Agricultural and Economy-Wide Effects of European Enlargement: Modelling the Common Agricultural Policy

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November 1998

Abstract

The economic impact of extending the Common Agricultural Policy (CAP) to the Central and Eastern European countries has become a major issue in the European enlargement debate. This paper addresses this issue by providing an assessment of the economy-wide effects of European enlargement using a global general equilibrium model where special attention is given to modelling the instruments of the CAP and the European Unions budget. This paper differs from our earlier efforts as the analyses is now based on version 4 of the GTAP database with a more detailed agricultural commodity coverage. Furthermore the representation of the CAP and the Uruguay Round has been improved and the Agenda 2000 proposal is now explicitly dealt with.

Keywords: CGE modelling, Common Agricultural Policy, Agenda 2000, Uruguay Round, European Enlargement, GTAP.

JEL classification: D58, F02, F15, Q17, and Q18.

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1. Introduction

The preparations for the enlargement of the European Union (EU) to include the Central and Eastern European Countries (CEEC) have begun and it seems realistic that several Central and Eastern European Countries will have joined the EU by the year 2005.

This impending enlargement has initiated a number of studies attempting to assess the possible impact of an enlarged EU. As the Common Agricultural Policy (CAP) remains a cornerstone of EU co-operation and the CEEC have a comparative advantage in agriculture, a number of these studies, as well as the present study, focus on agriculture. This is because an eastward enlargement with the 10 CEEC will expand the Union's agricultural area by 52 per cent, increase production and competition on the European market as well as on the world market. This could also affect future negotiations on agriculture within the World Trade Organisation. More urgently, an enlargement within the current set of agricultural policies could have major impacts on the EU budget.

Previous studies dealing with the EU/CEEC integration include Brenton and Gros (1993); Tyers (1993,1994); Tangermann and Josling (1994); Anderson and Tyers (1995), Slater and Atkinson (1995), European Commission (1995) and Tangermann (1996). However, these are all partial equilibrium studies that disregard potentially important linkages between agriculture, services and manufactures. Furthermore, only the European Commission (1995) takes into account the impact of the Uruguay Round. Multi-region computable general equilibrium (CGE) studies include Hertel *et al.* (1997b). However, Hertel *et al*. do not explicitly capture important elements of the 1992 CAP reform, such as the set-aside premiums and the milk quotas, or tackle the important question of whether the value-based or the quantitative restrictions of the Uruguay Round Agreement will become binding. Furthermore, the study is undertaken with a rather limited commodity structure, which is ill suited to the detailed commodity specification of the agricultural commitments of the Uruguay Round Agreement and the Agenda 2000 reform proposal. Baldwin *et al.* (1997) also use a multi-regional general equilibrium model but with a very stylised implementation of the CAP and no endogenous budget allocation.

Moreover, the previous studies have failed to assess the integration process in a projection mode and to take the EU Commissions Agenda 2000 proposal into account. These aspects are important in order to capture the interaction between structural changes and policy reforms in the period before integrating the Central and Eastern European Countries into the EU.

This paper deals explicitly with several of these aspects by giving special attention to an extended

representation of the Common Agricultural Policy, the GATT Commitments and the Agenda 2000 proposal within a global general equilibrium model. An explicit representation of these important institutional features and the detailed agricultural commodity coverage clearly distingwishes our efforts from earlier studies. Furthermore, the analysis is based on the latest version of the GTAP database (version 4). Projecting the world economy to the year 2005, the agricultural and the economy-wide effects of an EU enlargement are evaluated with and without the Agenda 2000 proposal in place. The analysis allows us to assess the economic and budgetary effects of integrating the Central and Eastern European Countries into the EU taking into account the need for interregional budgetary transfers.

The paper is organised as follows. In Section 2 a description of the applied methodology is given focusing on, the theoretical model, the database, and the representation of the CAP instruments. Section 3 describes the construction of the baseline (the projections) and in Section 4 introduces the experimental design. Section 5 contains the results of the simulations and Sections 6 and 7 discuss the validity of the results and the conclusions, respectively.

2. Methodology

The fundamental CGE framework used for this study is based on the GTAP applied general equilibrium model of the world economy (Hertel, 1997a), and the GTAP database (version 4, with 1995 as the base year) (McDougall, 1998), which is solved using GEMPACK (Harrison and Pearson, 1996).

We have chosen to use a relatively standard multi-region, static model that assumes perfectly competitive markets, constant returns to scale technology, a non-homothetic private demand system and a foreign trade structure charactorised by the Armington assumption. This approach allows us to focus on the institutional features of the Common Agricultural Policy and the Uruguay Round Agreement (URA) and we therefore abstract from features like imperfect competition and increasing return to scale. An example of a model with such characteristics can be seen in Hertel et al. (1997b). We briefly return to this in section 7 below.

The *macroeconomic closure* (the solution to the problem of the fundamental indeterminacy of investments in comparative static models) applied is a neo-classical closure where investments are endogenous and adjusts to accommodate any changes in savings. This approach is adopted at the global level and investments are then allocated across regions to equalise the marginal rate of

return in all regions. Although global investments and savings must be equal, this does not apply at the regional level, where the trade balance is endogenously determined as the difference between regional savings and regional investments. This is valid as regional savings enter the regional utility function.

As the *numéraire* we use a price index as suggested by de Melo and Robinson (1989) and de Melo and Tarr (1992), specifically the global primary factor price index.

As mentioned earlier, we use the GTAP database, which covers 50 commodities and 45 regions. But to keep the model within computational limits and focus on the issues of interest the data are aggregated to 16 regions and 19 commodities of which ten are primary agricultural goods. Regions and commodities are given in Table 1.

Table 1. Regional and commodity aggregation

Regions	Commodities
European Union (15)	Wheat
Central and Eastern European Countries*	Other grains
Australia	Vegetables, fruit and nuts
New Zealand	Oilseeds
Japan	Sugar cane and beet
ASEAN-6	Other crops
China	Bovine animals
Other Asia	Other animal products
United States	Raw milk
Central America	Wool
South America	Resource extraction
Former Soviet Union	Bovine meat products
EFTA	Other meat products
Middle East and North Africa	Dairy products
Sub-Saharan Africa	Sugar
The rest of the world	Other processed food products
	Textiles
	Manufactures
	Services

* Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovak Republic and Slovenia.

Finally, in order to be able to capture the effects of important institutional features of the CAP and the Uruguay Round Agreement, the standard global general equilibrium model (GTAP) has been modified in a number of ways with special attention given to the modelling of:

1) Import and export policies: import tariff reductions and value and quantity based restrictions on export subsidies;

2) Compensatory payments to arable land and livestock, together with set-aside

requirements and base area restrictions;

3) Milk and sugar quotas;

4) The European Union budget and the important effects of future inter-regional transfers between the EU and the CEEC.

Import and export policies

Import tariffs and export subsidy rates are adjusted in line with the Uruguay Round Agreement offers, and fixed at the agreed rates according to the Uruguay Round Agreement if these rates are binding. We also abolish the mechanism of variable import levies and variable export subsidy rates in the EU as these clearly are against the spirit of the GATT Agreement, cf. (GATT, 1994a).

The initial 1995 (average effective) tariff data in the database is therefore compared with the actual WTO tariff schedules and in those cases where the 1995 protection rates exceed the tariff schedules we reduce the rates to the bound rates agreed upon in the Agreement. With respect to the minimum access requirements it is important to note that neither the current nor the minimum access tariff rate quota constitute a minimum purchase agreement. They provide only the 'opportunity' to import under the advantages of a preferential or suspended tariff. This 'opportunity' is provided given the reduced average effective tariff rates implemented in our study.

In contrast to earlier studies on the Uruguay Round Agreement, we follow the precise commitments and target the value of export subsidies and not just the export subsidy rate. Moreover, we assess whether it will be the quantitative or the value based export requirements for agricultural subsidies that will be binding in the Uruguay Round Agreement.

Total export subsidies, $E_{i,r}$, associated with the export of good *i* from region *r* to other regions (*s)* are given by:

$$E_{i,r} = \sum_s \left(p_{i,r}^m - p_{i,r,s}^{fob} \right) \cdot q_{i,r,s}^{xs} = \sum_s \left(t_{i,r,s} \cdot q_{i,r,s}^{xs} \right)$$

where $p_{i,r}^m$ is the market price in region *r*, $p_{i,r,s}^{fob}$ is the destination specific world price, f.o.b., $q_{i,r,s}^{xs}$ is the quantity exported to region *s* and $t_{i,r,s}$ is the destination specific export subsidy rate.

