

Slovak Agriculture in the European Union¹

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Abstract

We build a Slovak sectoral dynamic partial equilibrium econometric model based on EU GOLD model. It is used to analyze the development of the Slovak agricultural markets after EU accession. Simulation results for cereals, oilseeds and meats are provided in this article. Two scenarios are analyzed: non-accession baseline and accession with adoption of single area payment scheme. EU accession is expected to increase prices of most products, the biggest increase of prices will occur in animal sector. Because of higher prices consumption will go down. Decrease of consumption will be mitigated by income growth. Production will not increase substantially due to decoupling of direct payments. Trade balance for majority of products will improve.

Keywords: *single area payment scheme, EU enlargement, Common Agricultural Policy, dynamic econometric model, commodity model*

JEL Classification: Q11, Q18

Introduction

There are many aspects how EU accession influences new member states, including Slovakia. First, accession eliminates barriers to free movement of goods, services, capital, and after a transition period also labour. Second, many

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regulatory powers are transferred from national to the EU level. Third, economic environment changes due to the adoption of *acquis communi autaire* and under the influence of Western informal rules of the „game“. Fourth, political stability in Europe increases.

European Union accession specifically influences agriculture. Changes in this sector are especially important as almost half of the EU budget is spent on agriculture. Agricultural sector has traditionally been strongly regulated by the supranational institutions within the Common Agricultural Policy (CAP).

European Union accession involves both changes in agricultural support level as well as support instruments used. Most prices in Slovakia were below EU level prior to the EU accession but the gap was closing in recent years. Direct payments in Slovakia are higher within the EU than they were before the accession. Price support and direct payments are two major policy instruments of the CAP. Direct payments adopted by Slovakia and other accessioning states are significantly decoupled, detached from production.

There are many studies that analyze the impact on EU accession. Studies in agricultural economics deal with budgetary impacts of adoption of CAP, development of commodity markets, international trade and WTO and macroeconomic implications (Anderson and Tyers, 1993; Tangermann and Josling, 1994; Hertel et al., 1997; Banse, 2000; Banse et al., 2000; Hartell and Swinnen, 2000; Münch, 2000; Bielik and Pokrivčák, 2001; Blaas and Božik, 2002; European Commission, 2002; Božik and Izakovič, 2004; Blaas and Božik, 2004; Chrastinová, 2005; Ciaian and Swinnen, 2005).

While papers published in early 1990s predicted significant changes occurring to agriculture in both old and new member states after enlargement of the EU, recent papers predict more moderate impacts. There are two reasons behind this adjustment of predictions. First, CAP of the EU went through significant reforms since early 1990s, reducing price support and replacing it with decoupled income support. Second, economic development and reforms in the CEECs reduced differences between new and old member states.

The objective of the paper is to analyze the impact of enlargement on agricultural prices, area harvested, production, consumption and trade for cereals, oil-seeds and meats. We use a modelling approach of AG-MEMOD Partnership.²

² AG-MEMOD is a pan-EU research partnership to analyse prospects for the agri-food sector in Member States and the EU as a whole. The title of the project is: *Agricultural sector in the Member States of the EU and in Newly Associated States in Central and Eastern Europe. Econometric Modelling for Projections and Analysis of EU Policies on Agriculture, Forestry and the Environment*. The AG-MEMOD Partnership was founded in 2000. Research partners are drawn from 24 EU Member and Acceding States and the project is co-ordinated by Teagasc – The Irish Agriculture and Food Development Authority based at the Rural Economy Research Centre, Dublin. The Partnership is financed by contributions from the EU Fifth Framework Programme

The model is based on the EU Gold model (Hanrahan 2001), developed by FAPRI and extended by Teagasc, Ireland.

The paper is organized as follows. The next section provides background information about CAP and accession. The section three briefly describes model that we used for projections. This is followed by section on policy scenarios and model assumptions. The section five contains simulation results while the last section draws conclusions.

1. Background

Since 1960s till 1990s price support was a major instrument used to support EU agriculture. Domestic prices were usually set above the world prices while tariffs were imposed in order to avoid imports of cheap products to common market from abroad. In commodities in which EC/EU produced more than domestic consumption level, export subsidies were used to eliminate surpluses.

Reforms started in 1992 (MacSharry reform) and continued through Agenda 2000. The last reform round took part within the Mid Term Review (MTR) of the CAP in 2003. The nature of these reforms was to replace distortive price support with income support. That is guaranteed prices were lowered and farmers were compensated for income loss with direct payments from the EU budget. Initially direct payments were coupled (linked) to farm inputs like hectares of crops or numbers of animals.

Mid Term Review cut further the link between direct payments and farmers' decision to produce by introducing SFP. Most of commodity specific direct aid payments to farmers are being replaced by a single farm payment which is independent from current and future production. This is known as full decoupling of support. SFP is only dependent on payments received in reference period which were years 2000-2002. In principle, support to farmers for most products is detached from production. There are however many derogations, which impair the basic principle.

