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CAP REFORM DECISIONS

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Foreword

In its Agenda 2000 communication of 16th July 1997, the European Commission set out proposals for the reform of existing European Union policies, and in particular of the common agricultural policy (CAP), the process of enlargement and the financial framework for the period 2000-2006.

Following the discussions on this document, the Commission adopted, on 18th March 1998, a set of legislative proposals covering the CAP reform, a new regulation on the Structural and Cohesion Funds, some instruments for pre-accession aid and the Financial Perspectives for the period 2000-2006.

The political agreement reached at the Berlin Summit in March 1999 resulted in the adoption of ten new Regulations and the decision on the level of allocations for the reform of the agricultural sector. The new regulations which come into force from 2000 onwards concern the arable crops, beef, milk and wine sectors, the new rural development framework, the horizontal rules for direct support schemes and the financing of the CAP (including amended regulations for the olive oil and tobacco sectors).

This publication brings together the findings of a series of impact analyses of the decisions on CAP reform for arable crops, beef and milk. This report includes impact assessments either at the agricultural sector level or at the macro-economic level. Some of them were carried out by independent experts, outside the European Commission. This is the case of the University of Bonn, the Food and Agricultural Policy Research Institute (FAPRI) in the US, and the Centre for World Food Studies of the University of Amsterdam. Others have been produced within the European Commission, and in particular by the Directorate-General for Economic and Financial Affairs and the Directorate-General for Agriculture. All these impact analyses are summarized in the form of an overview in the first chapter of this report.

List of acronyms and abbreviations

AWU	Annual Work Unit
bio	billion
BSE	Bovine Spongiform Encephalopathy
CAP	Common Agricultural Policy
CAPMAT	CAP Modelling and Accounting Tool
CEC	Commission of the European Communities
CEECs	Central and Eastern European Countries
COP	Cereals – Oilseeds – Pulses
CPI	Consumer Price Index
DG II	Directorate-General for Economic and Financial Affairs
DG VI	Directorate-General for Agriculture
EAA	Economic Accounts for Agriculture
EAGGF	European Agricultural Guidance and Guarantee Fund
EU	European Union
Eurostat	Statistical Office of the European Communities
FAO	Food and Agriculture Organisation (of the United Nations)
FAPRI	Food and Agricultural Policy Research Institute
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GVA	Gross Value Added
ha	hectare
LFA	Less Favoured Areas
MFSS	Medium-term Forecast and Simulation System
mio	million
NVA	Net Value Added
OECD	Organisation for Economic Co-operation and Development
SMP	Skimmed Milk Powder
SPEL	Sectoral Production and Income Model for Agriculture
t	tonne
URA	Uruguay Round Agreement
US	United States of America
WTO	World Trade Organisation

IMPACT ANALYSES OF AGENDA 2000 DECISIONS FOR CAP REFORM

Overview

By the European Commission

Directorate-General for Agriculture

February 2000

1. Introduction and summary results

The economic implications of the decisions[1] on the reform of the Common Agricultural Policy adopted in Berlin at the end of March 1999 have been evaluated in three separate studies. The first study, carried out by the University of Bonn, has been undertaken at sector level based on the SPEL/EU-MFSS model and has been complemented by an overall evaluation of the CAP reform at macro-economic level.

The second impact assessment study has been undertaken for the agricultural sector by the Food and Agricultural Policy Research Institute (FAPRI) in the US and consists of two quantitative analyses. The first one has been conducted by the FAPRI unit at the University of Missouri using an experimental version of an EU model, whereas the second analysis was carried out in the FAPRI unit at the University of Iowa using their set of models of major world agricultural markets.

The Centre for World Food Studies of the University of Amsterdam[2] (SOW-VU) undertook the third analysis using the CAPMAT model of the EU agricultural sector. Parts of this analysis was used by the Directorate General for Economic and Financial Affairs of the European Commission to conduct a quantitative assessment of the consequences of the CAP reform for the overall economy on the basis of the Quest II model.

The main results from these analyses[3], expressed in terms of deviations from a *status quo* scenario[4], can be summarised as follows:

Agricultural sector

- By 2005, **cereal** area –notably wheat area- is forecast to expand as compared to a *status quo* scenario thanks to the reduction in the rate of compulsory set-aside that would outweigh prospects for lower cereal returns. This would translate into a less than proportional increase in production due to slower yield growth. Improved competitiveness is foreseen to stimulate cereal internal demand, with a stronger pattern for coarse grains driven by increased feed use. Yet, the cereal net exportable surplus is projected to increase significantly. In that context, the outlook for EU cereal markets would remain dependent on the situation on world markets and the €/US $ exchange rate. Under favourable medium-term prospects for world markets –as forecast by most analysts- and a relatively weak €, wheat exports are foreseen to expand beyond the URA limits for subsidised exports, with world market prices (rather than intervention price) acting as price floor.

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1 A comparison between the CAP reform proposals for agricultural markets, on which the 1998 publication "CAP reform proposals - Impact Analyses" was based, and the Berlin decisions is given in annex of this chapter.

2 The Centre for World Food Studies is the leader of a team of three Dutch institutes associated under the FEA project (Future of European Agriculture), namely the Central Planning Bureau (CPB), the Agricultural Economics Research Institute (LEI-DLO) and the Centre for World Food Studies (SOW-VU).

3 These analyses have been complemented by an internal assessment of the impact of the CAP reform decisions on EU consumers.

4 The *status quo* scenario corresponds to a policy scenario based on the continuation of the 1992 CAP reform.

- Area allocated to **oilseed** is generally projected to decline in reference to a *status quo* scenario, although the magnitude of the fall remains mainly conditional on medium-term expectations on world oilseed markets.

- Reduced market prices and changes in the suckler cow premium system are expected to outweigh the increase in direct payments to the **beef sector** and result in a slight decline in beef production. The fall in market prices is foreseen to boost consumption levels that would be some 2 to 3 % higher than under a *status quo* scenario, thus leading to a significant reduction in stock levels. The magnitude of these changes would mainly depend on the Commission's policy in the management of the domestic market and subsidised exports.

- Lower beef prices are forecast to put pressure on the **pork** and **poultry** sectors, which should in turn benefit from lower cereal prices. The degree to which the feed cost reduction or the beef substitution effects influence the white meat sector differs across studies, although no significant changes are projected against *status quo* results. Yet, most studies foresee that lower prices may generate opportunities to increase unsubsidised exports, notably for poultry meat.

- The increase in milk quotas decided in Berlin is forecast to result in greater **milk** supplies, the magnitude of which differs across studies depending on the assumption made regarding the current over-quota production in some EU countries and the impact of reduced market prices on global milk supply. Most of the increase in the production of milk and dairy products is expected to be absorbed on the domestic market, although increased exports of dairy products are foreseen (notably for cheese). Nevertheless, the growth in domestic use and exports is projected to be outpaced by the production increase, resulting in higher stock levels (mainly in skimmed milk powder).

- Although developments in agricultural income under Agenda 2000 are expected to be slightly less favourable than in the theoretical -but in practice unsustainable- *status quo* scenario, **total agricultural income** in nominal terms would remain some 11 to 12 % above the high levels recorded over the 1992-1996 period. Moreover, when expressed per labour unit, agricultural income in 2005 would reach levels well above the 1992-1996 average, ranging between 16 % to 34 % in real terms (depending on the study, assumptions concerning inflation rate as well as future developments in the EU agricultural workforce).

Overall economy

- **Consumers in the EU** should benefit from the reduction in agricultural prices. Gains in consumer surplus have been estimated to reach around 9 bio € in 2005/06 and 10.5 bio € in 2006/07 for the EU as whole. The magnitude of these benefits depends mainly on future developments in the market prices of agricultural commodities. Generally speaking, a large proportion of these benefits should reach final consumers, whereas another part can be expected to be captured by the food and retailing sectors that would improve their profitability and competitiveness.

- On the basis of a certain number of assumptions, the fall in prices of agricultural products would translate into a reduction in the **consumer price index** of 0.25 % in 2005 and 0.33 % in 2010. This in turn would generate significant and permanent

positive macro-economic effects that would come from both an increase in real private consumption and the positive supply response resulting from the reduction in wage costs faced by firms. Yet, this latter source of output growth is strongly dependent on the wage behaviour of the labour market. A rapid adjustment in wages to the reduction in consumer price is foreseen to generate a virtuous cycle that could lead to an expansion in investment, output and employment. A slower adjustment in wages could limit largely the macro-economic benefits to an increase in private consumption, without substantial lasting effect on the supply side of the economy.

- According to the Quest II results, **real private consumption** at EU level would increase by a further 0.2 % to 0.4 % in the long run. The impact on **GDP growth** would be significant, though more gradual, with an additional gain of 0.12 % in 2005 and a regular increase of up to around 0.25 % in the long-term. These positive outcomes would be lower in the event of a slower adjustment of real wages. **Employment** would increase by 0.14 % in 2005 as compared to a *status quo* scenario, then rising further by up to 0.24 % by 2030.

2. Modelling framework

As already mentioned, a set of models has been used for the impact analysis of the CAP reform decisions on the agricultural sector. The **SPEL/EU-MFSS** model has been developed by the University of Bonn and is currently run by Eurostat. It allows to forecast and simulate policy changes on various market (in particular production and consumption) and income variables of the agricultural sector. It consists of a supply component and a demand component. These components are dynamically linked in an overall system that enables price formation through the recursive interplay of supply and demand.

The **FAPRI models** used in this exercise consist of a set of non-spatial partial equilibrium models for major agricultural markets. The **FAPRI-Iowa** analysis was conducted with the standard models used every year to develop baseline projections of world agricultural markets. These models estimate production, consumption, stocks, trade and prices of major trading countries and agricultural commodities. The **FAPRI-Missouri** work used an experimental version of a more detailed EU module. This new model is of a similar general structure than the standard FAPRI models and provides details for four EU Member States.

The **CAP Modelling and Accounting Tool (CAPMAT)** is the successor of the ECAM project and has been developed by three Dutch institutes (CPB, LEI-DLO and SOW-VU). It performs dynamic policy simulations on the basis of an analytical model of the applied general equilibrium type that generates developments in supply, demand and cross-commodity substitution.

The economic implications of the agricultural decisions for the overall economy have been analysed using the **Quest II** model of the Directorate General for Economic and Financial Affairs of the European Commission.

The impact of the Agenda 2000 CAP reform is analysed for **the year 2005** with reference to a *status quo* policy situation. These *status quo* scenarios vary substantially across studies with regards mainly to medium-term developments on world agricultural markets and key policy (e.g. compulsory set-aside rate) as well as economic variables (e.g. €/$

exchange rate). Therefore, for comparative purposes, the simulation results are presented in the form of deviations from the reference scenario. This allows to depict the likely impact of Agenda 2000 on the economy while reducing (though not avoiding) any potential bias generated by the models and the starting point, when both *status quo* scenario and Agenda 2000 situations are compared in terms of absolute levels. Furthermore, results should not be interpreted as changes relatively to the current (unreformed) situation.

The impact studies on the agricultural sector focus on the arable crops, meat and dairy production sectors, with particular reference to production, consumption, external trade and income changes. The macro-economic consequences are mainly assessed in terms of changes in the development of the EU private consumption, GDP growth and employment.

3. Simulation results

3.1 Consequences on EU agriculture

3.1.1 Crop sector

Despite the overall decline in arable crop returns, total area under cereals and oilseeds is generally foreseen to expand thanks to the reduction in the rate of compulsory set-aside[5]. However, the fall in the rate of compulsory set-aside does not translate into a similar increase in cropped area due mainly to a projected rise in the level of voluntary set-aside[6] generated by lower cereal prices and increased uniform direct payments.

Table 1.1 Outlook for cereals & oilseeds area in 2005 under Agenda 2000

Situation in 2005	Status quo	Agenda 2000			
	scenario	SPEL	FAPRI - I*	FAPRI - II*	CAPMAT
Cereal area	100.0	102.4			100.9
Wheat	100.0	102.6	104.0	105.9	102.6
Soft wheat	100.0	102.5			102.8
Durum wheat	100.0	103.4			101.4
Coarse grains	100.0	102.2			99.4
Barley	100.0	102.2	102.6	105.0	99.5
Maize	100.0	104.6	100.8	103.5	98.4
Oilseed area	100.0	99.7	97.2	95.8**	97.1
Rapeseed	100.0	96.8	97.4	95.2	96
Soyabean	100.0	104.0	96.9	99.5	97.5
Sunflower	100.0	102.4	96.9		98.1

* FAPRI - I: FAPRI Missouri; FAPRI - II: FAPRI Iowa. ** Only rape seed and soya beans.

[5] In its Agenda 2000 scenario, FAPRI-Missouri uses a rate of compulsory set-aside of 10 % for 2000 and 2001, and 5 % from 2002 to 2005, as compared to 10 % for the *status quo*. From 2006/7 onwards, the rate of compulsory set-aside is set at 0 %, as compared to 5 % in the *status quo*. In contrast, the FAPRI-Iowa study assumes a mandatory set-aside rate of 10 % for the Agenda 2000 scenario over the whole period against 10 % in 2000 and 2001, 12 % from 2002 to 2004 and 15 % from 2005 onwards in the *status quo*. In the CAPMAT simulation, the rate of mandatory set-aside is maintained at 10 % in both Agenda 2000 and *status quo* scenarios.

[6] Besides the small producers exemption from set-aside requirements.

Both the University of Bonn and FAPRI expect **cereals** to benefit most from this expansion in arable area. Whereas area expansion is foreseen to be rather uniform across cereals in the Bonn University study (2.6 % for wheat and 2.2 % for coarse grains), FAPRI and SOW-VU results display stronger gains for wheat (that would be supported by higher prices in the FAPRI analysis).

The evaluation of the combined impact of the decline in the relative competitiveness of oilseeds vis-à-vis cereals and the reduction in the set-aside requirements on the development in **oilseed area** differs across studies. Bonn University expects a relative stagnation in total oilseed area, with the drop in rapeseed being broadly compensated by a rise in land allocated to sunflower and soya bean. In contrast, the FAPRI and SOW-VU project a drop in oilseed area by around 3 to 4 %.

It appears that the Agenda 2000 impact on the oilseed sector is very sensitive to the assumptions adopted in the scenarios regarding the medium-term development in world oilseed prices and on the translation of policy changes in the respective models. In the Bonn University analysis, oilseeds prices have been assumed at around 195 €/t for rapeseed and 215 €/t for sunflower seed over the medium-term, whereas FAPRI uses a price of about 215 €/t for both commodities in 2005. The SOW-VU assumes that oilseed prices are about constant in real terms between 2000 and 2005 (before rising by 5 % by 2010).

The University of Bonn expects area allocated to **protein crops** to increase by 5.1 %.

Table 1.2 Outlook for cereals production in 2005 under Agenda 2000

Situation in 2005	Status quo	Agenda 2000			
Production	scenario	SPEL	FAPRI - I*	FAPRI - II*	CAPMAT
Total cereals	100.0	102.4			101.6
Wheat	100.0	102.7	103.3	104.7	103.0
Soft wheat	100.0	102.5			103
Durum wheat	100.0	104.2			101.4
Coarse grains	100.0	102.2			100.2
Barley	100.0	101.7	101.9	105.0	100.9
Maize	100.0	104.6	100.3	100.9	98.4

* FAPRI - I: FAPRI Missouri; FAPRI - II: FAPRI Iowa

Total **cereal production** is forecast to increase in line with the rise in cereal area, although FAPRI expects yield growth to slow down following the fall in market prices.

Despite differing outcomes on total meat production **cereal internal demand** is forecast to increase thanks to an improved competitiveness of EU cereals vis-à-vis their main substitutes. All studies forecast a stronger pattern for coarse grains than for wheat. This seems to reflect a situation in which increased demand for cereals is mainly driven by feed usage. Growth in total cereal demand is estimated to range between 1.4 % (wheat) and 2.2 % (coarse grains) by the University of Bonn. In spite of an estimated slight decline in total meat production, feed use is estimated to increase by around 3 % for all cereals, whereas non-feed uses (other than seed) would remain stagnant due to the very low demand elasticity.

FAPRI foresees a more modest development in domestic use of cereals. Wheat usage would stagnate due to its relative high price (as compared to other cereals). Maize demand would rise by between 0.4 % and 1.2 %, whereas barley usage would display a stronger pattern with a growth estimated between 1.4 % and 2.4 % driven by increased feed use[7]. The differentiated pattern of cereal domestic consumption is also pronounced in the SOW-VU study where wheat exhibits an increase of slightly less than 1 %, while coarse grains use would increase by more than 2 %.

Table 1.3 Outlook for cereal domestic consumption in 2005 under Agenda 2000

Situation in 2005	Status quo	Agenda 2000			
Domestic use	scenario	SPEL	FAPRI - I*	FAPRI - II*	CAPMAT
Total cereals	100.0	101.8			101.5
Wheat	100.0	101.4	100.1	100.0	100.8
Soft wheat	100.0	101.5			
Durum wheat	100.0	100.5			
Coarse grains	100.0	102.2			102.1
Barley	100.0	102.3	101.4	102.4	
Maize	100.0	102.3	100.4	101.2	

Since the increase in demand is forecast to be lower than the expansion of production, the **cereal net exportable surplus** increases significantly, in particular for wheat. The capacity of the EU to export much of these surpluses on world markets is critical to these impact analyses and relies heavily on the assumptions concerning world market prices and trade developments over the medium-term. In that respect, the medium-term prospects for world cereal markets on which the FAPRI and SOW-VU studies are based, are rather divergent[8].

The FAPRI-Missouri foresees that strengthening world markets, a relatively weak € (1€ = 1.08$) and lower EU market prices should enable the EU to record a growth of around 5 % in wheat exports over the 2000-2005 period as compared to a *status quo* scenario. FAPRI-Missouri also expects barley and maize exports to increase by 4 % and 1 % respectively by 2005[9]. Despite a stronger € (1€ = 1.25$), the FAPRI-Iowa study displays a relatively more optimistic picture with a stronger growth in net exports. However, the impact of Agenda 2000 on net exports is stronger in relative terms under a strong € environment owing to the fact that the level of net exports is significantly lower in the FAPRI-Iowa study than in the FAPRI-Missouri.

In contrast, the SOW-VU analysis assumes that world market prices for wheat will remain relatively low, so that unsubsidised exports from the EU will not be possible before 2010. The gap between internal and world market prices for coarse grains is foreseen to be even higher. Consequently, the exportable surplus is expected to increase

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7 Differences in the FAPRI analyses concerning total meat production, the €/$ exchange rate and the rate of mandatory set-aside account for most of the differences in the demand for coarse grains.

8 The University of Bonn does not make any forecast on external trade.

9 Increased EU cereal exports would induce a slight fall in world cereal prices of around 1 to 3.5 % over the 2000-2005 period.

sharply for wheat whereas it should decline for coarse grain as higher consumption is projected to outweigh the slight rise in production.

Higher domestic demand combined with increased exports generate a sharp reduction in the level of domestic stocks that would fall by more than 30 % by 2005 for wheat and barley and by 9 % for maize in the FAPRI-Missouri analysis (the FAPRI-Iowa study evaluates the fall in ending stocks of those cereals by 2005 at –35 %, –7 %, -22 % respectively)[10].

Table 1.4 Outlook for cereals exports in 2005 under Agenda 2000

Situation in 2005	Status quo	Agenda 2000			
Net exports	scenario	SPEL	FAPRI - I*	FAPRI - II*	CAPMAT
Total cereals	100.0				101.9**
Wheat	100.0		114.9	135.5	108.5**
Soft wheat	100.0				
Durum wheat	100.0				
Coarse grains	100.0				88.0**
Barley	100.0		109.0	105.8	
Maize (I)	100.0		100.0	107.1	

* FAPRI - I: FAPRI Missouri; FAPRI - II: FAPRI Iowa. ** Gross exportable surplus.

As a consequence, in the FAPRI analysis wheat prices would only fall by 6 €/t below baseline levels (or –4 %), whereas barley and maize prices would drop by around 8-7 €/t (or 7-5 %), i.e. by less than the reduction in intervention price. These prices would remain well above the new support levels with world prices constituting the new price floor under Agenda 2000.

In contrast, the cut in cereal intervention price is taken to translate fully into a reduction in market prices in the studies of the University of Bonn and the SOW-VU. This price development is in line with a forecasted increase in net cereal surplus (production minus consumption of around 6 % and 2 % respectively, mainly in wheat) under the assumption of cereal exports bound to the URA limits (i.e. no exports without subsidies).

Table 1.5 Outlook for cereal prices in 2005 under Agenda 2000

Situation in 2005	Status quo	Agenda 2000			
Prices	scenario	SPEL	FAPRI - I*	FAPRI - II*	CAPMAT
Total cereals	100.0	85.0			85.0
Wheat	100.0	85.0	95.8	91.6	85.0
Soft wheat	100.0	85.0			85.0
Durum wheat	100.0	85.0			85.0
Coarse grains	100.0	85.0			85.0
Barley	100.0	85.0	93.2	91.3	85.0
Maize	100.0	85.0	94.6	88.8	85.0

* FAPRI - I: FAPRI Missouri; FAPRI - II: FAPRI Iowa

[10] The University of Bonn does not provide any projections for ending stock levels, whereas the SOW-VU analysis assumes that stocks are kept constant.

The outcome of these impact studies appears to be fairly dependent on future prospects for the world cereal markets, the €/$ exchange rate and the underlying *status quo* scenario. They tend to demonstrate that a strong € and less favourable world markets (as observed in 1999) would reduce the favourable impact of the cut in intervention prices on the ability of the EU to export cereals beyond the URA limits. Risks would then grow that rising yields and constrained exports could lead to an accumulation of stocks and depressed domestic prices.

3.1.2 Animal sector

Beef

The various policy changes to be implemented in the beef sector are expected to have countervailing effects. On the one hand, the reduction in the current support prices, the removal of the current intervention system and its replacement by a private storage scheme and a new "safety net" intervention system, the adjustment in the suckler cow ceilings and the eligibility of heifers for suckler cow premium (for a maximum of 20 %) should put downward pressure on supply. On the other hand, the increase in the existing direct payments and the introduction of the slaughter premium, combined with lower feed costs and higher milk quotas should support production. Overall the three studies foresee that the former elements would outweigh the latter, resulting in a small decline in beef production as compared to the *status quo* scenario.

Table 1.6 Outlook for beef balance in 2005 under Agenda 2000

Situation in 2005	Status quo scenario	Agenda 2000			
		Bonn	FAPRI - I*	FAPRI - II*	CAPMAT
Production	100.0	99.9	97.8	99.5	98.6
Consumption	100.0	101.8	102.8	103.1	106.4
Net exports	100.0		37.8	92.1	17.5**
Ending stocks	100.0		0.0	19.0	100.0
Producer prices	100.0	80.0	87.9	87.1	80.0

* FAPRI - I: FAPRI Missouri; FAPRI - II: FAPRI Iowa. ** Gross exportable surplus.

FAPRI-Missouri forecasts that the rise in dairy cows of 0.4 % by 2005 would be more than compensated by the decline in the suckler cow herd of 2.6 %. This would in turn limit calf supplies and lead to a drop in availability in animals of 0.8 %. Combined with a decline in slaughter weight of 1.3 % relatively to the *status quo* scenario, total beef production is expected to fall by 2.2 %. Beef consumption would benefit from the fall in domestic prices and rise by 2.8 % relatively to the *status quo* scenario to reach 7.27 mio t. However, after a short-term increase in absolute value supported by lower prices, beef consumption would resume its long-term decline from 2003 onwards. Reduced production levels and increased domestic consumption would lead to a decrease of domestic prices of only 12 % (i.e. less than the cut in the current institutional prices), with total exports maintained well below the URA limits[11]. Beef intervention stocks

[11] This level of beef exports reflects the lower availability of exportable supply and assumed Commission's behaviour. Under an alternative scenario where the Commission would choose to keep subsidised exports at their URA limits, prices would fall by a smaller magnitude (and domestic consumption would be much lower).

would thus disappear by 2003. Similar findings are given in the FAPRI-Iowa study, although the magnitude of the impact may differ somewhat (owing mainly to an assumed greater potential for unsubsidised beef exports from the EU).

The SOW-VU study exhibits similar results. Lower revenues per head triggered by changes in prices and premiums are foreseen to generate by 2005 a fall of 2.5 % in non-dairy cattle numbers and lead to a reduction in beef production of 1.4 % as compared to the *status quo* scenario. The 20 % fall in market prices would stimulate domestic consumption, which would rise above *status quo* levels by more than 6 % by 2005. Assuming constant stock levels, higher internal demand combined with lower supply levels would strongly diminish exportable surplus which would fall by -82.5 % against *status quo* levels. If the impact of Agenda 2000 on the EU beef market is found to be broadly similar in the University of Bonn analysis, the latter exhibits changes of lower magnitude. However, a modest decrease in production and a rather moderate increase in consumption would combine to generate a dramatic fall in excess supply (more than 60 %).

Pig meat and poultry

Policy changes in the beef and arable crop sectors are expected to have an impact on the pork and poultry sectors. Lower feed prices are foreseen to favour production of white meat whereas more competitive beef prices should put pressure on white meat consumption and, in turn, on domestic prices and production levels. The degree to which both elements will impact the pork and poultry sectors differs across studies, which provide for diverging results.

On the one hand, the FAPRI-Missouri and the University of Bonn expect white meat consumption to suffer from cheaper beef with declines ranging between -0.3 % and -1.2 %. Lower consumption level would put pressure on market prices that would outweigh the impact of lower feed prices and generate a slight fall in pork and poultry production of roughly the same magnitude (cf. table 1.7).

