



CAP Reports

CAP reform
proposals

Impact
analyses

October 1998



European Commission
Directorate for Agriculture (DG VI)

CAP Reports

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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 main proposals for new agricultural Regulations cover:

- the revised Council Regulations for the common market organisations for arable crops, beef and milk;
- a revised Council Regulation on olive oil;
- a revision of the EAGGF Financing Regulation;
- a new Regulation covering rural development measures financed by the EAGGF.

All these proposals are due to come into effect in the year 2000.

This publication brings together the findings of a series of impact analyses of the CAP reform proposals for arable crops, beef and milk, presented on 18th March 1998. 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 and the Centre for World Food Studies of the University of Amsterdam. Others have been produced within the European Commission, and in particular by DG II (Directorate-General for Economic and Financial Affairs), Eurostat (Statistical Office of the European Community) and DG VI (Directorate-General for Agriculture).

List of acronyms and abbreviations

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

Overview

Impact analyses of the Agenda 2000 proposals for CAP Reform

By the European Commission

Directorate-General for Agriculture (DG VI)

October 1998

Chapter I

Overview of the impact analyses of Agenda 2000 proposals for CAP reform

1. Introduction and summary results

The economic implications of the proposals for reform of the Common Agricultural Policy presented in the framework of Agenda 2000 have been evaluated in two separate studies. The first study has been undertaken by Eurostat and the University of Bonn. As far as the impact on the agricultural sector is concerned, the analysis has been carried out by Eurostat using the SPEL/EU-MFSS model. In addition, a sector impact analysis for Germany has been prepared by the University of Bonn with the help of the RAUMIS model, as an example of a regionalized analysis with a completely different model approach. The macro-economic impact has been assessed in an analysis by the University of Bonn using the SPEL/EU-MFSS and RAUMIS results as an input.

The second impact assessment study has been undertaken for the agricultural sector by the Centre for World Food Studies of the University of Amsterdam¹ (SOW-VU) using the CAPMAT model whereas the consequences for the overall economy were examined by the Directorate General for Economic and Financial Affairs (DG II) of the European Commission using the Quest model.

The main results from both analyses² can be summarised as follows:

Agricultural sector

- Although agricultural income developments are expected to be less favourable when compared to a theoretical (but in practice unsustainable) sta-

tus quo scenario, agricultural income per labour unit in 2005 would still reach levels well above the high levels recorded over the 1992-1996 period (between 22 % and 34 % depending on the study and price scenario adopted as well as on the assumptions concerning future developments of agricultural employment).

- By 2005, the cereal sector would be characterised by an increase in production of around 6% compared to a status quo scenario. This expansion in production would be matched by rising internal demand (mainly coarse grains) and higher export levels (wheat). Oilseed area is forecast to expand between 3 % to 9 % depending on price developments. Oilseed production would broadly increase correspondingly. Area under protein crops would record an increase estimated between 2 % and 10 %. All simulation results suggest that future allocation of arable crop area will be very sensitive to the development of market prices both at EU and world levels.
- Beef production is foreseen to remain broadly stable, whereas beef internal demand would increase by more than 2 % compared to a status quo scenario (both studies differ widely on the magnitude of the rise in the demand for beef).
- Production of milk and dairy products would expand in line with the quota increase since the negative impact of the price cut on supply should be broadly offset by lower feed cost and the new cow premium. In that perspective, milk quotas remain restrictive. Most of this production increase is expected to be absorbed on the

¹ 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).

² These analyses have been complemented by an internal assessment of the impact of the CAP reform proposals on EU consumers.

domestic market, although increased exports of dairy products are foreseen by the CAPMAT simulations.

Overall economy

■ The budgetary impact of the CAP reform proposals has been estimated to range between 3.4 and 4.2 bio Ecu depending on the situation on world markets. This increase in budgetary costs is forecast to reflect the sharp increase in direct payments, that would only be partially offset by the reduction in expenditure on export subsidies and market intervention, notably in the beef and dairy sectors.

■ Consumers in the EU will benefit from the reduction in agricultural prices. Gains in consumer surplus have been estimated to reach between 10 and 17 bio Ecu for the EU as whole. The magnitude of these benefits depends mainly on future developments in the market prices of agricultural commodities. 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.

■ The fall in prices of agricultural products would translate into a reduction in the consumer price index ranging between 0.3 % to 0.45 %. 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 slow 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 more rapid 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 results, real private consumption at EU level would increase by a further 0.3 % to 0.7 % in the long-run. The impact on GDP growth would be significant, though more gradual, with an additional gain of 0.2 % in 2005 and a regular increase of up to 0.4 % in the long-term. These positive outcomes would be lower in the event of a milder fall in agricultural prices or a more rapid adjustment of real wages.

■ Employment would increase by 0.2 % in 2005 as compared to a status quo scenario, then rising further by up to 0.4 % by 2030. Results from the Quest model suggest that the long-term impact of CAP reform proposals on employment is relatively important, comparable to a reduction in labour taxes of around 4 %.

2. Modelling framework and working hypotheses

Modelling framework

Two models have been used for the impact analysis of the CAP reform proposals 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 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.

These impact studies for the agricultural sector have been complemented by an analysis at regional level for Germany using the RAUMIS model developed by the University of Bonn. This model is designed to evaluate changes in agricultural and environmental policy on production structure, market variables, income and a set of environmental indicators. Based on 431 sub-models at regional level for Germany, it follows a mathematical programming approach, maximising the regional income of agricultural production.

The economic implications of the agricultural proposals for the overall economy have been analysed using the Quest model of DG II. These results have been complemented by an analysis of the impact of the CAP reform proposals on the EU budget and consumers, based on internal tools and models.

Working hypotheses

Both impact analyses have been carried out using two main scenarios for agricultural market price developments following the cut in institutional prices. This allows to investigate the sensitivity of simulation results to future price developments and hence to provide a range of plausible outcomes. The first scenario (referred to as “scenario 1”) assumes that the cut in institutional prices will be fully reflected in market prices, whereas the second scenario (referred to as “scenario 2”) assumes a smaller drop in market prices (table 1.1).

All other policy variables (premium levels, set-aside rate) and hypotheses on macro-economic variables are kept identical across scenarios, although they may differ between the two sets of analysis.

Table 1.1: Agricultural price fall scenarios used in SPEL/EU-MFSS and CAPMAT simulations

	Agenda 2000 / scenario1		Agenda 2000 / scenario2	
	SPEL	CAPMAT	SPEL	CAPMAT
Cereals	-20 %	-20 %	-10 %	-10 %
Wheat	-20 %	-20 %	-10 %	-5 %
Coarse grains	-20 %	-20 %	-10 %	-15 %
Beef	-30 %	-30 %	-20 %	-20 %
Milk	-17 %	-15 %	-12 %	-12 %

3. Simulation results

The impact of Agenda 2000 is analysed for the year 2005 in reference to a policy status quo situation. Therefore, for comparative purposes, the simulation results are presented in the form of deviations from this reference scenario. This allows to depict the likely impact of Agenda 2000 on the economy while avoiding any potential bias generated by the models and misinterpretation of the results, when both reference and Agenda 2000 scenarios are compared in terms of absolute levels.

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

3.1 Consequences on EU agriculture at sectoral level

3.1.1 Crop sector

Despite an expected fall in revenue per hectare for arable crops, total area under arable crops is foreseen to expand by 6 % to 7 %. This development in harvested area mainly results from the new mandatory set-aside rate at 0 %, although the CAPMAT study expects some further modest shift from areas

previously allocated to fodder crops. Cereals will benefit most from this expansion in harvested area with a total increase ranging between 6 % and 11 % depending on price developments. Whereas area expansion is rather uniform across cereals in the SPEL study, the CAPMAT analysis shows stronger gains for wheat to the detriment of coarse grains. This pattern is even more pronounced in scenario 2 where wheat prices are assumed to fall less than coarse grain prices in the CAPMAT simulations (table 1.2).

The oilseeds area will also expand between 3 % to 9 % depending on the relative price competitiveness of oilseeds vis-à-vis cereals. The outlook for oilseeds appears to be very sensitive to the assumptions on the medium-term development of world prices adopted in the scenarios (this finding is confirmed by the RAUMIS simulations). In the SPEL analysis, oilseeds prices have been assumed at around 225 Ecu/t in the medium-term³.

Total cereal production is forecast to increase by around 5 % to 7 % as compared to the reference sce-

nario⁴, depending on the model used and the scenario examined, whereas oilseed production is foreseen to rise by between 2 % to 6 %. Prospects for oilseeds are more favourable in scenario 1 than in scenario 2 due to greater price competitiveness of oilseeds vis-à-vis cereals (the prices of which drop more sharply in scenario 1 than in scenario 2).

Prospects for development in protein crops production differ widely across studies. It is forecast to increase by more than 10 % in the SPEL study, whereas the CAPMAT analysis exhibits more moderate gains of around 2 % (table 1.3).

Cereal internal demand is forecast to increase following the decline in market prices. The rise in demand would range between 2.2 % and 3.5 % in scenario 1 (scenario with the greatest fall in prices) and between 1.4 % and 3.5 % in scenario 2. The CAPMAT results are always in the upper part of the range. This may be explained by the stronger development in the pig and poultry sectors that is foreseen in the CAPMAT study.

Table 1.2: Development in area under cereals, oilseeds and pulses, SPEL/EU-MFSS and CAPMAT simulations

Situation in 2005	Status quo scenario	Agenda 2000 / scenario1		Agenda 2000 / scenario2	
		SPEL	CAPMAT	SPEL	CAPMAT
Cereal area	100.0	106.3	106.1	107.5	106.6
Wheat	100.0	106.3	108.6	107.4	111.3
Soft wheat	100.0	106.4	109.4	107.4	112.6
Durum wheat	100.0	106.0	105.3	107.4	105.7
Coarse grains	100.0	106.3	103.9	107.5	102.4
Barley	100.0	106.9	104.2	107.7	102.6
Maize	100.0	108.6	102.2	109.8	101.0
Pulse area	100.0	111.0	103.7	109.7	103.1
Oilseed area	100.0	104.0	108.9	102.9	105.8

³ This working assumption may be considered as rather conservative as it is on the lower side of most forecasts from leading forecasting organisations. The CAPMAT study is based on internal prices for oil cakes and protein cakes of 442 Ecu/t and 521 Ecu/t respectively over the medium-term.