Accession negotiations with new Member States were conducted before the MTR reform of the CAP. Agenda 2000 was a reference point. Because of MTR reform, which took place after signing of Accession Treaty, and due to administrative complexity of Agenda 2000 it was decided that new member states will adopt a SAPS – Single Area Payment Scheme. New Member States (NMS)

have, however, option to adopt Agenda 2000 kind of policies if they are administratively ready to do so. The SAPS can be applied until 2006. It can be renewed twice by one year. To adopt SAPS the overall level of direct payments for the whole country or regions within a country is computed. This is so called national envelope, which is computed based on coupled direct payments for which the whole country or regions within the country would be eligible under Agenda 2000. The national envelope is then divided among farms based on their cultivation of hectares of agricultural land. Direct payments in NMS are therefore decoupled too, as they do not depend on production. Thus farmers would get subsidy for each used hectare of land, and basically there is no constraint on production or on input use.

Direct payments financed from the EU budget are gradually introduced in the NMS. The payments start at 25 % of the EU level in 2004 and then gradually increase by 5 % until 2006, and by 10 % from 2007 until 2013.

Additionally, NMS may complement (top-up) direct payments from rural development funds and from national budget. Top-ups may reach 30 % of the level in EU, but overall direct payments (EU financed + top-ups) must not exceed 100 %. Top-ups are generally more coupled to production than direct payments from EU budget.

2. The Model

We use a dynamic, partial equilibrium econometric model. It includes major agricultural commodities inter-linked through cross price elasticities, and cross elasticities of demand for land. There are also links between the crop and livestock sectors. Each sector is represented by supply and demand relationships. These relationships are estimated or calibrated. For calibration elasticities and coefficients from economic literature are used. All relevant CAP policies are incorporated in the model.

Domestic prices are endogenous and are represented by relationships that link them to EU market prices, Slovak self-sufficiency rate and self-sufficiency rate in the key EU market. EU prices are exogenous. The exception is the oilseeds model, where domestic market prices are directly linked to world prices. For a more detailed description of the general model see Hanrahan (2001) and Westhoff (2000) and for the description of the Slovak model see Pokrivčák, Bartová, and Ciaian (2005).

Data for modelling come from various sources: VUEPP (Research Institute of Agricultural and Food Economics), Eurostat, OECD, FAO, Ministry of Agriculture of the Slovak Republic, Slovak Statistical Office, National Bank of

Slovakia, Customs Statistics, the Slovak Academy of Sciences, FAPRI University of Missouri, European Commission. The projection period starts in 2002 for the most variables. The projections are made until 2010.

3. Policy Scenarios and Assumptions

The following two scenarios are assumed:

1. Non-accession baseline scenario (Non-Ac). Pre-accession policies observed in the last years are assumed to continue in the future.

2. Accession scenario (A-SAPS). This scenario assumes accession and introduction of SAPS in 2004. We also consider top-ups financed from national budget in addition to direct payment from EU budget. Domestic prices are assumed to converge in one year to EU prices (to key prices) by an adjustment factor that is equal to 90 % of the difference between domestic price in 2004 and its respective key price in 2004.

Decoupled direct payments are assumed to have a moderate impact on production. Theoretically fully decoupled direct payments should have no impact at all (Pokrivčák and Ciaian, 2004). However, imperfect risk, credit, and political markets warrant some impact of direct payments on production (Westhoff and Binfield, 2003). Coupling coefficient, measuring the extent of impact of direct payments on production, is therefore assumed to equal 0.15. European Commission, for example, assumes coupling coefficient to equal 0, OECD between 0.06 and 0.1, while EU Gold model uses coupling coefficient of 0.3.

Part of the top-ups coming from the national budget will remain coupled to production (to sheep and suckler cows) and the coefficient reflecting their effect on production is assumed to equal 0.6. For more details about scenario assumption and macroeconomic assumption see Pokrivčák, Bartová, and Ciaian (2005).

Distribution of impacts of direct payments on individual commodities is based on value shares of individual commodities in total value of production. Farmers use some direct payments to invest in commodities with the highest expected profit, but data on profitability of individual commodities are not readily available.

