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Potential impacts on agricultural commodity markets of an EU enlargement to Turkey

Extension of the AGMEMOD model towards Turkey and accession scenario

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Contact information
Address: Edificio Expo. c/ Inca Garcilaso, 3. E-41092 Seville (Spain)
E-mail: jrc-ipts-secretariat@ec.europa.eu
Tel.: +34 954488318
Fax: +34 954488300

http://ipts.jrc.ec.europa.eu
http://www.jrc.ec.europa.eu

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Authors:
Myrna van Leeuwen, Petra Salamon, Thomas Fellmann, Ali Koç,
Gülden Bölük, Andrzej Tabeau, Roberto Esposti,
Andrea Bonfiglio, Antonello Lobianco and Kevin Hanrahan

Editor:
Thomas Fellmann

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Preface

A growing membership of the European Union is part of the development of European integration. Turkey is a candidate country for EU membership following the Helsinki European Council of December 1999 and formal accession negotiations with Turkey started in October 2005. Given the importance of Turkey's agricultural sector, a Turkish accession to the EU could be expected to impact the agricultural sector in both the EU27 and in Turkey. This report provides an in-depth model-based quantitative assessment of the potential impacts of an EU enlargement to Turkey for agricultural commodity markets in Turkey and the EU.

It has to be noted that the report does not reflect any concrete political decision on modalities regarding the potential accession of Turkey to the EU. Moreover, the assumed accession date of 2015 does not represent a forecast or an expectation that Turkey will accede to the EU in 2015. The year 2015 was rather chosen for technical reasons in order to allow the analytical model used in this study enough time to adjust to an accession within its ten-year projection horizon.

The study "Extension of the AGMEMOD model towards Turkey and accession scenario" was carried out by members of the AGMEMOD (AGricultural MEmber states MODelling) Consortium under the management of the Agricultural Economics Research Institute (LEI, the Netherlands), in cooperation with the European Commission's Joint Research Centre - Institute for Prospective Technological Studies (JRC-IPTS, Spain) and the Johann Heinrich von Thünen-Institute (vTI, Germany), the Akdeniz University - Faculty of Economics and Administrative Sciences (Department of Economics, Turkey), the Association „Alessandro Bartola" (Ancona, Italy) and the Teagasc-Rural Economy Research Centre (RERC, Ireland).

The AGMEMOD model used in this study is an econometric, dynamic, partial equilibrium, multi-country, multi-market model for EU agriculture at the Member State level. Based on a set of commodity specific model templates, country specific models are developed to reflect the details of agriculture at Member State level and at the same time allow for their combination in an EU model.[1] For the purpose of this study a detailed dataset and modelling structure for the main agricultural commodities in the EU candidate country Turkey has been developed and integrated into the overall AGMEMOD modelling framework.

This report reflects the state of the modelling exercise at the end of November 2010. However, by the publication date some AGMEMOD country models will have already been further elaborated, which may impact the outcome of the accession scenario. Consequently the results of the accession scenario can be slightly different in further AGMEMOD publications on the topic.

[1] Detailed documentation on the AGMEMOD modelling approach, along with the outcome of the JRC-ITPS study 'Impact analysis of CAP reform on the main agricultural commodities' is published in five JRC Scientific and Technical Reports. EUR 22940 EN/1-5. (http://ipts.jrc.ec.europa.eu/publications).

AGMEMOD Consortium partners involved in this study

1. Agricultural Economics Research Institute (LEI), The Hague, The Netherlands
Myrna van Leeuwen
Andrzej Tabeau

2. Johann Heinrich von Thünen-Institute (vTI), Braunschweig, Germany
Petra Salamon

3. Association „Alessandro Bartola", Ancona, Italy
Roberto Esposti
Andrea Bonfiglio
Antonello Lobianco

4. Teagasc-Rural Economy Research Centre (RERC), Athenry, Co. Galway, Ireland
Trevor Donnellan
Kevin Hanrahan

5. *Akdeniz University - Faculty of Economics and Administrative Sciences, Department of Economics, Antalya, Turkey*
Ali Koç
Gülden Bölük

Executive Summary

A growing membership of the European Union (EU) is part of the development of European integration. Following the Helsinki European Council of December 1999, Turkey was accepted as a candidate for EU membership and formal accession negotiations with Turkey started in October 2005. A Turkish accession to the EU, and the concomitant adoption of the EU's Common Agricultural Policy (CAP) by Turkey, could be expected to impact the agricultural markets in both the EU27 and in Turkey. This report provides a comprehensive model-based quantitative assessment of the potential impacts of an EU enlargement to Turkey for agricultural commodity markets in Turkey and the EU.

In the process of becoming an EU accession state, and maybe at some future date a full EU member, Turkey has had a long association with the project of European integration. The relationship between the EU and Turkey began in 1963 with the Ankara Association Agreement. Turkey subsequently applied for membership of the European Community (EC) in 1987. In 1995 the EC-Turkey Customs Union was established. This agreement aimed to eliminate trade barriers between Turkey and the EU in industrial goods and processed agricultural products. Importantly, the scope of the customs union was limited as the agricultural sector which is of key importance to Turkey, both in economic and social terms, was not included.

The agricultural sector in Turkey

More than half of Turkey's total land area is devoted to agriculture. 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 for 9.2% of Turkish GDP. Vegetables and fruits (with tomatoes ranked first) account for the majority of Turkish crops output value. Cow milk is the most important product accounting for 36% of livestock product output value.

The 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 considerable potential for expansion and development. These conditions are reflected in Turkey's status as a major world producer of cereals, nuts, cotton, tobacco, fruits and vegetables.

Although Turkey is self-sufficient in most food items, its agriculture sector is relatively poorly structured and inefficient when compared to 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 considerably smaller than those in the EU, with the size of the average holding in Turkey being 6.5 ha, compared to the EU average of 15.8 ha. Small scale farming, partly via subsistence and unspecialized policulture 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 management and technology, an inefficient rural credit system, as well as high costs and diversity in quality standards that are applied in the Turkish food processing.

The drivers for increasing Turkish agricultural production are expected to be further productivity growth, government support (including tariff and non-tariff protection), irrigation projects, as well as growth in export demand. 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, and with agricultural labour being replaced by increasing level of technology and other infrastructure improved.

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 in order to bring Turkish agricultural policy more in line with the CAP 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 in Turkey since 2000, the income impact of the subsidies have been 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. Moreover, the most recent reform of Turkish agricultural policy, as set out in the Agricultural Strategy Paper 2006-2010, does not correspond to developments in the CAP of the EU. Turkey is moving from decoupled direct supports back to more coupled direct supports and price supports, while the EU is moving in the opposite direction. For a large number of arable crops and livestock production systems, significant premium payments are still coupled to production and are stimulating Turkish agricultural production and contributing to increased Turkish self-sufficiency levels. With the exception of direct income support payments, which were abolished in 2009, all other support types of subsidies to the Turkish agricultural sector will likely continue over the next ten years.

Border measures (tariffs, tariff rate quotas, and other non-tariff barriers) are another significant source of protection for Turkish agriculture. Import tariffs provide support for the country's domestic production and Turkey maintains a ban on imports of most live animals and animal products. Given the high barriers to agricultural imports that Turkey maintains, a liberalisation of bilateral trade relations between Turkey and the EU (as they apply to agricultural trade) would be highly asymmetrical.

Given the importance of Turkey's agricultural sector and its intensive domestic agricultural support system, Turkish accession to the EU, and the concomitant adoption of the CAP by Turkey, could be expected to impact Turkish and EU agricultural commodity markets.

Specification of the modelling approach

To conduct a quantitative assessment of the potential impacts on agricultural commodity markets of an accession of Turkey to the EU the AGMEMOD (AGricultural Member States MODelling) model has been used. AGMEMOD is an econometric, dynamic, partial equilibrium, multi-country, multi-market model for EU agriculture at the Member State level. Based on a set of commodity specific model templates, country specific models are developed to reflect the details of agriculture at Member State level and at the same time allow for their combination in an EU model. The close adherence to templates assures analytical consistency across the country models, which is essential for aggregation towards an EU level. The adherence to model templates and a common modelling approach also facilitates the comparison of the impact of a policy change across different Member States.

AGMEMOD version 3.0, the starting point of the study, not only includes models for each Member State, but also for the EU candidate countries Croatia and Macedonia. Turkey,

however, was so far not included. This study resolves this omission through the development of a detailed dataset and modelling structure for the main agricultural commodities in Turkey and integrating this Turkish AGMEMOD sub-model into the overall AGMEMOD modelling framework. As part of this study a detailed set of Turkish agricultural policy instruments such as direct payments, support prices and import tariffs has been also developed. These new features have been introduced in the AGMEMOD version 4 model, which can be used to gain quantitative insights into the impacts on agricultural markets of a future Turkish accession to the EU.

In developing and estimating the Turkish AGMEMOD model the maintenance of analytical consistency has been achieved via the adherence to the agreed common AGMEMOD templates. The incorporation of Turkish agricultural policy instruments in a harmonized way allows the AGMEMOD 4.0 model to analyse policy relevant questions and to examine the impact of possible agricultural policy changes in Turkey and current EU Member States, at the individual country and aggregate EU levels, in an internally consistent and transparent fashion. The maintenance of this analytical consistency is an essential condition for the successful integration of the Turkish model within the combined AGMEMOD framework. With this modelling framework meaningful analysis of the impact of Turkey's accession to the EU on agricultural commodity markets in Turkey and the EU is possible against a baseline counter-factual where Turkey is assumed to not accede to the EU.

The Turkish model developed as part of this study consists of different supply and demand sub-models for those commodities that represent the majority of the agricultural output of 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 have been 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.

In the pre-accession projection period the current agricultural and trade policy structures in the EU27 and in Turkey remain different and in place. However, under a scenario where Turkey accedes to the EU, Turkey must fully adopt the *acquis communautaire* and agricultural policy in Turkey would be defined by the CAP as operating in the EU at the time of accession. In modelling the impact of Turkish EU accession, the CAP replaces the baseline Turkish agricultural policy during the accession period starting in 2015. Thus, 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 a policy harmonization approach developed and implemented under the FP6 study AGMEMOD 2020-project number SSPE-CT-2005-021543.

To ensure that the baseline projections from the AGMEMOD Turkish model make sense and are coherent from a policy perspective, they have been validated by standard econometric methods and through consultation with the new Turkish AGMEMOD partner, who has a profound knowledge of agricultural markets in Turkey. From this perspective, the performance of the Turkish commodity market models in determining the baseline projections had primacy in the evaluation of the modelling system's performance. The resulting baseline outcomes had then been used to evaluate the accession scenario analysis conducted.

Projections and simulation assumptions

Based on the AGMEMOD "bottom-up" approach, this study is able to capture the diversity of European agriculture and its regional variations. Commodity balance items such as production, domestic use, stocks, exports, imports as well as the associated prices are projected and simulated to a 10 year time horizon (i.e. 2020), with the underlying quantitative and qualitative assumptions on macroeconomic and other exogenous variables reported. Baseline projections and accession simulation results cover:

- the individual EU Member States and Turkey;
- EU15 as a whole (15 EU Member States before the 2004 enlargement);
- EU12 as a whole (12 EU Member States of the 2004 and 2007 enlargements);
- EU27 as a whole (27 EU Member States after the 2007 enlargement);
- EU28 as a whole (EU27 and Turkey) from 2015 onwards.

On accession to the EU, Turkey will have to adopt the CAP and the border protection between the EU and Turkey will be removed. Additionally, Turkey would be obliged to enforce EU processing standards as they would stand on the day of accession**.** To simulate the impact of Turkey's accession on EU27 agricultural markets the following aspects have been implemented in the Turkish model:

- policy instruments associated with the *non-accession period*, such as direct income support payments, premium and compensation payments, support prices, sugar quotas and trade protection measures for Turkish agricultural commodities;
- policy instruments associated with the *accession period*, such as national budgetary ceilings, decoupled single farm payments for farmers falling under the CAP and modulation rates.

The assumed accession date of 2015 is neither a forecast nor an expectation that Turkey will accede to the EU in 2015. The year 2015 was rather chosen for technical reasons in order to allow the analytical model enough time to adjust to accession within its ten-year projection horizon.

Baseline and scenario description

For the purposes of this study separate baseline and accession scenarios were developed. The key assumption in the baseline scenario is that Turkey does not accede to the EU over the projection period to 2020 (the status quo ante is maintained). In the accession scenario Turkey is assumed to become an EU Member State in January 2015. Hence, Turkey is treated differently from the EU27 in that agricultural policy in the EU, as prevailing in May 2010, is assumed to continue over the rest of the projection period in the EU under both the baseline and accession scenarios, while Turkish agricultural policy during the post-accession period in the accession scenario differs from that in the pre-accession period and under the baseline.

The *EU27 baseline* situation assumes the following:

- Provisions of the CAP Health Check agreement of November 2008 remain in place for the projection period to 2020, including the abolition of milk quota, abolition of mandatory set-aside, further decoupled direct support (SPS and SAPS) and limited remaining coupled direct payments, and increasing 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);
- Macroeconomic projections per Member State, updated to capture financial crisis effects prevail;
- US dollar weakens versus the Euro over the next ten years (FAPRI, 2010);

- World price projections taken from FAPRI (FAPRI, 2010);
- EU 10% biofuel directive achieved in full by 2020.

The *Turkey baseline* situation assumes the following:
- 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;
- Direct income support is abolished from 2009 onwards;
- Current trade policy protecting Turkish agriculture: import tariffs, import bans on most live animals and livestock products and export subsidies is continued over the projection period to 2020.

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 assumptions:
- EU is enlarged to 28 Member States with the accession of Turkey in January 2015;
- Agricultural policy in the EU28 from 2015 onwards is the same as in the EU27 under the baseline scenario (reflecting the Health Check agreement);
- Same trade assumptions apply to the EU28 as applied to the EU27 in the baseline scenario;
- Macroeconomic and world price projections used in the accession scenario are the same as in the baseline scenario;
- EU budget allocated to support Turkey's agriculture from 2015, 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 the directive has not built in for Turkey.

Summary of baseline scenario results

The results of the baseline are model based projections of the future, assuming that the current (agreed and scheduled) policy remains unchanged over the projection period. AGMEMOD has been applied to provide baseline projections up to 2020 for Turkey and the EU and its Member States. It has to be noted that due to differing approaches, assumptions and models used, the EU27 baseline results as generated with the AGMEMOD model do not necessarily coincide with the prospects for agricultural markets as given by the European Commission (cf. European Commission, 2010).

Results for Turkey

Cereal and oilseeds markets continue to be highly protected with cereal and oilseed prices projected to remain significantly above the EU and world market prices. Growth in the yields per hectare is projected to be small for wheat and barley due to limited possibilities for irrigation. More positive growth in yields is projected for maize due the use of higher yielding seed varieties. A gradual growth in the area of cereals and oilseeds harvested is projected under the baseline.

Prices for other crops like root crops, tobacco and cotton are projected to remain significantly above the EU prices. Orange and apple prices are projected to remain at levels above EU market prices, while Turkish prices for tomatoes and olive oil are projected to remain below EU market prices. Turkish yields per hectare for tobacco are projected to be stable, with baseline yields of cotton projected to grow over the projection period. Growth in yields for apples and tomatoes are projected to be small due to poor access to financial services to modernize production systems (high interest rates for agricultural credit, small farm sizes). Due to higher direct payment and subsidy support land area switches from tobacco to cotton.

Increases in tomato and apple areas harvested are projected as a result of the provision of applied support premiums.

Turkish beef, sheep meat and eggs prices are projected to remain significantly above EU prices (due to continued tariff and non-tariff protection), whereas the Turkish broiler price is projected to remain below the EU price level. The characteristics of highly dispersed production, low yields and semi-subsistence farming hamper market growth in the beef sector and imply the continuation of high Turkish beef and lamb prices. Large vertically integrated firms, with labour and land cost advantages, are stimulating Turkish broiler meat production and consumption (low prices compared to other meat products) and broiler exports are expected to increase.

Turkish dairy product prices are projected to remain significantly above the EU prices (due to continued tariff and non-tariff protection); however, the Turkish prices are projected to decline over the baseline projection period due to increasing self-sufficiency rates and declining production costs. Turkish dairy farms are characterised by low productivity with low marketing ratios for food products. These farm structures are protected by continuing tariffs and coupled premiums. Turkish milk production is projected to increase moderately. Turkish dairy product markets are determined by market forces on the Turkish market, they are largely isolated from world markets by high import tariffs. Dairy product consumption per head is projected to grow due to growth in Turkish real per capita incomes.

Results for the EU

The AGMEMOD baseline projections for the EU27 indicate that wheat and oilseed prices remain at a higher level than before the price peaks 2007/08, whereas the barley price remains lower than before the price peaks. Demand for biofuels and the new intervention system affect price relations. Total cereal area harvested in the EU27 is projected to contract between 2005 and 2020. However, EU27 cereal production is projected to grow due to increasing productivity per hectare in the Member States. Total oilseeds area harvested and production levels in the EU27 are projected to expand due to higher demands for biodiesel feed stocks.

The EU sugar price is projected to decline due to the 2005 EU sugar reform, with EU sugar prices projected to move towards the world price over the projection period. EU27 areas harvested for root crops, cotton and tobacco are projected to decline, while the area cultivated for fruits and vegetables is projected to stabilize. The EU is projected to remain a net importer of apples.

In the livestock and meat markets, beef prices are projected to slightly increase, dairy herds are declining, there is a small demand increase and net trade is expected to be negative over the whole projection period. In the pig meat market prices are projected to be stable, even though a significant production increase is expected, demand will be slightly higher and net export is declining. In the projections for the poultry meat market prices are slightly increasing, production and demand are increasing, and exports are slightly declining.

EU milk prices are projected to remain stable. Milk quota abolition will lead to higher milk production, but the increase in production is projected to be less than the quota increase granted in advance of the abolition of quota in 2015, thus based on expected quota rents quota is not binding under the baseline. Cheese market prices are projected to stabilise over the baseline period, projected demand growth is higher than the projected production growth, and net trade is slowly declining. The EU butter market price is expected to be stable, with EU production decreasing slightly and demand being stable. EU skim milk powder market prices are projected to grow slightly over the baseline due to slight decreases in production and stable demand. The reallocation of milk fat and protein towards higher value products is projected to continue, e.g. the production of cheese and fresh products is projected to grow.

Summary of accession scenario results

Results for Turkey

In the baseline scenario, Turkish agricultural commodity prices are mainly driven by world market prices, import tariff rates and non-import barriers. In the accession scenario, Turkish domestic prices are projected to converge towards their respective EU price levels over the period 2015-2020. This type of price development in the early years of EU membership was also observed in other countries that have acceded to the EU in past enlargements.

Table 1 summarises the projected impacts on Turkish agricultural commodity markets in the accession scenario, measured as percentage changes relative to the baseline results. The market effects of accession to the EU are mostly negative for the Turkish crop sectors because market prices and produced quantities are both projected to decline in the accession scenario when compared to the baseline of non-accession. With the lower prices and quantities produced the income of Turkish producers 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 accession. The demand levels of most commodities are projected to increase due to lower prices, thus Turkish consumers are expected to gain from an accession to the EU.

Table 1: Accession impacts (%) on main Turkish agricultural markets in comparison to the baseline scenario in 2020

	Price	Production	Domestic use	Self-sufficiency rate
Soft wheat	-39.4	-11.2	4.7	-15.1
Durum wheat	3.4	3.6	2.7	0.8
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
Olive oil	-34.7	-2.1	2.0	-4.0
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	0.0	20.5	-17.0
Poultry	30.8	9.6	-8.0	19.1
Eggs	-29.8	12.7	41.0	-20.0
Sheep meat	-8.1	29.4	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 version 4.0 (2010)

Results for the EU

Table 2 summarises the main impacts on EU agricultural commodity markets of the accession scenario analysed. In the accession scenario the EU includes 28 Member States from 2015 onwards when Turkey entered the EU. The projected percentage changes between the EU27

(baseline scenario) and EU28 (accession scenario) levels of production and domestic use of agricultural commodities give an indication of the size of the corresponding Turkish markets. In particular EU production of wheat, rice, tobacco, cotton, tomatoes, oranges, apples, poultry and sheep meat are projected to increase significantly if Turkey would join the EU.

Table 2: Accession impacts (%) on main EU agricultural markets in comparison to the baseline scenario in 2020

	Price	Production	Domestic use	Self-sufficiency rate
Soft wheat	0.9	10.5	16.6	-6.2
Durum wheat	0.1	39.1	35.1	3.0
Barley	2.1	15.0	23.7	-7.0
Maize	1.2	5.1	9.6	-4.1
Rice	17.4	13.1	25.8	-10.1
Sunflower	0.0	11.9	25.2	-10.6
Potatoes	-1.0	3.6	7.3	-3.5
Sugar beets	0.0	7.5	12.5	-4.4
Tobacco	-0.8	24.3	16.7	6.6
Cotton	6.6	184.2	969.5	-73.4
Olive oil	0.0	6.3	5.5	0.7
Tomatoes	-4.5	77.0	74.0	1.7
Oranges	-2.8	33.8	9.4	22.3
Apples	-0.5	25.6	23.4	1.8
Beef	0.0	7.5	7.5	0.0
Poultry	-3.1	14.9	12.6	2.1
Eggs	-1.8	12.3	15.1	-0.8
Sheep meat	-5.0	14.6	11.8	2.5
Milk	0.1			
Butter	0.4	11.0	11.7	-0.7
Cheese	0.1	6.7	6.8	0.0
Other fresh products	0.1	28.1	27.1	9.6

Source: AGMEMOD version 4.0 (2010)

In the baseline scenario, EU prices were mainly driven by world market prices, EU trade measures and the self-sufficiency rates for the EU27. In the accession scenario, however, Turkey influences the self-sufficiency rates of commodities at the EU28 level and this leads to the projected changes in the level of EU key prices relative to the EU27 baseline. The changed level of prices across EU markets is reflected in changes in the projected levels of commodity supply and use at the Member States level. Table 2 shows that, relative to the baseline, in particular lower self-sufficiency rates for soft wheat, barley, maize, rice and cotton are projected to lead to higher EU prices, while projected higher EU28 self-sufficiency rates for tomatoes, oranges, apples, poultry and sheep meat are expected to generate lower EU prices.

Further remarks on the accession scenario results

Some important elements of the Turkish vegetables and fruits markets, such as cucumber, peppers, hazelnuts and grapes, are not covered in the current AGMEMOD model. As these are also important export commodities of Turkey, it can be assumed that an extension of the commodity coverage of the vegetables and fruits markets in the model would add meaningful information to the results of the accession scenario.

When looking at the results of the accession scenario it has to be recalled that the analysis

presented in this report is by construction partial, in that it focuses on the agricultural and food sector and ignores the impact of Turkey's accession to the EU on the non-agricultural part of the Turkish economy. As a matter of course these effects should not be ignored and will in all likelihood dwarf the impact on the agricultural sector. In general, EU enlargements imply more trade and higher economic growth for the whole economy. That process would also affect agricultural production costs and demand for the output of Turkish agriculture; however such implications have not been covered in the accession scenario of this study. Another issue not covered in this study relates to possible efficiency gains following accession, which may induce higher progress rates due to better access to knowledge and investments. In turn, such progress can be expected to generate higher yield increases and lower costs in the agricultural sector of Turkey.

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1 Introduction

1.1 Background

Enlargement has been part of the development of European integration right from the start and is an ongoing policy issue for the European Union (EU). On 1 May 2004, the EU was enlarged with the accession of the Czech Republic, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, the Slovak Republic and Slovenia, while Bulgaria and Romania acceded on 1 January 2007. The EU enlargement process took a further step forward in October 2005, when formal accession negotiations were opened with Croatia and Turkey. Their status as candidate countries was established by the Helsinki European Council in December 1999. In order to become an EU Member State, a candidate country must bring its institutions, management capacity and administrative and judicial systems up to EU standards, both at national and regional level.

As in previous accession processes, Turkey, as a candidate country, is required to change a considerable part of its national legislation so that it is in conformity with EU law. This will mean several fundamental changes for Turkish society, which will affect almost all sectors of the country, from the environment to the judiciary, from transport to agriculture, and will go across all sections of the population. On the day of accession, Turkey must fully adopt the *acquis communautaire*, including the Common Agricultural Policy (CAP), border protection and processing standards, as these will stand at that time.

A Turkish accession to the EU is expected to have consequences for the agricultural sector in the EU27, its Member States and in Turkey. These consequences mainly arise from the very large numbers of people employed in Turkish agriculture, who are often engaged in very low value added forms of agriculture. If Turkey joined the EU today, the number of people working in agriculture in the EU would more than double. The impacts of such an accession on Turkish and EU agricultural production could be expected to be different 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 differs from that in the EU. Hence, there is an interest in analysing the impact of Turkey's accession to the EU on the agricultural sectors of both Turkey and the EU27.

AGMEMOD[2] is a modelling tool designed to analyse European agriculture and the CAP. With respect to the needs of the European Commission for market and policy analysis, this model covers all EU Member States, with the exception of Malta. The current AGMEMOD version 3.0 incorporates models for the western Balkan EU candidate countries of Croatia and the Former Yugoslav Republic of Macedonia (Erjavec et al., 2007; Van Leeuwen et al., 2007a; Van Leeuwen et al., 2007b; Salputra et al., 2008). Although Turkey is an EU candidate country, it was not involved in AGMEMOD version 3.0, this study resolves this omission.

1.2 Objectives and scope of the study

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 the consequential adoption of the CAP by Turkey – would influence the EU agricultural commodity markets. Hence, this study aims to provide a quantitative analysis of the

[2] AGMEMOD stands for AGricultural MEmber States MODelling.

implications of the accession of Turkey to the EU on the agricultural markets of Turkey, the aggregate EU27, the EU15, the EU12 and the individual Member States of the EU. The AGMEMOD tool, that captures the diversity of European agriculture (via its multi-commodity approach) and its regional variations, is used to conduct a quantitative analysis of the impact of an accession of Turkey to the EU. In detail the objectives of this study are:

- extend the AGMEMOD model to include Turkey, including the development of a database and a model that describes the characteristics of Turkey's main agricultural commodity markets;
- update the AGMEMOD database with the latest assumptions on world prices, macroeconomic and agricultural policy developments;
- provide and discuss a baseline outlook for the EU27 and Turkey;
- carry out and analyse a scenario where Turkey accedes to the EU.

Within this study and analysis, the emphasis is on the main agricultural commodities in the EU and Turkey, which are:

- cereals (soft wheat, durum wheat, barley, maize, rye, other grains);
- oilseeds (rapeseed, sunflower seed, soybeans, cotton seeds, vegetables oils and meals);
- livestock and meat (beef and veal, pork, poultry, sheep and goats);
- milk and dairy products (butter, milk powder and cheese);
- fruits and vegetables sector (tomatoes, oranges, apples, olive oil);
- industrial crops (sugar beets, tobacco and cotton) and potatoes.

Commodity balance items such as production, domestic use, stocks, exports, imports as well as the associated prices will be projected and simulated to a 10 year time horizon, with the underlying quantitative and qualitative assumptions on macroeconomic and other variables reported. Baseline projections and accession simulation results cover:

- Turkey;
- the individual EU Member States: Austria, Belgium (including Luxembourg), Denmark, Finland, France, Germany, Greece (including Cyprus), Ireland, Italy, the Netherlands, Portugal, Spain, Sweden, the United Kingdom, the Czech Republic, Bulgaria, Estonia, Hungary, Latvia, Lithuania**,** Poland, Romania, the Slovak Republic and Slovenia;
- EU15 as a whole (15 EU Member States before the 2004 enlargement);
- EU12 as a whole (12 EU Member States of the 2004 and 2007 enlargements);
- EU27 as a whole (27 EU Member States after the 2007 enlargement);
- EU28 as a whole (EU27 and Turkey) from 2015 onwards.

In the event of Turkey acceding to the EU, Turkey will have to adopt the CAP and any border protection between the EU and Turkey will be removed. Additionally, Turkey would be obliged to use EU processing standards as they would stand on the day of accession**.** To simulate the impact of Turkey's accession to the EU27, which will probably not occur earlier than 2015, the following aspects have been implemented in the Turkish model:

- policy instruments associated with the *non-accession period*, such as
    - direct income support payments, premium payments, compensation payments, support prices. Support prices are substituted by initial buying prices for cereals as authorized by the Turkish Grain Board (TMO) and for sunflower seeds and cotton prices as authorized by the Turkey's Agricultural Sales Cooperatives Unions (ASCU);
    - sugar quotas;
    - trade protection measures for Turkish agricultural commodities, such as export subsidies and import tariff rates;

- policy instruments associated with the *accession period*, such as
    - national budgetary ceiling based on the assumption of Turkish EU membership in 2015;
    - (partly) coupled payments and decoupled single farm payments for farmers, falling under the CAP;
    - modulation rates.

The assumed accession date of 2015 is neither a forecast nor an expectation that Turkey will accede to the EU in 2015. Rather the year 2015 was chosen for technical reasons in order to allow the analytical model used in this study time to adjust to accession within its ten-year projection horizon.

To gain quantitative insight into the impact of a Turkish accession to the EU, the AGMEMOD version 3.0 has been extended and equipped as required. It should be recalled that the baseline and scenario results are not forecasts but projections based on the underlying assumptions as described in Chapter 4.

1.3 Structure of the report

This report is designed as follows. Chapter 2 describes the Turkish agricultural sector by providing an overview of the main market features such as production, consumption, trade and prices of the principal elements of Turkish agricultural output as well as details of the most important agricultural policy instruments used in Turkey. Chapter 3 provides a description of the methodology applied in developing the Turkish AGMEMOD country model. The macroeconomic assumptions underlying the baseline and scenario projections from the Turkish and EU models are discussed in Chapter 4. Baseline results for Turkey and the EU are reported in Chapter 5. Chapter 6 presents the results of the analysis of the impact of Turkish accession on Turkish and EU agricultural commodity markets. The final chapter 7 draws conclusions of the study and provides recommendations for further research on the topic.

2 Overview of the Turkish agricultural sector

After describing some general background characteristics, this chapter provides an overview on the agricultural sector in Turkey. Main features of Turkish agricultural markets such as production, consumption, trade and prices are delineated in section 2.2. Details of the most important agricultural policy instruments in Turkey are given in section 2.3.

2.1 General background

The Republic of Turkey was established on 23 October 1923. The current Constitution was adopted in 1982; major parts of the constitution have been revised particularly since the late 1990s. 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. The process started in 1963, when Turkey and the European Economic Community (EEC) signed the Ankara Association Agreement, which was an agreement that liberalised trade for certain goods between the EEC and Turkey and which included the provision of financial aid to Turkey by the EEC. Turkey applied for membership of the European Community in 1987 and on 1 January 1996, the EC-Turkey Customs Union agreement, issued by the EC-Turkey Association Council in Decision No. 1/95, was implemented. This agreement aimed to eliminate trade barriers between Turkey and the EU in industrial goods and processed agricultural products. Moreover, Turkey agreed to adopt the EU's Common External Tariff for trade with third countries and to align its domestic policies with the common commercial policy of the EU (Republic of Turkey, 1998). Due to the customs union between Turkey and the EU in manufactured goods, Turkey's GDP growth is estimated to have increased by between 1 and 1.5% per year. It is expected that benefits from the Turkey-EU Customs Union would have increased if the agricultural sector had been included (Harrison et al., 1996; Grethe, 2004).

Figure 2.1: Map of Turkey

Source: European Commission, 2010

Turkey is experiencing profound changes, establishing a modern, pluralistic democratic system and a stable, growing and modernising economy. Turkey's relationship with the EU

has significantly affected the political and economic reform process in Turkey, with the prospect of EU membership acting as a catalyst for reform. The prospect of possible Turkish accession has led to political debates within the EU and Turkey. However, the EU decision to open accession negotiations with Turkey in 2005 was considered to represent the beginning of an important new phase in EU-Turkey relations (Hughes, 2004; Hoekman and Togan, 2005; Aerni 2007).

Turkey has a total population of 71.5 million people and a continental land area of 784 thousand km² (Turkish Statistical Institute, 2009). The country stretches across western Asia and the Balkan region of south-east Europe and is bordered by Bulgaria, Greece, Georgia, Armenia, Azerbaijan, Iran, Iraq and Syria (cf. figure 2.1). Table 2.1 shows the main socio-economic indicators for Turkey as well as equivalent indicators for the EU27. Turkey experienced solid economic growth during the period 2002-2007, which was accompanied by moderate inflation rates. Floating exchange rates have been introduced since the currency reforms of 2001. The EU is Turkey's main trading partner and accounted in 2008 for 45% of exports and 42% of Turkey's imports.

Table 2.1: Socio-economic indicators for Turkey and the EU27, 2008

	Turkey	EU27
Total area (1,000 km²)	784	4170
Population (million)	71.5	497.7
Population density (per km²)	92	118
Population growth rate (%)	1.15	0.3
Labour force (million)	25	219
GDP (billion €)	442	12,167
GDP/capita (€)	6,181	24,446
GDP growth (%)	4.9	2.9
Inflation (%)	9.5	2.3
Trade volume (billion €)	187	2,322

Sources: *Turkish Statistical Institute, Eurostat*

2.2 Agricultural markets

Domestic situation

Agriculture is of key importance to Turkey, both in economic and social terms. 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 markets, through the Black Sea to the north, the Aegean Sea to the west and the Mediterranean Sea to the south. Due to high rates of population and income growth, Turkey's internal market demand for food is growing rapidly. These factors together imply that Turkey's agricultural sector can play a major role in the further economic and social development of the country. Table 2.2 shows the main agricultural indicators for Turkey in comparison with the EU27.

More than half of Turkey's total land area is devoted to agriculture, which is slightly above the EU27 average. Turkish accession would add about 41 million hectares to the agricultural area of the EU, and on accession Turkey would account for one fifth of the agricultural area

of a future EU28. Even though the share of agricultural labour in total labour is substantially decreasing during the last years, in 2008 still more than one quarter of the Turkish workforce was employed in agriculture, while the sector accounted for 9.2% of Turkish GDP. In 2008, Turkish agricultural output value was 104 billion TL (59 billion €), with crops accounting for 54% of output value and livestock and animal products 46% of output value. The vegetables and fruits sectors account for the majority of the value of crop sector output, while in 2008 tomatoes alone accounted for one third of total Turkish vegetable output value. Cow milk is the most important livestock product and accounted for 36% of livestock product output value in 2008.

Table 2.2: Agricultural indicators for Turkey and the EU27, 2008

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

Sources: *Turkish Statistical Institute, Eurostat*

There are roughly 3 million farms in Turkey, compared to 14.5 million in the EU27. Although Turkey is self-sufficient in most food items, Turkish agriculture is poorly structured and relatively inefficient when compared with agriculture in the EU27. The farm structure shows many similarities with the farm structures in some of the Member States that acceded to the EU from May 2004 onwards. Most Turkish farms are family farms employing and most only employ family labour. Turkish farm holdings are on average smaller than those in the EU, with the average size of holding in Turkey being 6.5 ha compared to a EU27 average of 15.8 ha. Small scale farming, partly via subsistence and unspecialized policulture production systems, is an important characteristic of Turkish agriculture, e.g. 60% of Turkish dairy farms have less than four animals. In general Turkish farms are characterised by low productivity with low marketing ratios for food products in particular (Turkish Statistical Institute, 2004).

In a report published in 2006 the European Commission found that the following problems characterised Turkish agriculture (EC, 2006a):

- a majority of agricultural land (86%) is affected by erosion (overgrazing, limited crop rotation);
- there is a shortage of water and drought is common;
- farm management and technology are inadequate;
- land holdings are fragmented due to the traditional inheritance system and the lack of well functioning land markets;
- the lack of clear property rights hampers investment due to lack of collateral;
- there is no efficient rural credit system in place;

- food processing is characterised by high costs and exhibits diversity in quality, though the dairy and broiler sector is rapidly upgrading and scaling up.

Against this list of problems, the climatic and geographical conditions of Turkey permit a wide range of farming activities and almost all crops can be cultivated. Turkish basic agricultural resources – such as fertile soil and varied climate – are vast and offer 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. The country is self-sufficient in milk products and livestock production is also an important component of Turkish agriculture. Turkey was, until the 1990s, an important supplier of live sheep, lamb and mutton to the Middle East. Since then however, this position has been lost. The per capita consumption of beef and lamb-mutton has been declining since the early 1990s, while red meat consumption has been increasingly substituted by broiler meat. Table 2.3 shows some agricultural production statistics for Turkey in comparison with equivalent data for the EU27.

Table 2.3: Agriculture production statistics for Turkey and the EU27, 2008

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

Sources: Turkish Statistical Institute, Eurostat

In general the drivers for increasing Turkish agricultural production are expected to be further productivity growth, government support (including tariff and non-tariff protection), irrigation projects, as well as growth in export demand. 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, and with agricultural labour being replaced by capital (such as tractors) and other infrastructure improved (cf. Yilmaz 2006). In terms of agricultural area used and production, over the period 2006-2008, the major crops have been cereals, fodder crops, sunflower, cotton, sugar beets, potatoes and tobacco (for more detail, see Table A1 in Annex 1). The major animal products are cow milk, broiler meat, eggs, beef and veal, lamb, mutton and goat meat. Total Turkish milk production has in recent years averaged at close to 12 million tons, of which 90% is obtained from cows. However, supply and use balances for milk and milk products are either unavailable or are inconsistent. The main dairy commodities produced in Turkey are a variety of fresh dairy products and cheeses. Chicken (broiler) meat and eggs are ranked second and third in terms of importance in livestock product output value shares. According to official Turkish statistics, production of beef and veal is around 380 thousand tonnes and lamb and mutton is around 100 thousand tonnes. As current official statistics are suspected of not reflecting a realistic picture for the red meat

sectors (cattle, sheep and goats), the Turkish Statistical Institute with contributions of external experts has in 2009 completed a project entitled "Upgrading the Statistical System of Turkey". The aim was to improve Turkey's animal inventory and meat production statistics. The Turkish Statistical Institute has planned to publish improved meat production statistics in the course of 2010; however this was not on time for inclusion in this report.

Trade situation

Main part of Turkish agricultural exports goes to the Mediterranean and Persian Gulf regions, to the Russian Federation and especially to the EU: 45% of Turkish exports are destined for the EU. Turkey has a high trade surplus in these regions, mainly due to exports of fruits, nuts, vegetables and tobacco and the high tariff and non-tariff barriers to exports from these regions to Turkey. A trade deficit exists in oilseeds, meals and oils, rice, corn and plant fibres. It should be noted that most EU agricultural exports to Turkey are subject to restrictive quotas (tariff rate quotas) and also that Turkey, for public health reasons, imposed a ban on imports of live animals and certain animal products. However, in April 2010 the Turkish Government decided to increase beef and beef cattle imports due to increased prices on Turkish meat markets (USDA, 2010). Tables 2.4 and 2.5 provide an overview on the main agricultural trade flows between Turkey and the EU27.

Table 2.4: EU27 exports to Turkey for main agricultural products (million €)

	2005	2006	2007	Average 2005-07
Cereals	42.4	28.6	126.3	65.8
Fruit and nuts	18.4	20.4	26.9	21.9
Dairy, eggs, honey	21.3	15.5	24.3	20.4
Sugar	15.5	13.7	8.3	12.5
Vegetables	8.6	11.4	13.0	11.0

Source: Eurostat-COMEXT

Table 2.5: EU27 imports from Turkey for main agricultural products (million €)

	2005	2006	2007	Average 2005-07
Fruit and nuts	1,175.6	1,205.5	1,182.6	1,187.9
Vegetables	244.9	243.6	319.0	269.2
Cereals	21.6	44.4	16.7	27.6
Wines	4.5	4.2	5.6	4.8
Dairy, eggs, honey	6.2	4.9	1.4	4.2

Source: Eurostat-COMEXT

2.3 Agricultural policy instruments

In the 1980s and 1990s, agricultural producer support measures in Turkey were entirely based on commodity output and variable input subsidies. Turkey's Agricultural Reform and Implementation Project (ARIP) was launched in 2001, with the support of the International Monetary Fund (IMF) and the World Bank, and aimed to implement reforms to Turkish agricultural programmes. ARIP represented a new direction in Turkish agricultural policy and sought to align Turkey's agricultural policy programmes with those of the EU and with Turkey's commitments as a World Trade Organization member. Under the ARIP price

supports and subsidies were to be removed, with farmers compensated for this through the payment of direct income support. In 2004, the *Agricultural Policy Paper 2006-2010* was agreed and it set a target for Turkish agricultural expenditures of 1% of Turkish GDP and allocated the Turkish State's expenditures over the various types of agricultural support instruments for the target year 2010.

Table 2.6 presents an overview of the Turkish agricultural and agricultural trade policy measures.

Table 2.6: 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

*Source: Turkish Official Gazette and Ministry of Agriculture and Rural Affairs, General Directorate for Production and Development Website. * Not applied in 2006.*

Domestic support

This section outlines the various domestic agricultural policy and border measures that support Turkish agriculture. A programme of *direct income support* (DIS) provides each registered farmer with a flatrate per hectare payment. The DIS was introduced at the beginning of 2001, and was initially paid up to a maximum of 20 hectares. Producers with

less than 0.01 hectare are excluded from receipt of DIS payments. The ceiling level for eligibility was increased to 50 hectares in 2002. In 2008, the system of DIS was applied to over 16.2 million hectares of land, and approximately 2.6 million farmers were registered under Turkey's National Farmer Registration system. The rate of DIS payment was TL 135 (€80) per hectare in 2003, TL 100 (€60) per hectare in 2005 and TL 70 (€37) per hectare in 2008. Total expenditure on DIS payments increased from TL 1,877 million (€829 million) in 2002 to TL 2,654 million (€915 million) in 2006 and thereafter declined to TL 1,138 million (€600 million) in 2008. Farmers practising organic agriculture and farmers in possession of a soil analysis certificate were paid an additional TL 30 (€17) and TL 10 (€5.60) per hectare respectively in 2006, 2007 and 2008. As the majority of Turkish farms are small, the number of farmers with a soil analysis certificate is limited.[3] The Turkish AGMEMOD model will not attempt to account for the organic agriculture premium and the soil analysis premium. Finally, diesel subsidies and fertiliser subsidies, based on the farm registry system, were paid to arable farmers in the years 2005 and 2007-2009. These diesel and fertilizer subsidies are coupled subsidies paid on a per hectare basis that are justified on the basis of fertilizer and diesel input requirements of respective crops.

Coupled *compensatory payments* were granted for the first time to Turkish potato growers in 2005, with expenditure in that year on compensatory payments of TL 12 million (€7 million). These payments were designed to compensate potato farmers for income losses associated with the prohibition of potato production in certain Turkish provinces affected by the potato ward disease. In 2006, a total of TL 4 million (€2 million) was paid in compensatory payments to potato growers, and TL 54 million (€30 million) was paid to tea growers to compensate them for the costs of pruning. Compensatory payments are also granted to livestock producers to compensate for income losses that were estimated as arising from the introduction of numerous health and quality measures that are required to enable Turkey to satisfy EU sanitary and phytosanitary standards. In 2008 an overall total of TL 80 million (€35 million) in compensation payments was provided (Bayaner, 2009), which represented a significant increase of almost 700% compared to the level of expenditure on compensatory payments in 2005.

An important component of Turkish agricultural policy are the *deficiency payments* that are paid to Turkish farmers on the basis of estimated Turkish agricultural production costs, world and domestic agricultural output prices. Such payments are currently paid to producers of olive oil, oilseeds, cotton, tea and cereals. To increase the quality of cereals produced in Turkey (mainly wheat) a certified seed supply programme was developed in 2005 by the Ministry of Agriculture and Rural Affairs. This programme was supported by a deficiency payment mechanism – with a variable subsidy rate that was linked to cereal prices, and in 2006 amounted to TL 35 (€21) per tonne of wheat and TL 25 (€15) per tonne of barley, rye and oats for registered farmers. If a farmer's crop production is stored by the Turkish Grain Board (TMO), this organisation pays farmers up to 25% of the total crop value. Farmers registered with the certified seed supply programme are eligible to receive credit from banks on the basis of the receipt vouchers they receive from the TMO for their crops[4]. Bayaner (2009) estimated that the sum of all such deficiency payments in Turkish arable agriculture amounted in the year 2008 to TL 1,647 million (€721 million).

Recently added components of Turkish agricultural policy are the *direct premium* measures introduced in 2007 to support animal production. Similar to the Agenda 2000 schemes of the

[3] The aim of this policy is to encourage farmers to use only an optimum amount of fertilizers and to thereby reduce fertilizer costs.

[4] It reduces the uncertainty faced by farmers, as they are able to forward sell 25% of their output to the TMO. The expected price in our model, however, is not affected by such details.

EU CAP, these premiums are granted on a per animal basis. Payments are conditional on compliance with specified animal health rules. Furthermore, some payments are granted to fodder areas on a per hectare basis. Bayaner (2009) estimated that expenditure on such direct premium measures in the Turkish livestock sector amounted in the year 2008 to TL 1,330 million (€582 million).

According to the WTO (2008), Turkish institutional prices were removed in 2002, but in the years that followed *buy-in prices* of state trading enterprises (such as the TMO) and the Agricultural Sales Cooperatives Unions (ASCUs) became the major price forming institutions in Turkey. According to Burrell and Oskam (2005) the privatisation of the state trading enterprises and cooperatives has proved difficult as they are located in poor regions. According to Turkish experts, an important impediment to any privatization of these institutions is that the TMO is a strong candidate for designation the paying agency[5] in the event that the future accession of Turkey is agreed. The experts argue that - given that the ASCU is the property of farmer members - ASCUs should not be fully privatized.

The provisions of the Turkish *sugar regime* should also be noted. A new "Sugar Law" was enacted in 2001 (Law Act number 4634) and was first implemented in the 2002/03 crop year. Current Turkish sugar policy aims to support the development of a more regular sugar supply structure, via the use of a production quota regime similar to the one used in the former EU regime, and involves the use of production contracts between beet producers (farmers) and sugar refiners. Starch based sweeteners production has also been included in the Turkish sugar quota system. The new sugar policy defines A and B sugar quotas as well as C sugar (which is quota-free). The amount of A-quota sugar depends on the situation of the domestic market demand (population growth, per capita income, sugar price), while the sugar B-quota is regarded as a buffer stock. The C sugar is a function of the world price and is used for export purposes; it cannot be sold on the domestic market and it is not depending on supports (import tariffs). However, C sugar can be transferred into a quota in case the A and B sugar quota are not fulfilled. Total sugar A-quota is allocated to both sugar beets (90%) and corn sugar (10%). The Turkish Sugar Authority is responsible for the quota determination and allocation, market monitoring and the inspection of quota.

The sugar beet support price was abandoned in the 2002/03 marketing year and since then the price of sugar beets used for A-quota sugar production has been mutually agreed between producers and factories on the basis of beet production costs, inflation rates, world sugar prices and tariff rates. The sugar beet price for B-quota sugar production is 10-30% less than the price for beet used to produce A-quota sugar and varies across Turkish regions[6]. The C sugar price is determined by the prevailing world price. Moreover, sugar beet producers benefit from the already mentioned direct income support, diesel and fertiliser subsidies.

An important conclusion can be drawn regarding the use of production distorting support measures in Turkey. Although the commodity output and variable input based subsidies have been reduced since 2000, these subsidies have been entirely offset by the DIS payments to farmers and the newly introduced compensatory premium payments for production of cereals, oilseeds and industrial crops, pulses, milk and meat. Moreover, the most recent reform of the Turkish agricultural policy, as laid down in the Agricultural Strategy Paper 2006-2010, does not correspond to developments in the EU CAP. Turkey is moving from decoupled direct supports back to more coupled direct supports and price supports, while the EU is moving in the opposite direction (EC, 2006). For a large number of arable crops and livestock

[5] This paying agency is different from IACS (Integrated Administration and Control System), but it relies on it.

[6] There is a buying point in each region (where the factory is located) and each farmer has a contract with the factory.

production systems, significant premium payments are still coupled to production and are stimulating Turkish agricultural production and increasing Turkish self-sufficiency levels.

With the exception of the direct income support (DIS) payments, which were abolished in 2009, most probably all other support types of subsidies to the Turkish agricultural sector will continue over the next ten years. Indications of this can be found in the Agriculture Strategy Document, prepared by the Ministry of Agriculture and Rural Affairs and approved by the Higher Planning Council (SPO, 2006).

Border protection

Border measures (both tariff and non-tariff) are another significant source of support to Turkish agriculture. *Import tariffs* provide support for the country's domestic agricultural industry; the average applied tariff rate was 56.4% in 2005 and 59.2% in 2006. Furthermore, Turkey maintains a ban on the import of most live animals and animal products. This non-tariff trade barrier remains a serious obstacle in bilateral relations between Turkey and the EU. Under the Uruguay Round Agreement on Agriculture (URAA), Turkey agreed to a 24% cut in export subsidy expenditures. This led to a reduction in the number of products eligible for export subsidisation from 44 to 16. Among those products that are still eligible for export subsidies are fresh and processed fruit, fresh and processed vegetables, derived food products, poultry meat and eggs. Turkey levies *export taxes* on exports of hazel nuts and animal hides.

The trade protection for many Turkish products is reflected in the considerable agricultural trade surplus of Turkey. Given the relatively high barriers to agricultural trade that Turkey maintains, any liberalisation of bilateral trade relations as they apply to agricultural trade between Turkey and the EU would be highly asymmetrical. The EU has granted Turkey preferential market access in the context of the Customs Union with roughly 70% of Turkish agricultural exports to the EU entering duty free, while Turkey has granted relatively only lower preferences to agricultural products from the EU and continues to effectively ban all imports of livestock and meat products from the EU (EC, 2006b).

3 Methodology of the modelling approach

This chapter describes the development of the Turkish AGMEMOD model and its implementation in the combined AGMEMOD structure. It starts in Section 3.1 with an overview of the current state of the AGMEMOD 3.0 model and then presents the steps followed in developing a Turkish database (section 3.2) and Turkish AGMEMOD model (sections 3.3 and 3.4).