According to the Uruguay Round Agreement the value of export subsidies for each commodity, $E_{i,r}$ has to decline by 36 per cent from the Uruguay Round base period value, while the total export volume, $\sum_s q_{i,r,s}^{xs}$, must decline by 21 per cent. In most previous studies of the Uruguay Round (see

Martin and Winters, 1996) this has been implemented by bluntly cutting the *export subsidy rates*, $t_{i,r,s}$, by 36 per cent. Instead, we modify the model in order to assess carefully, which of the actual restrictions that will be binding when projecting the 1995 database to 2005. That is, we compare the simulated value of export subsidies and quantities with the commitments as outlined in the Uruguay Round Country Schedules (GATT. 1994b).

The system of intervention and guaranteed prices is not explicitly modelled in this study but implicitly represented through the setting of border protection rates. We have chosen this strategy deliberately, as the main (sustainable) mechanism in the long run is border protection and not storage (which the EU Commission also recognises in for example the Agenda 2000 proposal). This approach also gives us an opportunity to illustrate to what extent and in which markets an increased competition from Central and Eastern European farmers potentially could affect future production in EU-15 if storage (intervention) and border protection are unchanged. Or to put it differently – in which markets the EU following an enlargement would have to change intervention prices so as to avoid possibly large increases in the level of intervention stocks in the European Union.

Compensatory payments to land

The compensatory payments, the set-aside requirements and the definition and size of the base areas are all important elements of the EU grain policy. To the best of our knowledge this is the first attempt to assess the eastern enlargement while incorporating these effects in a general equilibrium, multi-regional model.

The compensatory payments to land are implemented as input subsidies to agricultural land[1]. The resulting hectare premiums are introduced in the model by the following definition:

$$pl_{j,r} = pl^{f}_{j,r} + hp_{j,r,} \qquad j \in AGR, r \in REG$$

1 As described in McDougall (1998) all direct subsidies to agriculture in the OECD countries are based upon the OECD PSE tables for 1995. In the GTAP database these subsidies are represented as output subsidies. However, the compensatory payments to land in the EU which constitute a significant share of the overall direct subsidies, are not linked directly to production. Therefore, in the initial GTAP database input subsidies to land are added (hectare premiums) and output subsidies are adjusted to provide a more accurate measure of direct support.

where $pl_{j,r}$ is the market price of agricultural land used by sector *j* in region *r*, $pl^{f}_{j,r}$ is the land price paid by farms and $hp_{j,r}$ is the sector specific hectare premium per hectare. The total budgetary expenditure on hectare premiums by sector is given by:

$$HP_{j,r} = hp_{j,r} \cdot q^{f}_{j,r},$$

where $q^{f}_{j,r}$ is the input of agricultural land including set-aside, into sector *j* in region *r*, multiplied by the sector specific hectare premium $hp_{j,r}$.

In our initial database we calibrate $hp_{j,r}$ such as to comply with the compensatory rates paid to reform crops and set-aside in the European Union in 1995. At the same time, we also calibrate $q^{f}_{j,r}$ to the historic levels of land used in sector *j* in 1995 inclusive the required set-aside rate of land[2].

Finally, the total area for which compensatory payments can be requested in the European Union is restricted to the total base area of 53,563,000 hectares of land. In order to be able to check this restriction we introduce the following equation into the model:

$$Q_r = \sum_j q^{f}_{j,r},$$

where Q_r is the total area receiving compensatory payments. If Q_r exceeds the total base area of the European Union hectare premiums are reduced proportionally in line with the overshoot of the total base area.

The implementation of compensatory payments to land is modelled by fixing the hectare premium per hectare and allowing land to adjust endogenously between the reform crops given that the European Union's base area is not exceeded.

In the special case of oilseeds, however, the Blair House agreement puts a specific restriction on the grown area of oilseeds, namely 5,482,000 hectares including set-aside within the total area Q_r of the European Union. In 1995 this base area for oilseeds was exceeded, forcing the European

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2 In 1995 the average set-aside rate in the European Union was 14.4 percent, which on average meant that for every hectare of land where compensatory payments were paid only 0.856 hectare was productive. To change the set-aside rate from 14.4 percent in the 1995 base year we simply increase/decrease the productivity of land used in sector *j* and recalibrate $hp_{j,r}$, using the new share of land allocated to production and set-aside per hectare.

Union to reduce compensatory payments per hectare given to oilseeds proportionally with the amount of excess land used.

This implies that with the Blair House agreement in force, we have modelled compensatory payments to oilseeds by fixing the total budget expenditure on compensatory payments given to oilseeds while allowing the corresponding hectare premiums to adjust endogenously.

Compensatory payments to livestock

Similarly, we model compensatory payments to livestock as input subsidies in the case of suckler cow and breeding ewe premiums[3]. In the case of male animal and steer premiums we have chosen to model these premiums as output subsidies to livestock production. This difference in implementing compensatory payments to livestock reflects the fact that suckler cows and breeding ewes are a part of the production capital used to produce slaughter animals, while male animals and steers are final products sold directly to the slaughter houses.

The implementation of compensatory payments to suckler cows, breeding ewes, male animals and steers are modelled in the same manner as oilseed premiums, namely by fixing the total EU budgetary expenditure on premiums paid and allowing premiums per cow/ewe and male animal/steer to adjust endogenously. This is done because the ceiling on premium rights for breeding ewes, male animals and steers were fully utilised in the European Union in 1995, while for suckling cows the utilisation of rights was just below the total amount of premium rights, cf. (European Commission 1997b).

Milk and Sugar Quotas

Raw milk and sugar beet quotas in the European Union are introduced into the model by the following price link:

$$PM_{i,r} = (1 + T^{o}_{i,r} + T^{q}_{i,r}) \cdot PS_{i,r},$$

where $PM_{i,r}$ is the market price of commodity *i* in region *r*, $PS_{i,r}$ is the pre-tax supply price and $T^{o}_{i,r}$ is an output tax rate and $T^{q}_{i,r}$ is the quota tax rate. For the raw milk and sugar beet sectors

3 In the same manner as compensatory payments to land, output subsides are adjusted and input subsides are added in the GTAP database to represent compensatory payments to livestock.

$T_{i,r}^{q} \cdot PS_{i,r}$ is interpreted as the quota rent of raw milk/sugar beet respectively. In the initial 1995 database $T_{i,r}^{q} > 0$ for the raw milk and sugar beet sectors, reflecting a positive quota rent in both these sectors in 1995, while for all other sectors $T_{i,r}^{q}$ is equal to zero[4].

The raw milk and sugar beet quotas are implemented in the model by making the quantity of raw milk and sugar beet produced in the European Union exogenous while $T_{i,r}^{q}$ is endogenous allowing the quota rent to adjust to market conditions.

European Union budget and inter-regional transfers

Finally, we implement the budgetary transfers by incorporating a specific budget equation. The financing of the Common Agricultural Policy has been defined so that all expenditures net of all revenues from import tariffs in the EU and the CEEC are financed by the member countries, allowing, however, for transfers from the EU-15 to the CEEC. The transfers from the EU-15 to the CEEC are determined as the sum of

i) Compensatory payments to land and livestock in Central and Eastern European Countries;

ii) Output subsidies funded by the European Agricultural Guidance and Guarantee Fund (EAGGF);

iii) Agricultural export subsidies related to exports from these countries to third countries net of all import tariffs from the CEEC stemming from imports of agricultural products;

iv) The expected GDP contribution from the CEEC. As the CAP consumes approximately 50 per cent of the total EU budget and the future proportion of GDP from member countries is expected to be slightly below 1.3 per cent, the expected GDP contribution is set to 0.65 per cent of GDP.

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4 The existence of sugar and milk quotas in 1995 and the corresponding quota rents should be reflected in the database. Quota rents are therefore in these cases introduced into the database as wedges between the value of output at producer prices and the value of output at marked prices. The initial value of sugar and milk quota rents incorporated for the EU is estimated to be 20 per cent of the value of purchases of domestically produced raw milk (sugar beet) by dairy (sugar) firms in the EU.

3. Projections

Compared with other multi-region CGE studies of the economic effects of an EU enlargement, e.g. Hertel *et al.* (1997b), Baldwin *et al.* (1997), the emphasis of this study is also to construct a baseline with a projection of the world economies as they might look in the year 2005. The baseline can therefore be seen as a counterfactual of the world economy if enlargement does not take place.