⁴ The CAPMAT simulation results are based on a 5 % rate of mandatory set-aside in their reference scenario. They may then be underestimated when compared to SPEL simulation results that assume a 17.5 % set-aside rate in the reference scenario.

Both studies forecast that the rise in domestic demand should be stronger for coarse grains than for wheat. This seems to reflect a situation in which increased demand for cereals is mainly driven by feed usage due to the greater competitiveness of cereals vis-à-vis cereal substitutes. This phenomenon is more marked in the CAPMAT simulations.

Since the increase in demand is forecast to be lower than the expansion of production, the cereal net surplus increases significantly, in particular for wheat. With lower EU prices, the expansion of the world market can be expected to absorb the biggest part of this surplus, especially for wheat (table 1.4).

Table 1.3: Development in production of cereals, oilseeds and pulses, SPEL/EU-MFSS and CAPMAT simulations

Situation in 2005	Status quo scenario	Agenda 2000 / scenario1		Agenda 2000 / scenario2	
		SPEL	CAPMAT	SPEL	CAPMAT
Cereal production	100.0	106.1	105.0	107.2	105.8
Wheat	100.0	106.3	107.4	107.2	110.6
Soft wheat	100.0	106.3		107.1	
Durum wheat	100.0	106.3		107.5	
Coarse grains	100.0	105.8	102.4	107.3	100.8
Barley	100.0	105.8		106.9	
Maize	100.0	108.6		109.8	
Pulse production	100.0	112.0	102.6	110.1	101.6
Oilseed production	100.0	103.2	105.6	101.8	103.1

Table 1.4: Development in the consumption of cereals, oilseeds and pulses, SPEL/EU-MFSS and CAPMAT simulations

Situation in 2005	Status quo scenario	Agenda 2000 / scenario1		Agenda 2000 / scenario2	
		SPEL	CAPMAT	SPEL	CAPMAT
Cereal use	100.0	102.2	103.5	101.4	103.5
Wheat	100.0	101.9	102.4	101.3	102.6
Soft wheat	100.0	102.0		101.3	
Durum wheat	100.0	100.7		100.9	
Coarse grains	100.0	102.5	104.5	101.6	104.3
Barley	100.0	102.7		101.7	
Maize	100.0	102.2		101.3	
Pulse use	100.0	100.3	96.7	100.4	97.8
Oilseed use	100.0	100.6	96.6	100.3	97.6

3.1.2 Animal sector

BEEF

Both studies forecast a relatively stable beef production, with the negative impact of the price decline on production being broadly compensated under the combined effect of the higher level of premium payments to the sector and lower feed costs⁵. Beef consumption is forecast to increase significantly following the decline in market prices. Under scenario 1, SPEL forecasts an increase of 3.1 % by 2005, while the CAPMAT study displays a very strong gain of 7.8 %⁶. The milder price fall in scenario 2 leads to lower growth in internal demand for beef in both studies, though at rates that are still significant (around 2 %) (table 1.5).

PIG MEAT AND POULTRY

The two studies diverge significantly on the impact of Agenda 2000 proposals on the pork and poultry sectors. The SPEL study forecasts that the substitution of white meat consumption by beef meat consumption should lead to a decline in producer prices that will more than offset the triggering impact on the production of lower feed costs. Consequently, SPEL foresees a drop of around 0.8 % in white meat production,

whereas consumption would fall by about 0.6 % as compared to a status quo scenario⁷ (table 1.6).

On the other hand, CAPMAT results show that pork and poultry production would rise in response to lower feed costs and increased demand. Total white meat production would increase by slightly less than 2 %, whereas internal consumption would grow by 1 %. Around half of the increase in poultry production would be captured by export markets thanks to greater competitiveness, whereas the rise in pig production would be mainly absorbed by the internal market.

MILK

Results for the dairy sector from both studies are not directly comparable since SPEL figures refer to whole milk equivalent, whereas the CAPMAT model focuses on skimmed milk and fat from milk. According to SPEL results, cow milk production⁸ would increase by 1.7 %, due to the 2 % quota increase and thanks to lower feed costs and the granting of the cow premium, which are both expected to compensate the negative impact of lower milk prices. In the same line, the CAPMAT results show an increase in the production of skimmed milk and fat from milk of around 1.9 %. Despite the drop in support prices, results from both studies suggest that the develop-

Table 1.5: Development in meat production, SPEL/EU-MFSS and CAPMAT simulations

Situation in 2005	Status quo scenario	Agenda 2000 / scenario1		Agenda 2000 / scenario2	
		SPEL	CAPMAT	SPEL	CAPMAT
Meat production	100.0	99.5	101.1	99.7	101.1
Beef	100.0	100.5	99.4	101.0	99.7
Pigmeat	100.0	99.4	101.6	99.6	101.5
Poultry	100.0	98.7	102.2	98.6	101.7

⁵ Moreover, the increase in milk quotas should further increase the long-term potential for beef production through greater availability of calves and slaughtered dairy cows.

⁶ The rise in internal demand is so strong that the EU would have to reduce its level of exports in order to fulfil domestic demand (the EU would even become a net importer).

⁷ However, pig meat production and consumption in both Agenda 2000 scenarios would still be substantially higher than current levels.

⁸ Cow milk production includes milk production from non-dairy cows. Therefore, the 2 % quota increase is not fully translated into a corresponding increase in cow milk production.

ment in milk production would remain restricted by the production quotas (table 1.7).

According to the SPEL results, the growth in milk production would be mainly captured by internal demand for milk and dairy products that would increase in line with production thanks to reduced market prices. The CAPMAT model, however, foresees that a significant part of the increased availability in milk and dairy products would be captured by the export market (table 1.8).

3.1.3 Agricultural income

TOTAL AGRICULTURAL INCOME

According to SPEL and CAPMAT 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 some 13 % to 14 % higher in 2005 than the 1992-1996 average⁹ under a status quo scenario.

Table 1.6: Development in meat consumption, SPEL/EU-MFSS and CAPMAT simulations

Situation in 2005	Status quo scenario	Agenda 2000 / scenario1		Agenda 2000 / scenario2	
		SPEL	CAPMAT	SPEL	CAPMAT
Meat use	100.0	100.1	102.7	100.0	101.1
Beef	100.0	103.1	107.8	102.0	101.7
Pigmeat	100.0	99.5	101.3	99.8	101.1
Poultry	100.0	98.9	100.9	98.9	100.9

Table 1.7: Development in the production of animal products, SPEL/EU-MFSS and CAPMAT simulations

Situation in 2005	Status quo scenario	Agenda 2000 / scenario1		Agenda 2000 / scenario2	
		SPEL	CAPMAT	SPEL	CAPMAT
Ani. prod. production					
Raw milk	100.0	101.3	—	101.5	—
Cow milk	100.0	101.7	—	101.8	—
Eggs	100.0	99.4	102.2	99.4	101.8

CAPMAT simulation results for milk are not directly comparable

Table 1.8: Development in the consumption of animal products, SPEL/EU-MFSS and CAPMAT simulations

Situation in 2005	Status quo scenario	Agenda 2000 / scenario1		Agenda 2000 / scenario2	
		SPEL	CAPMAT	SPEL	CAPMAT
Animal products use					
Raw milk	100.0	101.3	—	101.4	—
Cow milk	100.0	101.6	—	101.7	—
Eggs	100.0	99.4	100.9	99.4	100.8

CAPMAT simulation results for milk are not directly comparable

⁹ The CAPMAT results use 1995 as the reference year.

Table 1.9: Agricultural income, SPEL/EU-MFSS and CAPMAT simulations

Situation in 2005	Average* 1992-1996	Status quo scenario		Agenda 2000 / scenario 1		Agenda 2000 / scenario 2	
		SPEL	CAPMAT	SPEL	CAPMAT	SPEL	CAPMAT
Agricultural income (nominal)**	100.0	113.1	114.0	104.2	107.6	110.7	112.1
Agricultural income (real)	100.0	89.7	103.2	82.6	97.4	87.8	101.5
Agricultural labour	100.0	65.7	80.3	65.7	80.0	65.7	80.1
Real agricultural income per unit	100.0	136.6	128.5	125.8	121.8	133.7	127.0

* 1992-1996 for SPEL. 1995 for CAPMAT; ** measured as value added at factor cost, net in SPEL and gross in CAPMAT

The impact of the CAP reform proposals on this positive development would appear to be very sensitive to the evolution of prices. Under the most pessimistic scenario of a full drop in market prices (scenario 1), agricultural income is forecast to decline by some 6 % to 8 % as compared to the status quo situation. However, agricultural income in nominal terms would still remain around 5 % higher than the 1992-1996 average. In the more optimistic scenario of a smaller price fall, agricultural income would only decline by 2 % in comparison to the base run and would stand some 10 % above the 1992-1996 average. In that scenario, the increase in direct payments would broadly offset the drop in market prices.

However, when expressed in real terms (i.e. after inflation), development in total agricultural income would be less favourable. Real agricultural income is forecast to fall relatively to the 1992-1996 average in all scenarios in the SPEL results, whereas CAPMAT depicts a rather mixed outcome (table 1.9).

TOTAL AGRICULTURAL INCOME PER LABOUR UNIT

When measured per unit of labour and expressed in real terms, agricultural income is expected to show a very strong positive pattern. It will be between 22 % and 34 % higher than the 1992-1996 average depending on the Agenda 2000 scenario and the analysis. This strong growth in agricultural income is mainly derived from the structural adjustment of

the sector and the long-term decline in the agricultural labour force. The SPEL simulations are based on the assumption that the strong decline in agricultural labour observed in the late 80s and early 90s will continue (an annual decrease of 3.7 %). The CAPMAT study foresees a slower rate of decline of 2.2 % that appears more consistent with recent developments.