4. Simulation Results

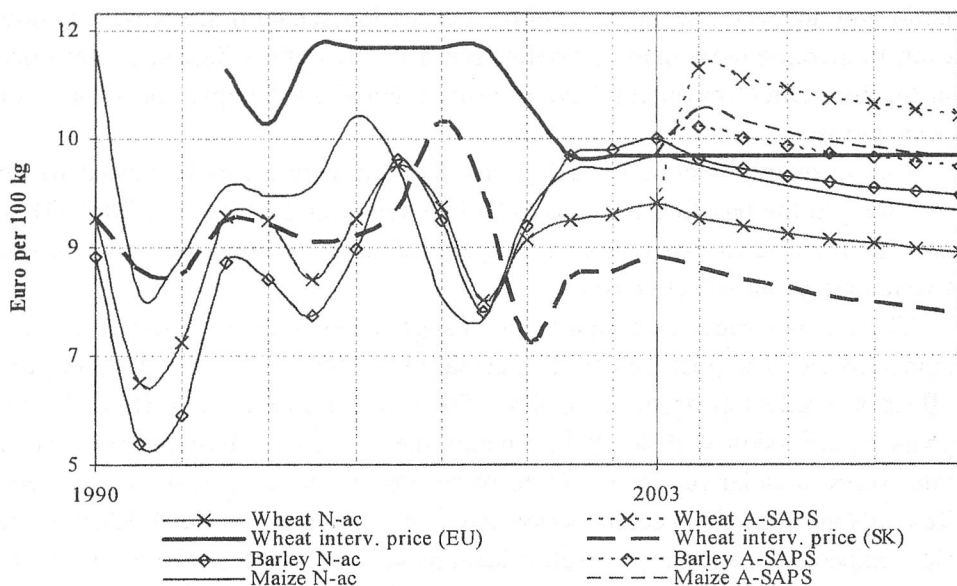
4.1. Cereals: Wheat, Barley and Maize

During the whole transition period Slovak cereal prices were substantially below the EU intervention prices and below the EU market prices. For baseline scenario, nominal cereal prices (after 2001) are forecasted to decline on average by less than 1 % per year (Figure 1). Nominal price decline combined with positive

inflation rate assumed imply a more than 1 % decline of real prices of cereals. In agricultural sector weather conditions cause year to year price fluctuations, which is not present in our projections as short run pattern of weather fluctuations is difficult to forecast. The model assumes that Slovak cereal prices are determined by the developments of the exogenous EU market prices.

Figure 1

Cereals Domestic Prices and Intervention Prices (baseline and A-SAPS)



In accession scenario trade barriers are eliminated and EU policies are introduced in Slovakia in 2004 year. As a result Slovak prices will converge to the EU prices. Wheat, barley and maize prices are expected to increase by 27 %, 5 %, and 9 % respectively (Figure 1 and Table 1).

Table 1

Expected Slovak Domestic Price Changes Caused by EU Accession

	% change (A-SAPS versus baseline)		% change (A-SAPS versus baseline)
Wheat	27	Beef meat	173
Barley	5	Pork meat	-24
Maize	9	Chicken	54
Rapeseed	53	Sheep meat	258
Sunflower	60	Milk	26
Soybeans	8	Butter	46
Potato	-20	SMP	1
Sugar	49	WMP	19
		Cheese	52
Crop products average	24	Animal products average	67

Blaas and Božík (2002) estimated that crop prices will increase by 19 %. Seaman and Doliak (2003) report 18 % expected increase of wheat price, 4 % expected increase of barley price and 3.8 % expected increase of maize price.

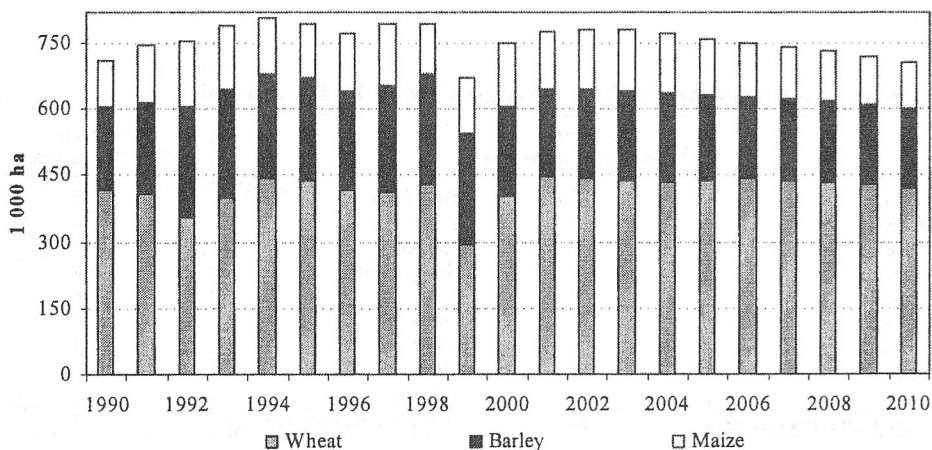
Area harvested is a function of expected gross returns of cereals relative to other commodities and on area allocated to competing crops. Expected gross returns further depend on prices, direct payments and yields. There is still a significant gap between Slovak cereal yields and those in EU but the gap is closing. Technological development is expected to increase yields in both baseline scenario and accession scenario. Yields in accession scenario are expected, however, to increase more than in baseline scenario due to the effect of higher prices in the EU. Direct payments have a positive but limited impact on relative expected gross returns.