It is indeed important to analyse the interactions between economic growth, structural change and policy reforms (see Bach *et. al.*, 1998). A number of economic and political changes will take place before the enlargement is a reality - some of which will significantly influence the economic consequences of an enlargement. First of all, the baseline takes into account the economic changes following the full implementation of the GATT Agreement and the 1992 EU agricultural reform. These reforms will change the pattern of production and trade in especially agricultural products. Secondly, economic growth, technological progress and the degree of convergence between the CEEC and the EU in the period before accession will affect the economic outcome of integrating the CEEC into the EU. Thirdly, in many countries the factor endowments are expected to increase significantly and capital/labour ratios in different countries and industries will change. This will create supply-side pressures for changes in the composition of output in some countries (Rybczynski effects). Finally, differences in income responsiveness of demand for commodities will affect the net export position of a given country and commodity group.

To construct the projection to the year 2005 we shock total population, factor endowments (land, unskilled labour, skilled labour and physical capital) and total factor productivity (TFP). The endowment of land and natural resources are assumed to be constant. The actual shocks used in shaping the baseline are shown in Table 2. On the policy side the baseline incorporates the policy reforms embodied in the GATT Agreement from 1994 and a continuation of the Common Agricultural Policy as fully implemented in 1995.

The projections for factor endowments are based upon a number of different sources including the World Bank long-term projections. The assumed yearly growth rates for GDP and physical capital reflect some degree of convergence in Europe as the Central and Eastern European Countries are assumed to grow 2 per cent faster per year than the EU countries. The economies in Asia, excluding China, are assumed to grow by around 5 per cent per year in the coming years. Population growth rates are derived from population projections for the year 2005. The labour force shocks are derived from the predicted population in the age group 15-64 years.

Table 2. **Exogenous assumptions in the projections, annual changes, 1995-2005, per cent**

	GDP	Physical Capital	Population	Unskilled labour	Skilled labour	TFP Crops	TFP Livestock
European Union (15)	2.4	3.4	0.0	-0.2	2.6	2.0	2.3
Central and Eastern European C.	4.4	5.9	0.1	0.4	5.4	2.5	3.0
Australia	3.3	3.7	0.8	0.5	5.2	1.6	1.9
New Zealand	2.9	3.4	0.6	0.5	5.2	1.6	1.9
Japan	2.0	3.4	0.0	-0.5	2.8	1.4	1.7
ASEAN-6	4.8	4.6	1.3	1.8	5.3	2.0	2.3
China	8.3	10.8	0.7	0.9	3.4	1.0	2.0
Other Asia	5.3	6.2	1.4	1.0	4.1	2.0	2.3
United States	2.6	2.9	0.7	1.0	3.3	1.6	1.9
Central America	4.8	4.7	1.5	1.7	4.1	2.0	2.3
South America	4.6	4.5	1.2	1.7	4.1	2.0	2.3
Former Soviet Union	1.2	2.6	0.1	0.4	5.4	2.5	3.0
EFTA	3.0	3.5	0.2	0.5	5.2	2.0	2.3
Middle East and North Africa	4.2	4.8	2.0	2.8	5.4	2.0	2.3
Sub-Saharan Africa	3.4	2.6	2.6	3.1	5.0	2.0	2.3
The rest of the world	3.2	3.4	1.2	2.4	2.8	2.0	2.3

Source: OECD (1998), IMF (1998), USDA (1998), Bach (1996) and own calculations.

Skilled labour projections are based on the growth of the total skilled labour stock (average years of secondary and tertiary schooling times population between age 15 and 64) in each country in the period 1980 to 1987 (Nehru, Swanson and Dubey, 1994). This differs from earlier work (Hertel *et. al.*, 1995; Bach *et. al.*, 1998) in three respects. Firstly, we include secondary schooling where as the earlier estimates included only tertiary schooling, as we believe this yields a better proxy for the growth in skilled labour. Secondly, we use the total stock of skilled labour where the earlier studies used growth in average years of schooling.

Finally, physical capital projections are derived by adding investment forecast for each year to 2005 and subtracting depreciation from 1990 capital stock estimates (Nehru & Dhareshwar, 1993).

As an important extension to the earlier projection studies, the growth rates for total factor productivity (TFP) in crops and livestock production are assumed to be region and sector specific. The assumed total factor productivity in agriculture is based on a review of the literature on TFP in a number of regions (Bach, 1996). It seems that the growth rate in total factor productivity in agriculture has ranged between 1 and 4 per cent over the past decades with most estimates being around 1.5 to 2 per cent. As can be seen from the two last columns in Table 2, the Central and Eastern European Countries are assumed to have a higher growth in agricultural productivity corresponding to 0.50 and 0.75 per cent more per year compared with the EU countries for crops and livestock, respectively. The higher productivity assumptions for the CEEC might be conservative compared with the potential productivity growth in the former communist countries if

the reforms prove successful. Reaching the GDP targets from our long-term projections is obtained by letting TFP in all remaining sectors adjust endogenously in the baseline.

4. Experimental design

A total of four scenarios are analysed; the details are summarised in Box 1. Scenario one represents the baseline for the period 1995 to 2005 incorporating projections of the world economy to the year 2005 as well as the effects of the Uruguay Round Agreement. Besides the changes following the implementation of the GATT Agreement, agricultural and other policies are assumed unchanged and kept constant at their 1995-levels in the period 1995 to 2005[5]. However, all direct payments in the EU are deflated by 2 per cent per year since the (maximum) budgetary outlays are fixed in nominal terms. Finally, it is assumed, that border taxes between the seven Central and Eastern European Countries are removed (preparation for joining the European Union)[6].

Scenario two analyses the economic effects of integrating the Central and Eastern European Countries into the European Union and the Common Agricultural Policy in the year 2005 in a world as shaped by scenario one. All tariffs and export subsidies as well as non-tariff barriers between the EU and the CEEC are abolished and all sectors in the CEEC are given the same level of protection against third countries as in the EU. This scenario also extends the CAP policy to the new member countries including the common financing of the agricultural policy and transfers from the EU-15 to pay for export subsidies, output subsidies and hectare and livestock premiums in the new member countries. This also implies for example, that sugar and milk quotas are established on the basis of production levels prior to integration (in 2005) as well as the set aside rate is equalised with the EU-15 rate.

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5 This implies that the 1995 changes in US agricultural policies is not taken into account - changes which potentially could influence world price evolution in the period prior to integration and thereby the EU budget costs of accession.

6 This assumption does not in any significant way affect the impacts of the scenarios analysed later. Also, the baseline does not explicitly take into account the effects of the Europe Agreements as these are very restrictive with respect to agricultural trade. However, the baseline does take into account increased trade generally between EU-15 and the Central and Eastern European Countries.