The sharp increase in the rate of decline in agricultural labour in the early 1990s reflected mainly the restructuring of the agricultural sector in the Eastern part of Germany and the implementation of the early retirement scheme. Reduction in agricultural labour has since slowed down considerably with the medium-term rate of decline falling from 3.9 % in 1993 to 2.7 % in 1997. In that respect, labour input in the European Union may be expected to fall over the 2000-2005 period at a rate of around 2.5 %. Under this assumption, the agricultural income per unit would be between 10 % (SPEL) and 25 % (CAPMAT) higher than the 1992-96 average under the full price drop scenario.

In summary, the simulation results from both studies show that:

The CAP reform proposals may be expected to lead to some drop in agricultural income as compared to the status quo scenario. The fall in income would range between 6 % and 8 %. However, these results need to be qualified:

- a drop at the lower end of the range would appear as the more plausible outcome as market prices can be expected to stabilise above support price levels;
- 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.

Under both Agenda 2000 scenarios, agricultural income would reach levels well above the high levels recorded over the 1992-1996 period (from 22 % to 34 % higher).

3.2 Consequences on EU agriculture at regional level

The analysis based on the RAUMIS model for Germany allows to analyse the differentiated impacts of Agenda 2000 at regional level in terms of production structure (in particular, area utilisation and crop allocation), production methods and income development. It also throws some light on the potential

consequences of the CAP reform proposals for the environment.

The RAUMIS study tends to confirm the simulation results at sectoral level presented above. The main findings can be summarised as follows:

- Concentration of cereal and oilseed production in the most favourable regions of Germany, with an area allocation very sensitive to the relative price competitiveness of cereal and oilseeds. Assuming of a full drop in cereal prices, the aggregate cereal area would decline by 5 % whereas the global oilseed area would climb 62 %. In contrast, a lower cereal price decline would reverse this trend and lead to an expansion in both aggregate cereal and oilseed areas of 11 % and 7 %. Voluntary set-aside will pick up sharply on marginal land. Production intensity in cereal production would decline. Combined with changes in cereal regional allocation, it would lead to a general slow down in yield growth (table 1.10).
- Beef production would become less competitive and could fall in aggregate by 6 % in a full price drop scenario. A milder fall in beef prices would

Table 1.10: Agricultural production in Germany, RAUMIS simulations

Situation in 2005	Status quo scenario	Agenda 2000 / scenario1	Agenda 2000 / scenario2
		Raumis	Raumis
Cereal production	100.0	90.2	109.1
Cereal area	100.0	95.1	111.3
Pulses production	100.0	104.6	101.0
Pulses area	100.0	105.0	101.0
Oilseed production	100.0	163.4	108.6
Oilseed area	100.0	162.3	106.6
Beef production	100.0	93.8	100.1
Pig production	100.0	102.7	100.7
Poultry production	100.0	99.9	99.2
Milk production	100.0	101.3	101.3

however stabilise the level of production. The supply response in the beef sector appears to be rather sensitive to the development in input costs, in particular to the speed of transmission in the decline in the price of young animals and feedingstuffs. Milk production is expected to remain competitive in all German regions. It would expand in line with the quota increase.

- Depending on the price scenario, real aggregate agricultural income per unit of labour would record a decline ranging between 2 % and 12 % as compared to the reference scenario (table 1.11). The fall in agricultural prices would only be partially compensated for by the sharp increase in direct payments (by around 33 %) and changes in production structure. However, agricultural income would remain at or above the high levels recorded in the mid 1990s.
- The structure of agricultural income may be expected to change significantly in some parts of Germany, with an increasing share of income originating from direct payments (from 40 % in the reference scenario to 60 % in Agenda 2000 scenario 1). This could be particularly the case in less favoured areas where voluntary set-aside is foreseen to expand strongly and in regions with dominant beef production.

- Environmental benefits appear to be rather sensitive to price developments. Measured in terms of nitrogen balance, they are not foreseen to show significant improvement in the event of a mild price fall. Nevertheless, if prices were to fully drop in line with institutional prices, the trend towards lower nitrogen surplus would be strengthened thanks mainly to lower production intensity, greater use of mechanical/technical alternatives and higher level of set-aside of land in some regions. Yet, wide variations may be expected across regions.

3.3 Consequences on the overall economy

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

EU budget

The impact of the CAP reform proposals on the guarantee section of the EAGGF has been estimated using two distinct versions for the status quo scenario. These additional versions are intended to distinguish the budgetary impact of policy changes according to developments on world markets and improve the accuracy and consistency of the budget

Table 1.11: Income development in Germany, RAUMIS simulations

Situation in 2005	Base year 1995	Status quo scenario	Agenda 2000 / scenario1 Raumis	Agenda 2000 / scenario2 Raumis
Total nominal income	100.0	106.1	93.7	104.2
Total real income*	100.0	85.9	75.9	84.4
Labour input	100.0	75.8	75.9	76.4
Real agricultural income per unit*	100.0	113.3	99.9	110.4

* DG VI calculation based on Raumis nominal income and SPEL GDP deflator

comparison between the status quo and the CAP reform scenarios¹⁰.

The budgetary cost of the CAP reform proposals is estimated to range between 3.4 and 4.2 bio Ecu depending on world markets situation. This increase in budget costs would reflect the sharp increase in direct payments, that would only partially be offset by the reduction in expenditure on export subsidies and market intervention, notably in the beef and dairy sectors. However, unfavourable developments on world markets would only reduce the budgetary cost of the reform in relative terms since the pre-reform budgetary cost of the CAP, that is used as benchmark, would be higher (due to a higher level of export refunds). Under status quo policy, budget expenditure remains more sensitive to world market conditions than under the reform scenarios with a further shift from price support to direct payments (table 1.12).

Consumer benefits

The benefits for consumers of the proposed reduction in the support prices of some agricultural products have been estimated to range from 10 to 17 bio Ecu by 2005 for the EU as whole. The magnitude of these benefits, that 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. If the drop in support prices is fully reflected in the development of market prices, the gains in consumer surplus can be foreseen to reach between 15 and 17 bio Ecu. However, they would be substantially lower, though still significant, in the assumption of a milder fall in agricultural prices (around 10 - 11 bio Ecu).

A large proportion of these benefits should reach final consumers, whereas another part can be expected to be absorbed by the food and retailing

Table 1.12: Impact on the EAGGF (Guarantee) expenditure in 2005 (mio Ecu)

	Status quo		Agenda 2000	
	Unfavourable	favourable	Scenario 1	Scenario 2
Arable crops	19639	19081	19350	19346
Beef and veal	5790	5540	7910	7910
Milk and dairy	2680	2680	4520	4520
Other	15475	15475	15160	15160
Total	43584	42776	46940	46936

Source: SPEL/EU-MFSS for market variables; DG VI calculation

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 proposals would generate a reduction in the aggregate agricultural price index that ranges between 4.3 % and 6.4 % according to the CAPMAT simulation results. This would translate into a drop in the consumer price index of around 0.3 % to 0.45 % depending on the price scenario (table 1.13).

Table 1.13: Impact of CAP reform proposals on aggregate price indices, CAPMAT results

Deviation from baseline (in %)	Agenda 2000 / scenario 1	Agenda 2000 / scenario 2
Agricultural price index	-6.43	-4.32
Consumer price index	-0.45	-0.27

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.

¹⁰ In that respect, an unfavourable situation on world markets may be expected to translate into higher expenditure on export subsidies under the status quo scenario, while reducing the potential for unsubsidised exports and maintaining prices close to support levels under CAP reform conditions.

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 (a) is based on the assumption that the decline in consumer prices will 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, is examined in version (b).

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.

Table 1.14: Impact of CAP reform proposals on private consumption, Quest simulations

Deviation from baseline (in %)	Agenda 2000 / scenario 1		Agenda 2000 / scenario 2	
	version a	version b	version a	version b
2005	0.60	0.45	0.39	0.30
2010	0.79	0.58	0.51	0.38
2020	0.75	0.52	0.49	0.35
2030	0.69	0.47	0.45	0.31

Table 1.15: Impact of CAP reform proposals on GDP, Quest simulations

Deviation from baseline (in %)	Agenda 2000 / scenario 1		Agenda 2000 / scenario 2	
	version a	version b	version a	version b
2005	0.19	0.13	0.13	0.08
2010	0.32	0.17	0.21	0.11
2020	0.38	0.19	0.25	0.13
2030	0.40	0.19	0.26	0.13

Table 1.16: Impact of CAP reform proposals on employment, Quest simulations

Deviation from baseline (in %)	Agenda 2000 / scenario 1		Agenda 2000 / scenario 2	
	version a	version b	version a	version b
2005	0.20	0.09	0.13	0.06
2010	0.34	0.12	0.22	0.08
2020	0.37	0.13	0.24	0.08
2030	0.38	0.13	0.25	0.08

Private consumption

According to the Quest results, real private consumption at EU level would increase by 0.3 % to 0.6 % in 2005 depending on the price and wage scenarios. It would then permanently stabilise slightly above that level over the long-run (table 1.14).

GDP growth

The impact on GDP growth would be significant, though more gradual¹¹. In the assumption that the price reductions are fully translated into lower wage costs, Quest results show that GDP would grow by an additional 0.2 % in 2005 in the greater price fall scenario. It would then increase regularly to reach 0.4 % in the long-term. The gradual response in GDP growth would mainly result from the slow adjustment process to increased investment (about 0.5 % to 0.6 %) and its impact on potential output. These positive outcomes for the economy may be expected to be slightly lower in the event of a milder fall in agricultural prices (table 1.15).

However, in the case of a more rapid adjustment of real wages (version b), macro-economic benefits could be largely limited and additional GDP growth substantially smaller. Nevertheless, the latter would still reach between 0.1 % and 0.2 % 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. According to the Quest results, employment would increase by 0.2 % in 2005 in scenario 1, then rising up to 0.38 % by 2030. As expected, the positive impact of Agenda 2000 on the labour market would be slightly lower in the case of a smaller decline in the price of agricultural products.

The impact of Agenda 2000 on employment is relatively important since the Quest model estimates that it is comparable to a reduction in labour taxes of around 4 % (table 1.16).

Nevertheless, as for GDP, a more rapid wage adjustment would significantly alter this positive outlook with additional potential growth in employment limited to around 0.1 %.