Due to mainly decline of real prices, the total cereal area harvested will be declining in the baseline scenario to be 9 % lower in 2010 than in 2001. Maize area is projected to experience the largest decline as profitability of maize relative to barley and wheat worsens.

There is not expected a significant change in cereal area harvested in accession scenario. The positive effect of cereal price increase is offset by a negative effect on production from decoupling. The area for all three cereals in the first years of accession will be slightly below the area in the baseline scenario. In later years, area harvested will increase because of increase of direct payments. Towards the end of projecting period cereal area harvested in the A-SAPS scenario is expected to exceed its baseline level by 0.5 %. Over time there is an expected shift from barley and maize to wheat. High wheat price rise after accession increases the profitability of this crop relative to barley and maize (see Figure 2).

Figure 2

Wheat, Barley and Maize Area Harvested (A-SAPS Scenario)

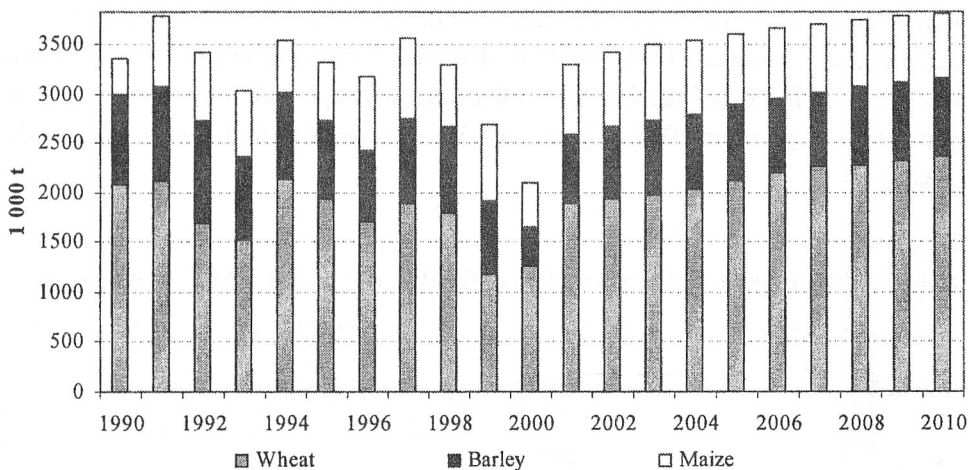


The expected yield increase offsets the decline in cereal area. As a result total cereal production will be increasing in baseline scenario to be 14 % higher in 2010 than in 2001. Barley and wheat production are projected to be higher by 22 % and 18 %, respectively in 2010 as compared to 2001. In contrast, maize production is projected to go down by 3 % due to a relatively large decline in area harvested which could not be offset by yield increase.

For A-SAPS scenario cereal production largely reflects the development of the cereal area harvested (Figure 3). In the first years after accession the production is lower than in the baseline scenario, but exceeding it after 2006 year. Higher cereal prices after accession lead to higher yields. As a result, the total cereal production for A-SAPS scenario will be up by around 1 % in 2010 as compared to baseline scenario. This increase is larger than the projected increase of the cereal area.

Figure 3

Wheat, Barley and Maize Production (A-SAPS Scenario)



Overall cereal consumption is projected to increase in the baseline. In 2010 the domestic cereal use will expand by 25 % as compared to 2001. An increase of use of cereals is explained by real GDP per capita growth and real price decline. Increase of demand for cereals will be mainly driven by its human consumption component. Less favourable development of animal production will lead to only limited increase of feed demand. Wheat, barley and maize use are projected to increase by 31 %, 6 % and 28 % respectively in 2010 as compared to 2001.

After accession consumers will loose as a result of the rise in cereal price level. Cereal consumption is projected to be lower by approximately 3 % compared to baseline scenario. The most affected crop is wheat which will experience the

largest price increase. The consumption of the other two cereals remains almost unchanged. Feed consumption is expected to decline more than non-feed consumption especially towards the end of the forecasting period. This development is due to decline in animal production after accession.