Box 1. Experimental design - overview

Abbr.	Description
S-1	**BASELINE SCENARIO 1995-2005** **Projections** Shocks to factor endowments, population and GDP Specific shocks to total factor productivity in crops and livestock. Shocks to total factor productivity in all other sectors implicit in GDP shocks. **Uruguay Round Agreement** Abolition of export quota tax equivalents according to the Agreement on Textiles and Clothing. Tariff reductions according to Agreement – tariff schedules compared with 1995 protection data. Export subsidy rates are adjusted in line with changes in tariff rates. If export subsidy commitment (either in value or quantity) is binding, the export subsidy rate is further reduced. EU-15: Wheat: Export subsidies abolished due to quantitative Commitment. Coarse grains: Export subsidy rate reduced due to quantitative Commitment. Other crops: Export subsidy rate reduced due to budgetary outlay Commitment. Other animal products: Export subsidy rate reduced due to budgetary outlay Commitment. **Additional CAP instruments** Fixed quota for raw milk and sugar cane and beet production Hectare premiums to wheat, coarse grains and other crops are allocated per hectare within the bounds of the total base area of 53,563,000 ha while the total budgetary outlay to oilseeds is fixed due to overshooting of the Blair House Agreement base area. Set-aside rate is held constant at the 1995 level (14,4 per cent). Livestock premiums to suckling cows, male animals, steers and breeding ewes are fixed at total budgetary outlay. All premiums are deflated by 2 per cent as these are fixed in nominal terms. **Central and Eastern European Countries:** Bilateral border taxes are removed between the individual Central and Eastern European Countries (preparations for joining the EU).The effects of the Europe Agreements are not explicitly taken into account.
S-2	**CEEC INTEGRATION AFTER S-1, 2005** Removal of all tariffs and export subsidies/taxes between the EU-15 and the CEEC. Fixed milk and sugar production (quota regime) in EU-15 and CEEC if binding. CEEC: External tariffs and export and output subsidies/taxes equalised with those in the EU-15. Hectare premiums to wheat, coarse grains, other crops and oilseeds are given as fixed budgetary outlays to a historic base area of 26,934,000 ha (1994 area). Quota levels for milk and sugar in CEEC are established on the basis on production in 2005 prior to accession. Set-aside rate is equalised with EU-15 rate (14.4 per cent decrease in land productivity). Livestock premiums are given as fixed budgetary outlays based on historic livestock figures (1994). Transfers from the EU-15 to the CEEC equal to export subsidies, output subsidies and hectare/livestock premiums less import tariffs and 0.65 per cent of GDP in the CEEC.
S-3	**AGENDA 2000, 1995-2005** **Projections and agricultural policies in all region** As in S-1, however, TFP in all sectors is shocked exogenous with growth rate found in S-1 with GDP endogenous. **EU-15:** Generally as in S-1, however, further cuts in border protection representing the proposed reductions in intervention prices for cereals, bovine meat and dairy product. Compensatory payments to arable crops are further adjusted in accordance with the proposal. All hectare premiums are given per hectare due to the abolishment of the Blair House Agreement on oilseeds within the bounds of the total base area of 53,563,000 ha. All livestock premiums are adjusted in accordance with the proposal and new premiums to dairy cows. The set-aside rate is reduced from 14,4 to 0 per cent. The total milk quota increased by 2 per cent.
S-4	**CEEC INTEGRATION AFTER S-3, 2005** As in Scenario 2 given the agricultural policy in the baseline S-3.

Box 2. Main elements of the Agenda 2000 Proposal for Agriculture

- **Cereals sector**
  - Intervention prices cut by 20 per cent
  - Uniform basic direct payment to grains, oilseeds, protein crops and set-aside: 66 ECU/t
  - Payments on top of the basic direct payment to protein crops: 6.5 ECU/t
  - The Blair House agreement imposed constraints on production area for oilseeds is eliminated
  - Compulsory set-aside retained, but the usual rate set at 0 per cent

- **Beef sector**
  - Intervention prices cut by 30 per cent
  - Direct payments to male animals increased to 310 ECU per bull and to 232 ECU per steer
  - Premium to suckler cows increased to 215 ECU per cow
  - A new premium to dairy cows: 70 ECU per cow
  - Premiums include the so-called national envelopes
  - Ceilings on total national premium rights for male animals

- **The dairy sector**
  - Intervention prices for dairy products cut by 15 per cent
  - The quota regime is maintained until 2006
  - Total quota amount increase by 2 per cent
  - Introduction of a new premium to dairy cows – a base payment and an additional payment fixed at national level: 100 + 45 ECU per premium unit

Source: European Commission (1997a).

Scenario three is an alternative baseline in which the CAP is reformed according to the Agenda 2000 proposal. Box 2 describes the main elements of the Agenda 2000 proposal.

Specifically, when modelling reductions in intervention prices we reduce border protection rates corresponding to a 20 per cent reduction in domestic market prices. In the case of wheat, this implies that the remaining import tariffs are abolished and for other grains import tariffs and export subsidy rates are reduced corresponding to a 20 per cent reduction in prices. These reductions are supplemented by increased direct payments to agricultural land and the compulsory set-aside rate is reduced from 14.4 per cent in 1995 to 0 per cent after the full implementation of the proposal. In the beef sector the effective market support level is reduced by 30 per cent and again this reduction is supplemented by increased compensatory payments to livestock (including the national envelopes). For milk border protection is reduced corresponding to a 15 per cent reduction in intervention prices and the milk quota regime is maintained supplemented by a 2 per cent increase in the total amount of authorised production. The lowering of prices is supplemented by payments (including the national envelopes) to dairy cows. Finally, in scenario four the CEEC are integrated (as in scenario two) in a world as shaped by scenario three.

These scenarios allow us to analyse the impacts of different agricultural policies in both the EU and the CEEC while taking into account the general prospects for economic growth. Moreover, it

allows us to analyse the interactions between economic growth, structural change and trade reforms in Europe and the rest of the world simultaneously.

The scenarios: Agricultural protection rates

The initial (1995) and resulting border tax rates and output taxes in 2005 following the two alternative baseline assumptions are shown in Table 3 below. In the first three columns the import tariff equivalents are shown for the base year 1995 as well as the resulting tariff equivalents after projecting the database to 2005. Correspondingly, the next three columns show the initial and final export tax/subsidy rates.

Table 3. **Border protection and output subsidies for agriculture, EU-15, per cent**.

	Import tariff equivalent			Export subsidies			Output subsidies	
	Base 1995	S-1 2005	S-3 2005	Base 1995	S-1 2005	S-3 2005	Base/S-1 1995/05	S-3 2005
Wheat	12.4	12.4	0.0	12.4	0.0	0.0	6.2	6.2
Other grains	44.2	44.2	15.4	44.2	25.3	15.4	5.0	5.0
Vegetables, fruit, nuts	5.5	5.5	5.5	-1.0	-1.0	-1.0	1.0	1.0
Oilseeds	0.0	0.0	0.0	0.0	0.0	0.0	8.9	8.9
Sugar cane and beet	76.6	76.6	76.6	76.6	76.6	76.6	-2.7	-2.7
Other crops	9.1	9.0	9.0	2.9	2.5	2.3	-0.1	-0.1
Bovine animals	111.2	75.6	47.7	111.2	75.6	47.7	10.5	28.2
Other animal products	0.8	0.6	0.6	18.7	10.9	10.4	9.0	9.0
Raw milk	-	-	-	-	-	-	8.9	16.2
Wool	0.0	0.0	0.0	0.0	0.0	0.0	24.9	24.9
Resource extraction	0.2	0.1	0.1	-0.6	-0.6	-0.6	0.4	0.4
Bovine meat products	111.2	75.6	47.8	111.2	75.6	47.8	0.6	0.6
Other meat products	18.7	18.7	18.7	18.7	18.7	15.7	0.7	0.7
Dairy products	116.3	116.3	83.9	116.3	116.3	83.9	1.0	1.0
Sugar	76.6	76.6	76.6	76.6	76.6	76.6	0.8	0.8
Other proc. food prod.	9.3	9.3	9.3	-0.1	-0.1	-0.1	-7.4	-7.4

Source: GTAP 4 database, Ingco (1995) and own calculations.
Note: See Box 1 for a description of the scenarios.

In the case of wheat, the initial tariff rate in 1995 is relative low due to high world market prices that year. This implies that the EU-15 tariff rate in that year was well below the final post UR commitment on wheat - and therefore no reductions in the tariff rate is required. However, the export subsidy rate for wheat (initially 12.4 per cent) is reduced in the baseline to zero due to quantitative restrictions on subsidised exports of wheat from EU-15 in accordance with the European Community's UR schedule on commitments limiting subsidisation, cf. (GATT 1994b).[7]

7 In 1995 according to the European Communities notification concerning export subsidy commitments to the World

In the case of other grains and other crops the same pattern emerges where post UR tariff rates are not binding but export subsidy rates have to be reduced due to quantitative or value commitments in the European Community's UR schedule.

In the case of bovine animals and bovine meat products, the post UR tariff rates are binding wherefore both border tax rates are reduced accordingly. Note also that the export subsidy rates are adjusted accordingly in order to avoid the situation where the import tariff rate is below the export subsidy rate (resulting in a "money machine" effect).

In scenario 3, the Agenda 2000 baseline, the border protection rates differ from scenario 1, as we have chosen to represent reductions in intervention prices by reducing protection rates for wheat, other grains, bovine animals and meat products and dairy products.

In Table 4 (first columns) the corresponding tariff rates for the CEEC in 2005 are shown. Comparing the 2005-levels in Tables 3 and 4 we find the implied changes in the distortions facing CEEC farmers when enlargement takes place (change columns in Table 4). Note that including the CEEC in the EU will lead to substantial increases in the CEEC agricultural protection rates against third-country suppliers. Import tariffs and subsidies to exports increase for especially grains, sugar, bovine meat and dairy products without the Agenda 2000 reforms (S-2, change), and much less so if the Agenda 2000 proposal is implemented (S-4, change). Moreover, with the Agenda 2000 in place output subsidies (and input subsidies as well (not shown)) increase significantly in the CEEC when integrated (S-4, changes). Note that protection rates are higher in the CEEC as compared with the EU for vegetables, fruit and nuts, oilseeds, other animal products (pig- and poultry meat) and other processed food products.