3.1 AGMEMOD: state of the art

AGMEMOD is a dynamic, multi-country, multi-market, partial equilibrium modelling system, which can provide significant detail on the main agricultural sectors in each EU Member State. The system has been largely econometrically estimated at the individual Member State level and produces results for the EU as a whole. In some cases, model parameters have been calibrated, where estimation was either not feasible or meaningful. The country models contain the behavioural responses of economic agents to changes in prices, policy instruments and other exogenous variables on the agricultural market. These econometrically estimated, country specific, economic models of agricultural commodity markets provide a sound basis for analysing the impact of the future accession of current candidate countries. In the models commodity prices adjust so as to clear all the markets considered, with quantitative baseline estimates of commodity supply and use and prices generated for each year to a 10-year horizon.

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

The modelling systems' projections are validated by standard econometric methods and through consultation with experts who are familiar with the agricultural market in the regions under study. Both of these model projection review mechanisms may result in the revision of model structures, parameter estimates and underlying policy assumptions.

The research to date 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. The network activities are supplemented by the assistance of national experts in commodity markets in the individual countries, who frequently review the models and projections produced by the national modelling teams (Salamon et al., 2008).

AGMEMOD uses a bottom-up approach. Based on a common country model template, country level models have been developed, reflecting the specific situation of the agricultural sectors in the individual countries. These country level models are then integrated into a composite EU model. The approach adopted allows for capturing the inherent heterogeneity of agricultural systems existing within the EU, while simultaneously maintaining analytical consistency across the estimated country models.

The previous version 3.0 of AGMEMOD consists of the EU Member States (with the exception of Malta) and the candidate countries Croatia and the Former Yugoslav Republic of

Macedonia.[7] The implementation of Turkey into the modelling system has been conducted along the same procedures as just described and that approach has resulted in the new AGMEMOD version 4.0 model.

3.2 Data availability and validation

Table 3.1 lists the commodities that have been implemented in the Turkish AGMEMOD model. Depending on the available data range, equations for supply, use and price variables have been either econometrically estimated or calibrated.

Table 3.1: Commodities in the Turkish AGMEMOD model

Soft wheat	Rapeseed	Sugar	Oranges	Eggs
Durum wheat	Sunflower	Tobacco	Apples	Cow milk
Barley	Soybean	Cotton	Cattle	Cheese
Maize	Sun oil	Tomato paste	Beef	Butter
Rye	Potatoes	Tomatoes	Sheep	Other fresh products
Rice	Sugar beets	Olive oil	Poultry	Milk powder

Cereals

The cereal group includes wheat, barley, maize, paddy rice, oats and rye. Harvested area (which is assumed to be equal to the cultivated or sown area), yield and production data are obtained from Turkish Statistical Institute. These data are presented on a calendar year basis. Prices and trade data are from the same source and are also presented on a calendar year basis. Supply and use balance data are obtained from various institutions, which implies that data must be checked, reconciled and balanced. The source of cereals stock data (other than for maize), in calendar years, is the Turkish Grain Board (TMO), stock data for maize are obtained from the Agricultural Economics Institute (AERI), the Turkish Statistical Institute and TMO for 1996-2006, 2007 and 2008 respectively. Maize processing and food use data, in marketing years, are obtained from the AERI and Turkish Statistical Institute for 1996-1999 and 2000-2007 respectively. The conversion factors used to compute seed use, marketing and harvest losses and feed use are obtained from the Turkish Statistical Institute marketing year crops balance worksheets. Food use data for cereals are derived from the market closing identity, i.e. in a given year a given cereal's food use is equal to that cereal's production plus imports plus opening stocks less the sum of marketing losses of the cereal, non-food use of the cereal, seed use of the cereal, exports and closing stocks of the cereal.

Oilseeds

The oilseeds group includes sunflower seeds, soybeans and rapeseeds. Cottonseeds are a by-product of cotton production. All data on harvested area, yields, production, producer prices and trade are obtained from the Turkish Statistical Institute as well as the conversion factors used to compute seed use, marketing and harvest losses and feed use. Stock data are not available and the production of oils and meals is calculated using conversion factors obtained from the Vegetable Oils Manufacturing Association (BYSD). Oilseed price data are obtained

[7] The AGMEMOD 3.0 version includes models of the cereal and oilseeds markets of Russia and the Ukraine, although these are not EU candidate countries. Both country models, built using AGMEMOD templates, run as separate models in parrallel with the EU27 AGMEMOD model.

from the Turkish Statistical Institute's agricultural price (producer price) dataset. Sunflower oil price data are obtained from "Izmir Mercantile Market-IZTB" (a commodity exchange market). No reliable and consistent data are available for other oils and meals (rape and soybean). All data are reported on a calendar year basis.

Sugar beets

Harvested area, yields, production, sugar beet prices and sugar trade data are collected from the Turkish Statistical Institute. Processing industry use of sugar beet, sugar supply and use data (all on a marketing year basis except for trade data), as well as data on white sugar prices are obtained from the Sugar Authority of Turkey from 2002/2003 onwards. Data before the introduction of the Turkish sugar quota regime, which started in the 2002/03 marketing year, are taken from the State Planning Organization (SPO) webpage (prepared for pre-accession negotiation with the EU). The data on processing industry use of sugar are obtained from an expert at the SPO.

Potatoes

Harvested area, yields, production and price data are from the Turkish Statistical Institute as are the conversion factors used to compute seed use, marketing and harvest losses and feed use. All data are on a calendar year basis.

Cotton

Cotton harvested area, raw cotton yield and production data as well as price data are collected from the Turkish Statistical Institute. The cotton lint price is obtained from the mercantile market (IZTB). This price is an annual average price for quality standard-1 ginned cotton. Other trade and stock data up to 2005 are obtained from the AERI Situation and Outlook Reports and thereafter from IZTB.

Tobacco

Raw tobacco harvested area, yield, production, trade and price data are collected from the Turkish Statistical Institute. The stock data are obtained from Leaf Tobacco Enterprise Co. (Yaprak Tutun A.S.). Domestic use data are calculated from the standard market clearing identity outlined earlier.

Tomatoes and tomato paste

Tomato harvest area data comes from the FAO. Tomato production, producer price and table tomato trade data are obtained from the Turkish Statistical Institute as are the conversion factors used to compute marketing and harvested losses. The data on tomato paste production up to 2007 are obtained from the AERI Situation and the Outlook Report, while trade and price data on tomato paste comes from Turkish Statistical Institute. Domestic use is computed in accordance with the standard market clearing condition outlined earlier. These data are expressed on a calendar year basis.

Oranges and apples

Orange and apple harvest area data come from the FAO. The number of fruit-bearing and non fruit-bearing trees, orange and apple production, producer price and trade data have been obtained from the Turkish Statistical Institute's electronic database. The same source provides the conversion factors used to compute marketing and harvested losses for these fruits. Domestic use is computed in accordance with the standard market clearing identity. All data are expressed in calendar years.

Olives and olive oil

The number of fruit-bearing and non fruit-bearing olive trees, areas harvested, olive production, yields, producer price and olive oil trade data come from Turkish Statistical Institute. Olive oil supply and use data are obtained from IZTB or the International Olive Oil Council (ICCO). All these data are expressed in calendar years. The olive oil price used is the extra virgin oil price. For the period up to 1990 these data are obtained from the Turkish Statistical Institute and are defined as the support price of 5 diem pure olive oil. From 1990 onwards the definition of the olive oil price changed to 5 diem raw olive oil, these data are taken from agricultural sales cooperative unions (ASCU-Taris).

Livestock and poultry

All data relating to livestock (cattle, cows, sheep, beef and veal, mutton and lamb, pig meat) and poultry (chicken, broiler and eggs) are from the Turkish Statistical Institute. All of these data are on a calendar year basis. Data on subsistence agriculture have not been included. Annual fluctuations in consumption figures, especially with respect to sheep meat consumption, suggest that only a partial data acquisition has taken place.

Dairy products

Total milk production, cow milk production, cow milk price and dairy products trade data are obtained from the Turkish Statistical Institute. Data on milk used for processing dairy products are also provided by this source. However, these data are only available in milk equivalents. Supply and use balances in milk equivalent terms are not closing. This indicates that there is quite an amount of milk going unregistered on the supply and demand side. Those milk quantities are likely to reflect in parts subsistence agriculture which does not only cover consumption on farms, but also direct sales of farms to consumers. The statistical differences are estimated to range between 2 and 3 million tonnes. They are derived by balancing the whole milk required in processing and the estimate of direct consumption on farms on the one hand with milk production on the other hand. Balances of dairy products in product weight that are normally available in EU Member States have not yet been compiled in Turkey. Data on the protein and fat content of raw milk and dairy products are also missing. Some figures on production of dairy products in product weight are published by FAOSTAT, thus fat and protein content can be implicitly derived. However, when the figures obtained from the Turkish Statistical Institute in milk equivalent have been recalculated on a product weight basis using standard fat and protein content assumptions large deviations from the butter and cheese production data reported in the FAO-STAT database were been found.

The statistics on the Turkish dairy sector are in the process of being revised and more detailed information is expected early 2011. The limited data availability prior to 1996 and the change of the statistical system in 2003 are two other problems this study had to deal with. For this reason the required data on wider Turkish dairy product production have been compiled by expert groups; these data cover drinking milk, yoghurt and ayran (other fresh dairy products), cheese (white cheese and other), ice cream and milk powder.

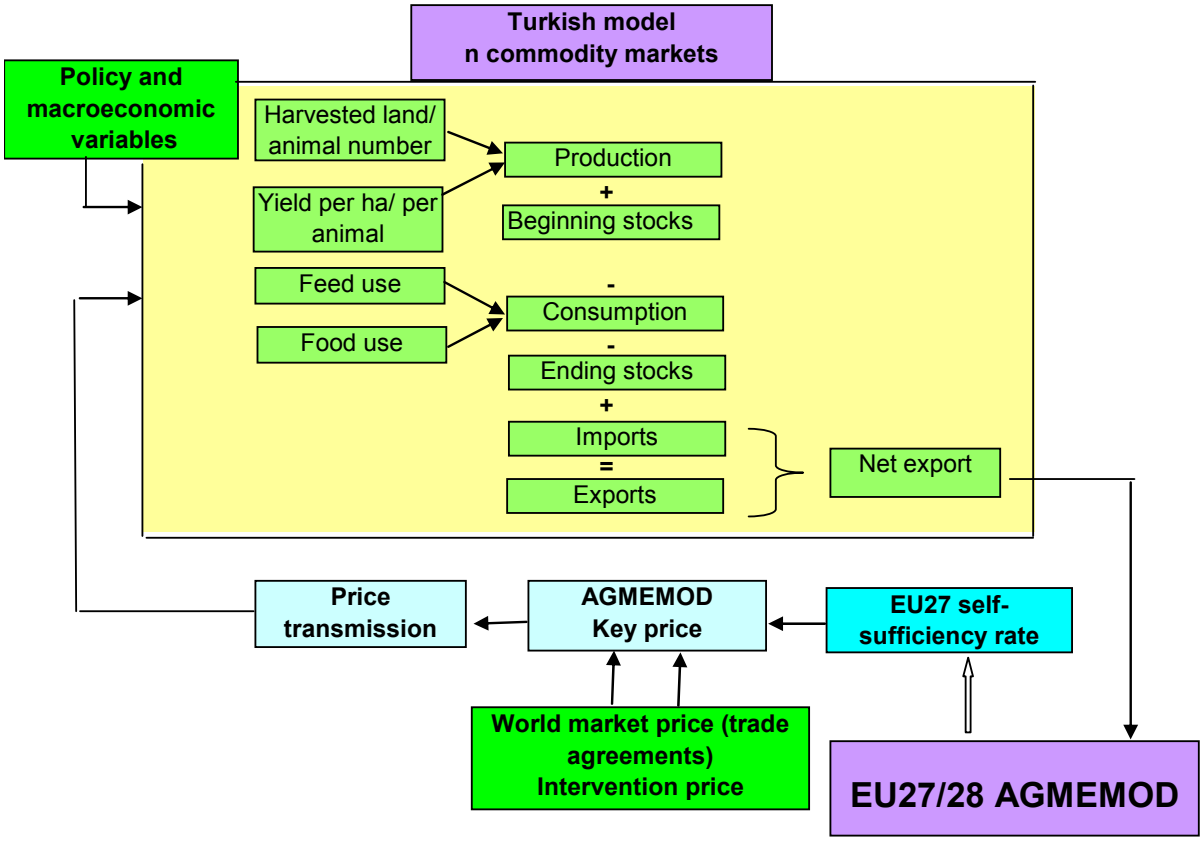
3.3 The Turkish model

The maintenance of the analytical consistency of the estimated Turkish AGMEMOD model and the expanded AGMEMOD modelling system has been achieved via adherence to the common AGMEMOD templates (Esposti and Camaioni, 2007). The incorporation of Turkish agricultural policy instruments in a harmonized fashion will allow the AGMEMOD 4.0 model to analyse policy relevant questions and the impact of possible policy changes in Turkey and in existing EU Member State in an internally consistent and transparent fashion. The

maintenance of this consistency across the country models is an essential condition for the successful incorporation of the Turkish model within the combined AGMEMOD framework.

The Turkish model developed during this project consists of different supply and demand parts for those commodities that represent the majority of the agricultural output of Turkey. Cereal and oilseeds together with their derived products (oils and cakes), industrial crops (sugar beet, cotton and tobacco), potatoes, livestock (cattle, beef, poultry, sheep and goats),[8] dairy (raw milk, on farm consumption of whole milk, drinking milk, other fresh products, butter, milk powder and cheese),[9] tomatoes, olives, olive oil, oranges and apples have been 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. One element of the supply and demand balance, for each commodity modelled, was derived as a closure variable. Figure 3.1 illustrates the general modelling structure of commodity markets at the Turkish country level, in this diagrammatic representation of an AGMEMOD commodity model exports have been assumed to be the supply and demand balance ensuring closure variable.

Figure 3.1: AGMEMOD structure for Turkey



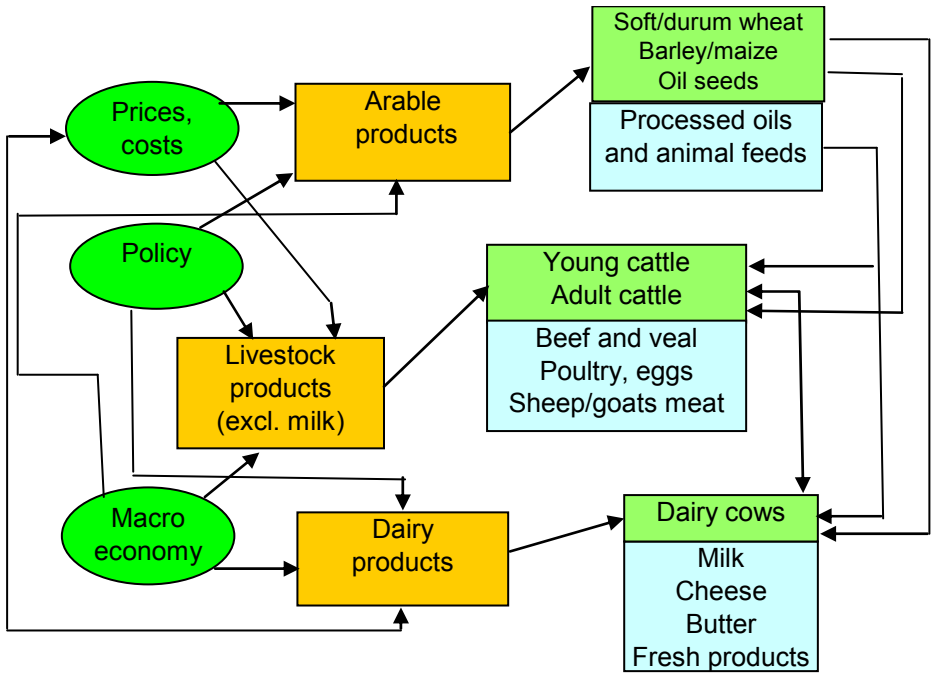
The various models of the agricultural commodity markets of Turkey have been linked to each other by substitution or complementary parameters in production or consumption.

[8] Production and consumption of pork in Turkey is negligible, see Table 2.3.

[9] Differentiated data on skimmed milk powder are not available. Furthermore, it can be assumed that the Turkish data on whole milk powder includes skimmed milk powder to a certain degree. Therefore, in the Turkish AGMEMOD model skimmed milk powder will be included with whole milk powder. This approach contrasts with approaches of other model databases (e.g. ESIM), which separate Turkish skimmed milk powder and whole milk powder production and use artificially.

Interactions between the crops and livestock sub-models have been captured via the derived demand for calves and feed (see Figure 3.2).

Figure 3.2: Linkages between commodity markets in Turkish model



Section 3.3.1 describes the functional Turkish AGMEMOD commodity market structures for crops, livestock and meats, milk and products. These structures largely mirror the common AGMEMOD structures and a detailed presentation of these can be found in Chantreuil et al. (2005). There are however important differences in the way in which Turkish agricultural policy has been implemented in the model under the baseline and for the Turkish (pre-) non-accession period and the way in which the CAP in Turkey has been covered in the model in the Turkish accession scenario. This will be separately explained in section 3.3.2.

3.3.1 General specification

Crops

In the crop models for grains, oilseeds and root crops (potato and sugar beets), land is allocated in a two-step process. In the first step producers' behaviour determines the total land area used for grains, oilseeds, and root crop culture groups (i). In the second step, the shares of the total land area devoted to the crop culture groups (grains, oilseeds, and root crop cultures) are allocated to each culture k of the corresponding culture group (i).

The total area harvested equation for grains, oilseeds and root crops is written as:

$$ah_{i,t} = f\left(p^{k}_{i,t-1}, ah_{l,t-1}, V\right) \qquad k = 1,...,n; \quad i,l = 1,...,3; \quad i \neq l \qquad (1)$$

Where $ah_{i,t}$ is the area harvested in year t for culture group i, $p^{k}_{i,t-1}$ is the real price in year $t-1$ of culture k belonging to culture group i, and V is a vector of exogenous variables which could have an impact on the area of culture i that is harvested such as e.g., inter alia, the total support for diesel, fertilizer, seed and direct income support premiums and quota. The share of culture k belonging to culture group i i ($sh^{k}_{i,t}$) is written as:

$$sh_{i,t}^{k} = f\left(R_{i,t-1}^{k}, sh_{i,t-1}^{k}\right) \qquad k = 1,...,n \qquad (2)$$

Where $R_{i,t-1}^{k}$ are the gross returns for culture k. The yield equation of culture k in the culture group i is written as:

$$r_{i,t}^{k} = f\left(p_{i,t-1}^{k}, ah_{l,t}, V\right) \qquad k = 1,...,n \qquad (3)$$

Where $r_{i,t}^{k}$ is the yield per hectare of culture k belonging to the culture group i, and V is a vector of variables which may impact on the yield per hectare of the culture k modelled, including a trend.

For demand, in principle three uses are distinguished, namely crushing, feed demand and non-feed use (modelled on a per capita basis) by using the following general functional forms:

$$Fu_{i,t}^{k} = f\left(p_{i,t}^{n}, Z\right) \qquad k = 1,...,n \qquad (4)$$

Where $Fu_{i,t}^{k}$ is the feed demand for culture k belonging to the culture group i, $p_{i,t-1}^{n}$ is the real price in year $t-1$ of each culture k (1,…,n) belonging to culture group i and Z is a vector of endogenous variables, which could have an impact on the use considered, such as milk and meat production.

$$NFu_{i,t}^{k} = f\left(p_{i,t}^{j}, V\right) \qquad k = 1,...,n \qquad (5)$$

Where $NFu_{i,t}^{k}$ is the non-feed demand for culture k belonging to the culture group i, and V is a vector of exogenous variables which may influence the non-feed demand of culture k modelled, such as the income per capita and the population. Crushing of oilseed culture k ($CR_{i,t}^{k}$) is modelled as:

$$CR_{i,t}^{k} = f\left(p_{i,t-1}^{h}, p_{i,t-1}^{l}, VZ\right) \qquad h, l = 1,...,n \qquad (6)$$

Where $p_{i,t-1}^{h}$ is the real price of oil produced and $p_{i,t-1}^{l}$ the real price of the meal produced as both are products of the crushing process. VZ is a vector of exogenous and endogenous variables which may influence the crush demand such as import, production, oil extraction rates.

Generally, stocks, export and import equations within the crop model have the following functional forms:

$$St_{i,t}^{k} = f\left(PR_{i,t}^{k}, DU_{i,t}^{k}, St_{i,t-1}^{k}, VZ\right) \qquad (7)$$

$$Ex_{i,t}^{k} = f\left(PR_{i,t}^{k}, DU_{i,t}^{k}, Ex_{i,t-1}^{k}\right) \qquad (8)$$

$$\mathrm{Im}_{i,t}^{k} = f\left(PR_{i,t}^{k}, DU_{i,t}^{k}, \mathrm{Im}_{i,t-1}^{k}\right) \qquad (9)$$

Where $\mathrm{Im}_{i,t}^{k}$, $Ex_{i,t}^{k}$ and $St_{i,t}^{k}$ are imports, exports and the ending stocks for culture k respectively, belonging to the culture group i in year t. $PR_{i,t}^{k}$ and $DU_{i,t}^{k}$ are the production and the total domestic use of culture k belonging to culture group i. VZ is a vector of exogenous and endogenous variables, such as support prices and price of the culture produced.

The respective markets for the processed commodities are also modelled. The supply sides of these markets are provided for by crushed quantities and technical coefficients. The specification of equations for exports, imports, stocks, oil consumption per capita, industrial

demand for oil and meal domestic use follow the form of equations (7), (8), and (9).

Livestock and livestock products

The structure of individual livestock and meat sub-models varies. However, each animal sector sub-models follow a general structure which is presented below. The standard AGMEMOD livestock model structure had to be slightly adjusted as some stock and slaughter information used in other EU country models is unavailable in Turkey. Ending numbers of animals are modelled as:

$$cct_{i,t} = f\left(cct_{i,t-1},\ p_{i,t}, V\right) \qquad i = 1,...,n \qquad (10)$$

Where $cct_{i,t-1}$ is the ending stock in year $t-1$, $p_{i,t}$ is the real price in year t of the animal i, and V is a vector of exogenous variables which affect the ending stocks such as premium payments.

The numbers of animals produced by the inventory of breeding animals is given by the following equation:

$$spr_{i,t} = f\left(cct_{i,t-1},\ ypa_{i,t}\right) \qquad i = 1,...,n \qquad (11)$$

Where $spr_{i,t}$ is the number of animals produced from the herd $cct_{i,t}$ in year t and $ypa_{i,t}$ is the yield per animal concerned. Yield per animal is modelled as

$$ypa_{i,t} = f(ypa_{i,t-1}, r_{i,t}, ra_{i,t}, V) \qquad i = 1,...,n \qquad (12)$$

where $r_{i,t}$ is the long-term return of animal i and $ra_{i,t}$ is the adjusted long-term return if decoupled direct payments are to be considered. Decoupled payments are included via reaction prices (Euro/100 kg) that account for available hectares, livestock density per hectare, animal stocks and slaughtering weights per animal.

Normally within each animal culture i there can be m different categories of slaughtering j, however, the Turkish data only allows for one category of slaughtering per animal culture. The slaughtering of animal culture i is modelled as:

$$ktt_{i,t} = f\left(cct_{i,t},\ p_{i,t}, V\right) \qquad i = 1,...,n \qquad (13)$$

where $ktt_{i,t}$ is the number of slaughtering of animal culture i in year t and V is a vector of exogenous variables, such as policy instruments.

Average slaughter weight per animal culture i can be written as:

$$slw_{i,t} = f\left(slw_{i,t-1}, p_{i,t}, V\right) \qquad i = 1,...,n\,. \qquad (14)$$

To derive the total meat production of animal culture i the average slaughter weight is multiplied by the total number of animals slaughtered.

Total ending stocks of animals and meat production are calculated as identities. Total domestic use of meat is calculated as the product of per capita demand times the exogenous population variable. Per capita consumption of meat itself is determined as:

$$upc_{i,t} = f\left(upc_{i,t-1}, p_{i,t}, p_{k,t}, gdpc_t, V\right) \qquad k,i = 1,...,n;\ k \neq i \qquad (15)$$

Where $upc_{i,t}$ is the per capita consumption of meat i in year t, $gdpc_t$ is the real per capita income and V is a vector of other exogenous variables that have an impact on per capita meat consumption. The functional form for estimating the ending stocks of meat has the same

general form as the animal breeding inventories in equation (10). Furthermore, the specifications of the trade equations for animals and meat resemble the general functional forms used in the grains and oilseeds models in equations (7)-(9).

Milk and dairy products

The dairy sub-model is more complicated due to the fact that the allocation of raw materials to dairy products is done on the basis of fat and protein rather than on the basis of raw milk. The exception is fresh milk use which is still modelled on a raw milk basis in the AGMEMOD model. The dairy products covered by the Turkish AGMEMOD model are fluid milk, cheese, butter, other fresh products, yoghurt and milk powder. In the first step, raw milk production, raw milk imports and exports are determined. In the second step, raw milk for feed use and fluid milk consumption are estimated with the remaining raw milk available for factory use (manufacturing milk) in the form of milk fat and milk protein for further processing. Governed by a series of equations, the usage of fat or protein itself determines the quantity of the different dairy products manufactured. For the different commodities, the residual or balancing product uses are determined as they are in other markets by using equations (7)-(9) and (15). The milk production equation is derived as an identity from the dairy cow ending stock equation (16) and the yield per cow equation (17). The dairy cow ending stock equation has the following specification:

$$dccct_t = f\left(dccct_{t-1}, p_t, V\right) \tag{16}$$

where $dccct_t$ is the dairy cows ending stock in year t, p_t is the real price of milk, and V is a vector with exogenous variables which may influence the milk production, such as milk supports. Milk yield per cow ypc_t can be written as:

$$ypc_t = f\left(p_t, trend\right) \tag{17}$$

Total milk production is calculated as the product of milk yield per cow and total ending cow numbers.

As noted above, total milk production is allocated to three uses, namely feed use (ufe_t), fluid use on farm (ufl_t), and factory use (ufa_t). Feed use per animal is kept constant. Fluid use on farm can be written as:

$$ufe_t = f\left(p_t,\ V\right) \tag{18}$$

with fluid use (exclusive of on-farm use) derived as per capita fluid milk consumption multiplied by population. Factory use of milk is derived as the balancing element that ensures balance between total milk supply and use. The factory use of milk determines the available fat and protein supply used in the manufacturing sector. Here, a number of assumptions have to be made concerning the fat and protein content of the raw milk and dairy commodities, because actual data on milk usage in milk products are unavailable or inconsistent. Instead, fat and protein contents of standard products are applied (e.g. 82% milk fat content in butter).

In the next step, milk fat is allocated to the different dairy commodity processing lines, and the amount for each final product produced is estimated. Then, the protein content will be defined by the level of dairy product produced (e.g. cheese produced) via an identity which reflects the fixed nature of the protein to fat ratio in the given product. Due to data unavailability, these ratios are assumed and calibrated to the observed dairy product production level. In principle, the fat allocation to a dairy commodity i can be written as

$$fpc_{i,t} = f\left(fpc_{i,t-1},\ p_{i,t}, p_{k,t},\ V\right) \qquad i,k = 1,...,n;\ i \neq k \tag{19}$$

where $fpc_{i,t}$ is the allocation of milk fat to a dairy commodity *i* in year t, $p_{i,t}$ is the price of dairy commodity i, and V is a vector of exogenous variables that affect the fat allocation to commodity i. Total fat available is distributed directly or indirectly to n dairy commodities, but only $n-1$ fat allocations are estimated, as the allocation to the n^{th} product is determined as a balancing residual. Consequently, production of dairy commodity *i* including fat is calculated as total milk fat use for commodity *i* divided by fat content of the dairy commodity *i* which is a technical coefficient. The allocation of milk protein is determined by identities.

Market balancing

To complete the Turkish AGMEMOD commodity sub-models, it is necessary to add an equation describing the equilibrium for each commodity market. This condition implies that production plus beginning stocks plus imports 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 we have chosen to use price linkage equations 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:

$$p_{i,t} = \alpha_t \left[f\left(Wp_{i,t}, ssr_{i,t}, V\right)\right] + \left(1-\alpha_t\right)\left[f\left(Kp_{i,t}, ssr_{i,t}, Kssr_{i,t}\right)\right] \quad (20)$$

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 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. The dummy variable α_t is equal to one under the baseline and under the accession scenario for all years up to but not including 2015. For years including 2015 and after under the accession scenario α_t is equal to zero.

Under the baseline and before 2015 under the accession scenario 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 that Turkey enters the EU market (as a Member State), 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

3.3.2 Policy in the Turkish accession period

In the pre-accession projection period the current agricultural and trade policy structures in the EU27 and Turkey remain different and in place. However, if the EU expands with the accession of Turkey, agricultural policy in Turkey would be defined by the CAP as operating in the EU at the date of accession. Hence, it is necessary to start with a description of how this policy harmonization approach has been implemented in the current EU Member State models.[10]

The MacSharry CAP reform in 1992 introduced the coupled direct payments to the CAP as compensation for reduction in intervention support prices. These payments were limited in terms of the total amount payments rights allocated per Member State. The direction of reform adopted in 1992 was again used in the 2000 reform, when additional and increases in the value of direct payments were made in parallel with reductions in intervention prices by the European Council as part of an agreement on the multi-year EU budgetary programme called Agenda 2000. The EU enlargement in 2004 took place after the CAP reform of 2003 (Council Regulation 1782/2003). This reform had four main elements: reduced market support, decoupling of income support from production, introduction of cross compliance requirements, and the modulation of direct income supports over a certain threshold. This reform broke the link between the receipt of income support and an obligation to produce a specific volume of production. Policy changes under the recent CAP Health Check in 2007/2008 maintained the philosophy of the CAP 2003 reform by further decoupling direct payments that had hitherto remained coupled and also agreed on the abolition of milk quota in 2015, preceded by a series of annual increases in milk quota (Council Regulation 73/2009).

Until 2013 the EU15 Member States can keep a variable structure of direct support with the options to move gradually from historical farm payments to flat rate regional payments or to use a hybrid system. For the new Member States that have joined the EU since 2004, the scope of the budgetary envelope gradually increases, and the structure of the envelope is also changing with a gradual increase of the share of EU financed decoupled payments and decline and ultimate disappearance of the nationally financed and coupled top-up payments.

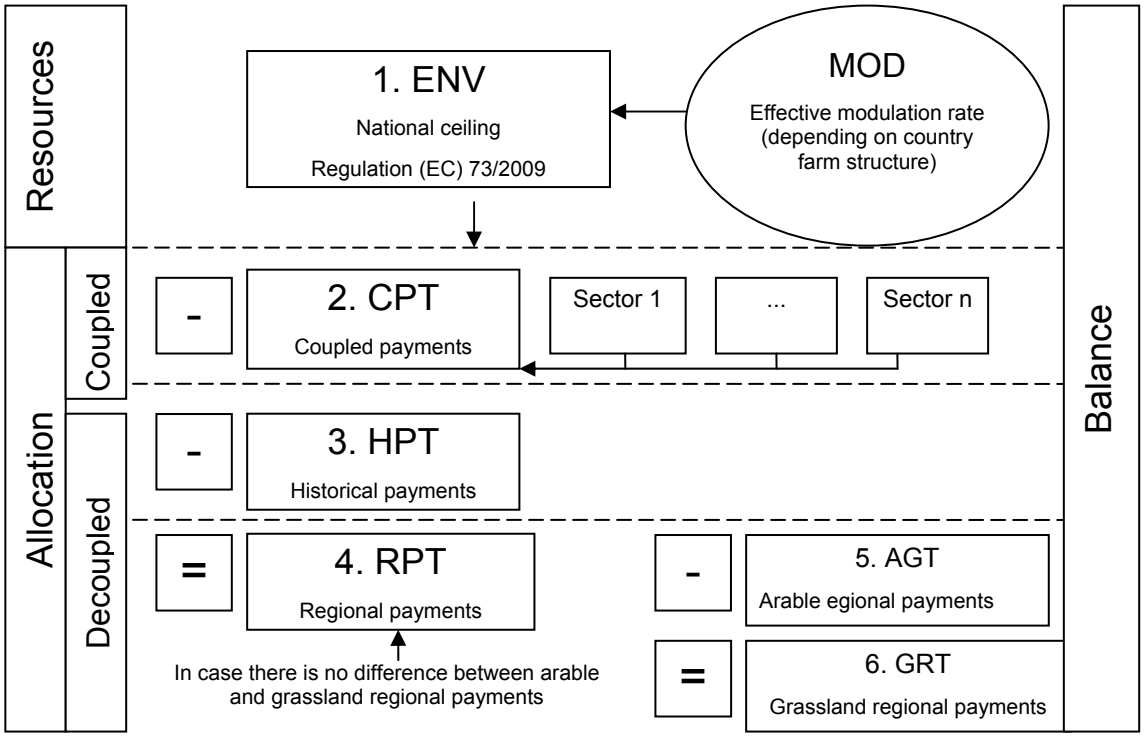
To make AGMEMOD capable of incorporating the switches in agricultural policy regimes, the all applicable direct support measures according to the 2003 CAP reform and the more recent Health Check decisions have been implemented in the policy block reflecting the total amount of money granted to the agricultural sector. The links between different policy measures in the model ensure the evaluation of policy effects in the case of a switch between policy schemes and changes of policy objects. Therefore the total direct budgetary support from the 1st pillar of the CAP has been included in AGMEMOD through the envelopes for different types of support considering that:

- part of the direct support can be allocated to sectors not captured by AGMEMOD (e.g., crops allocating small share of arable land, green fodder areas) or can be distributed outside the agricultural sector to maintain the land just in good agricultural condition;
- an increasing share of farmers' income support (87% of total support in old Member States in 2007), which gradually replaces the support coupled to certain type of production, has an impact on the supply of agricultural products.

[10] The policy harmonization approach has been developed and implemented under the FP6 study AGMEMOD 2020-Project number SSPE-CT-2005-021543.

Figure 3.3 represents the allocation of the national ceiling support over coupled and decoupled payments

Figure 3.3: Allocation of direct support national ceilings



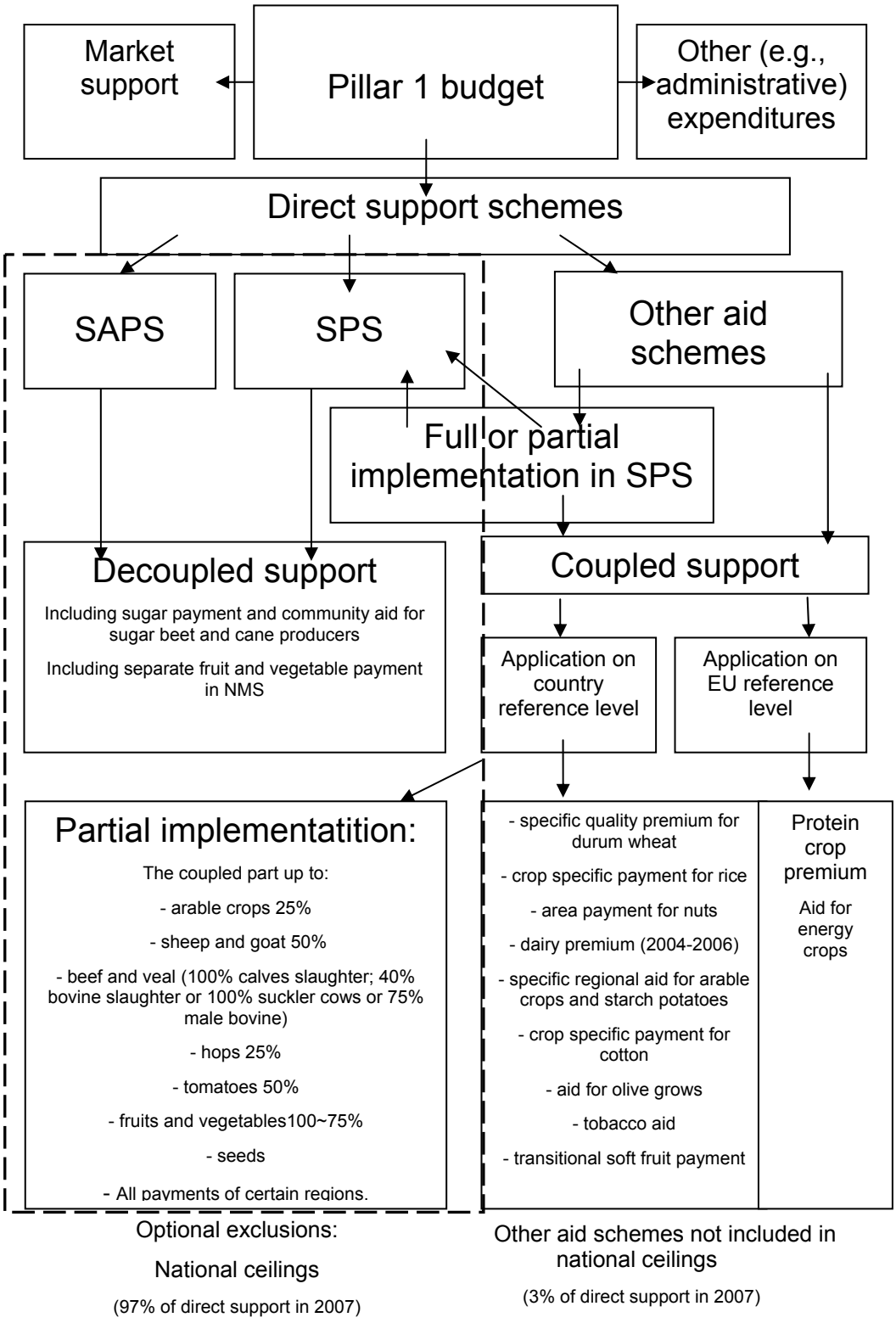
The funding of direct support measures is restricted at two levels:

- at the Member State level through national budgetary ceilings;
- at the EU level through envelopes for specific products to be supported outside of the established national ceilings.

The total funding for the Single Payment Scheme (SPS) and Single Area Payment Scheme (SAPS) is aggregated in national envelopes or national ceilings. This comprises about 97% of the total CAP direct support in 2007. Member States are allowed to decide (according to rules set by Commission Regulations 1782/2003 and 73/2009) on the sharing of the national ceiling between coupled and different types of decoupled (historical or regional) envelopes (Figure 3.4).

According to R1782/2003 and R73/2009, there remain other aid schemes (about 3% of CAP direct support in 2007) that will be granted from Pillar 1 and are additional to the national envelope budgets (e.g., crop specific payment for rice until the end of 2011). These payments are provided per hectare and linked to the production in Member States without the option to grant them in another form. Only coupled payments according to 'partial implementation' and 'optional exclusions' of SPS (R1782/2003 Title III, chapter 5) are included in the national envelope defined by the regulations.

Figure 3.4: Type of support and measures financed by pillar 1 budget of the CAP



Source: calculated according to R1782/2003 (consolidated version from 2008.01.01), R552/2007;
* - share in funding for Direct support schemes in 2007.

The basis for the grouping of direct support measures under different systems is the same classification applied by the OECD (2008), which is based on its Producer Support Estimate (PSE) components:

- coupled support: payments are based on output, on area planted or animal numbers where production is required;
- decoupled support: payments are based on non-current area and non-current numbers of animals where production is not required (historical entitlements).

Based on the policy structure described, a harmonized policy database at the EU Member State level has been developed and implemented in AGMEMOD. It covers all types of direct payments, shows the coherence between different types of the EU CAP direct support elements in their allocation and is detailed enough for impact analysis on the supply of agricultural products.

Following the policy harmonization approach used in the EU Member State models, all types of direct payments related to certain Turkish sub-sectors have been implemented in the Turkish AGMEMOD model structure as well. These direct payments have been recalculated in the form of price policy add-ups, which will increase the margins between the producer price and the input costs of the respective commodity sectors. These policy price add-ups are considered as *reaction prices,* which can be used to assess the impacts of total budgetary support on production. Reaction prices capture the impact of the decoupling of direct payments by linking their value to coefficients, termed *multipliers*. The value of these multipliers differs between coupled and decoupled payments. In the livestock sector models reaction prices are modelled as affecting livestock production decisions. In the crop sector models the policy add-ups are incorporated in the *expected gross return* per hectare variables that drive crop area allocation decisions. It is assumed that the support related (coupled) to a product or to a production factor associated with a particular product has a direct impact on production.

The multipliers applied to subsidies depend on the nature of the support payment. Multipliers applied for decoupled regional or historical payments are in the range between zero and one. For historical payments the multiplier values are set lower than for regional payments. This is because historical payments are expected to lead to a greater production incentive due to the availability of the appropriate production technologies on the farm. If a direct payment in a country model remains coupled to production, the multiplier is set to one, e.g., the direct support for the cattle sector via the reaction price then represents all the premiums coupled to cattle production as well as the value of decoupled single payments that are modelled as affecting the beef production decision of farmers. The reaction price in the livestock models is recalculated per tonne of meat produced according to animal density and slaughter weight thresholds. The direct support for the crop sector is added to the market gross return per hectare comprising the adjusted expected gross return, which affects the area allocated for certain crops.

In order to make the CAP Health Check decisions for the current EU Member States and Turkey comparable, the same harmonized policy approach has been implemented in the Turkey model under the assumed accession period from 2015 onwards. Chapter 4 provides information on the CAP policy instruments that operate in Turkey on accession, the applied system (historical, regional), the payments that will retain coupled, etcetera.

3.3.3 Validation

In general, the main objective of the validation procedure applied to the AGMEMOD modelling system and its component country level models is to improve the capacity of the model to produce market outlooks and meaningful impact assessment or policy analyses. The development of a Turkish model that is suitable for use in such analyses is driven by a mutli-phase validation process. In principle, the Turkish model structure has been derived from theoretically consistent commodity models, based on a consistent and coherent database that is used to estimate and/or calibrate the coefficients of specified agricultural commodity models. The first validation phase involves checking the consistency of the estimated behavioural equations with the theoretical requirements derived from economic theory. This is followed by assessment relative to required biological constraints and the estimated equations performance on standard statistical specification tests. This phase also involves the assessment of the models in-sample and post-sample projections. The second phase of validation involves the judgement of the observed and projected agricultural situation produced by the simulating model by country market specialists.

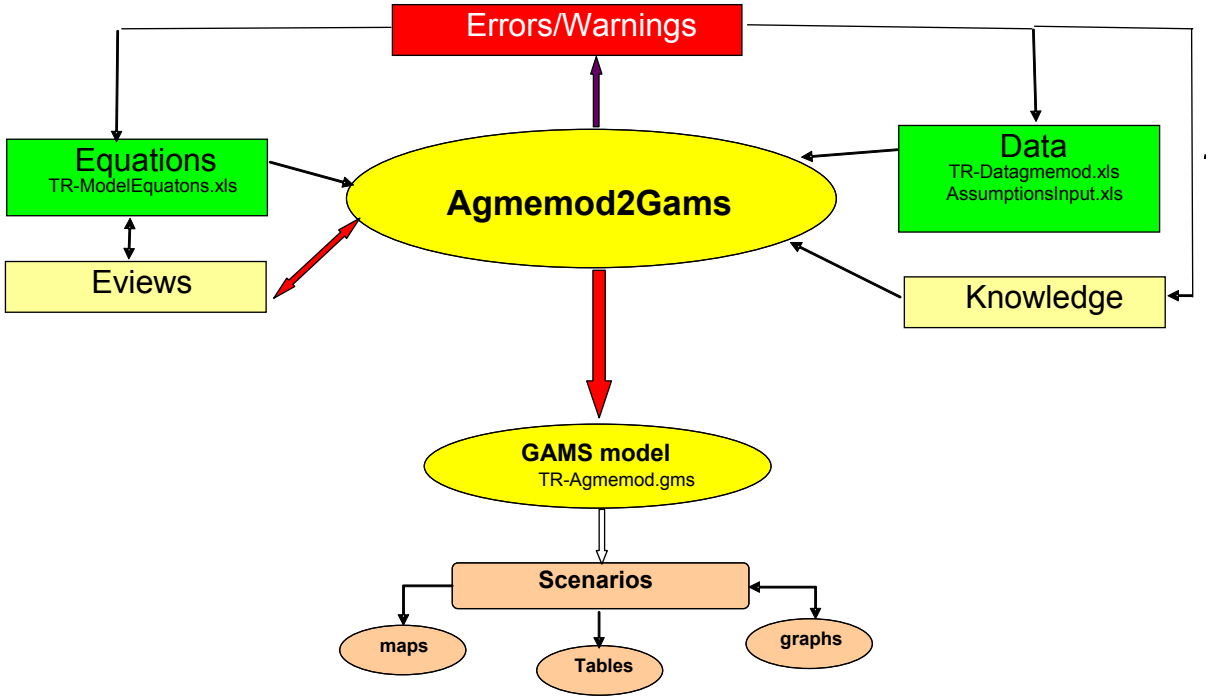
Thus, to ensure that the projections produced by the Turkish AGMEMOD model make economic sense and are coherent from a policy perspective, the projections have been validated by standard econometric methods and also through consultation with experts who are familiar with Turkish agricultural commodity markets. From this perspective, the ability of the developed models to realistically simulate the Turkish commodity markets was key in evaluating the models capacity to analyse the impact of Turkish accession to the EU on Turkish agricultural commodity markets and on the EU. The new Turkish AGMEMOD partner has introduced knowledge on data availability, the working of Turkish agricultural and agricultural trade policy in the (non-) accession period and on other specifics regarding the Turkish agricultural sector and Turkish macro-economy.

3.3.4 Integration of the Turkish AGMEMOD model

Figure 3.5 shows the global procedure applied to introduce the Turkish AGMEMOD model into the pre-existing AGMEMOD modelling framework. The steps employed are the preparation of data, the estimation of equations, the generation of the GAMS framework used, the solving of the model and the analyses of the baseline and the scenario. In Figure 3.5 the green boxes refer to required inputs such as data and model equations for Turkey, while yellow ovals refer to the software that has purposely been built to facilitate such AGMEMOD extensions.

The *Agmemod2Gams* tool, that played a major role in transferring the Turkish conceptual model into the Turkish computer model, was developed with the objective of guaranteeing the generation of consistent, transparent and error free GAMS programs. To make the computer version transparent and accessible, it has been structured on the basis of *Gtree. Gtree* stands for *GAMS tree* and is an alternative to the standard GAMS-IDE (Dol, 2006). *Agmemod2Gams* has also been applied to integrate the Turkish AGMEMOD module within the combined AGMEMOD 3.0 framework (van Leeuwen et al., 2008). Moreover, it is a useful instrument with which to validate the model results by adjusting data and equations, generating new GAMS code, solving the model and re-analysing the results. The result files capture the projections of agricultural activity levels (areas harvested, livestock numbers), supply and use balances (production, domestic use, imports, exports and ending stocks) and prices on the Turkish, other Member States and EU27/28 levels. At the end, however, expert knowledge remains the most important basis for interpreting data and model results and providing advice to equip and improve the Turkish AGMEMOD model.

Figure 3.5: Procedure from data handling to scenario analysis of the Turkish model



4 Description of the assumptions and 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 (for the year 2020) under two sets of contrasting assumptions regarding the accession of Turkey to the EU. Under the baseline, the EU remains as currently structured, a 27 member Union with agricultural and trade policy as currently defined. This policy framework is assumed to prevail for the entire projection period. Moreover, Turkey is assumed under the baseline to remain an EU candidate country with its own agricultural policy remaining as currently structured. Under the accession scenario, Turkey accedes to the EU in 2015 and the projection period is divided into a non (or pre) accession period and a (post) accession period. In the pre-accession projection period (up to but not including 2015) the current agricultural and trade policy structures in the EU27 and Turkey remain different. In the post accession period, the EU expands with the accession of Turkey to form the EU28 and agricultural policy in Turkey becomes defined by the CAP as operating in the EU (i.e. as under the baseline for the EU). To allow for the baseline projection generation, the Turkish model is integrated into the AGMEMOD system by accounting for its specific agricultural and agricultural trade policy structure compared to the EU27 agricultural and agricultural trade policy structure. In this situation, projections will be provided for Turkey and the EU27 as separate regions. Under the alternative (accession) scenario where Turkey joins the EU in 2015, Turkey and the EU are, as under the baseline treated as separate regions in the non (or pre) accession period, but with the policies of Turkey and the EU harmonized in the accession period. Therefore, projections for the EU28 as a whole are generated under the accession scenario, as in this situation Turkey is assumed to belong to the EU.

Turkish entry into the EU is expected to reduce the currently existing socio-economic development gap between both regions and to boost the macroeconomic growth rate in both Turkey and the EU. However, Burrell and Oskam (2005) argue that the Turkish membership would lock the EU into a long-term commitment to continue transferring resources to an underdeveloped Turkish agricultural sector. This, they argue, would mean that the economic gains would be low for both the Turkish countryside and the broader European economy. This statement makes clear that the agricultural (trade) policy and economic assumptions underlying the Turkish accession scenario are important in determining the nature and magnitude of the accession impact projected. However, so far no decision has been taken on the CAP after 2013 and thus the EU policy is assumed to remain unchanged in the accession scenario.[11]

Data for exogenous variables are determined outside the model. Information on assumptions on the macroeconomy, exchange rate and world market prices are described in section 4.1, and the assumptions on agricultural and trade policies are delineated in section 4.2. Some additional remarks on the assumptions are given in section 4.3. The baseline and accession scenarios are described in section 4.4.

4.1 Macroeconomic and world market price assumptions

Macroeconomic data

Macroeconomic data are needed to generate projections for the main agricultural commodity markets in Turkey and the EU Member States under both the baseline and the accession

[11] Nonetheless, the accession scenario reflects policies that are already scheduled in the current regulation, i.e. a full implementation of the Health Check agreements is incorporated.

scenario. Historical data on macroeconomic variables like population, inflation, per capita economic growth and currency exchange rates have been assembled at the country level. In order to conduct baseline and accession simulations and to generate projections from 2007 to 2020, exogenous projections for the development of the macroeconomic variables are also needed. In general, these macroeconomic projections are obtained from the national statistical offices in the respective countries involved in AGMEMOD as well as in Turkey.