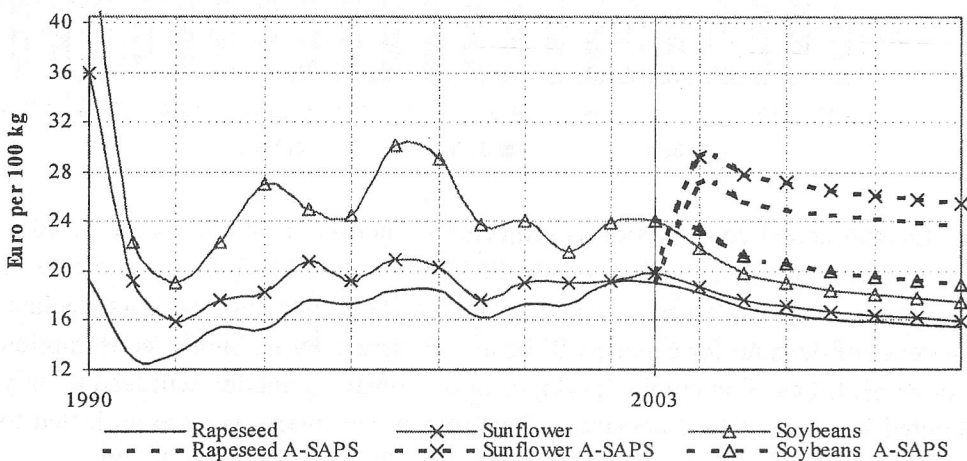
In the baseline scenario favourable development of market surpluses leads to a positive trade balance for wheat and barley. In contrast, decline in maize production and increase in consumption leads to deterioration of its trade balance. Trade balance for wheat improves in accession versus non-accession scenario as consumption declines and production increases. However, relative to baseline scenario, reduction of barley and maize area harvested after accession and therefore also reduction of production will deteriorate barley trade balance.

4.2. Oilseeds: Rape seed, Sunflower and Soybeans

Rapeseed and sunflower prices were below the EU market prices during the transition period. They are expected to remain below EU level in the baseline non accession scenario. On the other hand, soybean price was above the EU price at the beginning of 90s, but later declined to reach a level about 8 % below the EU price in 2001. Nominal oilseeds prices are expected to decline by 2 % per year on average after 2001 (Figure 4). This implies that real prices will decline even more.

Figure 4

Rapeseed, Sunflower and Soybean Prices for Baseline and A-SAPS Scenarios



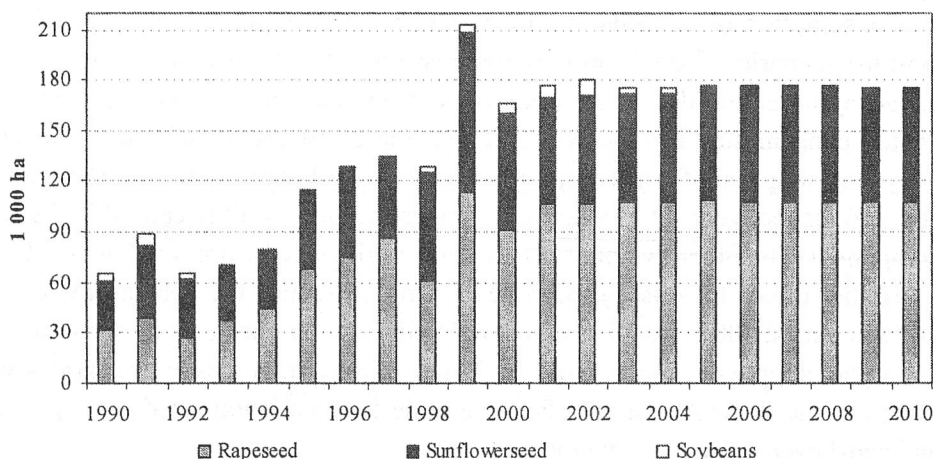
Oilseed prices are expected to increase in A-SAPS scenario. Compared to baseline scenario, accession will increase rapeseed, sunflower, and soybean prices by 53 %, 60 %, 8 % respectively (Figure 4, Table 1). Oilseed prices are expected

to increase substantially more than cereal prices. European Commission (2002) projects a similar pattern. It estimates a higher increase of oilseed prices in CEECs than that of cereal prices. Seman and Doliak (2003) also report a relatively high increase of rapeseed price, 37 %.

In the baseline non accession scenario oilseeds area harvested will slightly decrease because of decline of returns of oilseeds relative to cereals (nominal oilseed prices decrease more than nominal cereal prices).

After accession total oilseeds area harvested will follow baseline non accession scenario. The positive effect of oilseeds price increase is offset by a negative effect of decoupling of direct payments from production under SAPS. This holds despite the higher direct payments in absolute terms because the impact of decoupled direct payments is limited. Within the oilseeds significant adjustments are expected. Sunflower area will expand by around 6 % by 2010 while rapeseed area will stay almost unchanged compared to non-accession scenario. Soybean production is less competitive. Its area is expected to converge almost to zero (Figure 5).