Trade Organisation the EU15 exported 10.8 million tons of wheat, which is below the EU15's final quantity commitment on total subsidised wheat exports of 14.4 million tons, cf. (WTO 1998). Under the assumption that all wheat export from the EU15 is subsidised in the projection of the database to 2005, the growth of subsidised wheat exports is only allowed to expand by 33 percent. But with this restriction imposed in the projection of the database, the European Community - given the increased global demand for wheat in the baseline - has to tax exports of wheat to remain within the quantity commitment. Therefore, we eliminate wheat export subsidies, cf. Table 3.

Table 4. **Protection and output subsidies, CEEC, per cent (levels) and per cent points (change)**

	Import tariff equivalent			Export subsidies			Output subsidies	
	2005 (levels)	S-2 (change)	S-4 (change)	2005 (levels)	S-2 (change)	S-4 (change)	2005 (levels)	S-4 (change)
Wheat	-17.9	30,3	17,9	-17.9	17,9	17,9	5.1	1,1
Other grains	-15.3	59,5	30,7	-15.3	40,6	30,7	4.9	0,1
Vegetables, fruit, nuts	10.9	-5,4	-5,4	-0.0	-1,0	-1,0	0.4	0,6
Oilseeds	3.8	-3,8	-3,8	3.8	-3,8	-3,8	6.0	2,9
Sugar cane and beet	29.1	47,5	47,5	29.1	47,5	47,5	4.0	-6,7
Other crops	9.4	-0,4	-0,4	-0.0	2,5	2,3	0.4	-0,5
Bovine animals	2.3	73,3	45,4	2.3	73,3	45,4	6.1	22,1
Other animal products	8.2	-7,6	-7,6	33.8	-22,9	-23,4	5.2	3,8
Raw milk	-	-	-	-	-	-	5.9	10,3
Wool	0.0	0,0	0,0	-0.0	-0,0	0,0	0.9	24,0
Resource extraction	1.2	-1,1	-1,1	-0.0	-0,6	-0,6	-2.4	2,8
Bovine meat products	2.3	73,3	45,5	2.3	73,3	45,5	7.6	-7,0
Other meat products	33.8	-15,1	-15,1	33.8	-15,1	-18,1	7.5	-6,8
Dairy products	20.5	95,8	63,4	20.5	95,8	63,4	0.2	0,8
Sugar	29.1	47,5	47,5	29.1	47,5	47,5	1.9	-1,1
Other proc. Food prod.	16.8	-7,5	-7,5	0.2	-0,3	-0,3	1.3	-8,7

Source: GTAP 4 database and own calculations.
Note: Columns (levels) indicate the level of the tax or subsidy in CEEC before integration and columns (change) are the change in taxes or subsidies in per cent points associated with an enlargement.

6. Results

In presenting the results we will focus on production, market prices, the implications for the EU budget and regional welfare (further results can be found in Frandsen *et al.* (1998)).

Production

Changes in output are determined by the assumed productivity increases, export and import growth rates, and the growth in domestic private consumption shaped by income growth and the assumed income elasticities. The resulting production changes in the European Union are given in Table 5.

The baseline (scenario 1) reflects the structural shift in the composition of European production as the importance of agriculture and the agricultural processing industry declines relative to manufacturing and more capital-intensive industries. During the period of consideration the production of wheat and other grains in the EU increases slightly whereas the production of oilseeds and other crops increases by more than 30 per cent. This shift reflects the assumed relative profitability among the crop sectors following the implementation of the Uruguay Round with lower export subsidies for wheat and other grains, cf. Table 3. The production of sugar is assumed limited by the EU sugar quota regime. The production of industrial goods and services is projected to increase by around 2 per cent annually.

Table 5. **Change* in output in the European Union (15), per cent**

	Scenario 1 1995-2005	Scenario 2 2005	Scenario 3 1995-2005	Scenario 4 2005
Wheat	10.5	-2.9	12.6	-4.2
Other grains	4.7	-8.1	-9.0	-8.9
Vegetables, fruit, nuts	15.9	3.0	16.2	2.8
Oilseeds	33.1	0.3	33.7	-0.2
Sugar cane and beet	0.0	0.0	0.0	0.0
Other crops	32.8	1.3	34.1	1.0
Bovine animals	-11.9	-8.8	-16.3	-6.3
Other animal products	15.0	1.3	15.7	1.2
Raw milk	0.0	0.0	2.0	0.0
Wool	137.8	0.6	155.9	0.0
Resource extraction	17.5	0.0	17.5	0.0
Bovine meat products	-2.7	-3.3	-12.5	-1.8
Other meat products	12.7	2.1	13.7	1.9
Dairy products	4.5	0.3	6.9	0.2
Sugar	7.7	-0.2	8.6	-0.3
Other processed food prod.	13.6	1.5	14.7	1.4
Textiles	6.9	1.4	7.3	1.2
Manufactures	20.4	0.1	20.3	0.1
Services	23.9	-0.1	23.9	-0.1

* The results for scenario 1 and 3 are presented as accumulated changes during the period 1995-2005, while scenario 2 and 4 are reported as changes relative to scenario 1 and 3, respectively.

In the animal sectors particulerly the production of bovine animals is affected by the full implementation of the Uruguay Round Agreement as the protection rate in 1995 is significantly higher than the EU post UR binding commitment (protection is reduced to the final rate in the year 2000). The production of bovine animals falls by around 12 per cent. The EU dairy policy is assumed unchanged during the period 1995 to 2005 resulting in no changes in the quantity of raw milk produced. The production of wool is more than doubled, which is explained by an increased global demand for wool products caused by an increased regional income growth and the relatively large income elasticity for wool found in most regions.

In scenario 3 we supplement scenario 1 with the Agenda 2000 proposal as described above. Comparing the results we generally find only small changes in the production of the individual agricultural commodities - with the exception of other grains (lower import tariffs and export subsidies) and bovine animals and bovine meat products (significantly lower border protection). The production of raw milk/quota increases by 2 per cent as outlined in the Agenda 2000 proposal. The production of wheat, oilseeds and other crops increases slightly as the profitability of these

Table 6. **Change* in output in the Central and Eastern European Countries, per cent**

	Scenario 1 1995-2005	Scenario 2 2005	Scenario 3 1995-2005	Scenario 4 2005
Wheat	31.2	42.3	33.0	67.7
Other grains	19.6	69.1	24.2	84.5
Vegetables, fruit, nuts	27.5	-15.5	27.5	-15.4
Oilseeds	38.6	-5.8	38.9	-0.7
Sugar cane and beet	46.2	-2.5	45.6	-1.3
Other crops	46.4	-29.7	46.0	-26.5
Bovine animals	44.7	86.9	44.5	70.0
Other animal products	30.6	-24.4	29.1	-23.3
Raw milk	21.2	0.0	21.1	0.0
Wool	43.0	-2.9	42.3	-2.4
Resource extraction	34.6	1.2	34.6	1.1
Bovine meat products	35.4	75.6	44.5	56.0
Other meat products	31.4	-20.9	29.8	-19.9
Dairy products	48.9	29.6	48.4	22.4
Sugar	48.7	1.0	48.0	2.1
Other processed food prod.	35.4	-19.1	34.7	-18.4
Textiles	46.7	6.9	46.5	8.5
Manufactures	46.8	-0.6	46.9	-1.4
Services	45.5	-0.2	45.5	0.0

- See Table 5.

products increase relative to the production of other grains (land is reallocated accordingly)[8].

Integrating the CEEC into the EU, scenario 2, leads to a 3 and 8 per cent decrease in the production of wheat and other grain products in the EU-15 relative to what the production would have been in the absence of enlargement. The production of bovine meat products falls by 3.3 per cent while the milk quota keeps the production of raw milk unchanged. For a number of industries production increases as a result of increased export to the Central European Countries. At first, the 3 per cent increase in the production of vegetables, fruit and nuts in EU-15 are a surprise. However, production of these products falls by 15.5 per cent in the new member countries as the relative protection of these commodities is reduced (lower border protection for vegetables and fruits relative to higher border protection for grains and hectare premiums to the reform crops), cf. Table 6. Agricultural land is reallocated accordingly to equalise the return to land.