Table 1.7 Outlook for pork and poultry meat balance in 2005 under Agenda 2000

Situation in 2005	Status quo	Agenda 2000			
	scenario	Bonn	FAPRI - I*	FAPRI - II*	CAPMAT
Pork production	100.0	99.7	99.5	100.3	100.1
Pork consumption	100.0	99.7	99.4	100.3	100.4
Pork exports	100.0		100.7		97.0
Pork prices	100.0	93.3	96.8	95.4	95.6
Poultry production**	100.0	98.8	99.5	100.5	100.6
Poultry consumption	100.0	98.8	99.4	100.3	100.4
Poultry exports	100.0		100.6		102.8
Poultry prices	100.0	97.6	96.7	95.5	97.2

* FAPRI - I: FAPRI Missouri; FAPRI - II: FAPRI Iowa. ** Broiler in FAPRI figures.

Conversely, the feed cost reduction effect dominates in the FAPRI-Iowa and SOW-VU analyses with a modest rise projected for pork and poultry production ranging between 0.1 % and 0.6 %. Consumption would also develop accordingly, although the SOW-VU foresees some adjustments between internal and external demand.

Lower market prices could generate increased export opportunities, notably for poultry meat.

Milk

Results for the dairy sector in 2005 only reflect the first year of implementation of the reform in the dairy sector (besides the quota increase from 2000 and 2001). The impact of the increase in milk quota on milk production differs across studies, depending on the assumption used regarding the current over-quota production in some EU countries and the impact of reduced market prices on global milk supply. By 2005, FAPRI predicts an increase in milk production of 1.1 % (reaching 1.7 % in 2007, i.e. less than the quota increase), resulting from improved yields (0.3 %) and an increased dairy cow herd (0.8 %) (0.2 % and 1.5 % in 2007 respectively). The SOW-VU and the University of Bonn provide for a more direct and nearly full translation of the milk quota increase into a milk production increase (+1.3 % and 1.6 % in 2005 respectively).

Table 1.8 Outlook for dairy products balance under Agenda 2000

Situation in 2005	Status quo	Agenda 2000			
	scenario	SPEL	FAPRI - I*	FAPRI - II*	CAPMAT
Milk production	100.0	101.6	101.1	101.2	101.3
Milk consumption	100.0	100.2			100.2
Milk prices	100.0	94.3	96.0	95.0	95.0
Cheese consumption	100.0		101.2	101.5	100.3
Cheese exports	100.0		102.0	102.9	118.0**
Butter consumption	100.0		100.3	101.2	100.5
Butter exports	100.0		104.4	105.8	118.6**
Butter ending stocks	100.0		102.3	103.4	100.0
SMP consumption	100.0		100.4	103.4	100.1
SMP exports	100.0		100.0	104.5	111.4**
SMP ending stocks	100.0		118.7	116.7	100.0

* FAPRI - I: FAPRI Missouri; FAPRI - II: FAPRI Iowa. ** Gross exportable surplus.

The University of Bonn expects that lower market prices should stimulate internal consumption. However, part of the additional supply would not be captured by the internal consumption and growing excess supply would have to be disposed off either on the external market or in stores. In contrast, the SOW-VU projects that the increase in internal consumption would keep pace with domestic production so that exportable surplus would only rise moderately in absolute terms.

Increased milk production and reduced support prices in 2005 would lead to a fall in the market prices of dairy products. According to the FAPRI analyses, the largest price decline would be observed for skimmed milk powder and butter, whereas the drop in cheese prices is expected to be more moderate. The FAPRI studies project that the growth in milk production would be mainly captured by internal demand for milk and dairy products thanks to lower prices. This is particularly pronounced for cheese (1.2-1.5 % in 2005 and 2.4-2.6 % in 2007) and more moderate for butter (0.3 % and 0.7 % respectively) and skimmed milk powder (0.4 % and –0.9 % respectively).

Yet, FAPRI expects that improved competitiveness should enable exports of some dairy products to rise (notably for cheese, by around 2 to 3 % in 2005), although to a moderate

extent since EU domestic prices would remain above international prices (in the assumption of no significant changes in Commission's behaviour regarding exports of subsidised butter). Since the increase in production is forecast to outweigh consumption and export growth, stocks are expected to rise. By 2005, FAPRI forecasts a stock increase ranging between 1 and 3 % for cheese, butter and whole milk powder whereas stocks of skimmed milk powder would rise stronger (17-19 %)[12].

3.1.3 Agricultural income

Total agricultural income

Among the studies examined, only the University of Bonn and the SOW-VU provided for some impact analysis of the Berlin decisions on income development. According to their results, total agricultural income, measured as net value added at factor cost (i.e. including the direct payments granted in the framework of the common market organisations) and expressed in nominal terms, would be in 2005 some 3 % below the *status quo* level (i.e. a loss of 3-4 bio €)[13]. However, agricultural income in nominal terms would still remain some 11 to 12 % above the 1992-1996 average.

Table 1.9 Outlook for agricultural income in 2005 in nominal terms in the EU

Situation in 2005	Base	Status quo		Agenda 2000	
	period*	SPEL	CAPMAT	SPEL	CAPMAT
Agricultural income (nominal)	100.0	113.7	114.8	110.6	111.7
Agricultural income (real)	100.0	90.2	103.9	87.8	101.1
Agricultural labour	100.0	65.7	80.8	65.7	79.5
Real agricultural income per capita	100.0	137.4	128.6	133.7	127.2

* 1992-1996 for SPEL; 1995 for CAPMAT.

When expressed in real terms (i.e. after inflation), development in total agricultural income would be less favourable. In the Bonn University analysis, real agricultural income would fall relatively to the 1992-1996 average by around 10 % in the *status quo* situation[14] and by some 12 % in the Agenda 2000 scenario. The SOW-VU study displays more favourable prospects with real agricultural income about 4 % and 1% above the base period in the two respective scenarios[15].

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[12] By 2007 and 2008, the further cut in support prices should favour cheese production (instead of butter and SMP), thus reducing skimmed milk powder production and stocks.

[13] It should be reminded however that the income forecast for 2005 takes only account of the first year of implementation of the cut in support prices in the dairy sector. In the study from the University of Bonn, the fall in production value of 4.8 % (i.e. 11.3 bio €) would only be partially compensated by the rise in subsidies level (+19 % or 6.5 bio €) and the slight fall in production costs (-1.4 % or –1.6 bio €).

[14] The use of a *status quo* scenario for comparative purposes only represents a theoretical exercise. Indeed, this scenario would invariably lead to market situations characterised by strong market imbalances and heavy public stocks that would be unsustainable over the medium-term.

[15] These diverging income results reflect mainly different expectations on future inflation rates.

Total agricultural income per labour unit

When measured per unit of labour and expressed in real terms, agricultural income is expected to show a more positive pattern.

The Bonn University exhibits the strongest pattern where agricultural income per unit would be some 34 % higher than the 1992-96 average under Agenda 2000 (37 % under the *status quo* scenario). This outcome is based on the assumption of a rather high level of labour outflow (-3.7 % per annum). This high rate of decline in agricultural labour reflects the historical trend observed in the EU over the last 25 years. Under the assumption of a more moderate reduction in agricultural labour as observed over the most recent years (-2.5 % per year), agricultural income per worker would still be some 16 % above the 1992-1996 average. The analysis conducted at the SOW-VU tends to show similar results, with real agricultural income per worker around 27 % above the 1995 level (on the basis of a 2.4 % reduction in the agricultural labour force).

These results tend to demonstrate that Agenda 2000 may be expected to generate a slight decrease in agricultural income per worker when compared to a *status quo* scenario. This fall would range between –1 % and –3 % by 2005. However, it should be acknowledged that maintaining a policy *status quo* only constitutes a theoretical but, in practice, unsustainable exercise. When analysed in relation with the situation of the mid-1990s, prospects for agricultural income under Agenda 2000 appear rather favourable in the two studies. Furthermore, the 16 %-27 % income level estimated above the base period under a moderate labour outflow may constitute the lower end of the range as market prices may be expected to stabilise above support levels.

3.2 Consequences on the overall economy

The macro-economic impact of the Agenda 2000 decisions for CAP reform is first addressed by analysing the possible consequences for **EU consumers**. It then focuses on the impact of the reduction in the consumer price index on the pattern of **consumption**, **GDP growth** and **employment** at EU level up to 2030.

Consumer benefits

The benefits for consumers of the reduction in the support prices of some agricultural products have been estimated to reach around **9 bio €** in 2005/06 and **10.5 bio €** by 2006/07 for the EU as whole. The magnitude of these benefits, which are measured as the change in consumer surplus, depends mainly on future developments in the market prices of agricultural commodities and in the price transmission between the producer and the consumer stage. In the case where the drop in market prices would be stronger than the cut in support prices, the gains in consumer surplus could be foreseen to reach 11 bio € in 2005/06 and 12.5 bio € in 2006/07. However, they would be substantially lower, though still significant, in the assumption of a milder fall in agricultural prices (around 7 and 8 bio € respectively).

A large proportion of these benefits should reach final consumers, whereas another part can be expected to be absorbed by the food and retailing sectors that would improve their profitability and competitiveness.

Consumer price index

The fall in the support prices of some agricultural products resulting from the implementation of the CAP reform decisions would generate a reduction in the aggregate agricultural price index which would translate into a **drop in the consumer price index** of **0.25 %** in 2005 and **0.33 %** in 2010 according to the SOW-VU.

The reduction in the consumer price index would in turn generate significant and permanent positive macro-economic effects. These impacts would come from two sources: on the one hand, from an increase in real private consumption and, on the other hand, from the positive supply response resulting from the reduction in wage costs faced by firms.

However, this latter source of output growth is dependent on the **wage behaviour of the labour market**. In that perspective, two versions of the Agenda 2000 scenarios are given in order to reflect alternative wage behaviour. Version (1) is based on the assumption that workers would fully pass on the fall in consumer prices onto wages initially and wages would only respond to an increase in employment and productivity that could emerge from this price shock. The decline in consumer prices would then fully translate into a reduction of wage costs for firms. A more standard wage rule, where workers pass on only about 50 % of the consumer price reduction initially, is examined in version (2).

A lesser growth in wages following the reduction in consumer prices is foreseen to generate a virtuous cycle in which the CAP reform may lead to an expansion in investment, output and employment. Conversely, if the benefits from the reduction in consumer prices were not to be translated in lesser wage demand, the macro-economic benefits from the CAP reform could be largely limited to an increase in private consumption, without substantial lasting effect on the supply side of the economy.

Private consumption

According to the Quest II results, **real private consumption at EU level would increase by 0.21 % to 0.40 %** in 2005 depending on the price and wage scenarios. It would then permanently stabilise slightly above that level over the long run.

Table 1.10 Impact of CAP reform on private consumption, Quest II simulations

Deviation in %	Agenda 2000	
from *status quo* levels	Wage behaviour (version 1)	Wage behaviour (version 2)
2005	0.40	0.21
2010	0.49	0.28
2020	0.46	0.29
2030	0.43	0.28

GDP growth

The impact on GDP growth would be significant, though more gradual[16]. In the assumption that the price reductions are fully translated into lower wage costs, Quest II results show that **GDP would grow by an additional 0.12 % in 2005**. It would then increase regularly to reach around **0.25 % in the long-term**. The gradual response in GDP growth would mainly result from the slow adjustment process to increased investment (about 0.3 %) and its impact on potential output.

Table 1.11 Impact of CAP reform on GDP, Quest II simulations

Deviation in %	Agenda 2000	
from *status quo* levels	Wage behaviour (version 1)	Wage behaviour (version 2)
2005	0.12	0.06
2010	0.19	0.09
2020	0.23	0.11
2030	0.25	0.12

However, in the case of a slower adjustment of real wages (version 2), macro-economic benefits could be largely limited and additional GDP growth substantially smaller. The effect of the CAP reform could be mainly limited to an increase in private consumption without lasting effects on the supply side of the economy. Additional GDP growth would reach between 0.06 % in the short-term and 0.12 % over the long run.

Employment

Total employment would significantly benefit from the reduction in consumer prices. As for GDP, employment would only gradually increase due to the adjustment lags in the firms' labour demand. Quest II results indicate that employment would **increase by 0.14 % in 2005, then rising up to 0.24 % by 2030**. Nevertheless, as for GDP, a slower rapid wage adjustment would significantly alter this positive outlook with additional potential growth in employment limited to less 0.1 %.

Table 1.12 Impact of CAP reform on employment, Quest II simulations

Deviation in %	Agenda 2000	
from *status quo* levels	Wage behaviour (version 1)	Wage behaviour (version 2)
2005	0.14	0.05
2010	0.22	0.08
2020	0.23	0.08
2030	0.24	0.09

[16] Since consumer expenditure is expected to adjust more rapidly than output growth, the trade balance is foreseen to worsen. This could lead to a real currency depreciation and in turn limit GDP expansion through its adverse effect on the price of imported raw materials, investment goods and wage costs.

4. Overall evaluation of the CAP reform decisions

Despite some watering down of the Commission's initial proposals by the European Council at the Berlin summit in March 1999, the Agenda 2000 decisions are globally viewed as a further positive contribution to the ongoing process of reform of the CAP, which started in 1992. They are considered as a renewed attempt to proceed further in the direction towards:

- An improved market orientation of the CAP that should enhance the competitiveness of European agriculture and improve the long-term prospects for further participation to the expansion of world markets, in view of the growing concerns regarding the outlook for EU domestic agricultural markets;
- A greater integration of European agriculture in the world economy that should contribute to the fulfilment of its international commitments (e.g. WTO) and facilitate the enlargement of the EU to Central and Eastern European Countries candidate for accession;
- Greater consideration of environmental concerns and the enhancement of an integrated rural development.

Yet, some deficiencies have been identified. They can be summarised as follows:

- In view of the recent developments on world markets, the magnitude of the reduction in price support may not be sufficient for guaranteeing greater access to world markets and facilitating the enlargement to CEECs;
- A move towards further decoupling of internal support and its extension to other sectors are seen as a necessary step to improve the competitiveness of European agriculture and to prepare the EU for the next multilateral trade negotiations. Moreover, the magnitude, permanence and economic/social justifications for direct payments are still considered as a matter of debate;
- Some sectors and instruments of supply control are still excluded from the current reform process (e.g. sugar and milk quotas);
- The generalisation of the remuneration of well-specified and monitored ecological services is considered as a more efficient instrument for the protection of the environment than the mere application of cross-compliance conditions.

Comparison between the Commission proposal and the Council decision Main differences

1. Arable crops sector

Measure	Commission proposal	Council decision
Intervention price for cereals	20 % cut, in one step, from the present level of 119.19 €/t, to 95.35 €/t in 2000/01	15 % cut, in two equal steps, starting in 2000/01 and brought to 101.31 €/t in 2001/02
Monthly increments	To be abolished	Maintained as at present
Area payment for cereals	Increase, in one step, from the current level of 54.34 €/t to 66 €/t in 2000/01	Increase in two equal steps, i.e., 58.67 €/t in 2000/01 and 63 €/t in 2001/02
Area payment for oilseeds	Alignment on the cereal direct payment to 66 €/t in 2000/01	Three steps reduction from the present level of 94.24 €/t (cereal equivalent) to 63 €/t in 2002/03
Area payment for pulses	Decrease from the present level of 78.49 €/t to 72.5 €/t in 2000/01	Proposal retained
Area payment for linseed	Decrease from the present level of 105.1 €/t to 66 €/t in 2000/01	Three steps reduction from the present level to 63 €/t in 2002/03
Aid for grass silage	Not eligible	In member states where maize is not a traditional crop, grass silage is eligible for the cereal payment, within a specific base area, without increasing the total base area.
Compulsory set-aside	Set at 0 % for the whole period	Set at 10 % for the whole period
Specific measures	None	- Increase in reference yield for Spain and Italy. - In Finland and Northern Sweden, additional 19 €/t for drying cereals and oilseeds.

2. *Beef sector*

Measure	Commission proposal	Council decision
Market support price	30 % cut, in three equal steps starting in 2000, from the current level of 2780 €/t to 1950 €/t in 2002	20 % cut, in three equal steps starting in 2000, brought to 2224 €/t in 2002
Intervention	To be phased out and replaced by private storage from the 1st of July 2002 (if prices fall below 103 % of new support price)	Proposal retained Introduction of safety net intervention when prices fall below 1560 €/t. Ad-hoc intervention in cases of crisis.
Direct payments	Increase in direct payments to compensate for 80 % of the price cut. 50 % of the compensation in the form of increased 1992-like direct payments; other 50 % in the form of supplementary aid within national envelopes.	Rate of compensation higher, especially for suckler cows. Amounts provided within national envelopes reduced, and instead, introduction of a slaughter premium (from 50 to 80 €/head in 2002).
Extensification premium (for male and/or suckler cow)	Additional 100 €/animal if stocking density is below 1.4 livestock unit per hectare.	Proposal retained However, member states may opt for a two-stage system phased over three years.

3. Dairy sector

Measure	Commission proposal	Council decision
Quota regime	Extended until 2006	Extended until 2008 Mid-term review in 2003 to allow "the present quota arrangements to run out after 2006".
Quota increase	2 % increase (1 % for young farmers, 1 % for mountain and arctic regions) in four steps, starting in 2001/02.	Specific allocation of quota for five member states in two unequal steps in 2000/01 and 2001/02. Additional quota (+1.5 %) for the remaining member states, in three equal stages, starting in 2005/06 (in parallel with the price cut)
Intervention price (butter, SMP)	15 % cut in four annual steps, starting in 2000/01	15 % cut in three annual steps, starting in 2005/06
Milk compensation	Based on number of premium units divided by the average yield of 5800 l/cow. Direct payments made of a basic payment per premium unit, reaching 100 € in 2003, and an additional payment of 45 € per unit.	Introduction of a direct payment per tonne of individual reference quantity linked to the global volume of the quota year 1999/00, set in three steps starting in 2005/06, and amounting to 17.24 €/t from 2007/08 onwards.
Supplementary payment	Introduction of a system of national envelopes, starting in 2005/06, to take account of specific circumstances in the different member states.	Proposal retained
Quota management	No changes	Member states are allowed greater flexibility.

SECTORAL IMPACT ANALYSES

IMPACT ANALYSES OF THE AGENDA 2000 FINAL DECISIONS FOR CAP REFORM

Analysis for the agricultural sector of the EU (SPEL/EU-MFSS simulations)

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1. Introduction

By now, the March 1999 Agenda 2000 decisions and their political gestation beginning with the July 1997 vision (European Commission 1997) and the March 1998 regulation proposals have become well known historical facts. In essence they involve a certain move from price support to direct payments for selected agricultural commodities, quite resolute in the 1998 proposals and considerably watered down in the final decisions.

This chapter presents a quantitative assessment of these political decisions with the "SPEL/EU-MFSS", an agricultural sector model run at Eurostat for quite some time now. It is an update of a previous assessment from 1998, which was confined to the Commission proposals (Witzke, Henrichsmeyer 1998).

2. Modelling approach

The modelling approach of the SPEL/EU-MFSS model may be characterised in short as follows. Common to all modules of the SPEL system is the activity-based accounting approach (Wolf 1995). The agricultural sector is described in detail by a matrix with production and use activities, associated yield and input coefficients and linkage by product flows. About 50 production activities, 80 product items and 30 variable input items are distinguished for each member state. The system covers the agricultural sector in the definitions of the Economic Accounts for Agriculture (EAA). In the demand component the flows of products from their origin to use activities are broken down into human consumption, animal feed, seed use, industrial use, processing, stock changes, losses and exports. In addition, it links the supply-balance sheets of the raw products (e.g. rapeseed) to the domestic resources of the processed products (e.g. rape oil) via "processing" activities.

The Medium-term Forecast and Simulation System (SPEL/EU-MFSS, cf. Weber 1995) is a partial equilibrium tool for policy-oriented analyses, forecasts and simulations. The core component on the *supply* side gives levels of production activities as a function of changes in the (auto-regressively) expected value-added per unit of the production activities. These functions are based on a set of elasticities estimated in the SPEL modelling group or taken from econometric results in the literature. Subsequently, this set of input elasticities has been forced (calibrated) to comply with symmetry and homogeneity conditions of microeconomic theory and to stay in plausible ranges. For simplicity, activity yields per member state are assumed to be invariant to the policies investigated.

On the *demand* side the central area of human consumption is again modelled using a calibrated set of elasticities which has been revised recently (for details, cf. Witzke, Britz 1998):

- As in previous versions of the demand component, the set of elasticities meets symmetry, adding up, and homogeneity requirements.
- As regards negativity, the full curvature conditions beyond negativeness of own price effects have been imposed now. This guarantees, for example, that cross price effects relate reasonably to own price effects.

- In addition, the implied Hicksian cross price elasticities have been forced to be positive. Net complementarity would not contradict microeconomic theory but is difficult to reconcile with intuition and a well-behaved overall model.

With a theoretically consistent demand system, sequentially calculated consumer surplus changes over the whole set of markets may be taken to approximate a sequential calculation of equivalent variations. Equivalent variations would be preferable to consumer surplus changes on theoretical grounds, but the approximation error is likely to be negligible given the small budget share of food items and their frequently low income elasticities. Components of demand other than human consumption are projected exogenously or derived from the supply side.

Supply and demand components are recursively linked together, taking policy instruments into account to achieve a market clearing solution with equilibrium prices and complete physical supply balance sheets. In this process agricultural supply and input demand functions are determined essentially as a function of expectations, which derive from past observations. With fixed supply side variables, policy and the demand component determine market clearing prices and market balances, which may cause supply to react in the next year. Due to the CAP, endogenous prices are only relevant for pork, poultry and eggs whereas other prices are determined mainly through policy. The implicit time lag in supply side reactions is applied to all activities. Different treatments of the dynamics might be preferable for some parts of the livestock sector (milk, poultry, pork) but this would further complicate an already fairly complex model.

Some of the Agenda 2000 measures had to be included in the simulations[17] in a rather crude way. For example the extensification premium for bulls was translated into an additional value added for the activity male adult cattle. Others features of the Agenda 2000 package had to be neglected altogether such as upper limits on total premiums per farm. National ceilings, on the other hand, for certain premia (suckler cows, special male and slaughter) have been incorporated in this version of the MFSS. Consequently, the actual (average) premia per animal in member states are reduced compared to the "nominal" premia by the simulated percentage excess production relative to the national ceiling. This correction implies, for example, that the actual premia per head of male adult cattle are calculated endogenously, giving specific values for EU member states.

For the simulations done with the previous version of the MFSS, as presented in Chapter II of "CAP reform proposals – Impact analyses", (DG VI), 1998, these average national premia had been projected exogenously. To obtain comparable "proposal" and "decision" scenarios it was necessary to repeat the simulations of the Commission proposals with the improved version of the MFSS. For methodological reasons therefore, the results presented in this report may deviate to some extent from those published previously.

[17] We heavily relied on superb technical assistance by Andrea Zintl. For several technical problems, we required in addition helpful advice from Wolfgang Wolf and Gerald Weber.

3. Scenario assumptions

3.1 Reference run

The reference run is a projection of developments in the agricultural sector based on the assumption that the measures adopted in 1992 by the EC Council of Ministers for the reform of the Common Agricultural Policy will be maintained throughout the projection period, although account is taken of the changes made in the meantime to the set-aside rate. It is also assumed in the base run that the measures adopted under the Blair House Agreement for limiting oilseed production will continue to be applied throughout the period.

- The ***farmgate prices*** of most products have been fixed outside the model for the projection period: Producer prices for cereals, which are initially higher than intervention prices, are assumed to move closer to intervention prices until the year 2000 and are assumed not to change after 2000 (in nominal euros at member state level). For oilseeds, pulses, sugarbeet, wine, beef, veal, sheep meat and goat meat, farmgate prices are assumed not to change from their 1997 levels (in nominal euros at member state level) which are on average 195 €/t for rape and 215 €/t for sunflowers.

  The farmgate prices of *pig meat, eggs and poultry*, on the other hand, have been calculated for the entire projection period within the model as market-clearing prices. Thus they depend on the level of production costs and the non-price-dependent factors determining consumer demand.

  The producer prices for all *other output items* are kept constant in real terms (when deflated with the GDP price index).

- The ***purchase prices*** of feed grains, cereal substitutes and milk feed follow the prices of cereals and milk products. The purchase prices of all other intermediate consumption items have been kept constant in real terms throughout the projection period.

- In SPEL, figures on ***subsidies and taxes*** linked to production are represented in accordance with the definitions in the Economic Accounts for Agriculture. These two headings are not broken down to individual production activities.

  Owing to their relevance to agricultural policy, the *per-hectare premiums* and animal premiums introduced under the EU agricultural reform of 1992 are separately represented in SPEL within a breakdown by production activity. However, since for some headings the available information on the amounts paid relates to a different level of aggregation than that used in SPEL, it should be noted that the SPEL-figures are only estimates already for the ex-post period.

  In the reference run projection, the per-hectare premiums for cereals, pulses and oilseeds and the set-aside premiums have been assumed to be the same as those paid in 1997 per hectare of land eligible for such premiums.

  Further, it has been assumed that there is no change in the sectoral average of premiums paid per head for *cattle and sheep*.

For *other subsidies* and *taxes linked to production* it is assumed that during the projection period their value for the entire sector remains the same as in 1996.

- The average sectoral **set-aside** percentages for the years 1993-1997 at member state level are calculated from DG VI figures and adjusted to SPEL definitions. For 2000 - 2005, the set-aside requirement for professional producers increases to 17.5 % (according to DG VI assumptions). Taking into account that the set-aside requirement for 1997 was 5 %, the average sectoral set-aside percentages for 2000-2005 are calculated by adding additional 12.5 % to the 1997 rates.

- With regard to the **production quotas for sugar** and **the guaranteed quantities for cows' milk**, it has been assumed that there will be no changes.

3.2 Agenda 2000 proposals

To analyse the differences between the Commission proposals (March 1998) and the Berlin summit conclusions two scenario versions have been set up. The first of them, to be explained in this section, corresponds to the Commission proposals under the (pessimistic) assumption that the proposed reductions in administered prices would translate into a decrease in farm gate prices of exactly the same percentage order ("version 1" in Chapter II of "CAP reform proposals – Impact analyses", (DG VI), 1998).