Figure 5
Rapeseed, Sunflower and Soybean Area Harvested (A-SAPS Scenario)

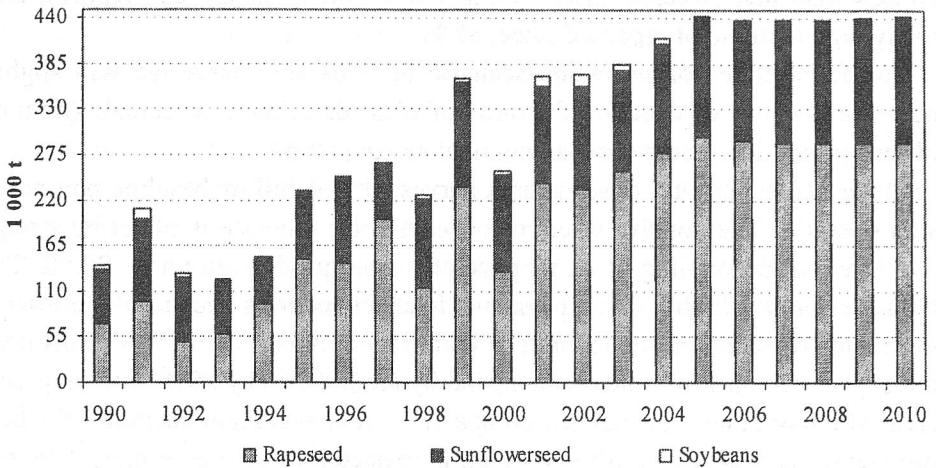


Oilseeds yield is expected to increase and will offset the decline of area harvested. As a result the production is projected to expand in the baseline scenario. Compared to 2001 the production will expand by 4 % in 2010.

Higher prices after accession lead to higher yields. The total oilseeds production is expected to expand in A-SAPS scenario. Compared to baseline scenario the oilseeds production is expected to increase by 18 % in 2005 and by 15 % in 2010. Sunflower production increases by around 22 %, rapeseed follows with 14 – 19 % expansion, while soybean production goes down to almost zero (Figure 6).

Figure 6

Rapeseed, Sunflower and Soybean Production (A-SAPS Scenario)



Oilseeds are mostly used for production of oil. Oilseed meal, which is used as animal feed is a by-product of crushing of oilseeds. Demand of processing industry for oilseeds depends on returns obtained from processing.

Consumption of oilseeds is projected to remain relatively unchanged in the baseline scenario. There is an initial increase in oilseed consumption that is followed by a decline due to lowering of real returns from processing. However, overall consumption in 2010 will still be about 22 % above 2001 level. Specifically, consumption of soybeans, rapeseeds, and sunflower expand by 36 %, 26 % and 7 % respectively. The expansion of rapeseed use is mainly caused by its feed component. The other two oilseeds are driven primarily by non-feed demand.

Higher prices for oilseeds after accession will reduce the demand by around 16 % in period 2005 – 2010 as compared to the level in the baseline scenario.

Higher supply of rapeseed and sunflower relative to domestic use creates surpluses in the domestic market. Positive trade balance is expected for rapeseeds and sunflower while negative for soybeans.

Positive trade balance is also expected in A-SAPS scenario and at a higher level than in the baseline scenario. After accession higher expected prices will drive production up while consumption will be pushed down.

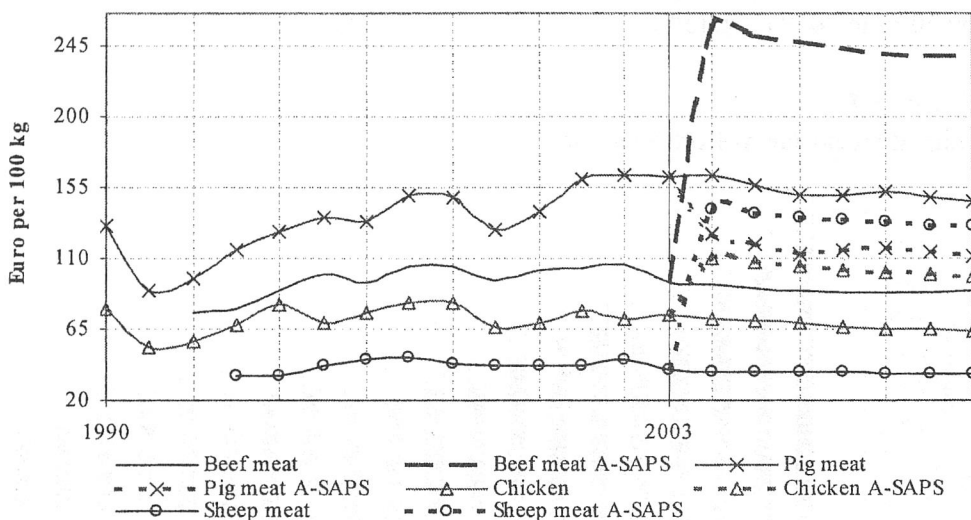
4.3. Meat and Animal Numbers

Prices of animal products are modeled as a function of EU market prices, which are exogenous in the model. Domestic prices were significantly below the EU market prices before 2001. The difference between EU and domestic prices

were larger for animal products than for crops. On average beef and sheep meat prices did not reach 50 % of the EU level. On the other hand, the pork price was on average above the EU price. In the baseline scenario the projected prices follow the past trend and their projections are relatively stable (Figure 7).