Table 6 also illustrates the changes in the pattern of production in the CEEC prior to enlargement. Integrating the CEEC into the EU changes this pattern dramatically within agriculture at the

8 It is noted that these projections seem to agree quite well with the latest long term 1998-2005 commodity projections form the Commission (1998).

expense of the other industries. Note, also that the production of raw milk in the CEEC is limited by a production quota corresponding to the level of production in the year of integration (2005), whereas the quota for sugar cane and beet is found not to be binding (lower than their 2005 level of production)[9]. Production of manufacturing and services is affected negatively as a result of factor reallocations following the integration of the countries into the EU. This is also a logical consequence of the reduction of protection for these products as tariffs are harmonised (higher initial tariffs in the CEEC). An exception is the textiles and clothing industries where integration spurs further production growth in the CEEC.

Reforming the Common Agricultural Policy according to the Agenda 2000 proposal prior to enlargement does not significantly change the impact of enlargement on the European structure of production. However, the reforms seem to stimulate the production of grains and oilseeds further due to the assumed extension of the hectare premiums to the new members in spite of lower border protection for wheat and grains[10]. Contrarily, the expansionary effect on the production of bovine meat and dairy products in the CEEC is clearly smaller as the border protection is significantly lower after the Agenda 2000 proposal. These impacts on the individual activities in the new member countries reflect the balances between on the one hand the changes in relative border protection rates and the implemented compensatory payments and on the other hand the effects on consumption and the secondary effects through the factor markets.

Finally, production of industrial goods in the Central and Eastern European Countries falls by 1.4 per cent in scenario 4 as compared to 0.6 per cent in scenario 2. The opposite result is found for services where production is now unchanged opposed to a small loss of 0.2 per cent in scenario 2. The extent to which the remaining industries are affected by the extension of the CAP depends, as demonstrated, on the design of agricultural policies and on the importance of e.g. labour and capital in total costs as well as differences in exposure to international competition in the two industries.

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9 We are of course aware that the exact quota level for raw milk and sugar cane and beet as well as the base area for which hectare premiums will be given is subject to the enlargement negotiations.

10 It is noted that the per hectare premium in the new member countries are different in scenario 2 and 4 as the hectare and livestock premiums are implemented as a maximum budgetary outlays based on a historical base area. Therefore, per hectare premiums are endogenous and determined to the extent that the grown area exceeds the base area, cf. Box 1.

Commodity and primary factor prices

When it comes to the simulated market prices, the assumed differential factor growth rates contribute to the diverse development of market prices of factor endowments. Also, the implementation of the GATT Agreement shows up in EU land prices falling by 22 per cent net of the assumed yearly productivity increases over the considered 10-year period, cf. Table 7. The wage rate increases by 14 per cent while the price of investment goods falls by 12 per cent reflecting the fact that labour will become a relatively scarce resource in the European Union in the coming years, cf. Table 2. The rent accruing to the so-called natural resources more than doubles as we have assumed (exogenously) that the prices of resource extraction, including energy, increase by 8.8 per cent globally over the considered 10 year period. This estimate is based upon the OECD long-term forecasts of energy prices, cf. OECD (1997). The shown price changes of primary factors, along with the assumed yearly TFP growth rates, determine the changes in market prices of the produced goods and services. These relative price shifts will of course affect the input factor intensities in all the EU industries - lowering for example the labour/capital ratio over the coming years.

Table 7. **Change* in market prices in the European Union (15), per cent**

	Scenario 1 1995-2005	Scenario 2 2005	Scenario 3 1995-2005	Scenario 4 2005
Land	-22.0	-1.0	-19.3	-0.2
Unskilled labour	14.1	0.1	14.1	0.1
Skilled labour	-6.7	0.0	-6.7	0.0
Physical capital	-12.4	0.0	-12.4	0.0
Natural resources	113.9	0.0	114.0	0.0
Wheat	-20.4	-0.6	-22.9	-0.5
Other grains	-20.9	-1.2	-23.9	-0.5
Vegetables, fruit, nuts	-17.8	0.1	-17.7	0.2
Oilseeds	-17.7	-0.1	-17.4	-0.1
Sugar cane and beet	-5.1	-0.2	-3.9	-0.4
Other crops	-17.5	0.0	-17.7	0.1
Bovine animals	-27.1	-2.8	-40.2	-3.2
Other animal products	-25.1	-0.2	-25.9	-0.1
Raw milk	6.7	-6.2	-31.6	-6.0
Wool	-23.3	-0.4	-24.2	-0.3
Resource extraction	8.8	0.0	8.8	0.0
Bovine meat products	-16.3	-1.3	-21.3	-1.1
Other meat products	-16.1	-0.3	-17.2	-0.2
Dairy products	-2.6	-2.8	-18.0	-2.0
Sugar	-7.8	-0.2	-8.1	-0.2
Other processed food prod.	-8.1	-0.2	-8.9	-0.1
Textiles	-5.4	-0.1	-5.5	-0.1
Manufactures	-4.7	0.0	-4.7	0.0
Services	-6.0	0.0	-6.0	0.0

* See Table 5.

The lower protection rates implied by the UR Agreement (scenario 1) combined with the other exogenous assumptions shaping the baseline, including the assumed total productivity growth of 2 per cent per year, lead to falling grain prices of around 20 per cent. The price of bovine animals and bovine meat products are reduced by 27 and 16 per cent, respectively. Coupled with an increased demand for dairy products - both domestically and internationally - the supply constrain imposed by the EU milk quota regime implies that the price of raw milk in the EU-15 rises by 6.7 per cent. Lower prices generally, with the exception of wages, imply, however, that the price of processed milk falls only slightly over the considered 10 years time period.

In comparison with the first scenario the lower border protection in scenario 3, supplemented by the proposed hectare and livestock premiums leads to a further 2.5 to 3 per cent fall in grain market prices. For dairy products the market prices fall by additionally 15 percentage points which corresponds closely to the proposed cut in intervention prices given the 2 per cent increase in the aggregated EU milk quota. We also find that the EU quota is still binding. For bovine animals and bovine meat products we report a further reduction in market prices of 13 and 5 percentage points, respectively. This is somewhat less than the proposed cut in intervention prices - however - we are here focusing on market prices remembering that the production of bovine meat products in the EU is reduced by 10 percentage points relative to scenario 1. We also find that the Agenda 2000 proposal (combining price cuts with compensatory payments) leads to a slight increase in land prices of almost 3 percentage points, indicating that the proposal only marginally will affect land prices.

Integrating the CEEC leads to only minor reductions of the domestic market prices in the EU-15. Prices of dairy and bovine meat products decrease by 2 to 3 per cent whereas the prices of grains fall by 0.5 to 1 per cent. Naturally, one could argue that enlarging the EU would not affect market prices facing EU farmers (and thereby production) given the existing system of intervention and variable restitutions for a number of important agricultural commodities. Nevertheless, our simulations illustrate in which markets increased competition from Central and Eastern European farmers potentially could affect future terms of production in the EU-15 if intervention prices and border protection levels remain unaltered[11]. Or to put it differently – enlargement would

11 In case we had explicitly implemented storage (intervention) to fix the domestic market price in the EU or increased

neccessitate changes to the intervention prices for certain products in order to avoid large increase in intervention stocks.

The market price changes in the CEEC are shown in Table 8. Due to the assumed high total factor productivity growth rates for the agricultural sectors and the reductions in import prices on these commodities, the market prices for all agricultural products decline in scenarios 1 and 3. Agenda 2000 initiatives do not to any notable degree affect market prices in the CEEC. Land prices increase by around 13 per cent and the prices of manufacturing and services rise relative to agricultural prices. Once again different factor growth projections lead to divergent factor returns and the wage rate increases by 25 per cent during the 10-year period.