Table 4.1 captures the macroeconomic data for Turkey in the period 2000-2020. For the historical period up to 2008, data on Turkish population, GDP and the average exchange rates have been collected from the Turkish Statistical Institute and Turkey's SPO. Turkey experienced solid economic growth during the period 2002-2007, which was accompanied by relatively high inflation rates, especially in the period 2001-03 (with inflation rates of 53% in 2001, 37% in 2002 and 23% in 2003). Projections up to 2020 for GDP growth and price deflators have been obtained from the Midterm Fiscal Program (OVMP) of the Turkish Government. The OVMP provides annual macro economic updates for the next three years, which are published in the Official Gazette (Number 27353). The most recent projections (at the time this study was conducted) for 2010-12 were provided in September 2009. The GDP growth was expected to fall by 6% to 7% in 2009, but the OVMP forecasts a GDP growth rate of 3.5%, 4% and 5% for 2010, 2011 and 2012 respectively. For the 2013-2020 period, a 6% annual GDP growth rate has been assumed, which is 0.5% below the average growth rate realised over the period 2002-2007. Over 2009-2012, the projections for the development of Turkey's GDP deflator have been obtained from the SPO (6% in 2009, 5% in 2010 and 4% in 2011 and 2012). For the 2013-2020 period, the GDP deflator rates have been reduced by 0.1% in each successive year from 2012 onwards. With a rate of 1.1% per year, Turkish population is expected to grow more than twice as fast as the EU27 population.

Table 4.1: Macroeconomic assumptions for Turkey

	Unit	2000	2005	2008	2009	2010	2015	2020
Population	million	64	69	71	72	73	77	80
Real GDP	billion TL (1987)	118.8	146.8	166.7	152.5	157.9	205.3	274.8
GDP deflator	2000=1.00	1.00	3.12	4.04	4.28	4.50	5.31	6.43
Real GDP/cap	1987 prices	1,849	2,140	2,345	2,122	2,172	2,681	3,424
exchange rate	TL/Euro	0.57	1.67	1.90	2.15	2.30	2.81	3.62

Source: Turkish Statistical Institute

Table 4.2 summarises the macroeconomic assumptions used for the EU27 in the period 2000-2020, which have been constructed on basis of data from the Member States. For the historical period up to 2008 or 2009, data on population, GDP and inflation rates have been collected at the country level. To conduct simulations and to generate projections to a ten year horizon, exogenous projections for the development of these macroeconomic variables have been obtained from the national statistical and economic research services in the Member States.

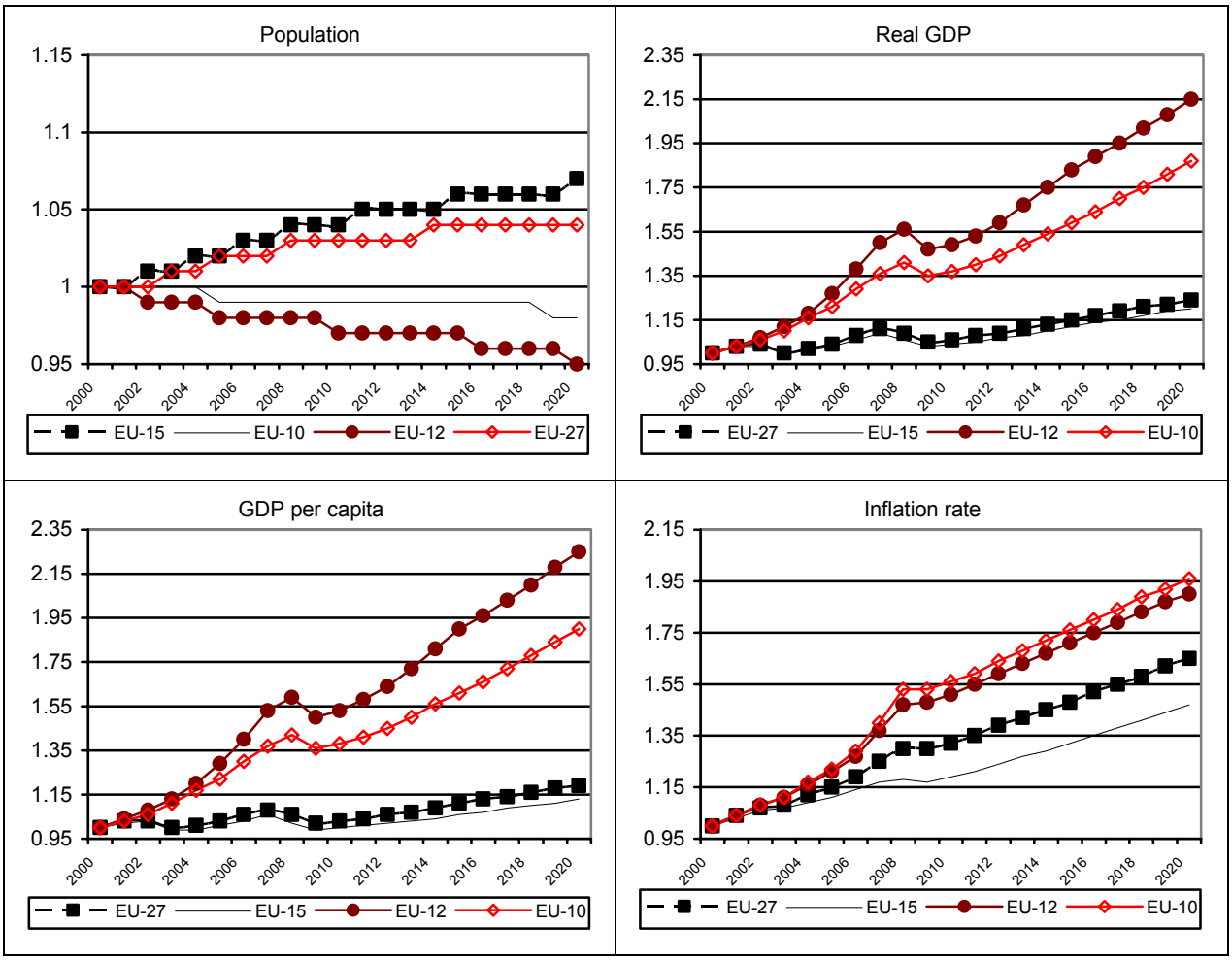
Table 4.2: Macroeconomic assumptions for the EU27

	Unit	2000	2005	2008	2009	2010	2015	2020
Population	million	481	488	494	495	495	498	501
Real GDP	billion Euro (2000)	9100	9498	9880	9546	9658	10473	11315
GDP deflator	2000=1.00	1.00	1.15	1.30	1.30	1.32	1.48	1.65
Real GDP/cap	2000 prices	18923	19457	20015	19281	19523	21013	22582
exchange rate	USD/Euro	0.93	1.25	1.37	1.46	1.39	1.48	1.57

Source: Eurostat, national services in the EU

Figure 4.1 presents the baseline assumptions for the key macroeconomic aggregates for the EU10, EU12, EU15 and EU27 Member State aggregations detailing population rate, GDP, GDP per capita and inflation rate.

Figure 4.1: Macroeconomic projections at different EU levels (2000=1.00)



Source: EU Member State national services

The macroeconomic projections for the EU27 indicate that over the projection period there will be a return to stronger growth than was experienced in the EU over the last decade. In general the rate of growth in countries which have recently acceded to the EU is projected to be higher than that of the more affluent EU15 members. As well as experiencing higher growth rates, EU10/EU15 Member States are also projected to experience higher rates of inflation. The projections indicate that there will be a decline in population in several eastern EU Member States, and a slight increase in populations in western EU Member States. This can be largely attributed to westward migration by younger workers from some eastern states of the EU.

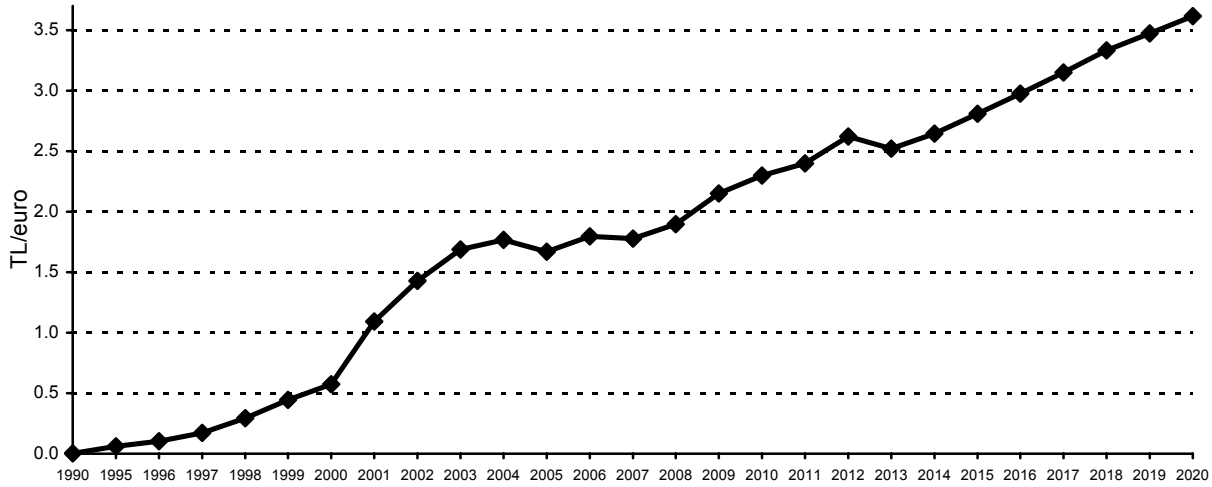
Exchange rates

The exchange rate between the Euro and the US dollar is a key macroeconomic variable, since it influences the Euro value of the exogenous world prices used in the AGMEMOD model. The US dollar/Euro exchange rate projections are sourced from the FAPRI annual world market outlook (FAPRI, 2010). The assumptions on the evolution of the US dollar/Euro exchange rate are based on the observed exchange rate for 2009 and the percentage change in this exchange rate that has been published by FAPRI in March 2010.

For non-Euro zone countries, including Turkey, the exchange rate between these national currencies and the US dollar is derived from their exchange rate with the Euro and the baseline US dollar/Euro exchange rate, so that projected exchanges rates are consistent with the absence of possibilities for triangular arbitrage.

Figure 4.2 presents the actual and projected TL/Euro exchange rates for the period 1990-2020. The observed TL/Euro exchange rates up to 2009 and its projections up to 2012 are taken from the SPO. From 2013 onwards, exchange rate projections are based on information from international institutions such as IMF and OECD.

Figure 4.2: TL/Euro exchange rate assumptions



Source: SPO; IMF

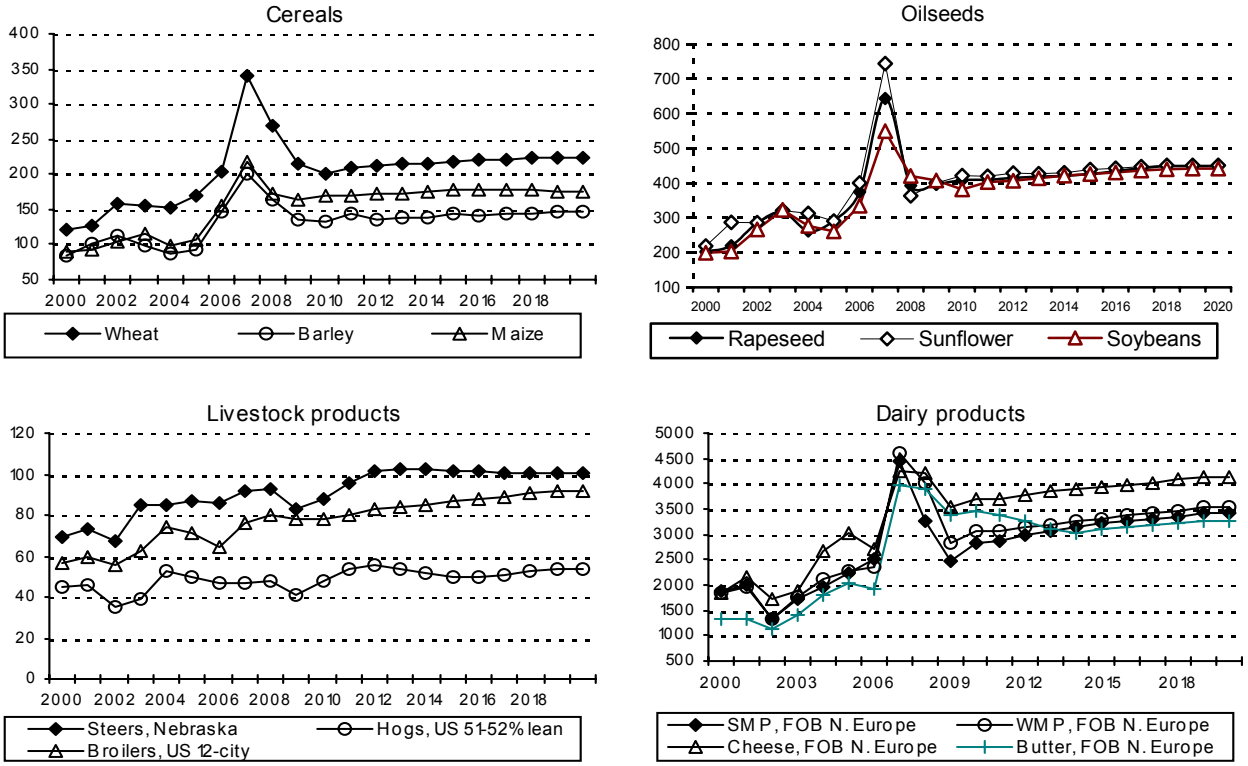
With respect to the USD/Euro exchange rate projections (FAPRI, 2010), it is expected that the US dollar will continue to strengthen over the period 2009-2011, but will then weaken again hereafter (Table 4.2).

World market prices

In the baseline, world market prices are used in the simulation of both the Turkish and the EU combined models. Variables relating to world market prices are specifically included in the Turkish price equations as well as in the EU key price equations to capture the effects of the world market on Turkey and the EU respectively. In the accession scenario's accession period (i.e. from 2015 onwards), the world market prices are only implemented in the EU key price equations, with the key EU prices entering the Turkish price equations in the manner described in Chapter 3.

The generation of the baseline and accession scenario projections in AGMEMOD is dependent on exogenous world market price projections. These price projections have, in general, been taken from the FAPRI World Outlook (2010). The world livestock and grain prices are US market prices. Dairy commodity prices as well as prices of oilseeds, oilseed meal and oil are generally northern European export prices. These world market prices are introduced in the EU key price equations and reflect the effects of global supply and demand (as reflected in the world market prices) on the EU agricultural commodity markets. The developments of the world market price projections up to 2020 are presented in Figure 4.3.

Figure 4.3: World market prices (US dollar/tonne) projections



Source: FAPRI 2010 US and World Agricultural Outlook.

The general trend across all of the major agricultural commodities is one of rising world prices, which are driven by increasing demand around the world. The prices of the major grains and oilseeds are set to increase as competition for resources from the biofuel sector pushes up food and feed prices in cereals markets.

Beef, pork and broiler prices are also projected to trend upward as income growth generates strong international demand. The increase in feed prices has knock on consequences as it increases input prices for livestock and livestock product production, which impacts negatively on the projected production growth in these sectors and contributes to the projected increases in livestock and livestock products.

International dairy product prices increased sharply in 2007 and 2008 due to a combination of factors. Growth in international demand is quite strong and the availability of supplies to meet this demand has been affected by a gradual decline in the export surplus from the EU and a slowing in the growth of production in the southern hemisphere. The prices declined significantly in 2008/09, but increased again in 2010. It is projected that international dairy product prices will be sustained at these higher levels over the duration of the projection period.

It should be noted, however, that the above discussion relates to world prices as measured in US dollars. The very positive world price outlook across the main commodities is affected somewhat by the projected appreciation of the Euro against the US dollar over the projection period. A consequence of this projected US dollar weakness is that world price increases, measured in Euro, are not as large as when measured in US dollars.

4.2 Policy assumptions

4.2.1 Agricultural (trade) policy

Baseline scenario

A key element of the baseline projections comprises the definition of the agricultural policy programme of the Turkish state and its implementation in the Turkish AGMEMOD model on the one hand and the definition and implementation of the CAP in the EU country level AGMEMOD models on the other hand. The baseline policy of the EU27 models reflects the CAP Health Check agreement of 2008, which includes:

- milk quota abolition after 2015 with the agreed annual increases in milk quota beginning in 2009;
- mandatory set-aside rate set to zero, starting in 2009;
- further decoupled direct supports;
- continuation of coupled suckler cow and ewe premiums in some Member States (France, Belgium, Hungary, Romania);
- increasing modulation rates that reach 14% by 2012.

Based on the policy structure as described in section 3.3.2, a harmonized policy database on the EU country level has been generated and implemented in AGMEMOD. It covers all types of direct payments, shows the coherence between different types of the EU CAP direct support elements in their allocation and is detailed enough for impact analysis on supply of agricultural products.

The national agricultural policy of Turkey reflects a package of instruments including direct income supports, premium supports, production quota and price supports as described in section 2.3 of this report. Under the baseline, it is expected that this current package of policy instruments will be continued unchanged up to 2020, with the exception of the DIS payments which are abolished from 2009 onwards.

With respect to agricultural trade policy developments, the baseline makes no assumptions concerning the outcome of the still ongoing Doha Development Round of the WTO. As no probable quantitative outcome is available so far, assumptions regarding the shape of a future agreement and the impact of the Doha Round on EU agriculture would be speculative. The Turkish border policy measures that protect Turkish agriculture include import tariffs, import bans on most live animals and livestock products and export subsidies. In the baseline, it is assumed that Turkey will continue to use these border measures up to 2020 and that the EU will continue to apply the agricultural trade rules as set out in the URAA.

Tables 4.3 to 4.6 present summaries of the applied Turkish agricultural (and trade) policies for the period 2000-2020 for crops and livestock respectively. Domestic supports (both input subsidies and output price supports and complementary premiums) have been obtained from Turkey's General Directorate for Agricultural Production and Development (MARA), whereas border measures such as tariff rates and export support became available from Turkey's Undersecretary of Foreign Trade website and the Turkish official gazettes respectively. It is assumed that the nominal value of Turkish support payments and support prices (expressed in TL) will change on an annual basis over the projection period in line with the economy wide inflation projection. This maintenance of the real value of direct payments and market support prices over the baseline projection period is in common with policies regarding the setting of payment and support prices in the historical period.

Table 4.3: Agricultural policy variables for crops in Turkish AGMEMOD model

Agricultural Policy	Unit	2000	2003	2005	2008	2009	2010	2015	2020
Fertilizer, diesel, seed support									
Wheat	TL/ha	0	20	40	95	117	123	146	176
Barley	TL/ha	0	20	40	85	102	108	127	154
Maize	TL/ha	0	20	40	50	92	97	114	138
Rye, oats	TL/ha	0	20	40	85	102	108	127	154
Cotton	TL/ha	0	20	75	84	108	113	134	162
Rice	TL/ha	0	20	40	50	68	71	84	101
Tobacco	TL/ha	0	20	75	84	108	113	134	162
Potatoes	TL/ha	0	20	40	250	267	281	331	401
Olives	TL/ha	0	20	25	39	67	71	84	101
Soybeans, sunflowers	TL/ha	0	20	75	84	108	113	134	162
Direct income support									
Cereals	TL /ha	0	135	100	70	0	0	0	0
Tobacco	TL /ha	0	160	100	0	0	0	0	0
Potatoes, olives, sunflowers, soybeans	TL /ha	0	135	100	70	0	0	0	0
Tomatoes (bombus support)	TL/tonne	0	0	0	900	954	1,002	1,182	1,431
Potatoes (compensation support)	TL/ha	0	0	0	1,100	1,100	1,100	1,298	1,572
Citrus sap support	TL/ha	0	0	3,000	1,350	1,431	1,503	1,773	2,147
Apple sap support	TL/ha	0	0	2,500	1,800	1,908	2,003	2,364	2,862
Support prices									
Soft and durum wheat	TL/tonne	102	325	350	500	500	525	620	750
Barley	TL/tonne	82	215	248	400	375	394	465	563
Maize	TL/tonne	92	310	330	430	450	473	558	675
Rye, oats	TL/tonne	71	225	234	400	375	394	465	563
Rice	TL/tonne	290	645	720	870	0	914	1,078	1,305
Cotton	TL/tonne	400	1,100	830	1,000	1,100	1,155	1,363	1,650
Tobacco	TL/tonne	1,302	0	0	0	0	0	0	0
Olive oil	TL/tonne	1,110	3,200	5,000	3,750	3,750	3,938	4,646	5,626
Soybeans	TL/tonne	135	0	0	0	0	0	0	0
Sugar beets	TL/tonne	36	95	120	0	0	0	0	0
Quota									
Sugar quota A	1,000 tonnes	2,879	2,458	2,458	2,667	2,701	2,444	2,444	2,444
Sugar quota B	1,000 tonnes	0	42	42	84	122	88	88	88
Tobacco quota	1,000 tonnes	189	0	0	0	0	0	0	0

Table 4.4: Trade policy variables for crops in Turkish AGMEMOD model

Trade Policy	Unit	2000	2003	2005	2008	2009	2010	2015	2020
Import tariffs									
Soft and durum wheat	%	55	40	85	50	80	130	130	130
Barley	%	55	40	85	50	80	130	130	130
Maize	%	85	85	85	50	80	130	130	130
Olive oil	%	50	45	115	35	130	130	130	130
Rapeseeds	%	35	32	31	31	31	31	31	31
Sunflower	%	0	12	10	10	10	10	10	10
Soybeans	%	28	12	20	27	27	27	27	27
Cotton	%	0	0	0	8	8	8	8	8
Citrus fruit	%	0	0	0	0	0	0	0	0
Tomatoes	%	56	54	60	15	15	15	15	15
Potatoes	%	51	49	49	20	20	20	20	20
Sugar beets	%	22	20	19	20	20	20	20	20
Sugar	%	22	20	19	4	4	4	4	4
Apples	%	141	137	135	135	135	135	135	135
Tobacco	%	62.9	60.9	60.3	60	60	60	60	60
Tobacco import rate	USD/tonne	3,000	3,000	3,000	3,000	3,000	0	0	0
Export support									
Olive oil	USD/tonne	200	180	150	100	100	100	100	100
Citrus fruit	USD/tonne	80	65	35	76	76	76	76	76
Apples	USD/tonne	0	0	40	0	0	0	0	0

Table 4.5: Agricultural policy variables for livestock in Turkish AGMEMOD model

Agricultural Policy	Unit	2000	2003	2005	2008	2009	2010	2015	2020
Milk premium	TL/tonne	40	5	40	55	36	38	47	61
Beef premium	TL/tonne	0	0	0	900	900	961	1,175	1,513
Broiler meat premium	TL/tonne	0	0	0	0	0	0	0	0
Goat and sheep milk support	TL/tonne	0	0	0	900	900	961	1,175	1,513

Table 4.6: Trade policy variables for livestock in Turkish AGMEMOD model

Trade Policy	Unit	2000	2003	2005	2008	2009	2010	2015	2020
Import tariffs									
Milk	%	150	150	150	150	150	150	150	150
Cheese	%	0	113	113	113	140	140	140	140
Broiler	%	65	65	65	65	65	65	65	65
Eggs	%	85	78	77	77	77	77	77	77
Beef meat	%	238	228	225	225	225	225	225	225
Export support									
Sheep and goats	USD/tonne	0	0	0	0	0	0	0	0
Broilers	USD/tonne	0	0	186	186	180	180	180	180
Eggs	USD/1,000 items	0	0	6	15	15	15	15	15
Tariff rate quota									
Beef and veal	1,000 tonnes	0	0	0	0	0	19,1	19,1	19,1
Beef cattle	1,000 tonnes	0	0	0	0	0	6,3	6,3	6,3

Accession scenario

Under the accession scenario it is assumed that Turkey would join the EU in 2015. At that point in time, Turkey will replace its own national agricultural (and trade) policies with the common EU agricultural (and trade) policies. For this study, a Turkish policy database was created that is similar in form to those developed for the existing EU Member States in the AGMEMOD FP6 project (Salputra and Miglavs, 2007). Due to the uncertainty on when or whether Turkey will accede to the EU, data on policy variables such as budgetary envelopes, coupling rates, modulation rates have not yet been formally determined by the EU and Turkey. For the purposes of this research, assumptions concerning the values of such data have been based on current knowledge. Historical information on the Turkish agricultural policies and what has occurred in previous accession processes and negotiations (such as those involving Bulgaria and Poland) have been used as the basis for the accession scenario assumptions. The following assumptions concerning CAP support elements that will apply in Turkey over the period 2015-2020 are taken under the accession scenario:

- *national budgetary envelope (phased-in)*: the Turkish agricultural support budget amounted to 0.54% of Turkey's GDP in the period 2002-2010 (SPO Annual Programs 2006-2010). The same ratio between support and GDP has been assumed to prevail after 2010 in estimating the Turkish national budgetary envelope for the 2015-2020 period;
- *total expenditure on coupled payments* under Article 69, 1782/2003 and Article 68, 73/2009 will be maximized at 3.5% from the national ceiling (R73/2009);
- the *cotton premium (100%), tobacco premium (42%), grain compensation (3%), cattle slaughtering premium (8%), ewes premium (2%)* and *milk premium (3%)* will be (partly) coupled to production;
- *budgetary ceilings for partially coupled direct payments* (the list according to the articles 66 to 71 of regulation (EC) No 1782/2003) is assumed to follow the same structure as the pre-accession payments in 2008 (Producer Single Commodity and Group Commodity transfers, source: OECD);

- *compulsory modulation rates*: it is assumed that the modulation rates to be applied in the Turkish AGMEMOD model will be equal to those applied in the Bulgarian AGMEMOD model as the Turkish farm structure is similar to the Bulgarian structure;
- a *regional payments* scheme will be applied.

Table 4.7 summarises the principal elements of the CAP that are assumed to apply in the post accession period (2015-2020) under the accession scenario.

Table 4.7: Estimated budgetary ceiling, coupled payments, modulation and coupling rates in Turkey, 2015-2020

		2015	**2016**	**2017**	**2018**	**2019**	**2020**
Budgetary national ceiling for direct payments	mio €	1,685	1,838	1,991	2,144	2,450	2,757
Coupled payments (articles 68, 69, 71):		107	107	107	107	107	107
- *milk*	mio €	7.8	7.8	7.8	7.8	7.8	7.8
- *arable crops*	mio €	60.9	60.9	60.9	60.9	60.9	60.9
- *beef and veal*	mio €	11.2	11.2	11.2	11.2	11.2	11.2
- *sheep and goat*	mio €	9.7	9.7	9.7	9.7	9.7	9.7
- *cotton*	mio €	17.2	17.2	17.2	17.2	17.2	17.2
- *tobacco*	mio €	143.6	143.6	143.6	143.6	143.6	143.6
- *sugar*	mio €	0.4	0.4	0.4	0.4	0.0	0.4
Regional payments total envelope	mio €	1,577	1,730	1,884	2,037	2,343	2,650
Compulsory modulation	index	0.019	0.019	0.019	0.019	0.019	0.019
Coupling rates for:							
- *arable crops*	index	0.03	0.03	0.03	0.03	0.03	0.03
- *ewes*	index	0.02	0.02	0.02	0.02	0.02	0.02
- *adult slaughter premium*	index	0.08	0.08	0.08	0.08	0.08	0.08
- *tobacco*	index	0.42	0.42	0.42	0.42	0.42	0.42
- *milk*	index	0.03	0.03	0.03	0.03	0.03	0.03
- *cotton*	index	1.00	1.00	1.00	1.00	1.00	1.00

4.2.2 Biofuel policy

The baseline and accession scenarios take account of the EU biofuel directive in the sense that 10% of the energy demand in transport must be met by biofuels by 2020. The PRIMES energy model (European Commission, 2008b) estimated that the energy demand in the EU27 in transport in 2020 will amount to:

- gasoline: 4,870 million gigajoule;
- diesel oil: 777 million gigajoule.

Consequently, 565 million gigajoule of the transport energy demand must be substituted by biofuels. AGMEMOD assumes that the division between bioethanol and biodiesel across the EU Member States will be 50%-50% (and 41%-59% in Germany), which means the need of

- 20 million tonnes of rape oil;

- 85 million tonnes of cereals (soft wheat and maize).

These demands for bioethanol and biodiesel have been exogenously calculated and have then been added as a new item to the total domestic use of cereals and rape oil.

It would be interesting to examine to what extent the accession of Turkey to the EU will increase the size of the transport energy market in the EU as well as the size for feedstock derived from the demand of implied biofuels. This topic, however, remained beyond the scope of this study as the biofuel directive has not built in for Turkey.

4.3 Additional remarks on the assumptions

As with all projections and policy simulations, the results described in this study are based on several explicit and implicit assumptions. To the extent that such assumptions, ex post, are proved to have been unfounded, the model simulations and their policy import will be affected. The conditional nature of all projections should be recalled by users of model based policy analysis. In this context especially, it is worthwhile emphasising the following points:

- Although the latest available projections concerning the macroeconomic variables (especially GDP growth, population, inflation rate, exchange rates) have been used, considerable uncertainties in relation to the future development of these macroeconomic indicators remain. There are signs of a quicker-than-expected recovery of economy and demand, with respective implications for the prices of agricultural products on a worldwide basis. However, recent information on the over-indebtedness of some EU Member States and the need for fiscal contraction within the context of the Stability and Growth Pact could hamper the economic recovery within the EU. Developments in the wider macroeconomic environment and ongoing policy responses to it will affect exchange rates between the Euro and other EU currencies as well as the currencies of non-EU countries. Effects on the Turkish currency are even more difficult to derive and the TL/Euro exchange rate might be used as indicator for sensitivity analysis.
- Weather conditions are assumed to be normal, which means that the weather over the baseline projection period is assumed to reflect long-run averages. When weather deviates significantly from the average, e.g. during a drought, then agricultural prices are expected to increase above the projected level and vice versa. The assumptions of normal weather applies to both the EU and Turkey, but also to the rest of the world as the assumption of normal weather underlies also the exogenous world price projections used. This means that negative weather events and associated yield, production and price volatility that could occur over the 10 year projection period are not taken into account.
- Energy prices are not explicitly represented in AGMEMOD. However, uncertainty exists in this area with respect to the development of the future oil prices, which affect the prices of a wide range of agricultural inputs and outputs.
- Although EU Bioenergy Mandates have been considered in AGMEMOD's baseline and scenario simulations, the extent to which they are fulfilled and by what approach they will be implemented in the different Member States remains uncertain. The introduction and use of second generation biofuels has not been considered.
- No extra positive demand shock in terms of biofuels demand arising from Turkey's accession to the EU has been built in. Thus, the question remains how agricultural markets of the EU28 would be influenced if Turkey would have to fulfil the binding EU biofuels mandate of 10% of transport fuels (e.g. would the demand for biofuel feed stocks be shifted; would it lead to an extra positive impact on EU cereal and oilseed prices?).

- Specific challenges are incurred in the projections for the milk market sector. The abolishment of the milk quota regime, which restricted milk quantities in the EU for 30 years, constitutes a structural break which is difficult to model. Furthermore, the level of quota rents imputed in the models have a significant impact on the results.
- Another issue in the AGMEMOD model relates to the assumption of commodity homogeneity. In reality many of the price spreads observed between EU Member States are due to quality differences between commodities. 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, e.g. the EU key price for cheese is an Emmental cheese price, but this type of cheese might represent a quite unimportant category of cheese production and use in a possibly acceding country.
- As all analyses also the analysis with the current AGMEMOD model is subject to some caveats. Since it is partly econometrically estimated, structural breaks in sectors cannot be captured. Implementation of such new situations would require certain assumptions. A further restriction of the model is the fact that the feedback between the EU and the world market has not yet been captured in AGMEMOD.
- Equilibrium models do not explicitly take 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. However, considering the variation of a periodicity that is higher than annual, i.e. monthly or weekly, not only a model such as AGMEMOD but any agricultural production model will fail or be unable to deal with this issue.

4.4 Description of baseline and accession scenarios

The key assumption under the baseline is that Turkey will not accede to the EU (status quo ante), while Turkey will become an EU member under the accession scenario. Hence, in the baseline Turkey will be treated differently from the EU27.

The *EU27 baseline* situation assumes the following:

- the CAP Health Check agreement of November 20th, 2008 defines EU agricultural policy for the period to 2020: milk quota abolition after 2015 with the agreed annual increases in milk quota beginning in 2009, set aside rate set to zero starting in 2009, decoupled direct support, modulation rates reaching 14% by 2012;
- trade policy measures according to the Uruguay Round Agreement on Agriculture (URAA);
- macroeconomic projections per Member State;
- there is a flight to the US dollar due to the crisis that is pushing the dollar up in value against currencies such as the Euro; the US dollar will continue to strengthen over the period 2009-2011, but is expected to weaken again hereafter (FAPRI, March 2010);
- rising world price projections (FAPRI, March 2010);
- implementation of the EU 10% biofuel directive; target to be achieved by 2020.

The *Turkey baseline* situation assumes the following:

- macroeconomic projections for Turkey according to current knowledge;
- continuation of specific Turkish agricultural policy instruments: input subsidies, premium payments, hectare payments and production quota;
- abolition of the direct income support from 2009;
- continuation of trade policies to protect Turkish agriculture: import tariffs, import bans on most live animals and livestock products and export subsidies.

In the accession scenario, Turkey becomes a member of the EU on 1 January 2015. An important objective of this study is to develop a model that can be augmented and improved as more detailed information about the terms of a possible future accession of Turkey to the EU become available. From this perspective, the assumptions made in this study about the characteristics of the accession process are kept simple and transparent.

The *EU28 accession* scenario analysed is based on the following narratives:

- EU will be enlarged through the accession of Turkey and will cover 28 Member States from 2015 onwards;
- same agricultural policy environment (Health Check) will prevail in the EU28 as is assumed to prevail under the baseline in the EU27;
- same trade assumptions are made as under the baseline scenario;
- macroeconomic projections are assumed to be the same as in the baseline scenario;
- world agricultural commodity price projections are assumed to be the same as in the baseline scenario;
- EU budget resources will be allocated to support Turkey's agriculture from 2015 onwards. Assumptions concerning the allocations of the Turkish budgetary envelope between coupled and decoupled supports are as outlined in section 4.2.1 (cf. Table 4.5);
- The EU biofuel directive is assumed to be the same as in the baseline scenario, but targets have not built in for Turkey (cf. section 4.2.2).

The policy block from Table 4.5 has been implemented in the Turkish model for the accession scenario in the period 2015-2020.

Furthermore, a switch takes place in the Turkish price transmission equations. In the baseline scenario, Turkish prices are mainly driven by world market prices and import tariff rates. In the accession scenario, however, the EU key prices are assumed to determine Turkish prices. Although an overnight convergence is not expected, it is assumed that the convergence of Turkish prices towards their respective EU key prices will take place over the span of a couple of years. Model parameters have been calibrated in order to implement such a convergence process. In this respect it is assumed that the Turkish prices follow the patterns of comparable other new Member State countries (such as Poland and Bulgaria) when they joint the EU. In the event that Turkish accession occurs (as under the accession scenario), EU self-sufficiency rates for all commodities will adjust (unless Turkey neither consumes nor produces the commodity concerned). As a result the respective EU key commodity prices will change also. Such key price changes, which may of course be only marginal changes, will result in commodity market changes in all of the other AGMEMOD country models in total EU28 agricultural commodity supply and demand and prices.

5 Results of the baseline scenario

The baseline is a model based projection of the future, assuming that current (and scheduled) policy remains unchanged over the projection period chosen. The details of the narrative and assumptions underlying the baseline are presented in the previous chapter. This chapter describes the results of the AGMEMOD baseline projections for the period to 2020. Section 5.1 focuses on the results for Turkey, while section 5.2 presents the results for the EU and its Member States. More detailed results for Turkey are available in the Annex.

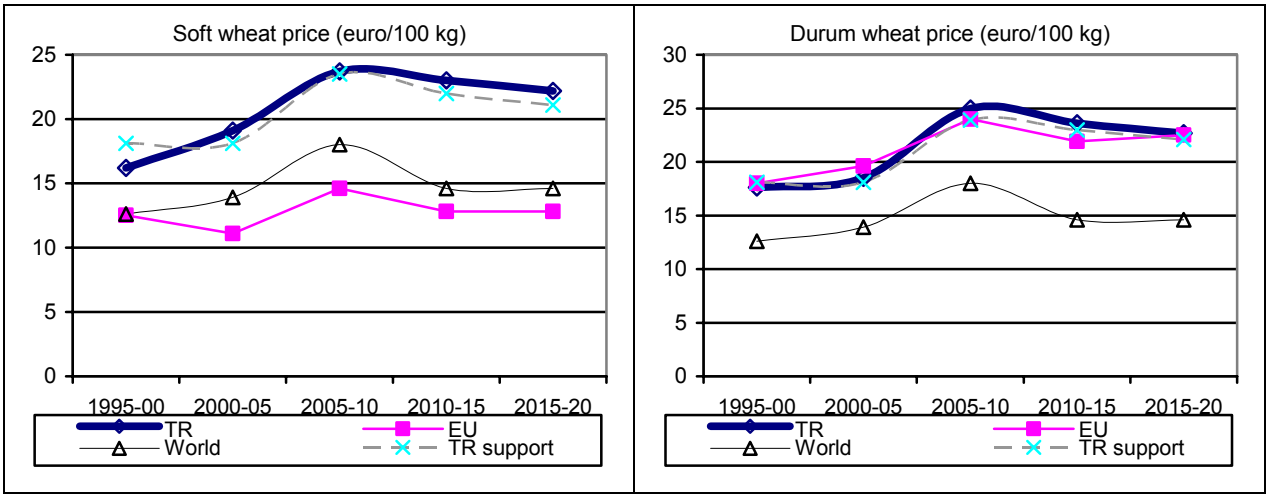
5.1 Turkey

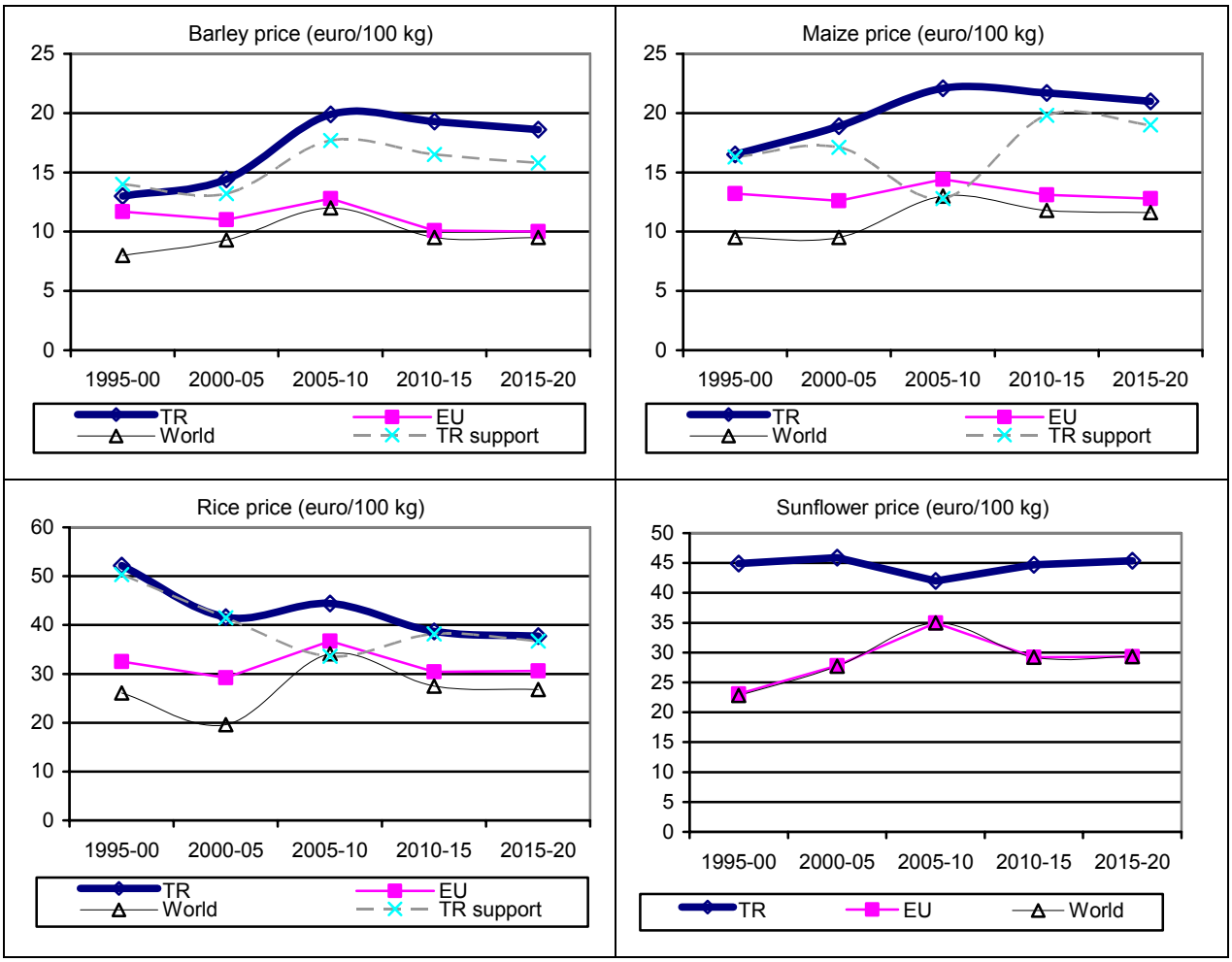
5.1.1 Grains and oilseeds

Prices

Figure 5.1 presents historical and projected market prices for cereals and sunflowers in Turkey, the EU and the world markets. Turkish agricultural policy support prices are also depicted. In Figure 5.1 (and subsequent figures in this chapter) the years in the graphs are presented as 5-year averages, e.g. the '1995-00' value shows the average value of a variable over 1995-2000. Cereal prices follow their respective world market and support prices. Due to continuing high levels of tariff and non-tariff protection under the baseline, Turkish cereal and oilseed prices under the baseline are projected to remain above the world and EU prices. There is also a drop in the level of the Turkish maize support price over the period 2005-10 projected. Due to the severe drought in 2007 and 2008, the government not only significantly reduced the import tariffs levied on maize, but also introduced premium supports for maize and reduced the Turkish maize intervention price.

Figure 5.1: Cereal and oilseed prices (Euro/100 kg) in Turkey, EU and the world





Areas and yields per hectare

Figure 5.2 shows the historical and projected development of cereal areas harvested in Turkey over the period 1995-2020. The total grains area harvested is projected to remain quite static during the studied period. Two third of the total cereal area harvested is composed of wheat (durum and soft wheat) cultivation. Soft and durum wheat area harvested fell in the period 2006-2007 due to lower producer prices and considerably higher input prices. From this point in time, a gradual growth of the cereal area harvested is expected in the projection period due to:

- continued provision of seeds, fertilizers and diesel subsidies (TL/ha);
- continued provision of complementary crop premium supports (TL/tons);
- availability of unused land, although this has only a limited impact.

Nevertheless, at the end of the projection period in 2020, the total cereal area under cultivation is projected to be smaller than the area harvested over the period 1995-2000.

Figure 5.2: Cereal areas (1,000 ha) in Turkey

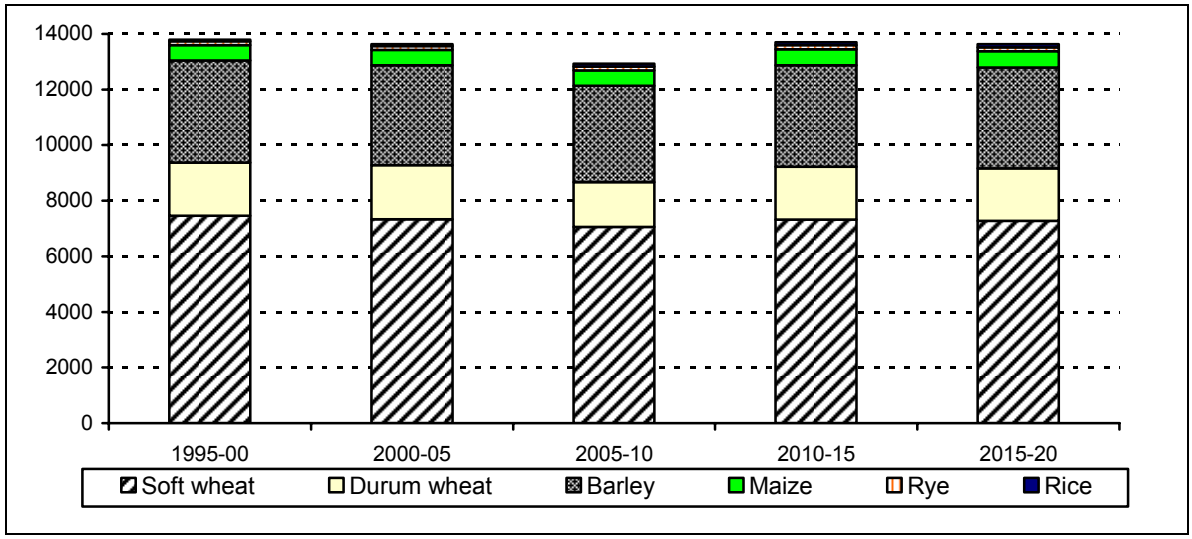
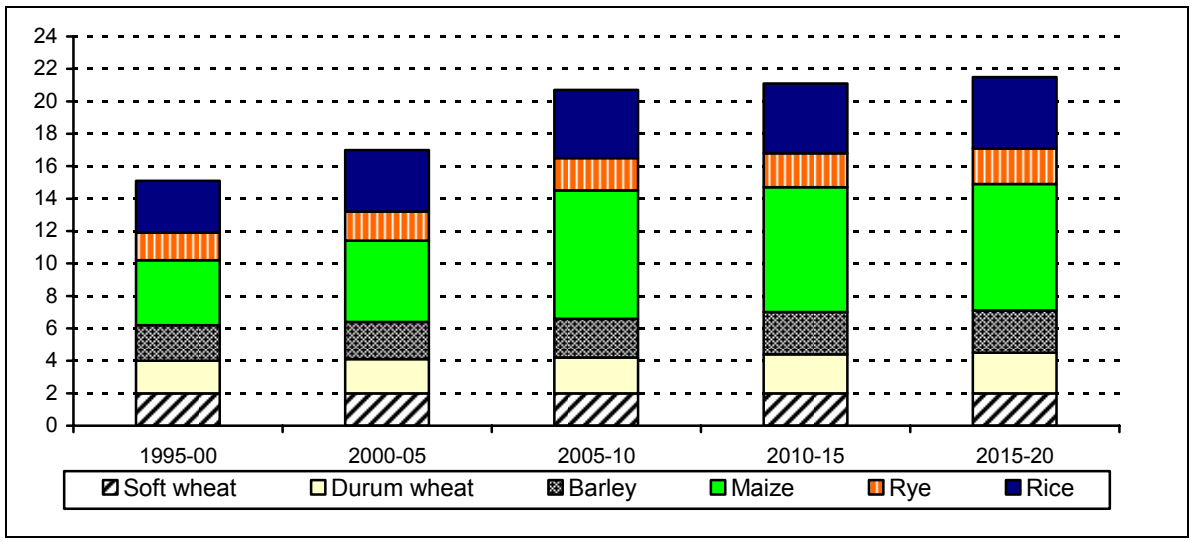


Figure 5.3 shows the historical and projected cereal yields per hectare in Turkey over the period 1995-2020. The yields per hectare for wheat and barley are limited as these commodities are mainly cultivated in dry areas with little irrigation possibilities. The expected growth in projected maize yields are higher than for wheat and barley due to the use of higher-yielding seed varieties and the cultivation of this crop on areas with better irrigation possibilities.

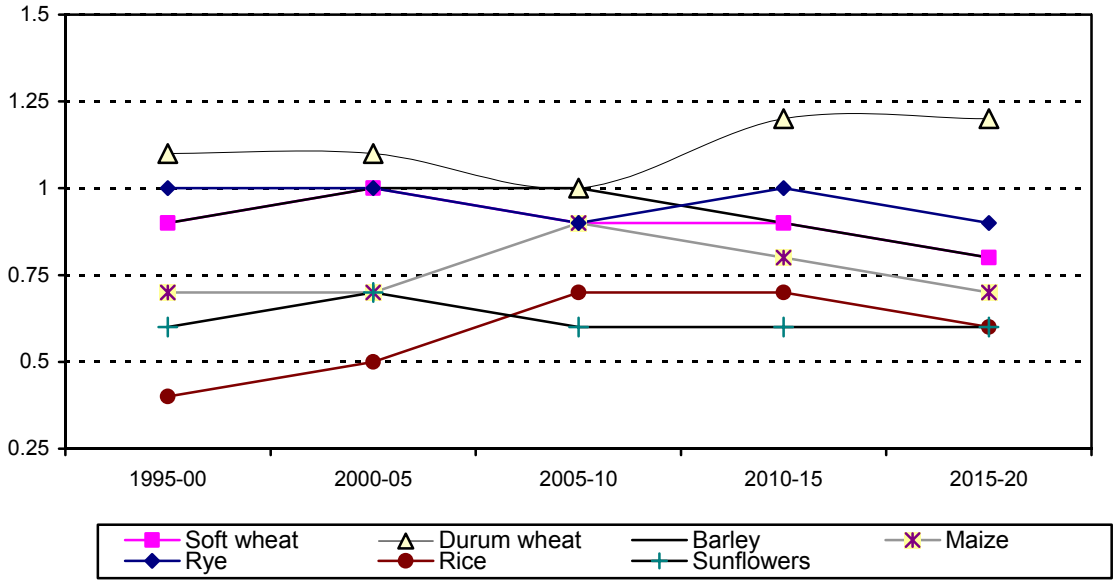
Figure 5.3: Cereal yields (tonnes/ha) in Turkey



Self-sufficiency rates

Except for durum wheat, Turkey is neither self-sufficient for cereals nor for sunflowers. About one third of the domestic demand for cereals is used to feed animals, whereas two third is used for human food consumption. By 2020, the per capita consumption of cereal products in Turkey is projected to be 378 kg per head, which is significantly higher than the use of 263 kg per head by EU27 inhabitants. This fits within the a priori expectation that poorer countries eat more bread than richer countries.

Figure 5.4: Self-sufficiency rates (indices) for cereals and sunflowers in Turkey



5.1.2 Other crops

Prices

Figure 5.5 presents historical and projected market prices for root crops, tobacco, cotton, vegetables and fruits on the Turkish, EU and the world markets The Turkish potato price is projected to remain higher than the EU price in the baseline due to tariff and non-tariff protection, but largely tracks to the EU key price projection. Over the baseline projection period, the gap between the Turkish and EU prices is projected to narrow due to the projected increase in the Turkish potatoes self-sufficiency rate.