- The **price assumptions** in detail: *Cereal* prices will be reduced by 20 % in 2000. These price reductions do not only apply to cereals as output but also to cereals as inputs (feed and seeds). Prices for cereal feed substitutes will partially follow the cuts in cereal prices. *Beef and veal* prices fall by 30 % between 2000 and 2002 in 3 steps. *Milk* prices fall by 17 % between 2000 and 2003 in 4 steps.

As compared with the reference run there are differences with respect to the compensatory payments in the crop sector, the set-aside obligations, the animal premiums and the milk quota:

- **Compensatory payments in the crop sector**: The compensatory payments for *cereals* increase from 54.34 €/t to 66.24 €/t in 2000, which translates into an increase of 21.9 % of the premium payments per hectare for each cereal crop. The payments for *pulses* are reduced from 78 €/t to 72.74 €/t in 2000, which gives a decrease of 6.7 % of the premium per hectare. *Oilseeds receive the* same per tonne compensation as cereals, the effect of which is a fall of 35.5 % of the premium payment per hectare as compared to the reference run.

- **Compensation for the beef price drop**: the budget amounts are increased from 135 €/head to 310 €/head for bulls and from 108.7 €/head to 232.1 €/head for steers between 2000 and 2002. The actual premia in EU member states may fall short of these upper limits, depending on the restrictiveness of national ceilings summing up to an EU total of 9.278 mio payments. As has become clear by now the extensification premium for male adult cattle is effectively held constant on average, because the budgetary outlays were projected to remain constant as well[18] (European

[18] The former simulations assumed, on the contrary, that the average premium would increase in line with the nominal increase of the extensification premium from 32.7 € to 100 € per head. The increased restrictiveness of eligibility criteria had been ignored therefore.

Commission 1998a). For *dairy cows* a compensation premium of 70 €/head is introduced. For suckler cows the budget amounts rise from 145 €/head to 215 €/head during the period 2000-2002, subject to national ceilings, which give an EU total of 10.285 mio payments.

- **Compensation for the milk price reduction**: an additional premium of 145 €/head for a reference milk yield of 5.8 t per cow is introduced on the basis of historical quotas. If milk yields turn out to be above (below) the reference yield this would trigger - quotas given - a proportional increase (decrease) of the payment per cow.

- The **milk quota** is increased over the years 2000 to 2004 by between 1 % (Ireland) and 8.4 % (Finland) with an EU average of 2 %.

- The rate of obligatory set-aside is set at 0 %.

3.3 Agenda 2000 decisions

As in the "proposal" scenario, it is assumed that the reductions in administered prices would translate into a decrease in farm gate prices of exactly the same percentage order.

- The **price assumptions** in detail: *Cereal* prices will be reduced by 15 % in two steps (2000-2001). These price reductions do not only apply to cereals as output but also to cereals as inputs (feed and seeds). Prices for cereal feed substitutes will partially follow the cuts in cereal prices. *Beef and veal* prices fall by 20 % in 3 steps (2000 - 2002). *Milk* prices fall by 17 % in three steps beginning in 2005 and up to 2007. Because the current reference run ends in 2006, however, only the first two of these steps (-5.7 %, -6.0 %) have been simulated here.

Compared with the reference run and with the "proposal" run, there are differences related to the compensatory payments in the crop sector, the set-aside obligations, the animal premiums and the milk quota:

- **Compensatory payments in the crop sector**: The compensatory payments for *cereals* usually increase from 54.34 €/t to 63 €/t in 2000, which translates into an increase of 15.9 % of the premium payments per hectare for each cereal crop. Increased reference yields for Italy and Spain, and supplementary payments for drying in Finland and Northern Sweden cause the total payments for cereals to increase by 19.6 %, 27.4 %, 42.3 % and 17.2 % in these countries respectively. Payments for *pulses* are reduced from 78 €/t to 72.5 €/t in 2000, which gives a decrease of 7.6 % of the premium per hectare (in the usual case). *Oilseeds* receive the same per tonne compensation as cereals in 2002, the effect of which is a fall of 33.1 % of the premium payment per hectare as compared to the reference run, again in the usual case.

- **Compensation for the beef price drop**: The budget amounts are increased from 135 €/head to 200 €/head for bulls and from 108.7 €/head to 150 €/head for steers between 2000 and 2002. This could translate into a rise of the average premium for the production activity *male adult cattle for fattening* by 51.4 %; but subject to national ceilings identical to those in the "proposal" run. For suckler cows the budget amounts rise from 145 €/head to 200 €/head during the period 2000-2002, i.e. by 38 %, subject to slightly higher ceilings than in the "proposal" run (10.824 mio). In addition, slaughter premia of 80 €/head for adult cattle and 50 €/head for calves are

introduced and controlled by national ceilings for steers/bulls (EU-15 total: 11.160 mio), cows (7.545 mio), heifers (4.262 mio), and calves (5.828 mio). The "national envelopes" amounting to 493 mio € in EU 15 are assumed to be used for a national "topping" of the adult cattle slaughter premium, giving total premia from 96.2 € (EL) to 138.5 €/head (BL).

- **Compensation for the milk price reduction**: The final (2007) premium of 17.24 €/t is equivalent to the 145 €/head for a "virtual cow" in the "proposal" run. In the "decision" run, however, these payments per tonne are strictly tied to the 1999/2000 quota levels, in spite of the quota rights being increased.

- The **milk quota** is usually increased over the years 2005 to 2007 by 1.5 %. For I, E, IRL and UK, additional quota rights are granted already in 2000 and 2001.

- The **obligatory set-aside** is set to 10 %, implemented as in the reference run. Voluntary set aside has been projected exogenously by DG VI and taken to be somewhat lower than in the "proposal" run.

4. Modelling results

4.1 Production and demand

Crop Sector

Set-aside has a strong influence on area use in all scenarios. The MFSS projections imply that **area** under cereals would be around 6 % higher under "proposal" conditions, with zero obligatory set-aside, compared to the reference run, with a 17.5 % obligatory set-aside rate[19]. As obligatory set-aside is fixed at an intermediate value (10 %) according to the final decision, it follows that the return of area into production is between the reference run and the "proposal" run in this simulation. The change in relative profitability following from the differential changes in compensatory payments and prices makes for pulses expanding and oilseeds contracting relative to cereals. In the "decision" run, area under oilseeds is even reduced compared to the reference run.

Table 2.1 Areas under cereals, oilseeds and pulses (mio ha)

	Average 1992-1996	Reference run 2005	Agenda "Proposal" 2005	Agenda "Decision" 2005	Difference "Proposal" / Ref. run	Difference "Decision" / Ref. run	Difference "Decision" / "Proposal"
Wheat	16.50	15.71	16.68	16.12	6.21%	2.63%	-3.37%
Coarse grains	19.51	18.21	19.35	18.61	6.26%	2.19%	-3.84%
Pulses	1.66	1.72	1.91	1.81	10.92%	5.05%	-5.29%
Oilseeds	5.73	5.42	5.63	5.40	3.93%	-0.33%	-4.10%

Changes in area use directly translate into corresponding changes in produced **quantities.**

[19] In a few member states, most importantly Germany, MFSS projects a decrease in cereal area, in spite of reduced set aside, because silage area is expanding. These country specific particularities contribute also to small changes in the shares of certain cereals in total cereal area at the EU level, if some "special" countries (for example Germany) command a high market share for certain commodities (for example rye).

Table 2.2a Production of cereals, oilseeds and pulses (mio t)

	Average 1992-1996	Reference run 2005	Agenda "Proposal" 2005	Agenda "Decision" 2005	Difference "Proposal" / Ref. run	Difference "Decision" / Ref. run	Difference "Decision" / "Proposal"
Wheat	88.78	102.06	108.42	104.78	6.23%	2.67%	-3.36%
Coarse grains	93.21	101.87	107.76	104.10	5.78%	2.18%	-3.40%
Pulses	5.21	5.65	6.32	6.00	11.95%	6.23%	-5.11%
Oilseeds	11.97	12.35	12.73	12.28	3.13%	-0.53%	-3.54%

Total domestic use[20] rises by some 2 %, mainly due to higher demand for feed and therefore stronger for coarse grains than for wheat. Compared to the proposal run we observe a slight *increase* in feed demand in the decision run in spite of cereal prices falling less. This is due to beef production expanding due to higher profitability in the "decision" run (cf. below). Human consumption is projected to be almost invariant to the producer price changes of –20 % or –15 %, because in terms of consumer prices, these changes are much smaller and price elasticities are very low.

Table 2.2b Total domestic use of cereals, oilseeds and pulses (mio t)

	Average 1992-1996	Reference run 2005	Agenda "Proposal" 2005	Agenda "Decision" 2005	Difference "Proposal" / Ref. run	Difference "Decision" / Ref. run	Difference "Decision" / "Proposal"
Wheat	73.15	85.45	86.74	86.67	1.51%	1.43%	-0.08%
Coarse grains	85.44	85.62	87.39	87.52	2.06%	2.22%	0.15%
Pulses	7.88	8.10	8.11	8.11	0.06%	0.02%	-0.04%
Oilseeds	33.26	31.37	31.49	31.26	0.38%	-0.35%	-0.73%

Excess supply would increase in both Agenda 2000 scenarios, but less so in the "decision" scenario. This does not imply that the WTO export subsidy restrictions (14.4 mio t for wheat and 10.8 mio t for coarse grains) are less binding in the "decision" scenario for it is not clear whether a 15 % price decease will be sufficient to permit exports without subsidies, at least for wheat.

Table 2.2c Excess supply of cereals, oilseeds and pulses (mio t)

	Average 1992-1996	Reference run 2005	Agenda "Proposal" 2005	Agenda "Decision" 2005	Difference "Proposal" / Ref. run	Difference "Decision" / Ref. run
Wheat	15.63	16.61	21.68	18.11	30.52%	9.04%
Coarse grains	7.77	16.25	20.37	16.58	25.33%	2.01%
Pulses	-2.67	-2.46	-1.79	-2.11	-27.27%	-14.25%
Oilseeds	-21.29	-19.02	-18.75	-18.98	-1.40%	-0.24%

Livestock Sector

Status-quo developments between 2005 and 1992/96 are expected to follow long run trends: the clear "winner" is poultry (+30.6 %) followed by pig meat (+9.6 %) whereas beef and veal demand are stagnating. **Meat** markets are affected by a whole set of interacting forces, the most important being the reduction of administered prices, the compensation with increased premia which are subject to ceilings however, cost reductions due to declining cereal prices and indirect repercussions on raw fodder costs,

[20] This includes uses for feed, human consumption, seed, losses, industrial use and processing, all on the market as well as on farms.

changed supply originating from a growing dairy herd, and endogenous price changes for pork, poultry and eggs due to supply side shifts and substitutions with beef on the demand side.

Table 2.3a Gross indigenous production of meat and eggs (mio t)

	Average 1992-1996	Reference run 2005	Agenda "Proposal" 2005	Agenda "Decision" 2005	Difference "Proposal" / Ref. run	Difference "Decision" / Ref. run	Difference "Decision" / "Proposal"
Beef and veal	8.19	8.19	8.08	8.18	-1.38%	-0.15%	1.25%
Pigmeat	16.02	16.76	16.67	16.71	-0.58%	-0.32%	0.26%
Poultry	7.68	9.59	9.47	9.48	-1.26%	-1.23%	0.03%
Eggs	4.72	4.72	4.69	4.74	-0.49%	0.45%	0.94%

According to the most recent simulations, the net impact of these changes on beef and veal production is negative in both Agenda 2000 scenarios, though significantly so only in the proposal run. This follows from the price reductions being clearly alleviated in the final decision whereas premia changed only in type (introduction of the slaughter premium), not in value. Domestic use increases in the "proposal" and "decision" runs, but only by approximately 3 % and 2 % respectively. This is first, because the 30 % and 20 % price decline on the producer level is only about a third of this magnitude on the consumer level and second, because the triggered price reductions for pork and poultry moderate the substitution towards beef.

Table 2.3b Total domestic use of meat and eggs (mio t)

	Average 1992-1996	Reference run 2005	Agenda "Proposal" 2005	Agenda "Decision" 2005	Difference "Proposal" / Ref. run	Difference "Decision" / Ref. run	Difference "Decision" / "Proposal"
Beef and veal	7.89	7.93	8.16	8.08	2.81%	1.82%	-0.97%
Pigmeat	15.05	16.49	16.39	16.43	-0.60%	-0.33%	0.27%
Poultry	7.09	9.26	9.14	9.14	-1.27%	-1.21%	0.07%
Eggs	4.71	4.74	4.72	4.76	-0.44%	0.46%	0.91%

This tendency to substitute cheaper beef for pork and poultry exerts some pressure on prices of the latter, a pressure which is reinforced by the feed cost reductions. Equilibrium quantities of supply and demand are subject to counteracting forces, downward due to the substitution effect and upward due to the feed cost reduction. The net effect turns out to be slightly negative, more clearly in the "proposal" run than in the "decision" run and stronger for poultry than for pork.

Table 2.3c Excess supply of meat and eggs (mio t)

	Average 1992-1996	Reference run 2005	Agenda "Proposal" 2005	Agenda "Decision" 2005	Difference "Proposal" / Ref. run	Difference "Decision" / Ref. run
Beef and veal	0.30	0.26	-0.08	0.10	-131.25%	-60.94%
Pigmeat	0.97	0.27	0.28	0.28	0.73%	0.37%
Poultry	0.58	0.34	0.34	0.33	-0.89%	-1.78%
Eggs	0.00	-0.02	-0.02	-0.02	9.52%	4.76%

The difference of gross indigenous production[21] and total domestic use is excess supply, which ends up in increasing stocks or in net exports. Excess supply for beef is highest in

[21] Gross indigenous production = slaughterings + exports of life animals – imports of life animals.

the reference run, lowest in the "proposal" run and an intermediate 0.1 mio t in the situation following the final decision. To assess whether this meets the WTO export restrictions for beef exports (0.8 mio t), it is necessary to include exogenous imports of meat (0.4 mio t) and life animals. Depending on their magnitude and the uncertain (status quo) recovery of demand from the BSE crisis, it is possible that there is no margin of safety left for subsidised beef exports.

Price reductions and the main quota expansion for **milk** are only initiated in 2005. Therefore we will also look at the 2006 market balance for milk products (butter, milk powder and other milk products) from dairy, other cows and sheep and goat milk.

The increase of production in the reference run over the base period stems from the quota expansions for southern EU members in the middle of the 1990s. Total domestic use is increasing along long run trends. Production increases in the "proposal" and "decision" run are mainly determined by the respective quota expansions[22] and to a lower degree by endogenous changes in the production of milk products from goats and sheep (about 4 % of total production). The latter increase in the "decision" run compared to the "proposal" run and thus largely compensate for the dairy quota limits being lower (in 2005).

Table 2.4 Production and total domestic use of milk products (mio t of raw milk equivalents)

	Average 1992-1996	Reference run	Agenda "Proposal"	Agenda "Decision"	Difference "Proposal" / Ref. run	Difference "Decision" / Ref. run	Difference "Decision" / "Proposal"
			2005 (~1/3 of milk market reform)				
Production	107.41	109.03	110.86	110.74	1.68%	1.56%	-0.12%
Total domestic use	90.68	100.46	101.15	100.66	0.68%	0.20%	-0.48%
Excess supply	16.73	8.58	9.72	10.07	13.33%	17.47%	
			2006 (~2/3 of milk market reform)				
Production	107.41	108.74	110.51	110.79	1.63%	1.89%	0.25%
Total domestic use	90.68	101.35	102.06	101.86	0.70%	0.50%	-0.20%
Excess supply	16.73	7.39	8.45	8.94	14.40%	20.92%	

Total domestic use is higher in the "proposal" run than in the "decision" run, because prices have been reduced already further in the former. In both Agenda 2000 scenarios, excess supply rises which has to be disposed off, either in exports or in additional stocks. Whether the price reduction is sufficient for the required exports of certain milk products to take place without subsidies remains an open question. The increase in excess supply in the "decision" run will be an issue of concern therefore.

4.2 Income from agricultural activity

Due to falling prices for agricultural products, market income would decline by 15 % in the "proposal" run and more moderately by 8 % in the "decision" run in terms of nominal gross value added (GVAm) in 2005 compared to the reference run. This decline is further aggravated in 2006 according to the final decision because the reform measures on the

[22] Quota increases relative to the reference run are +2 % in 2005 and 2006 for the "proposal" run, and +1.6 % in 2005 and +2 % in 2006 for the "decision" run. The full quota expansion of +2.4 % according to the final decision in 2007 is not modelled in our simulations.

milk market will be only initiated in 2005 and it will continue in 2007 when the last step becomes effective.

Table 2.5 Changes in agricultural incomes and their components in Agenda 2000 simulations compared to the reference run (mio €)

	Reference run	Agenda "Proposal"	Agenda "Decision"	Difference "Proposal" / Ref. run	Difference "Decision" / Ref. run	Difference "Decision" / "Proposal"
			2005 (~1/3 of milk market reform)			
GVA at market prices	124690	106230	114940	-14.80%	-7.82%	8.20%
Subsidies	34390	40750	40830	18.49%	18.73%	0.20%
NVA at factor cost	121270	109170	117960	-9.98%	-2.73%	8.05%
			2006 (~2/3 of milk market reform)			
GVA at market prices	125510	108260	114070	-13.74%	-9.11%	5.37%
Subsidies	34300	40560	40630	18.25%	18.45%	0.17%
NVA at factor cost	122000	111000	116880	-9.02%	-4.20%	5.30%

In both Agenda 2000 scenarios there is a similar increase in subsidies of some 6500 mio €[23] or 18.5 %, granted to moderate the decline in factor income from agriculture. Because market income is lower in the "proposal" run compared to the final decision, **factor income** will be lower as well[24]. In 2005 this decline relative to the reference run will be 10 % whereas the final decision limits the decrease of agricultural income to 2.7 % in 2005. Again, we should remember that the drop in income occurs with some delay following the final decision and consequently proceeds in 2006 (and 2007).

For an evaluation of the agricultural income situation the nominal values have to be deflated, and the continuing flow of labour out of agriculture has to be taken into account. The nominal values have been deflated to real values in constant prices of 1992/96 (based on a 2.1 % inflation rate). Assumptions on labour mobility reflect ex-post observations: The "normal" rate of labour outflow for the EU (in annual work units, without East Germany) may be characterised by the median value of 3.4 % over the past 25 years. However, in the last two years, labour mobility attained on average only 1.7 %. The crucial question is evidently whether the last two years should be taken to announce a longer period with low labour mobility or whether they should be considered transitory, caused by special circumstances (cf. for example, Agra Europe 36/99). To the extent that pessimism would spread among farmers, in part due to the Agenda 2000 discussion, we may expect that the rate of labour outflow might return at least to "normal" levels in the next years. A recovery of European labour markets would operate in the same direction. However, without a detailed analysis and projection of labour use, it appears appropriate to reflect the uncertainty in a kind of sensitivity analysis. We therefore assume first a "high" labour mobility (-3.7 % p.a.) and subsequently a rather low mobility (-2.5 % p.a.). These values may be expected to embrace the developments to be observed in the future.

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[23] The subsidy figures given in this report for the Agenda 2000 scenarios are lower than those projected earlier with the MFSS (European Commission 1998) because the ceilings are treated more appropriately in the most recent simulations.

[24] It should be mentioned that, for reasons of simplicity, depreciation has not been adjusted to account for variations in decay of machinery, due to differences in capacity utilization in the various model runs.

Table 2.6 Changes in agricultural incomes in Agenda 2000 simulations compared to the present situation

	Base period 1992-1996		Agenda "Proposal"	Agenda "Decision"	Difference "Proposal" / Base period	Difference "Decision" / Base period	Difference "Decision" / "Proposal"
			2005 (~1/3 of milk market reform)				
Nominal NVA at factor cost *(mio €)*	106630		109170	117960	2.4%	10.6%	8.1%
Real NVA at factor cost *(mio €)*	106630		86600	93570	-18.8%	-12.2%	8.0%
Labour force *('000 AWU)*	7553	High mobility	4959	4959	-34.3%	-34.3%	0.0%
Real NVA at factor cost per AWU *(€/AWU)*	14118	(-3.7%)	17463	18869	23.7%	33.7%	8.0%
Labour force *('000 AWU)*	7553	Low mobility	5717	5717	-24.3%	-24.3%	0.0%
Real NVA at factor cost per AWU *(€/AWU)*	14118	(-2.5%)	15148	16367	7.3%	15.9%	8.0%
			2006 (~2/3 of milk market reform)				
Nominal NVA at factor cost *(mio €)*	106630		111000	116880	4.1%	9.6%	5.3%
Real NVA at factor cost *(mio €)*	106630		88050	92710	-17.4%	-13.1%	5.3%
Labour force *('000 AWU)*	7553	High mobility	4767	4767	-36.9%	-36.9%	0.0%
Real NVA at factor cost per AWU *(€/AWU)*	14118	(-3.7%)	18471	19448	30.8%	37.8%	5.3%
Labour force *('000 AWU)*	7553	Low mobility	5574	5574	-26.2%	-26.2%	0.0%
Real NVA at factor cost per AWU *(€/AWU)*	14118	(-2.5%)	15796	16632	11.9%	17.8%	5.3%

The calculations show (table 2.6) that **real income per annual work unit** will increase in all scenarios, in spite of the income losses caused for the sector by the Agenda 2000 package. The income development is somewhat more favourable in the "decision" than in the "proposal" scenario. But the results show as well that the path of structural adjustment in agriculture and the corresponding rate of labour mobility contribute far more importantly to the improvement of incomes per worker in agriculture. Considering, for example, the results shown for the year 2006, the implied yearly growth rates are only 0.9 % and 1.4 % with a low labour mobility, but they increase to 2.3 % and 2.7 % in the "proposal" and "decision" runs, respectively, if labour mobility returns to a high level again.

In addition, real agricultural incomes are very likely to be somewhat higher than projected above, due to a less than perfect transmission of administered price changes to market prices. Corresponding sensitivity analysis illustrating this point had been prepared for the impact analysis volume (European Commission (DG VI), 1998) and is not repeated for reasons of simplicity.

4.3 Benefits to consumers of agricultural products

Falling prices for agricultural products cause income from agriculture to decline, but the same price reductions are benefits to downstream industries and final consumers. These benefits are measured as consumer surplus changes caused by the price changes in the Agenda 2000 scenarios ("proposal" and "decision") compared to the reference run. In part, the increase in consumer surplus will go to final consumers, another part will benefit the food industry and improve its profitability and competitiveness.

Table 2.7 Gains in consumer surplus compared to the reference run due to the Agenda 2000 measures in EU-15 (mio €)

	Reference run food expenditure	Gain in consumer surplus in Agenda "Proposal" run	Gain in % of reference run expenditure	Gain in consumer surplus in Agenda "Decision" run	Gain in % of reference run expenditure	% difference in gains "Decision" / "Proposal"
			2005 (~1/3 of milk market reform)			
Total	446352	17149	3.8%	9511	2.1%	-44.5%
Cereals	*78480*	*1457*	*1.9%*	*1134*	*1.4%*	*-22.2%*
Meat	*139465*	*9834*	*7.1%*	*6426*	*4.6%*	*-34.7%*
Milk products	*78701*	*5358*	*6.8%*	*1781*	*2.3%*	*-66.8%*
Other	*149706*	*500*	*0.3%*	*170*	*0.1%*	*-65.9%*
			2006 (~2/3 of milk market reform)			
Total	452107	16379	3.6%	11008	2.4%	-32.8%
Cereals	*79001*	*1421*	*1.8%*	*1143*	*1.4%*	*-19.6%*
Meat	*141911*	*9109*	*6.4%*	*5891*	*4.2%*	*-35.3%*
Milk products	*79570*	*5406*	*6.8%*	*3596*	*4.5%*	*-33.5%*
Other	*151625*	*443*	*0.3%*	*378*	*0.2%*	*-14.6%*

In the "proposal" run, these gains amount to some 17000 mio € in 2005 and a little less in 2006 (cf. table 2.7). The small variation over time is due to certain dynamics in the prices for pork and poultry, which are predicted to deviate somewhat stronger in 2005 than in 2006 from the reference run. In the "decision" run, there are smaller gains in consumer surplus, because the administered price reductions are more moderate. However, they will increase in the "decision" run to 11000 mio € in 2006 (and further in 2007) with the milk price reductions being implemented more completely. To give some indication of their relative importance, we note that these gains amount to 2-4 % of food expenditures in the reference run.

In an overall evaluation, the above gains in consumer surplus have to be taken into account together with agricultural income losses and the budgetary impacts. A corresponding budgetary impact analysis had been prepared by DG VI in our previous welfare analysis of the Agenda 2000 proposals (see European Commission 1998b), but is not yet available tailored to the simulations presented above[25].

5. Summary and Conclusions

For the **crop sector** market impacts are dominated by the differences in the set-aside rate. Area use and production of cereals increase from the reference run (17.5 % set-aside rate) to the "decision" run (10 % set-aside) and further to the "proposal" run (0 %). Because domestic use only increases moderately, mainly due to higher use for feed, excess supply increases in the same order. This does not imply that the WTO export subsidy restrictions are less binding in the "decision" scenario than in the "proposal" scenario, for it is unclear whether a 15 % price decrease will be sufficient to permit exports without subsidies, at least of wheat.

Meat markets are affected by a whole set of interacting forces. According to our simulations the net impact of these forces on beef and veal production is negative in both

[25] The development of an integrated budget component for the MFSS model is under way, but not yet available. Depending on assumptions for the budgetary impact analysis, whether conducted as a supplementary exercise or by an integrated module, some corrections of the consumer surplus gains might be called for. If, for example, some savings in subsidies to consumers are foreseen as part of the implementation, the consumer surplus gains of table 2.7 have to be reduced accordingly.