Table 8. **Change* in market prices in the Central and Eastern European Countries, per cent**

	Scenario 1 1995-2005	Scenario 2 2005	Scenario 3 1995-2005	Scenario 4 2005
Land	12.9	194.6	13.4	187.4
Unskilled labour	25.1	-3.7	25.1	-3.2
Skilled labour	-13.7	-4.5	-13.8	-4.0
Physical capital	-17.9	-4.6	-18.0	-4.1
Natural resources	214.8	10.0	215.1	9.6
Wheat	-20.9	7.9	-20.6	0.4
Other grains	-21.0	11.5	-20.4	-1.8
Vegetables, fruit, nuts	-19.3	24.2	-19.3	23.5
Oilseeds	-17.6	-5.0	-17.5	-6.4
Sugar cane and beet	-16.3	44.4	-16.4	43.9
Other crops	-15.6	9.6	-15.6	8.3
Bovine animals	-24.1	47.7	-24.0	24.3
Other animal products	-25.7	12.2	-25.8	11.5
Raw milk	-30.2	211.3	-30.2	137.7
Wool	-23.5	3.6	-23.5	3.0
Resource extraction	8.8	-1.0	8.8	-1.0
Bovine meat products	-20.1	34.6	-20.1	21.5
Other meat products	-20.4	14.5	-20.5	13.9
Dairy products	-18.5	60.1	-18.5	39.2
Sugar	-16.0	33.0	-16.0	32.6
Other processed food prod.	-10.7	11.7	-10.8	11.0
Textiles	-7.0	1.2	-7.0	1.0
Manufactures	-5.9	-0.7	-5.9	-0.5
Services	-6.9	-0.1	-6.9	0.0

* See Table 5.

the border protection to avoid lower domestic market prices (although against the spirit of the URA) this would affect the composition of production in the EU following enlargement. Agricultural production would therefore not fall for some of the agricultural commodities, and factor prices would be slightly higher with a relative small negative impact on services and manufacturing. The later reported budgetary and welfare costs would therefore also be slightly higher.

Integrating the Central and Eastern European Countries following scenario 1 causes large increases in the price of agricultural land as the CAP, including hectare and livestock premiums, are extended to farmers in the CEEC. Grain prices increase by 8-12 per cent and prices of dairy products increase by 60 per cent as import tariffs and export subsidies adjust to the EU levels. The price of raw milk triples as we assume that a quota will limit the production of milk. The price effects for grains, bovine meat and dairy products are dampened significantly if integration takes place after the implementation of the Agenda 2000 proposal.

The EU budget and welfare consequences

Finally, we consider the implications for the EU budget and regional welfare. Integration of the Central and Eastern European Countries into the European Union implies that the protection of the CAP is extended to a larger number of countries. The resulting changes in relative prices will affect factor allocations and consumption patterns with changes in economic welfare as a result. Trade patterns will change and the relative price changes will have an impact on the terms of trade in the two regions. Given the common financing of the CAP possible allocative efficiency effects in the CEEC will either be offset or boosted by increased transfers from the EU associated with the agricultural support policies. Transfers from the EU to the CEEC will naturally affect income levels in the EU negatively. However, efficiency gains and changes in the terms of trade can partly offset this income loss following the establishment of a free trade zone with the CEEC.

Tables 9, 10 and 11 describe in detail the budgetary implications of integrating the Central and Eastern European Countries into the EU. The budget presented incorporates the expenditures to compensatory payments to land and livestock, output subsidies, expenditures related to export subsidies and the revenue from tariffs on agricultural imports. The elimination of EU export subsidies on exports to the CEEC and slightly lower export quantities to a number of other regions reduce the EU-15 expenditures for export subsidies marginally for a number of commodities. However, costs associated with dairy exports increase by 0.2 billion ECU as exports to third countries increase by 9.5 per cent (not shown). In total expenditures increase by ECU 94 million (1995 prices), cf. Table 9. If the Agenda 2000 reform proposal is implemented before an enlargement the lower protection of dairy products leads to a small net saving of ECU 38 million. The rise in EU dairy exports to third countries is now reduced to 6.3 per cent.

Extending the coverage of the CAP to the new members will result in significantly higher

agricultural budgetary costs unless the CAP is reformed, cf. Table 10. Total expenditures related to agricultural production support in the new member states will be 1995-ECU 13.7 billion. Of this amount, expenditures to export subsidies constitute approximately ECU 2.3 billion and compensatory payments ECU 11.4 billion. If the CEEC are integrated after the border protection for grains, bovine meat and dairy products is reduced and compensated by somewhat higher compensatory payments as proposed, the costs associated with integration increase to a total of ECU 14.4 billion. Compared with scenario 2 the costs of export subsidies are reduced by 1995-ECU 850 million whereas the costs of compensatory payments increase by ECU 1.5 billion.

Table 9**. Changes in expenditures on export subsidies in the EU (15), million 1995 ECU**

	Scenario 2	Scenario 4
Wheat	0	0
Other grains	-8	-12
Vegetables, fruit, nuts	0	0
Oilseeds	0	0
Sugar cane and beet	-2	-2
Other crops	-9	-10
Bovine animals	4	8
Other animal products	-12	-16
Raw milk	0	0
Wool	0	0
Bovine meat products	-24	-5
Other meat products	-13	-18
Dairy products	233	96
Sugar	-75	-80
Other processed food prod.	0	0
Total	94	-38

Table 10. **Agricultural budgetary costs in the CEEC, million 1995 ECU**

	Scenario 2: Integration Total costs	of which export subsidies	Scenario 4: Integration Total costs	of which export subsidies
Wheat	2508	0	2920	0
Other grains	3770	144	4311	108
Vegetables, fruit, nuts	164	0	163	0
Oilseeds	905	0	710	0
Sugar cane and beet	-26	18	-25	18
Other crops	202	2	190	2
Bovine animals	1612	267	2205	162
Other animal products	574	1	572	1
Raw milk	1831	0	1943	0
Wool	80	0	79	0
Bovine meat products	284	237	146	106
Other meat products	67	11	67	11
Dairy products	1659	1552	1063	976
Sugar	73	56	73	57
Other processed food prod.	0	0	0	0

Total	13702	2287	14417	1440

The total budgetary burden for the EU is shown in Table 11. Total transfers to the Central and Eastern European Countries as a result of the CAP amount to 1995-ECU 11.3 billion. This includes expenditures to compensatory payments, output subsides and export subsidies net of tariff revenue collected on imports into the CEEC and their GDP contribution to the financing of the Common Agricultural Policy. Taking into account changes in costs to export subsidies and the lower import tariff revenues in the EU-15, the total impact on the EU budget amounts to almost ECU 14 billion. This amounts to 35 per cent of the (counterfactual) expenditure level related to the CAP in the year 2005. If the CAP is reformed as proposed in Agenda 2000 - reduced border protection for grains and significant reductions in support for dairy and bovine meat products supplemented by compensatory payments - the transfer to the CEEC increase by ECU 750 million to a total of ECU 12 billion. Including saved export subsidies and lost revenues from import tariffs in the EU-15, the total impact on the EU budget is still almost ECU 14 million, corresponding to 32 per cent of the counterfactual EU expenditure level in 2005. Note that this estimate does not include other important aspects of the EU budget, especially costs associated with the structural funds.

Table 11. **Changes in the EU budgetary costs, million 1995 ECU**

	Scenario 2	Scenario 4
CAP costs in the CEEC	13702	14417
Tariff revenue and GDP contributions, the CEEC	-2447	-2412
Total transfers to the CEEC	11255	12006
Changes in costs to export subsidies in the EU-15	94	-38
Lower tariff revenue in the EU-15	2554	1852
Total change in the EU budget	13904	13819

Hertel *et al.* (1997b) find that the total change in the EU budget amounts to 1992-ECU 0.4-1.2 billion which is less than a tenth of our estimate. This is due to different assumptions especially regarding the CAP instruments. Most importantly we take the compensatory payments into account and assume that they will also be extended to the new member countries. It would be politically very difficult to have two different versions of a “Common” Agricultural Policy within the same Union and the recent debate regarding a re-nationalisation of part of the agricultural support does reflect budgetary concerns related to the future enlargement. Furthermore our study is undertaken in a projections mode allowing for changes in factor endowments and some degree of convergence of incomes in Europe prior to accession. This also means that our study is based on larger

Armington elasticities, which imply substantially greater supply response in the CEEC.

The European Commission, (1995) finds the CAP budgetary costs of integrating all 10 Central and Eastern European countries to be ECU 12 billion, which is close to our estimate. Other recent estimates of the CAP budgetary impact of integrating the Czech and Slovak Republic, Hungary, and Poland have been in the range of ECU 5 to 15 billion (Tangermann and Josling, 1994; Slater and Atkinson, 1995; Tangermann, 1996). Adding the costs of including Slovenia, Bulgaria and Romania would, based simply on relative population size, add another 50 per cent to these estimates and still place our estimate within the range.