Prior to 2005, the Turkish sugar beet price was above the world price, but it was still below the EU price. The EU sugar reform in 2005 is projected to result in significantly lower EU sugar prices over the baseline projection period. EU prices are projected to decline towards the slightly increasing world sugar prices. From 2005 onwards, the Turkish sugar price under the baseline is projected to remain above the EU price, while the projected gap between the Turkish and world price for sugar is not expected to narrow due to the largely stable Turkish sugar self sufficiency rate over the baseline projection period. Despite the quota regime in Turkey, the sugar quota is not fulfilled due to:

- the Turkish Sugar Factory and the Pankobirlik (Union of Cooperatives) allocate their total quota to regions in which their factories are located; quota renting is not allowed;
- the small scale size of arable farms;
- provision of alternative crops support in order to alleviate the impact of the reforms for sugar beets and tobacco (abolishment of support prices).

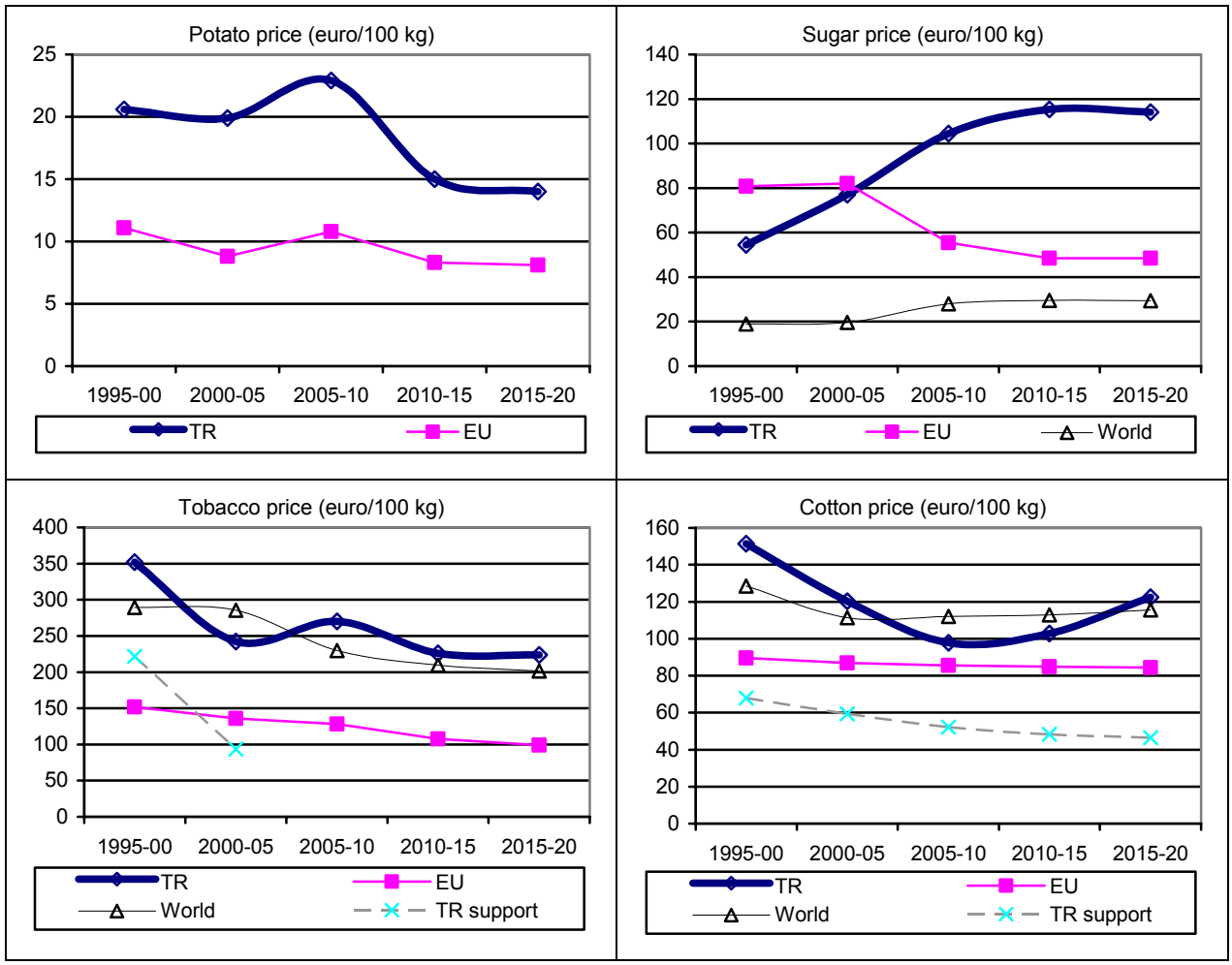
The Turkish tobacco producer price is determined by agreements between growers and tobacco processors and in general is projected to follow the path of the world market price for tobacco. The tobacco Turkish price (when measured in Euros) is projected to decline over the period to 2020 in particular due to the abolishment of the tobacco support price in 2002. The tobacco self-sufficiency rate for Turkey will increase as production is projected to remain stable while the demand is projected to decline on foot of heightened health concerns. Moreover, tobacco exports are expected to show a small increase.

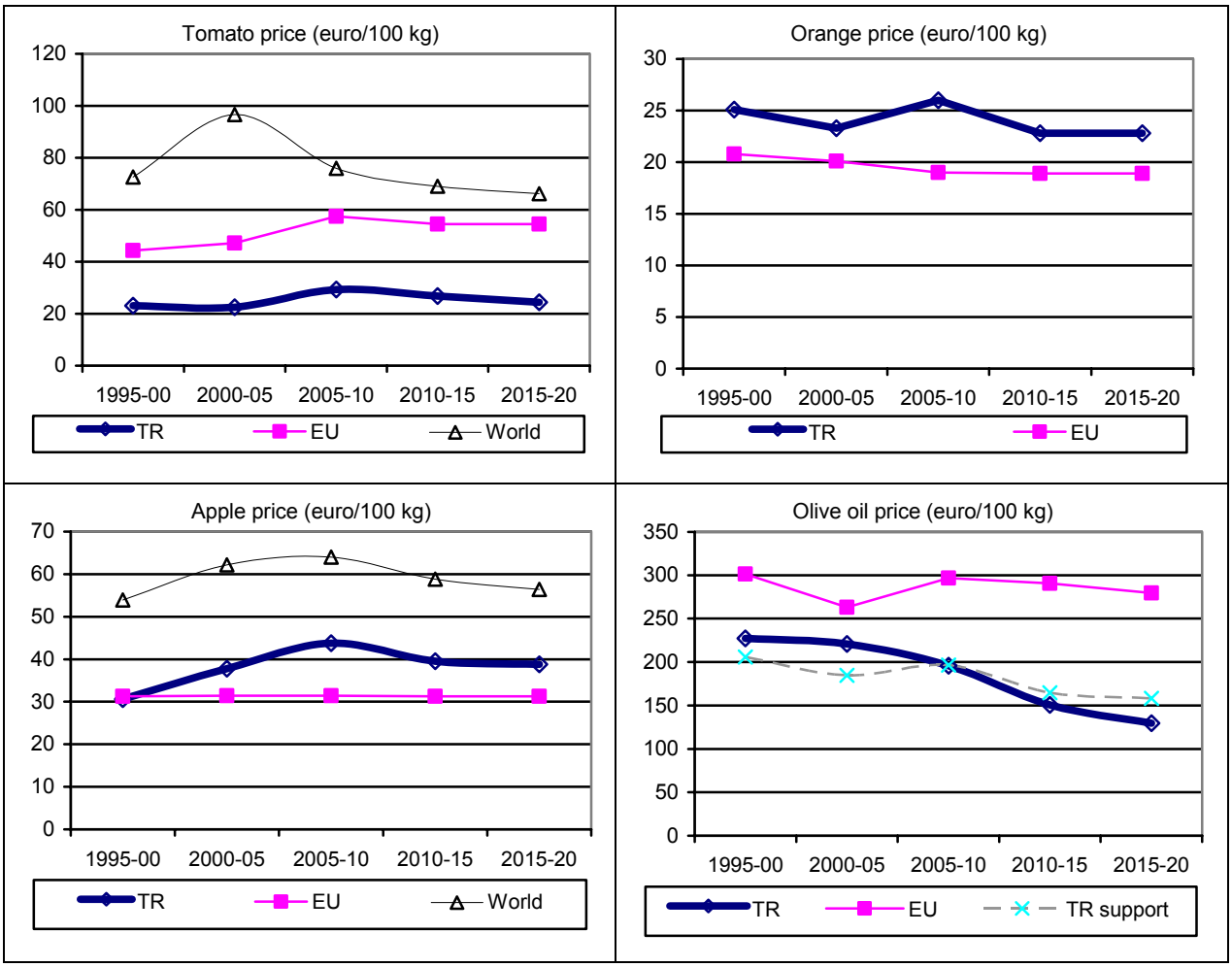
The Turkish cotton price in the baseline is projected to follow the projected movements on the lower world market price. Due to higher levels of tariff protection the Turkish price is

forecasted to remain significantly above the projected EU (Greek) key price. Over the first part of the projection period the gap between the Turkish price and the EU and world prices is projected to decrease, but will then increase. The combination of lower cotton prices and the relatively high growth of the real GDP in Turkey over the baseline projection period is expected to increase the demand for cotton, which will lead to a lower Turkish cotton self-sufficiency rate. This last factor has an upward effect on the domestic cotton price, which will smooth the rise of the demand for cotton from that moment onwards.

The projected baseline developments of Turkish tomato and apple prices are a function of expected developments in world market prices for these products and the level of import tariffs levied by Turkey. Increasing self-sufficiency rates negatively affect the Turkish price level. Under the baseline the Turkish tomato and olive oil prices are projected to remain at a lower level than the EU tomato and olive oil prices, due to significant production growths, low labour costs and quality differences. Also, the EU border measures maintained by the EU prevent price convergences. The Turkish orange price is projected to remain above the EU price under the baseline due to Turkish import tariffs and export supports.

Figure 5.5: Root crops, tobacco, cotton, vegetables and fruit prices (Euro/100 kg) in Turkey, EU and the world





Areas and yields per hectare

Figures 5.6 and 5.7 present the historical and projected development of area harvested and yields per hectare in Turkey over the period 1995-2020 for root crops, tobacco and cotton. The area devoted to the cultivation of root crops declined over the period 1995 to 2007. Under the baseline this area is projected to increase slightly due to the relatively higher support premiums for potatoes (introduced in 2008, see Table 4.3) as compared to alternative crops.

Figure 5.6: Root crops, tobacco and cotton areas (1,000 ha) in Turkey

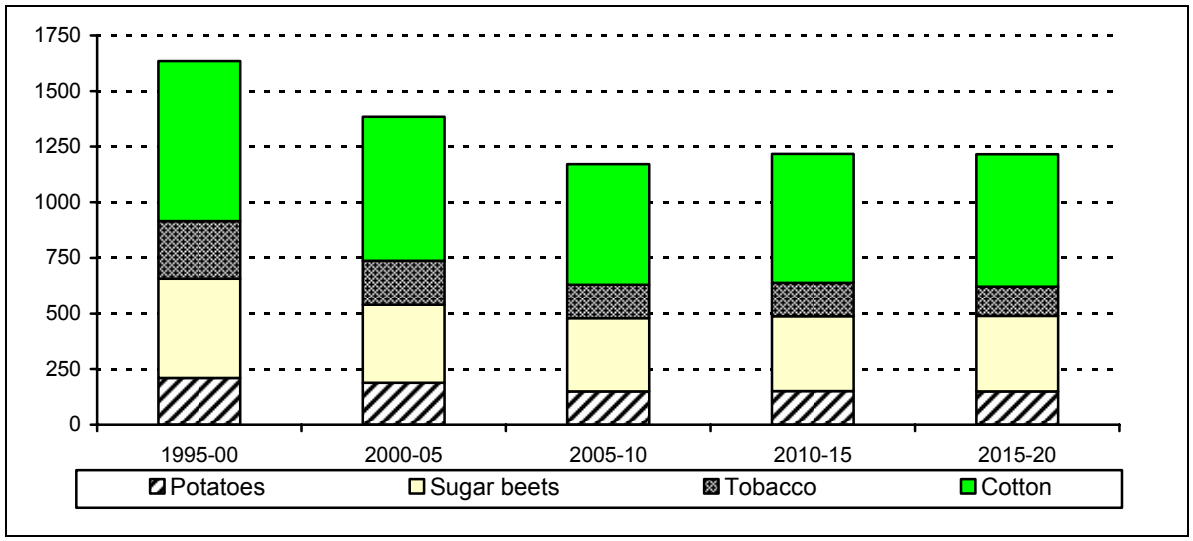
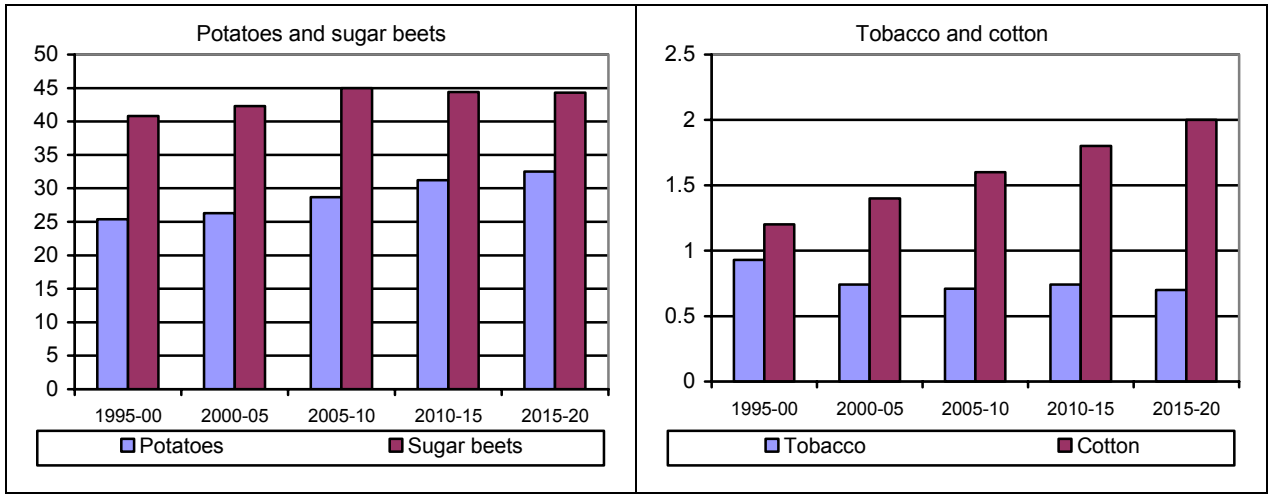


Figure 5.7: Root crops, tobacco and cotton yields per hectare (tonne/ha) in Turkey



Under the baseline, area is projected to switch from tobacco area to cotton area. This switch is expected to occur because under the baseline the support for cotton is relatively high compared to support granted to tobacco or other crops cultivated in dry areas. Under the baseline, Turkish tobacco yields are projected to remain stable after 2000, whereas those for cotton are projected to increase due to technical improvements and the provision of coupled support payments such as certified seed support and premium payments.

Figures 5.8 and 5.9 present historical and baseline projections of area harvested and yields per hectare for fruits and vegetables in Turkey over the period 1995-2020. Tomato and apple areas harvested are projected to increase due to recently introduced support premiums, such as sap supports and subsidized credits for organic farming. Yields for apples and tomatoes are projected to only increase slightly due to small farm sizes and high interest rates for agricultural credits. These factors limit the opportunities to modernize farm production systems.

The olive and orange yields under the baseline are projected to increase. New orange and olive plantation has recently been added, and this will also ensure that recent growth development in yields can be expected to continue over the baseline projection period.

Figure 5.8: Fruits and vegetables areas (1,000 ha) in Turkey

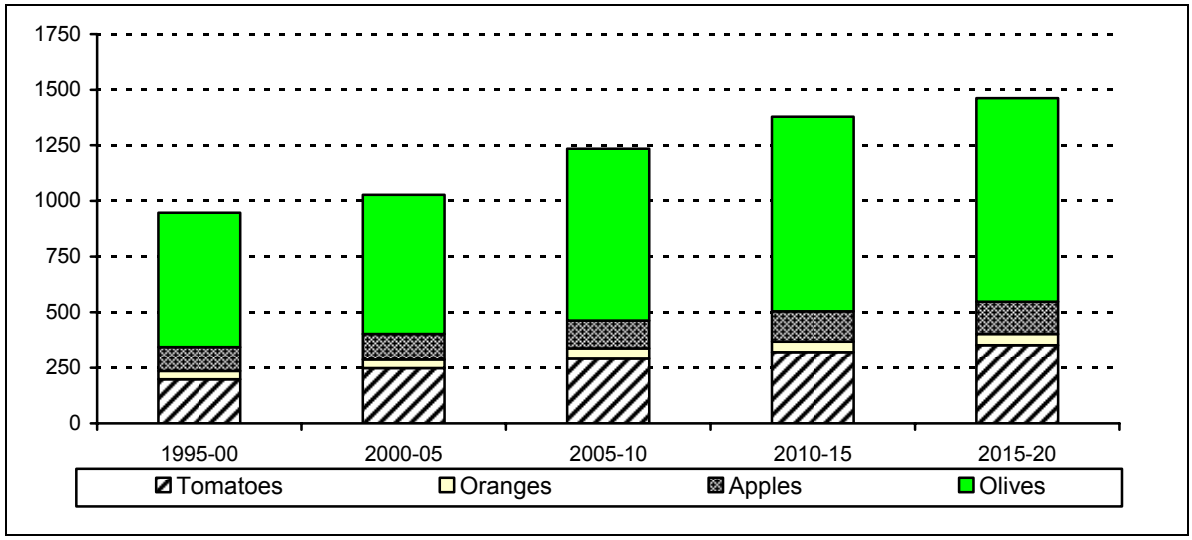
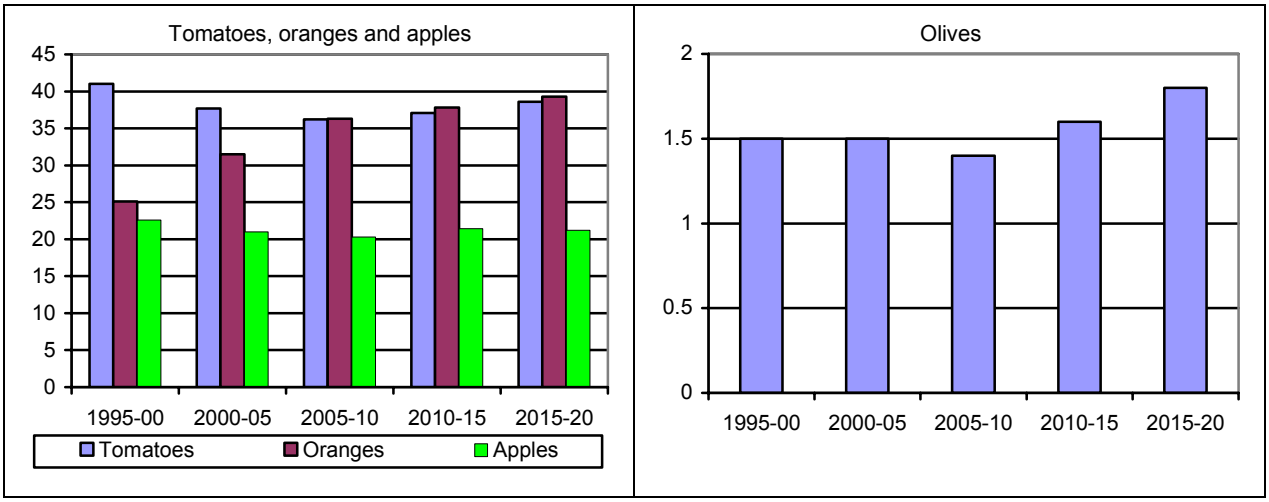


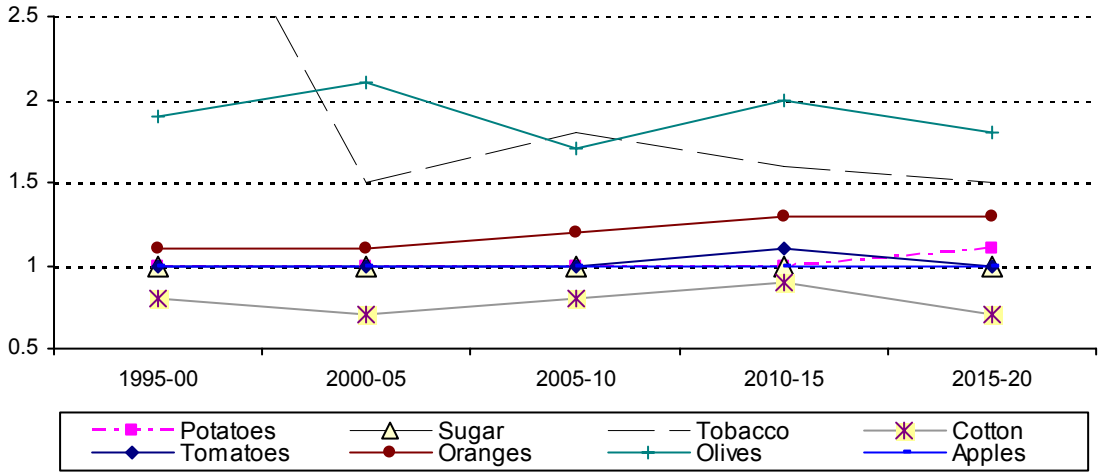
Figure 5.9: Fruits and vegetables yields per hectare (tonne/ha) in Turkey



Self-sufficiency rates

Figure 5.10 shows that with the exception of cotton, Turkey is self-sufficient in root crops, tobacco, fruits and vegetables. The projected increase in the self-sufficiency rate for potatoes in Turkey under the baseline is due to decreasing human consumption per head over the projected period (potatoes are an inferior good), whereas the production of potatoes will be strongly encouraged through the provision of policy support.

Figure 5.10: Self-sufficiency rates (index) for root crops, tobacco, cotton, fruits and vegetables in Turkey



5.1.3 Livestock and meat

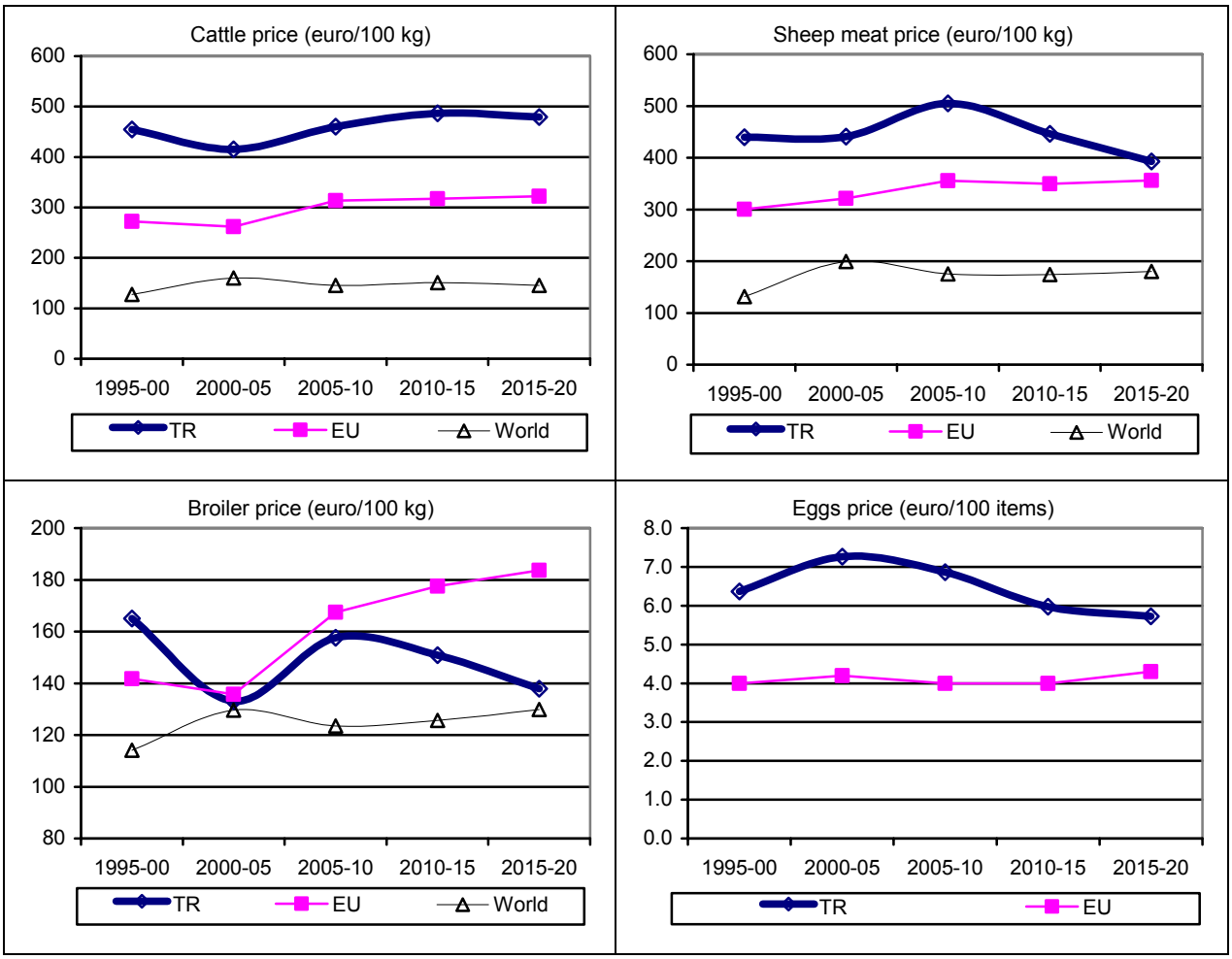
In the past, Turkey has been self-sufficient in most animal products. This reflects the impact of Turkish agricultural policy as self-sufficiency was seen as an important objective. The major animal products in Turkey are cow milk, broiler meat, eggs, beef and veal, lamb, mutton and goat meat. Based on religious and cultural preferences the demand of pig meat is negligible in Turkey. Consequently, Turkish pork production is nearly zero. When compared to the case of arable crops, the structure of public policy support to the livestock sectors is less

complicated. In most cases, there are no support prices implemented and coupled premiums are only applied to beef, dairy, and sheep and goats. All animal product markets are protected from the world markets by high tariffs. Furthermore, Turkey maintains a ban on the import of most live animals and animal products. Additionally, support is provided by granting export subsidies to broiler and eggs, but the level of export subsidy support has been fixed in real terms as part of Turkey's commitments as a WTO member. When compared to the EU, feeding costs are higher due to the higher level of grain and oilseed prices in Turkey and these higher production costs in part offset the positive production effects of higher market prices for meat and dairy products.

Prices

Under the baseline, Turkish beef, sheep meat and eggs are significantly above the respective EU prices due to the high levels of tariff and non-tariff protection provided to Turkish livestock farmers. In contrast, Turkish broiler prices are projected to remain below the EU prices for the projection period. The expansion of broiler production is driven largely by considerable gains in efficiency due to vertically integrated broiler systems of farms and industries.

Figure 5.11: Meat and egg prices (Euro/100 kg) in Turkey, EU and the world

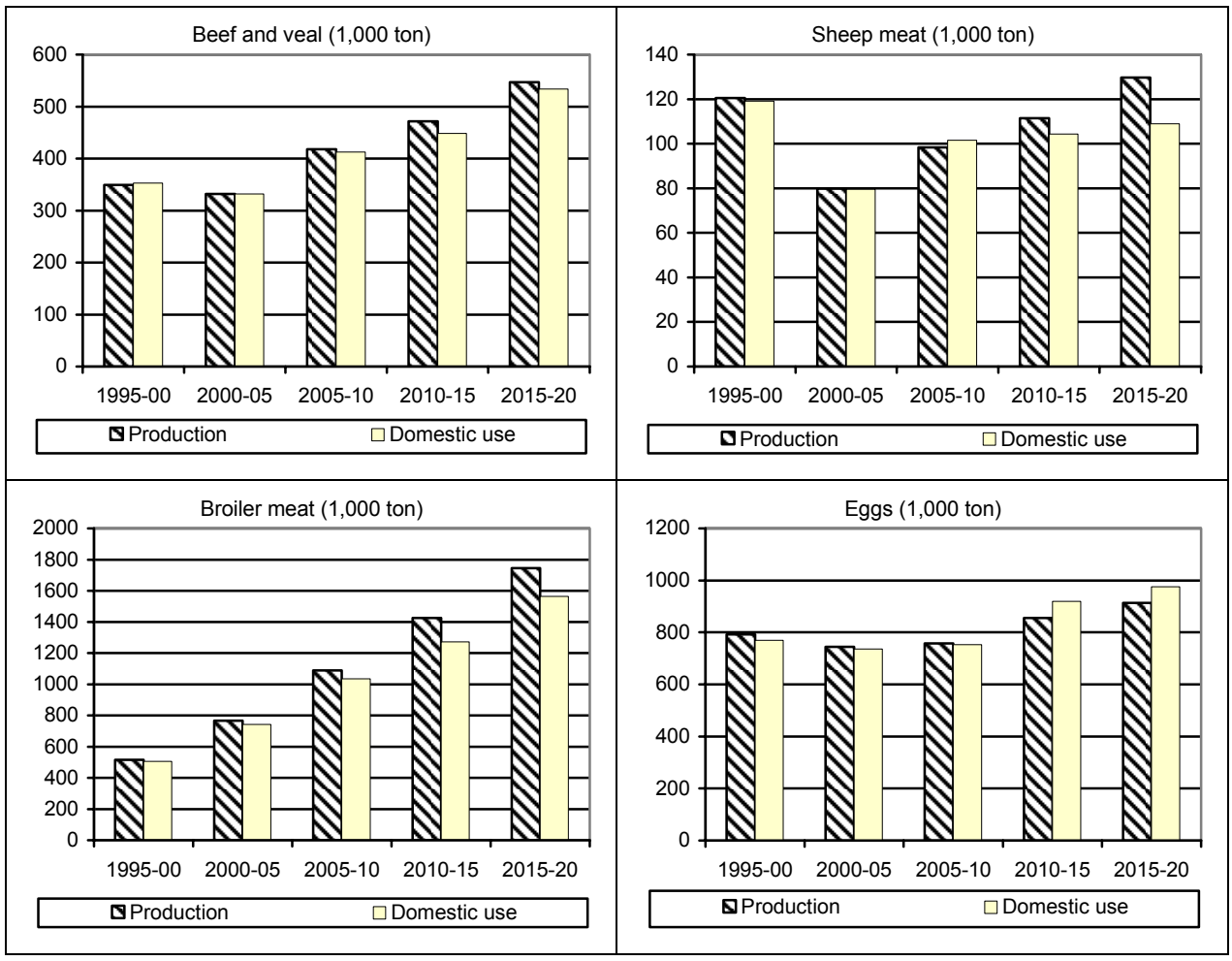


Self-sufficiency rates and consumption per head

In terms of output shares, poultry and eggs are ranked second and third among animal products in 2008. Under the baseline, Turkish broiler consumption and production are

projected to grow considerably (see Figure 5.12); the broiler status as Turkey's favourite meat continues to be supported by projected low prices relative to other meat products. Despite a 3% annual increase of the broiler consumption per capita, current broiler consumption in Turkey is less than the EU average. Under the baseline, Turkish prices are projected to be above world market prices, but to decline over time towards the world price level. Turkish broiler production is characterized by large and partly international firms, which are vertically integrated. Low labour prices have supported the expansion in broiler production, though high inflation rates and growth in input costs (feed most importantly) will limit the growth of production. Under the baseline, the real value of export subsidies expenditure is kept constant in US-dollar terms, so that over the projection period they do not provide any additional incentive to increase production. Over the baseline projection period production and consumption per head growth are expected to be over 2% and 2.5% per year respectively. The strong growth in per capita consumption is driven by the per capita income growth and the favourable price position of boiler meat relative to the price of sheep meat and beef.

Figure 5.12: Production and domestic use of meat and eggs (1,000 ton) in Turkey



The Turkish egg sector is in some ways similar to the Turkish broiler sector in that it is relatively concentrated. However, despite increasing concentration in large integrated companies, egg production is still common in subsistence agriculture as well. As a world market price for eggs is unavailable, the Turkish egg sector has been linked to the Turkish broiler sector in the Turkish AGMEMOD model. Such an approach, however, has consequences for the simulation analysis under the baseline as the evolution of the broiler sector determines the baseline development of the simulated Turkish egg market situation.

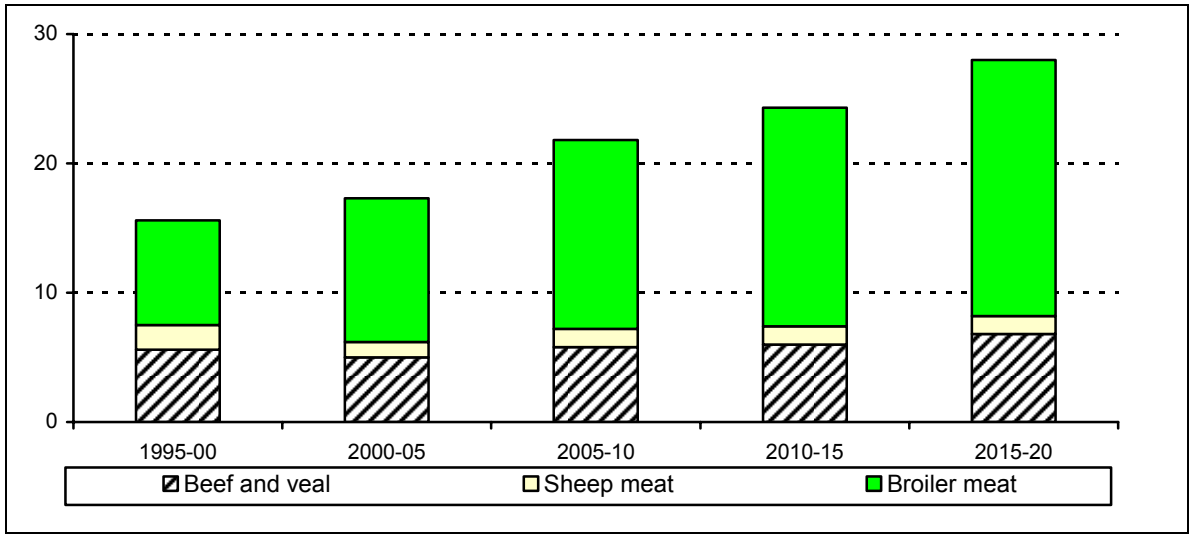
Under the baseline egg prices, when expressed in Turkish Lira, are projected to increase. Historically, sharp increases in the price of eggs have limited the scope for consumption increases, although the underlying growth in income has generated positive demand growth. Under the baseline, the projected increase in the egg consumption per capita is quite moderate with an annual growth of 1.2% during the studied period, while Turkish egg production is projected to increase less due to expected higher feed costs.

The production of beef, and sheep and goats in Turkey is much more dispersed than the production of poultry meat or eggs. The Turkish beef production is based on dual purpose cattle, with milk being the dominant output. According to the official Turkish statistics, the production of beef and veal, and lamb and mutton was around 380 thousand tonnes and 90 thousand tonnes respectively over the 2004-2008 period. As current statistics are thought not to reflect a realistic picture of red meat markets, the Turkish Statistical Institute and external experts are working together on improving Turkey's animal inventory and meat production statistics. When new data become available (to be expected in 2011), it is likely that a revision of the AGMEMOD model data and parameter estimates will be required. Importantly, Turkish meat markets are afforded significant non-tariff protection in addition to the high levels of tariff protection they enjoy. Most agricultural exports of the EU and other third countries to Turkey are subject to restrictive import quotas (tariff rate quotas) and Turkey has imposed a ban on the imports of live animals and certain animal products for public health reasons. Highly dispersed production, low yields and semi-subsistence farming production systems hamper the emergence of growth in the beef sector. These production characteristics and the high levels of tariff and non-tariff protection of Turkish red meat markets are reflected in the high domestic prices for beef and sheep meat in Turkey. Under the baseline, the Turkish beef production will be largely driven by a growth in Turkish milk production. Moreover, Turkish beef production and domestic use are projected to grow at similar rates and the Turkish self-sufficiency rate is projected to be close to one for the entire projection period. This internal market balance and the baseline assumptions of no change in domestic and trade policies limit the scope for real price changes.

Until the 1990s, Turkey was an important supplier of live sheep, lamb and mutton to the Middle East. Since then, however, this position has been eroded due to increased competition from Australian producers. The Turkish sheep meat sector is largely cut off from outside influence by the very high tariff and non-tariff barriers. Also, domestic factors including the provision of coupled premiums under the baseline, dominate the determination of prices and sheep meat supply and use balances in Turkey. Turkish domestic prices currently exceed world and EU market prices and under the baseline this is projected to continue when expressed in Turkish Lira. As a comparable EU price the Greek price is used instead of the Irish key price, because it reflects a product (light lamb) which is more common in the Turkish sheep meat sector than the heavy lamb product that characterises northern European sheep meat production. Turkish sheep meat consumption per head and total consumption of sheep meat are projected to grow only slowly over the projection period, and the sheep meat share of total Turkish meat consumption is projected to decline under the baseline. Under the baseline the supply of sheep meat is expected to grow and thus the Turkish self-sufficiency rate is projected to increase. Most of the growth in production is projected to arise because of growth in sheep numbers.

A comparison of the baseline projections for Turkey's self-sufficiency rates for beef and veal, sheep meat and broiler meat illustrates that they are projected to remain close to one. The main drivers of domestic use of meat are population growth and per capita consumption growth. The decline that is projected under the baseline in the price of broiler meat relative to beef and sheep meat contributes to the strong growth in the per capita demand for that meat (see Figure 5.13).

Figure 5.13: Meat consumption per head (kg) in Turkey



5.1.4 Milk and dairy products

Total Turkish milk production has reached up to 12 million tonnes during recent years, with cow milk accounting for approximately 90% of overall milk production, whereas the other 10% being a mix of goat milk and sheep milk. There are special dairy products made from goat and sheep milk, such as cheese and ice cream. The demand for these products has been growing due to price advantages for sheep and goat milk above cow milk.

Production statistics on the Turkish dairy sector have undergone several revisions. These revisions and the associated breaks in the data make the estimation of reliable models for the Turkish dairy sector challenging. Official supply and use balances for milk and milk products are either inconsistent or for some years even unavailable. Turkish milk production, according to official statistics, has grown considerably since 2000. However, it is unclear whether a real expansion of milk production has taken place or whether it is only that the share of milk going into processing had been growing. The increased direct payment supports over this period to dairy farmers should also be considered.

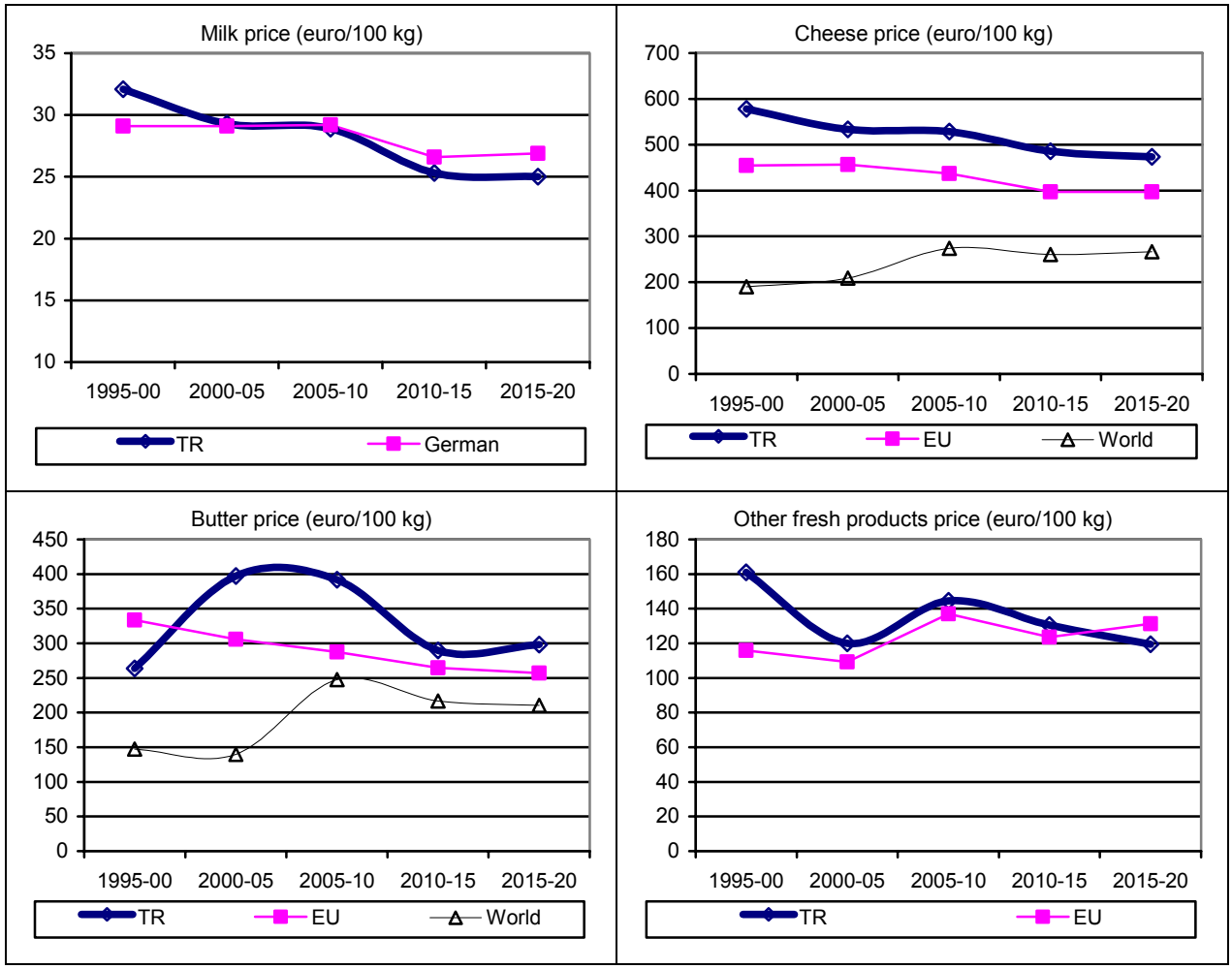
Like the other cattle farms, Turkish dairy farms are characterised by low productivity with low marketing ratios for food products in particular (Turkish Statistical Institute, 2004). Compared to the EU, feeding costs are higher due to higher grain and oilseed prices. Tariffs on milk and cheese are applied to protect the Turkish dairy sector. Further support to producers has comprised coupled premiums for milk and coupled beef production premiums. Due to the production structure and associated high costs, as well as the high levels of tariff and non-tariff protection, Turkish prices of raw milk and processed dairy products have exceeded EU and world market price levels. The main dairy commodities produced in Turkey are a variety of fresh dairy products and cheese.

Under the baseline, Turkish milk production is projected to increase. However, the rate of growth is projected to be lower than the recent rates of growth reported in the official data. The slower growth arises from the absence of increased real producer milk prices and the absence of additional coupled support to dairy production. It is expected that the current economic crises will somewhat limit the scope for increases in the consumption of dairy products over the short run. As in EU Member States, the on-farm use of milk in Turkey is projected to decline; this development reflects the probable reduction in the number of dairy farms and also declines of on-farm feed, food use and direct sales that arise as a consequence of more stringent hygienic regulations. As a result, under the baseline, the factory use of milk in Turkey is expected to increase over the projection period.

Prices

Figure 5.14 presents amongst others the historical and projected market prices for cheese and butter on the Turkish, EU and world markets. Turkish dairy prices are, under the baseline, significantly higher than EU prices, but there is a downward tendency over time. This projected development has been caused by the increasing rate of Turkish self-sufficiency in these products and also by the declining average unit costs of production that arise from yield growth and the provision of fodder crops supports.

Figure 5.14: Milk and dairy product prices (Euro/100 kg) in Turkey, EU and the world

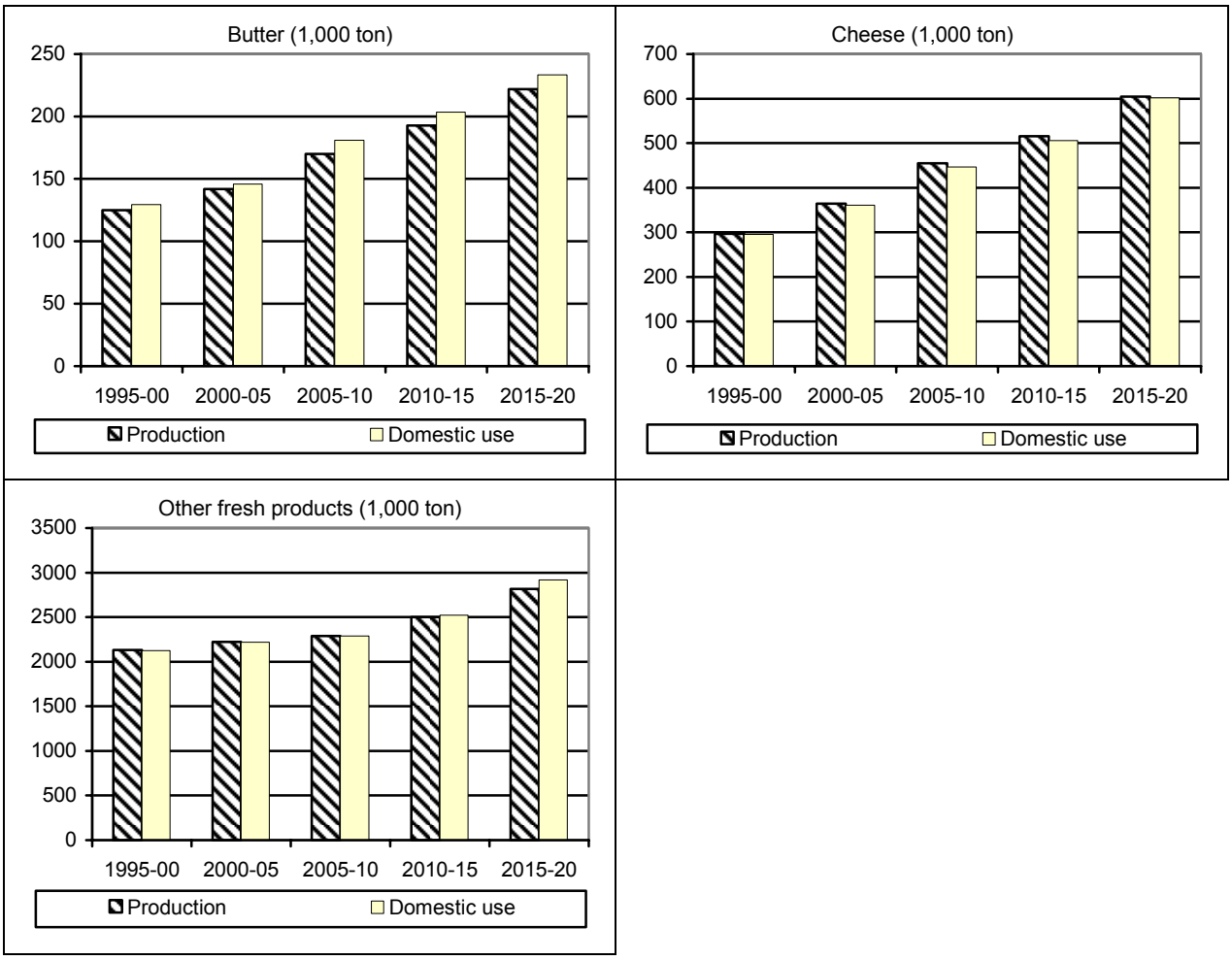


Self-sufficiency rates and consumption per head

In contrast to the milk production, which has been supported by coupled premiums, support prices for dairy products are not a feature of Turkish agriculture policy. In general, Turkish dairy product markets are driven by domestic Turkish market forces, while the market for cheese is isolated from imports by tariffs. Cheese demand in Turkey has grown considerably in recent times, although consumption of all dairy products is projected to grow under the baseline. Fresh product trade is less affected by foreign competition because of perishable issues and local preferences. These fresh products represent the most important dairy consumption item. Under the baseline the increase in the consumption of butter is quite high, however this growth is from a low base. This and other growth in the per capita consumption of dairy products is driven by the medium term recovery of the economic growth and by a decline in the real prices for dairy commodities. In the case of butter, the projected increase in butter production under the baseline outpaces projected growth in consumption over the

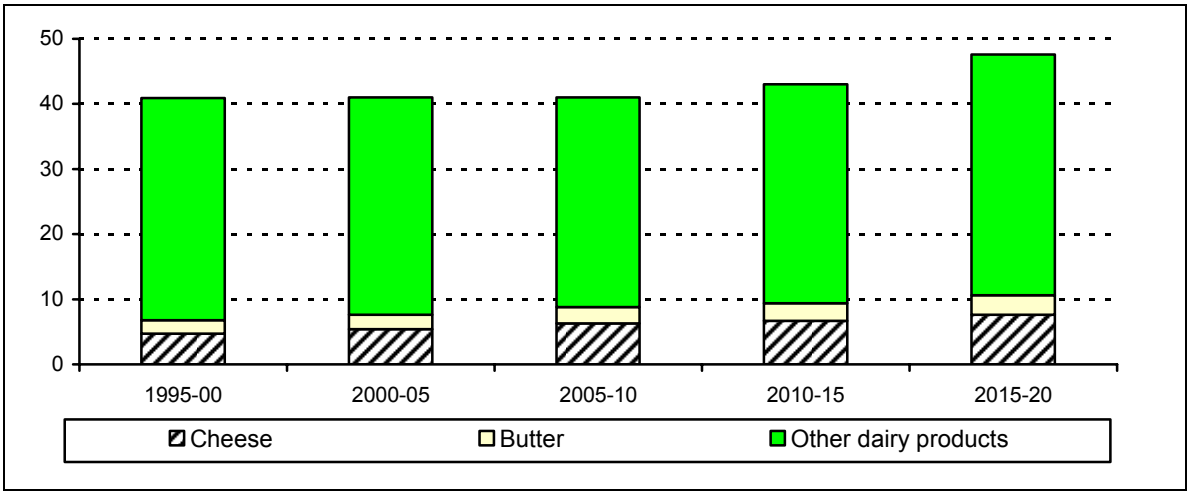
baseline period. Figure 5.15 presents the development of production and domestic use of dairy products. Self-sufficiency rates for cheese, butter and other dairy products in Turkey are projected to remain close to one in the baseline period.