Figure 7

Beef Meat, Pig Meat, Chicken Meat and Sheep Meat Domestic Prices for Baseline Scenario and A-SAPS Scenario



After accession convergence will result in an increase of prices of animal products, except for pork. Beef, sheep and chicken prices are expected to increase by more than 54 % (Table 1). Pork price is expected to be reduced by around 24 %. Seman and Doliak (2003) report smaller increases of prices of animal products after accession. According to them, beef, pork, poultry and sheep meat prices will increase by 10 %, 1 %, 1 % and 23.8 % respectively. Blaas and Božík (2002) provide larger figures. They estimated that as a result of accession, animal prices would increase by 25 %.

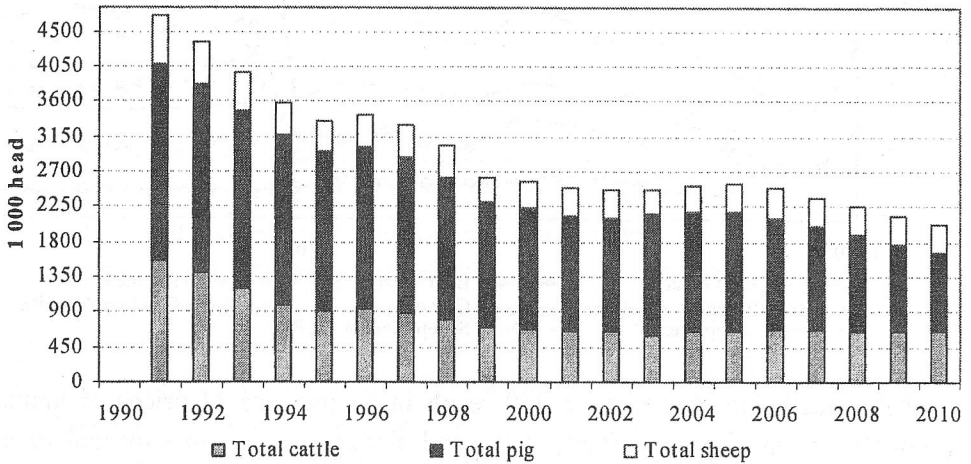
Because of decline of real price, pig sector is expected to contract. Sow numbers are projected to go down by 25 % in 2010 compared to 2001 in baseline scenario. Most of the decline will take place at the end of the projecting period. Fattening pigs are projected to decline by 9 %. On the other hand sheep numbers will remain stable.

Total cattle number will slightly decline, in 2010 by 3 % relative to 2001. It is due to real price decline, productivity increase and production quota constraint. Specifically, dairy cows are projected to decrease while suckler cows are projected to stay unchanged.

After accession, decoupling of most of the direct payments under SAPS will have a negative impact on animal numbers. A small share of direct payments that will remain coupled to production (part of the top-ups) will not exert a significant effect on number of animals.

A negative effect of decoupling is offset by a price increase resulting in an overall expansion of total cattle number from 2 – 4 % relative to the baseline. Number of sheep expands by around 2 – 5 % compared to baseline scenario. Due to decline of pork price, pig numbers are expected to decline by 2 % in 2005 and by 30 % in 2010 (Figure 8).