4. Overall evaluation of the CAP reform proposals

The Agenda 2000 proposals presented in March 1998 are viewed as a further positive contribution to the ongoing process of reform of the CAP which started in 1992. Both studies consider that the proposals, in particular for the reshaping of internal support, constitute 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.

¹¹ 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.

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 proposed 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 reform process (e.g. sugar and milk quotas);
- The proposals are still considered as conservative with respect to liberalisation of import access;
- 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.

Sectorial impact analyses

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

By the European Commission

**Statistical Office of the European Communities
(Eurostat)**

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Chapter II

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

1. Introduction

On request of DG VI, policy simulations with SPEL/EU-MFSS have been carried out in order to analyse the effects of the Agenda 2000 CAP reform proposals on EU agriculture.

The simulations for the revised proposal of March 1998 have been performed in two versions referred to as "version 1" and "version 2". Version 2 assumes that price reductions at farm level are lower than the proposed reductions in administered prices, whereas in version 1 the reductions in farm gate prices equal those of the administered prices.

A first set of results has been sent to DG VI on 2 June 1998. This report contains revised results which are based on the most recent update of the SPEL ex-post data (from August 1998) and which were compiled after a complete revision of the set of demand elasticities for agricultural products.

2. Brief description of the modelling approach

The following brief description of SPEL explains the aims of SPEL, its modular approach, characteristics common to all modules of SPEL and in particular the design of the Medium-term Forecast and Simulation System, which has been used to compile the simulation results presented in this report.

2.1 Aims and modules of the SPEL System

The SPEL System is designed for monitoring and diagnosis of the present situation in the agricultural sectors of the EU Member States, for ex-post analyses of sectoral developments and for short-term and

medium-term forecasts and policy simulations of the effects of alternative agricultural policies.

In its modular design, the SPEL/EU System consists of the following interrelated parts:

- the Base System (BS) for the compilation of the ex-post database,
- the Short-term Forecast and Simulation System (SFSS), and
- the Medium-term Forecast and Simulation System (MFSS).

2.2 Characteristics common to all modules of SPEL

Common to all these modules of SPEL is the activity-based accounting approach:

- the activity-based approach constitutes a division of the agricultural sector into production and use activities. It traces production interactions within the agricultural sector (intrasectoral flows) and between agriculture and non-agriculture (intersectoral flows);
- it provides a detailed breakdown of agricultural production and distinguishes between 49 production activities, 60 product items and 33 variable input items. 15 intrasectoral use activities and one intersectoral use activity (sales/purchases) complete the representation of product and input flows;
- the compliance with the accounting-approach guarantees consistency with respect to physical and monetary cyclical links, and ensures the comparability of data and model results with the

definitions used in the Economic Accounts for Agriculture (EAA).

The approach described above results for each represented year and Member State in what is called an "Activity-based Table of Account (ABTA)" and a "Matrix of Activity Coefficients"¹². These provide a detailed breakdown of the agricultural production processes into yield and input coefficients as well as cultivated area and herd size. By also taking into account the important intrasectoral product flows between production activities and within single production activities (e.g. young animals or feedingstuffs), approximately realistic gross output values are presented. After the aggregation of the production activity data, the sum of the non-consolidated (gross) flows of SPEL is identical with the sum of the consolidated (net) flows of the EAA, which contains the final output value. The resulting sectoral gross value added at market prices of SPEL therefore complies with the definitions of the EAA.

An "Additional Demand Component" that depicts the flows of products from their origin to their final consumption supplements the supply-oriented ABTA. It breaks down the use of the raw (primary) agricultural products outside the agricultural sector into different use activities: 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. rape seed) to the domestic resources of the processed products (e.g. rape oil) via "processing" activities.

2.3 Medium-term forecast and simulation system

The Medium-term Forecast and Simulation System (SPEL/EU-MFSS) was designed to be used for policy-oriented analyses, forecasts and simulation calculations. The idea was to create a model for agricultural administration by the European Commis-

sion and to promote dialogue with policy-makers. This resulted in the following specifications:

- the MFSS had to be highly detailed (the activity-based approach), so that account could be taken of individual variables relating to policy objectives and tools;
- it also had to be up-to-date and flexible, so that the latest data could be input and the reference year for forecasts and simulations would reflect the current situation;
- above all, however, the model had to have sound forecasting qualities, so that it could not only explain basic links (as academic models often do), but also provide plausible numerical forecasts for the most important variables relating to policy objectives (agricultural income, output, self-sufficiency level, net trade).

These requirements largely determined the methodological design and basic structure of the MFSS. One important feature is the modular structure, which is based on the unit construction principle. This allows individual components (supply, demand and external trade components) and sub-models to be produced and applied piecemeal, but is also designed to allow the various components to be combined into an overall system.

Supply Component

The supply component explains how agricultural production adapts to basic economic changes, and in particular to administered agricultural prices and other agricultural policy measures affecting production.

When the supply component is applied in isolation for policy-related simulations, agricultural policy and other economic parameters are entered in the form of scenarios. The model then shows how output will adapt and how income will be generated in

¹² The ABTAs for the European Union as a whole are calculated by an aggregation over the Member States' ABTAs.

response to a given scenario. Under the overall system agricultural pricing is then explained endogenously in terms of the interplay between supply, domestic demand and international agricultural trade, and taking the influence of policy into account.

For the design of the supply component, the two main concerns were an up-to-date reference base and sound forecasting ability. This was the main reason why the following two-stage approach was chosen:

- during the first stage, trend-based projections for all individual components in the SPEL matrix are produced using the SPEL/EU-BS time series (the approach is similar to that used in the SFSS, but for the medium term). These comprise detailed analyses of ex-post trends and consistency checks;
- during the second stage, the reactions to agricultural policy and general economic conditions (compared with trend developments) are calculated. Modelling for the second stage is based on three interrelated sub-models.

The price expectation sub-model explains the price expectations of farmers on the basis of past experience and prices administered under a given policy.

The yield sub-model then can show how production intensity (input use and yield per unit of production activity) might adapt to the anticipated input and output prices. These calculations are based on production functions for the individual categories of crop and livestock products, and on the assumption that farmers determine input use and thus the level of yields per hectare/animal according to profit-maximizing principles.

The central activity sub-model shows the level of production activities as a function of changes in the value-added per unit of the production activities.

Calculations are based on the concept of value-added elasticities, which was developed specifically for this purpose. This seems to be more plausible than the conventional use of price elasticities, as the profitability of production activities also depends on input prices and technical progress. The specification of elasticities is based on comprehensive econometric estimates of the Institut für Agrarpolitik of the University of Bonn and detailed studies of specialist literature. These are combined to create a complete matrix of own and cross value-added elasticities in a specially developed linear-planning calibration process which also includes symmetry and homogeneity as theoretical constraints.

The individual sub-models are interlinked recursively, so that in a given year price expectations can be used as a basis for calculating first the way in which production intensity adapts within each type of activity, and then how the level of activity adapts to meet changes in value-added (which, in addition to technical progress and changes in production and factor prices, also reflect changes in production intensity). Similarly, models for individual calendar years are interlinked by a recursive-dynamic procedure to depict how the agricultural sector might develop in the medium term.

The results of the different sub-models are integrated in the sectoral accounting framework of the Activity-Based Table of Accounts (ABTA).

Demand and external trade component

The demand component includes the various components of domestic use of raw and processed agricultural products outside the agricultural production sector (food demand, feed use, seed use, industrial use and processing). A direct link to the supply component exists via the sales activities for raw agricultural products and the purchase activities for seed and feedingstuffs of the supply component. The central area of food demand is recorded using an elasticity-based analysis and forecasting system.

The external trade component was derived from a world trade model developed under a special research project at the Institut für Agrarpolitik of the University of Bonn. It allows derivation of the net trade functions between the EU and the rest of the world, which are integrated into the SPEL system as the "external trade component".

Interlinkage of the different components in the overall system

The various components are interlinked in the overall system. In it, agricultural pricing is derived from the interplay between supply, domestic demand and international trade and taking policy influence into account. Market clearing is one of the central constraints of this process. The combination of the results of the supply component (output and intra-branch consumption), demand component (use and stock changes outside the agricultural production sector) and external trade component (net trade) allows complete physical supply balance sheets to be produced (figure 2.1).

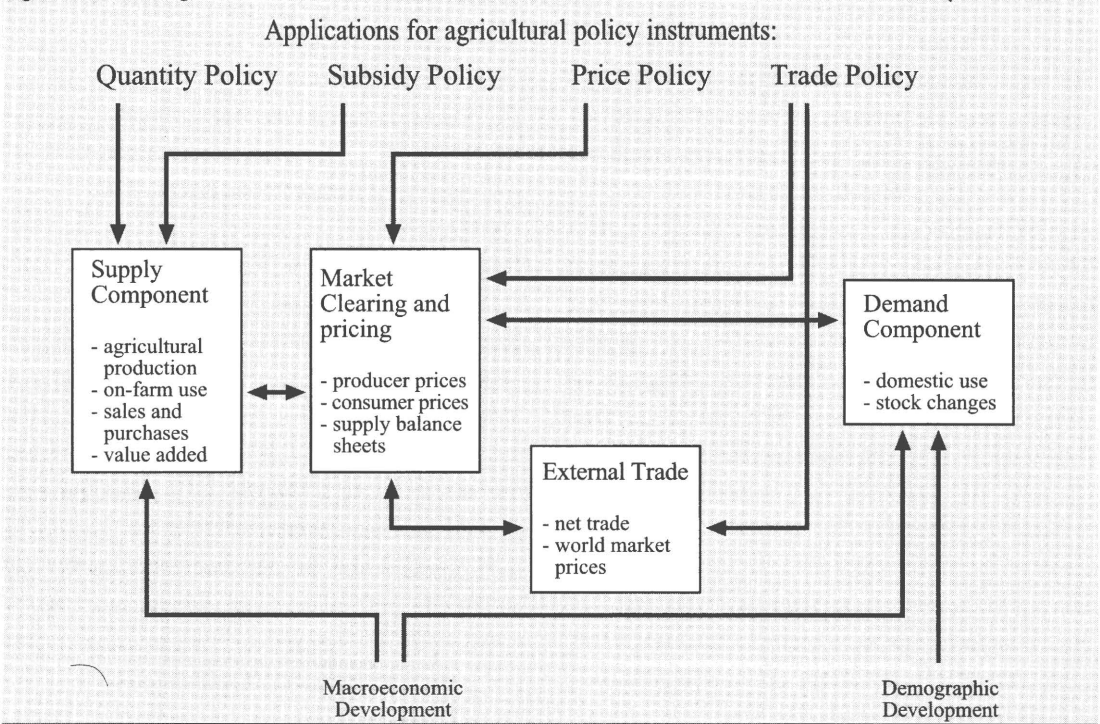
The various components of the overall system come together as a non-linear programming model for individual calendar years. Recursive-dynamic links allow developments in the agricultural sector of the EU Member States to be charted.

