another issue relates to the assumption of commodity homogeneity. In reality many of the price spreads observed between Member States are due to quality differences between commodities. In AGMEMOD, there is only one price per commodity that is used as the key price, although the product in question can be very heterogeneous across countries.
- A further restriction of the model is the fact that the feedback between the EU and the world market has not yet been captured.
- Equilibrium models are not explicitly taking into account short-term fluctuations of, e.g., world market prices. As the baseline scenario involves cuts in intervention prices, world market price fluctuations will be transmitted to domestic EU prices to a larger extent than occurred in the past.

Despite and partly in view of the mentioned limitations, the simulation results of this study as well as the process of data compilation and parameter estimation still allows for several conclusions:

- Turkey is characterised by a differentiated agriculture that covers nearly all sectors of the EU agriculture with a strong focus on plant production in general and on the production of fruits and vegetables in particular.
- In Turkey, the system of data collection and dissemination is currently under revision. Considerable knowledge is required to compile data of requisite quality, while long time series are needed to conduct parameter estimates. Consequently, estimates are hampered by the presence of 'structural' and/or technical breaks in the long-term data series. In this study the collection of data and development of coherent data sets on the Turkish animal sectors proved to be one of the biggest challenges. Thus additional efforts in the statistical har-

monisation are required to improve the basis for sound policy advice.

- To simulate the potential impacts of a possible Turkish accession to the EU, a detailed agricultural policy inventory was carried out revealing that, as with the EU CAP system, the Turkish agricultural market policy has been subject to regular policy reforms. However, Turkish policy reforms can be distinguished from the EU's by the frequencies of policy adjustments and its ad-hoc nature in order to counteract unwanted market developments.
- The currently applied support prices in Turkey are often buying-in prices set by state enterprises or cooperatives. Although such prices are not support prices from a formal point of view, they are expected to generate similar market impacts and thus have been modelled as such.
- In 2001, a policy reform was launched with the objective to liberalise Turkish agricultural markets, and to move to non-distorting policy instruments (decoupled payments). However, despite the reduction of commodity output and input based subsidies, Turkey is now moving from a system of decoupled direct income support back to more coupled direct income and market price support regime.
- Most Turkish prices for crop, meat and dairy products are significantly above the EU and world price level under the baseline. This high price level also implies relatively high feed costs for Turkish meat and dairy producers. Under the baseline the Turkish production of cotton, fruits and vegetables increases over the projection period due to the relatively high policy support levels. Vertically integrated large firms with low labour and land costs are projected to stimulate broiler production in Turkey and domestic consumption levels.
- The Turkish agricultural policy program aims to achieve self-sufficiency. Due to this objective the relationship between supply and demand on the Turkish markets does not change fundamentally under the baseline. Both supply and demand are projected to grow in most cases. While nominal markets prices, expressed in Turkish currency, are expected to increase over the baseline projection period, the production growth for some commodities leads to declines in domestic prices towards EU price levels when these prices are expressed in Euros.
- By the end of the baseline projection period, projected price gaps between the higher Turkish prices and EU prices are generally reduced, however in some cases still remain at a considerable level.
- Previous EU accessions indicate that when prices in acceding countries were markedly above the EU prices prior to accession (e.g., Finland, Sweden, Austria) these prices quickly dropped to EU levels after accession. In contrast, in acceding countries where domestic prices were lower than EU prices at the time of accession (as in most of the EU12 Member States that acceded in 2004 and 2007), it takes more time until these prices converge. The converging process does not categorically provide a single EU price, but in deficit regions mostly results in somewhat higher prices, e.g. like the milk producer price in Italy. Besides the deficit versus surplus argument, the commodity mix is another explanation for the differences in prices.The principle impact of the Turkish accession on Turkish agriculture is the projected reduction of domestic producer prices. Dairy prices are projected to decline by about 15 % while crop prices are projected to drop by 20 % to 50 % as a result of the accession to the EU. Additionally the CAP support payments (which are mostly decoupled) give smaller incentives to increase production than those payments under the baseline. The results of the accession scenario analysis indicate that even though a reduction in production support will occur, this will not lead to dramatic reductions in production levels when compared to the baseline. An effect of the accession on livestock production in Turkey is positive as the price decline for cereals in Turkey leads to lower feeding costs. Furthermore, decrease in market prices is the associated with positive impacts on the level of Turkish consumption.
- In general, with the adoption of the CAP by Turkey the level of support to Turkish agriculture is projected to decrease for almost all commodities. In particular, the support provided to producers of maize, rice and potatoes will be less under the accession scenario than under the baseline. The analysis in this study suggests that the supply of these commodities in Turkey will decline by between 20 % and 40 %. On the other hand, their demand levels would increase.
- Tobacco, sheep meat and cotton are exceptions. Direct payments to these sectors are assumed to remain partly coupled in the event that Turkey would accede to the EU. This is projected to result in production growths for these commodities.
- Impacts of a Turkish accession to the EU are limited in most cases except in those where the share of the Turkish market is considerable, e.g. rice, cotton, tomatoes, oranges, sheep meat. In contrast, accession effects on the Turkish agri-food markets are mostly negative because market prices and produced quantities are both projected to decline under the accession scenario when compared with the baseline of non-accession. With the lower prices and quantities produced producers' income is reduced for almost all commodities. However, producers of tobacco due to higher support