Figure 8
Animal Stocks for A-SAPS Scenario

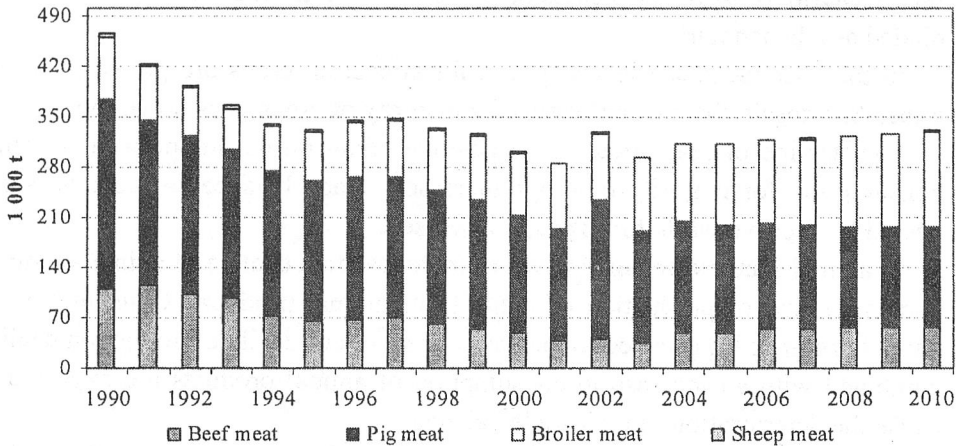


In the baseline non accession scenario total meat production is expected to expand by 12 % in 2005 and by 19 % in 2010 relative to 2001. Specifically, pork production increase only by 2 % and by 5 % in 2005 and 2010 respectively as compared to 2001. The reduction of pig stock is offset by an increase of the slaughter weight.³ Beef and chicken meat are projected to increase by more than 20 %. An increase in slaughter weight offsets the reduction of cattle numbers. Beef meat production expands between 23 % and 30 %. Chicken meat is forecasted to increase between 20 and 44 %, while sheep meat production remains stagnant. Because of the share of pig meat close to half of the total meat production, the overall increase in meat production is smaller than an increase in beef and chicken meat production.

³ The slaughter weight is expected to increase as a result of adoption better pig races and better feeding practises by farmers leading to higher portion of meat extracted relative to fats.

After accession the positive trend in meat production will continue but at a lower rate (Figure 9). Relative price changes will alter the distribution of animal production. The production of beef, chicken and sheep meat will increase while the production of pork will decline. Relative to non-accession baseline scenario, accession improves the production outlook for beef, chicken and sheep. Price incentive induces higher animal productivity as well as animal numbers, thus positively affecting production. The production of these three meats will increase between 1 and 12 % relative to the baseline. The largest gains will be observed in beef and sheep sectors. In contrast, pork production decreases considerably (between 7 and 12 %) as pork price declines after accession.

Figure 9
Meat Production for A-SAPS Scenario



Real price decline and real per capita GDP increase both positively influence consumption of animal products in the baseline scenario. Overall total meat consumption is expected to be up by 13 % in 2005 and by 25 % in 2010 compared to 2001. Of this beef will expand by around 18 – 30 %, pork by 7 – 15 %, chicken by 23 – 40 % and sheep meat will expand by 11 – 20 %.

Consumption increases in accession scenario by around 5 % relative to the baseline. Consumers are expected to switch from other meats to pork. Because of price increase consumption of beef, chicken and sheep meat actually contracts. The most significant decline will occur for beef by around 32 % relative to baseline scenario, followed by sheep meat (by around 25 %). On the other hand consumption of pork increases as pork prices are expected to go down after accession. As a result, the share of pork consumption in the overall meat consumption is expected to increase from 50 % in the baseline scenario to around 60 % in A-SAPS scenario.

Trade balance for chicken is expected to improve while that for other meats to worsen in non-accession baseline scenario. Beef trade balance is expected to stay positive, however.

In accession scenario the trade balance for meats is expected to improve as a result of lower consumption and higher production. Pork is an exception. Its domestic supply declines and consumption increases resulting in negative trade balance.

Conclusions

This paper analyzes the impact of the Slovak accession into the EU on selected agricultural commodities. Two scenarios are simulated: non accession baseline scenario (N-Ac) and accession (A-SAPS). Non-accession scenario is included as a benchmark.

In the baseline scenario real prices for almost all crops are projected to decline. As a result, the area cultivated for majority of crops goes down too.

The decline of real prices has a positive effect on consumption. Per capita consumption for majority of crops increases. Trade balance for cereals is expected to improve while for oilseeds to worsen.

In animal sector worsening terms of trade lead to a decline of animal numbers and to decline of production of majority of animal products. Consumption of animal products is projected to increase as real prices decline. Production decline combined with an increase in consumption of animal products are expected to cause the deterioration of their trade balance.

Scenario A-SAPS assumes decoupling of a majority of direct payments. Decoupled direct payments have a small impact on production. Price level increases after accession have a more important impact on agricultural markets. Majority of prices before accession were lower than EU prices. The largest difference was for animal products. Pork is an exception to this rule. Due to accession crop prices are expected to increase by around 24 % and animal prices by around 67 % (Table 1). First, higher prices will lead to higher yields per hectare or animal which will have a positive production effects. Second, higher prices will have a negative effect on consumers. They will reduce consumption after accession compared to baseline scenario. This opposite developments in production and consumption will produce a general improvement of agricultural trade balance after accession.

Our model has several weaknesses which should be considered when interpreting the results. First, there are short time series and inconsistent databases available. This can reduce the accuracy of predictions of parameters. Second, the

improvement of institutional environment after the accession may lead to better functioning of agricultural markets, especially land and credit markets. These improvements may have productivity enhancing effect which is not reflected in the functional relationships that were estimated on the past data. We also disregarded important changes occurring in wholesale and retail sectors. Entrance of supermarket chains into the Slovak market is expected to have some impacts on farm prices (see Swinnen, 2004). In spite of these deficiencies, we believe that our model is useful for general projections as well as for analyzing the impacts of policy changes on agricultural markets.

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