Agenda 2000 scenarios, though significantly only in the "proposal" run. Domestic use increases both in the "proposal" and "decision" run, but only by approximately 2.8 % and 1.8 %, respectively. Excess supply for beef declines from the reference run to the "decision" run, and further to the "proposal" run. Taking into account imports of meat and life animals and the uncertainty surrounding the recovery of demand from the BSE crisis, it is possible that the reduction of excess supply is insufficient in the "decision" run.

Production increases on the **milk market** in the "proposal" and "decision" runs are mainly determined by the quota expansions (+2 % in 2006). Total domestic use is somewhat higher in the "proposal" run than in the "decision" run in 2005 and 2006, because prices have been reduced already further in the former. In both Agenda 2000 scenarios, excess supply rises which has to be disposed off, either by exports or in additional stocks. It is by no means certain that the price reduction will be sufficient for corresponding exports of certain milk products to come about without subsidies.

These market impacts have implications for **major political goals**. It can be expected that the reform decisions

(1) will allow agricultural incomes per worker to rise at a moderated pace

(2) will take account of existing budgetary constraints, and

(3) will benefit consumers and improve the competitiveness of European food products on international markets.

Even without a definite confirmation in a fully consistent cost benefit analysis, which would require a matching assessment of budgetary impacts, these results lend support to the proposition that the Agenda 2000 will have positive economic welfare effects for society as a whole.

If one compares the impacts of the EU Commission proposals with the final outcome of the Berlin summit, significant modifications can be recognised: the heads of government have succeeded in cushioning the effects on agricultural income and in reducing the burden on the EU budget to some extent. However, it appears that these achievements involve greater market risks stemming from WTO commitments of the EU and they are paid by EU citizens as domestic consumers.

In addition, we have to consider effects on general economic and political goals. The most important aspects are: the integration of European agriculture into world markets, the competitiveness of European agriculture, the accession of Middle and Eastern European countries, the future of compensation payments and the achievement of sustainable agriculture and rural areas. Although this assessment is confined to quantitative aspects, we have to bear in mind that positive and negative effects on these goals have to be added to the quantitative impacts of this chapter. Such a more encompassing evaluation will be taken up in chapter VI.

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FAPRI analysis of CAP reform in the Agenda 2000 final decisions

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Executive summary

The Food and Agricultural Policy Research Institute (FAPRI) conducted two separate analyses of the final decisions on CAP reform in the Agenda 2000 using its models of EU and world agriculture. The FAPRI unit at Iowa State University examined the reforms as part of a project to examine the implications of EU expansion. The FAPRI unit at the University of Missouri looked at the reforms as part of an ongoing project in Ireland and Northern Ireland.

FAPRI maintains a system of linked non-spatial partial equilibrium models of major world agricultural markets. For cereals, oilseeds, meat, and dairy products, FAPRI models estimate production, consumption, stocks, prices, and trade in major trading countries. The FAPRI-Iowa State analysis was conducted with the standard set of models FAPRI uses each year to develop baseline projections of world agricultural markets and to conduct policy analysis. The FAPRI-Missouri analysis utilized an experimental version of the EU model that provides country level detail for France, Germany, Italy, and the United Kingdom.

Although the two analyses were done with different models using different conditioning assumptions, most of the estimated impacts of the CAP reforms were similar. Compared to a no-reform baseline, both analyses estimate that the reforms would result in:

- lower EU domestic prices for cereals, meat, and dairy products,
- market price reductions for cereals and beef that are less than the reductions in support prices,
- increased production and exports of wheat with a potential for unsubsidised exports,
- reduced EU oilseed production, but only small effects on world oilseed markets,
- reduced EU production and stocks of beef, and
- small dairy sector effects until support prices are reduced in 2005.

Many of the differences in results between the two analyses can be explained by differences in conditioning assumptions. For example, the FAPRI-Iowa State analysis uses the macroeconomic assumptions underlying the January 1999 FAPRI baseline, including a significant strengthening of the euro relative to the dollar. This results in lower levels of EU cereal exports than in the FAPRI-Missouri analysis, which assumes the dollar-euro exchange rate remains steady at levels prevailing in early 1999.

Full reports on the two analyses can be found in the "Publications" section of the web sites maintained by the two FAPRI units (www.fapri.iastate.edu for the Iowa State paper, and www.fapri.missouri.edu for the University of Missouri paper).

1. Introduction

The Food and Agricultural Policy Research Institute (FAPRI)[26] conducted two separate analyses of the Agenda 2000 reforms of the Common Agricultural Policy (CAP) shortly after final decisions were reached in Berlin in March 1999. The FAPRI-Missouri unit was asked to look at the reforms as part of an ongoing project with the Agricultural and Food Development Authority (Teagasc) in Ireland and Queens University in Northern Ireland (Westhoff and Young 1999). FAPRI-Iowa State examined the reforms as part of a project funded by the Midwest Agribusiness Trade Research Information Center to evaluate the likely impacts of EU expansion (FAPRI-ISU 1999).

The two analyses were conducted relative to a common baseline for world agricultural markets that was prepared in January 1999. However, the two analyses used different models for EU agriculture and different macroeconomic assumptions, especially with regard to exchange rates. Results of the two analyses are broadly similar, with differences that can be explained by the use of alternative models and variations in several assumptions.

2. FAPRI models

FAPRI has developed an integrated set of non-spatial partial equilibrium models for major agricultural markets. Current FAPRI models cover world markets for cereals, oilseeds, meats, dairy products, cotton, and sugar. For each commodity, the largest exporting and importing countries are treated separately, with other countries included in regional groupings or a "rest of world" aggregate. In the case of wheat, for example, the 1999 version of the model includes 7 exporting countries, 13 importing countries, 8 regional groupings, and a small rest-of-world category. For most countries and commodities, the model estimates production, consumption, and trade; in many cases the model also estimates domestic market prices, stocks, and other variables of interest.

Where feasible and appropriate, parameters of the FAPRI model were estimated using econometric techniques applied to time series data. In some cases, however, data limitations, recent structural change, or resource limitations mean that econometric techniques cannot be used to determine model parameters. In these cases, the model uses assumed parameters that are taken from the literature or that are established based on analyst judgement and input from market specialists.

The model estimates both the area devoted to a particular crop and the yield per harvested hectare. Area is generally a function of output and input prices and government policies. Yield equations incorporate technical progress and price responses. For beef and pork, supply equations consider herd dynamics, where the key behavioural equations generally are those that determine breeding herd inventory, slaughter, and carcass weights. These meat supply equations are functions of livestock prices, feed and other input prices, and

[26] FAPRI is a joint institute of Iowa State University and the University of Missouri, created to provide objective, quantitative analysis of issues related to world agriculture. FAPRI collaborates with a number of other universities, government agencies, and other institutions in the United States, the European Union, and around the world. For each of the past 15 years, FAPRI has developed ten-year projections of world agricultural markets. FAPRI analysts use a system of linked models and the judgement of commodity and country specialists to estimate the supply, demand, and prices of major commodities under alternative sets of assumptions.

government policies. The dairy model estimates both cow numbers and milk yield per cow, and the supply equations are functions of milk prices, feed and other input prices, and government policies. In all supply equations, care is taken to ensure that the model reflects marginal incentives. As a result, a direct production subsidy will have a larger effect on production, all else equal, than a more decoupled subsidy that provides the same level of producer income support. Because the models attempt to incorporate biological constraints and other dynamic factors, they are intended to reflect both short-run and long-run supply behaviour.

Per capita consumer demand equations for cereals, oils, meats, dairy products, and sugar are a function of the price of the food in question, the prices of other foods, and income. Feed demand for cereals and oilseed meals depend on livestock production and feed prices. Oilseed crush demand is a function of relative oilseed and oilseed product prices. Allocation of milk to production of the various dairy products is a function of relative prices. End-of-period stocks generally are a function of prices and government policies.

The models close different markets in different ways, depending on the nature of the product and policies. In the simplest case of a relatively homogeneous good without insulating policies, domestic prices in each country are directly linked to a world market price. Net trade for each country is simply the difference between domestic supply and demand at this price effectively determined in world markets. The world market price is that which causes total world exports to equal total world imports, thus balancing global supply and demand.

For more heterogeneous goods (e.g., meats), trade is a function of relative prices and other variables, and domestic market prices are determined by equating total supply (production, changes in stocks, and imports) and demand in domestic markets. Where tariffs, quotas, support prices, and other government policies determine or influence market prices, the models attempt to incorporate these effects.

The EU component of the basic FAPRI model treats the European Union as a bloc. The EU portions of the model generally follow the structure described above, with a number of special features to reflect idiosyncrasies of EU policies and markets. Intervention prices place an effective floor below market prices. Milk supplies are largely determined by milk quotas. Set-asides, direct payments, and other policies affect crop and livestock supplies. Exports are limited by WTO restrictions on subsidised exports whenever EU domestic prices exceed prices prevailing in world markets. This basic FAPRI model is used to develop the annual FAPRI baseline projections for EU and world markets, and was used by FAPRI-Iowa State in conducting its analysis of the Agenda 2000 reforms.

As part of its project in Ireland, FAPRI-Missouri is developing an experimental new model of the EU agricultural sector. The model again follows the general structure outlined above, but it provides country-level detail for France, Germany, Italy, and the United Kingdom, while treating the other countries of the European Union as a group. Market prices in the various member countries are linked, but domestic supply and demand conditions affect cross-country price relationships. Net export supply for the European Union is the sum of the net export supplies (production plus beginning stocks minus domestic consumption minus ending stocks) of the member countries at a given set of prices. Net export demand for the European Union is a behavioural function of EU and world prices that also attempts to incorporate WTO limitations and plausible behaviour by the European Commission in establishing export refunds and other

measures affecting EU trade and prices. Domestic EU market prices are those that equate EU net export supply and demand.

The experimental FAPRI-Missouri model provides additional detail in the beef and dairy sectors, reflecting the priorities of FAPRI's Irish collaborators. For example, suckler cow inventories are affected by quota levels and by direct payments for both suckler cows and other cattle. Furthermore, the equations assign different weights to different factors depending on the relationship between actual suckler cow numbers and quota levels. Marginal incentives will be different for a producer who maintains fewer cows than the payment quota than for a producer who holds more cows than are eligible for payments. The dairy model tracks the supply and demand for both protein and fat, making it possible to examine the implication of changes in the composition of milk and dairy products.

The new model can be operated as a component of the overall FAPRI modelling system. Alternatively, it can be operated in a stand-alone fashion by introducing reduced-form equations that determine world market prices as a function of EU trade levels. These world price equations are calibrated to mimic the dynamic behaviour of a global model and are aligned with the most recent FAPRI world baseline. This experimental FAPRI-Missouri model is still undergoing testing and modification, but it is fully operational and was used to conduct FAPRI-Missouri's analysis of the Agenda 2000 reforms.

3. Scenario assumptions

The FAPRI-Iowa State (FAPRI-ISU 1999) and the FAPRI-Missouri (Westhoff and Young 1999) analyses each examine two scenarios. The baseline scenario assumes a continuation of policies that were in place prior to March 1999, while the Agenda 2000 reform scenario incorporates provisions of the March 1999 agreement.

Most of the specific assumptions underlying the two analyses are identical (cf. table 3.1). In the baseline, intervention prices, milk quotas, and most other policy variables are continued indefinitely at their 1999 levels. In the Agenda 2000 scenario, annual levels for each of these policy variables are set as prescribed by the March 1999 agreement. In years after 2005 for crops and beef and 2007 for dairy, policy variables are frozen at the final levels specified under the Agenda 2000 agreement.

Both analyses begin with the January 1999 FAPRI baseline as the benchmark for world agricultural market conditions (FAPRI 1999). In general, the FAPRI baseline indicated a gradual recovery in the prices of most major agricultural products traded in world markets. Prices for most products remain below the levels prevailing in the mid-1990s, however. In the analyses, world market prices differ from their January 1999 FAPRI baseline levels whenever EU trade differs from the levels indicated in that baseline.

Both analyses also assume similar behaviour by the EU Commission in managing the CAP. It is generally assumed that the Commission will act in ways to avoid stock accumulation when possible. While WTO limits place a cap on subsidised exports, estimated export levels reflect a balancing of an assumed desire to support market prices and avoid stock accumulation by disposing of exportable supplies with an assumed desire to limit the budgetary costs of export refunds. As a result of this balancing assumption, the analyses indicate that subsidised exports often fall short of the WTO maximum levels, and that market prices often fail to change by the same proportion as changes in

intervention prices.

Table 3.1 Common assumptions of the FAPRI-Iowa State and FAPRI-Missouri analyses

	Baseline	Agenda 2000 Reform
Cereal and oilseed policy		
Cereal intervention price, 2001-09	119 €/t	101 €/t
Cereal compensation, 2001-09	54 €/t	63 €/t
Oilseed compensation, 2002-09	94 €/t	63 €/t
Mandatory set-aside rate, 2000-01	10%	10%
Wheat export subsidy limit, 2001-09	14.4 mio t	14.4 mio t
Beef policy		
Beef market support, 2002-09	278 €/100 kg	222 €/100 kg
Suckler cow payment quota, 2000-09	11.4 mio head	10.8 mio head
Suckler cow premium, 2002-09	145 €/head	200 €/head
Male bovine premium, 2002-09	135 €/head	210 €/head
Dairy policy		
Milk quota, 2007-09	117 mio t	120 mio t
Butter intervention price, 2007-09	328 €/100 kg	279 €/100 kg
Skim milk powder int. price, 2007-09	206 €/100 kg	175 €/100 kg
Macroeconomic variables		
GDP growth rate, 2000-09 avg.	2.5%/year	2.5%/year
GDP deflator inflation, 2000-09 avg.	2.3%/year	2.3%/year

In both the baseline and the Agenda 2000 scenario, WTO restrictions on export subsidies and market access requirements are continued indefinitely at 2000/01 levels. Based on projections by macroeconomic forecasters at Standard and Poor's DRI, rates of growth in real GDP in the European Union over the next ten years average 2.5 % per year. Inflation as measured by the GDP deflator averages 2.3 % per year.

Exchange rates are a critical difference in assumptions between the FAPRI-Iowa State study and the FAPRI-Missouri study (cf. table 3.2). The FAPRI-Iowa State study uses DRI projections that called for a significant appreciation of the euro vs. the dollar. The 2001-2009 average exchange rate is $1.25 per euro, with a significant strengthening of the euro over time. The FAPRI-Missouri study, in contrast, assumes that the dollar-euro exchange rate continues indefinitely at $1.08 per euro, the June 1999 futures rate prevailing on April 1, 1999.

This difference in exchange rate assumptions is the principal reason the two analyses differ in a key policy assumption, the applied rate of mandatory set aside. In the FAPRI-Iowa State analysis, EU baseline wheat prices are too high to allow unsubsidised exports before 2006. To keep stocks from building, the mandatory set-aside rate is increased from 10 % in 2000 and 2001 to 12 % from 2002-2004 and 15 % from 2005-2008. In the Agenda 2000 scenario, EU prices fall sufficiently to allow unsubsidised exports, and the mandatory set-aside rate can be maintained at 10 % indefinitely.

In the FAPRI-Missouri analysis, the weaker euro makes EU wheat more competitive in world markets, eventually allowing unsubsidised exports even in the baseline. As a result, baseline set-aside rates are maintained at 10 % through 2005, and then are reduced to

5 %. In the Agenda 2000 scenario, unsubsidised wheat exports become possible almost immediately, and set-aside rates are reduced to 5 % in 2002 and 0 % in 2006.

Table 3.2 Differing assumptions of the FAPRI-Iowa State and FAPRI-Missouri analyses

	Baseline	Agenda 2000 Reform
Exchange rate, 2000-09 average		
FAPRI-Iowa State	$1.25/€	$1.25/€
FAPRI-Missouri	$1.08/€	$1.08/€
Cereal mandatory set-aside rate		
FAPRI-Iowa State, 2002-04	12%	10%
FAPRI-Iowa State, 2005-08	15%	10%
FAPRI-Missouri, 2002-05	10%	5%
FAPRI-Missouri, 2006-09	5%	0%
Beef unsubsidised export potential		
FAPRI-Iowa State	Limited	Significant
FAPRI-Missouri	Limited	Limited

A final significant difference in assumptions between the two scenarios concerns the potential for unsubsidised beef exports. The FAPRI-Iowa State analysis assumes that unsubsidised EU beef exports become possible whenever the EU domestic beef market price is 5 % below the U.S. equivalent. In the Agenda 2000 analysis, this makes it possible for the European Union to export beef without subsidy, and results in EU domestic beef market prices that tend to move with prices in U.S. markets. The FAPRI-Missouri analysis assumes less potential for unsubsidised EU beef exports, primarily because it considers EU beef a poor substitute for beef traded in Pacific basin markets.

4. Model results

The two FAPRI studies generally yield similar qualitative and even quantitative results. Most of the major differences can be explained by the differences in assumptions outlined above, although there are also some minor differences that can be attributed to differences in model structure and parameters.

4.1 Cereal and oilseed sector results

The reduction in cereal intervention prices significantly increases the probability that the European Union will be able to export wheat without the use of export subsidies. In both FAPRI studies, the ability to export wheat without subsidy increases total demand to the point that a reduction in set-aside rates is possible without resulting in a build-up in stocks. Because of the assumed reduction in set-aside rates, cereal area and production expand in spite of lower cereal market prices. While part of the expansion in production is consumed domestically, much of it is exported. Stocks of wheat are reduced dramatically, as EU wheat market prices are supported by world markets rather than by intervention (cf. table 3.3).

In both studies, the increase in harvested cereal area is less than the reduction in compulsory set aside. In the FAPRI-Missouri analysis, for example, reducing the compulsory set-aside rate in 2005 from 10 % in the baseline to 5 % in the Agenda 2000 scenario increases total cereal and oilseed harvested area by just 2.2 %. Two principal

reasons account for the modest response of harvested area to the assumed reduction in compulsory set aside. First, small farmers are exempt from compulsory set-aside, so changes in the set-aside rate have no direct effect on their planting decisions. Second, reduced cereal prices encourage more farmers to participate in voluntary set-aside. Farmers with marginal production costs that exceed these lower market prices would rationally choose to place land in the voluntary set-aside program if that alternative is open to them. Expanded area and reduced prices result in a modest reduction in average yields per harvested hectare, but not enough to offset fully the increase in area. Oilseed area and production decline in response to the sharp reduction in direct payments for oilseed production.

Table 3.3 Cereal and oilseed sector results

	Baseline 2002	Agenda 2000 2002	Change	Baseline 2005	Agenda 2000 2005	Change
Wheat area (mio ha)						
FAPRI-Iowa State	16.3	16.7	2.6%	15.8	16.8	5.9%
FAPRI-Missouri	16.8	17.3	3.2%	16.8	17.5	4.0%
Wheat yield (t/ha)						
FAPRI-Iowa State	5.96	5.88	-1.4%	6.19	6.12	-1.2%
FAPRI-Missouri	6.06	6.03	-0.5%	6.29	6.25	-0.7%
Wheat production (mio t)						
FAPRI-Iowa State	97.1	98.3	1.2%	97.9	102.5	4.7%
FAPRI-Missouri	101.6	104.3	2.6%	105.8	109.3	3.3%
Wheat domestic use (mio t)						
FAPRI-Iowa State	83.5	83.6	0.1%	84.5	84.6	0.0%
FAPRI-Missouri	87.4	87.8	0.5%	88.4	88.5	0.1%
Wheat net exports (mio t)						
FAPRI-Iowa State	13.3	15.1	13.2%	13.3	18.0	35.5%
FAPRI-Missouri	14.1	17.8	26.4%	18.3	21.0	14.9%
Wheat ending stocks (mio t)						
FAPRI-Iowa State	16.1	13.4	-17.3%	19.7	12.8	-35.2%
FAPRI-Missouri	17.7	11.2	-36.6%	15.7	9.9	-36.9%
Wheat market price (€/t)						
FAPRI-Iowa State	123.0	109.8	-10.7%	124.5	114.0	-8.4%
FAPRI-Missouri	128.9	120.4	-6.6%	131.1	125.6	-4.2%
World wheat price (US$/t)						
FAPRI-Iowa State	149.9	147.6	-1.6%	162.8	156.9	-3.6%
FAPRI-Missouri	149.4	144.2	-3.5%	154.3	151.2	-2.0%
Barley area (mio ha)						
FAPRI-Iowa State	10.9	11.1	2.5%	10.5	11.1	5.0%
FAPRI-Missouri	10.8	11.1	3.6%	10.7	11.0	2.6%
Barley domestic use (mio t)						
FAPRI-Iowa State	43.1	44.2	2.6%	43.5	44.6	2.4%
FAPRI-Missouri	43.7	44.4	1.5%	44.5	45.1	1.4%
Barley market price (€/t)						
FAPRI-Iowa State	118.9	107.5	-9.6%	119.9	109.5	-8.7%
FAPRI-Missouri	118.2	108.1	-8.5%	118.8	110.7	-6.8%
Maize area (mio ha)						
FAPRI-Iowa State	3.85	3.91	1.4%	3.74	3.87	3.5%
FAPRI-Missouri	4.00	4.10	2.5%	3.97	4.00	0.8%
Maize market price (€/t)						
FAPRI-Iowa State	122.9	107.9	-12.2%	123.8	109.9	-11.2%
FAPRI-Missouri	133.6	120.6	-9.7%	132.6	125.5	-5.4%
Oilseed area (mio ha)*						
FAPRI-Iowa State	3.67	3.54	-3.8%	3.55	3.41	-4.2%
FAPRI-Missouri	5.69	5.51	-3.2%	5.64	5.48	-2.8%

* Soybeans and rapeseed in the FAPRI-Iowa State analysis; soybeans, rapeseed, and sunflower seed in the FAPRI-Missouri analysis.

In both analyses, total meat production in 2005 changes by less than 1 % between the baseline and the Agenda 2000 scenario. Lower cereal prices, however, encourage livestock producers to replace some cereal substitutes with cereals in livestock rations. In both analyses, this effect is small, and total feed consumption of cereals increases by less than 2 % under Agenda 2000 relative to the baseline. Comments received after release of the reports suggest that the analyses may understate the potential for further expansion of cereal use in livestock rations.

The reduction in intervention prices and the increase in production result in a significant reduction in EU cereal prices. These lower prices enable the European Union to increase wheat exports without the aid of export subsidies. As world markets provide support for domestic EU markets, cereal prices decline by less than the 15 % reduction in intervention prices. In 2002, cereal prices are between 6 and 12 % below baseline levels, depending on the cereal and the study. By 2005, world markets provide even greater support to EU cereal markets and the decline in EU prices relative to the baseline is between 4 and 11 %. Increased EU exports mean that world cereal prices are reduced slightly from baseline levels.

Because market prices generally exceed the new, lower intervention prices, total cereal intervention stocks are smaller under Agenda 2000 than in the baseline. Under the assumptions of the FAPRI analyses, significant intervention buying would occur only when yields are unexpectedly high or demand is unexpectedly low. In most years, EU cereal prices would be supported by world markets, not by intervention buying.

Exchange rate assumptions account for most of the differences between the two studies in the cereal sector results. The weaker euro in the FAPRI-Missouri study facilitates greater levels of unsubsidised wheat exports, even in the baseline scenario. This allows set-aside rates to be set at lower levels in order to permit more cereal production to meet world demand.

This relatively optimistic view of the EU cereal markets is contingent, of course, on a relatively optimistic view of world cereal markets. Both FAPRI studies are conditioned by a FAPRI baseline that indicated a recovery in world markets from current depressed levels. As an aside, it should be noted that new long-term projections being prepared by FAPRI at the end of 1999 indicate a slower world market improvement. A weaker recovery in world cereal markets may delay the onset of unsubsidised wheat exports and may make unsubsidised barley exports impossible.

4.2 Livestock and meat sector results

Lower beef support prices and lower feed prices translate into lower prices for all major categories of livestock and poultry under the Agenda 2000 CAP reform scenario. Beef prices decline the most in response to the reduction in support prices. Suckler cow inventories and beef production are both reduced slightly from baseline levels. Beef consumption increases in response to lower prices, and beef stocks are reduced dramatically from the very high levels in the baseline scenario. Changes in pork, poultry, and sheep meat production are modest, as lower feed prices are offset by downward pressure on prices resulting from the lower beef prices (cf. table 3.4).

Many of the differences between the two FAPRI studies can be explained by the assumed differences in the potential for unsubsidised beef exports. In the FAPRI-Iowa State

analysis, the reduction in EU market prices results in significant unsubsidised exports, even though the study's assumption of a stronger euro tends to make EU products less competitive in world markets than the weaker euro in the FAPRI-Missouri analysis. In contrast, the FAPRI-Missouri analysis assumes that EU beef exports would actually fall below baseline levels (and below WTO limits on subsidised exports), as the Commission would do less to encourage subsidised exports when such exports are not necessary to avoid intervention stock accumulation. With the different beef export assumptions, EU cattle prices are lower in the early years of the FAPRI-Missouri analysis, putting more pressure on prices of other meats.