3. Scenario assumptions

3.1 Reference run

The reference run is a projection of trends 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.

Figure 2.1 Linkage of the overall MFSS-model



- The farm gate 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 Ecu at Member State level). For oilseeds, pulses, sugarbeet, wine, beef, veal, sheep meat and goat meat, farm gate prices are assumed not to change from their 1997 levels (in nominal Ecu at Member State level).

The farm gate 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. They thus 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 1999-2005, 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 1999-2005 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 scenarios

To analyse the possible effects of Agenda 2000 two scenario versions have been set up. One of them (version 1) reflects the more pessimistic assumption that the proposed reductions in administered prices would translate into a decrease in farm gate prices of exactly the same percentage order. The other (version 2) starts from the more optimistic assumption that the proposed cuts in administered prices would only partially translate into falls of farm gate prices.

- The price assumptions in detail: Cereal prices will be reduced by 20 % (version 1) and 10 % (version 2) 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 % (version 1) and 20 % (version 2) between 2000 and 2002 in 3 steps. Milk prices fall by 17 % (version 1) and 12 % (version 2) between 2000 and 2001 in 2 steps.

For the other key policy variables both versions are identical. As compared with the reference run there are differences for 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 Ecu/t to 66.24 Ecu/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 Ecu/t to 72.74 Ecu/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 Ecu/head to 310 Ecu/head for bulls and from 108.7 Ecu/head to 232.1 Ecu/head for steers between 2000 and 2002. This translates into a rise of between 102.2 % (Portugal) and 158.4 % (Italy and the Netherlands) of the premium payment per animal for the production activity male adult cattle for fattening; the extensification premium for male adult cattle is increased by 206.7 %. For dairy cows a compensation premium of 70 Ecu/head (budget amounts) with a variation

between 62.7 Ecu/head (Portugal) and 90 Ecu/head (Italy) is introduced. For suckler cows the budget amounts rise from 144.9 Ecu/head to 214.5 Ecu/head during the period 2000-2002. This translates into an increase in model terms of between 32.9 % (Portugal) and 62.2 % (Italy and Netherlands) of the premium payment per animal in the production activity other cows.

- Compensation for the milk price reduction: an additional premium of 145 Ecu/head for a reference milk yield of 5.8 t per cow is introduced on the basis of historical quotas. If milk yields were above (below) the reference yield this would result - quotas given - to 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 %.

4. Modelling results

4.1 Production and demand

Reference run

Set-aside has a big influence on production in the reference run. The SPEL/EU-MFSS projections show that in 2005 with 17.5 % obligatory set-aside the area under cereals would be around 5.8 % lower than for the average of the years 1992-1996 (in the following referred to as 1992/96). In order to fulfil the Blair House agreement, oilseeds area would be reduced by around 5.4 %.

The positive trends in yields for cereals, however, would lead to an increase of cereal production by around 12.1 % between 1992/96 and the projection

year 2005. Cereal output is forecast to arrive at 203.9 mio t by 2005. Cereal demand is expected to grow in the projection period mainly due to higher feed demand.

Meat demand is expected to rise by 11.7 % between 1992/96 and 2005. Among meats, the clear “winner” is poultry (+30.6 %) followed by pig meat (+9.6 %) and sheep and goat meat (+2.2 %). Beef and veal demand, however, is forecast to rise only by 0.5 %. Demand for eggs would be 0.6 % higher in 2005 than in 1992/96.

High demand for white meats encourages producers to invest into this sector and to expand production, whereas the ruminant sector would be stagnant due to the existing quota system for dairy and limited beef and veal demand.

Agenda 2000 (compared with the reference run)

Version 1 (pessimistic price assumption)

CROPS

Changes in prices and compensatory payments influence the competitiveness of oilseeds and cereals. Incomes per hectare for cereals would be reduced as compared to the reference run since the price reductions would not be completely offset by increases in the compensatory payments per hectare. For pulses and oilseeds the reform proposals mean a reduction of compensatory payments per hectare.

Although incomes per hectare would decline, area under cereals, pulses and oilseeds would be higher than in the reference run since the set-aside obligations would be removed. The increase in the area for cereals and pulses would be with 6.3 % and 11.0 % markedly higher than for oilseeds for which area would increase by 4.0 % (table 2.1). Cereals and pulses would become more competitive compared to oilseeds, which would suffer from a strong decrease

Table 2.1: Agenda 2000 (version 1) vs. reference run: areas under cereals, pulses and oilseeds, EU 15 (mio ha)				
	Average 1992-1996	Ref. Run 2005	Agenda 2000 2005	Difference Agenda 2000/ ref. run
Cereals (excl. rice)	36.00	33.92	36.06	6.3%
Wheat	16.50	15.71	16.70	6.3%
Soft wheat	13.39	12.94	13.76	6.4%
Durum wheat	3.11	2.77	2.94	6.0%
Coarse grains	19.51	18.21	19.36	6.3%
Rye	1.22	1.13	1.10	-3.1%
Barley	11.47	10.61	11.34	6.9%
Oats	2.14	1.98	2.07	4.3%
Maize	3.93	3.65	3.96	8.6%
Other cereals	0.75	0.84	0.90	6.4%
Pulses	1.66	1.72	1.91	11.0%
Oilseeds	5.73	5.42	5.63	4.0%

Source: SPEL/EU, Eurostat F-1

of the compensatory payments and hence of income per hectare.

Assuming unchanged per-hectare yields in the single Member States compared to the reference run, the production quantities in version 1 of the Agenda 2000 scenario are higher by 6.1 % for cereals, 12.0 % for pulses and 3.2 % for oilseeds (table 2.2a). With lower prices than in the reference run, demand for these products would increase by 2.2 % for cereals and 0.6 % for oilseeds (table 2.2b).

The increase in demand would not offset the rise in output quantities. Therefore, net surplus of cereals would be higher and net deficit of oilseeds lower than in the reference run (table 2.2c).

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The increase of the premium payments to the production activity “male adult cattle for fattening” and lower input costs have the potential to compensate the price cut for beef with respect to profit per animal. However, the extent to which costs would be reduced has to be partially left to scenario assumptions as regards the triggering impacts on feed prices and young animal prices. In addition, the higher milk quota increases the availability of calves as input to the beef and veal producing activities and the number of slaughtered cows in the longer run.

Table 2.2a: Agenda 2000 (version 1) vs. reference run: production of cereals, pulses and oilseeds, EU 15 (mio t)

	Average 1992-1996	Ref. Run 2005	Agenda 2000 2005	Difference Agenda 2000/ ref. run
Cereals (excl. rice)	181.98	203.93	216.32	6.1%
Wheat	88.77	102.06	108.49	6.3%
Soft wheat	80.79	94.02	99.95	6.3%
Durum wheat	7.98	8.04	8.54	6.3%
Coarse grains	93.21	101.87	107.83	5.8%
Rye	4.78	6.19	5.81	-6.1%
Barley	46.76	48.28	51.07	5.8%
Oats	7.02	8.03	8.32	3.6%
Maize	31.18	34.71	37.70	8.6%
Other cereals	3.48	4.67	4.93	5.5%
Pulses	5.21	5.65	6.33	12.0%
Oilseeds	11.96	12.35	12.74	3.2%

Source: SPEL/EU, Eurostat F-1

Table 2.2b: Agenda 2000 (version 1) vs. reference run: use of cereals, pulses and oilseeds, EU 15 (mio t)

	Average 1992-1996	Ref. Run 2005	Agenda 2000 2005	Difference Agenda 2000/ ref. run
Cereals (excl. rice)	158.59	171.07	174.84	2.2%
Wheat	73.15	85.45	87.07	1.9%
Soft wheat	66.23	77.56	79.12	2.0%
Durum wheat	6.91	7.89	7.95	0.7%
Coarse grains	85.44	85.62	87.77	2.5%
Rye	4.21	2.90	2.91	0.6%
Barley	39.51	43.58	44.77	2.7%
Oats	6.32	5.90	6.07	2.9%
Maize	32.11	29.31	29.97	2.2%
Other cereals	3.29	3.93	4.05	3.0%
Pulses	7.88	8.10	8.13	0.3%
Oilseeds	33.26	31.37	31.55	0.6%

Source: SPEL/EU, Eurostat F-1

Table 2.2c: Agenda 2000 (version 1) vs. reference run: net surplus of cereals, pulses and oilseeds, EU 15 (mio t)

	Average 1992-1996	Ref. Run 2005	Agenda 2000 2005	Difference Agenda 2000/ ref. run
Cereals (excl. rice)	23.40	32.86	41.47	26.2%
Wheat	15.63	16.61	21.42	28.9%
Soft wheat	14.56	16.46	20.82	26.5%
Durum wheat	1.07	0.15	0.59	298.7%
Coarse grains	7.77	16.25	20.06	23.4%
Rye	0.56	3.29	2.90	-12.0%
Barley	7.25	4.70	6.30	34.0%
Oats	0.70	2.13	2.25	5.7%
Maize	-0.93	5.40	7.73	43.3%
Other cereals	0.18	0.74	0.88	19.3%
Pulses	-2.67	-2.46	-1.80	-26.6%
Oilseeds	-21.29	-19.02	-18.81	-1.1%

Source: SPEL/EU, Eurostat F-1

The SPEL results show an increase in beef and veal output quantities by 0.5 % (table 2.3). The output effect depends, however, on the magnitude of the fall in production costs. A reduction of beef and veal output might therefore be possible as well. Con-

sumers would react to the price reductions by higher demand for beef and veal (+3.1 %).