compared with baseline scenario, as well as of sheep meat, broiler and milk induced by lower feed cost compared to baseline could gain from an accession.

References

Atakan T (2008) Sector report agriculture : Turkey [online]. To be found at <http://www.google.de/search?q=atakan+sector+agriculture+turkey&ie=utf-8&oe=utf-8&aq=t&rls=org.mozilla:de:official&client=firefox-a> [quoted 11.11.2010]

Burrell A, Oskam A (2005) Turkey in the European Union : implications for agriculture, food and structural policy. Wallingford : CABI, 302 p

Burrell AM, Kurzweil M (2007) Distortions to incentives in Turkey. Washington : World Bank, Agricultural Distortions Working Paper 10

Chantreuil F, Le Barbenchon M-D (2007) AGMEMOD database documentation : AGMEMOD Deliverable 3 ; project no. SSPE-CT-2005-021543

Esposti R, Camaioni B (2007) Technical report on the modelling structure : document number AGMEMOD WP2 D2 ; project no. SSPE-CT-2005-021543

Eurostat (2010) Statistics Database [online]. To be found at <http://epp.eurostat.ec.europa.eu/portal/page/portal/agriculture/data/database> [quoted 03.11.2010]

FAPRI (2010) FAPRI 2010 US and world agricultural outlook [online]. To be found at <http://www.fapri.iastate.edu/outlook/2010/> [quoted 03.11.2010]

Leeuwen M van, Tabeau A, Dol W, Bouma F (2008) Technical report on the combined model : AGMEMOD Deliverable 8 ; Project no. SSPE-CT-2005-021543

MARA (2005) Agricultural strategy paper 2006-2010. Ministry of Agriculture and Rural Affairs. Ankara [online]. To be found at <http://docsdrive.com/pdfs/ansinet/jas/2006/3052-3059.pdf> [quoted 23.11.2010]

Pelikan J, Brockmeier M, Kleinhanß W, Tietz A, Weingarten P, Bayaner A (2009) Auswirkungen eines EU-Beitritts der Türkei. Braunschweig : vTI, 112 p, Landbauforsch SH 329

Salamon P, Chantreuil F, Donnellan T, Erjavec E, Esposti R, Hanrahan K, Leeuwen M van, Bouma F, Dol W, Salputra G (2008) How to deal with the challenges of linking a large number of individual national models: the case of the AGMEMOD partnership. Agrarwirstschaft 57(8):373-378

Turkish Statistical Institute (2004) Agricultural structure : production, price and value. Ankara : Turkish Statistical Inst