Table 3.4 Livestock and meat sector results

	Baseline 2002	Agenda 2000 2002	Change	Baseline 2005	Agenda 2000 2005	Change
Suckler cows (mio head)						
FAPRI-Iowa State	11.7	11.7	-0.4%	11.6	11.5	-0.2%
FAPRI-Missouri	11.6	11.2	-3.6%	11.5	11.2	-2.6%
Beef production ('000 t)						
FAPRI-Iowa State	7777	7745	-0.4%	7701	7663	-0.5%
FAPRI-Missouri	7686	7562	-1.6%	7584	7419	-2.2%
Beef consumption ('000 t)						
FAPRI-Iowa State	7181	7281	1.4%	7100	7322	3.1%
FAPRI-Missouri	7170	7401	3.2%	7069	7269	2.8%
Beef ending stocks ('000 t)*						
FAPRI-Iowa State	409	208	-49.2%	1142	217	-81.0%
FAPRI-Missouri	613	137	-77.7%	1005	0	-100.0%
Beef net exports ('000 t)						
FAPRI-Iowa State	429	488	13.7%	426	392	-7.9%
FAPRI-Missouri	398	333	-16.3%	397	150	-62.2%
Cattle reference (€/100 kg)						
FAPRI-Iowa State	129	120	-6.9%	129	112	-12.9%
FAPRI-Missouri	131	112	-14.2%	129	113	-12.1%
Pork production ('000 t)						
FAPRI-Iowa State	17330	17401	0.4%	17632	17692	0.3%
FAPRI-Missouri	17227	17173	-0.3%	17501	17416	-0.5%
Pork consumption ('000 t)						
FAPRI-Iowa State	16262	16325	0.4%	16571	16619	0.3%
FAPRI-Missouri	16242	16173	-0.4%	16505	16412	-0.6%
Pork reference (€/100 kg)						
FAPRI-Iowa State	130	125	-4.0%	137	131	-4.6%
FAPRI-Missouri	127	121	-4.9%	128	123	-3.2%
Broiler production ('000 t)						
FAPRI-Iowa State (EU-15)	6700	6767	1.0%	6902	6934	0.5%
FAPRI-Missouri (EU-12)	6183	6158	-0.4%	6351	6320	-0.5%
Broiler consumption ('000 t)						
FAPRI-Iowa State (EU-15)	6220	6270	0.8%	6452	6468	0.3%
FAPRI-Missouri (EU-12)	5674	5641	-0.6%	5871	5837	-0.6%
Chicken price (€/100 kg)						
FAPRI-Iowa State	121	115	-4.7%	129	123	-4.5%
FAPRI-Missouri	135	129	-4.7%	136	132	-3.3%
Sheepmeat price(€/100 kg)						
FAPRI-Iowa State	336	332	-1.4%	338	332	-1.7%
FAPRI-Missouri	332	320	-3.7%	342	330	-3.7%

* Total ending stocks in the FAPRI-Iowa State analysis; intervention stocks in the FAPRI-Missouri analysis.

As with cereals, the estimated beef price declines because of Agenda 2000 reforms are significantly less than the reduction in support prices. In the FAPRI-Iowa State analysis, EU prices eventually are supported by world market prices, and EU cattle prices tend to move with U.S. prices. In the FAPRI-Missouri analysis, world prices are less of a factor. EU cattle prices decline more in the early years of the FAPRI-Missouri analysis, when beef stocks are liquidated, and less in later years.

In both analyses, the reduction of suckler cow payment quotas and lower beef market prices result in reduced suckler cow inventories. The effect is particularly pronounced in the FAPRI-Missouri analysis, where it is estimated that very few beef producers would choose to hold suckler cows that are not eligible for direct payments. Offsetting the reduction in suckler cow inventories is the increase, relative to the baseline, in dairy cow numbers because of the increase in milk quotas. The net effect is that total cow numbers and total cattle slaughter are largely unchanged from baseline levels. Slaughter weights decline in response to lower cattle prices, and so beef production is modestly lower under Agenda 2000 than in the baseline.

While the absolute differences are modest, the two studies do indicate different directional effects on pig meat and poultry production. In the FAPRI-Iowa State analysis, the effect of lower feed prices more than offsets the effect of more competition from low-price beef, and pig meat and poultry production under Agenda 2000 slightly exceeds baseline levels. In the FAPRI-Missouri analysis, the beef competition effect dominates, and pig meat and poultry production fall slightly short of baseline levels.

4.3 Dairy sector results

Dairy sector impacts of Agenda 2000 are limited in the period between 2000 and 2004. The slight increase in quota for selected countries results in a small increase in milk production and a slight reduction in milk and dairy product prices under Agenda 2000 relative to the baseline. Further quota expansion and reduced intervention prices result in lower dairy market prices after 2005. As with other products, however, the estimated reductions in dairy market prices are smaller than the reduction in intervention prices (cf. table 3.5).

Milk production increases under Agenda 2000 are slightly smaller than the increases in production quota. In the early years of the analysis, part of the reason is that the quota increases granted selected countries largely ratify existing production levels. In later years, the decline in milk prices means that some producers may be slightly less likely to overfill or slightly more likely to under-fill quotas. Relative to the baseline, the Agenda 2000 scenario results in slower reductions in dairy cow numbers and faster increases in production per cow. Changes in cow numbers account for most of the change in milk production relative to the baseline, as lower milk prices moderate the increase in milk yields that might otherwise result from an increase in quotas.

With reduced intervention prices, market prices for skim milk powder and butter generally decline more sharply than cheese prices after 2005. As a result, cheese production absorbs a disproportionate share of the increase in milk production. Consumption of drinking milk and cheese increases in response to lower market prices. For butter and skim milk powder, the effects of lower market prices are offset by assumed reductions in consumption subsidies.

In the FAPRI-Missouri analysis, EU skim milk powder exports are limited by the WTO limits on subsidised exports in both the baseline and Agenda 2000 scenarios. In the FAPRI-Iowa State study, baseline EU powder exports are slightly below the WTO limits in the later years of the analysis, and the Agenda 2000 scenario results in further declines as exportable supplies diminish in response to lower production and stock levels. For butter, Agenda 2000 exports under both FAPRI studies exceed baseline levels in the early years as the Commission disposes of some of the increase in milk production in foreign markets. In the later years, butter exports fall slightly short of baseline levels due to a projected reduction in exportable supplies.

Table 3.5 Dairy sector results

	Baseline 2005	Agenda 2000 2005	Change	Baseline 2007	Agenda 2000 2007	Change
Milk cows (mio head)						
FAPRI-Iowa State	19.5	19.7	1.0%	19.1	19.4	1.6%
FAPRI-Missouri	19.4	19.6	0.8%	18.9	19.2	1.5%
Milk production (mio t)						
FAPRI-Iowa State	120.3	121.7	1.2%	120.3	122.3	1.7%
FAPRI-Missouri	120.0	121.3	1.1%	119.9	122.0	1.7%
Milk price (€/100 kg)						
FAPRI-Iowa State	30.0	29.0	-5.0%	31.0	28.0	-9.5%
FAPRI-Missouri	29.6	28.4	-4.0%	29.6	27.1	-8.5%
Cheese production ('000 t)						
FAPRI-Iowa State	6313	6424	1.8%	6423	6619	3.1%
FAPRI-Missouri	6278	6361	1.3%	6375	6536	2.5%
Cheese consumption ('000 t)						
FAPRI-Iowa State	6004	6091	1.5%	6109	6268	2.6%
FAPRI-Missouri	5952	6021	1.2%	6040	6182	2.4%
Cheese exports ('000 t)						
FAPRI-Iowa State	426	439	2.9%	431	456	5.7%
FAPRI-Missouri	439	448	2.0%	448	459	2.4%
Cheese price (€/100 kg)						
FAPRI-Iowa State	494	473	-4.2%	504	465	-7.8%
FAPRI-Missouri	475	457	-3.7%	475	439	-7.5%
Butter production ('000 t)						
FAPRI-Iowa State	1752	1764	0.7%	1748	1746	-0.1%
FAPRI-Missouri	1704	1717	0.7%	1695	1700	0.3%
Butter exports ('000 t)						
FAPRI-Iowa State	211	223	5.8%	213	194	-9.0%
FAPRI-Missouri	192	200	4.4%	193	191	-0.8%
Butter stocks ('000 t)						
FAPRI-Iowa State	195	201	3.4%	177	135	-23.6%
FAPRI-Missouri	223	228	2.3%	218	216	-0.8%
Butter price (€/100 kg)						
FAPRI-Iowa State	364	345	-5.1%	367	327	-11.0%
FAPRI-Missouri	361	348	-3.5%	360	326	-9.3%
SMP production ('000 t)						
FAPRI-Iowa State	1009	1001	-0.8%	974	915	-6.1%
FAPRI-Missouri	1042	1042	0.0%	1026	991	-3.3%
SMP exports ('000 t)						
FAPRI-Iowa State	261	273	4.5%	258	214	-17.2%
FAPRI-Missouri	272	272	0.0%	272	272	0.0%
SMP stocks ('000 t)						
FAPRI-Iowa State	193	225	16.7%	189	129	-31.8%
FAPRI-Missouri	214	254	18.7%	211	207	-1.9%
SMP price (€/100 kg)						
FAPRI-Iowa State	219	205	-6.3%	224	198	-11.5%
FAPRI-Missouri	209	196	-6.2%	209	182	-13.0%

Given FAPRI projections for world dairy product prices, it appears unlikely that the European Union would be able to export significant quantities of butter or milk powder without the use of export subsidies. Both analyses estimate that lower EU cheese prices will facilitate a modest (2 to 5 %) increase in unsubsidised exports of certain cheeses in particular markets, but EU bulk cheeses are likely to remain uncompetitive with product from Australia, New Zealand, and other low-cost producers.

5. Concluding comments

The two FAPRI studies of the Agenda 2000 reforms indicate that the reforms are likely to reduce EU market prices for cereals, meats, and dairy products relative to a continuation of previous policies. In general, however, the estimated market price reductions are smaller than the reductions in support prices mandated by Agenda 2000.

Especially in the case of wheat, the reforms are likely to facilitate unsubsidised exports when world market conditions improve from their current depressed state. EU beef, pig meat, poultry, and cheese are also more likely to be competitive in world markets because of the reforms. In contrast, the reforms are less likely to facilitate unsubsidised exports of milk powder and butter, and unsubsidised barley and maize exports appear less likely than unsubsidised wheat exports.

In the cereal and beef sectors, the reforms should reduce the likelihood that the European Union will accumulate large quantities of intervention stocks. In contrast, the short-run effect of increasing milk quotas may be an increase in intervention stocks. Only when intervention prices are reduced after 2005 is balance restored to dairy markets.

While results of the two FAPRI analyses are very similar, many of the differences can be attributed to different exchange rate assumptions. This illustrates the point that the Agenda 2000 reforms to the CAP make EU markets more strongly affected by changes in world market conditions than in the past.

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CAP REFORM IN AGENDA 2000

An opening bid for the Millennium Round (CAPMAT simulations)

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Abstract

In its Agenda 2000, the European Commission decided on new reform measures for the Common Agricultural Policy. These measures imply a further shift from price to income support, by lowering intervention prices for cereals, beef and milk, and by increasing the level and scope of acreage and headage premiums so as to compensate for income losses. However, the impact on farm incomes is negative. Acreage and headage premiums increase and become the dominant item on the agricultural budget of the EU. The Agenda 2000 decision facilitates the accession of new members, and constitutes an opening bid for the WTO negotiations whose successful completion will require further adjustments.

1. Introduction[27]

In 1997, the Commission presented the first draft of its plans for preparing the European Union for the next century (CEC, 1997a). These included a reform of the Common Agricultural Policy (CAP), that proposed to amend the regulations prevailing since 1992 because of developments within the agricultural sector itself, the upcoming international trade negotiations under WTO and the planned accession of Central and Eastern European countries (CEECs). The plans were elaborated upon in the draft regulations of March 1998 (CEC, 1998a). In October 1998, the Commission published an impact assessment of the proposed reforms (CEC, 1998c). The assessment included a forerunner of the present paper (Keyzer and Merbis, 1998) that also studied the consequences of the agricultural market and price policies of the proposed version of Agenda 2000.

However, in March 1999 the meeting of the EU Council in Berlin only approved Agenda 2000 after significant modifications of the initial proposals. Whereas the Commission originally sought to improve efficiency by eliminating set-asides and by significantly reducing the support prices for the sectors beef and dairy, the Berlin compromise maintained the set-asides at ten percent, postponed the adjustments for dairy and softened other price reductions (CEC, 1999a,b). Yet the Community Preference remained in place throughout these revisions. Consequently, ACP countries can maintain their preferential imports in quantity terms, while the unit value of preferences drop as a result of the reduction in support but the other exporting countries that do not enjoy such preferences are less satisfied.

The EU is currently engaged in several major parallel undertakings such as the preparation of the accession of the CEECs, the negotiations on the new Lomé Convention, the accession of China to the WTO and the formulation of the negotiating agenda for a new WTO round. Consequently, the agricultural part of Agenda 2000 might

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[27] The current research has been conducted as part of the FEA (Future of European Agriculture) project in which three institutes from The Netherlands participate: the Netherlands Bureau for Economic Policy Analysis (CPB), the Agricultural Economics Research Institute (LEI), both in The Hague, and the Centre for World Food Studies (SOW-VU, Amsterdam). Earlier versions were presented to the Dutch parliament (based on the July 1997 proposals, see SOW-VU et al., 1998) and the EU (based on the proposals of March 1998, see Keyzer and Merbis, 1998). The comments by Mr Pierre Bascou (European Commission, DG Agriculture) and the members of the FEA team are gratefully acknowledged.

be regarded as an opening bid. Indeed the reviews scheduled in the coming years leave room for further adjustments[28].

In view of the various modifications introduced through the Berlin compromise the Commission decided to invite those who conducted an impact analysis of its earlier proposal to perform a similar exercise on the basis of the actual decisions taken in Berlin, while accounting for recent developments on world markets. This is the subject of the present paper. The paper is structured as follows. After briefly sketching the modelling approach (section 2), we describe the policies of Agenda 2000, Berlin compromise and express these as scenario assumptions, comparing them to the reference scenario of continuation of the 1992 policy regime (section 3). Next, in section 4 we discuss CAPMAT outcomes of these scenarios for the years 2005 and 2010. Section 5 concludes. Annex A contains supplementary model outcomes, and Annex B gives a summary description of the CAPMAT model.

2. Modelling approach

On the basis of outcomes of a simulation model, we describe the effects on production, demand and trade, farm incomes, and the EU budget, against the background of the upcoming WTO negotiations and the enlargement with CEECs. This model, the CAP-Modelling and Accounting Tool (CAPMAT), incorporates the CAP rules and farmers' behavioural response to a policy change, and incorporates major elements of the ECAM model (see Folmer et al., 1994, 1995). It covers the full agricultural sector of the EU, and distinguishes over forty activities and links fourteen national models.

In the present report, results are only presented for the commodities affected by Agenda 2000, either directly such as cereals, oilseeds, beef and dairy, or indirectly, e.g. pork and poultry products as these face lower feeding costs (see also Annex B). Although calculations proceed at member-state level, we limit the presentation to outcomes for EU-15 aggregates, starting in 1995, the base year of the model. Monetary values are as in the earlier report expressed in real terms, assuming a 1 % rate of inflation. This assumption is important since key policy variables such as intervention prices and hectare premiums are kept fixed in nominal terms once a reform has been implemented, and hence fall in real terms. The reform is introduced in 2000 and its effects are compared to the reference calculations in 2005 and 2010. Since long-term developments are studied, stock changes are assumed to be zero. This implies that the model only reports on possible non-compliance with the GATT export commitments without any in-built adjustment mechanism, say, by raising stocks or set-aside rates. The surplus (production minus domestic demand) is exported in full, and any exports in excess of the GATT commitments can be viewed as expressing the need for further adjustments. We point to them when they arise.

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[28] Some of these reviews arise automatically when the regime of a particular commodity expires. For example the current five-year period for sugar ends in 2001, and a review is scheduled in 2002. Reviews can only be scheduled as part of the implementation of Agenda 2000. The dairy regime will be reviewed in 2003 to take the necessary measures for allowing the current quota arrangements to run out after 2006. Reviews are also planned for fruits and vegetables (2000), olive oil (2001), cereals and oilseeds (2002), and a mid-term evaluation of rural development policy will take place in 2003. Finally, a revision of hemp and flax regime has been announced recently (CEC, 1999c).

Compared to the earlier impact assessment, three major modifications were introduced. First, the time horizon for simulations was extended until 2010. This was necessary because the Berlin compromise includes policy changes that are effectuated as of 2005 only. Second, the baseline predictions on world price have changed and on the basis of recent projections of the World Bank and OECD led to downward revisions. Finally, the Berlin compromise itself implied changes to be described in the next section.

3. Reference scenario: continuation of 1992 regime

3.1 Scenario assumptions

We start with the specification of our reference scenario for the CAPMAT-model. The implementation of a scenario requires assumptions on both CAP-related policy variables and exogenous variables describing the general economic environment (e.g. growth of non-agricultural GDP, and population growth). For transparency, assumptions on exogenous variables are kept constant across scenarios.

Also for transparency, we treat world market prices as exogenous, using price projections by OECD (1999) and World Bank (1999). In the model, it would be possible to let the EU trade position affect world prices, but this effect is highly speculative as it strongly depends on the assumed policy reactions by other countries. For several products, world market prices are in sharp decline since May 1996, and an early recovery is not expected (see World Bank, 1999, p. 6). Though the projections differ to some extent, they all assert that cereal prices remain relatively low and only gradually climb to the levels of the early nineties. The long-term decline of the world prices for dairy products and beef is believed to come to halt, and possibly to reverse due to expanding world markets. Recently, Deaton (1999) has argued that the price projections of international organizations have in the past tended to be over-optimistic, and although the speedy recovery in Asia may boost demand for feed grains, in the CAPMAT scenarios we maintain conservative assumptions regarding world prices. This also applies to the assumed strength of the euro against the US-dollar. We take the average 1999-exchange rate (1€ = 1.07$) to prevail in the future period, while stressing that the model simulations are expressed in real prices (basically the agricultural prices in euros relative to non-agricultural prices).

We assume that the real export prices (in euros) of the EU for wheat, sugar, protein feeds, carbohydrates and dairy products would drop until 2000 and then start increasing over the remainder of the period. After 2000 export prices of coarse grains, rice, vegetable oils, beef and mutton remain relatively depressed. Other crops (such as vegetables, wine) remain constant until 2010 in real terms. The assumptions for fats & oils and protein feeds determine the EU-price of oilseeds (since oilseeds are after processing split into oils and cake, its price can be recovered from these two prices). As the world price for oils appears to stagnate after 2000 and the price of protein feeds is 15 % higher in 2010, the real EU-average oilseed price is about constant between 2000 and 2005 and about 5 % higher in 2010. We also make relatively conservative assumptions regarding variables directly related to agriculture. For instance, the rate of technological progress is taken to be fixed but lower than in the past, and the availability of agricultural land continues its downward trend, falling from 150.6 in 1995 to 142.2 mio ha in 2010, a decrease of 5.6 %.

Regarding policy variables, the reference scenario supposes, in accordance with present regulations, that intervention prices and premiums per hectare and animal remain constant in nominal euro terms. In real terms this implies a modest one per cent decline

due to inflation. Other policy variables, which are also kept fixed over the years 2000-2010, include:

- The set-aside rate is maintained at 10 %, which is the level of 1999.
- Dairy and sugar quotas are kept constant.
- Intervention stocks are kept constant at their 1995 level.

Furthermore, stabilizer rules are implemented to limit premium outlays, as follows:

- The premium level for cereals, oilseeds and protein crops (known as COP-crops) is constrained by a reference area, of 53.5 mio ha, for the EU-15.
- Support to other CAP commodities is constrained by the 1996-premium levels. If, after correction for inflation, premium outlays exceed the 1996-level, premium rates are scaled downwards.

3.2 Main outcomes

Production and trade

Production growth continues for most products (cf. table 4.1). For cereals and oilseeds, the driving forces are a reduction of the set-aside rate from 15 (in 1995) to 10 %, and the sustained growth in yields, which range from 0.4 to 1.7 % per annum. Milk production remains constant since quotas are kept unchanged. Hence, the number of dairy cows has to decrease by about 4 mio head. The negative impact of this reduction on beef production further amplifies the decline of the non-dairy cattle sector after 2000 which does not recover due to poor prospects as prices in real terms are depressed and food safety concerns continue.

Table 4.1 EU-15 production (mio t) and annual growth rate (%), 1995-2010

	1995	2000	2005	2010	Growth rate
Wheat	87.6	98.4	104.8	110.9	1.6
Coarse grains	89.9	95.2	99.2	102.2	0.9
Fats and oils	8.2	8.4	8.5	8.6	0.4
Fat from milk	4.8	4.8	4.8	4.8	0.0
Skimmed milk	109.1	109.2	109.3	109.4	0.0
Beef and veal	8.0	7.9	7.8	7.8	-0.1

Human consumption, in terms of quantities of farm produce, has for several years been more or less stagnant within the EU. Over the period 1995-2010, growth rates are less than 0.5 % per annum for most products, despite declining real prices and a modest growth in income and population. Feed use is stagnating as well, due to technical progress and a drop in livestock numbers for dairy cattle, while the numbers in the intensive livestock sectors show a modest growth. As the use of cereal substitutes (protein feeds and carbohydrates) for animal feeding is also declining, the share of cereals in the feed mix is rising due to the drop in cereal prices within the EU.

The trading volumes follow these shifts in production and consumption. Table 4.2 confronts exports to the existing GATT commitments, in volume terms. Export growth is pronounced for cereals and modest for other products. The steady rise in cheese

consumption within the EU reduces the amount of fat from milk available for exports of butter and cheese. The export of milk powder increases because of a decline in the use of the protein component of milk in animal feed.

The results indicate that while GATT commitments tighten by 21 % over five years, the exportable surplus expands in the case of wheat and milk powder. For wheat, the exportable surplus is 54 % higher than the GATT commitment in 2000. The excess can be absorbed by stock accumulation. Before 2000 it is possible to invoke the unused commitments of earlier years, which are allowed to be 'rolled over' but this is no longer permitted from 2000 onwards. For bovine meat, exports might overshoot due to the uncertain long-term consequences of the BSE-crisis. The annual balance of supply and demand is deceptive here, since still over 300 000 t of beef are kept in stocks, that must be sold eventually.

Table 4.2 GATT commitments and EU 15 exports (mio t)

	GATT commitments			CAPMAT exports	
	Base quantity	1995	2000	1995	2000
Wheat and wheat flour	18.3	20.4	14.4	15.9	22.1
Coarse grains	13.7	13.7	10.8	9.1	8.3
Butter and butter oil	0.5	0.5	0.4	0.2	0.1
Skimmed milk powder	0.3	0.3	0.3	0.4	0.4
Cheese	0.4	0.4	0.3	0.5	0.3
Other dairy	1.2	1.2	1.0	1.5	0.9
Bovine meat	1.0	1.1	0.8	0.9	0.8

Note: CAPMAT computes quantities of fat from milk and skimmed milk that are expressed here in own product weights of butter, SMP, cheese and other dairy, using base-year conversion ratio's.

With respect to dairy, commitments were already binding in 1995 but the tension has attenuated somewhat. Some relief might be obtained from modified product composition, since each of the four related GATT commodities listed in table 4.2 basically is a mix of the same two ingredients, fat and protein. The data in the table are constructed using constant conversion ratios and thus neglect possible substitution, but this is generally believed to be a minor effect only. We notice that the table does not show the GATT commitments for pigs, poultry and eggs. The EU can meet these under the prevailing arrangements, since there is no intervention price for these products, by allowing the internal price to adjust downwards whenever export subsidies have reached their ceilings.

Table 4.3 Exports (mio t), EU-15, and annual growth rate (%), 1995-2010

	1995	2000	2005	2010	Growth rate
Wheat	15.9	22.1	29.4	35.8	5.6
Coarse grains	9.1	8.3	14.0	17.5	4.5
Fat from milk	0.4	0.3	0.2	0.3	-2.1
Skimmed milk	11.8	13.5	14.0	15.1	1.7
Beef and veal	0.9	0.8	0.7	0.8	-0.6

Table 4.3 presents the development of exports in the longer run, highlighting the fundamental CAP problem. As long as all agricultural land is used, consumer demand is stagnating, and increases in productivity persist, the exportable surplus will rise steadily, and requires export subsidies since world prices are expected to remain considerably below the 1992 intervention prices. Thus, the CAP has to choose between maintaining

Community Preference with all production controls in place or making the essential steps towards genuine tariffication and full transmission of world prices.

Agricultural income

Real income from agricultural activities –defined in table 4.4 as net revenues inclusive of transfers, premiums and subsidies– would rise by 0.5 % per year during the period 1995-2010. This fairly modest increase is the net result of a much greater increase in production volume and a reduction in real prices. At the same time, a significant reduction in the workforce takes place, by 2.4 % annually. Consequently, the income per full-time agricultural worker rises by 3.0 % annually. Although an increasingly greater portion of income will have to be allocated to capital as opposed to labor, it can be concluded that total earnings in the agricultural sector will more or less keep pace with other sectors in the economy.

Table 4.4 Farming income and employment, EU-15

	1995	2000	2005	2010	Growth rate
Total farming income (bio €)	138.8	139.5	144.2	150.3	0.5
Farm population (mio)	7.8	7.0	6.3	5.5	-2.4
Farming income ('000 €/cap.)	17.8	19.9	23.1	27.5	3.0

Further adjustments to meet existing GATT commitments

As mentioned earlier, meeting the GATT commitments will require additional policy adjustments. Since according to CAPMAT, the budgetary cost of the CAP falls by 0.4 % per annum, in real terms, there would seem to be sufficient budgetary room for such adjustments modifications, within the spending guideline for the EAGGF. In the absence of further reform, the EU basically has, for cereals, the choice between two options for meeting the GATT export commitments. The first is to absorb the surplus through intervention stocks, and the second to raise the set-aside rate. In practice, the EU might resort to a combination of both policies, and also raise payments for set-asides to compensate for the income loss. The costs of the stockholding option will be high and rising over the years, whereas higher set-asides rates will leave valuable land resources idle, and will be opposed by member states with large cereal production.