The price cuts for cereals would lead to lower production costs for pig meat, poultry and eggs. The

Table 2.3: Agenda 2000 (version 1) vs. reference run: production and use of animal products, EU 15 (mio t)

	Average 1992-1996	Ref. Run 2005	Agenda 2000 2005	Difference Agenda 2000/ ref. run
Production				
Meat (gross production (1))	34.14	36.73	36.54	-0.5%
Beef and veal	8.53	8.51	8.55	0.5%
Sheep- and goatmeat	1.27	1.16	1.15	-0.8%
Pigmeat	16.50	17.26	17.15	-0.6%
Poultry	7.85	9.80	9.68	-1.2%
Meat (gross indigenous production (2))	33.10	35.67	35.48	-0.5%
Beef and veal	8.19	8.19	8.23	0.5%
Sheep- and goatmeat	1.22	1.12	1.11	-0.8%
Pigmeat	16.02	16.76	16.66	-0.6%
Poultry	7.68	9.59	9.47	-1.3%
Meat (net production (3))	33.77	36.33	36.14	-0.5%
Beef and veal	8.39	8.38	8.42	0.5%
Sheep- and goatmeat	1.20	1.09	1.09	-0.9%
Pigmeat	16.50	17.26	17.15	-0.6%
Poultry	7.69	9.59	9.47	-1.3%
Eggs	4.89	4.92	4.89	-0.6%
Milk (unprocessed)	145.62	142.17	144.07	1.3%
Cow milk	136.58	133.87	136.15	1.7%
Sheep and goats milk	9.04	8.30	7.91	-4.6%
Total domestic use				
Meat	31.40	35.08	35.12	0.1%
Beef and veal	7.89	7.93	8.18	3.1%
Sheep- and goatmeat	1.38	1.41	1.38	-2.2%
Pigmeat	15.05	16.49	16.41	-0.5%
Poultry	7.09	9.26	9.15	-1.1%
Eggs	4.71	4.74	4.71	-0.6%
Raw milk (4), (5)	143.87	142.97	144.82	1.3%
Cow milk (4), (5)	134.81	134.72	136.94	1.6%
Sheep and goats milk (4)	9.06	8.24	7.88	-4.5%
(1) = slaughterings + exports of live animals				
(2) = slaughterings + exports of live animals - imports of live animals				
(3) = slaughterings				
(4) including processing				
(5) including milk of other cows than dairy cows				
Source: SPEL/EU, Eurostat F-1				

lower production costs would have – ceteris paribus – a triggering impact on production. However, the strong price drop for beef and veal leads to a substitution of white meat consumption by ruminant meat. Therefore demand of pig meat and poultry is reduced by 0.5 % resp. 1.1 %. Consequently the price drops for white meats overcompensate the reduction in input costs so that the profit margins in pig meat and poultry production would fall and production would be reduced.

The increase in the milk quotas, the introduction of the cow premiums and the lower feed costs, which would partially compensate the effect of the milk price reduction on profit per cow, would lead to a higher cow milk output volume (+1.7 % as compared to the reference run)¹³. Consumption of raw cow milk (mainly processing) would rise by 1.6 % due to the reduced milk price (table 2.4).

Version 2 (optimistic price assumption)

CROPS

In the case of the optimistic price assumption the per hectare premiums could compensate the reduction in output values. Cereal area would increase therefore stronger than in version 1 (+7.5 % as compared to the reference run) (table 2.5).

Due to substitution effects, the increase of areas under pulses and oilseeds, however, would be lower than in version 1 (+9.7 % and +2.9 % as compared to the reference run).

Production quantities of cereals would be 7.2 % higher than in the reference run (table 2.6a). The increase in the production quantities of pulses and oilseeds would be 10.1 % and 1.8 %. Due to the price cut for cereals, demand for cereals would increase by 1.4 % compared to the reference run (table 2.6b). This is a less strong increase than for version 1.

Table 2.4: Agenda 2000 (version 1) vs. reference run: production and use of milk products (raw milk equivalent), EU 15 (mio t)

	Average 1992-1996	Ref. Run 2005	Agenda 2000 2005	Difference Agenda 2000/ ref. run
Marketable production				
Milk powder	4.52	4.68	4.75	1.6%
Butter	34.56	33.74	34.47	2.2%
Other fresh milk products	68.33	70.61	71.54	1.3%
Total domestic use				
Milk powder	2.62	3.24	3.23	-0.5%
Butter	23.33	27.71	28.03	1.2%
Other fresh milk products	64.74	69.50	69.91	0.6%

Source: SPEL/EU. Eurostat F-1

¹³ The quota increase of 2 % at EU 15 level does not fully translate into a corresponding increase of cow milk production since the latter includes also output from non-dairy cows.

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Also for beef and veal the price cuts are smaller than in version 1. Output quantities for beef and veal would increase by 1.0 % as compared to the reference run (table 2.7a on next page). The smaller price cuts of version 2 lead to a lower consumption of beef and veal than in version 1. However,

compared to the reference run there would still be an increase of 2.0 %.

The production costs for pig meat, poultry and eggs are less reduced than in version 1. But also the substitution on the demand side of white meats by beef and veal is less pronounced.

Table 2.5: Agenda 2000 (version 2) vs. reference run: areas under cereals, pulses and oilseeds, EU 15 (mio ha)

	Average 1992-1996	Ref. Run 2005	Agenda 2000 2005	Difference Agenda 2000/ ref. run
Cereals (excl. rice)	36.00	33.92	36.45	7.5%
Wheat	16.50	15.71	16.87	7.4%
Soft wheat	13.39	12.94	13.90	7.4%
Durum wheat	3.11	2.77	2.98	7.4%
Coarse grains	19.51	18.21	19.58	7.5%
Rye	1.22	1.13	1.17	3.2%
Barley	11.47	10.61	11.42	7.7%
Oats	2.14	1.98	2.09	5.5%
Maize	3.93	3.65	4.00	9.8%
Other cereals	0.75	0.84	0.90	6.6%
Pulses	1.66	1.72	1.89	9.7%
Oilseeds	5.73	5.42	5.57	2.9%

Source: SPEL/EU, Eurostat F-1

Table 2.6a: Agenda 2000 (version 2) vs. reference run: production of cereals, pulses and oilseeds, EU 15 (mio t)

	Average 1992-1996	Ref. Run 2005	Agenda 2000 2005	Difference Agenda 2000/ ref. run
Cereals (excl. rice)	181.98	203.93	218.69	7.2%
Wheat	88.77	102.06	109.38	7.2%
Soft wheat	80.79	94.02	100.74	7.1%
Durum wheat	7.98	8.04	8.64	7.5%
Coarse grains	93.21	101.87	109.32	7.3%
Rye	4.78	6.19	6.27	1.4%
Barley	46.76	48.28	51.59	6.9%
Oats	7.02	8.03	8.41	4.7%
Maize	31.18	34.71	38.12	9.8%
Other cereals	3.48	4.67	4.93	5.6%
Pulses	5.21	5.65	6.22	10.1%
Oilseeds	11.96	12.35	12.57	1.8%

Source: SPEL/EU, Eurostat F-1

Table 2.6b: Agenda 2000 (version 2) vs. reference run: use of cereals, pulses and oilseeds, EU 15 (mio t)

	Average 1992-1996	Ref. Run 2005	Agenda 2000 2005	Difference Agenda 2000/ ref. run
Cereals (excl. rice)	158.59	171.07	173.50	1.4%
Wheat	73.15	85.45	86.54	1.3%
Soft wheat	66.23	77.56	78.58	1.3%
Durum wheat	6.91	7.89	7.96	0.9%
Coarse grains	85.44	85.62	86.96	1.6%
Rye	4.21	2.90	2.92	1.0%
Barley	39.51	43.58	44.34	1.7%
Oats	6.32	5.90	6.02	1.9%
Maize	32.11	29.31	29.68	1.3%
Other cereals	3.29	3.93	4.00	1.8%
Pulses	7.88	8.10	8.14	0.4%
Oilseeds	33.26	31.37	31.46	0.3%

Source: SPEL/EU. Eurostat F-1

Table 2.6c: Agenda 2000 (version 2) vs. reference run: net surplus of cereals, pulses and oilseeds, EU 15 (mio t)

	Average 1992-1996	Ref. Run 2005	Agenda 2000 2005	Difference Agenda 2000/ ref. run
Cereals (excl. rice)	23.40	32.86	45.19	37.5%
Wheat	15.63	16.61	22.84	37.5%
Soft wheat	14.56	16.46	22.16	34.6%
Durum wheat	1.07	0.15	0.68	353.2%
Coarse grains	7.77	16.25	22.35	37.5%
Rye	0.56	3.29	3.35	1.8%
Barley	7.25	4.70	7.26	54.3%
Oats	0.70	2.13	2.39	12.4%
Maize	-0.93	5.40	8.43	56.3%
Other cereals	0.18	0.74	0.93	25.7%
Pulses	-2.67	-2.46	-1.92	-22.0%
Oilseeds	-21.29	-19.02	-18.88	-0.7%

Source: SPEL/EU. Eurostat F-1

The production quantities of cow milk in version 2 do not differ much from those in version 1 for the following reasons:

- higher output values per cow, which would be due to the lower milk price cut, would be par-

tially offset by higher production costs (smaller price cuts for feed),

- the production would be mainly determined by the quota system.