More important than budgetary implications should be the overall welfare implications (although it sometimes appears as if policy makers value the budget over total economic welfare). These welfare effects include changes in allocative efficiency, terms of trade, inter-regional transfers and contributions from other factors (changes in endowments, technical changes and effects from non-homothetic preferences). The welfare effects are shown in Table 12.

Table 12. **Change in economic welfare, million, 1995 ECU**

	Scenario 2 2005	Scenario 4 2005
European Union (15)	**-11980**	**-12001**
-of which		
Allocative efficiency gains	870	769
Terms of trade effects	-1742	-933
Transfers	-11265	-12016
Other effects	156	180
Central and Eastern European Countries	**11926**	**12100**
-of which		
Allocative efficiency gains	119	-28
Terms of trade effects	1657	1019
Transfers	10735	11502
Other effects	-586	-393

Note: Economic welfare is measured as the money metric value of the Equivalent Variation. 'Other effects' include welfare changes due to changes in endowment, technical changes, and effects from the non-homothetic preferences.

In total, the CEEC are estimated to gain a welfare improvement of ECU 11.9 billion (measured as the money metric value of the Equivalent Variation) following integration with the existing CAP. This corresponds to a welfare gain of 4.6 per cent. If the agricultural policy is reformed according to the Agenda 2000 proposal, almost the same welfare gain is found (ECU 12.1 billion).

The overall welfare loss for the EU-15 is estimated to be ECU 12 billion in both enlargement scenarios covering the economic impacts of both trade creation and trade diversion effects as well as the cost associated with transfer of income from the EU-15 citizens to the CEEC farmers. This corresponds to a loss of income of 0.2 per cent. Decomposing the losses for the EU and the gains for CEEC illustrates that the story told is primarily a question of redistribution from Western European tax payers to Eastern European farmers. The total cost for EU-15 of ECU 12 billion in scenario 2 consists of a loss of 11.3 billion caused by the need for interregional transfers, an efficiency gain of almost ECU 1 billion and a term of trade loss of ECU 1.7 billion.

Baldwin *et al.* (1997) estimate real income gains in the CEEC from integration to be ECU 2.5 billion (1992 prices) in their conservative case and ECU 30.1 billion in their less conservative case (which, however, should be carefully interpreted, see Rodrik, 1997). For the EU they find a real income gain of ECU 9.8 billion, which contrasts our welfare loss. Their stylised representation of the CAP and lack of an endogenous budget allocation clearly explains this.

For the remaining non-member regions considered in this analysis we find only very small welfare effects (for a detailed discussion of the welfare implication of a European enlargement on non-member regions see Frandsen *et al.*, (1998)).

It is important to note that these welfare effects only tell part of the story. Most importantly we have not accounted for the possible dynamic effects of integration such as enhanced capital accumulation and higher productivity growth. The implications for investments could be substantial due to a reduction in the risk premium in the CEEC following a more stable and predictable environment (Baldwin *et al.*, 1997). Another factor not accounted for is a reduction in trade costs due to the adoption of uniform rules and procedures, which, however, has a mirror image in the higher costs needed to raise standards in the CEEC.

7. Qualification

Besides modelling the CAP instruments the structure of the model in general is important for e.g. the size of the welfare implications of integrating the Central and Eastern European Countries. Using a relatively standard neo-classical structure assuming constant returns to scale technologies, perfect competition and no income-investment linkages implies lower welfare effects from trade reforms as compared with models that incorporate scale economies, imperfect competition and accumulation effects. These effects are important features in the literature on the U.S.-Canada Free

Trade Agreement (Cox and Harris, 1985), the NAFTA (Francois and Shiells, 1994) and European Integration (Venables and Smith, 1988; Baldwin, 1992, Hertel et. al, 1997b).

Trade flows, production levels and budgetary implications of integrating the CEEC into the CAP also depend upon the Armington specification and the size of the trade elasticities. Generally, models with Armington specifications yield smaller trade and output effects than models with homogenous goods or models with firm-level product differentiation (see Francois *et al.,* 1996). The elasticities used in this study with respect to the agricultural products are typically around 9 for the import nest between different regions and around 4.5 between the domestic commodity and (a composite of) imports. Naturally, if these elasticities are reduced the increases in the CEEC production and exports of agricultural products are correspondingly smaller when integration takes place. This in turn would lead to smaller budgetary costs of integrating the CEEC. The chosen level of aggregation also matters for the results found, cf. Gehlhar and Frandsen (1998).

Sensitivity analysis indicate that the budgetary costs of integrating the Central and Eastern European Countries are reduced by approximately 10 per cent to ECU 12.3 billion when trade elasticities are halved. Moreover, if we assume that the hectare and animal premiums are not extended to the new member countries – although difficult to envisage given the present policy – the budgetary cost of an enlargement would be reduced to 6.9 ECU billion compared to the ECU 13.9 billion reported earlier.

As noted earlier the projections do not explicitly deal with the Europe Agreements as these are very restrictive with respect to agricultural trade. However, to the extent that they provide some access prior to full membership for the CEEC farmers to EU prices the calculated costs of accession might be slightly exaggerated.

Further, in the accession scenarios consistency with EU22 WTO disciplines has not been dealt with explicitly in this paper. These aspects could potentially be important issues in the WTO discussions related to European Enlargement between the European Countries and a number of other WTO contracting parties. Some of these aspects are dealt with explicitly in Frandsen et. al (1998).

Our attempt to represent the institutional features such as the Common Agricultural Policy in a general equilibrium model illustrates the importance of getting things right. Combined with other assumed initial distortions these features do affect the quantitative implication of for example an EU enlargement. Finally, the chosen level of aggregation matters for the results found, cf. Gehlhar and Frandsen (1998).

8. Concluding remarks

The focus of this analysis has been to assess the effects of integrating the Central and Eastern European Countries into the EU, with detailed modelling of the CAP and the Uruguay Round Agreement and with projections to the year 2005. Addressing the integration issue in a projections mode is essential in order to capture the economic growth and structural changes before integration. The specific modelling of the EU agricultural policy instruments allows us to capture the important implications of the Uruguay Round commitments, export subsidies, set-aside requirements, compensatory payments and the milk and sugar quota.

Our findings support the need for more detailed work on global trade reforms. The value-based implementation is not a sufficient representation of the Uruguay Round Agreement. Allowing for the quantitative aspects of the outcome of the Round on both the import and export side is important. Furthermore, evaluations of multilateral trade reforms need to be taken into account when evaluating possible CAP reforms such as the Agenda 2000 proposal.

The results show a continued structural shift in the EU composition of production in the coming years as the importance of agriculture and the food processing sectors decline in relative terms.

The Central and Eastern European Countries have a solid potential for increased production of both agricultural and labour-intensive manufacturing products. If the CEEC are integrated into the present Common Agricultural Policy of the EU it will significantly boost agricultural production and reallocate resources out of manufacturing and services. The Agenda 2000 proposal does not seem to change this pattern as the reductions of border protection in the EU for highly protected commodities are supplemented by increased compensatory payments. Our analysis supports the view that an enlargement of the EU where border protection and compensatory payments are extended to the new members will have significant supply effects in the new member countries.

Enlarging the EU to include the CEEC in the present or even a reformed agricultural policy along the lines of the Agenda 2000 proposal is an expensive option in budgetary terms. Total expenditures related to agricultural production support in the new member states is estimated at ECU 14-15 billion (1995 prices). Of this amount, compensatory payments constitute approximately ECU 12-13 billion and export subsidies around ECU 1.5-2 billion. But, taking into account tariff revenues and the GDP contributions from the CEEC, and changes in the EU15's costs associated with export subsidies and lower tariff revenues due to the enlarged common market, yields a total change in the EU budget of almost ECU 14 billion. This is about a third of the counterfactual

expenditure level related to the CAP in the year 2005.

Overall economic welfare improves significantly in the Central and Eastern European Countries following integration. The income gain for these countries is estimated to ECU 12 billion, which corresponds to an annual welfare gain of 4.6 per cent. The current EU countries are estimated to loose some ECU 12 billion (corresponding to an income loss of 0.2 per cent) irrespective of whether it is the present or the reformed agricultural policy (Agenda 2000) that is extended to the new member countries.

While these estimates may shed additional light on the economic implications of an eastward enlargement of the European Union, they are, of course, dwarfed by the historical and political importance of creating a united and peaceful Europe.

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