The reference scenario: a summary

Under the reference scenario, agricultural production continues to grow, and agricultural incomes per worker stay in line with growth in other sectors due to sustained labor outmigration. The EAGGF does not increase in real terms and remains well within the spending guideline but this calculation ignores the costs of meeting the existing GATT commitments. Yet from a budgetary perspective the need for reform is far less than in the seventies and eighties when export refunds and storage costs constituted the dominant budget items and exhibited sharp fluctuations. Currently, the EAGGF largely consists of premium payments, which cannot increase since they are fully restricted by stabilizer regulations. As the total refunds under the WTO rules are now constrained as well, farmers' incomes are the only remaining adjustment mechanism when prices are low and compensating mechanisms reach their maximum. This might generate political pressures for special support measures in exceptional years.

Two further problems have to be faced if the CAP was kept unchanged or subjected to minor revisions. First, it appears that in the preparatory discussion for the Millennium Round competing exporters ask for further agricultural trade liberalization. Second, the integration of Central and Eastern European countries will become difficult because the policy keeps EU prices above those that currently prevail in these countries. According to (CEC, 1998b) support prices for most products in the EU are still higher than corresponding prices in the CEECs, and (OECD, 1998) shows that, measured by PSEs, support in EU is more than twice as high as in the transition countries.

4. The Agenda 2000 scenario

4.1 Scenario assumptions

The agricultural chapter of Agenda 2000 sets new levels for intervention prices and premiums and new rules for market organization (CEC, 1999d), which reduce price support, especially for cereals and bring further reform to the dairy and bovine sector. The following set of policy rules and model assumptions describes how these were incorporated within the CAPMAT model. As mentioned earlier, world market prices are kept at their reference scenario level.

In the scenario to be presented only the policy changes stated in Agenda 2000 are being represented, and regulations for olive oil, tobacco, fruits and vegetables, sugar beet and wine sectors are kept as in the reference scenario. This is despite the fact that the wine sector reform is part of Agenda 2000, with the rules that govern the rights to plant new orchards adjusted and distillation rules sharpened, while the existing measures on managing exports and imports are retained. We disregard environmental measures and rural development policies (measures for early retirement, aid to young farmers, etc.) to the extent that the present amounts in EAGGF are kept frozen at 1996 level. The outlays of the Coherence Fund and the Structural Fund are also exogenous in CAPMAT and frozen at 1996 level, and we disregard the new budget lines that will be opened up when new members join the Union.

Scenario implementation of Agenda 2000

For the crop sector, the following policies are implemented. First, the price decisions of Agenda 2000 for intervention prices are taken to be representative of changes in market prices within the EU in the sense that a reduction in intervention price is taken to translate fully into a reduction in market and farm gate prices[29]. Specifically, intervention prices are reduced by 15 %for cereals (in two steps in the years 2000-2001), for beef by 20 %(in three steps over the period 2000-2002), for milk by 15 % (in three steps over the period 2005-2007). Second, the compulsory set-aside rate remains at 10 %, while compensating premiums are made more uniform. All cereals and oilseeds now receive the same premium (63 €/t) with a mark-up for pulses (9.5 €/t), and a supplement for durum wheat. These premiums are translated into acreage premiums on the basis of regionalised reference yields. Silage maize is treated as cereals. The Northern part of

[29] Sugar is an exception. The sugar beet price is derived from the intervention price of sugar after deducting the unit sugar levy, that producers (and farmers) must pay to balance the export refunds of sugar surpluses. Specifically, the so-called C-sugar and re-exports of ACP-sugar do not count as sugar surpluses.

Sweden and Finland receive additional hectare premiums for the drying of cereals and oilseeds.

In the dairy sector, milk quotas are raised by 2.39 % in total but there is differentiation across member states. For most member states quotas are increased by 1.5 % in three steps, starting 2005. Five member states (Greece, Spain, Ireland, Italy and UK, but for Northern Ireland only) receive specific quotas increases in two steps already starting in 2000/'01. The present milk quota regime is extended until 2008 (in CAPMAT until 2010).

The livestock sector also receives compensation for the fall in prices. Starting in 2005, dairy cows receive a premium that will increase in three equal steps, rising to 17.24 €/t for which all production up to the milk quotas is eligible. Premiums are gradually increased for cattle in pace with the phasing in of the price changes. The premiums for sucklers rise to maximally 200 €/head, for bulls 210 €/head, for steers 300 €/head. Adult animals and calves are eligible for slaughter premiums of 80 and 50 €/head, respectively.

Each member state also receives two sets of financial envelopes which at their own discretion can top up payments on male or female bovines and dairy cows, providing them some flexibility to compensate for regional differences in production practices and agro-ecological conditions. In total, these envelopes direct 493 and 910.7 mio euro to bovine and dairy sectors, respectively (in CAPMAT these envelopes are treated as direct payments to farmers and are thus part of farming income but do not affect cattle's net revenues per head). Furthermore, the deseasonalisation premium is abolished but the extensification premium is increased to 100 €/head, if livestock density falls below 1.4 livestock units per hectare (with adjusted amounts for higher densities, up to 2 LU/ha).

Stabilizing mechanisms

Premium outlays are capped by ceilings, in conformity with the old and new regulations. The stabilization mechanism for cereals, oilseeds and protein crops is maintained. If the planted acreage of COP crops exceeds the reference area, premiums are scaled down proportionately. The supplement for durum wheat is split into a high and low payment, both limited by reference areas. For the beef sector the existing herd size and density constraints continue to hold. For the special premiums (granted to steers and bulls) and for the suckler premiums, the numbers of eligible animals are taken from an update of (CEC, 1997c). We assume that the 1995-ratio of eligible animals divided by totals also determines eligibility in later years. The number of eligible animals cannot exceed the ceilings stated in the regulation on beef (CEC, 1999d). In fact, the ceiling for males proves to be binding in most countries, and especially for Ireland and UK. The same approach is followed for the extensification premiums, where historic rates are taken due to lack of data to replace them. The use of stabilizing mechanisms limits the total of premium outlays in nominal terms, and hence implies a reduction in real terms.

4.2 Scenario outcomes under Agenda 2000

We discuss the effects on production, consumption, trade, budget and farmers' incomes. Additional outcomes are presented in Annex A. All measures are introduced in the year 2000, and we compare the outcomes to those of the reference scenario in 2005 and 2010.

Community preference

The policy changes of Agenda 2000 can be interpreted as a further step in reducing the gap between internal prices of the EU and the world market. The present regulations already cause this gap to narrow down because of inflation but Agenda 2000 accelerates the process. If we accept the projection that world prices will remain relatively low in the next decade, then the gap between internal and external prices for wheat is only closed by 2010[30]. In that year, most other prices will be closer but still well above world market level (cf. table 4.5). Consequently, refunds eventually vanish for wheat while for coarse grains there still is a difference of 21 €/t. For beef, the gap is reduced by half relative to the very high levels of above 1000 €/t. The assumption of a 1 % rate of inflation is a major driving force behind this reduction, and also applies for the reduction in refunds for fat from milk and skimmed milk that fall by 50-80 %.

Table 4.5 Ratio of internal and external price

	1995	Reference 2010	Agenda 2000 2010
Wheat	1.38	1.19	1.01
Coarse grains	2.51	1.54	1.31
Fat from milk	4.43	2.79	2.37
Protein from milk	2.05	1.30	1.10
Beef	2.29	1.89	1.51

Production and activity levels in Agenda 2000

In the CAPMAT model, changes in activity levels follow from changes in relative net revenues per hectare or head. These are triggered by changes in prices and premium rates. It appears that the net revenues of cereals and oilseeds have fallen (see Annex A). For cereals, the increase of premiums only partly compensates the 15 % price fall. For oilseeds the premiums have dropped. The shift in relative profitability between cereals and oilseeds induce a reallocation within the COP area: cereals gain and oilseeds lose. Yet the stabilizing mechanism applied to the COP crop premiums ensures that COP area remains below the reference area. Net revenues per head of non-dairy cattle are reduced, as increases in headage premiums and slightly lower costs cannot make up for the fall in price. At EU level, this results in a 2.5 % reduction in non-dairy cattle numbers and a small negative impact on beef production (cf. table 4.6).

This is because a non-dairy cattle basically remains a grass-based activity for which alternative usage is scarce. Net revenues of dairy cattle fall in all member states, on average by 11 %.

[30] In earlier version of Agenda 2000, and under higher projections for wheat prices on the world market, and deeper price cut for intervention prices, the EU was able to export without subsidies, see Keyzer and Merbis (1998).

Table 4.6 EU-15 production in 2005 and 2010 (mio t)

	Reference		Agenda 2000	
	2005	2010	2005	2010
Wheat	104.8	110.9	108.0	116.4
Coarse grains	99.2	102.2	99.4	103.9
Fats and oils	8.5	8.6	8.4	8.1
Pulses	7.6	7.8	7.3	7.3
Sugar refined	17.1	16.9	17.0	16.9
Fat from milk	4.8	4.8	4.9	4.9
Skimmed milk	109.3	109.4	110.7	111.6
Beef and veal	7.8	7.8	7.7	7.7
Pork	17.3	17.4	17.3	17.7
Poultry meat	8.0	8.0	8.0	8.2

Milk production expands nonetheless, following the expansion of milk quotas, which continue to be binding. There is also a modest expansion of the intensive livestock sector (less than 1 %), which is driven by higher consumption at lower prices.

Consumption and feed use

Dairy and meat consumption increases due to lower prices (cf. table 4.7). This holds especially for beef where the price reduction is strongest and assumed to be transmitted in full to the consumer. As in the 1992 reform, the changes in relative prices between cereals and cereal substitutes cause a further rebalancing: feed usage of cereals increases by 3.8 mio t, at the expense of lower usage of the grains substitutes, i.e. protein feeds and carbohydrates.

Table 4.7 EU-15 consumption and feed/seed use in 2010 (mio t)

	Consumption		Feed/seed use	
	Reference	Agenda 2000	Reference	Agenda 2000
Wheat	45.6	45.7	32.4	33.5
Coarse grains	31.5	31.5	58.6	61.3
Fats and oils	14.5	14.5	1.2	1.2
Pulses	2.5	2.5	5.3	4.9
Sugar refined	12.7	12.7	0.1	0.1
Protein feeds	---	---	14.3	13.5
Carbohydrates	---	---	9.1	8.6
Fat from milk	4.5	4.5	0.2	0.2
Skimmed milk	81.7	82.1	16.6	16.6
Beef and veal	7.3	7.7	---	---
Pork	16.0	16.1	---	---
Poultry meat	7.6	7.6	---	---

Trade

Table 4.8 shows that the exportable surplus of cereals increases by 3.3 mio t, while that of wheat even rises by 4.3 mio t (but recall that stocks are kept fixed). Whereas the wheat price will eventually reach world market level, coarse grains prices remain well above world market level and the surplus exceeds the GATT commitments by 3.7 mio t. Yet the difference from the assumed world market prices proves to be small and suggests that

existing GATT commitments could be met if coarse grains prices are reduced slightly. This would stimulate domestic feed use and at the same time cause a production shift towards wheat.

The exportable surplus of dairy shows a moderate shift in terms of fat and protein components, as increase in consumption keeps pace with the expansion of the dairy quotas. The problem of exporting the surplus of skimmed milk powder seems to worsen. In general, meeting the GATT commitments for dairy products until 2005 becomes more difficult since the first enlargement of the milk quotas occurs well before the intervention prices are being lowered. The exportable surplus of beef returns to levels below the GATT commitments, since the substantial price reductions discourage beef production, while stimulating consumption. Changes in the system of intervention stocks, that will eventually be replaced by a system of private stocks supported by subsidies, are also likely to contribute to lowering production. Refunds decrease substantially, for coarse grains by 45 % and for dairy by 40 %, indicating that the reduction of the price gap makes it easier to meet the GATT constraints.

Table 4.8 EU-15 exports in 2005 and 2010 (mio t)

	Reference		Agenda 2000	
	2005	2010	2005	2010
Wheat	29.4	35.8	31.9	40.1
Coarse grains	14.0	17.5	12.3	16.5
Butter	0.1	0.2	0.1	0.2
Skimmed milk powder	0.4	0.5	0.5	0.5
Cheese	0.3	0.4	0.3	0.4
Other dairy	0.8	1.1	1.0	1.1
Beef and veal	0.7	0.8	0.1	0.3

Note: exports of fat from milk and skimmed milk are expressed in own product weights of butter, SMP, cheese and other dairy, using base-year conversion ratio's.

Revenue from farming

Total farming income, i.e. the net revenues including transfers, premiums and subsidies, falls by 3.8 %, compared to the reference scenario in 2010. Agenda 2000 affects income negatively due to the partial compensation for the price reductions. This is hardly mitigated by lower feed costs in the intensive livestock sector, as output prices fall as well due to competition and sluggish demand. The development over time is therefore also less favourable as in the base case (cf. table 4.9). Farming income per worker now increases by an annual 2.7 %, against a full 3 % before the reform (as shown in table 4.4).

Table 4.9 Farming income and employment, EU-15

	1995	2000	2005	2010	Growth rate
Total farming income (bio €)	138.8	138.2	140.3	144.6	0.3
Farm population (mio)	7.8	7.0	6.2	5.4	-2.4
Farming income ('000 €/cap.)	17.8	19.8	22.5	26.6	2.7

We conclude that under the current modelling assumptions the increase in premiums and the lower feeding costs are not enough to compensate for the fall in prices. The income loss due to the reform in 2010 is almost 4 % in terms of income from all agricultural activities.

Agricultural Budget

The total of premiums exceeds the reference level by 5.6 bio euros, but the refunds are 1.9 bio euros lower. As other items hardly change or are kept constant in real terms by assumption, the EAGGF budget rises when the implementation sets in, but soon after 2000 the eroding effect of inflation and the stabilizers prevent further growth. As can be seen from table 4.10, the rise in EAGGF respects the official guideline of 74 % of GNP growth.

Table 4.10 EAGGF budget, Agenda 2000 (mio €)

	1995	2000	2005	2010	Growth rate
EAGGF total	35077	39005	38762	37521	0.45
of which refunds on trade	7710	6219	4902	3667	-4.83
of which premiums	18792	21625	22861	22777	1.29

One reason for the modest increase is that exogenous budget items were assumed to remain constant in real terms. Another reason is the application of ceilings and reference areas, through which the Commission can affect the growth rate of the premiums. Also note that the costs of additional adjustments needed to remain within the GATT commitments (such as storage costs or increase in set-aside) were not included here.

5. Summary and conclusions

Model simulations are generally more insightful if the scenarios under investigation exhibit significant differences. Under Agenda 2000 the CAP is only marginally different from what would happen if the CAP remained unchanged. As compared to the 1992 reform that was implemented over the period 1993-1995, the Agenda 2000 decision is a further step towards liberalization. Internal prices move further towards world market level and refunds decline. Though the acreage and headage premiums constitute a burden to the budget, EAGGF growth remains below the guideline. Incomes per capita fall due to the reform measures, with an EU-average of 3.2 %, compared in 2010. The headage and acreage premiums are insufficient to maintain farmers' incomes at pre-reform level, under the assumption that the reduction in the intervention prices of cereals, beef, and milk translates fully into market and farm-gate prices. Consumers benefit from the reform. They acquire more food while their consumer expenditures fall by 9.98 bio euros, i.e. 27 €/cap. Furthermore, Agenda 2000 makes it easier to meet existing GATT commitments. The reform also seeks to facilitate the intended enlargement of CEECs. Yet, as is often the case, this CAP reform is also characterized by aspects it does not address explicitly. A balanced assessment calls for a few remarks on these aspects, more specifically on the contribution to trade liberalization and CEEC accession.

With respect to trade liberalization, a few remarks are in order. First, Agenda 2000 basically leaves the import regimes intact, and this implies for cereals that the system of variable import tariffs is being maintained (although at a lower level of protection), preventing price fluctuations on the world market from being transmitted fully to the EU market. Such a transmission would improve world market integration, and thus strengthen the signalling role of prices as scarcity indicators. It would also remove the artifact that the EU keeps prices of wheat and feed grains moving in parallel. Second, Agenda 2000 does not expand market access. Developing countries could benefit greatly from improved access for products such as sugar, fruits and vegetables. Thirdly, the implementation of market access commitments via tariff quotas is cumbersome,

discriminatory for exporters, and in need of improvement. At present the EU opts for a status quo whereby preferential access is being granted through special agreements. Finally, Agenda 2000 attempts to increase the transparency of domestic support measures for crops. It harmonizes, with a few exceptions, the premiums for arable crops. Set-aside remains an active instrument for production control. This significant harmonization of premium rates per hectare strengthens the argument of support being decoupled. Under the strictest interpretation, only decoupled premiums, such as R&D and extension services, qualify as WTO-compatible. Whether these harmonized hectare premiums are to be accepted as such remains a matter to be settled during the new trade round.

Regarding the impact on the CEECs, the price reductions decided in Agenda 2000 reduce the price gap between the EU and these countries, and this facilitates their accession. As already argued in the previous evaluation of Agenda 2000, it remains questionable whether the reduction is sufficient to avoid an important increase in consumer prices in CEECs upon accession. This holds now even more since price changes are now less deep and further postponed. If the current slump on world markets persists, these countries might by the time have lowered their internal prices so as to let their consumers benefit, and in this case the gap would be wider.

Yet all this cannot undo that Agenda 2000 is best characterized as a modest extrapolation of the 1992 reform. In the longer term the CAP will necessarily need a more radical reform, not only to mitigate the surpluses described in our scenario simulations, but also to adapt to new circumstances. Consumer concerns and vertical integration call for a policy that deals with product chains rather than with the pricing of agricultural raw materials. In this connection the multi-functionality approach may prove effective (CEC, 1998d). It replaces the publicly funded farm income support by a system that rewards the satisfaction of consumer concerns and rewards various services relating to tourism, and preservation of the landscape and the environment. The consumer can pay for this indirectly, through the price of labelled products that meet consumer concerns, or directly, through entrance fees in parks, or as tax payers, via a contribution to landscape preservation. At the same time, farmers will have to pay for environmental damages caused. In such a setting, the countryside becomes much more than a producer of raw materials, and offers a variety of alternatives to agricultural employment. In this way, production characteristics such as animal welfare and preservation of rural life and natural amenities can receive their remuneration. This goes beyond the "cross-compliance" requirements stated in Agenda 2000 according to which farmers also comply with environmental objectives in return for payments received, see CEC (1997b) and calls for explicit and independent assessments of the contributions made and the damages caused by a given farm operation. Most importantly, since multi-functionality payments can be viewed as a regular reward for services delivered, they should qualify relatively easily as Green Box measures, provided they are not used to harbour new measures of agricultural support. As the revenue from multi-functionality payments does not fall with increased imports, farmers become less dependent on price support and have more to gain from further trade liberalization.

To sum up, world food prices are currently low, and they are not expected to pick up very soon, although the economic recovery in East Asia and the opening up of Chinese markets might lead to significant increases in demand for feed grains. During the Uruguay Round it was common practice to blame the protectionist agricultural policies of OECD countries but this line of argumentation has now lost much of its force. There are good grounds for arguing that the low prices are due to the crises in Asia and Russia,

which caused a severe reduction in demand for feed grains, and to the lack of effective liberalization. The GATT 1994 agreement put a mechanism in place but did not generate much tariff reduction or increased import access. Be this as it may, most experts had predicted that the agreement would cause world prices to rise and they may now find it difficult to convince policy makers that these prices would have been even lower had no agreement been reached. Indeed, the main parties in Seattle have now even agreed to disagree on the agenda for the coming round, and it will presumably take a quite while before a consensus is reached. In such a context, it is understandable that through the CAP reform of Agenda 2000 the EU is seen to adopt a careful, albeit conservative position. This may be interpreted as an opening bid for the WTO round, that enables the EU to conduct the various parallel negotiations with ACP-countries, with CEECs, with China, and possibly even with regional blocks such as Mercosur and NAFTA. But in the longer term further CAP reform seems inescapable, and then multifunctionality may offer a promising alternative.

Conclusions

1. Simulation results show that continuation of present CAP regulations would yield favourable outcomes for the EU budget and farm incomes, while raising serious problems with respect to satisfaction of existing GATT commitments, especially for cereals. Moreover, a pricing regime that keeps intervention prices substantially above world market prices makes accession of Central and Eastern European countries (CEECs) more difficult, as the budgetary cost becomes higher and food prices in the new member states will increase substantially. Against this background, the Commission's decisions in Agenda 2000 can be viewed as supplements to the policy introduced in 1992.

2. The effects of Agenda 2000 can be summarized as follows. The total premium amount will rise by 5.6 bio € in 2010 in real terms, as compared to the reference scenario. Export refunds decrease by 1.9 bio €, keeping the EAGGF budget below the official spending guideline. Average farming income in the year 2010 is lowered by 3.2 %per worker as compared to the reference scenario. Consumers gain as their tax burden increases by 4.6 bio €, while they save 10 bio € on food expenditures. The gain from the reform could be higher, if it results in improved efficiency within the non-agricultural sector.

3. Regarding the GATT commitments, it appears that if world cereal prices recover as slowly as assumed in this analysis, wheat exports without refunds are hard to realize during the implementation period of Agenda 2000. For coarse grains, export subsidies are still required, and for dairy products and beef the price reductions generate savings on export subsidies. Overall, the product-related subsidies (premiums per hectare and per animal) increase to compensate for the fall in intervention prices, while for crops the premium levels tend towards harmonization. Whether this harmonization will be sufficient to ensure GATT-compatibility will have to be settled in the Millennium round.

4. The Agenda 2000 decisions make the accession of Central and Eastern European countries easier, because they lower the existing price differences. It may be questioned whether the reforms go far enough in this respect, because the price differences for dairy products, sugar and, to a lesser extent, beef remain significant. It would seem likely that the new member states will need a significant transitional period before they can fully harmonize their prices. Furthermore, the system of premiums per hectare and per animal implies an inherent budgetary risk, because the newly admitted countries could eventually

claim these subsidies as well, on top of the aid they are already receiving from the structure and cohesion funds.

6. Maintenance of the set-aside obligation to ten per cent maintains an inefficient utilization of agricultural land but the relaxation of milk quotas is an improvement in this respect.

7. The Agenda 2000 decisions are conservative with respect to liberalization of import access. The Commission still sees price stabilization on the internal market as an important policy objective, and proposes to maintain the present system of protection through variable import tariffs and tariff quotas. For cereals, this implies that the internal price of animal feed will not rise when there is a shortage outside the EU, and this intensifies the price fluctuations on the world market and shifts the full burden of short-term adjustment to traders and consumers outside the EU. For sugar, vegetables and fruits, which are currently subject to tariff quotas or seasonally imposed protective measures, the strict regulations will remain in effect, and Agenda 2000 does not contain any new initiatives in this area. Consequently, developing countries will have to continue coping with a maze of restrictions when they seek to export to the EU in the future, although those who finally gain preferential access will receive a significantly higher price than would have been the case under free access. In short, for those wishing to export to the EU, little will change.

8. In the longer term further CAP reform seems inescapable, and the multi-functionality approach may offer a promising alternative.

Annex A Additional scenario outcomes for the year 2010

Reference scenario vs. Agenda 2000 scenario

Table 4.11a Net revenues and activity levels in 2010

	Net revenue per unit (€/ha or €/head)		Activity level ('000 ha or '000 head)	
	Reference	Agenda 2000	Reference	Agenda 2000
Soft wheat	716	624	14093	14770
Durum wheat	636	629	3159	3226
Rye and maslin	337	278	1353	1394
Barley	429	403	10733	10873
Oats	282	261	1937	1974
Maize	885	766	3928	3883
Pulses	1257	1341	1789	1698
Sugar beets	1712	1711	1860	1858
Rape seeds	366	310	2861	2436
Sunflower seeds	394	286	2565	2371
Dairy cattle	363	323	58340	58845
Non-dairy cattle	796	705	11743	11449

Table 4.11b EAGGF/EU budget in 2010 (mio €)

	Reference	Agenda 2000
Refunds	5553	3667
Stockholding cost	392	392
Producer subsidies	3983	3687
Subsidies on demand	1402	1461
Premiums	17180	22777
Voluntary set-aside	587	587
Direct transfers	5	1105
Other EAGGF	3846	3846
EAGGF total	32948	37521
Administration costs	4129	4129
Development aid	3967	3967
Other expenditure	11767	11767
Other funds	20428	20428
Total outlays	73239	77812
Levies on trade	685	491
Levies on production	1237	1235
Custom duties	13608	13608
National contribution	53611	58380
Other receipts	4098	4098
Total receipts	73239	77812

Annex B The CAPMAT simulation tool

CAP-Modelling and Accounting Tool (CAPMAT) consists of three components:

- a dedicated database,
- an applied general equilibrium (AGE) model to simulate overall medium term effects,
- a simulation and accounting tool that uses outcomes from (1) and (2) to perform scenario calculations.

B.1 *Databases*

The main components of the database are (i) the FAO-Supply Utilization Accounts (SUA), (ii) the SPEL data base, (iii) the EXMIS trade database, for extra-EU trade, (iv) the Economic Accounts of Agriculture from EUROSTAT, (v) the reports by the Court of Auditors (1977) and (vi) the EU-budget documents. All databases are completed and scrutinized up to and including 1995; EAGGF data for 1996 have been used to reflect the most recent policy stance. One distinguishing feature is the computerized aggregation procedure for Supply Utilization Accounts. This makes it possible to express supply, demand and international trade of a processed commodity such as macaroni in terms of the original commodity wheat and derive a consolidated wheat account for use in CAPMAT. This is important, since agricultural trade policy is usually concerned with overall imports and exports of processed products that contain agricultural raw materials, rather than with the trade in the raw material itself. Demand categories are more aggregated than in the original Supply Utilization Accounts: human consumption, other utilization and imbalances (when they exist) are taken together as consumption. Another special feature is that the databases are inter-linked; repercussions of policy changes on, say, budgetary items like refunds and premiums and production and trade can be shown in a consistent way.