Table 2.7a: Agenda 2000 (version 2) vs. reference run: production of animal products, EU 15 (mio t)

	Average 1992-1996	Ref. Run 2005	Agenda 2000 2005	Difference Agenda 2000/ ref. run
Meat (gross production (1))	34.14	36.73	36.60	-0.3%
Beef and veal	8.53	8.51	8.59	1.0%
Sheep- and goatmeat	1.27	1.16	1.15	-0.7%
Pigmeat	16.50	17.26	17.19	-0.4%
Poultry	7.85	9.80	9.67	-1.3%
Meat (gross indigenous production (2))	33.10	35.67	35.54	-0.4%
Beef and veal	8.19	8.19	8.27	1.0%
Sheep- and goatmeat	1.22	1.12	1.11	-0.8%
Pigmeat	16.02	16.76	16.69	-0.4%
Poultry	7.68	9.59	9.46	-1.4%
Meat (net production (3))	33.77	36.33	36.20	-0.3%
Beef and veal	8.39	8.38	8.46	1.0%
Sheep- and goatmeat	1.20	1.09	1.09	-0.8%
Pigmeat	16.50	17.26	17.19	-0.4%
Poultry	7.69	9.59	9.46	-1.4%
Eggs	4.89	4.92	4.89	-0.6%
Milk (unprocessed)	145.62	142.17	144.25	1.5%
Cow milk	136.58	133.87	136.24	1.8%
Sheep and goats milk	9.04	8.30	8.01	-3.5%

(1) = slaughterings + exports of live animals;

(2) = slaughterings + exports of live animals – imports of live animals;

(3) = slaughterings

Source: SPEL/EU. Eurostat F-1

Table 2.7b: Agenda 2000 (version 2) vs. reference run: use of animal products, EU 15 (mio t)

	Average 1992-1996	Ref. Run 2005	Agenda 2000 2005	Difference Agenda 2000/ ref. run
Meat	31.40	35.08	35.08	0.0%
Beef and veal	7.89	7.93	8.09	2.0%
Sheep- and goatmeat	1.38	1.41	1.39	-1.4%
Pigmeat	15.05	16.49	16.45	-0.2%
Poultry	7.09	9.26	9.15	-1.1%
Eggs	4.71	4.74	4.71	-0.6%
Raw milk (1), (2)	143.87	142.97	144.99	1.4%
Cow milk (1), (2)	134.81	134.72	137.03	1.7%
Sheep and goats milk (1)	9.06	8.24	7.97	-3.4%

(1) including processing; (2) including milk of other cows than dairy cows

Source: SPEL/EU. Eurostat F-1

Table 2.8: Agenda 2000 (version 2) vs. reference run: production and use of milk products (raw milk equivalent), EU 15 (mio t)

	Average 1992-1996	Ref. Run 2005	Agenda 2000 2005	Difference Agenda 2000/ ref. run
Marketable production				
Milk powder	4.52	4.68	4.75	1.6%
Butter	34.56	33.74	34.46	2.1%
Other fresh milk products	68.33	70.61	71.64	1.5%
Total domestic use				
Milk powder	2.62	3.24	3.21	-1.1%
Butter	23.33	27.71	27.94	0.8%
Other fresh milk products	64.74	69.50	69.80	0.4%

Source: SPEL/EU. Eurostat F-1

4.2 Income from agricultural activity

Reference run

Sectoral real net value added at EU 15 level for the projection year 2005 would be about 13.1 % higher than for 1992/96. However, structural changes would lead to a further reduction in sectoral labour input. As a consequence real income from agricultural activity per annual work unit would increase by 36.6 % between 1992/96 and 2005.

Agenda 2000 (compared with the reference run)

Version 1 (pessimistic price assumption)

The proposed CAP reform would reduce Gross Value Added at market prices (GVAm) by 15.0 % (table 2.9, simulation results for 2005 compared with reference run results for 2005) if the price cuts in administered prices would be fully transmitted to farm level. However, the price cuts do not only affect GVAm in a negative direction, but also lead to reduced feed input costs and better prospects on the markets for white meats, which can have a moderating influence on market incomes.

Table 2.9: Agenda 2000 (version 1) vs. reference run: EU agricultural net value added (average 1992-1996 = 100)

	Ref. Run 2005	Agenda 2000 2005	Difference Agenda 2000/ ref. run
GVA at market prices	109.15	92.78	-15.0%
Subsidies	118.34	150.70	27.4%
Net value added (NVA) at factor cost	113.08	104.19	-7.9%

Source: SPEL/EU. Eurostat F-1

Table 2.10: Agenda 2000 (version 1) vs. reference run: EU agricultural incomes (average 1992-1996 = 100)

	Ref. Run 2005	Agenda 2000 2005	Difference Agenda 2000/ ref. run
Real net value added at factor cost	89.67	82.62	-7.9%
Annual work unit (AWU)	65.66	65.66	0.0%
Real NVA at factor cost per AWU	136.57	125.83	-7.9%

Source: SPEL/EU. Eurostat F-1

The reform proposal would increase subsidies by 27.4 %. Net Value Added at factor cost (NVAf) would therefore fall only by 7.9 %.

Table 2.11: Agenda 2000 (version 2) vs. reference run: EU agricultural net value added (average 1992-1996 = 100)

	Ref. Run 2005	Agenda 2000 2005	Difference Agenda 2000/ ref. run
GVA at market prices	109.15	98.71	-9.6%
Subsidies	118.34	151.32	27.9%
Net value added (NVA) at factor cost	113.08	110.70	-2.1%

Source: SPEL/EU, Eurostat F-1

Table 2.12: Agenda 2000 (version 2) vs. reference run: EU agricultural incomes (average 1992-1996 = 100)

	Ref. Run 2005	Agenda 2000 2005	Difference Agenda 2000/ ref. run
Real net value added at factor cost	89.67	87.78	-2.1%
Annual work unit (AWU)	65.66	65.66	0.0%
Real NVA at factor cost per AWU	136.57	133.69	-2.1%

Source: SPEL/EU, Eurostat F-1

Version 2 (optimistic price assumption)

The proposed CAP reform combined with a more optimistic view on the price cuts at farm level would reduce GVAm by 9.6 % (table 2.11). The increase in subsidies is about the same magnitude as in version 1. NVAf would decrease slightly by 2.1 %.

Concerning the income results presented above it has to be mentioned that they assume an autonomous rate of change in labour input. The income depression due to the Agenda 2000 could be relaxed - on a per capita basis - if the Agenda 2000 would lead to higher migration of labour capacity out of agriculture (table 2.12).

Sectorial impact analyses

Regional analysis for the German agricultural sector (RAUMIS simulations)

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June 1998

Chapter III

Regional analysis for the German agricultural sector (RAUMIS simulations)

1. Executive Summary

The March 1998 proposals for a further reform of the Common Agricultural Policy (CAP) cover price reductions for cereals, beef and milk and an increase resp. introduction of compensatory payments coupled to production activities in these production branches.

The modelling system RAUMIS has been used to analyse the regional impacts for the German agricultural sector. RAUMIS consists of 431 regional sub-models and is based on a mathematical programming approach, maximizing the regional income of agricultural production.

Scenario definitions for the impact analyses of the Agenda 2000 proposals have been harmonized both with the DG VI and the scenario assumptions for SPEL/EU-MFSS model runs (Eurostat). A "no-change" policy scenario ("Ref 2005") is the standard of comparison for impact analyses of alternative scenarios. The obligatory minimum share of set-aside in the reference run is set to 17.5 %. Alternative scenarios are "Agenda 1" with large price reductions (pessimistic point of view from producer's perspective of further developments on agricultural world markets) and full compensatory payments for cereals, beef and milk. "Agenda 2" assumes a more optimistic development on agricultural world markets and therefore smaller price reductions than in "Agenda 1". In all simulation runs, a price of 223 Ecu/t for oilseeds is assumed.

The model results for the Agenda scenarios can be summarized as follows:

- A concentration of arable crops in favourable locations in Germany. In marginal locations we can observe a high share of voluntary set-aside area. The consolidated effects lead to a decrease

in the cultivation of cereals by 5 % ("Agenda 1") resp. an increase of 11 % ("Agenda 2"). Changes in relative competitiveness lead to a major increase in cultivation of oilseeds (+62 % resp. +7 %).

- Sensitivity analyses of price changes in oilseeds production show a large influence on competitiveness of oilseeds and cereals. An oilseeds price reduction by about 30 Ecu/t (223 Ecu/t to 193 Ecu/t) would lead to a huge reduction of oilseeds cultivation in "Agenda 2" (-64 % instead of +7 % in relation to reference run). Cereal production would increase by +17 % instead of +11 % in relation to reference run.
- Despite price cuts for milk, the milk quota is still restrictive in all regions of the Agenda scenarios (quota +1.3 %). Subsidies partly compensate price cuts in the sectoral average. Marginal value of milk quota in Germany decreases in "Agenda 1" by approximately 11 % in relation to "Ref 2005".
- Beef production decreases in "Agenda 1" by about 6 %. A more optimistic assumption on beef prices in "Agenda 2" (-20 % in relation to "Ref 2005") would stabilize beef production in the sectoral average on the level of the reference scenario.
- Impacts on income (net value added at factor cost, NVAf) vary between -12 % in "Agenda 1" and -2 % in "Agenda 2". A declining share of NVAf earned on market (nearly -40 % in "Agenda 1") is accompanied by an increasing share of transfer income (in both scenarios about +33 %). Especially the share of animal premiums increases drastically.
- In terms of environmental aspects both Agenda scenarios have a relieving effect. Reductions of fertilizer use and a slightly higher use of

mechanical/technical alternatives, such as no-tillage alternatives, lead to decreasing nitrogen surpluses in the sectoral average.

2. Brief description of the modelling system RAUMIS

RAUMIS = Regionalized Agricultural and Environmental Information System for Germany

The modelling system RAUMIS was developed by the Institute of Agricultural Policy, University Bonn, in a research project for the German Federal Ministry of Agriculture (BMELF) in the late 1980s. Stepwise improvements of the core-model especially in several Ph.D.-theses. Direct implementation of RAUMIS in BMELF (1993 to 1997). Applications in different fields of political interest: analyses of 1992 CAP reform impacts, partial liberalization of CAP (sugar beet, milk), decoupling of subsidies, environmental policies etc.

General features of the modelling system RAUMIS:

- Regional differentiation into 431 sub-models (approximately NUTS III-level)
- Description of interdependencies between agricultural production and environment
- Regional depiction of political measures (quotas, subsidies, etc.)