Figure 5.15: Production and domestic use of dairy products (1,000 ton) in Turkey



It is expected that the consumption per head of dairy products will increase in the projected period due to higher real incomes per head (Figure 5.16). Consumption of other dairy products gains mostly from the higher welfare and outweighs the production growth.

Figure 5.16: Consumption per head of dairy products (kg) in Turkey



5.2 EU and its Member States

The assumptions on macroeconomic development, world prices for agricultural commodities and agricultural policy underlying the baseline are described in chapter 4. These data have also been used in the generation of projections under the accession scenario, the results of which are presented in chapter 6. The baseline results at the EU level are presented in separate sub-sections for cereals and oilseeds, other crops, livestock and meat, milk and dairy products. The results for the EU show different geographic levels: in the period 1995-2003 the EU consists of 15 Member States (EU15), whereas in the period 2004-2006 the EU covers 25 Member States (EU25) and finally in the period 2007-2020 the EU represents 27 countries (EU27). Detailed results at the Member State level for crops (CropsOutlook-Baseline) and animal products (LivestockDairy-Baseline) are available on the AGMEMOD website.

5.2.1 Grains and oilseeds

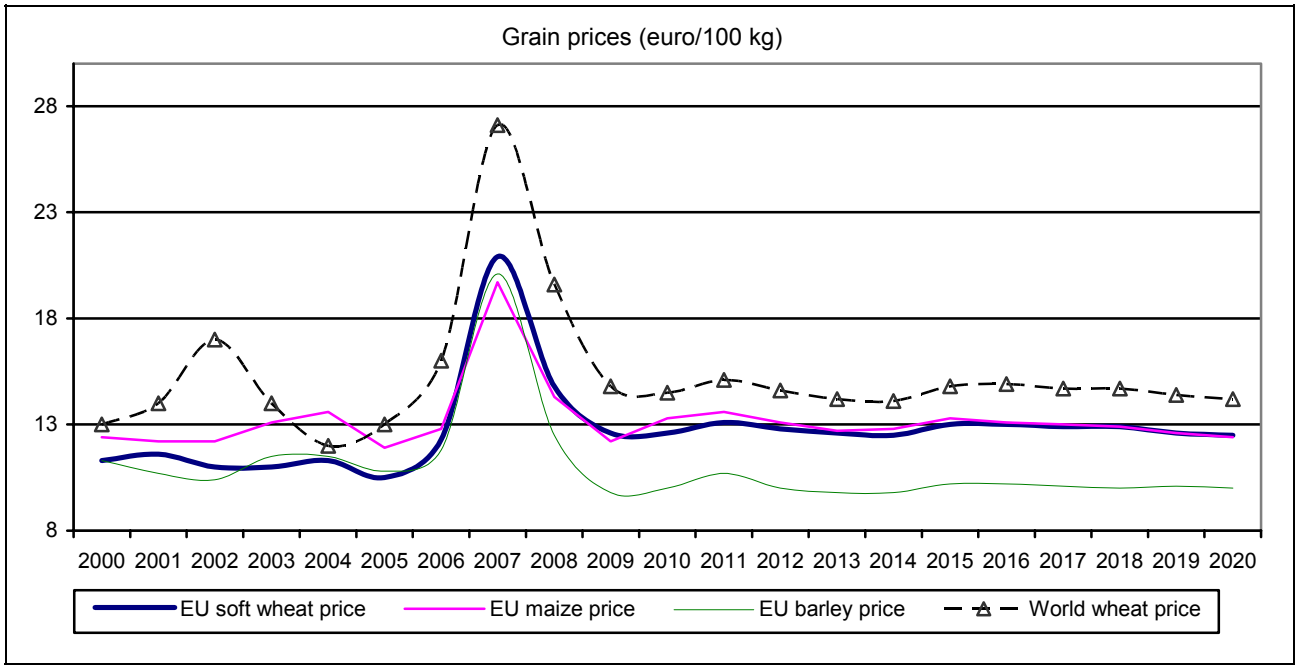
Prices

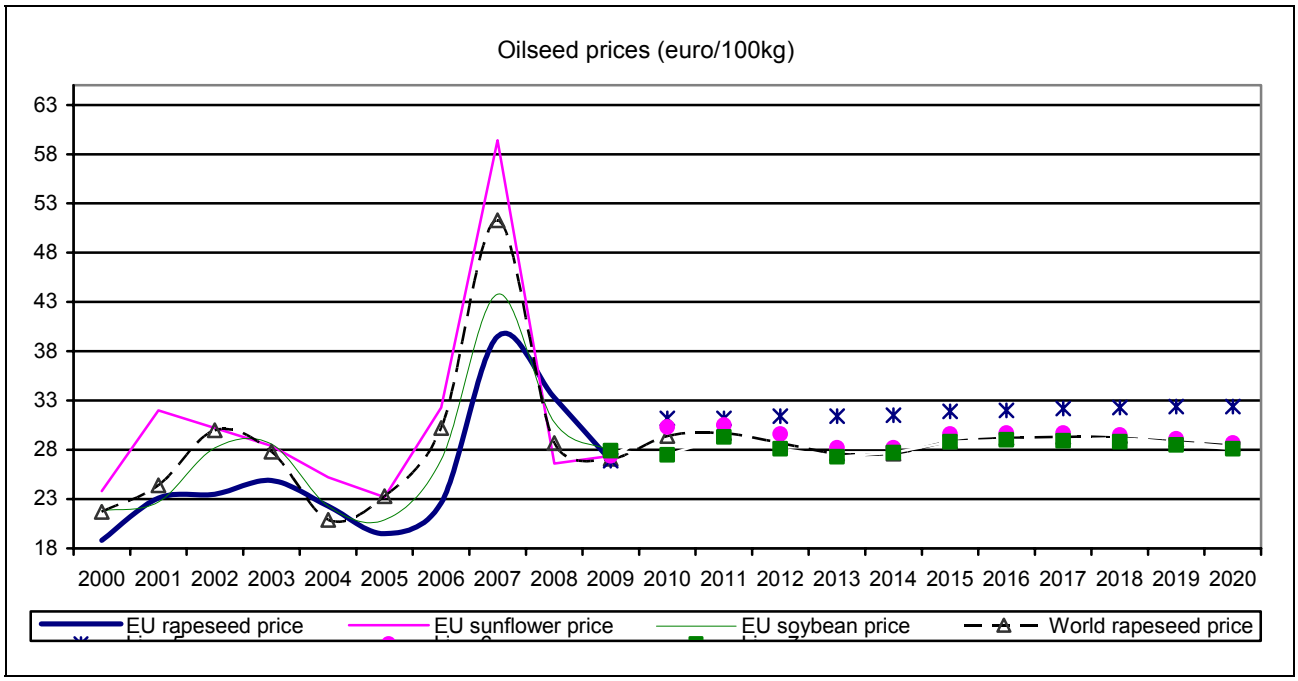
Figure 5.17 presents the development of EU and world grain and oilseed prices in the baseline. Grain and oilseed prices (expressed in Euros) are projected to remain stable after declining from the price spike that occurred in 2007/08. However, during the projection period:

- wheat, maize and oilseed prices remain at a higher level than before the price peaks;
- barley prices remain lower than before the price peak;
- demand for biofuel and the new intervention system affect price relations.

The simulated gap between barley on the one hand and wheat and maize on the other hand has also been observed on the actual markets.

Figure 5.17: EU and world market prices (Euro/100 kg) in baseline, 2000-2020

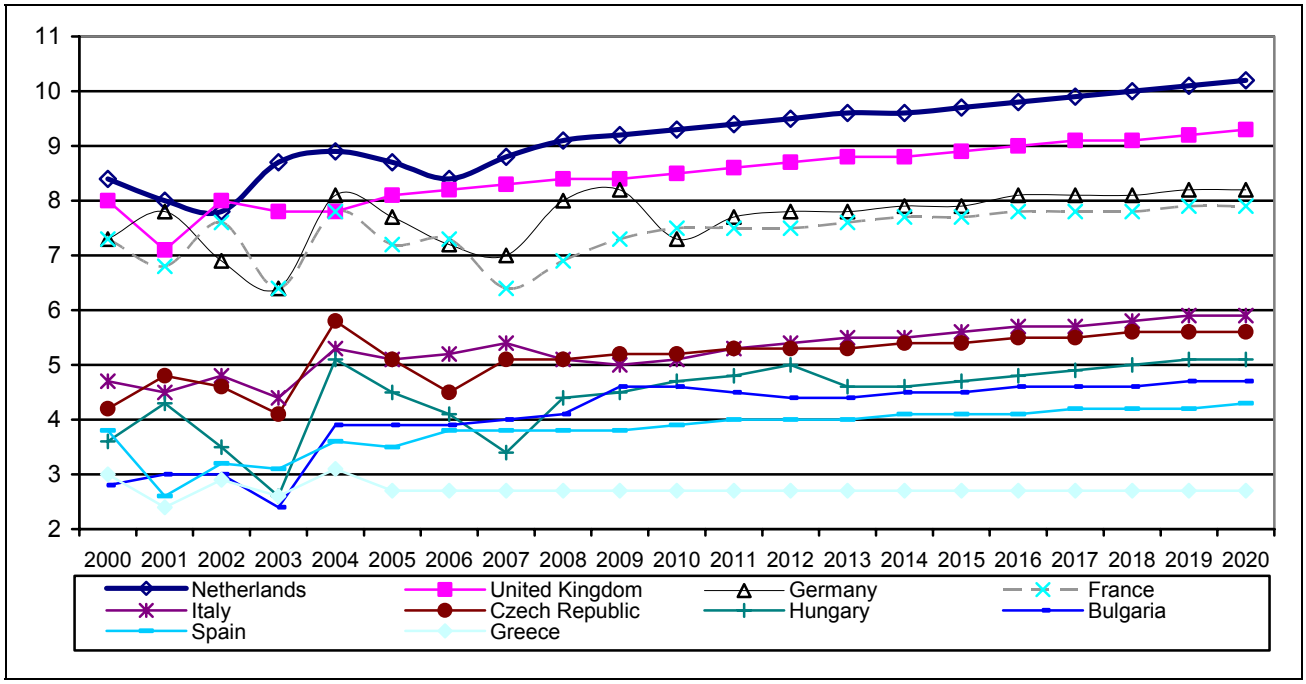




Production and domestic use

In the baseline the total cereals area harvested in the EU is projected to decrease from 61 million hectares in 2000 to 57.8 million hectares in 2020. However, across the cereal types there is a substitution from the area harvested of barley, rye and oats towards area harvested of soft wheat and maize over the period to 2020. Despite the projected reduction in the total cereals area harvested, total EU cereals production is projected to increase gradually as a result of projected increased productivity per hectare (yields). Figure 5.18 shows the projected development of the soft wheat yields per hectare under the baseline in a selected number of EU country groups and Member States.

Figure 5.18: Soft wheat yields in selected EU Member States (tonnes/ha), 2000-2020



Figures 5.19 to 5.21 present the medium-term baseline outlook for EU soft wheat, barley and maize markets. EU soft wheat and maize productions are projected to grow over the baseline period 2008-2020 by about 1% per annum due to the higher prices that occur as a result of the assumed fulfilment of the EU biofuel directive. The removal of the barley intervention price from 2009 onwards contributes to a projected decline in EU barley production of 0.2% by 2020.

The domestic use of soft wheat and maize in the EU is projected to grow at a slightly higher rate than the EU production due to the assumed additional biofuel demand. EU net exports are projected to decrease as increasing demand for bio-ethanol production leads to reduced availability of wheat supplies for export and increased net imports of maize.

Figure 5.19: Soft wheat production and domestic use (million tonnes) in EU15, EU25 and EU27, 2000-2020

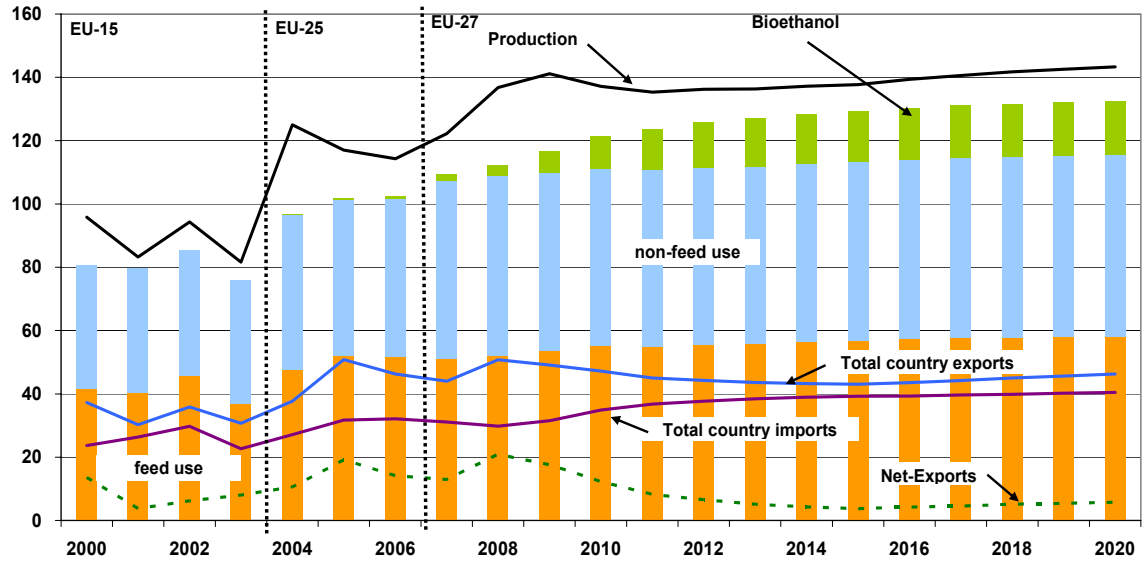


Figure 5.20: Barley production and domestic use (million tonnes) in EU15, EU25 and EU27, 2000-2020

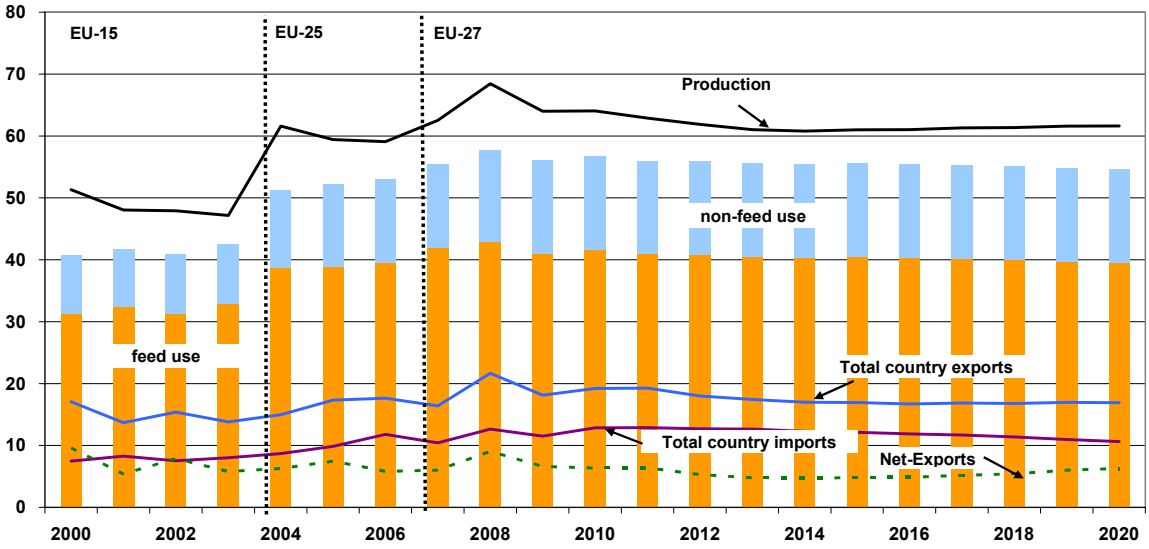
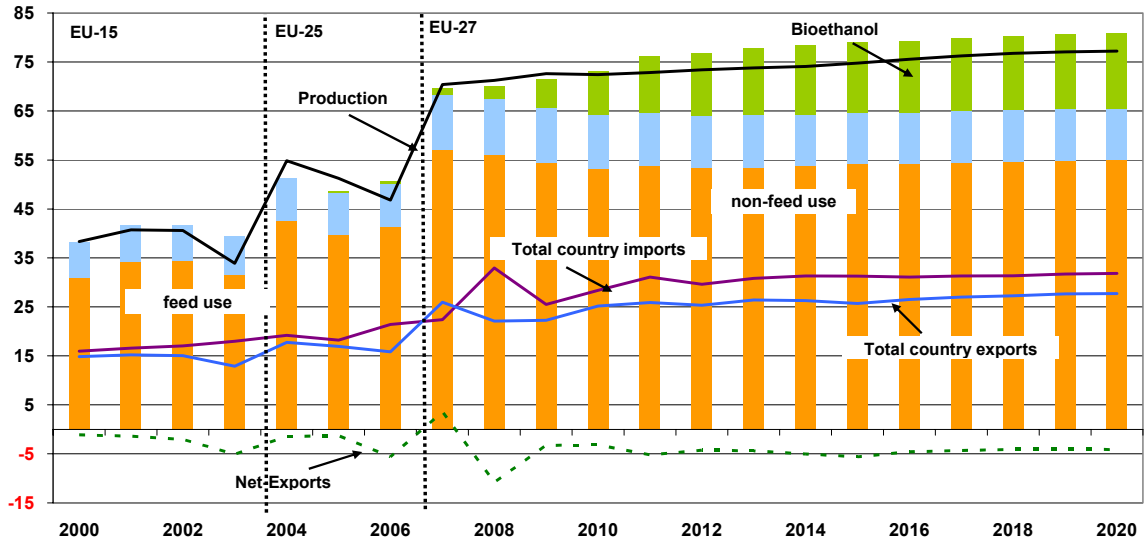


Figure 5.21: Maize production and domestic use (million tonnes) in EU15, EU25 and EU27, 2000-2020



Under the baseline the total oilseeds area harvested in the EU27 is projected to expand by 0.3% per year. This strong demand growth is due the higher demand for biodiesel. EU oilseeds production is projected to increase by 1.4% per year. Figures 5.22 and 5.23 present the medium-term baseline outlook for the rapeseed and rape oil markets in the EU. The significantly increased domestic use of rapeseed and rape oil is leading to a growing EU net import position. To fulfil the biofuel directive, the EU Member States are expected to become more dependent on rape oil imports. The growth of rapeseed meal produced in crushing the seeds for biodiesel feed stocks is allocated to the animal sector induced by lower feed meal prices.

Figure 5.22: Rapeseed production and domestic use (million tonnes) in EU15, EU25 and EU27, 2000-2020

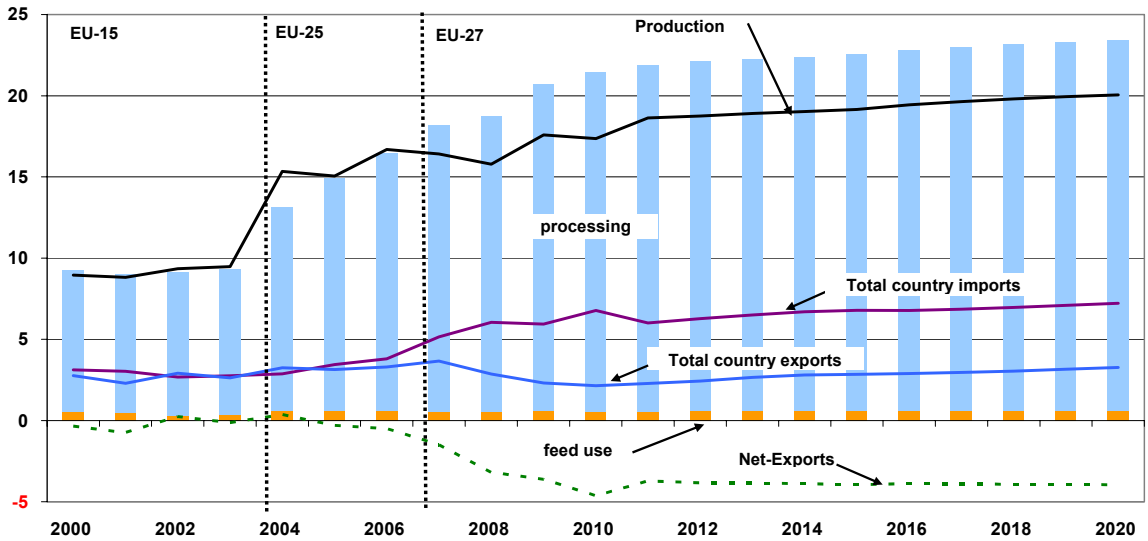
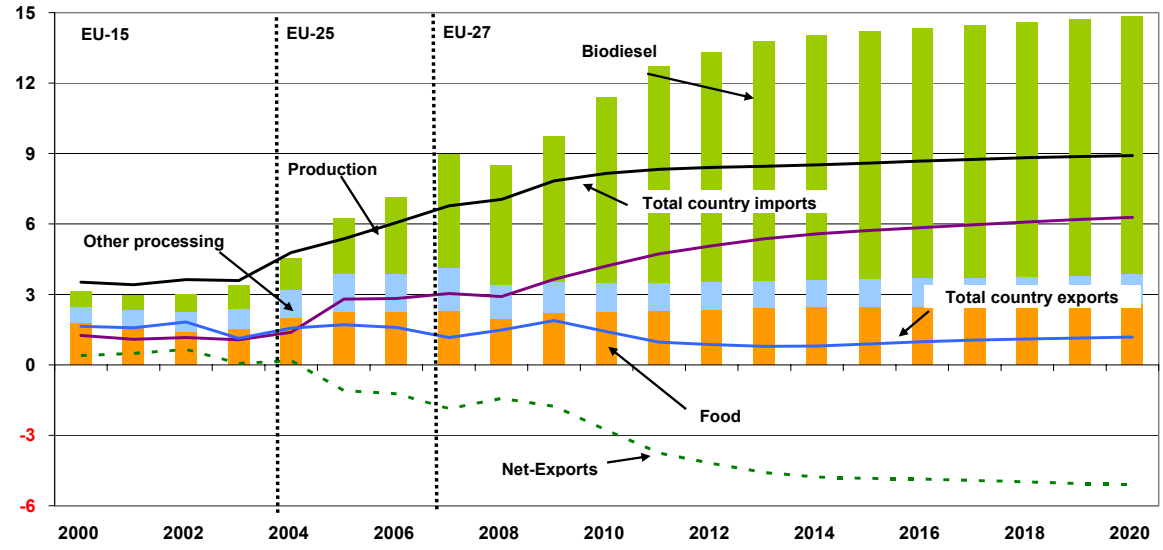


Figure 5.23: Rape oil production and domestic use (million tonnes) in EU15, EU25 and EU27, 2000-2020

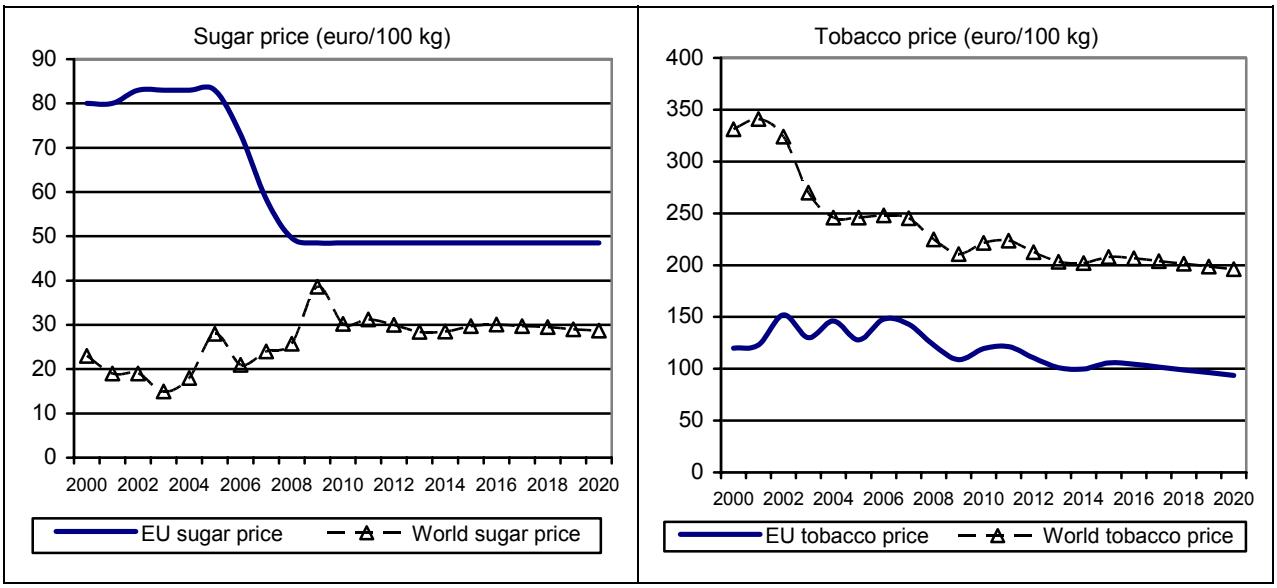


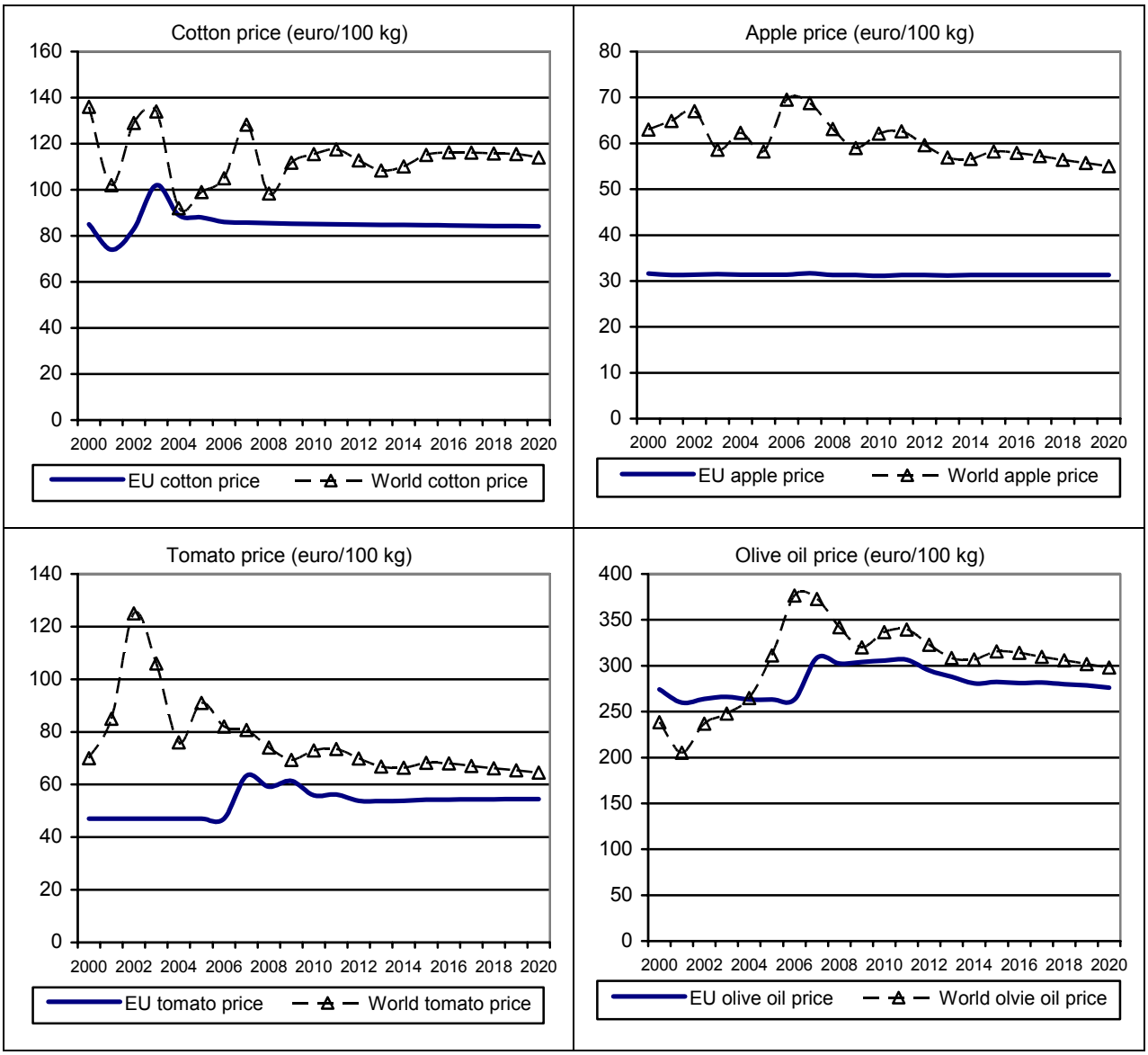
5.2.2 Other crops

Prices

Figure 5.24 shows the projected development of EU and world prices for some other selected crops under the baseline. The EU sugar reform in 2005 is projected to result in significantly lower EU sugar prices over the baseline projection period, however the EU sugar prices are projected to remain above the world market price. The prices of the other crops depicted are expected to remain stable and below their respective world market prices under the baseline.

Figure 5.24: EU and world prices (Euro/100 kg) in baseline, 2000-2020





Production and domestic use

In the baseline, the total area of root crops harvested in the EU is projected to decrease by 0.7% per annum to 4 million hectares in 2020. The EU27 area of tobacco and cotton harvested is expected to fall to about 600 thousand hectares in 2020, which means a decrease by 0.6% per annum in the period 2008 to 2020. The area in the EU27 that is cultivated with apples, tomatoes, oranges and olives is expected to stabilize at 5.8 million hectares over the same period. Figures 5.25 to 5.31 present the medium-term baseline outlook for potato, sugar, cotton, tobacco, apple and tomato markets in the EU.

Figure 5.25: Potato production and domestic use (million tonnes) in EU15, EU25 and EU27, 2000-2020

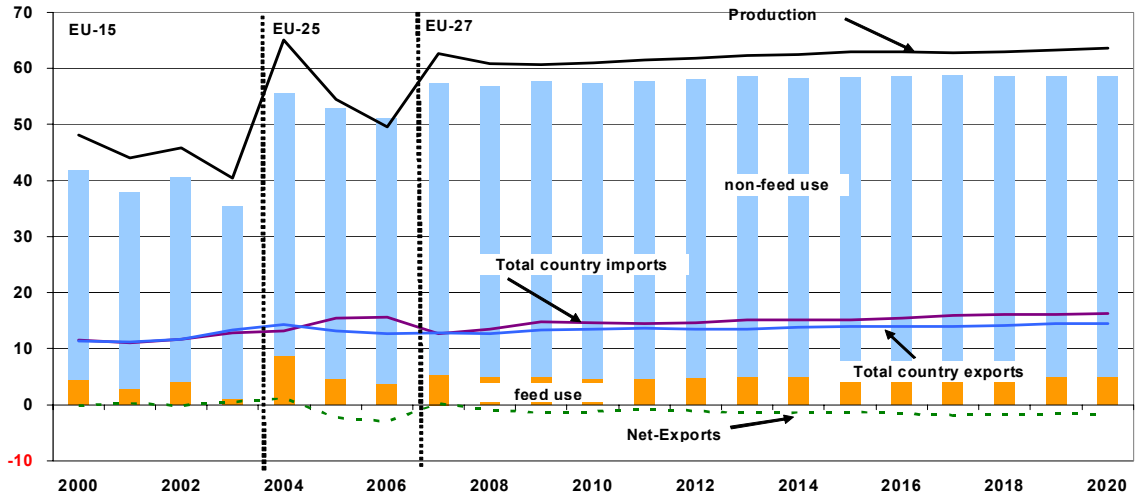


Figure 5.26: Sugar production and domestic use (million tonnes) in EU15, EU25 and EU27, 2000-2020

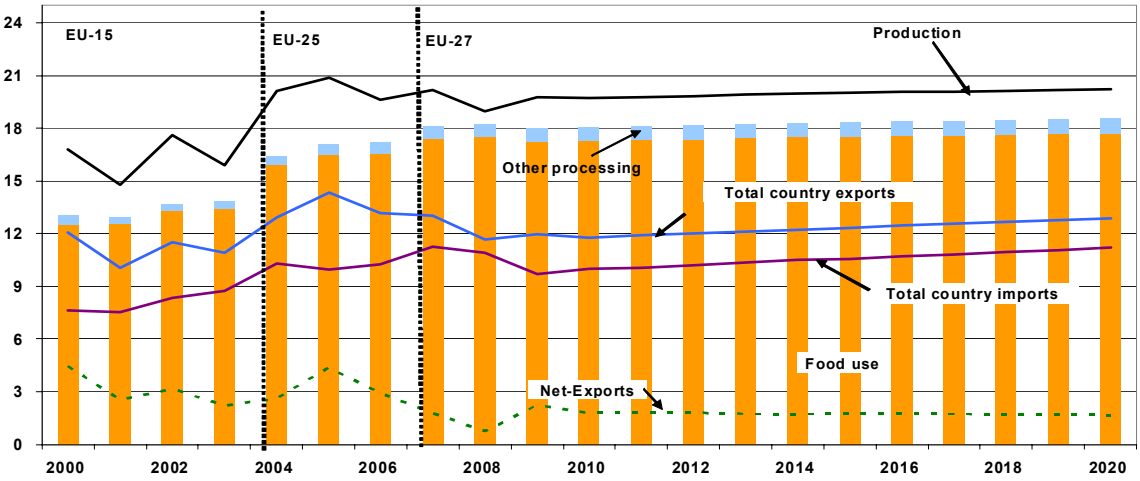


Figure 5.27: Tobacco production and domestic use (1,000 tonnes) in EU15, EU25 and EU27, 2000-2020

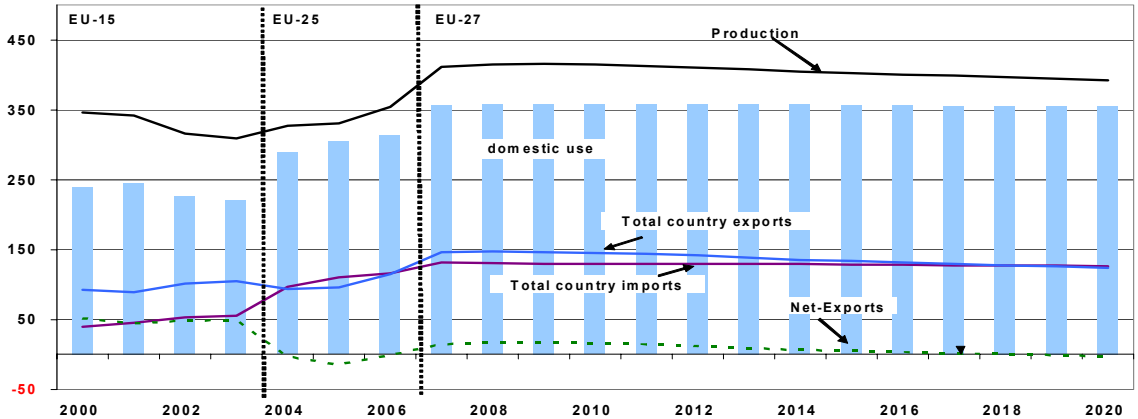


Figure 5.28: Cotton production and domestic use (1,000 tonnes) in EU15, EU25 and EU27, 2000-2020

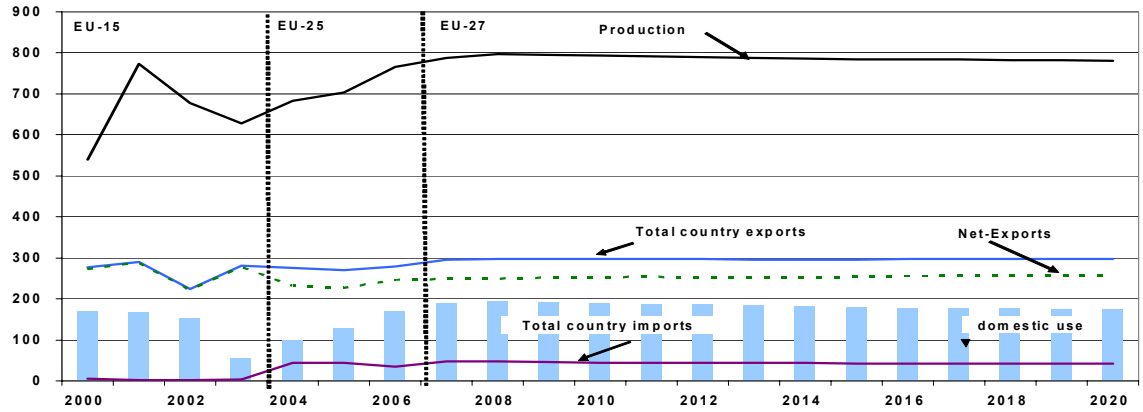


Figure 5.29: Apple production and domestic use (million tonnes) in EU15, EU25 and EU27, 2000-2020

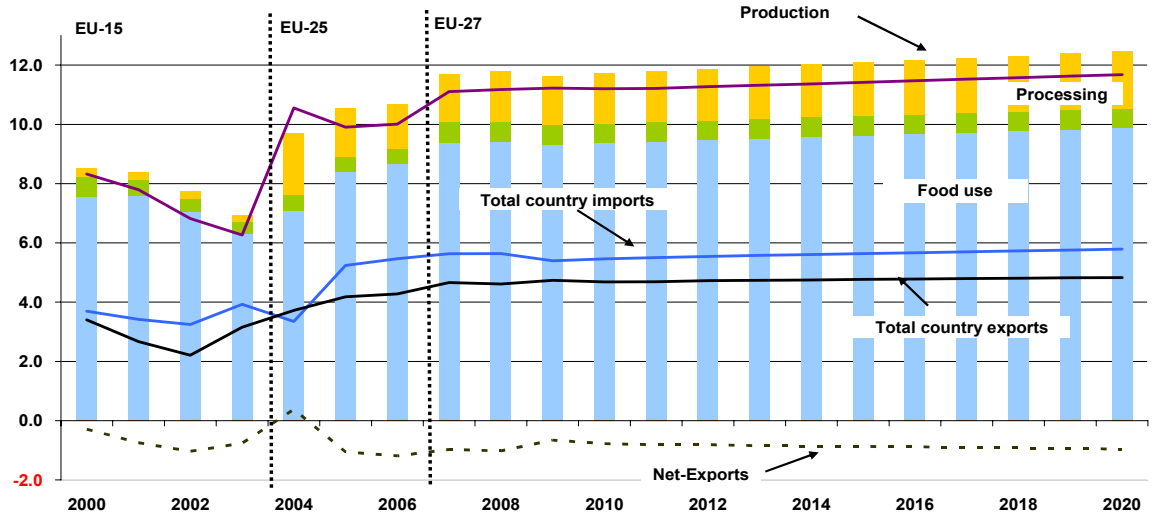


Figure 5.30: Tomato production and domestic use (million tonnes) in EU15, EU25 and EU27, 2000-2020

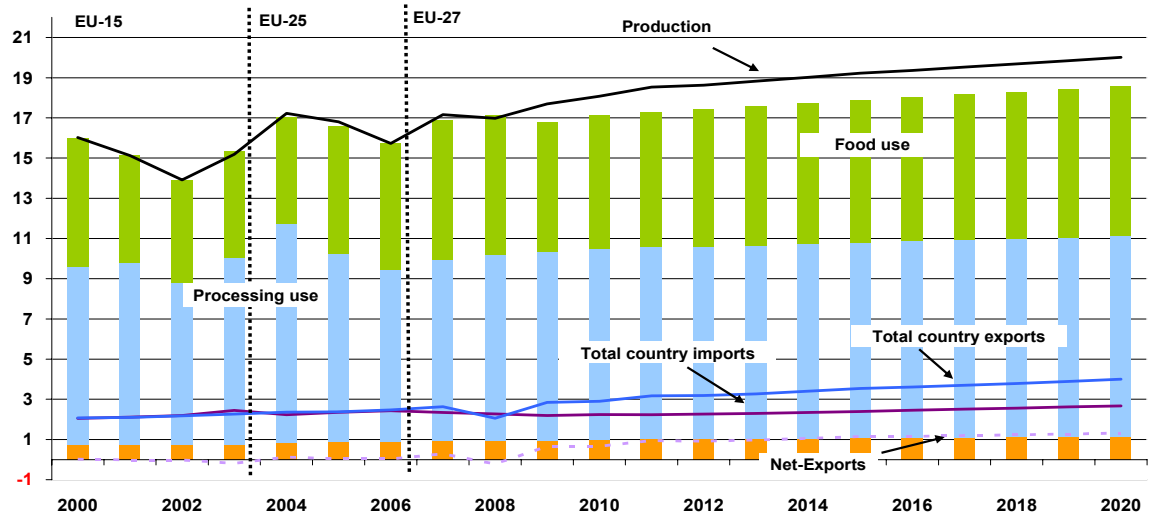
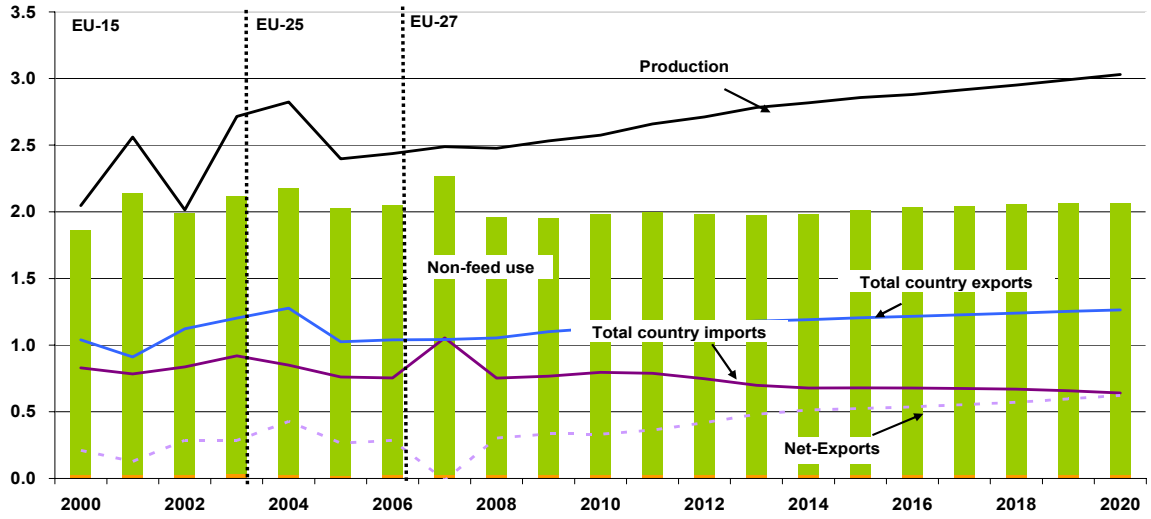


Figure 5.31: Olive oil production and domestic use (million tonnes) in EU15, EU25 and EU27, 2000-2020



It must be remarked that the tobacco and cotton markets have only been modelled and projected in a couple of EU27 countries (Spain, Greece, Bulgaria, Poland). As both commodity markets are of no importance in the other Member States from a supply perspective, it is expected that the production projections as depicted in Figures 5.27 and 5.28 are reliable. On the other hand, the modelling of the cotton and tobacco domestic demand of all Member States would provide another picture. The reason why EU tobacco and cotton balances are nevertheless presented is the provision of a reference situation in order to show the influence of the important Turkish tobacco and cotton markets if Turkey would accede to the EU (see Section 6.2).

5.2.3 Livestock and meat

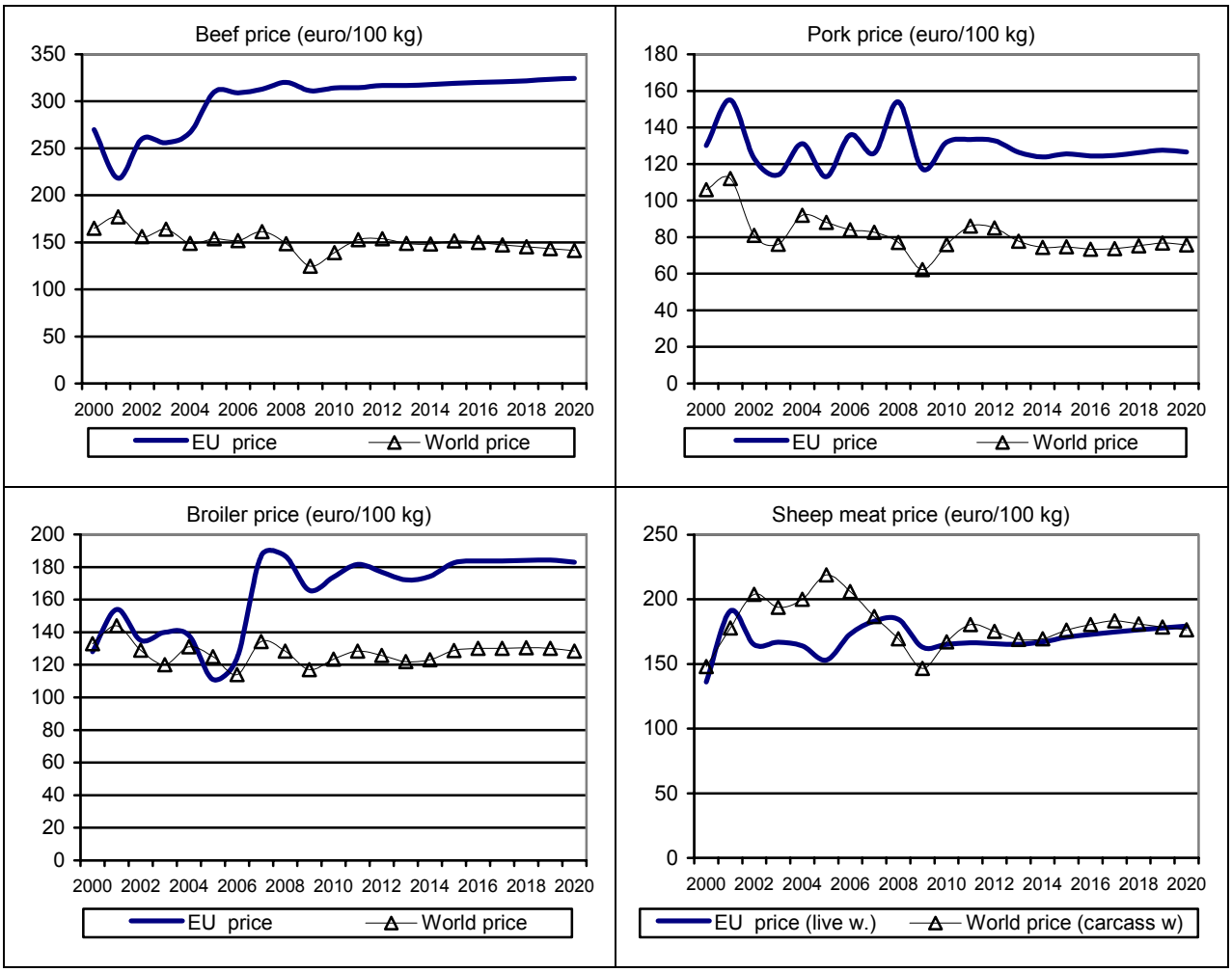
Under the baseline, no major policy changes directly affecting the livestock sector are assumed to occur. However, the implementation of policy changes such as the abolition of milk quota and the implementation of the Bioenergy Mandates will affect livestock markets through their impact on the number of animals available for slaughter (milk quota abolition) and the impact on the price of animal feedstuffs. Other factors such as the reduced rate of economic growth due to the ongoing recession and limited population growth in the EU27 also play a non-negligible role in determining the projected outcomes for EU27 livestock markets. In the following section overall results for beef and veal, pig meat, broiler and lamb meat are presented.

Based on the assumptions described in Chapter 4, under the baseline EU beef prices are not projected to change significantly over the period to 2020 (see Figure 5.32). Increases in feed prices and land scarcities driven by biofuel directives in some Member States mean that meat prices do not decline over the baseline projection period. In the baseline, EU beef production is projected to show a slightly decline to 7.9 million tonnes by 2020, and EU consumption of beef is projected to rise to 8.9 million tonnes by 2020 (see Figure 5.33). Beef and veal are still suffering by a loss in consumer preferences in red meat and especially in beef, at least in some Member States. Under the baseline, the average amount of beef consumed per head is projected at 17.9 kg by 2020, which is comparable with the level in 2005 but significantly below the level in the nineties. From 2004 onwards, under the baseline, the EU is a net importer of beef. The net import level would increase if the EU economic growth recovers more quickly and more strongly than currently anticipated.

Prices

Figure 5.32 shows the projected development of EU and world prices for meat products over the baseline period.

Figure 5.32: EU and world prices (Euro/100 kg) for meat products in baseline, 2000-2020



With the higher prices of beef and lamb that are projected to arise as a result of the (partial) decoupling of direct payments, domestic use of pig meat (see Figure 5.34) and poultry meat (see Figure 5.36) are projected to increase in the baseline. Average pork consumption per head in the EU is simulated to reach 45.1 kg per year by 2020, a rise by 0.3% per annum compared to the level in 2008. Total domestic use of pork is projected to increase by 6% in the same time period. In 2020 total domestic use and total domestic supply levels are projected to be approximately balanced.

Demand growth and increases in input prices (feedstuffs) drive pig meat prices to increase in the baseline projection period by almost 7%, which equals approximately the price level of 2000. In response to projected higher prices, the pig meat production increases by 2% between 2008 and 2020. Very low pig meat prices in the recent past, especially in comparison with cereal prices, have led to farmers' decisions to leave pig meat production, also partly supported by European and national environmental policies.