B.2 *ECAM-model*

The basic analytic engine for the analysis is ECAM, see Folmer et al. 1995, a model of the applied general equilibrium (AGE) type that generates the basic developments with respect to supply, demand and cross-commodity substitution. ECAM distinguishes country modules and an aggregate EU module. Consumers maximize utility subject to a budget constraint, farmers maximize net revenues. They allocate crops to available land and livestock types to available buildings and equipment. The crop allocation module includes three forage activities that produce non-marketable green fodder. Budgetary rules reflect closely actual CAP regulations including the balance of the Community budget through adjustment of member contributions. Detailed country modules are currently available for the original EU-9. A link to the database was created, that makes it possible to process the model results for simulation and accounting.

B.3 *Simulation and Accounting Tool* (SAT)

The Simulation and Accounting Tool (SAT) is a GAMS program that performs a dynamic simulation to derive the implications of various price and compensation scenarios under

assumed or calculated trends at detailed commodity level, applying selected growth factors from the ECAM model to the information extracted from the database.

In terms of its relation to the ECAM model, SAT makes two important simplifying assumptions:

- for endogenous variables (acreage, headage, human consumption and feed composition) in countries not covered by the ECAM-model the factors of a 'sister'-country are applied;
- for commodities where the treatment in SAT is less aggregated in than in ECAM a common growth factor is applied to all members of a subset.

Hence, SAT is a perfectly independent package that could read its information from any other model than ECAM, or base its scenarios on explicit assumptions only. This enhances its flexibility of use and its scope for future applications.

B.4 Units of measurement

Activity levels are in 1000 ha ('000 ha) for crops and in 1000 heads ('000 head) for livestock, except poultry and laying hens which are in million heads (mio head). Acreages of the crops that fall under the set-aside scheme are presented with the set-aside included. Net revenues, subsidies and premiums per unit of activity are in €/ha and €/head. Monetary Values are generally in '000 euro, but in mio euro when it concerns Revenue from farming and the budget. Prices are in €/ha or €/head (for poultry and laying hens in €/'000 head). Quantities of the commodities on the supply utilization account are listed below ('000 t denotes 1 000 metric tons). Note that quantities of milk and dairy products are expressed in their fat and protein contents, and that all dairy products are aggregated along their processing relationships to consolidated balances of fat from milk and protein from milk. The protein from milk is expressed in milk equivalents, and named skimmed milk. In the aggregation procedures FAO conversions factors have been used throughout.

Commodity	**Unit**	**Explanation**
Wheat	'000 t	wheat and wheat products (like flour)
Coarse grains	'000 t	barley, oats, rye, maize, other cereals
Rice, milled	'000 t	
Pulses	'000 t	
Sugar refined	'000 t	white equivalent
Fats and oils	'000 t	all fats and oils of vegetable and animal origin
Protein feed	'000 t of protein content	mainly cakes from oilseeds
Carbohydrates	'000 t of carbohydrate content	
Fresh fodder	'000 t	
Dry fodder	'000 t	
Fat from milk	'000 t of fat	
Skimmed milk	'000 t of protein expressed in milk equivalent	
Beef and veal	'000 t	
Pork	'000 t	
Meat from sheep and goats	'000 t	
Eggs	'000 t	
Poultry meat	'000 t	incl. ducks, turkeys, geese

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GLOBAL IMPACT ANALYSES

IMPACT ANALYSES OF THE AGENDA 2000 DECISIONS FOR CAP REFORM

Implications for consumers of agricultural products

By the Directorate-General for Agriculture

of the European Commission

February 2000

1. Introduction

This chapter assesses the potential impact on EU consumers of the reduction in the support price of some agricultural products (cereals, beef and dairy products) decided in the framework of the Agenda 2000 CAP reform. The analysis provides for an evaluation of the reduction in the consumer cost generated by the reformed policies in 2005/06 and in 2006/07 under a static comparative approach[31]. It is based on **partial equilibrium** models of agricultural markets representing, through price and income elasticity parameters, the behaviour of economic agents and their adjustment to changing prices.

2. Main findings

Benefits for consumers in the **whole economy** from the full implementation of the drop in support prices of cereals, beef and dairy products are estimated to reach around **8.8 bio €** in 2005/06 and **10.5 bio €** in 2006/07.

These benefits would first concern both the **agricultural sector** (2.2 bio € in the short-run, but only **0.1 bio €** over the medium-term), which would gain from lower feed and seed costs, and the **non-agricultural economic sectors** of the economy that will benefit from lower costs of intermediate consumption. A large proportion of these benefits will then be passed on to the final consumers. On the assumption that about 20 % of these price declines remain on average at the industry and marketing levels, **final consumers** could expect to record a reduction in their (mainly food) consumption cost of about **6.9 bio €** in **2005/06** and **8.2 bio €** in **2006/07 (i.e. around 1.3 % and 1.6 % respectively of their total food expenditure)**.

Total benefits for final consumers would mainly depend on future developments in the market prices of agricultural commodities and in the price transmission between the producer and the consumer stage. Alternative scenarios of market price developments show that they could be expected to range from **5.1** to **8.4 bio €** in **2005/06** and between **6.1** and **9.7 bio €** in **2006/07**.

3. Methodology and working assumptions

The economic gains for consumers are estimated as the increase in consumer surplus resulting from the lowering of the agricultural support prices. They are calculated for each agricultural product and distributed among the various economic sectors, on the basis of assumptions on the price transmission between the economic sectors of the economy and the final consumers. This approach enables us to assess the **benefits for all consumers in the whole economy** in terms of reduced consumer costs on agricultural commodities and their processed products.

Whereas the reduction in support prices for cereals is projected to result in a smaller drop in market prices thanks to a sustained expansion in demand both externally and internally (i.e. a 13 to 14 % price fall), the cut in price support in the beef and dairy sectors is

[31] It does not provide for neither the dynamic process of the adjustment to these new policies, nor the spillover impact of reduced input prices for the non-agricultural sectors of the economy and of lower consumer prices in terms of improved allocation of resources, gains in economic growth and employment.

assumed to translate into a similar fall in market prices (i.e. –20 % and –5 % respectively).

4. Results

The reduction in support prices decided in the framework of Agenda 2000 would lead to substantial consumer gains for the **economy as a whole**. These are estimated to amount to **8.8 bio €** in 2005/06 and **10.5 bio €** in 2006/07 (cf. table 5.1).

Table 5.1 Expected benefits from the reduction in support prices (mio €)

	Agricultural sector		Other sectors (incl. food & retail.)		Final consumers		Total	
	2005/06	2006/07	2005/06	2006/07	2005/06	2006/07	2005/06	2006/07
Cereals	102	103	338	346	788	808	1228	1257
Total meat	0	0	1146	1160	4583	4640	5729	5800
Milk and eggs	0	0	374	692	1495	2768	1869	3460
Total	102	103	1857	2198	6866	8216	8826	10518

In the short-run, consumer benefits to the **agricultural sector** would reach around 2.2 bio € (or more than 20 % of total benefits). They will all come from the fall in cereal prices in the form of lower feed costs in the production of animals and animal products, and from lower seed costs for crop production, in the assumption that cereal price reductions are fully transmitted by the input industry to agricultural producers[32]. Yet, over a medium-term perspective, a large proportion of these savings may be expected to be passed on to the rest of the economy in the form of lower meat prices[33]. In this analysis, only the benefits from lower seed costs are supposed to remain in the agricultural sector (in the order of 0.1 bio €).

Other benefits (than reduced seed costs) for EU consumers would be distributed among the **non-agricultural economic sectors and the final consumers**. Assuming a less than perfect transmission of the decline in market prices through to consumer prices[34], these benefits would reach:

- Around **1.9 bio €** in 2005/06 and **2.2 bio €** in 2006/07 (or **21 % of total benefits**) for the food **processing and retailing sectors** (but also for other non-agricultural industrial sectors having agricultural commodities as primary inputs). More than half of these consumer gains would come in the form of lower meat prices and benefit the meat and packing industry, whereas lower milk and egg prices would account for 20 % in 2005/06 and 30 % in 2006/07 as the reform of the dairy sector is being implemented. Lower beef prices would give rise to the highest gains with around 0.8 bio €. The overall impact of lower cereal prices on the prices of other meat and eggs is estimated at more than 0.4 bio € in terms of savings for the industrial and marketing sectors;

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[32] This analysis does not take into account the potential spillover impact of lower price of agricultural products on other input costs such as fertilisers and pesticides.

[33] No account has been taken of the potential impact of lower cereals prices on the price of other feedingstuffs.

[34] It has been assumed that part of the total consumer gains (around 20 %) will be absorbed by the industrial and marketing sectors.

- **Final consumers** would benefit from an increase in their net welfare of around **6.9 bio €** in 2005/06 and **8.2 bio €** in 2006/07. As for the non-agricultural sectors, more than half would come from lower meat and meat products consumption cost (4.6 bio €). Benefits from lower prices for dairy products and eggs would increase from 1.5 bio € in 2005/06 to 2.8 bio € in 2006/07 as the dairy sector reform takes place. The consumer gains from bread and cereal products will only amount to around 0.8 bio € (or about 10 % of the total final consumer benefits).

These benefits for final consumers would represent around **1.3 %** in 2005/06 and **1.6 %** in 2006/07 **of their total food bill**, with around 1.0 % reduction in their expenditure on bread and other cereal products and more than 3 % reduction in their total expenditure for meat and animal products (milk, dairy products and eggs). Since other factors may affect food consumer prices, these estimates should be interpreted as suggesting that the implementation of Agenda 2000 may result in the EU final consumer food expenditure being somewhat 1.3 % to 1.6 % lower than otherwise would have been the case.

The results presented above depend strongly on two assumptions: namely the future **development in market prices** in the EU and the price transmission between the producer stage and the consumer stage. Therefore, two alternative scenarios of price developments are examined. The results from these two additional scenarios read as follows:

Table 5.2 Consumer benefits in 2005/06 and 2006/07 (bio €) under alternative market price developments

		High price decline	Projected price decline	Low price decline
2005/06	Total benefits	10.7	8.8	6.7
	(of which final consumers)	8.4	6.9	5.1
2006/07	Total benefits	12.4	10.5	8.1
	(of which final consumers)	9.7	8.2	6.1

These results[35] show that a drop in the market prices of beef and milk stronger than the projected price decline for beef and dairy products would lead to a further increase in total consumer gains of around 1.9 bio €. Conversely, a decline in market prices lower than the projected price fall in the three reformed sectors would reduce total consumer benefits. Yet, they would still reach around 8 bio € in 2006/07, i.e. a 2.4 bio € reduction as compared to the reference price scenario. Therefore, depending on the future development in market prices, consumer gains for the whole economy should be expected to range between around 8 and 12 bio € in 2006/07 when the cut in support prices is fully implemented in the cereal and beef sector and two-third of the dairy sector

[35] In the "high price decline" scenario, market prices for cereals, beef and milk are assumed to fall in 2005/06 (2006/07) by –15 %, -25 % and –7 % (-12 %) respectively. In the "low price decline" simulation, the corresponding changes are as follows: –10 %, -15 % and –4 % (-8 %) respectively.

reform has taken place (with final consumers absorbing between 6 and 10 bio € of these benefits).

OVERALL EVALUATION OF THE AGENDA 2000 CAP REFORM

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1. Introduction

The political and public discussion on the Agenda 2000 CAP-reform focused mainly on partial political objectives, especially:

- to assure a certain continuity of agricultural income development,
- to limit the growth of budget expenditures.

The aim of this chapter[36] is to evaluate the proposals and final decisions of the Agenda 2000 CAP-reform with respect to their compatibility with basic principles of a market economy and sustainability of agricultural and rural development.

2. Integration of European agriculture into the world economy

For many decades the CAP was characterised by an inward looking policy strategy. Main policy objectives were an adequate supply of domestic markets and income support for domestic farmers, put into practice by a high degree of external protection. Most other highly developed countries pursued similar strategies, especially the other West European countries, Japan and, for some products, the US. Only a few developed countries with a high agricultural production potential relative to domestic demand (as New Zealand, Australia, partially the US and Canada) pursued world market oriented trade policies in order to exploit their export opportunities.

This situation resulted in highly distorted and depressed world market prices, harming economic development in export oriented countries, including some developing countries. In addition, export subsidies became an increasing financial burden for many protectionist countries, which had to get rid of their production surpluses. In the end, the escalating budget expenditures for market interventions were the major driving force for the beginning of the CAP reform in 1992. On this background, the 1992 reform can be considered a first contribution of the European Union towards reducing trade distortions and improving the functioning of world markets. At the same time it opened up a perspective for a more fundamental reform approach regarding domestic problems.

The Agenda 2000 CAP reform is an attempt to proceed further in this direction. To what extent the Agenda 2000 decisions can be considered as a step towards the principles of a market economy and an improvement of allocative and distributive efficiency will be evaluated in this section.

2.1 Grandes cultures

In spite of the EU-Commission proposals being watered down on the Berlin summit, the largest progress has been made in the area of "grandes cultures". Further reduction of intervention **prices** for grains increases the chance to export without subsidies. Therefore, the EU can relinquish obligatory set-aside requirements without coming into conflict with the limits of WTO-obligations for export subsidies. Decreased intervention prices will only have the function of a "security net" for agricultural producers in the case of very depressed world market prices. Since more favourable developments of world market

[36] The argument presented here heavily draws on a former paper in which the Agenda 2000 CAP-reform *proposals* have been evaluated (Henrichsmeyer and Witzke 1998).

prices for grain producers (lower rates of decrease in real terms) can be anticipated in the longer term (Heckelei et al. 1998), this might happen only occasionally. Therefore, the EU will have the chance to export some grain without subsidies most of the time and will be able to participate in the rapidly growing demand on the world market. Furthermore, the reduction of grain and other feed prices close to world market prices will be an important step to increase the competitiveness of the European *pork and poultry* production. These branches are already quite competitive now, and should be able to compete without export subsidies under liberalised trading conditions.

If EU prices and world market prices were closer connected, this would have a stabilising effect on price fluctuations on the world market. The contribution to world market stabilisation could be even stronger if both intervention prices as well as the occasional use of export tariffs were abolished. While intervention prices (at a lower level) might be considered difficult to do away in the present political setting, the abolition of export tariffs in situations of high world market prices would be supported both by the farmer lobby as well as by adherents of market principles. At the latest when world market trends have been confirmed and farmers have learned to deal with market risks (e.g. by participation in future markets) abolition should be a realistic option for intervention prices as well.

The fact that the *sugar market* is again excluded from any reform in the Agenda 2000 is only understandable as another victory of the sugar lobby. Otherwise it would be only natural to include the sugar market into the reform according to the concept for "grandes cultures". Neither allocative nor distributional arguments could be put forward against this step.

The unification of **compensation payments** for grain and oilseeds constitutes a big step forward towards "decoupling", certainly motivated by the desire to overcome the Blair House agreement. Without comparable external pressure, other (less important) distortions appear to persist longer, e.g. higher payments for pulses and durum wheat. In view of further decoupling, all agricultural land should benefit from the same payment per hectare. To realise *perfect* decoupling, crop related payments should be paid as fixed amount per hectare of a historical base year (Wissenschaftlicher Beirat 1997). This seemingly slight modification of payments would have decisive advantages: It would improve efficiency and international competitiveness of European agriculture. At the same time, this kind of payments would have to be accepted as a "green box" measure in the next round of WTO negotiations. Of course, this will accelerate the process of structural change and regional re-allocation in European agriculture. But this should not be considered only as a burden, but also as a chance to improve the competitiveness of European agriculture. In the longer term, far reaching structural adjustments will be unavoidable in any case. Environmental considerations might necessitate some steering of this process to avoid excessive concentration of animal production and abandonment of valuable landscapes, but this should be an issue of environmental policy (cf. section 4).

2.2 Milk and beef production

Regardless of the timing of their introduction (2000 or 2005), the reduction of price support for milk products will have little *immediate* allocative consequences because the compensatory payments are related to current production (quota rights) and therefore have a similar effect as production subsidies. However, the introduction of compensatory payments may be considered a cautious institutional innovation designed to pave the way

towards a new system, to be discussed in the "mid term" review of the milk market, scheduled for 2003. It signals to agricultural producers and processing industries that the strategy of "quantities down" and "prices up" is coming to an end, and that milk production, too, cannot be excluded from the process of trade liberalisation in the longer run.

A decisive reform step in the area of milk production would be to decouple the compensation payments from *current* milk production, as it has been realised, to a certain extent, in the area of "grandes cultures". This could be operationalized by taking the volume of milk production *of a base year* as a reference for the calculation of payments. Such a step would reduce quota prices, give further incentives for structural adjustments in the milk sector and would prepare the ground for the next steps, flexibilisation and finally abolishment of the quota system, likely to occur some time after 2008. Switching towards a decoupled support system could significantly reduce administrative costs in the milk market, which have to be borne in part by milk producers.

The Agenda 2000 measures for the **beef sector** go into the same direction as those for the milk sector: reduction of market price support and an increase of compensatory payments. Because the Berlin decision alleviated the former (-20 % instead of -30 %) without significantly adjusting the latter, support is finally maintained at a high level. On the other hand the introduction of the slaughter premium (80 € for all types of adult cattle and 50 € for calves), and the optional abolishment of upper limits per farm for the special male premium reduce some intrasectoral distortions and avoidable administrative burden. Because compensatory payments for beef still have the character of production related subsidies, types and structure of beef production are largely influenced by the specification of subsidies for the different beef categories.

Again, the principle to guide further reform would be decoupling of payments from current production and relating them to the production of a base year. This would trigger a process of selection of most competitive beef production systems in different parts of Europe. It would also be a precondition for a significant cut into the proliferating system of complicated regulations and excessive administrative costs. A number of decoupling schemes has been proposed, each with distinctive implications for distribution and efficiency gains (see Wissenschaftlicher Beirat 1997). To give an example coming close to full decoupling, the concept of a general premium for agricultural land irrespective of its actual use may be mentioned, where all animal related payments are integrated. Viewed from this perspective, there are ample opportunities of improvements beyond the Agenda 2000 measures.

2.3 To the future of compensation payments

Given that compensation payments became a central tool of agricultural income policy, the question arises how long they will (or should) stay. Both in the 1992 reform and in the Agenda 2000 proposals and final decisions compensation payments were fixed with reference to (high) EU prices determined by past policies. But even in market economies with a large degree of state intervention it is untenable to argue that politically determined prices of a past period may provide a justification and a reference point forever to fix compensatory payments. On the other hand the argument has some persuasiveness that *too abrupt* changes of politically determined prices for private agents would undermine trust in economic policy if resulting economic losses were not compensated at all. This point may justify compensatory payments for a limited period of

time. To the extent that pre-reform investments are written off and agricultural labour had time to move into other jobs or (early) retirement, the compensation argument fades away. On the basis of these considerations compensation payments should be offered only in decreasing amounts and for a limited period of time. The fact that the Agenda 2000 does not pronounce any such kind of temporal limitation is thus an evident deficiency.

The question of compensation payments becomes still more delicate in view of the expected access of Central European Countries. These countries had lower agricultural prices all the time. Sometimes it is argued, therefore, that farmers in these countries do not need any compensation. But this is a questionable argument, as it would distort fair competition in the Common Market, especially as long as those payments are not completely decoupled. On the other hand it is unthinkable to apply the present system of compensatory payments in unmodified form to the farm households of a larger number of Central European Countries. This would be an excessive burden for the EAGGF and would not be compatible with the low-income situation of other parts of the (rural) population in those countries. Budgetary considerations moved the decrease of compensation payments indeed in the centre of the Agenda 2000 discussion at one point in time but, as is well known, the heads of state preferred a more piecemeal solution.

To summarise the above: The future of *compensatory* payments should be transitory. *Permanent* payments have to be justified as a remuneration of environmental services (cf. section 3.3). A still different question is the appropriateness of socially motivated direct transfers to agricultural households. This has to be decided politically. Equity considerations would suggest that payments of this kind should be equivalent to those for other low-income groups in society.

In the political arena, the EU-member states have very different positions concerning the need for direct income transfers for agriculture, as the discussions in the Council of agricultural Ministers and the Berlin summit have shown. Some do not want them at all, others strive for "durability" and "reliability". Therefore, the Agenda 2000 proposal - to permit national variations of a certain part of EU payments - could have been a chance to facilitate finding a compromise in the Council of Ministers. Such differentiation of payments according to national preferences would correspond to the principle of subsidiary, under the condition that these payments were perfectly decoupled and hence did not distort competition in the Common Market. Yet in the process of final decision making at the Berlin summit, this opportunity was not seized, because certain member states, most importantly France, had a vested interest to prevent even the slightest deviation from the traditional principle of "financial solidarity".

A step further beyond a limited part of compensatory payments being distributed in national envelopes would be to *delegate the competence* for socially motivated transfer policy completely to the national level, both with respect to financing as well as to distribution. This allocation of competence would correspond to well established principles of fiscal policy as well as to usual practice in the area of redistributive policies (income tax, social payments). Apart from this question of *interpersonal* distribution *within* a country, the question of international transfers has to be judged under the viewpoint of *cohesion policy* within the whole EU for which the competences should be allocated to the EU level.

3. Improvement of the competitiveness of European agriculture

To improve the competitiveness of commercial farms has been considered a crucial task in many parts of Europe already for a long time. Step by step liberalisation of agricultural commodity markets, as initiated in the CAP reform 1992, to be continued according to the Agenda 2000 decisions and likely to proceed later, will intensify economic pressure to improve competitiveness. Only those farms, which reach a minimum degree of international competitiveness, will survive as commercial full time farms in liberalised markets in the long-term. Similarly, it may be expected that only those rural areas with a sufficient number of commercial full-time farms as "backbone" will be able to keep an efficient agribusiness complex.

But as in the past, agriculture will have different faces in Europe. It can be expected that different types of part-time farming and multiple job holding increase in importance in the future. Further, the spectrum of activities of agricultural enterprises will be extended to various types of services for keeping the landscape and protecting the environment (cf. section 4). But keeping all this in mind, a key task of the CAP should be to contribute to *international competitiveness* of the core of commercial farms on suitable locations in Europe. This is also a precondition to attain frequently stated income goals in a liberalised world.

The most important contribution of the Agenda 2000 decisions is in this respect, that European farmers are more exposed to world market prices, the yardstick of international competitiveness, at least in the areas of grains, grain substitutes and oilseeds. Other Agenda 2000 measures contribute or would have contributed as well to more efficient factor use and production:

- Setting obligatory set-aside at 0 %, as envisaged in the proposals would have increased the scale of European farms and reduced their average costs. It would have freed administrative resources for more productive uses. In addition, it would have reduced the distortion of intrasectoral competition due to the present exemption of small producers from set-aside obligations.

- Partial unification of compensation payments for "grandes cultures" reduces some allocative distortions between products and enables more flexible adjustments to changing market conditions.

- Adjustments of grain prices towards world market prices reduce feeding costs for animals, especially in pork and poultry production, so that European farmers can produce on more equal terms with their competitors in other parts of the world.

Yet many deficiencies still exist and should be overcome in further steps of CAP reform. Of utmost importance are:

- Further steps in direction of decoupling, which have already been asked for in section 2.

- The cancellation of remaining upper limits for compensation payments per farm (e.g. for the suckler cow premium) and other support measures. From an efficiency point of view it is a fortunate result of the political process that the proposed upper limits

for total compensation payments per farm were not included in the Agenda 2000 decision.

- A simplification of bureaucratic procedures and a reduction of associated costs in farm enterprises and the administration, although progress will be limited without additional steps of decoupling.

In addition, each member state would be well advised to exploit the possibilities to promote rather than inhibit competitiveness within the Agenda 2000 framework. This refers to flexible transferability within the milk quota system, to unmodulated and partially decoupled national components of direct payments, and to cancellation of national upper limits on voluntary set aside in order to initiate and prepare for structural and regional adjustments in agriculture which are unavoidable in the longer-term.

A **longer-term** objective of the CAP-reform should be to abolish the quota regulations for milk and sugar at all. In the case of *sugar*, this could be realised without major technical difficulties and social hardship by incorporating sugar into the grain oilseeds regime. Here the main difficulty is to overcome the resistance of the sugar lobby. A similar rigorous solution for the *milk sector* would have a much larger financial dimension (if the immediate income losses are to be compensated, as in the case of "grandes cultures") and could have far reaching consequences for the environment and landscape in Europe, especially in marginal and peripheral areas. Therefore, the step by step strategy of the Agenda 2000 CAP-reform seems to be adequate. However, the Agenda 2000 decision to reduce the milk price and to introduce more or less equivalent compensatory payments based on *current* production can only be considered a (symbolic) first step. Decoupling of payments will be the decisive next step, which would reduce the value of quotas and might go hand in hand with further flexibilisation of the quota system, preparing the ground for the full abolishment of the quota system. This may be a long way to go, but otherwise the European milk sector will never become competitive on international markets (without subsidies).

All suggestions for further reform steps have a common bottom line: more market orientation, less state regulation and intervention. This would offer additional chances to agricultural entrepreneurs, but increase at the same time risks and uncertainties of market developments. However, market risks have to be balanced against the risk of abrupt policy changes, which might become unavoidable under the influence of internal pressures (budget cuts, unrest of young farmers) or external pressures (e.g. WTO negotiations). The history of the CAP has shown that this has happened several times in the past (Henrichsmeyer, Witzke 1996, p. 355.). At present, the Agenda 2000 decisions are frequently felt to increase risks and uncertainties. Therefore, it has to be an important political task to point out long-term perspectives, to inform about chances for international competitiveness, and to provide support for necessary adjustments.

4. Protecting the environment and landscape

Price reductions and steps towards liberalisation, starting in the CAP reform 1992 and continued in the Agenda 2000 decisions, have partly positive and partly problematic impacts on the environment and landscape:

- On the positive side it can be expected that price reductions will reduce variable input use and concomitant pollution of the soil-water-system and of the atmosphere.

Various model calculations confirm this effect of the Agenda 2000 measures (for example, Henrichsmeyer et al. 1998)

- Problematic impacts on the environment and landscape could result from a retreat of agriculture on a larger scale from marginal areas, which might lead to a loss of valuable landscape characteristics and biodiversity in some cases. So far, agricultural land has hardly been abandoned because of less favoured area schemes, upper limits for set-aside (which are abolished as obligatory EU legislation in the Agenda 2000 but may be maintained by member states) and limited tradability of quota rights. But this could change under the conditions of fully liberalised markets and decoupled payments in the next CAP reform steps after the Agenda 2000.

Results of an agricultural sector model for Germany with regional differentiation down to NUTS 3 level (RAUMIS-Model, Löhe and Sander, 1997, Henrichsmeyer et. al 1998) show that under liberalisation scenarios (without supporting measures for the environment) and German production conditions, intensive forms of agricultural land use tend to concentrate in most productive regions, while decreasing intensity of land-use and an increase of fallow land would occur in disadvantaged regions.

Bearing this potential loss of valuable habitats and landscape features due to liberalisation and decoupling in mind, the question arises how agricultural policy should react. From an economic point of view, neither special subsidies for agriculture in disadvantaged regions to restore competitiveness, nor upper limits for set aside are adequate tools to realise envisaged ecological and landscape goals. Instead of conserving the *existing* structure and intensity of production, which may serve these goals in many, but certainly not in all cases, efficiency considerations would suggest to remunerate contributions to ecological goals and the beauty of the countryside as directly as possible.

In the 1992 CAP-reform, first steps in this direction have been undertaken in the context of the accompanying measures (EU regulation 2078/92). Further extension and differentiation of agri-environmental policy will be realised the Agenda 2000 CAP reform (additional funding for accompanying measures, LFA payments possible for regions with stricter environmental legislation, more restrictive conditions for the extensification premium). The basic orientation of these measures corresponds to the requirements mentioned above.

A more precise specification and monitoring of the ecological and cultural benefits would further increase the efficiency of this type of measures, certainly beyond the precision achieved in recent EU regulation (Agra Europe 1996). However, this task has to be delegated to member states and regions due to the nature of the problem and the principles of subsidiarity. Apart from efficiency considerations, WTO standards also suggest a more precise definition of requirements beyond "good agricultural practice" to qualify for payments if they are coupled to current factor use. The development of a more specific, goal oriented concept for this type of measures and programs will be a challenging task for scientists, political economists and the administration.

General economic considerations thus lead to the conclusion, that a completely decoupled transfer policy supplemented by specific goal oriented environmental measures (the above presented concept) would be the most efficient approach ("Tinbergen-Rule"). This does not imply that environmental conditions associated with compensatory payments ("cross compliance") have no place in the ongoing process of CAP reform. Examples are

the maximum stocking density condition for the calculation of beef payments in CAP reform 1992, and environmental minimum standards to be specified at member state level for eligibility for compensatory payments and for LFA schemes in the Agenda 2000 CAP reform.

The "cross compliance" approach makes some sense in a "second best" environment such as the present political setting. As long as compensatory payments and other forms of agricultural support are not completely decoupled they will have environmental effects and it is reasonable to take care that these effects are not negative.

Cross compliance conditions may be considered also a *first step* to relate the payments to their only rationale in the long run, the remuneration for the delivery of public goods. Viewed from this perspective, it is not the cross compliance component of support which deviates from a first best solution, but rather the fact that a big portion of payments is still unrelated to environmental goals.

Political advisors must not neglect the problems of empirical implementation and political reality. If "cross-compliance" offers chance to make progress, there is little reason to hesitate. However, the guideline for the first best strategy should not be lost out of sight: Environmentally motivated payments are to be fixed according to the value of the environmental services provided. On this basis, they can become a permanent source of income to farm households in many regions.

5. Integrated rural development

In the course of time it has become generally accepted knowledge that the future of rural areas cannot be based mainly on the employment opportunities in agriculture, even when an extended range of activities in public services (environment, landscape) and multiple-jobholding of farm families is included. Irrespective of the degree of protection and supporting income policies it has to be expected that employment opportunities in agriculture and connected activities will decrease further in the course of time. Therefore, it is necessary to create job opportunities in other sectors in order to avoid or at least reduce the exodus from peripheral rural areas. At the same time this is an essential precondition for socially acceptable structural adjustment processes in agriculture.

With the 1988 reform of "structural funds", the EU has carried out an important step in this direction. This concept has been developed further in the Agenda 2000 reform where the need for integrated rural development is emphasised. The basic ideas of this concept (not the kind of implementation) correspond very much to what agricultural and regional economists have asked for a long time (Buckwell 1997). This is especially true with respect to the need for a multi-sectoral co-ordinated policy approach, and competence allocation according to the principles of subsidiarity and regional/local participation.

On this background and on past experience, it can be stated that the Agenda 2000 initiatives with respect to rural development (see Agra Europe 17/98) are steps in the right direction, especially:

- the emphasis on an integrated development approach for all rural areas,
- the broadening of the financial base for those programs, partly by incorporation of funds from the EAGGF guarantee section,

- the further shift of competence to member states,
- the attempt to clarify the distribution of various competences (design, implementation, control) to the different levels of decision making.

The criticism mainly concerns the evaluation of those programs. The question of overall efficiency of regional development programs according to the criteria of cost - benefit analysis is very difficult to answer and still open. However, there is broad consensus that integrated rural development programs are certainly more efficient than partial sectoral support measures, because they are less biased towards a single sector.

The factual realisation and effectiveness of the proposed rural development concept will largely depend on how far the different member states make use of their options. To some extent they have the possibility to choose between forward looking rural development strategies and protectionist policies trying to preserve existing structures. It will be a difficult task for EU institutions to avoid distortions of competition and to give incentives for efficient policy implementation. Implementation and evaluation of the newly designed rural development scheme will be a mutual learning process and a challenging task for both, policymakers as well as agricultural and regional economists.

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THE MACRO-ECONOMIC EFFECTS OF THE CAP REFORM

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1. Introduction

The CAP reform, as agreed at the Berlin European Council in March 1999, aims at reducing the differences between internal EU prices and world market prices by lowering the intervention prices in three sectors: arable crops (by 15 %), beef (by 20 %) and dairy (by 15 %). The reform, starting in year 2000, except for the dairy sector (from 2005/06), provides for a gradual reduction in two (arable crops) or three equal steps. Such reductions are translated into lower consumer prices of agricultural products and consequently into the consumer price index. The reduction in consumer prices can have significant effects on important macroeconomic variables such as GDP, private consumption, real wages and employment.

The purpose of this chapter is to give a quantitative account of these price effects originating from the reform through simulation results from the current version of the Commission's Quest II model[37]. It also points out some (labour market) conditions under which the macroeconomic benefits of the CAP reform could become large. A reduction of consumer prices has both demand and supply effects. A fall in consumer prices will increase private consumption but it may also increase employment depending how wage costs for firms develop. The demand effect is likely to exert largely a short run effect on output and employment, while the latter may generate a longer term improvement in potential output, since the reduction of wage costs may not only increase employment but also lead to additional capital formation by increasing profitability of the corporate sector.

2. Methodology

2.1 Consumer price assumptions

The impact of the reform on the level of consumer prices in the EU has been estimated by the Centre for World Food Studies with the help of the CAPMAT simulation tool.

Price changes for individual agricultural products have been aggregated to arrive at an estimated change in the EU consumer price level. The latter computes the impact of the reform on food raw materials under the assumption of full transmission of agricultural producer prices through the food processing and marketing system to consumer prices, an assumption, which is supported by empirical evidence in the long run. For non-agricultural goods, the CPI estimate is based on the share of non-food consumer expenditures as they result from national accounts and on the assumption of a constant real price. The fall in agricultural prices leads to a decline in consumer prices by 0.25 % in year 2005 and 0.33 % in year 2010.

2.2 Wage behaviour assumptions

Since results indicate that the macroeconomic effects will depend crucially on how the benefits of lower consumer prices will be divided between workers and firms, results from alternative scenarios (scenarios 1 and 2) are presented where different assumptions on wage behaviour are made. In the first scenario it is assumed that workers would fully pass on the fall in consumer prices onto wages initially and wages would only respond to an increase in employment and productivity that could emerge from this price shock.

[37] The current version of Quest II incorporates the latest developments of the model. A description of the model structure is given in the appendix.

Under this assumption the decline in consumer prices would *fully* go into a reduction of wage costs for firms. This may be considered as a somewhat optimistic assumption. It could be justified as the outcome of a co-operative agreement between workers (trade unions) and firms to use the CAP reform as a chance to lower unemployment in the EU. It is also instructive to make this assumption in order to show how wage behaviour and here in particular the timing of wage changes can have an effect on the macroeconomic outcome. Results under this assumption can then be compared to results obtained from standard QUEST wage rule which implies that workers would pass on only about 50 % of a consumer price reduction initially. This standard wage rule is imposed in scenario 2.

3. Results

3.1 Results based on the assumption of a strong initial shift of consumer price reductions onto wages (scenario 1)

As can be seen from table 7.1, the macroeconomic effects of such a reform are positive for the EU both in the short and in the long run. Real consumption can be up by 0.4 % after five years and remains at roughly this level permanently. The GDP effect sets in more slowly. GDP is increased by roughly 0.1 % after the first five years but continues to rise to approximately 0.25 % in the long run. Similarly, employment only increases gradually, thus employment expansion induced by the CAP reform is not completed after five years. Similarly, though investment rises more strongly initially it nevertheless takes time for the capital stock to adjust to its higher level. The slow adjustment of both inputs also limits the short run expansion of GDP.

Table 7.1 Macro-economic impact measured as percentage deviation from baseline levels (reduction of consumer prices with strong pass through onto wages)

	2005	2010	2020	2030
Gross Domestic Product	0.1190	0.1947	0.2310	0.2512
Private Consumption	0.4044	0.4869	0.4604	0.4318
Private Investment	0.2943	0.3191	0.3165	0.3108
Exports	0.1429	0.1692	0.1990	0.2211
Imports	0.4752	0.5212	0.4771	0.4366
Real Wage Costs	0.0033	0.0077	0.0156	0.0214
Employment	0.1399	0.2177	0.2321	0.2421

There are two main economic channels, which bring about this result. First, the reduction in consumer prices will have a positive effect on private consumption. Since consumers regard this price change as having a permanent effect on their real income they respond quickly and strongly with an increase in consumer expenditure[38]. However, the increase in private consumption by itself would not generate positive output effects permanently. Long run positive output effects can only occur if the price reduction also triggers a positive supply response. This positive supply response is due to the effect consumer prices have on wage costs for firms. This occurs because the real (consumption) income gain from the consumer price reduction is shared between workers and firms[39]. This effectively means that firms are faced with lower wage costs and they respond to the

[38] This is an implication of the permanent income hypothesis.

[39] This is an implication of wage bargaining models of the labour market.

increase in demand by also increasing employment. Since there are adjustment lags in labour demand the employment response is rather slow. The increase in profits also leads to higher investment, which gradually increases the capital stock and slowly increases potential output. This also has additional effects on the productivity of labour and induces further wage, income and labour demand responses. It is especially the capacity increasing effect of investment, which sets in motion a lengthy adjustment process of GDP and explains why the adjustment of GDP takes time. Because of the more rapid adjustment in consumer expenditure the trade balance is negative over the adjustment period. But even if income and consumption would increase at the same pace there would still be a negative effect on the trade balance since the EU is expanding more strongly than the rest of the world. This puts pressure on the EU economy. The worsening of the external position will lead to a real depreciation in order to restore external balance. This in turn limits output expansion because of its adverse effect on the price of imported raw materials, investment goods but also wage costs.

3.2 Results based on the standard wage rule with limited pass-through of consumer prices (scenario 2)

The total macroeconomic multiplier effect of a change in consumer prices depends crucially on the timing of wage changes. If trade unions pursue a policy of sharing the benefits with the corporate sector, then as described in scenario 1 a virtuous cycle could emerge in which the CAP reform leads to an expansion of capacity output. If on the other hand workers are trying to reap the benefit of a consumer price change immediately after it occurs, then there may be little incentive on the part of firms to expand employment and productive capacity. The effect of the CAP reform could therefore be largely limited to an increase in private consumption without lasting effects on the supply side of the economy.

Table 7.2 Macro-economic impact measured as percentage deviation from baseline levels (reduction of consumer prices with standard wage rule)

	2005	2010	2020	2030
Gross Domestic Product	0.0602	0.0908	0.1117	0.1218
Private Consumption	0.2108	0.2830	0.2863	0.2803
Private Investment	0.2611	0.2471	0.2368	0.2243
Exports	0.1504	0.1577	0.1716	0.1809
Imports	0.3217	0.3710	0.3637	0.3529
Real Wage Costs	0.0064	0.0223	0.0381	0.0427
Employment	0.0534	0.0756	0.0813	0.0852

As can be seen from table 7.2, if the reduction in consumer prices leads only to a 50 % pass through on wages then the results from scenario 2 indicate that the GDP and employment effects could be substantially smaller compared to those from scenario 1. The long run GDP effect in the EU as a whole would be about 0.12 % (one half of the effect with full pass through) and the employment effect would be about 0.09 % (one third of the effect with full pass through). The increase in consumption would still be substantial with 0.3 %, however, this is at the cost of a trade deficit. The loss in net foreign assets and the exchange rate effects will eventually move consumption closer to the figure for GDP, though this happens at a very slow pace in the simulation.

To sum up, the market policy reform has positive effects, through the subsequent reduction in consumer prices, on important macro economic variables such as private consumption, GDP and employment. The magnitude of these effects depends of course on the size of the consumer price change but also crucially on wage behaviour. Under certain labour conditions the benefits of the reform can become significant in quantitative terms and persist/develop over the long run.

References

Roeger, W. and in't Veld, J. (1997), "QUEST II – A multi Country Business Cycle and Growth Model", *Economic Papers*, European Commission (DG II).

Appendix: The European Commission's QUEST II Model

A. Introduction

This appendix will give a brief description of QUEST II, a more detailed description of the model can be found in Roeger and in't Veld (1997). The model can be characterised as a modern version of the Keynesian-neoclassical synthesis. The behavioural equations in the model are based on microeconomic principles of inter-temporal optimising behaviour of households and firms and the supply side of the economy is modelled explicitly via a neo-classical production function. This feature of the model assures that its long run behaviour resembles closely the standard neo-classical growth model. The steady state growth rate is essentially determined by the rate of (exogenous) technical progress and the growth rate of the population. Also the real rate of interest in the long run is determined by private savings behaviour, especially by the discount rate of private households. Similarly, the real exchange rate equilibrates the current account in the long run, i. e. it moves in such a way as to make the net foreign asset position of the country sustainable. In this type of model economic policy will not be able to change the long run growth rate, unless it is able to affect the rate of time preference, the rate of technical progress or the growth rate of the population. It can however affect the long run level of output and thereby the growth rate of the economy over extended periods of time until the new (steady state) income level is reached.

QUEST II departs from the standard neo-classical model in the long run in two ways. Because firms are not perfectly competitive but can charge mark-ups over marginal cost, the long run level of economic activity will be lower than that predicted from a model with perfect competition. Also, the model economy will not reach a steady state equilibrium with full employment because of important frictions and imperfect competition in the labour market. To capture these labour market imperfections, a bargaining framework is used to characterise the interaction between firms and workers. The short run behaviour of the model economy will be influenced by standard Keynesian features since the model allows for imperfectly flexible wages and prices, as well as adjustment costs for labour and investment.

B. Model Description

The next sections will give a more detailed description of the economic hypotheses underlying the model. Here we only describe the behaviour of the private sector. The government is introduced via a conventional government budget constraint. No specific behavioural assumptions are made, except for a debt rule, which is required to make the evolution of the debt sustainable. The debt rule adjusts lump-sum taxes of the household sector such as to stabilise the debt to GDP ratio along a baseline path.

Consumption and saving

It is assumed that there are two types of households, namely those following a life cycle consumption pattern where consumption is based on financial wealth (FW) and life cycle income (LCI) and liquidity constrained households which base their consumption decision on disposable income (YDIS). The parameter λ determines the fraction of liquidity constrained households

$$C_t = (1-\lambda)(\theta + p)[LCI_t + FW_t]P_t/PC_t + \lambda YDIS_t \quad (1a)$$

where θ is the rate of time preference and p the inverse of the "forward looking horizon" of households. Life cycle income is defined as the present value of current and future expected net income and net transfers from the government, given by

$$LCI_t = \int_t^{\infty}\left[(1-tl)\frac{W_s N_s}{P_s} + \frac{TR_s}{P_s}\right]\exp\left(-\int_t^s (r+\delta)dj\right)ds \quad (1b)$$

The life cycle component of consumption can generate important savings responses in the context of expected changes in income. If households expect for example an increase in their future net income because of better employment opportunities the current savings rate is likely to fall, i. e. consumption may already increase in the present period in anticipation of higher future income.

Firm behaviour

Firms operate in a monopolistically competitive environment. Private sector GDP (Y) is produced via a nested CES and Cobb Douglas production function F(.) with capital K, energy E and private sector employment N as inputs. The variable T_{Kt} represents an efficiency index for the fixed capital stock and the variable T_t represents technical progress. The following equation describes potential output of the corporate sector under the assumption that all factors of production are fully utilized.

$$YPOT_t = \left(\left[aK_t^{-\rho} + (1-a)E_t^{-\rho}\right]^{-1/\rho} T_{Kt}\right)^{(1-\alpha)} N_t^{\alpha} T_t \quad (2)$$

Technical progress grows with an exogenous rate. The efficiency index captures embodiment effects resulting from current and past investment. More specifically, T_{Kt} is modelled as a function of the mean age of capital. Because prices adjust sluggishly, firms not always operate at full or optimal capacity, therefore actual output can differ from potential output and we define

$$Y_t = UC_t YPOT_t \quad (3)$$

where UC_t is the rate of capacity utilization. Capital stock (K_t) changes according to the rate of fixed capital formation J_t and the rate of geometric depreciation δ

$$\dot{K} = J_t - \delta K_t . \quad (4)$$

Furthermore, it is assumed that the investment process is subject to rising marginal costs of installation. Total real investment expenditures are equal to investment purchases J_t plus the costs of installation. The unit installation costs are assumed to be a linear function of the investment to capital ratio. Total investment expenditures I_t are therefore given by

$$I_t = J_t\left(1 + (\phi/2)(J_t/K_t)\right)PI_t/P_t \quad (5)$$

The objective of the firm is to maximize the present value of its cash flow. The optimization problem yields the following investment rule

$$I_t = \phi\left(q_t / \left(PI_t / P_t\right) - 1\right)K_t \qquad (6)$$

where q is the shadow price of capital and PI/P denotes the relative price of investment goods relative to the GDP deflator. The variable q can be interpreted as reflecting the present discounted value of the marginal revenue from current investment. This can also be written as a function of current and discounted future expected profitability, where profitability is expressed as the ratio between gross operating surplus (GOS) and the capital stock. Profitability is adjusted for monopoly rents. The degree of monopoly is expressed by the Lerner index η. The shadow price of capital is thus given by

$$q_t = \int_t^{\infty}\left[\left(1-tc\right)\left(\left(1-\eta\right)\frac{GOS_s}{K_s}\right)\right]\exp\left(-\int_t^{s}(r+\delta)dj\right)ds \qquad (7)$$

As can be seen from this expression, the shadow price of capital is a complex expression and depends in particular on current and future real interest rates, profitability and effective corporate tax rates (tc) but also on the mark-up level charged by the firm.

Domestic prices

It is assumed that firms set prices sluggishly and they especially respond to changes in the level of capacity utilization in the following form.

$$\log\left(P_t\right) = padj^{*}\log\left(UC_t / UC^{*}\right) + \sum \pi_i \log\left(P_{t-i}\right) \quad \text{with } \Sigma\pi_i = 1. \qquad (8a)$$

Notice, this rule together with the labour demand equation implies that prices are effectively set as a variable mark-up over unit labour costs and the mark-up depends on the degree of capacity utilization.

Consumer prices are a composite of domestic prices and the prices of imports, adjusted for the value added tax rate

$$PC_t = \left[\left(1-S^m\right)P_t^{(1-\sigma m)} + S^m PM_t^{(1-\sigma m)}\right]^{1/(1-\sigma m)}\left(1+tvat\right) \qquad (8b)$$

The investment price deflator is defined in a similar way, except that no adjustment is made for value added taxes.

Employment

Labour is also a quasi-fixed factor of production since it takes time for firms to reduce employment or fill existing vacancies. Therefore a distinction between short and long run labour demand elasticities must be made. Labour demand per employee is a positive function of output and is negatively related to total real wage costs. These include - on top of the direct real wage costs per employee (W_t/P_t)- a premium which depends on search and vacancy costs of the firm vc_t. In addition it is negatively affected by the mark-up the firm charges in product markets.

$$N_t = \left[(1-\eta)\alpha Y_t / \left(W_t / P_t + (r_t + s)vc_t\right)\right]^{(1-nl)} \left(N_{t-1}\right)^{nl} \quad (9)$$

Wages

A bargaining framework underlies our specification of the labour market. If workers and firms can agree on a particular job match, then they will both benefit relative to the alternative state of being unemployed (in the case of workers) and only receiving a reservation wage or having an unfilled vacancy (in the case of firms). The central idea of the bargaining model is that both workers and firms will share these individual returns among each other, depending on their relative bargaining strength. The bargaining strength is represented by the parameter β which can take on values between zero (competitive labour market and no bargaining strength of workers) and one (insider-outsider model with complete bargaining strength of workers). As an outcome of the Nash bargaining solution a wage rule for total wage costs per employee (wc) of the following form can be derived

$$WC_t = (1-\beta)(Z_t + L_t)/(1-tl) + \beta\left\{\left(\alpha + \eta(1-\alpha)\right)Y_t / N_t + vc_t PROB\left(LUR_t\right)\right\} \quad (10a)$$

According to this formulation of the wage rule, wage costs depend fundamentally on three factors, namely first, the reservation wage which is composed of unemployment benefits (Z_t) and the value of leisure (L_t), secondly on labour productivity (Y_t/N_t) and finally on labour market tightness as expressed by the function PROB(LUR_t), which denotes the probability of a currently unemployed worker to find employment in the present period as a (negative) function of the unemployment rate (LUR_t). As can be seen from equation (10a), the relative impact of these three factors varies according to the bargaining strength of workers. As bargaining strength increases real wages tend to be more strongly indexed to labour productivity and increasingly exceed the reservation wage. As the bargaining position of workers diminishes, firms are able to push wages closer to the level of the reservation wage. The wage equation here is stated entirely in real terms and gives the solution of wage bargaining if there is no nominal rigidity in the labour market. We do, however, allow for price sluggishness in the labour market by assuming that there are overlapping wage contracts which have a duration of four quarters and these are signed in nominal terms. The contract signed in period t is given

$$WCONT_t = 1/4 \sum E_t(WC_{t+j} P_{t+j}) \quad (10b)$$

this yields an average nominal wage rate in period t of

$$W_t = 1/4 \sum WCONT_{t-j}. \quad (10c)$$

Trade and current account

The model is closed with respect to international trade. The model distinguishes 26 countries/regions altogether. Among these, the EU member countries individually as well as the US and Japan are modelled as described above. The rest of the world is divided into 10 different zones, which are represented by small trade feedback models. It is assumed that each country/region produces a product, which is an imperfect substitute for

the products of other regions. This allows us to formulate import equations of the following form for each individual country

$$IM_t = S_t^m \left(PC_t / PM_t\right)^{\sigma m} \left(C_t + G_t + I_t\right) \quad (11)$$

Imports are a function of total domestic demand defined as private and public consumption and total investment and relative prices expressed as the ratio between the domestic consumption and the import price deflator. The coefficient σm is the price elasticity. To capture possible lagged adjustment of imports to price changes the relative price variable appears as a distributed lag. The income elasticity is restricted to one, i. e. we attribute all trend changes in the import share S^m to structural developments such as increased trade integration between countries and regions Consistent with our specification of imports we define exports of each region as

$$EX_t = \left(WPXS_t / \left(PX_t / E_t\right)\right)^{\alpha} WDEM_t \quad (12)$$

where PX is the export deflator, WPXS a competitors price index (in dollars) and WDEM is an indicator of world demand. Also for exports we allow that they respond sluggishly to changes in relative prices, thus there will be a difference between short and long run price elasticities. The coefficient of the world demand variable is constraint to one. The trend growth of the export share in GDP is captured by an exogenous trend. Depending on the market structure and the type of products traded, export prices can deviate from domestic prices. This is captured by the following pricing rule

$$PX_t = P_t^{(1-ptm)} WPXS_t^{ptm} \quad (13)$$

The parameter ptm determines to what extent there is pricing to market. Net foreign assets (F) evolve according to the following identity

$$F_t = \left(1 + r_t\right) F_{t-1} + EX_t \left(PX_t / P\right)_t - IM_t \left(PM_t / P_t\right) + FTR_t \quad (14)$$

where the term FTR denotes net foreign transfers received.

Financial markets and exchange rates

Asset markets are assumed to be fully integrated across all the industrialized countries covered in the model and there is full capital. Thus the exchange rate of country j is determined by the (uncovered) interest arbitrage relation

$$i_t^j = i_t^{us} + \Delta E_{t+1}^j / E_y^j + RPREM_t^j \quad (15)$$

The second term on the right hand side denotes the expected depreciation of country j's currency vis-à-vis the US dollar. Money demand is modelled via a conventional demand equation for real balance, which stresses both transaction and speculative motives of holding money

$$M_t / P_t = Y_t \left(1 + i_t\right)^{-\upsilon} \quad (16)$$

There is no specific monetary policy rule imposed. Simulations can be run under alternative rules like for example money targeting, nominal GDP targeting or nominal interest rate targeting.

European Commission
Directorate-General for Agriculture

This report brings together the findings of a series of impact analyses of the CAP reform decisions in the framework of Agenda 2000.

These evaluations were carried out both at sector level as well as at macro-economic level.