Figure 5.33: Beef and veal production and domestic use (1,000 tonnes) in EU15, EU25 and EU27, 2000-2020

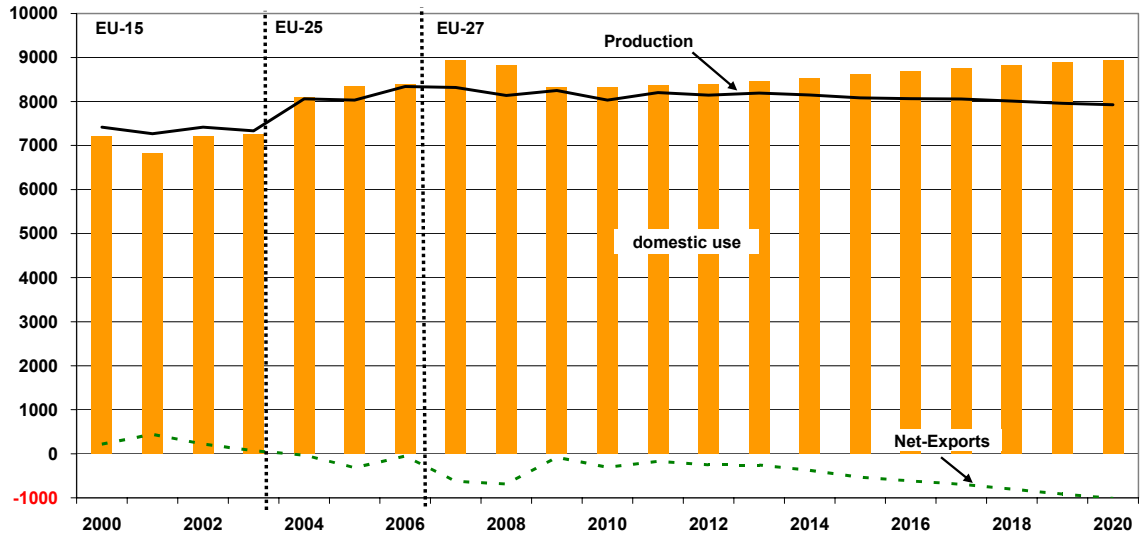


Figure 5.34: Pork production and domestic use (1,000 tonnes) in EU15, EU25 and EU27, 2000-2020

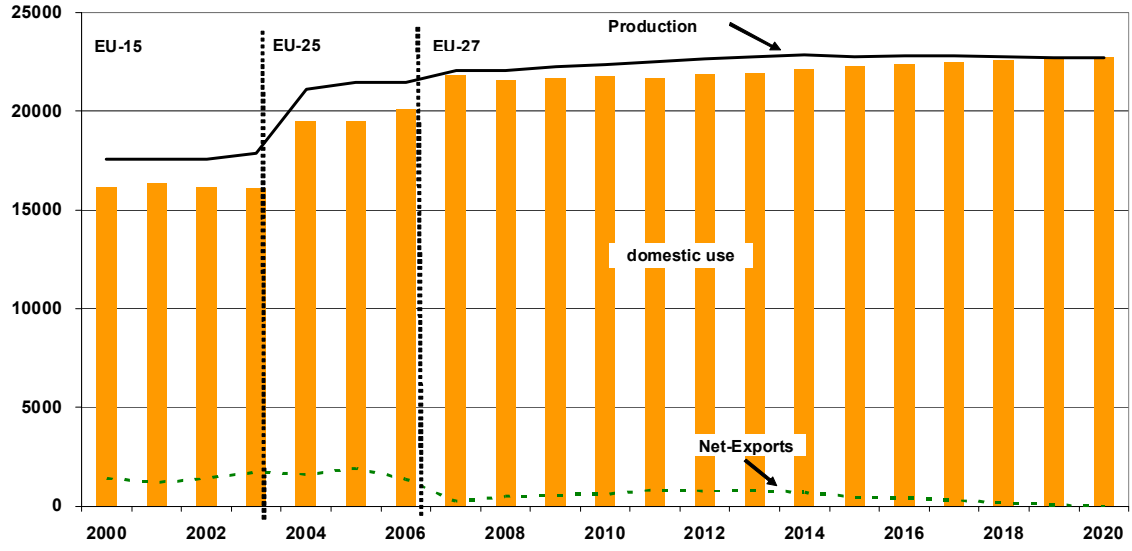
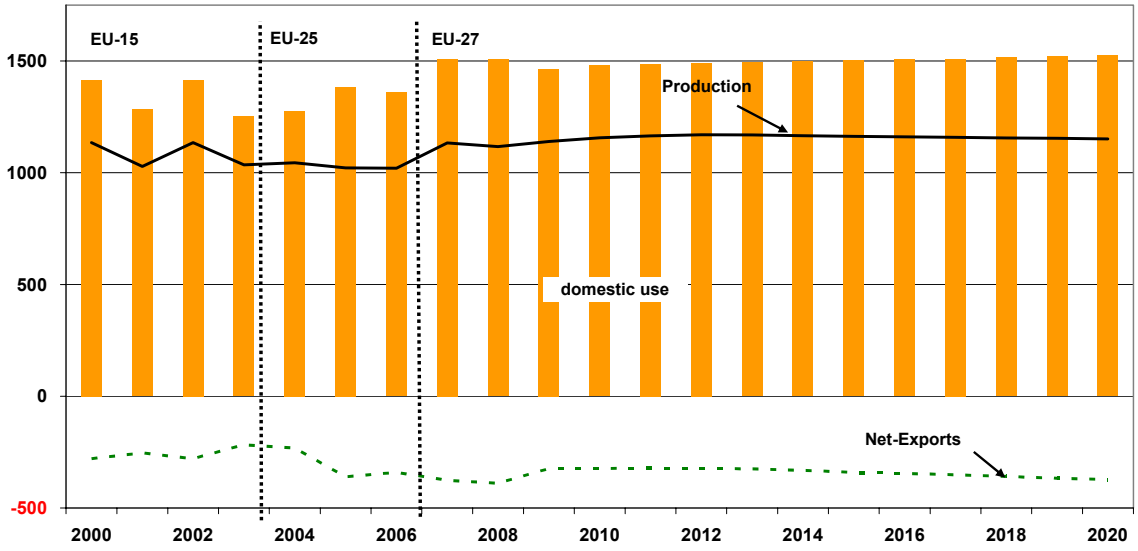


Figure 5.35 shows that total domestic use of sheep meat in the EU increase slightly in the baseline scenario. This increase in domestic use is driven by population growth; the average per head consumption is projected to remain stable under the baseline. The EU sheep meat market is protected by high tariffs and a TRQ system through which it imports lamb from New Zealand. The overall price story for the EU is expected to be a stable one and largely determined by the situation in France, UK and Ireland. Thus, price incentives on the production will be limited and production will remain constant on the EU level in the period 2008 to 2020. Price levels are close to the world market[12] and are strongly driven by world

[12] It must be remarked that the key price is a Eurostat live weight sheep price, whereas the world price is a carcass weight price. The EU price is much higher than the world price. The live weight price had to be used because there are no data in Eurostat on carcass weight prices of sheep in Ireland.

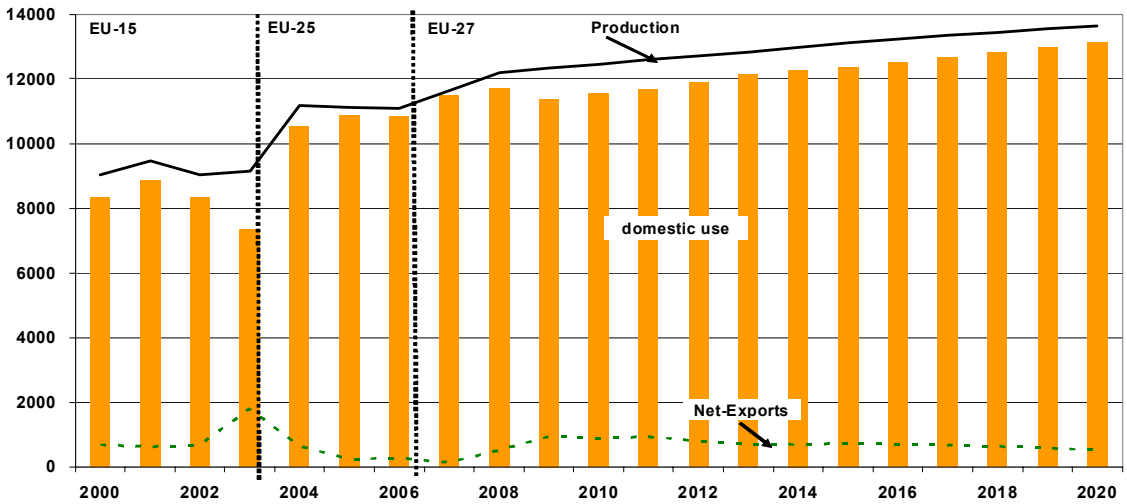
market conditions and exchange rates. However, price differences for different sheep meat types of lamb (light in southern Europe and heavy lamb in northern Europe) are expected to persist. Up to 2020, the EU27 as a whole remains a strong net importer of sheep meat.

Figure 5.35: Sheep meat production and domestic use (1,000 tonnes) in EU15, EU25 and EU27, 2000-2020



Under the baseline, the situation in the poultry sector is characterised by a marked increase in the projected consumption per head of 0.9% per annum; with EU27 average consumption reaching 26 kg per capita by 2020. Prices of poultry meat in the EU are projected to increase by almost a quarter over the period 2004 to 2007[13], but are expected to stabilize in the period hereafter. Driven by the current price projections and the continuing strong technology incentives, the EU production is projected to rise by 12% from 2008 to 2020 (see Figure 5.36). A main part of this growth is expected to occur in Poland.

Figure 5.36: Poultry production and domestic use (1,000 tonnes) in EU15, EU25 and EU27, 2000-2020



[13] It has to be recalled that the German key price depicted a huge price rise in last years. As former prices were compiled by the liquidated ZMP, a problem has been revealed with the comparability concerning the new series.

5.2.4 Milk and dairy products

In broad terms, the baseline projects a relatively static level of milk production for the EU27, with the exception of the increase in production arising from the expansion in milk quota as part of the 2008 quota expansion package (the 2% EU milk quota increase agreed for 2008/09 onwards) and the milk quota abolition in 2015. Expansion in overall EU27 milk production is limited, though projected developments across the Member States are not uniform. Due to low milk prices, the milk quota does not constrain overall production growth as the quota is not binding anymore in all Member States. Quota abolition is projected to lead to only a very limited milk production increase in the EU.

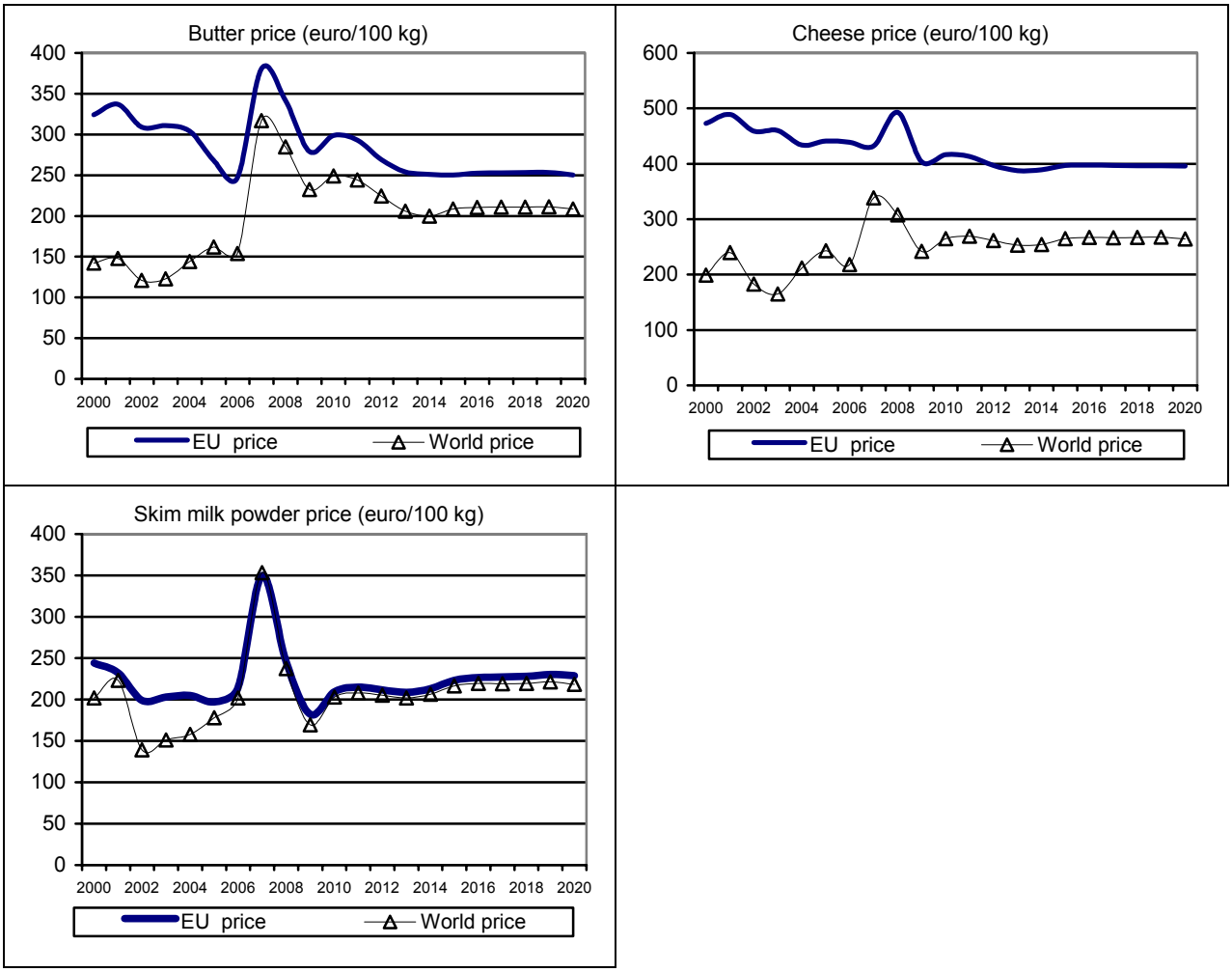
In the past, domestic prices on EU dairy commodity markets were separated from lower world market prices by intervention (reference) prices, import tariffs and export refunds, which together insulated EU markets from the negative impacts of world market price movements. Cuts in intervention prices and suspensions of export refunds provision, in combination with curbed demand prospects, have reduced the spread between the world and EU market prices and consequently have reduced the degree to which border policies insulate EU dairy markets completely from price fluctuations originating on the world market. Stabilising measures will only be considered when domestic prices will fall below reference prices. However, prices on the world market are volatile, as they can vary a lot around the projected annual averages due to economic adaptations and especially due to yield variations according to weather patterns. As movements of the exchange rate between the Euro and the US dollar normally add to price fluctuations, the future exchange rates will play an important role in future price volatilities as well.

Within AGMEMOD the prices of dairy commodities are driven by the self-sufficiency ratio of respectively the country considered and the whole EU. Additionally, policy measures such as intervention (reference) prices, world market prices, and trade measures determine the prices. The impact of the world market prices on the EU price level increased due to the reductions in institutional prices.

Under the assumption of normal weather conditions, it can be expected that the world dairy product prices will remain considerably lower than the albeit exceptional levels achieved in 2007/08. However, the international dairy commodity price outlook is much brighter than had been projected in earlier years. On average and relative to 2005, all dairy product prices under the baseline are projected to decrease at the EU level due to intervention price cuts. Skim milk powder prices, however, show an increase, aided by positive world market developments (see Figure 5.37). Cheese price reductions are more modest induced by production increases which closely track the higher domestic consumption. Finally, the choice for butter production is seen as less attractive in the projected period.

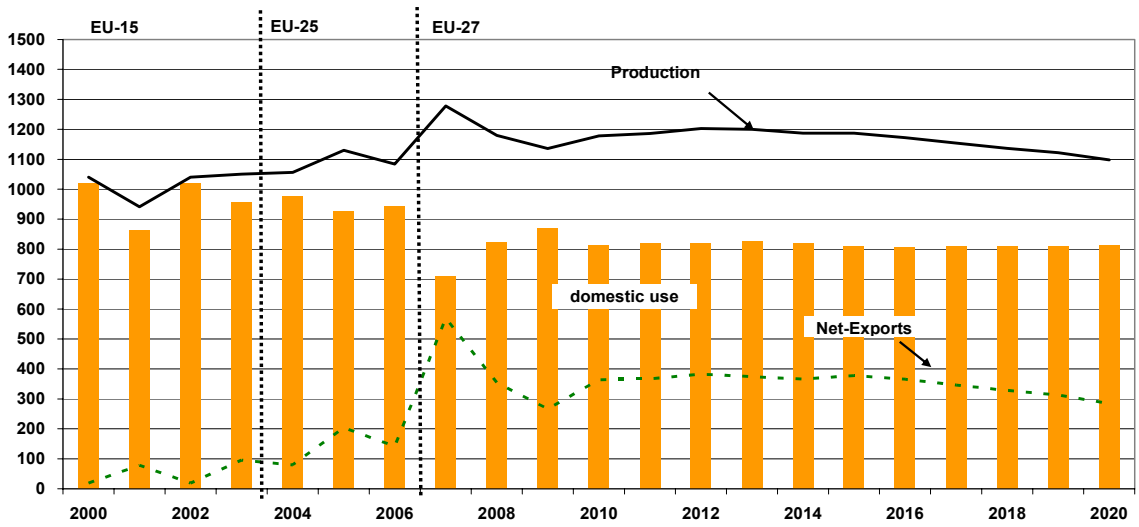
Under the baseline, it is projected that there will be some reorientation of the EU dairy product mix in the sense that cheese production is expected to increase and the production of intervention products will decrease. However, the reduction in the processing of intervention products, notably skim milk powder (SMP), is somewhat diminished by the impact of higher world market prices. The rise in cheese production broadly follows the pattern of the projected increase in cheese consumption, while the reduction in butter and SMP production reflects, in principle, the increased possibilities for alternative uses for milk.

Figure 5.37: EU and world prices (Euro/100 kg) for dairy products in baseline, 2000-2020



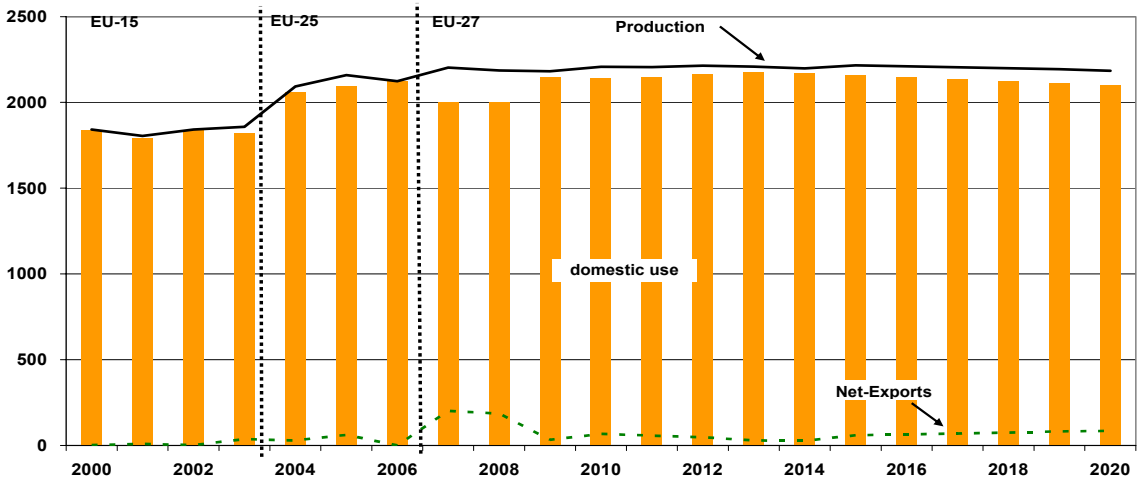
It is notable that domestic prices for SMP are aligned to and driven by the international prices for SMP and not so much anymore by the intervention price system. In the case of SMP, international prices keep EU production of SMP relatively high (see Figure 5.38), despite the fact that protein demand for cheese manufacturing, supplemented by the demand of other fresh products, leads to increased demand for milk protein within the EU. Under the baseline the domestic use of SMP is declining, which reflects a projected drop in the feed use of SMP and the increases in SMP prices that are driven by strong growth in SMP exports.

Figure 5.38: Skimmed milk powder production and domestic use (1,000 tonnes) in EU15, EU25 and EU27, 2000-2020



Although the international price of butter is still lower than its intervention price level, the gap between EU domestic and world market price levels has been reduced considerably. This decline in the gap between EU and world butter prices has been due to the institutional price cuts within the EU and by worldwide demand increases supported by reduced level of butter exports from the EU that could only occur with support of export subsidies. Under the baseline, the average EU butter consumption per head is projected to decrease slightly over the 2005-2020 period. Nevertheless, the total domestic use remains nearly stable due to the assumed population growth (see Figure 5.39). Under the baseline, the EU butter production is projected to grow marginally, which is reflected in a limited growth in net exports.

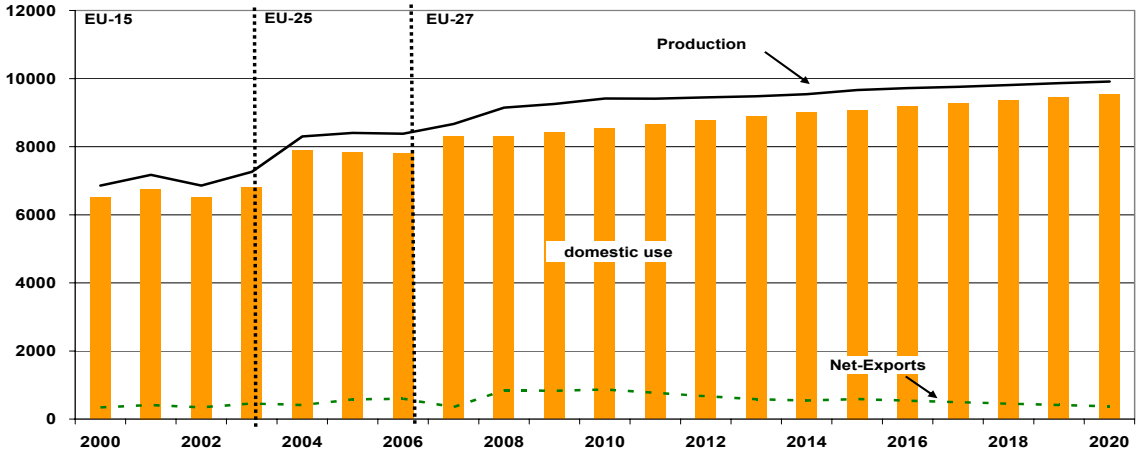
Figure 5.39: Butter production and domestic use (1,000 tonnes) in EU15, EU25 and EU27, 2000-2020



Projected cheese prices move a bit closer to the world market price, but a gap between both prices still exists. This gap most likely will not be bridged as prices also reflect quality differences in the commodities represented. Despite the price gap, in the past considerable EU exports without export subsidies took place. However, relative price changes between cheese and other dairy products as well as the lowering of intervention prices, particularly butter, is projected to result in the use of more milk in cheese production and less in intervention products. Thus, cheese production is projected to increase under the baseline (Figure 5.39).

This projected development in turn limits the prospects for any increase in cheese prices under the baseline. The domestic price of cheese in different EU Member States differ considerably only due to varying supply and demand situations, but due to differences in variety and quality (e.g. input of raw milk, duration of ripening, restrictions in feeding, marketing efforts).

Figure 5.40: Cheese production and domestic use (1,000 tonnes) in EU15, EU25 and EU27, 2000-2020



6 Results of the accession scenario

This chapter presents the results of the accession scenario for Turkey (section 6.1) and EU section 6.2). The assumption of the accession scenario analysed are described in detail in chapter 4 of this report. Accession impacts have been calculated by comparing the results of the accession scenario with the results of the baseline scenarios for Turkey and for the EU (cf. section 5).

6.1 Turkey

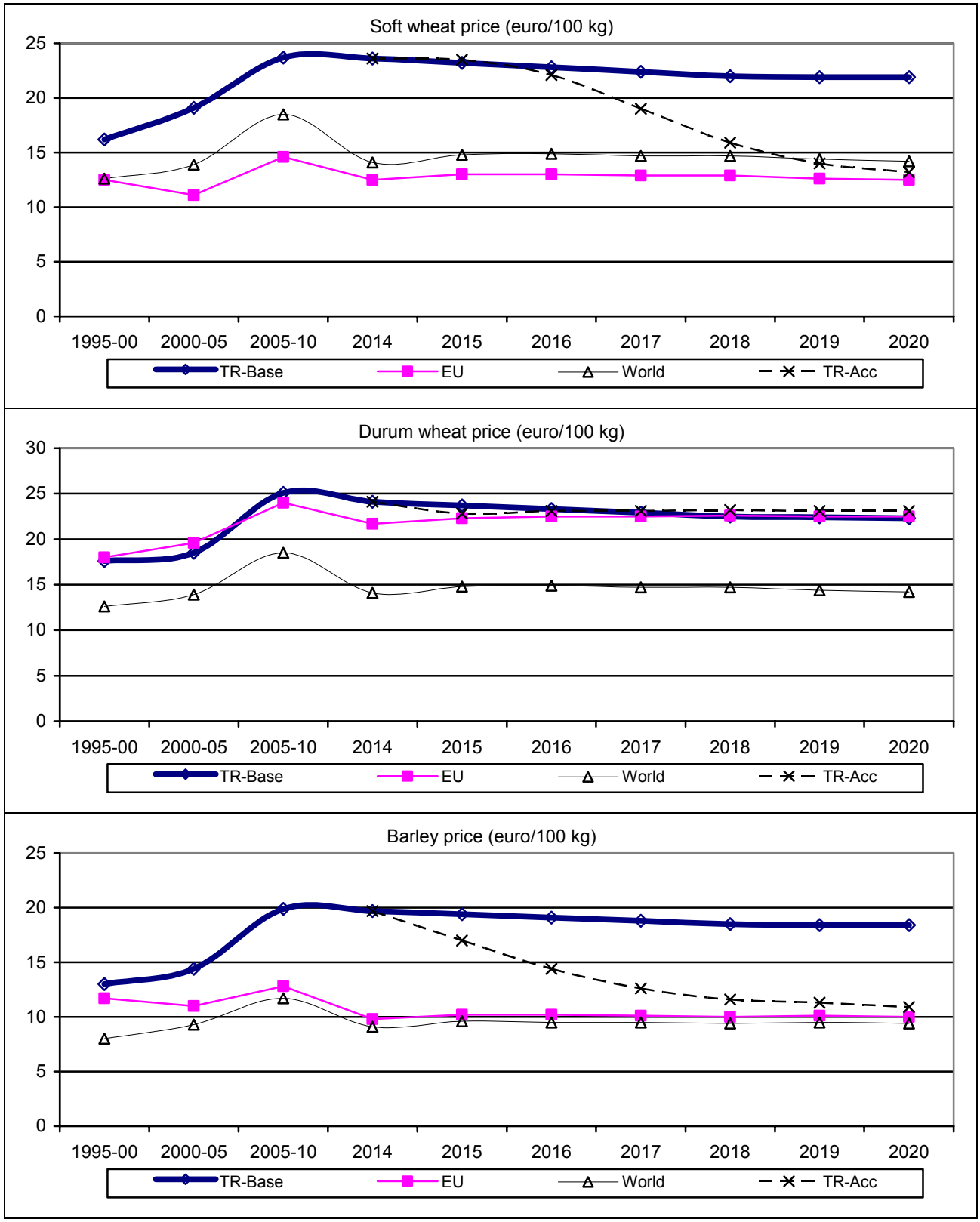
Following accession, it is expected that Turkish domestic prices will converge to their respective EU price levels over the period 2015-2020. This type of price development in the early years of EU membership was also visible in other countries that have acceded to the EU in past enlargements. It makes a difference if the initial domestic price level is above or below the EU price levels. If the domestic price starts from a higher level than the EU price, then the domestic price will converge towards the EU price (often due to the removal of domestic commodity supports after accession). However, when domestic prices are lower than the EU price, like e.g. the Polish beef price in 2004, then the price will probably not as easily converge with the EU price and may remain below the EU price for some considerable period after accession. When no rapid upward convergence is seen then there is usually an issue with product characteristics which explains the slow convergence. Polish beef is an example as its lower quality poor carcass conformation explains a large part of why Polish market prices remain lower than those in other Member States after EU accession.

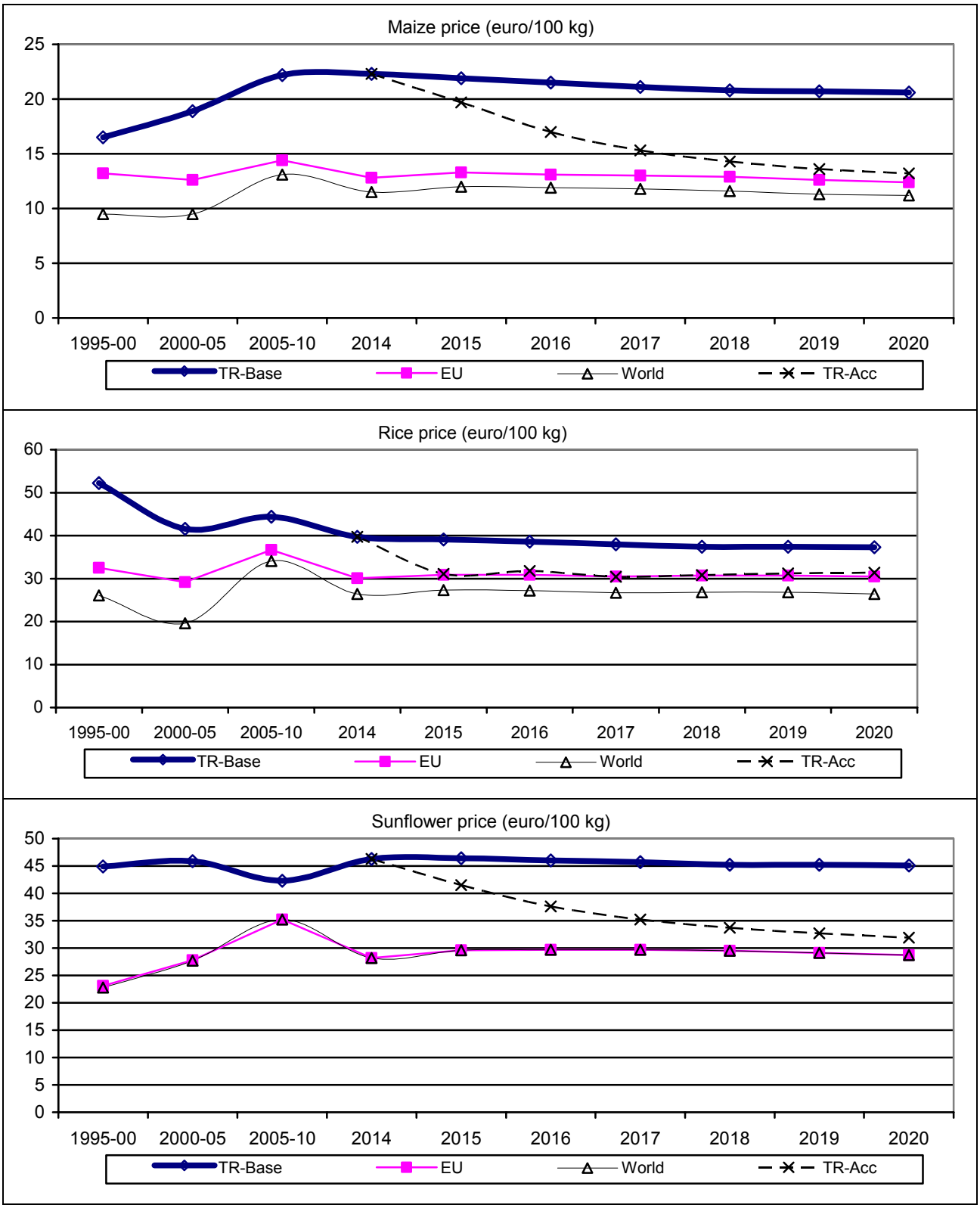
6.1.1 Grains and oilseeds

Prices

Figure 6.1 shows the baseline and accession scenario projections of Turkish cereal and sunflower prices. The baseline projections (where Turkey does not accede to the EU) are the same as those presented in chapter 5. The accession scenario projections (TR-Acc) show the projected commodity price paths when it is assumed that Turkey accedes to the EU in 2015. Following accession, Turkish cereal and sunflower prices are projected to converge towards EU levels over the period 2015-2020 due to the removal of Turkish support prices and import tariffs in particular.

Figure 6.1: Baseline and accession scenario Turkish cereal and oilseed prices (Euro/100 kg)





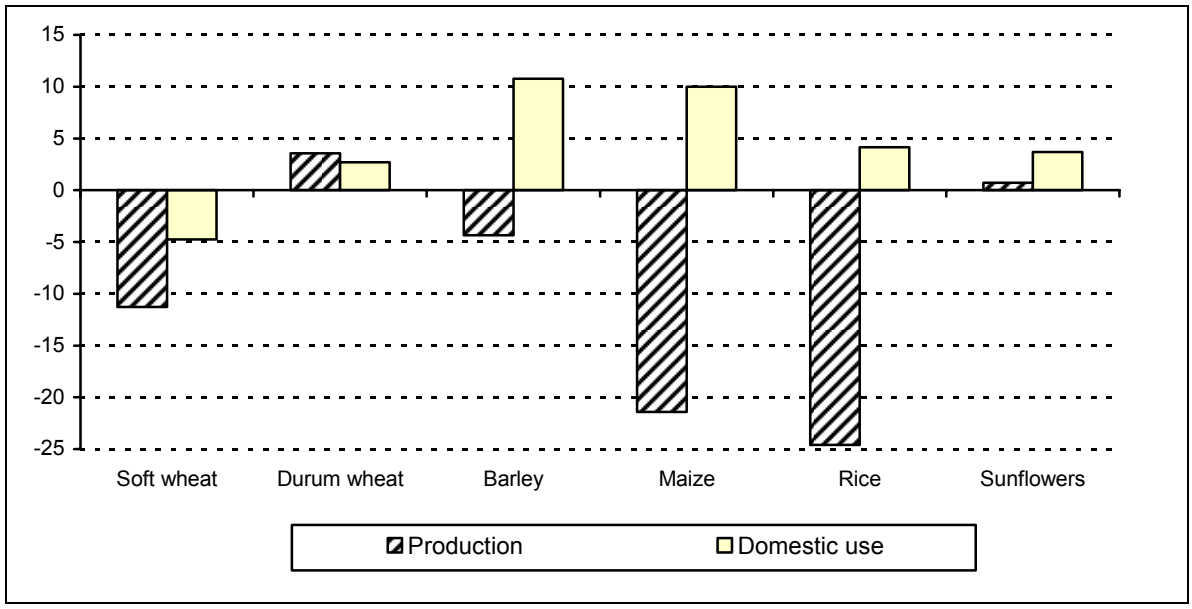
Production and domestic use

Following accession to the EU in 2015, the Turkish production of cereals, with the exception of durum wheat, is projected to decrease. Prior to EU accession, the Turkish durum wheat price is projected to remain at a level roughly equal to its respective EU key price and consequently the process of accession has little impact on this price. The relatively increased

profitability of the durum wheat production is projected to result in an increase in the area of arable land that is cultivated with durum wheat (see Figure 6.2).

Despite the only moderate price reduction for rice during the accession period (see Figure 6.1), Turkish rice production is projected to decrease significantly (Figure 6.2). In the accession scenario support provided to different cereals (including rice) is assumed to be equal, whereas in the baseline the rice support was relatively high compared to the support provided to the production of other cereals. This policy change and lower market prices following accession to the EU is projected to reduce the relative profitability of rice, and as a consequence risce production decreases.

Figure 6.2: Accession impact (% change) on Turkish cereals and sunflower production and domestic use in 2020



6.1.2 Other crops

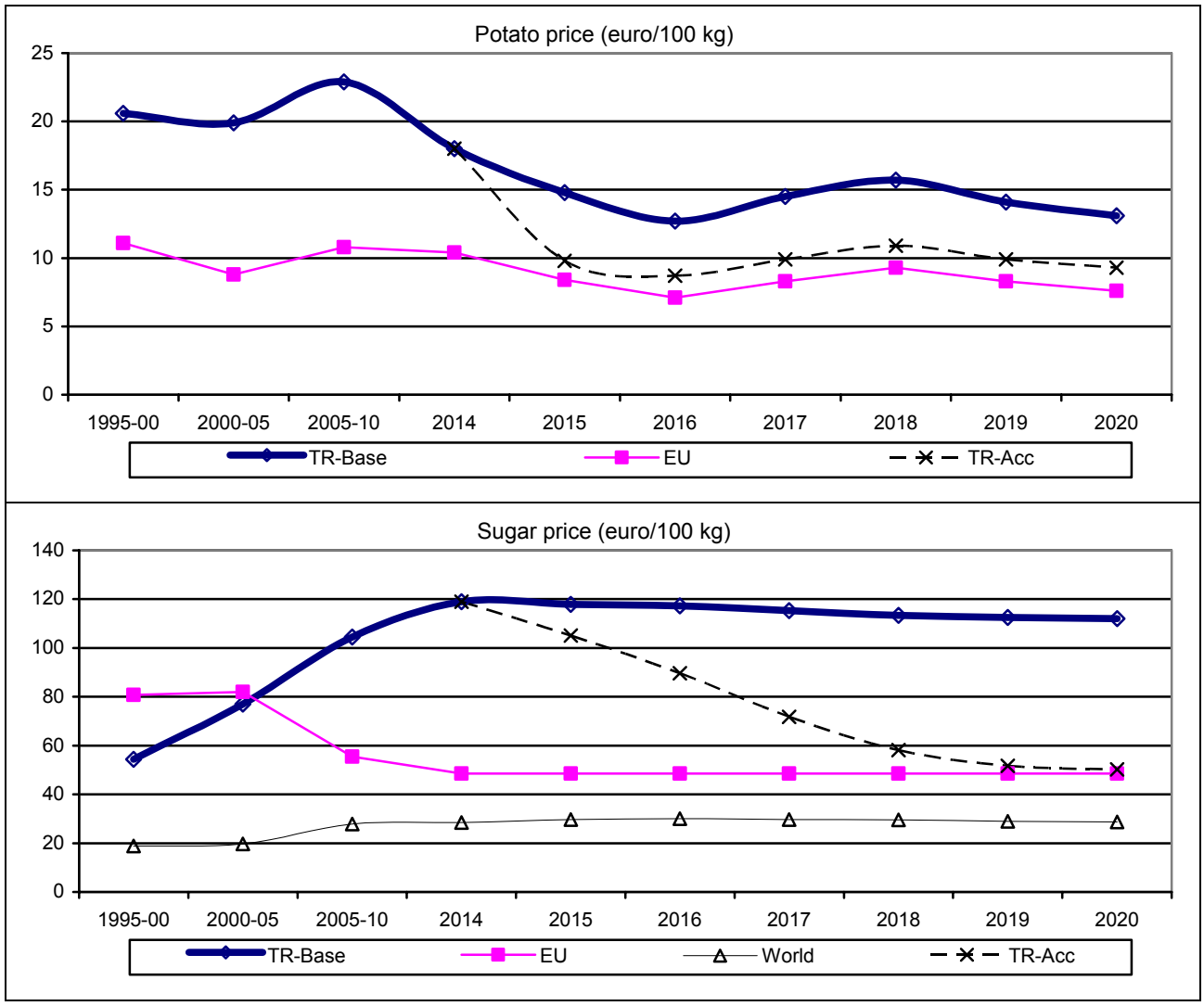
Prices

Figure 6.3 shows the baseline and accession scenario projection prices of root crops, tobacco, cotton, fruits and vegetables. For those commodities where in the baseline Turkish prices were above EU prices (such as potatoes, sugar, tobacco, cotton, oranges, olives and apples), the Turkish price is projected to converge towards the EU price over the course of time in the accession scenario. In the case of tomatoes, where the baseline Turkish price is below the EU price, both prices are not immediately converging. Due to the relatively high supply elasticity of tomatoes, a small price increase would lead to a significant supply increase which would enable Turkish farmers to reach higher yields and to reduce production costs. Producer prices would remain at the lower level in such a case. Also, the Turkish tomato price is forecasted to remain approximately the same after accession due to existing bilateral trade agreements (trade diversion). Currently, the Turkish tomato export price to the Russian Federation (major destination) is evidently below the EU export price and the Spanish wholesale price. Without this applied entry price system[14], however, the Turkish tomato export is expected to switch

[14] This is an administrated price determined by the EU Commission and announced at the end of each month. The charge is applied if any importer would import tomatoes at a price lower than this entry price. If the import price is 8% lower, the importer has to pay the difference between the entry price and the lower price, plus a

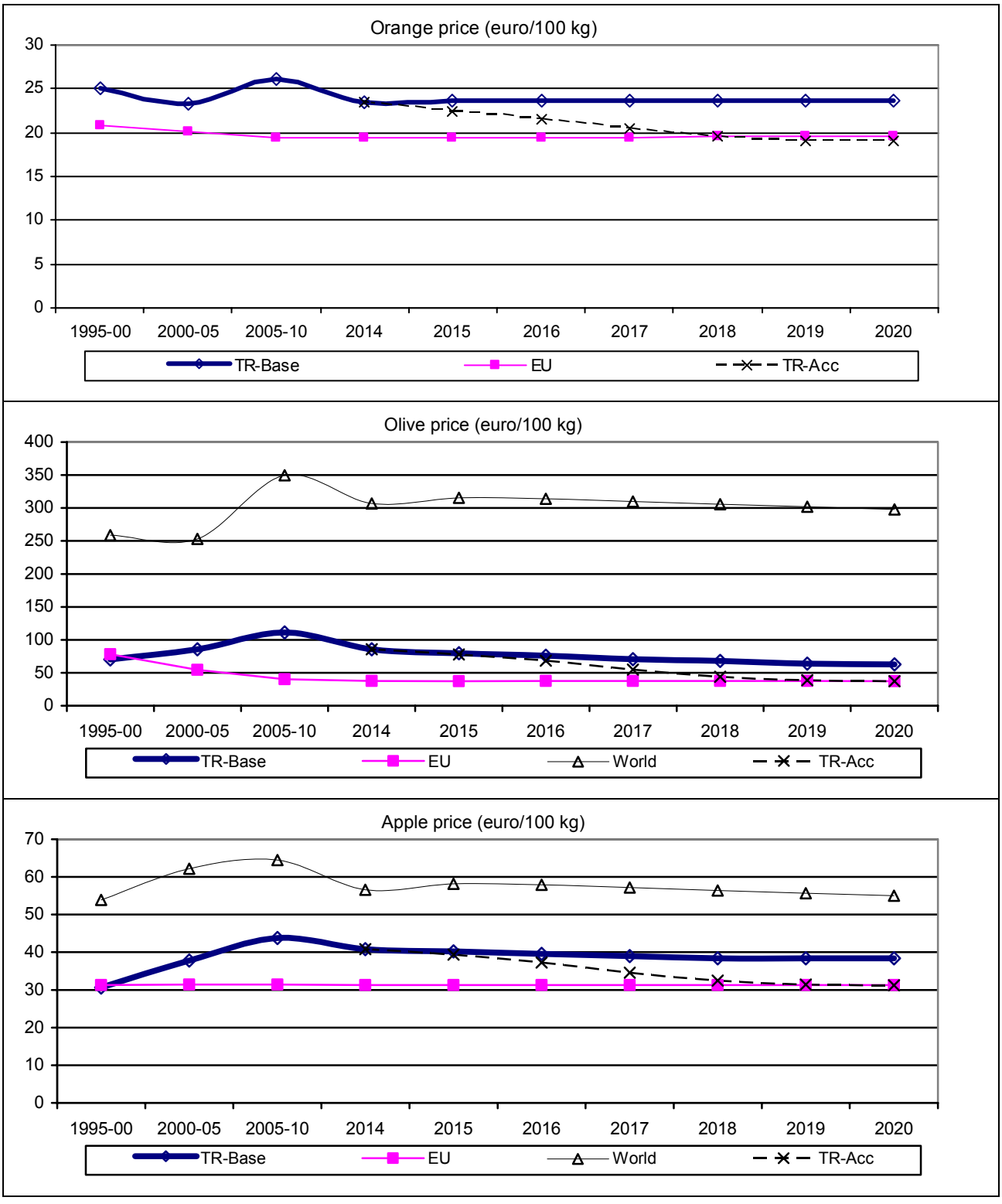
from the Russian market to the higher valued EU market. In that case, both prices will move towards one another.

Figure 6.3: Baseline and accession scenario Turkish root crops, tobacco, cotton, fruit and vegetable prices (Euro/100 kg)



normal tariff. If the import price is much lower than the entry price (more than 10%), the importer has to pay the difference between the lower import price and the entry price, plus a maximum tariff rate. Together these measures are equivalent to a quite high tariff rate, effectively protecting the EU tomato producers.


Tobacco price (euro/100 kg)
400
350
300
250
200
150
100
50
0
1995-00
2000-05
2005-10
2014
2015
2016
2017
2018
2019
2020
TR-Base
EU
World
TR-Acc
Cotton price (euro/100 kg)
160
140
120
100
80
60
40
20
0
1995-00
2000-05
2005-10
2014
2015
2016
2017
2018
2019
2020
TR-Base
EU
World
TR-Acc
Tomato price (euro/100 kg)
120
100
80
60
40
20
0
1995-00
2000-05
2005-10
2014
2015
2016
2017
2018
2019
2020
TR-Base
EU
World
TR-Acc



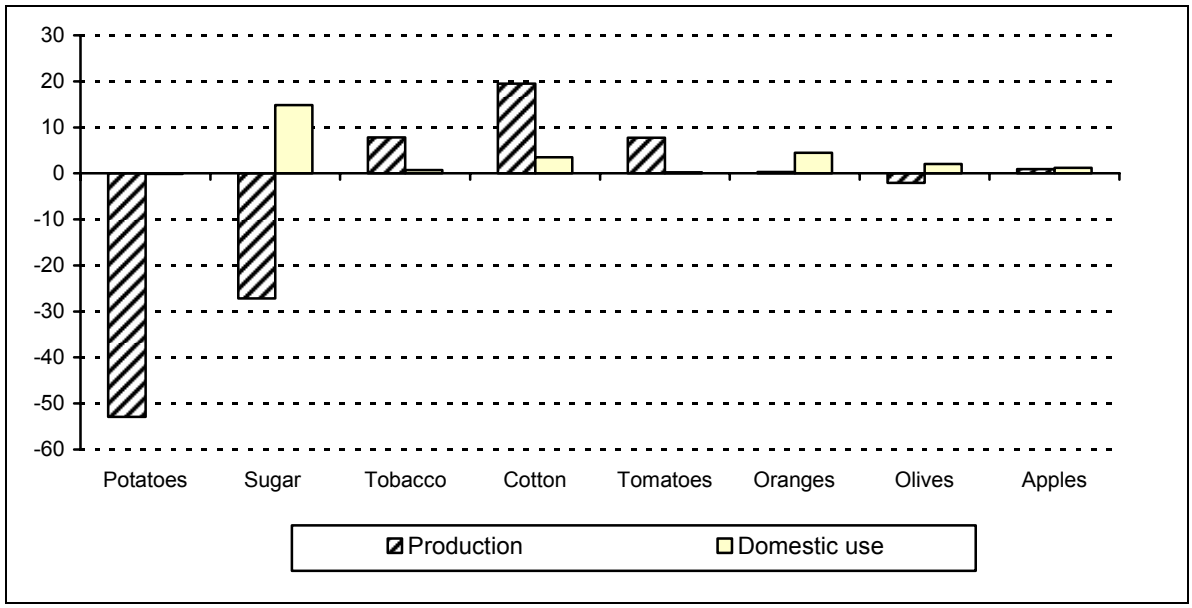
Production and domestic use

Sharp price decreases and the lower policy supports for root crops following EU accession are projected to result in declines in the areas of potatoes and sugar beets grown in Turkey when compared with the baseline. In the accession scenario Turkish root crop prices are projected to decrease in absolute terms and relative to cereal prices. Turkish potato and sugar beet production are projected to be more than 50% and 27% respectively lower in 2020 than in the

baseline. These large declines in production are the result of lower prices following accession as well as large changes in the level of policy support under the accession scenario.

Given the projected lower prices for both potatoes and sugar under the accession scenario, Turkish demand for potatoes and sugar is expected to increase. Turkish potato consumption per capita is projected to be 6% higher in 2020. Lower potato prices and projected improvements in the relative price competitiveness of potatoes versus competing consumer goods, such as rice, drive the growth in potato demand in the accession scenario. Compared to the baseline, the demand for potato seeds is projected to decline due to the smaller projected potato area harvested. Overall Turkish domestic use of potatoes (sum of food and seed demand) is projected to be the same as in the baseline (see Figure 6.4). In a similar fashion, lower sugar prices in the accession scenario are projected to result in a moderate increase of the sugar intake by people in Turkey compared to the baseline.

Figure 6.4: Accession impact (% change) on Turkish root crops, tobacco, cotton, fruits and vegetables production and domestic use in 2020



The profitability of Turkish tobacco production is projected to increase following accession to the EU in 2015 due to a sharp increase of coupled support under the CAP. Thus, Turkish tobacco production is projected to be 8% higher by 2020 than under the baseline. Cotton production, which under the CAP receives coupled production support as well, is expected to increase relative to the baseline. On accession to the EU, Turkish cotton producers are assumed to receive a direct payment equal to the payments received by cotton producers in Greek (594 € premium per hectare). Despite the removal of fertilizer and fuel subsidies following accession, the adoption of the CAP is expected to lead to a significant increase (approximately 55%) in the value of direct payments to Turkish cotton producers. Based on this assumed policy change following accession, Turkish cotton production is projected by 2020 to be 20% higher in 2020 than under the baseline.

The projected decrease in the cotton price following accession is, compared with the baseline scenario, projected to influence the demand for cotton positively. In contrast, and despite the projected decline in prices, demand for tobacco is not expected to change significantly as for health related reasons and other factors – such as assumed excise taxes on cigarettes – the demand curve is assumed to shift to the left in the accession scenario. As there will be only a

slightly demand increase, most of the production growth will lead to an increase of Turkish tobacco exports.

The projected price changes for vegetables and fruits in the accession scenario are relatively small compared to those of the other mentioned commodities. Together with the lower level of policy support under the accession scenario, this will lead to quite small impacts on production and demand levels in Turkey.

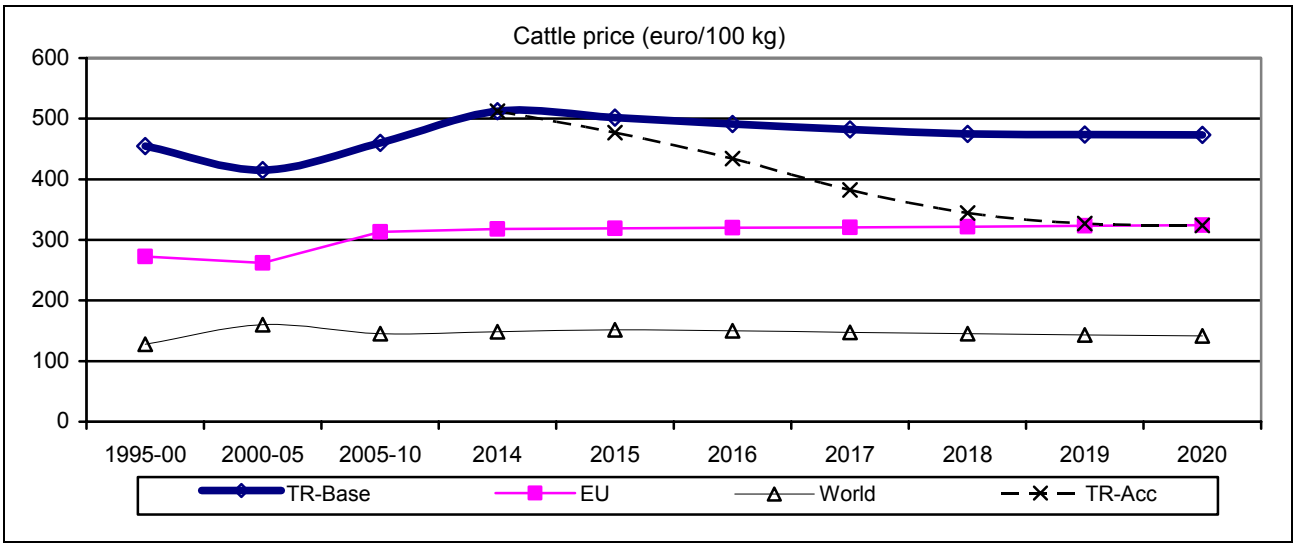
6.1.3 Livestock and meat

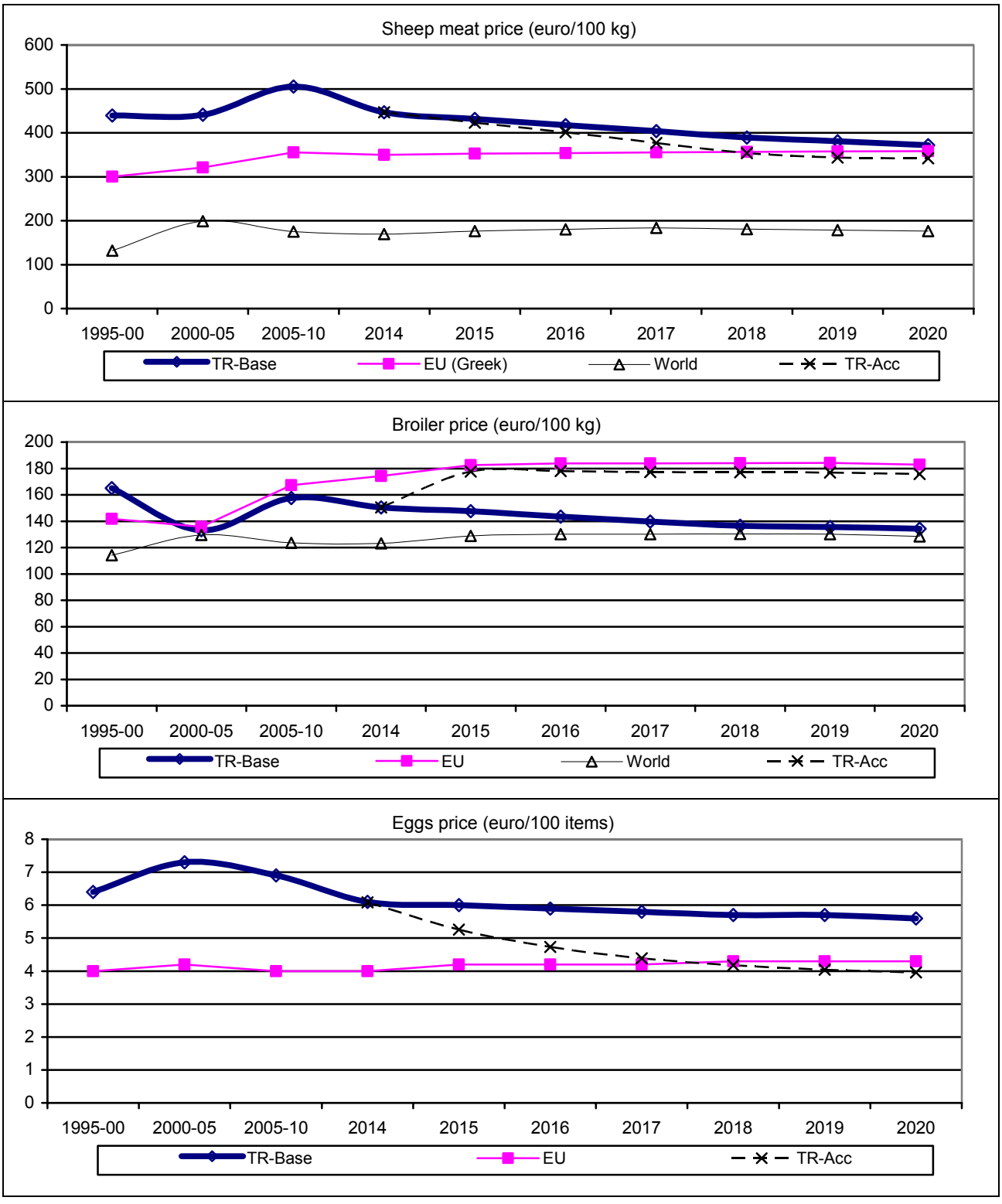
Prices

Figure 6.5 shows projections of Turkish meat prices in the baseline and accession scenarios. In the accession scenario, Turkish prices for cattle and sheep meat are projected to converge with their respective EU price levels over the period 2015-20 due to a removal of import tariffs and export supports. It must be noted that the Turkish sheep meat price is not projected to converge with the EU key price (Ireland), which is a price of heavy lamb rather than the light lamb product produced in Turkey. Turkish prices are projected to rather converge with the Greek light lamb prices, since Turkish lamb carcass are similar to those produced in other Mediterranean countries.

Under the baseline the Turkish broiler meat price is projected to remain below the EU key price, whereas the egg price is projected to remain above its respective EU key price. Under the accession scenario, both prices are expected to converge towards the EU prices.

Figure 6.5: Baseline and accession scenario Turkish meat prices (Euro/100 kg)





Production and domestic use

In the accession scenario is assumed that, as part of Turkeys implementation of the CAP, direct payments will remain partly coupled to beef and sheep meat production in Turkey. Thus the baseline Turkish coupled beef premium is substituted by a policy price add-up which has been recalculated per tonne of beef produced taking account animal density thresholds. Therefore the direct support for the cattle sector in Turkey via this reaction price represents all the premiums that are coupled to cattle under the CAP, but also captures the production

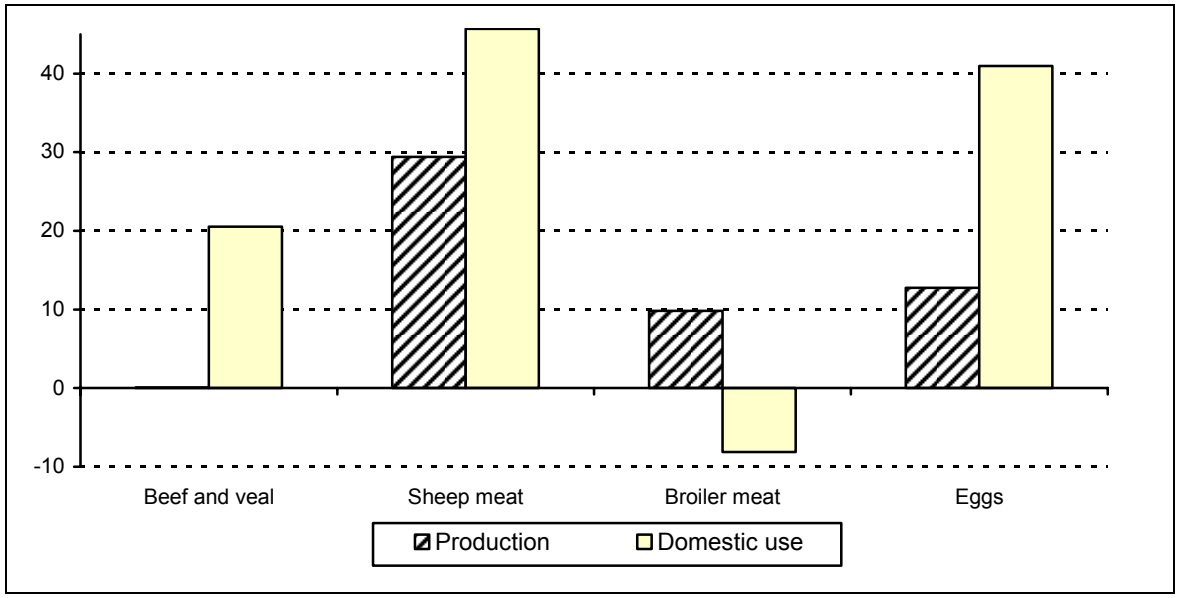
impact of the decoupled payments paid to all Turkish farmers under the CAP. Both the decoupled and coupled CAP payments are projected, via their reaction price representation, to affect the production response of Turkish farmers. However, given the levels of coupled support provided to the Turkish beef sector under the baseline (and prior to accession) and the decline in market prices for cattle under the accession scenario, it is not expected that the accession will lead to significant increase in the level of Turkish beef production. Overall lower market prices for cattle offset any increase in the level of policy support provided by the CAP. However, Turkish consumers are projected to gain from the lower beef prices that are projected to prevail in the accession scenario. Compared to the baseline, Turkish beef demand is projected to be 20% higher in 2020 (see Figure 6.6); nonetheless Turkish beef consumption levels per head still remain low compared to EU standards.

The situation for the sheep sector is different to the situation in the beef sector. The level of policy support received under the accession scenario would be higher than in the baseline. This higher level of policy support is projected to boost Turkish sheep meat production. Due to the decline in Turkish sheep meat prices under the accession scenario, Turkish sheep meat consumption is projected to increase significantly (towards 2 kg per head) in 2020 relative to the baseline.

In the accession scenario, Turkish broiler meat production is projected to increase due to higher prices and the significant downward trend in the prices of feedstuff in Turkey. Broiler prices are projected to remain at the almost equivalent EU level under the accession scenario. Due to the higher broiler price effect of accession compared to the lower prices of sheep meat and beef (cross price effect), the domestic use of broiler meat is projected to decline in 2020 with 8% relative to the baseline.

In the accession scenario, the Turkish eggs production is projected to increase despite the lower egg prices that arise when Turkish egg prices converge with those in the EU. The lower prices of feed under the accession scenario moderate the negative impact of lower egg prices on egg production. In the accession scenario lower egg prices are projected to lead to a sharp egg consumption increase when compared with the baseline.

Figure 6.6: Accession impact (% change) on Turkish meat and egg production and domestic use in 2020

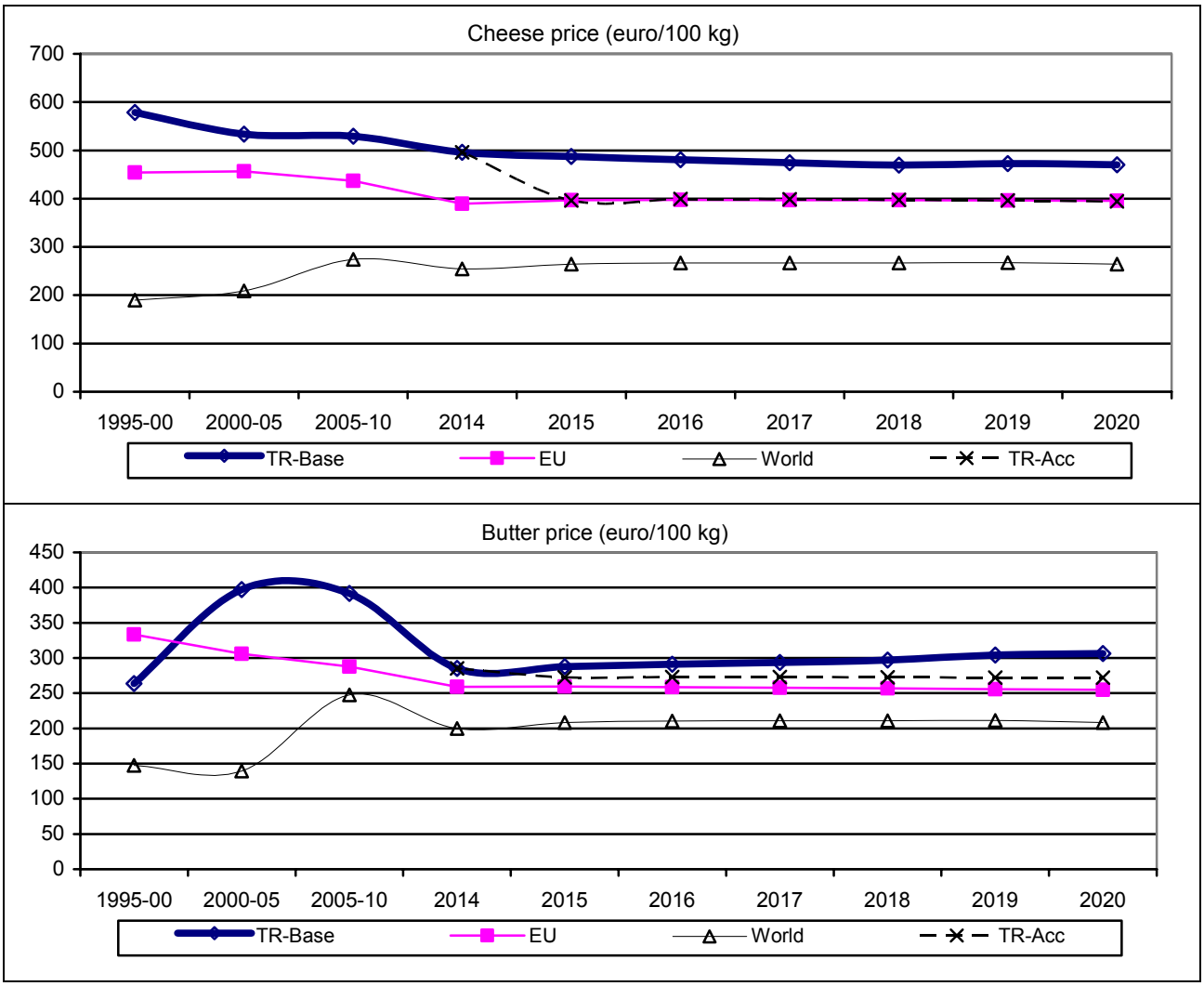


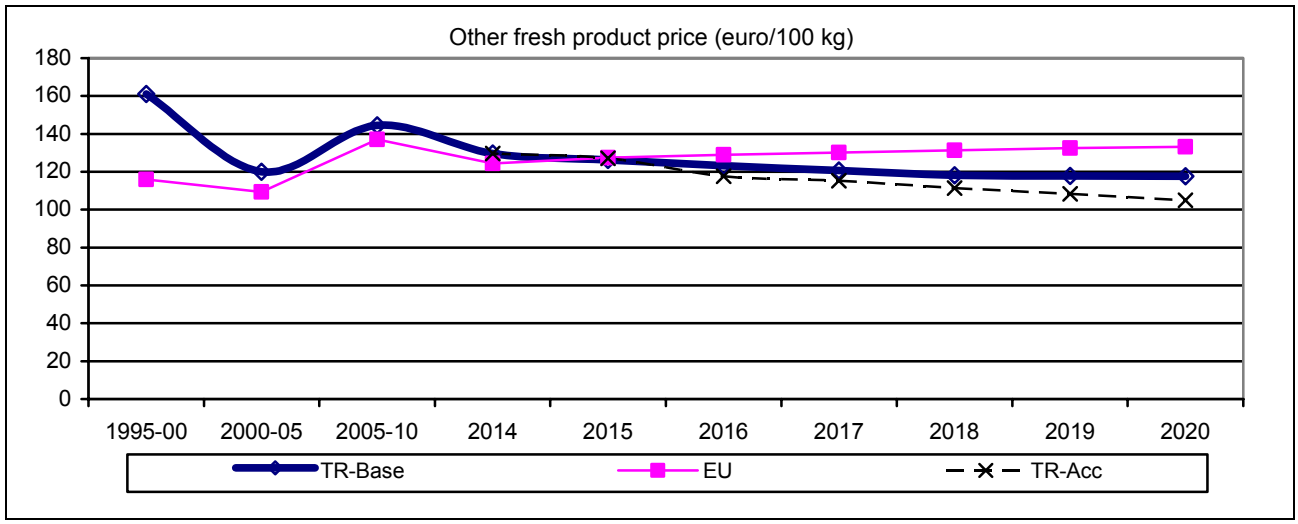
6.1.4 Milk and dairy products

Prices

Figure 6.7 shows the projections of Turkish dairy product prices in the baseline (TR-Base) and EU accession scenario (TR-Acc). In the accession scenario, Turkish cheese and butter prices are projected to converge with their respective EU prices over the period 2015-2020. In the case of other fresh products, Turkish domestic prices do not reach the EU price level in the accession scenario. Over the medium term, Turkish prices for other fresh products are even projected to decrease compared to the baseline, due to a higher production level and its relatively focus on the regional (Turkish) market.

Figure 6.7: Turkish dairy product prices (Euro/100 kg) in baseline and accession scenario, in comparison with EU and world prices

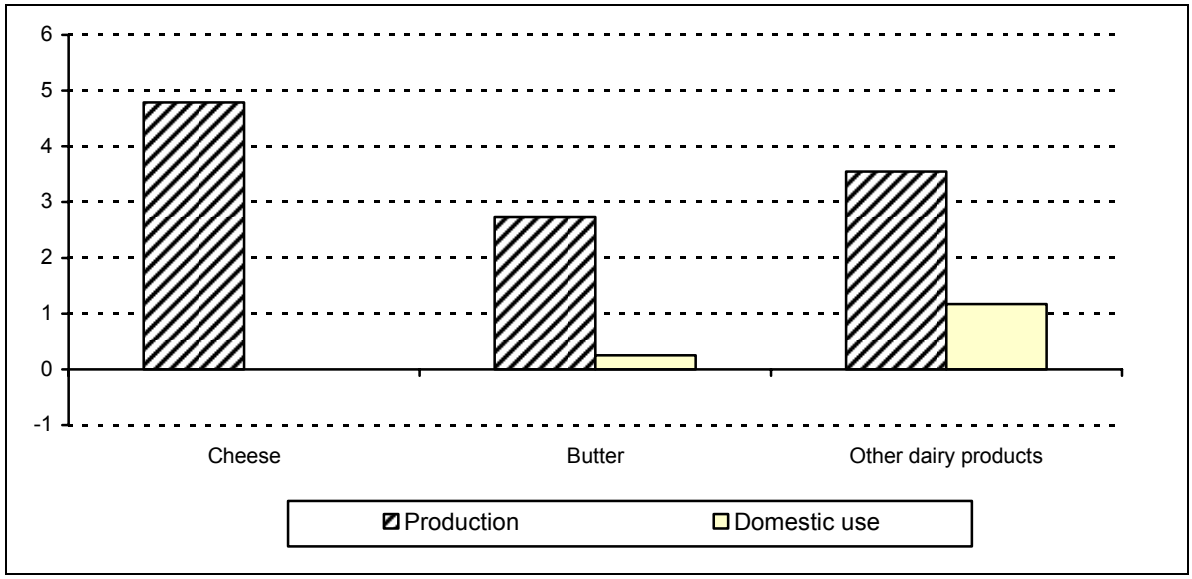




Production and domestic use

In the accession scenario EU institutional prices for butter and SMP are applicable in Turkey at the same levels as in the rest of the EU. As in the accession scenario Turkey accedes after the abolition of milk quota in the EU27, this EU policy change has no impact on Turkey. Turkey will be required to remove its direct payments which are currently coupled to the milk production and these are replaced by the decoupled income support payments of the CAP and the coupled support associated with coupled support of Article 68 and 69 provisions of the baseline CAP regulation. These premiums, as in other Member State models, are implemented in the Turkish AGMEMOD model through the use of policy price add-ups, which are calculated per tonne of milk produced. Turkish milk production under the accession scenario is thus supported via this reaction price (market price plus policy add-ups), which captures the supply inducing effect of coupled premiums as well as decoupled payments and market prices. However, in the accession scenario, the amount of policy support received by Turkish milk producers is less than under the baseline scenario. While it is projected that the accession to the EU does lead to lower feed costs, most other production costs are projected to remain unchanged or to increase. In combination, both aspects lead to lower input costs under accession. When compared with projected levels under the baseline, this will boost the Turkish milk production as well as the production of dairy products (Figure 6.8).

Figure 6.8: Accession impacts (% change) on Turkish dairy products production and domestic use in 2020



6.2 EU and its Member States

Under the accession scenario where Turkey accedes to the EU in 2015, Turkey and the EU are, as under the baseline, treated as separate regions in the pre-accession period (up to 2014). However, in the accession scenario the policies of Turkey and the EU are harmonized from 2015 onwards and thus projections for the EU28 as a whole are generated for the 2015-2020 period. The impact of the accession is measured as the difference between the projection results of the accession scenario and the baseline scenario. Detailed results at the Member State level for crops (CropsOutlook-Accession) and animal products (LivestockDairy-Accession) are available at the AGMEMOD website.

Table 6.1 shows that the accession of Turkey is projected to generate lower EU self-sufficiency rates for e.g. for cereals, rice, sunflowers, cotton, eggs and butter and this will in general result into higher EU prices compared to the baseline. In contrast, the projected higher EU self-sufficiency rates following Turkey's accession that characterise the markets for tomatoes, oranges, apples, poultry and sheep meat are projected to generate lower EU market prices.

The percentage changes in EU (EU27 versus EU28) levels of production and domestic use of agricultural commodities between the baseline and accession scenario in Table 6.1 give an indication of the size of the corresponding Turkish markets. Most notably, EU production levels for wheat, rice, tobacco, cotton, tomatoes, oranges and apples would all increase significantly if Turkey would join the EU. Subsections 6.2.1 through 6.2.4 discuss the projected developments in the accession scenario of the EU markets for grains and oilseeds, other crops, livestock and meat, and milk and dairy respectively.

Table 6.1: Accession impacts (%) on EU agricultural commodity markets in comparison with baseline scenario in 2020

	Price	Production	Domestic use	Self-sufficiency rate
Soft wheat	0.8	10.5	16.6	-5.2
Durum wheat	0.1	39.1	35.1	3.0
Barley	2.1	15.0	23.7	-7.0
Maize	1.2	5.1	9.6	-4.1
Rice	17.4	13.1	25.8	-10.1
Sunflower	0.0	11.9	25.2	-10.6
Potatoes	-1.0	3.6	7.3	-3.5
Sugar beets	0.0	7.5	12.5	-4.4
Tobacco	-0.8	24.3	16.7	6.6
Cotton	6.6	184.2	969.5	-73.4
Olive oil	0.0	6.3	5.5	0.7
Tomatoes	-4.5	77.0	74.0	1.7
Oranges	-2.8	33.8	9.4	22.3
Apples	-0.5	25.6	23.4	1.8
Beef	0.0	7.5	7.5	0.0
Poultry	-3.1	14.9	12.6	2.1
Eggs	-1.8	12.3	15.1	-0.8
Sheep meat	-5.0	14.6	11.8	2.5
Milk	0.1			
Butter	0.4	11.0	11.7	-0.6
Cheese	0.1	6.7	6.8	0.0
Other fresh products	0.1	28.1	27.1	9.6

Source: AGMEMOD version 4.0 (2010)

6.2.1 Grains and oilseeds

The scale of Turkey relative to EU cereal markets in terms of production and domestic use is presented by Figures 6.9 to 6.11. Up to the year 2014 the pictures are the same as those presented in section 5.2.1, where the EU represents 27 Member States. However, during the period 2015-2020 when Turkey acceded the EU, the figures above depict the supply and use balances of wheat, barley and maize for the EU28 and these differ importantly from the balances presented in section 5.2.1 of this report. In the accession scenario the net export position of the EU in these cereals is projected to diminish compared to those of the EU27 due to the lower self-sufficiency rates of Turkey.

Figure 6.9: Soft wheat production and domestic use (million tonnes) in EU15, EU25, EU27 and EU28, 2000-2020

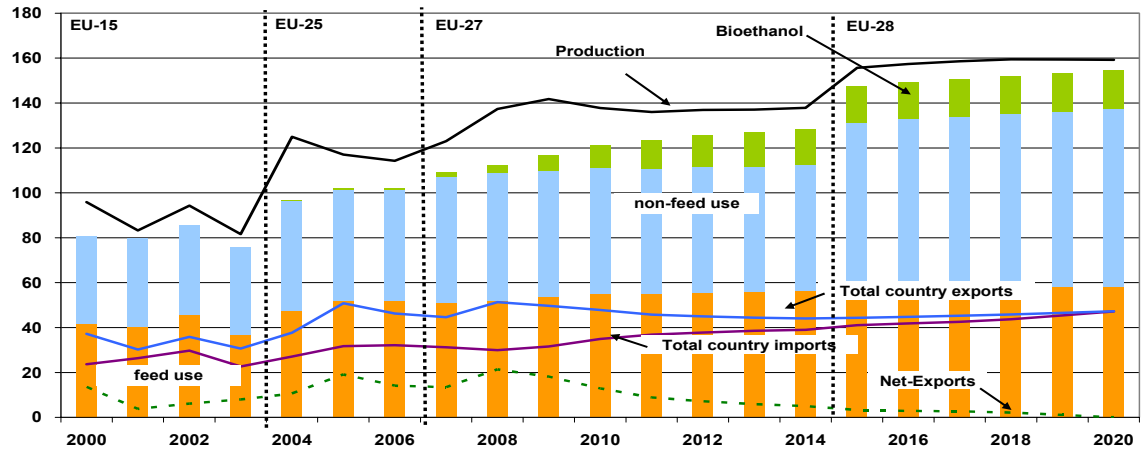


Figure 6.10: Barley production and domestic use (million tonnes) in EU15, EU25, EU27 and EU28, 2000-2020

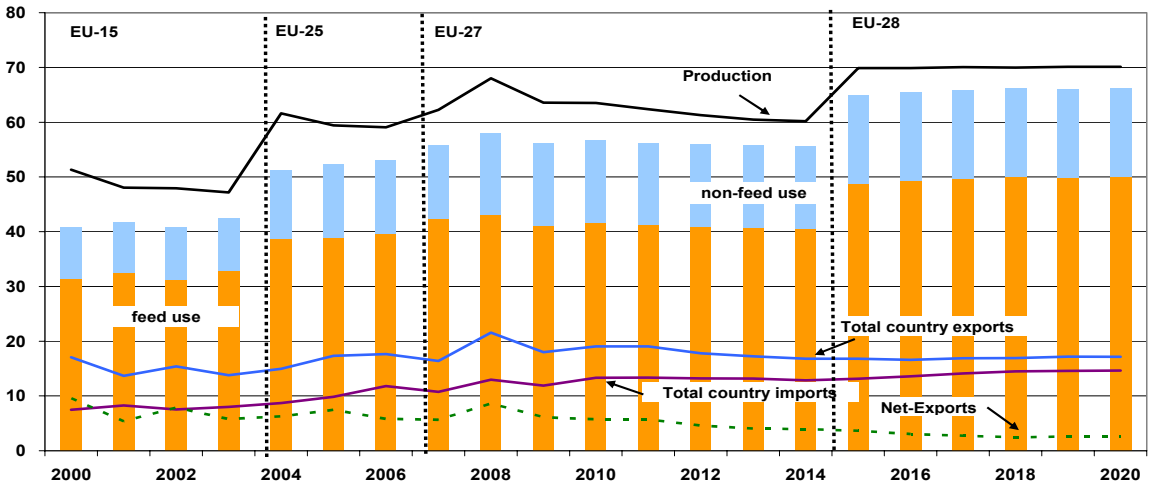
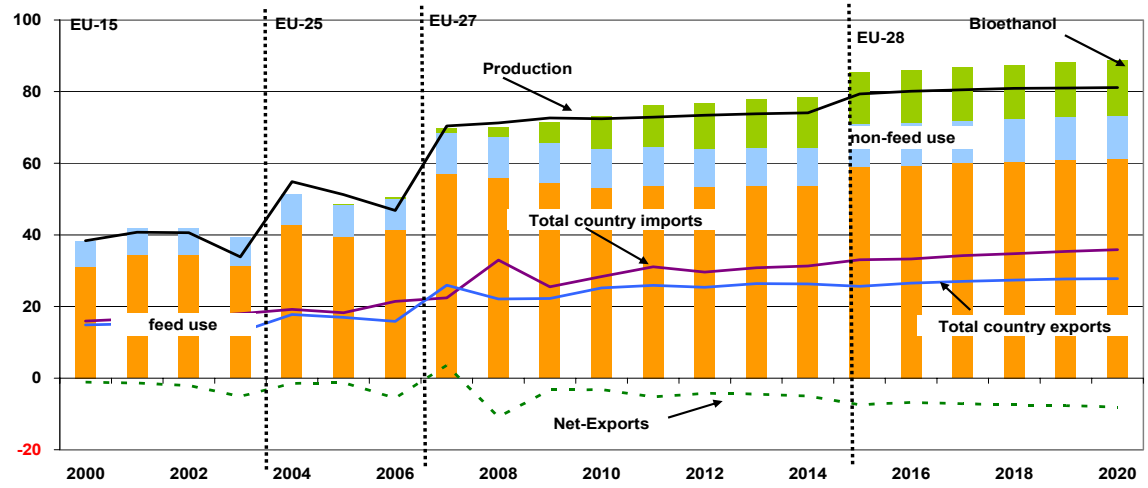


Figure 6.11: Maize production and domestic use (million tonnes) in EU15, EU25, EU27 and EU28, 2000-2020



6.2.2 Other crops

The total area of root crops harvested in the EU is projected to increase from 4.1 hectares in the baseline to 4.4 million hectares in the accession scenario. Similarly, the area harvested for tobacco and cotton is projected to more than double from 6.1 to 14 million hectares when Turkey accedes to the EU. The area cultivated for apples, tomatoes, oranges and olives, is expected to increase from 5.8 to 7.2 million hectares.

Figures 6.12 to 6.18 present the medium-term accession scenario outlook for potatoes, sugar, cotton, tobacco, apples, tomatoes and olive oil in the EU28. Again these figures underline the scale of the Turkish market (production and use) relative to the total EU for root crops, tobacco and cotton, and fruit and vegetables. Under the accession scenario, EU net exports of root crops and cotton is projected to decline due to the lower self-sufficiency rates in Turkey when compared with the EU27 Member States. In contrast, the net export position of the EU is expected to increase for tobacco, fruits and vegetables due to the higher self-sufficiency rates in Turkey in comparison with those in the EU27.

Figure 6.12: Potato production and domestic use (million tonnes) in EU15, EU25, EU27 and EU28, 2000-2020

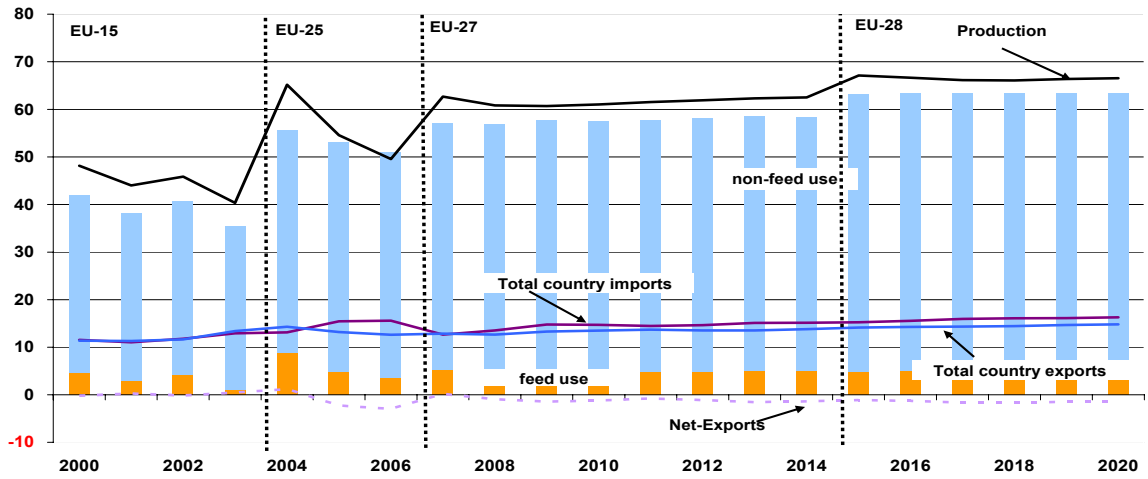


Figure 6.13: Sugar production and domestic use (million tonnes) in EU15, EU25, EU27 and EU28, 2000-2020

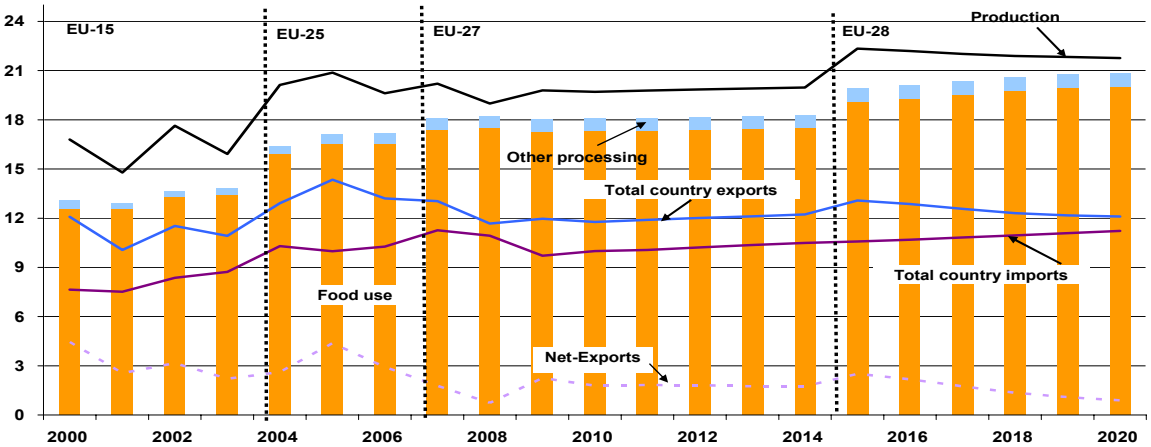


Figure 6.14: Tobacco production and domestic use (1,000 tonnes) in EU15, EU25, EU27 and EU28, 2000-2020

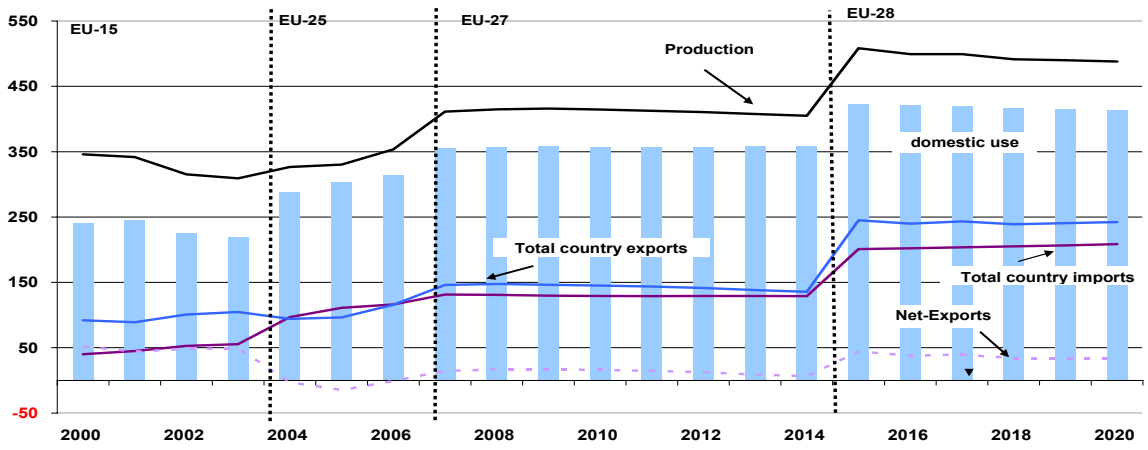


Figure 6.15: Cotton production and domestic use (1,000 tonnes) in EU15, EU25, EU27 and EU28, 2000-2020

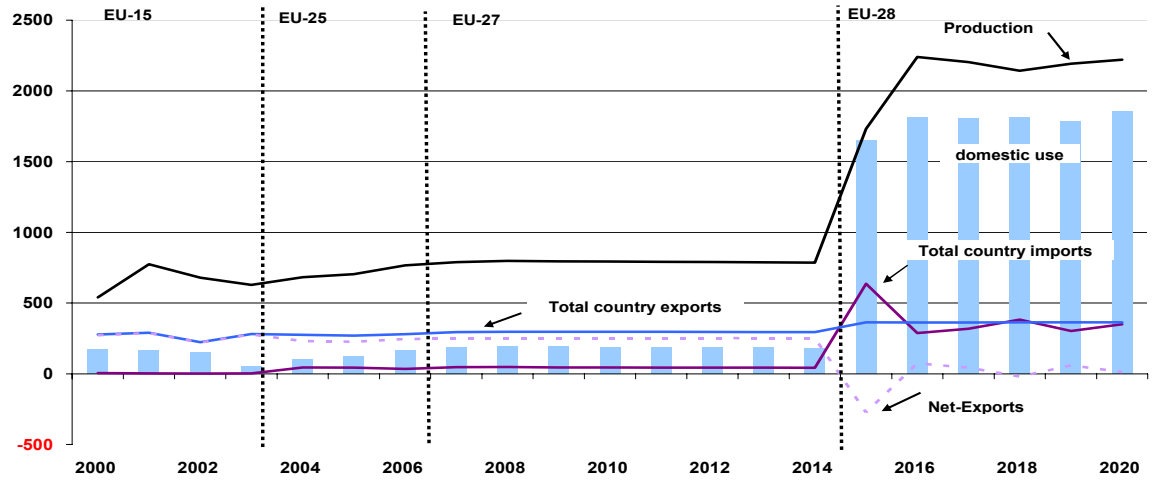


Figure 6.16: Apple production and domestic use (million tonnes) in EU15, EU25, EU27 and EU28, 2000-2020

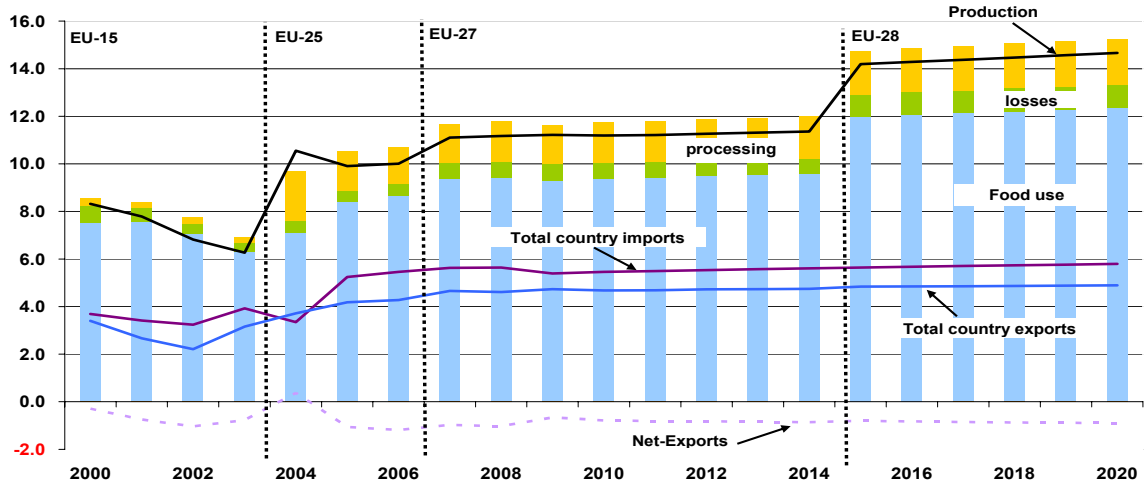


Figure 6.17: Tomato production and domestic use (million tonnes) in EU15, EU25, EU27 and EU28, 2000-2020

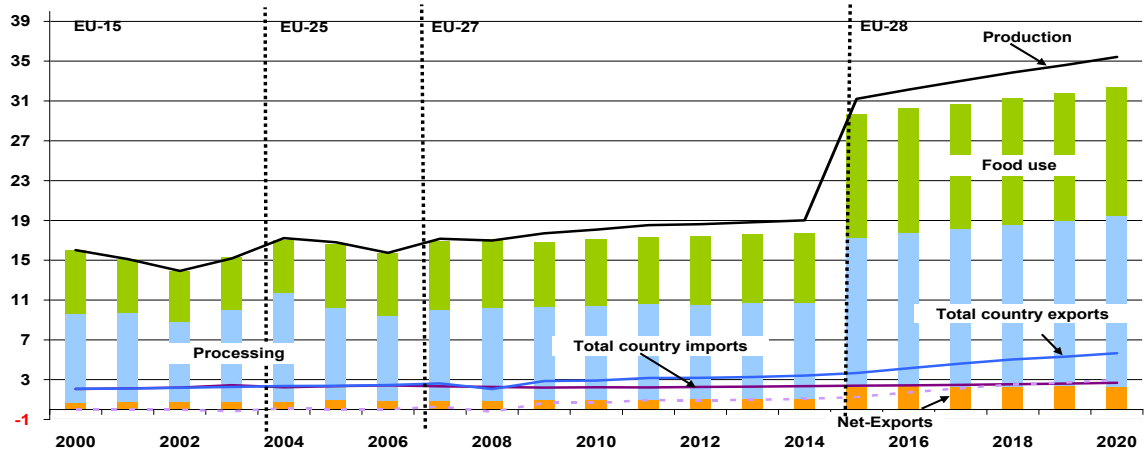
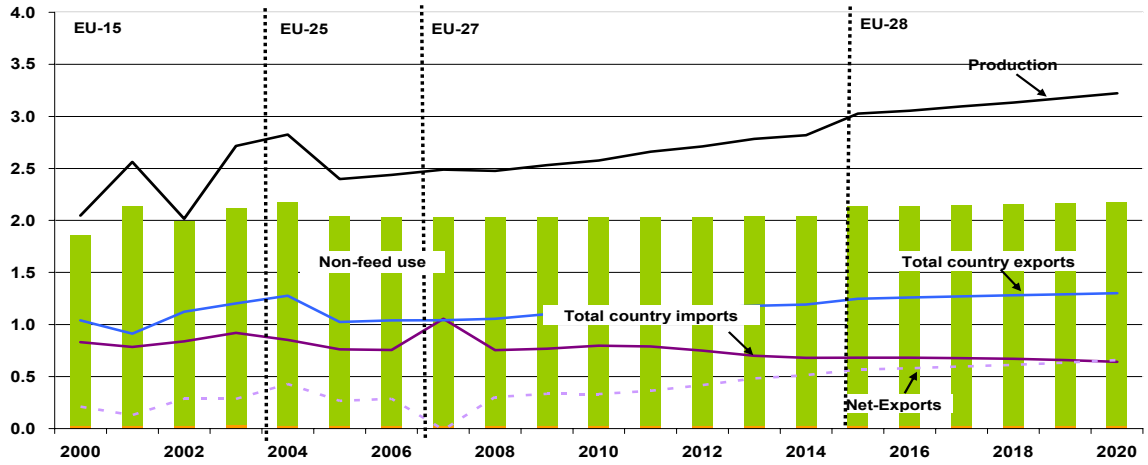


Figure 6.18: Olive oil production and domestic use (million tonnes) in EU15, EU25, EU27 and EU28, 2000-2020



6.2.3 Livestock and meat

In 2020 total meat production in the enlarged EU is projected to increase by 6% from 45 million tonnes under the baseline to 48 million tonnes under the accession scenario. In comparison with the baseline scenario, the poultry and sheep meat production in the EU are both expected to increase by 15% in 2020, whereas beef production in the EU is projected to increase by 7%. Even though pig meat is nearly not produced in Turkey, the EU pig meat production will slightly decline due to the expected higher EU feed stuff prices when Turkey joins the EU. At the same time, the EU meat consumption per head is projected to decline by 9%, in particular due to less demand for poultry and pork (-14% each) and beef (-7%), induced by the lower intakes per capita of the Turkish population compared to the EU27 averages.

The medium-term outlooks for beef and veal, poultry and sheep meat in the EU are presented in Figures 6.19 to 6.21. The importance of Turkey for the EU results is in particular highlighted in the situation of sheep meat and poultry. Up to the year 2014 the pictures are exactly similar to their respective Figures in section 5.2.3 as both cases represent the EU27, whereas the period 2015-2020 shows projections for the EU28. In the post accession period, the net export position of the EU is expected to decline for eggs and sheep meat due to the

excess demand situation in Turkey. On the other hand, the net export position of the EU is projected to increase for poultry due to the relatively high Turkish self-sufficiency rate.

Figure 6.19: Beef and veal production and domestic use (1,000 tonnes) in EU15, EU25, EU27 and EU28, 2000-2020

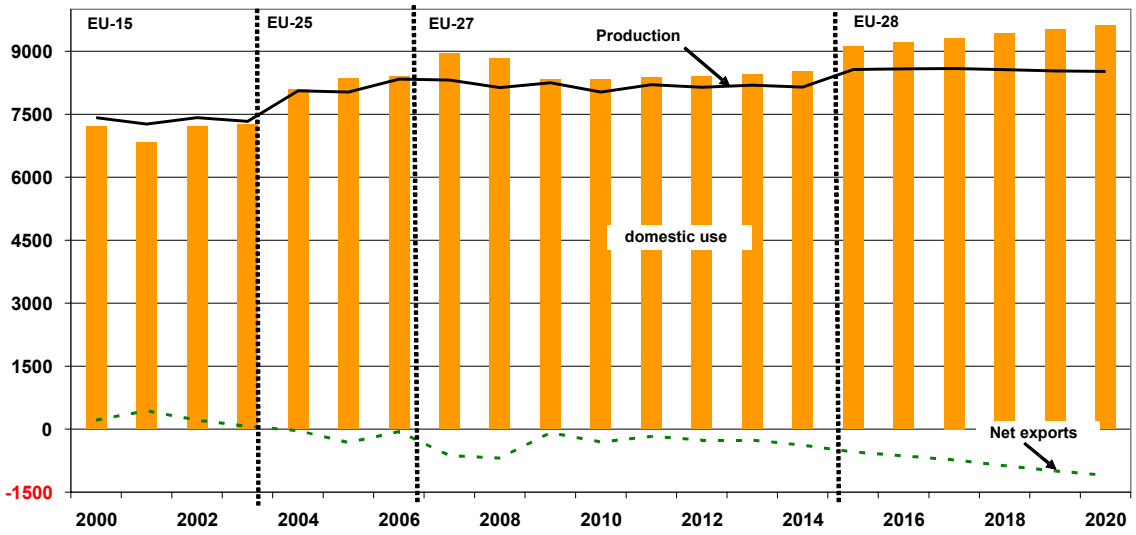


Figure 6.20: Sheep meat production and domestic use (1,000 tonnes) in EU15, EU25, EU27 and EU28, 2000-202

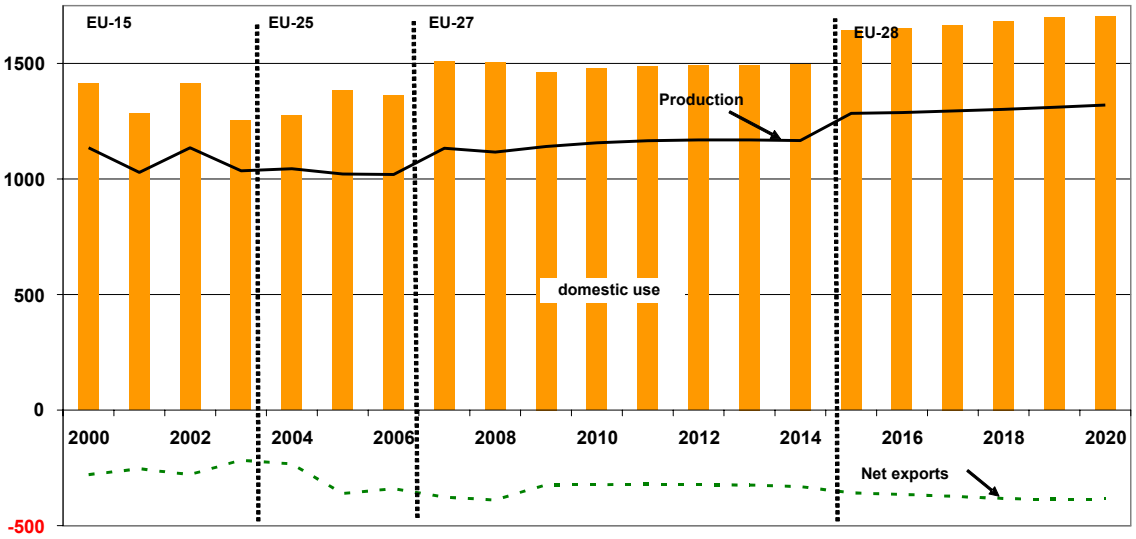
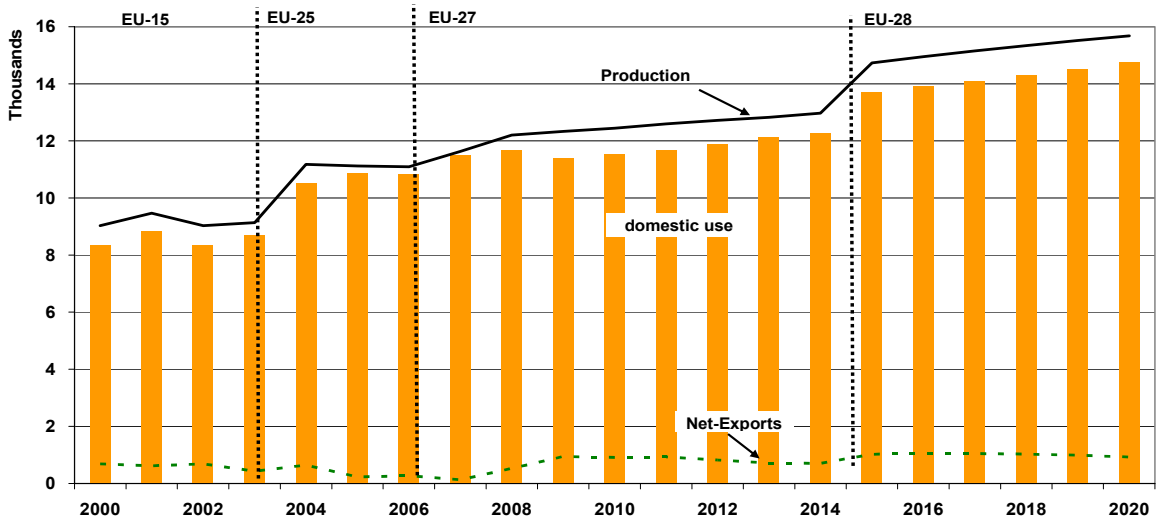


Figure 6.21: Poultry production and domestic use (1,000 tonnes) in EU15, EU25, EU27 and EU28, 2000-2020



6.2.4 Milk and dairy products

Turkey is a significant milk producer and thus with the accession of Turkey to the EU, milk production in the EU is projected to increase by 14.4 million tonnes in 2020 compared to the baseline. In the baseline, the Turkish milk sector was nearly self-sufficient. Self-sufficiency rates for dairy products in the expanded EU28 are projected to decline slightly when compared with the projected levels for the EU27 in the baseline scenario – this is mostly because consumption of most milk products is projected to increase due to the reduction in milk product prices. As a result of the lower level of EU self-sufficiency, EU dairy commodity prices are projected to slightly increase under the accession scenario. The medium-term outlook for EU butter and cheese commodity markets under the accession scenario is presented in Figures 6.22 and 6.23.

Figure 6.22: Butter production and domestic use (1,000 tonnes) in EU15, EU25, EU27 and EU28, 2000-2020

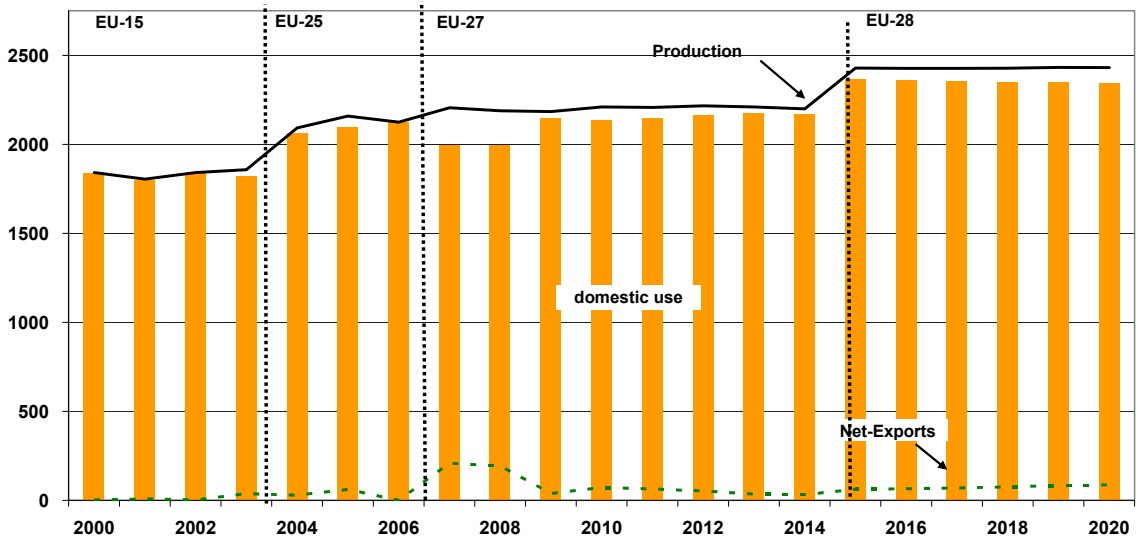
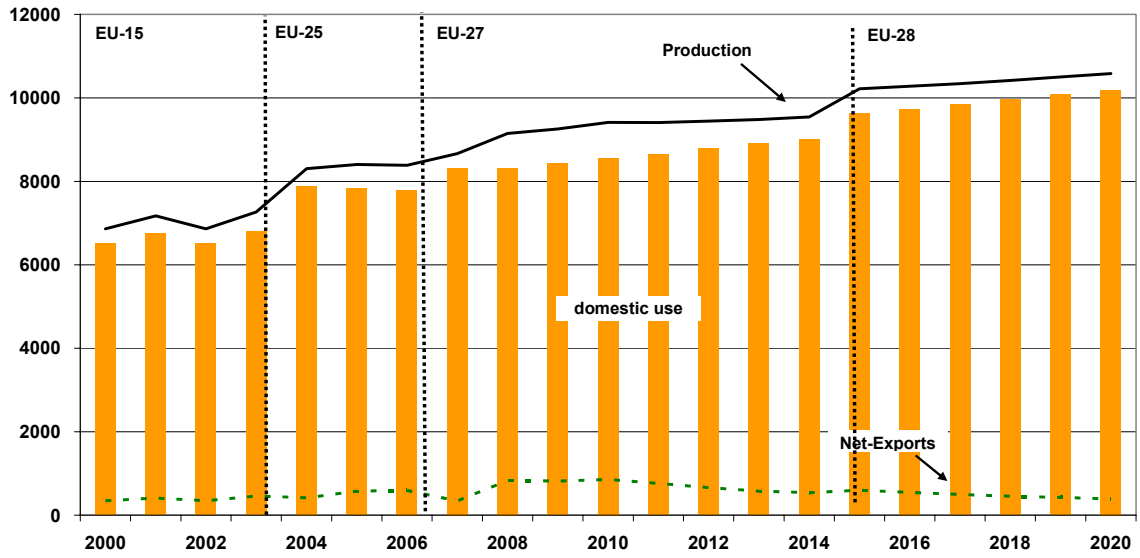


Figure 6.23: Cheese production and domestic use (1,000 tonnes) in EU15, EU25, EU27 and EU28, 2000-2020



6.3 Turkish farm sector income and EU net trade

This section estimates some preliminary accession effects for farm sector incomes in Turkey by comparing the market returns and policy support of commodities as projected in the baseline and accession scenarios. The last columns of Table 6.2 (crops) and Table 6.3 (livestock) show accession impacts on the gross net farm revenues of sectors in 2020 as far as revenue and cost items are captured by the Turkish AGMEMOD model.

Under the accession scenario, the amount of policy support allocated to the Turkish crop sectors is in general less than under the baseline where Turkish agricultural policy and its supports for production prevailed. Only the policy support for tobacco and cotton is expected to be higher in the assumed accession situation as these remain either partly (tobacco) or fully (cotton) coupled to production. It is assumed that the costs per unit crop production will not change between the baseline and accession scenarios. According to this background, Turkish tobacco farmers are the only group that would gain from a Turkish accession to the EU by showing 17% higher gross farm revenues in 2020 relative to the baseline.

Table 6.2: Accession impacts (million TL) on gross net farm revenues for crop sectors in Turkey in 2020

	Baseline	Accession	Accession impact		Baseline	Accession	Accession impact
Soft wheat				**Tobacco**			
market returns	*13,583*	*7,281*	*-46%*	*market returns*	*711*	*335*	*-53%*
policy support	*2,569*	*501*	*-81%*	*policy support*	*21*	*518*	*2382%*
Gross farm sector revenues	16,152	7,781	-52%	Gross farm sector revenues	732	853	17%
Durum wheat				**Cotton**			
market returns	*3,867*	*4,141*	*7%*	*market returns*	*5,344*	*3,959*	*-26%*
policy support	*692*	*133*	*-81%*	*policy support*	*857*	*1,084*	*26%*
Gross farm sector revenues	4,559	4,274	-6%	Gross farm sector revenues	6,201	5,042	-19%
Barley				**Tomatoes**			
market returns	*6,245*	*3,551*	*-43%*	*market returns*	*12,156*	*12,313*	*1%*
policy support	*1,119*	*246*	*-78%*	*policy support*	*2052*	*27*	*-99%*
Gross farm sector revenues	7,364	3,797	-48%	Gross farm sector revenues	14,208	12,340	-13%

	Baseline	Accession	Accession impact
Rice			
market returns	*444*	*347*	*-22%*
policy support	*101*	*9*	*-91%*
Gross farm sector revenues	546	357	-35%
Sun seed			
market returns	*1,638*	*1,168*	*-29%*
policy support	*404*	*37*	*-91%*
Gross farm sector revenues	2,042	1,205	-41%
Potatoes			
market returns	*2,353*	*787*	*-67%*
policy support	*298*	*5*	*-98%*
Gross farm sector revenues	2,651	792	-70%
Sugar beets			
market returns	*4,916*	*1,390*	*-72%*
policy support	*56*	*17*	*-69%*
Gross farm sector revenues	4,971	1,407	-72%
Olive oil			
market returns	*862*	*551*	*-36%*
policy support	*615*	*60*	
Gross farm sector revenues	1,477	610	-59%
Oranges			
market returns	*1,768*	*1,397*	*-21%*
policy support	*0*	*3*	
Gross farm sector revenues	1,768	1,400	-21%
Apples			
market returns	*4,366*	*3,487*	*-20%*
policy support	*0*	*10*	
Gross farm sector revenues	4,366	3,497	-21%

Table 6.3: Accession impacts (million TL) on gross net farm revenues for livestock sectors in Turkey in 2020

	Baseline	Accession	Accession impact
Beef			
market returns	*9996*	*6838*	*-32%*
policy support	*884*	*110*	*-88%*
Total farm revenues	10879	6948	-36%
-/- feed costs	*1072*	*690*	*-36%*
-/- other costs	*611*	*611*	*0%*
Total farm costs	1683	1301	-23%
Gross farm sector revenues (revenue-/-cost)	9197	5647	-39%
Sheep meat			
market returns	*1848*	*2199*	*19%*
policy support	*208*	*375*	*80%*
Total farm revenues	2056	2574	25%
-/- feed costs	*417*	*347*	*-17%*
-/- other costs	*304*	*394*	*29%*
Total farm costs	721	740	3%
Gross farm sector revenues (revenue-/-cost)	1336	1834	37%
Poultry			
market returns	*9259*	*13281*	*43%*
policy support	*0*	*0*	
Total farm revenues	9259	13281	43%
-/- feed costs	*2790*	*1968*	*-29%*
-/- other costs	*1319*	*1446*	*10%*
Total farm costs	4109	3415	-17%
Gross farm sector revenues (revenue-/-cost)	5149	9867	92%
Eggs			
market returns	*3169*	*2507*	*-21%*
policy support	*0*	*0*	
Total farm revenues	3169	2507	-21%
-/- feed costs	*1779*	*1290*	*-27%*
-/- other costs	*311*	*351*	*13%*
Total farm costs	2091	1642	-21%
Gross farm sector revenues (revenue-/-cost)	1078	866	-20%
Milk			
market returns	*12636*	*11106*	*-12%*
policy support	*846*	*155*	*-82%*
Total farm revenues	13482	11261	-16%
-/- feed costs	*7515*	*4985*	*-34%*
-/- other costs	*4282*	*4416*	*3%*
Total farm costs	11797	9401	-20%
Gross farm sector revenues (revenue-/-cost)	1685	1860	10%

The comparison of the EU27 and EU28 markets (see Section 6.2) underlines the scale of the Turkish market (production and use) for crops and livestock products relative to the total EU. However, this doesn't mean that Turkey is self-sufficient for all these commodities at the moment it would join the EU. It is interesting to investigate whether deficits on Turkish markets could be filled from EU excess supply markets. Tables 6.4 and 6.5 provide an overview of the difference in net trade positions of both the Turkish and the EU crops and livestock commodities analysed between the baseline and accession scenario in 2020.

Under accession, the net export position for Turkish soft wheat, barley, maize, rice, sunflowers, soybeans, potatoes, oranges, apples and olive oil is projected to diminish in 2020 in relation to the baseline (Table 6.4). Following a Turkish accession, the EU net exports for barley, maize, rice and sunflower seeds are expected to increase, whereas the EU net exports for wheat, rapeseeds and potatoes are projected to decrease. This means that the deteriorated Turkish net import position for barley, maize, rice and sunflower seeds could partly be filled by the increased EU27 excess supply position of these commodity markets. On the other hand, the increased Turkey excess supply for tomatoes could be used to come in place for the reduced availability of net exports on the EU27 tomato market in 2020 in the accession scenario.

Table 6.4: Accession impact on net trade (million tonnes) of crops in EU27 and Turkey, 2020

	EU27	Turkey		EU27	Turkey
Soft wheat	-80	-807	Potatoes	-69	-2622
Durum wheat	-36	68	Sugar beets	7	0
Barley	358	-1688	Tobacco	0	6
Maize	249	-1723	Cotton lint	-5	179
Rice	47	-153	Tomatoes	-67	1078
Rapeseed	-17	11	Orange	-7	-64
Sunflower seed	2	-57	Apples	-7	-7
Soybeans	-2	-61	Olive oil	0	-6

Under accession, the net export position for Turkish beef, sheep meat and eggs is projected to decrease in 2020 in relation to the baseline (Table 6.5). As the EU27 shows similar net trade positions for the respective livestock commodity markets under accession in 2020, the increased shortages on the Turkey markets should be filled from non EU regions.

Table 6.5: Accession impact on net trade (million tonnes) of livestock and dairy products in EU27 and Turkey, 2020

	EU27	Turkey		EU27	Turkey
Beef	-80	-118	Butter	-4	6
Pork	13	0	Skim milk powder	-6	0
Sheep meat	-11	-11	Whole milk powder	-45	-4
Poultry	390	322	Cheese	20	31
Eggs	-364	-290	Other fresh products	-83	68

6.4 Remark on the Turkish crops covered in the study

Not all important crops are sufficiently covered in the Turkish AGMEMOD model. Table 6.6 shows the observed production value of crops in Turkey in 2008 and the percentage of these products covered by the Turkish AGMEMOD model.

Table 6.6: *Production value of crops in Turkey (billion TL) and % covered by AGMEMOD, 2008*

	Observed in 2008	% in AGMEMOD
Cereals, oilseeds, root crops, industrial crops	18.3	92.9%
Vegetables	16.0	38.7%
Fruits	20.6	29.0%
Total crops	54.9	53.1%

As can be seen in Table 6.6, the group with cereals, oilseeds, root and industrial crops seems to be sufficiently involved in AGMEMOD. On the contrary, in particular the commodity coverage of the vegetables and fruits markets in the model seems to be not broad enough to take account of the actually important role these sectors play in Turkish agriculture. Only 39% of the Turkish vegetables (just tomatoes) and 29% of fruits (just oranges, apples and oranges) have been modelled in the AGMEMOD Turkey model. Other products such as cucumber, peppers, hazelnuts and grapes are also important elements of Turkish agriculture. As these are important export commodities of Turkey, it can be assumed that an inclusion of these products would also have an impact on the outcome of the accession scenario.

6.5 Comparison with other Turkish EU accession studies

This section briefly compares the accession effects found in this study with the impacts obtained in other studies on the potential Turkish accession to the EU.

Grethe (2004) analyzed the effects of including the Turkish agricultural sector in the terms of the Customs Union, which was established between Turkey and the EU in 1996 for non-agricultural goods and services. For the analysis of the Turkish agriculture sector Grethe used a comparative static, partial equilibrium model (TURKSIM). The main conclusion of this study was that, compared to a continuation of pre-existing policies, the liberalisation of agricultural and food trade between Turkey and the EU would generate welfare gains due to lower commodity prices and higher consumer demands (welfare gains to Turkish consumers outweigh welfare losses). However, Grethe did not analyse the impacts on EU agriculture.

Karaca and Philippidis (2008) investigated the economic impact of a Turkish accession to the EU on the Turkish agricultural sector using the Global Trade Analysis Project (GTAP) model. They looked at sector reallocations if all tariff barriers between the Turkey and EU were abolished and all economic sectors in Turkey get the same level of protection against imports of third countries. In general, this scenario is expected to give welfare gains and production increases in most agricultural sectors compared to the status quo situation, whereas manufacturing and services will lose. This result contrasts with the results presented in this report, as in the report at hand accession to the EU is expected to affect the production of most agricultural output in Turkey negatively.

Togan, Bayener and Nash (2005) analyzed the impact of a Turkish accession to the EU on the agricultural markets and incomes of Turkey. They used a partial equilibrium model which covers wheat, barley, maize, sunflower, sugar beet, potatoes, grapes, milk, beef, poultry and bovine meat. Main findings of Togan et al. are that the impact of Turkish accession to the EU

would be expected to be negative for incomes of Turkish farmers and that Turkish agricultural product prices would converge with those of the EU.

Table 6.7: Accession impacts on main agricultural markets in Turkey, various studies

	Koç et al. (2008)	**Grethe (2004)**	**Karaca et al. (2008)**	**AGMEMOD (2010)**
Wheat	price: -44% prod: -5% cons: 1%	price: -11% prod: -5% (cereals)	price: 0.5% prod: -3%	price: -39% prod: -11% cons: -5%
Barley	price: -29% prod: 2%			price: -41% prod: -4% cons: 11%
Maize	price: -44% prod: -13% cons: 6%			price: -36% prod: -21% cons: 10%
Rice	price: -50% prod: -40% cons: --			price: -16% prod: -24% cons: 4%
Sunflower	price: -35% prod: 20% cons: 30%		price: 4% prod: 8%	price: -29% prod: 1% cons: 4%
Sugar			price: 4% prod: 9%	price:-55% prod: -27% cons: 15%
Tobacco	price: - prod: -		price: -8% prod: 2.4%	price: -56% prod: 8% cons: 1%
Cotton	prod: +			price: -38% prod: 20% cons: 4%
Tomatoes	price: +	price: -0.4% prod: -0.3% (vegetables)	price: 1% prod: - (vegetables, fruit)	price: -6% prod: 8% cons: 0.2%
Oranges		price: 0% prod: 0.5% (fruit)		price: -19% prod: 0.3% cons :5%
Milk	price: + prod: 15%	price: -11% prod: -4% (animal products)	price: -0.2% prod: 1%	price: -15% prod: 3%
Beef	price: -30% prod: +17% cons: +		price: 0.5% prod: 88% (meat)	price: -32% prod: - cons: 20%
Poultry	price: +20% prod: +15% cons: +			price: 31% prod: 10% cons: -8%

Burrell and Kurzweil (2007) evaluated the agricultural policies that have been applied in Turkey during the recent decades (1961-2007). They examined the extent to which these policies may have distorted incentives faced by Turkish farmers and attempted to explain the underlying forces that drove the Turkish agricultural policy formation process and results. Burrell and Kurzweil concluded that the Turkish agricultural sector experienced recurrent negative real income growth over the period they studied, even though the Turkish

agricultural sector as a whole was heavily supported since the late 1980s. This findings contrast with the experience in earlier decades when the agricultural sector was not supported. However, Burrell and Kurzweil found that a large part of the support ostensibly provided to agriculture did not reach Turkish farmers, and instead was captured higher up the value chain.

Eruygur and Çakmak (2005) investigated the effects of a full liberalization of agricultural trade between Turkey and the EU and the implementation of a common external tariff. They estimated the trade diversion and creation effects of Turkey's membership for agricultural trade and concluded that EU countries would gain in case of an enlargement. Eruygur and Çakmak found that Turkey's imports of agro-food products would increase by 12%, but they did not report on exports of these products.

In general, the impact results obtained with the AGMEMOD model developed in this study look similar to the outcomes of an earlier study conducted by Koç, Isık and Erdem (2008). Koç et al. used a partial equilibrium model as well as assumptions on policy variable changes after Turkish accession to the EU, that are similar to those used in this study. With the exception of cotton, sunflower and barley production, they found that the production of arable crops in Turkey would decline because the prices of these commodities would decline sharply following accession to the EU. Moreover, with the exception of production of beef, Koç et al. expect the production of other animal products to increase in Turkey in the post accession period.

7 Conclusions and recommendations for further research

This final chapter presents the main conclusions of the study "Extension of the AGMEMOD model towards Turkey and accession scenarios" with regard to data compilation and parameter estimation for the Turkish model, the current agricultural policy in Turkey, and the main results of the baseline and Turkish accession scenario (section 7.1). In section 7.2 some recommendations for further research on the topic are delineated.

7.1 Conclusions

This study examined the impact of a Turkish accession to the EU on the agricultural sectors in Turkey and the EU. AGMEMOD, an econometric, dynamic, multi-country, multi-market, partial equilibrium economic model of EU agriculture at the Member State level, has been extended with a Turkish model and then applied to gain quantitative insights into the impacts of a potential Turkish accession to the EU.

To establish a model for Turkey, as for any other candidate country, the implementation of the model equations requires parameter estimates, or if econometric estimation is not possible, the specification of synthetic model parameters. In order to estimate such model parameters and to build an operational Turkish agriculture sector model, a database with time series data on Turkish agricultural production, market balances and prices, macroeconomic variables and policy variables had to be developed.

Data compilation and parameter estimation for the Turkish model

The following conclusions can be derived from the process of data compilation and parameter estimation for the Turkish model:

- Turkey is characterised by a differentiated agriculture that covers also nearly all sectors of the EU agriculture. There is a strong focus on plant production in general and on the production of fruits and vegetables in particular;
- Turkey is in the process of concentrating its statistical collection and dissemination effort at the Turkish Statistical Institute. Considerable knowledge is required to compile data of requisite quality, while long time series are needed to conduct parameter estimates. Changes in the ways in which data were collected in the past leads to issues in the comparability of data through time. Consequently, estimates are hampered by the presence of 'structural' and/or technical breaks in the data series. In this study the collection of data and development of coherent data sets on the Turkish animal sectors proved to be the biggest challenge. The Turkish Statistical Institute has acknowledged the problems identified by this study and are in the process of revising their data on Turkey's animal sectors with help of experts.
- Turkish and EU data are sometimes difficult to compare, e.g. balances for dairy products are compiled in milk equivalents in Turkey while they are compiled in product weights in the EU statistics. Such differences and difficulties encountered in attempting to reconcile these dataset can hamper the evaluation of policy reforms across these two regions.
- Turkish dairy data is currently under revision with the aim to provide more harmonised information. The Turkish Statistical Institute is now obliged to produce detailed supply and use data for dairy that meet EU standards, however these data have not yet been produced. The data used in this study have been compiled from numerous different sources and are based on several assumptions. When more consistent and harmonised data

are made available from the Turkish Statistical Institute this should allow for the improvement of the modelling of the Turkish dairy market.

- Since 2001/02, the Turkish Statistical Institute generates supply and use balance data for crops. In contrast, production data for cattle, beef and veal, small ruminant, mutton and lamb are still incomplete, with better information expected to become available in 2011.
- High inflation rates, large currency depreciations, high and variable economic growth rates, a relatively young population and high unemployment rates are characteristics of the Turkish economy. The first three of these macroeconomic factors significantly influenced the modelling undertaken as part of this study, in that they gave rise to issues such as: how to deal with the very high inflation rates that occurred over the sample period used to estimate the Turkish AGMEMOD model? Should deflated Turkish prices or instead prices expressed in a different currency be used? Which price deflator should be used? In the context of very high inflation, does the use of a GDP deflator as opposed to a consumption price index lead to comparable results?

Current agricultural policy in Turkey

To simulate the impacts of a potential Turkish accession to the EU, a detailed inventory and analysis of agricultural policy in Turkey was carried out and times series of the Turkey policy variables were compiled. This task proved to be particularly complicated as the collected policy information comes from a wide variety of sources. The collected information led to the following conclusions:

- As with the CAP of the EU, Turkish agricultural market policy has also been subject to regular policy reforms. However, Turkish policy reforms can be distinguished from those occurring in the EU by the very frequent policy adjustments which occur and which appear to be applied in an ad-hoc manner so as to counteract unwanted market developments.
- Especially for plant crops a wide range of policy instruments has been applied in Turkey, often linked to compliance obligations and often paid via the provision of input subsidies.
- The currently applied Turkish support prices 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, the ARIP was launched with the objective of liberalising Turkish agricultural markets, to remove input subsidies and to compensate farmers through the provision of less-distorting policy instruments (decoupled payments). Despite the reduction of the commodity output and the input based subsidies, the income impact of these changes has been entirely offset by the provision of direct income support payments to farmers. Turkey is now moving from decoupled direct income supports back to more coupled direct income and market price supports, while the EU is moving in the opposite direction.
- Turkish external agricultural and food trade is subject to import tariffs, tariff rate quotas and import bans on the import side and to export subsidies and a few export taxes on the export side. The main policy instruments that affect the Turkish domestic markets for agricultural commodities are output payments (premium and compensation payments), input subsidies such as diesel, fertiliser and seed payments and production quota. Most coupled support payments are limited to a maximum claim of 50 hectare.
- Due to the often yearly adjustments of the nominal value of support premiums in Turkey it is difficult to fix their future nominal values (as this is done in the baseline assumptions

used in EU Member States). For the baseline normally a status-quo of the last observed values is applied, unless a certain policy reform has already been agreed on. However, due to the high inflation rate prospects in Turkey, such an approach would most likely imply dramatic declines in the real value of support to Turkish agriculture over time. As a compromise, the nominal value of future support amounts in Turkey has been fixed in Euros, which is comparable to the approach applied to EU Member States of the non-Euro zone. High inflation would lead to a depreciation of the domestic currency versus the Euro and this would translate into higher domestic currency equivalents of the fixed Euro amounts. This is the case for all non-Euro zone EU Member States. For example in 2009, UK agricultural incomes increased almost exclusively due to the increased value in UK pounds of the fixed Euro supports provided for by the CAP as well as the increase in the UK pound value of exports to the Euro zone.

Main results of the baseline and accession scenarios

Scenario results are generated for Turkey, the individual EU Member States and the aggregates of EU15, EU12, EU27 and in the accession scenario also EU28. The main outcomes of the conducted baseline and accession scenario analysis are as follows:

- The Turkish agriculture is poorly structured and relatively inefficient. Furthermore, the sector suffers from problems such as land erosion, shortage of water and drought. The loss of soil fertility is one of the reasons that the expected growth of crop yields per hectare in the projection period remains limited in Turkey. Semi-subsistence farming hampers the emergence of market growth in the beef and dairy sectors.
- In the baseline most Turkish prices for crops, meat and dairy products are significantly above the EU and world market prices. These high price levels imply relatively high feed costs for Turkish meat and dairy producers. Turkish production of cotton, fruits and vegetables increase in the baseline due to the relatively high policy support levels. Vertically integrated large firms with low labour and land costs are projected to stimulate the broiler production in Turkey and domestic consumption levels.
- Turkish agricultural policy programs have aimed to reach self-sufficiency of agricultural production, these is also reflected in the baseline results for Turkey.
- The baseline assumption that future policy variables remain as currently defined means that the relationship between supply and demand on the Turkish market does not change fundamentally, with both variables 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, implying price reductions towards EU price levels when prices are expressed in Euros.
- By the end of the baseline projection period in 2020, the gap projected to exist between the higher Turkish prices and EU prices, while generally reduced, is sometimes still considerable.
- Previous accession experiences indicate that when domestic prices in acceding countries were markedly above the EU prices prior to accession (e.g. Finland, Sweden, Austria) then these prices quickly dropped to EU levels. In contrast, in acceding countries where domestic prices were lower than in the EU at the time of accession (as in most of the EU12 Member States acceding the EU in 2004 and 2007), it took quite some time before the prices converged. The converging process does not categorically provide a single EU price, with deficit regions mostly showing somewhat higher prices, e.g. the milk producer price in Italy. This high Italian price also reflects what the milk is used for: the production

of very high value cheeses. This contrasts with Ireland, where most of the milk is used to produce butter and milk powder. Besides the deficit versus surplus argument, the commodity mix is another explanation for the differences in prices in EU Member States.

- The principal 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 decline by 20%-50% as a result of accession to the EU. However, such reductions in Turkish producer prices give rise to other impacts.
- The direct premiums, output and input subsidy measures of Turkish agricultural policy as well as direct income support measures are all assumed to be abolished on accession to the EU, and Turkish producers will instead become eligible for EU decoupled and coupled supports defined by the CAP. The CAP support payments (which are mostly decoupled) generate smaller incentives to increase production than those payments which Turkish farmers receive in the baseline.
- The results of the accession scenario analysis for the Turkish animal sector indicate that even though a reduction in support for production will occur, this will not lead to dramatic changes in production levels when compared to the baseline situation. The general effect of the accession on Turkish livestock production is projected to be positive because the negative impact of the scenario on Turkish cereal prices results in lower feeding costs in Turkey. It has to be noted that total production costs will not decline to the same extent as feed costs due to the presence of non-feed items in the input bundles of Turkish livestock producers. These other costs are projected to largely remain constant in real terms, however, rising labour cost and rising land prices due to decoupled payments cannot be ruled out. A second impact of the decline in market prices is the associated positive impact that lower prices have on the level of Turkish consumption of agricultural and food goods.
- In general, with accession and hence adoption of the CAP, 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 is less in the accession scenario than in the baseline. The analysis in this report suggests that the supply of these commodities in Turkey will decline by between 20% and 40%. On the other hand, their demand levels are projected to increase.
- Tobacco, sheep meat and cotton are exceptions, as direct payments to these sectors are assumed to remain partly coupled in the event of Turkey's accession to the EU. This is projected to result in production growths for these commodities.
- The market effects of accession to the EU are projected to be mostly negative for the Turkish crop sectors because market prices and produced quantities are both projected to decline in the accession scenario when compared to the baseline. With the lower prices and quantities produced, agricultural producer income is reduced for almost all commodities in Turkey. However, Turkish producers of tobacco (more support compared to the baseline scenario), sheep meat, broiler and dairy milk (lower feed costs for livestock sectors compared to the baseline) could gain from an accession.

When looking at the results of the accession scenario it has to be recalled that the analysis presented in this report is by construction partial, in that it focuses on the agricultural and food sector and ignores the impact of Turkey's accession to the EU on the non-agricultural part of the Turkish economy. As a matter of course these effects should not be ignored and will in all likelihood dwarf the impact on the agricultural sector. In general, EU enlargements imply more trade and higher economic growth for the whole economy. That process would also affect agricultural production costs and demand for the output of Turkish agriculture;

however such implications have not been covered in the accession scenario of this study. Another issue not covered in this study relates to possible efficiency gains following accession, which may induce higher progress rates due to better access to knowledge and investments. In turn, such progress can be expected to generate higher yield increases and lower costs in the agricultural sector of Turkey.

7.2 Recommendations for further research

In the accession scenario, it is assumed that Turkey enters the EU on 1 January 2015. This date is not regarded as a likely date but was chosen for technical reasons, as AGMEMOD needs a certain time span to evolve and begin to show the impact of such a scenario (2020 is the end year of the projected period). This means that the accession date chosen for the modelling exercise does not reflect any political decision. An important objective of this study was to develop a model that can be augmented and improved as more detailed information about the terms of a possible future accession of Turkey to the EU become available. From this perspective, the assumptions made in this study about the characteristics of the accession process are kept simple and transparent. The carefully equipped Turkey model should now be capable of more detailed accession scenario analysis as the details of the accession terms emerge in the future.

The Turkish entry into the EU is expected to reduce the currently existing socio-economic development gap between both regions and to boost the macroeconomic growth rate in both Turkey and the EU. However, even though Burrell and Oskam (2005) also argue for a positive impact from a future accession of Turkey to the EU, they expect that the economic gains would be low for both the Turkish countryside and the broader European economy. Such different opinions on the accession effects point out the significance of assumptions on economic, agricultural and agricultural trade policy underlying the Turkish accession scenario, since some of the differences in expectations of the impact of accession are based on differing assumptions concerning the policy changes implied by accession. As there is no evidence yet about if and how the CAP would probably be reformed given the prospect of Turkish accession, EU policy has been kept unchanged in the accession and baseline scenarios of this study (i.e. they reflect the Health Check agreement). If, as done in our accession scenario, Turkish producers receive the same direct income support as presently provided to Greek producers, this would significantly increase the pressure on the EU budget. Therefore it could be interesting to apply some sensitivity analysis with regard to further CAP reforms (e.g. regarding the cotton and tobacco regime) or to an adjustment of the EU budgetary ceiling.

Another uncertainty with respect to the future budget costs of the Turkish accession is related to the exchange rate between the TL and the Euro at the moment of accession and beyond. At the time of accession, 2015 in our accession scenario, a crucial issue will be the level of Turkey's GDP (when converted to Euros) relative to that of the then existing members of the EU. This ratio will in large measure determine Turkey's contribution to the EU budget. Thus, a sensitivity analysis with different TL/Euro exchange rates could be meaningful to investigate the accession cost effects.

Some important elements of Turkish agriculture such as cucumber, peppers, hazelnuts and grapes are not covered in the current AGMEMOD model for Turkey. As these are also important export commodities of Turkey the commodity coverage of the vegetables and fruits markets in the model seems to be actually not broad enough to take fully account of the important role these sectors play in Turkish agriculture. Therefore it might be interesting to extend the modelling framework to also account for these products.

Since 2001/02, the Turkish Statistical Institute has started to generate supply and use balance

data for crops. However, supply and use data for livestock have not yet been released. These data are expected to be published in 2011. In addition, the Turkish Statistical Institute has been obliged to produce detailed supply and use data for dairy that meets EU data. With better data being available a future challenge would be to improve the production data for cattle, beef and veal, small ruminant, mutton and lamb and dairy in the AGMEMOD Turkey database and to re-estimate these commodity market models and to generate new baseline and scenario projections.

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Annex: Agricultural commodity results in baseline and accession scenarios

Table A.1: Baseline projections and accession impact for cereal markets in Turkey, 2000-2020

		Baseline					Baseline 2000-2020 (%growth/yr)	Accession impact in 2020 (%)
		2000	2005	2010	2015	2020		
Total grains								
Production	1,000 ton	32,109	36232	37066	36905	37349	0.8%	-9.4%
Area harvested	1,000 ha	13,963	13893	13958	13863	13793	-0.1%	0.6%
Domestic Use	1,000 ton	33,611	36533	37642	42752	48393	1.8%	1.8%
Soft wheat								
Production	1,000 ton	17,008	17000	17142	17115	17192	0.1%	-11.3%
Area harvested	1,000 ha	7,479	7250	7405	7304	7264	-0.1%	1.2%
Yield per hectare	tonne/ha	2.3	2.3	2.3	2.3	2.4	0.2%	-12.4%
Domestic Use	1,000 ton	17,001	17031	17268	20186	23855	1.7%	-4.8%
Price	TL/100kg	16.8	21.1	23.9	23.2	21.9	1.3%	-39.6%
Durum wheat								
Production	1,000 ton	3,992	4500	4557	4674	4795	0.9%	3.6%
Area harvested	1,000 ha	1,921	2000	1914	1898	1888	-0.1%	3.2%
Yield per hectare	tonne/ha	2.1	2.3	2.4	2.5	2.5	1.0%	0.3%
Domestic Use	1,000 ton	3,182	4280	4002	3935	3814	0.9%	2.7%
Price	TL/100kg	17.9	21.8	24.5	23.7	22.3	1.1%	3.4%
Barley								
Production	1,000 ton	8,000	9500	9541	9456	9408	0.8%	-4.3%
Area harvested	1,000 ha	3,629	3650	3657	3630	3609	0.0%	-0.1%
Yield per hectare	tonne/ha	2.2	2.6	2.6	2.6	2.6	0.8%	-4.3%
Domestic Use	1,000 ton	9,079	9171	9659	10875	11871	1.3%	10.8%
Price	TL/100kg	14.1	17.3	20.0	19.4	18.4	1.3%	-40.6%
Maize								
Production	1,000 ton	2,300	4200	4722	4447	4712	3.7%	-21.4%
Area harvested	1,000 ha	555	600	576	585	589	0.3%	0.2%
Yield per hectare	tonne/ha	4.1	7.0	8.2	7.6	8.0	3.3%	-21.6%
Domestic Use	1,000 ton	3,153	4697	5318	6177	7134	4.2%	10.0%
Price	TL/100kg	18.5	22.1	22.6	21.9	20.7	0.5%	-35.7%
Rye								
Production	1,000 ton	260	270	293	311	330	1.2%	-7.3%
Area harvested	1,000 ha	147	130	147	146	146	0.0%	-7.1%
Yield per hectare	tonne/ha	1.8	2.1	2.0	2.1	2.3	1.2%	-0.2%
Domestic Use	1,000 ton	296	327	365	409	447	2.1%	-8.4%
Price	TL/100kg	12.3	15.9	17.1	16.5	15.5	1.2%	-33.0%

Source: AGMEMOD combined model (2010)

Table A.2: Baseline projections and accession impact for oilseeds markets in Turkey, 2000-2020

		Baseline					Baseline 2000-2020 (%growth/yr)	Accession impact in 2020 (%)
		2000	2005	2010	2015	2020		
Total oilseeds								
Production	1,000 ton	845	1,005	1,011	1,163	1,335	2.3%	2.7%
Area harvested	1,000 ha	557	575	557	594	626	0.6%	1.9%
Domestic Use	1,000 ton	1,777	2,708	3,224	3,626	4,022	4.2%	3.6%
Rapeseed								
Production	1,000 ton	0	1	97	172.9	290.2	44.4%	7.9%
Area harvested	1,000 ha	0	1	33	52	79	41.0%	7.9%
Yield per hectare	tonne/ha	2.3	1.7	3.0	3.3	3.7	2.4%	0.0%
Domestic Use	1,000 ton	24	66	309	348	410	15.2%	2.9%
Price	TL/100kg	30.2	26.7	31.3	34.0	33.7	0.5%	-0.2%
Sunflower								
Production	1,000 ton	800	975	879	953	1006	1.2%	0.7%
Area harvested	1,000 ha	542	566	515	533	537	0.0%	0.8%
Yield per hectare	tonne/ha	1.5	1.7	1.7	1.8	1.9	1.2%	0.0%
Domestic Use	1,000 ton	1,322	1458	1543	1641	1733	1.4%	3.7%
Price	TL/100kg	51.0	50.5	42.3	46.4	45.0	-0.6%	-29.2%
Soybeans								
Production	1,000 ton	45	29	34	37	39	-0.6%	15.9%
Area harvested	1,000 ha	15	9	9	10	10	-2.0%	15.8%
Yield per hectare	tonne/ha	3.0	3.4	3.8	3.9	3.9	1.4%	0.1%
Domestic Use	1,000 ton	431	1184	1371	1637	1880	7.6%	3.6%
Price	TL/100kg	26.5	28.7	27.3	30.8	29.6	0.6%	-0.1%

Source: AGMEMOD combined model (2010)

Table A.3: Baseline projections and accession impact for root and industrial markets in Turkey, 2000-2020

		Baseline					Baseline 2000-2020 (%growth/yr)	Accession impact in 2020 (%)
		2000	2005	2010	2015	2020		
Total root and industrial crops								
Production	1,000 ton	25,271	20240	20623	20973	21514	-0.8%	-30.4%
Area harvested	1,000 ha	1,506	1221	1213	1218	1222	-1.0%	-7.3%
Domestic Use	1,000 ton	25,364	20892	20424	20949	21464	-0.8%	-19.1%
Potatoes								
Production	1,000 ton	5,370	4060	4479	4867	4962	-0.4%	-52.9%
Area harvested	1,000 ha	205	153	149	153	151	-1.5%	-42.2%
Yield per hectare	tonne/ha	26.2	26.6	30.1	31.8	32.9	1.1%	-18.6%
Domestic Use	1,000 ton	5,230	4069	4338	4524	4510	-0.7%	-0.1%
Price	TL/100kg	21.1	22.5	21.8	14.8	13.1	-2.3%	-29.0%
Sugar beets								
Production	1,000 ton	18,821	15181	15053	14901	15257	-1.0%	-27.2%
Area harvested	1,000 ha	410	336	334	336	344	-0.9%	-27.2%
Yield per hectare	tonne/ha	45.9	45.2	45.0	44.3	44.3	-0.2%	0.0%
Domestic Use	1,000 ton	18,873	15200	15068	14916	15272	-1.1%	-27.2%
Price	TL/tonne	6.5	6.7	8.0	9.1	8.9	1.6%	-61.2%
Sugar								
Production	1,000 ton	2,534	2070	2071	2050	2099	-0.9%	-27.2%
Domestic Use	1,000 ton	1,671	1713	1793	1869	2024	1.0%	14.8%
Price	TL/tonne	60.7	94.0	109.3	117.9	112.0	3.1%	-55.2%
Production	1,000 ton	25,271	20240	20623	20973	21514	-0.8%	-30.4%
Area harvested	1,000 ha	1,506	1221	1213	1218	1222	-1.0%	-7.3%
Tobacco								
Production	1,000 ton	200	135	130	101	89	-4.0%	7.8%
Area harvested	1,000 ha	237	185	171	138	129	-3.0%	-30.7%
Yield per hectare	tonne/ha	0.8	0.7	0.8	0.7	0.7	-1.0%	55.6%
Domestic Use	1,000 ton	118	123	75	67	58	-3.4%	0.7%
Price	TL/100kg	301.9	262.9	214.0	231.1	222.0	-1.5%	-56.2%
Cotton								
Production	1,000 ton	880	864	960	1104	1206	1.6%	19.5%
Area harvested	1,000 ha	654	547	560	591	599	-0.4%	17.9%
Yield per hectare	tonne/ha	1.3	1.6	1.7	1.9	2.0	2.0%	1.4%
Domestic Use	1,000 ton	1,143	1500	943	1442	1623	1.8%	3.5%
Price	TL/100kg	157.5	110.0	83.4	118.8	122.5	-1.2%	-38.0%

Source: AGMEMOD combined model (2010)

Table A.4: Baseline projections and accession impact for vegetables and fruit markets in Turkey, 2000-2020

		Baseline					Baseline 2000-2020 (%growth/yr)	Accession impact in 2020 (%)
		2000	2005	2010	2015	2020		
Tomatoes								
Production	1,000 ton	8,890	10050	11255	12500	14338	2.4%	7.7%
Area harvested	1,000 ha	225	270	312	332	365	2.5%	8.4%
Yield per hectare	tonne/ha	39.5	37.2	36.0	37.7	39.3	0.0%	-0.6%
Domestic Use	1,000 ton	8,770	9800	10701	11892	13689	2.3%	0.2%
Price	TL/100kg	25.6	25.5	27.3	26.3	23.5	-0.4%	-6.0%
Oranges								
Production	1,000 ton	1,070	1445	1663	1939	2118	3.5%	0.3%
Area harvested	1,000 ha	39	40	46	49	52	1.4%	-3.1%
Yield per hectare	tonne/ha	27.5	35.9	36.2	39.7	40.8	2.0%	3.6%
Domestic Use	1,000 ton	979	1319	1401	1510	1579	2.4%	4.5%
Price	TL/100kg	27.3	32.7	23.5	23.6	23.6	-0.7%	-19.5%
Apples								
Production	1,000 ton	2,400	2570	2602	2770	2966	1.1%	0.9%
Area harvested	1,000 ha	108	121	130	140	148	1.6%	-3.0%
Yield per hectare	tonne/ha	22.3	21.2	20.0	19.8	20.0	-0.5%	4.0%
Domestic Use	1,000 ton	2,391	2545	2556	2701	2888	0.9%	1.2%
Price	TL/100kg	39.1	48.6	37.6	40.2	38.4	-0.1%	-18.7%
Olive oil								
Production	1,000 ton	175	101	137	169	194	0.5%	-2.1%
Area harvested	1,000 ha	600	662	823	902	919	2.2%	-5.8%
Yield per hectare	tonne/ha	0.3	0.2	0.2	0.2	0.2	-1.6%	3.9%
Domestic Use	1,000 ton	73	50	70	89	115	2.3%	2.0%
Price	TL/100kg	193.3	299.3	164.9	143.5	122.8	-2.2%	-34.7%

Source: AGMEMOD combined model (2010)

Table A.5: Baseline projections and accession impact for livestock and meat markets in Turkey, 2000-2020

		Baseline					Baseline 2000-2020 (%growth/yr)	Accession impact in 2020 (%)
		2000	2005	2010	2015	2020		
Beef and veal								
Production	1,000 ton	355	322	444	496	584	2.5%	0.0%
Beef cows end stock	1,000 head	0	0	0	0	0	0.0%	0.0%
Slaughter weight	kg/animal	168.7	197.3	205.9	221.7	237.5	1.7%	0.0%
Domestic Use	1,000 ton	355	322	440	477	574	2.4%	20.5%
Consumption/head	kg/head	5.5	4.7	6.1	6.2	7.2	1.3%	20.5%
Price	TL/100kg	495.1	490.2	405.9	501.6	473.5	-0.2%	-31.6%
Pig meat								
Production	1,000 ton	0	0	0	0	0	0.0%	0.0%
Sows ending stock	1,000 head	0	0	0	0	0	0.0%	0.0%
Slaughter weight	kg/animal	0.0	0.0	0.0	0.0	0.0	0.0%	0.0%
Domestic Use	1,000 ton	0	0	0	0	0	0.0%	0.0%
Consumption/head	kg/head	0.0	0.0	0.0	0.0	0.0	0.0%	0.0%
Price	TL/100kg	0.0	0.0	0.0	0.0	0.0	0.0%	0.0%
Sheep meat								
Production	1,000 ton	111	74	101	119	137	1.1%	29.4%
Ewes ending stock	1,000 head	0	0	0	0	0	0.0%	0.0%
Slaughter weight	kg/animal	18.2	17.8	18.2	18.3	18.5	0.1%	-0.9%
Domestic use	1,000 ton	110	74	105	107	112	0.1%	45.7%
Consumption/head	kg/head	1.7	1.1	1.4	1.4	1.4	-1.0%	45.7%
Price	TL/100kg	488.6	521.1	484.4	431.4	372.0	-1.4%	-8.1%
Broiler								
Production	1,000 ton	639	926	1,234	1,551	1,875	5.5%	9.8%
Domestic use	1,000 ton	629	882	1,138	1,379	1,696	5.1%	-8.1%
Consumption/head	kg/head	9.8	12.9	15.7	18.0	21.1	3.9%	-8.1%
Price	TL/100kg	170.9	141.1	162.9	147.6	134.3	-1.2%	30.8%
Poultry meat								
Production	1,000 ton	19	43	31	31	31	2.5%	0.0%
Domestic use	1,000 ton	21	40	30	30	30	1.9%	0.0%
Consumption/head	kg/head	0.3	0.6	0.4	0.4	0.4	1.4%	0.0%
Price	TL/100kg	170.9	141.1	162.9	147.6	134.3	-1.2%	30.8%
Eggs								
Production	1,000 ton	844	753	782	875	942	0.5%	12.7%
Domestic use	1,000 ton	843	744	832	939	1,000	0.9%	41.0%
Consumption/head	kg/head	13.1	10.8	11.4	12.3	12.5	-0.3%	41.0%
Price	TL/100item	123.9	132.8	100.4	98.8	93.1	-1.4%	-29.8%

Source: AGMEMOD combined model (2010)

Table A.6: Baseline projections and accession impact for milk and dairy product markets in Turkey, 2000-2020

		Baseline					Baseline 2000-2020 (%growth/yr)	Accession impact in 2020 (%)
		2000	2005	2010	2015	2020		
Cow milk								
Production	1,000 ton	8,732	10,026	12,708	13,428	13,980	2.4%	3.1%
Dairy cow end stock	1,000 head	5,280	3,998	3,889	3,518	3,191	-2.5%	4.3%
Yield/cow	kg/cow	1,654	2,508	3,190	3,741	4,293	4.9%	0.3%
Consumption/head	kg/head	5.8	7.4	8.7	9.7	10.9	3.2%	10.1%
Price	TL/100kg	38.6	33.3	25.6	25.3	25.0	-2.1%	-14.8%
Butter								
Production	1,000 ton	133	158	177	205	233	2.8%	2.7%
Domestic use	1,000 ton	137	164	189	215	247	3.0%	0.3%
Consumption/head	kg/head	2.1	2.4	2.6	2.8	3.1	1.9%	0.3%
Price	TL/100kg	381.0	515.1	306.5	287.9	306.3	-1.1%	-11.2%
Cheese								
Production	1,000 ton	330	427	467	553	637	3.3%	4.8%
Domestic use	1,000 ton	331	419	466	539	648	3.4%	0.0%
Consumption/head	kg/head	5.2	6.1	6.4	7.0	8.1	2.3%	0.0%
Price	TL/100kg	724.0	579.8	485.0	487.2	470.0	-2.1%	-16.1%
Other fresh products								
Production	1,000 ton	1,972	2,242	2,319	2,635	2,938	2.0%	3.5%
Domestic use	1,000 ton	1,961	2,241	2,339	2,671	3,090	2.3%	1.2%
Consumption/head	kg/head	30.5	32.7	32.2	34.9	38.5	1.2%	1.2%
Price	TL/100kg	179.8	118.4	138.3	126.2	117.7	-2.1%	-10.9%

Source: AGMEMOD combined model (2010)

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Authors: M. van Leeuwen, P. Salamon, T. Fellmann, A. Koç, G. Bölük, A. Tabeau, R. Esposti, A. Bonfiglio, A. Lobianco and K. Hanrahan

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Abstract

This report provides an in-depth model based quantitative assessment of the potential impacts of an EU enlargement to Turkey for agricultural commodity markets in Turkey and the EU. For the purpose of the study a detailed dataset and modelling structure for the main agricultural commodities in the EU candidate country Turkey has been developed and integrated into the overall AGMEMOD modelling framework.

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