The model is designed for the impact analysis of alternative agricultural and environmental policies. These analyses quantify the impact of alternative policies on following targets:

- Agricultural variables
 - Production structure and quantity

- Input and factor use
- Income

- Environmental variables
 - Nutrient balances (N, P, K)
 - Biodiversity Indicator
 - Greenhouse-gas emissions

The Modelling System RAUMIS can be characterized methodologically as follows:

- Supply model for the agricultural production sector in Germany
- Mathematical programming approach (maximizing the regional income of agricultural production)
- Comparative-static analysis
- Activity based approach (77 crop activities, 16 activities in animal production)
- Endogenous adjustment of optimal special intensity by a set of mechanical/technological production alternatives
- Consistency to Economic Account for Agriculture (EAA)

3. Assumptions for scenario specification

The scenario assumptions for the simulation runs follow those of the SPEL/EU-MFSS simulations for DG VI. Target year of simulation runs is the year 2005. Detailed scenario assumptions have been provided by DG VI.

Results of the "Agenda scenarios" are compared with a "no-change" policy assumption, which is depicted in scenario "Ref 2005".

3.1 Policy assumptions for reference run (Ref 2005)

- Farm gate prices for cereals equal intervention prices
- Farm gate price for oilseeds is 223 Ecu/t
- Per hectare premiums of the 1992 CAP reform for "grandes cultures" remain nominally constant
- In accordance to SPEL/EU-MFSS and projections of DG VI, set-aside requirement is set to 17.5 %; maximum share of set-aside is 33 % of regional base area
- "Blair House" agreement for oilseed production
- Market regulations for milk and sugar remain untouched

3.2 Policy assumptions for alternative scenario Agenda 1

General

- Oilseed area may exceed limits of "Blair House" agreement
- Responses on world markets for agricultural commodities are not considered
- Markets without regulations (e.g. pig meat, potatoes) are supposed to stay more or less stable; therefore prices are adjusted to approximate the output level of "Ref 2005";

- Proposal of degressive compensatory payments in relation to payment amount per farm is not taken into account

Plant production

- Cut of cereals intervention price by 20 % (from 119.19 Ecu/t to 95.35 Ecu/t)
- Compensatory payments for cereals (included corn for silage), oilseeds and set-aside: 66 Ecu/t reference yield of cereals
- Compensatory payments for pulses: payments for cereals plus 6.5 Ecu/t.
- Set-aside obligation 0 %; maximum share of set-aside is assumed to remain 33 % of regional base area

Animal production

- Price reduction for beef and veal by -30 % up to 2005 (from 2780 Ecu/t to 1946 Ecu/t)
- Compensatory payments in animal production assumed in RAUMIS follow the calculations of DG VI:
 - Suckler Cows: 219.7 Ecu
 - Bulls: 316.8 Ecu
 - Steers: 237.1 Ecu (twice)
 - Dairy Cows: 71.5 Ecu
- Quota for milk production is increased by appr. 1.3 % in Germany
- Milk price reduction by 17 %; compensatory payment: 100 Ecu plus additional payment in responsibility of Member State. It is assumed that this component comprises 45 Ecu in Germany, so that the total payment adds up to 145 Ecu per "premium unit".

3.3 Policy assumptions for alternative scenario Agenda 2

Plant production

- Cut of cereals intervention price by 10 % (from 119.19 Ecu/t to 107.27 Ecu/t)

Animal production

- Price adjustment for beef and veal by -20 % up to 2005 (from 2780 Ecu/t to 2224 Ecu/t)
- Price adjustment for milk by -12 % up to 2005

All other assumptions as described in scenario Agenda 1 (inclusive full compensatory payment of 66 Ecu/t for cereals and oilseeds).

4. Model results

Simulation results of the two Agenda scenarios are compared with the "no-change" policy depicted in the Ref 2005 scenario.

4.1 Production structure and quantities

Results of the reference run (1995 - 2005)

- According to DG VI assumptions set-aside requirements have been set to 17.5 %. Maximum share is 33 % of the regional crop areas. This set-aside obligation has a big influence on production structure in the reference run. The area of cereal production declines by approximately 7 % in relation to the base year 1995 (set-aside obligation in 1995: 10 %). In order to fulfill the "Blair House" agreement (net guarantee area), oilseeds are reduced by about 10 %.
- The yield increase of the grains (annual growth rates for e.g. soft wheat 1.47 %, barley 1.09 % and rye 2.0 %) overcompensates the higher set-

aside requirements, so that the cereal production increases in "Ref 2005" by about 7 %. To stay within the quotas, the area under sugarbeet falls in line with rising yields. Potato production remains nearly unchanged.

- Slight increase of pig, poultry and beef production.
- Increasing milk yields per animal and (nearly) constant milk quota lead to reduction in dairy cattle herds by the year 2005. In consequence basic feed requirements also fall, entailing a substantial reduction in fodder cropping and meadow land (-16 % and resp. -5 %).

Results of alternative scenarios in relation to reference run

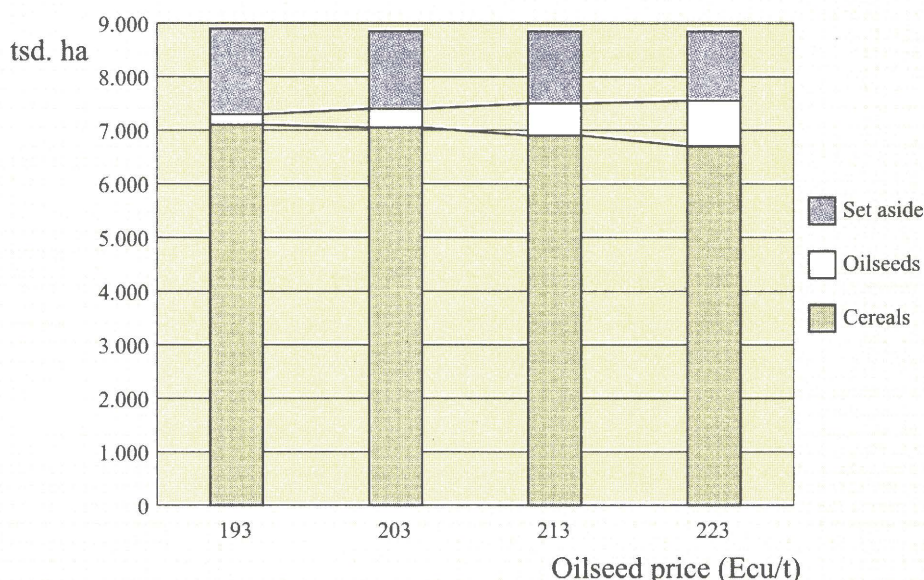
- Changes of production structure and output are mainly determined by the following policy changes:
 - rate of obligatory set-aside set at 0 %,
 - modification of area and animal related subsidies and
 - price changes.
- On favourable locations, the drop in obligatory set-aside requirements leads to an extension of the area under "grandes cultures", whereby the amount of extension is rather sensitive with respect to the degree of grain price reduction.
- The assumed price relation between oilseeds and cereals in "Agenda 1" leads to a significant increase of relative competitiveness of oilseeds (oilseeds price: 223 Ecu/t). Cultivation increases by about 60 % in relation to "Ref 2005", diminishing cereal area, which is reduced by about 5 % (cf. table 3.1). In relation to the "no change" scenario, set-aside area decreases by 11 %. The regionalized impacts are shown in map 3.1 and map 3.2 (see appendix). On marginal locations we

can observe a high share of voluntary set-aside area (maximum 33 % of regional base area).

- The lower grain price reduction in "Agenda 2" (-10 %) leads to a much larger decrease of the set-aside area of approximately 37 %, and reduces the substitution of oilseeds for grains. In this scenario, the area under cereals increases by about 11 % and the area under oilseeds by 7 % (table 3.1).

■ Additional sensitivity analyses of price changes for oilseeds underline the huge influence on the relative competitiveness of oilseeds cultivation. An oilseeds price reduction by about 30 Ecu/t in relation to "Ref 2005" (223 Ecu/t to 193 Ecu/t) would lead to a huge reduction of oilseeds area in "Agenda 2" (-64 % instead of +7 % in relation to "Ref 2005")¹⁴. Cereal production would increase by +17 % instead of +11 % in relation to reference run (figure 3.1)

Figure 3.1: Level shares of set-aside, oilseeds and cereals depending on oilseeds price



Source: Institute for Agricultural Policy, Bonn 1998.

Table 3.1: Area use in Germany (RAUMIS) ('000 ha)

	Base Year (1995)	Ref 2005	Agenda 1	% var.	Agenda 2	% var.
Cereals	6507	6015	5720	(-5)	6695	(+11)
Pulses	122	100	105	(+5)	101	(+1)
Oilseeds	850	809	1313	(+62)	862	(+7)
Potatoes	314	285	284	(0)	284	(0)
Sugar-beet	509	474	475	(0)	475	(0)
Forage Crops	1755	1483	1491	(+1)	1531	(+1)
Meadowland	5170	4917	4809	(-2)	4870	(-1)
Set-aside	1400	2088	1869	(-11)	1308	(-37)
Fallow		252	361	(+43)	396	(+17)

Source: Institute for Agricultural Policy, Bonn 1998

¹⁴ The study Cypris et al., "Modellrechnungen zu Auswirkungen der Agenda 2000 in der deutschen Landwirtschaft", Braunschweig, 1997, assumes lower oilseed prices and higher cereal prices which lead consequently to a high reduction of acreage cultivated by oilseeds.

- Compensatory payments for silage and lower opportunity costs of arable land (due to price cuts for cash crops) lead to an increase of fodder production on arable land and a slight decrease of meadowland.
- Price reductions affect yield per hectare in cereals. Due to changes in production patterns (less intensive production alternatives gain competitiveness) and to regional allocation effects, the average yield coefficient declines by approximately -5.2 % for the German agricultural sector. The decrease of cereal output is -10 % in scenario "Agenda 1". In scenario "Agenda 2" we can observe an increase in the production output of cereals by +9 % in relation to "Ref 2005".
- Despite price cuts, milk production is still competitive in all German regions; the quota is still restrictive for milk production (assumption: quota +1.3 %; cf. table 3.2). Subsidies (incl. area-related-premium for silage) partly compensate income losses in the sectoral average. According to the model results the marginal value of the milk quota declines in "Agenda 1" by about 11 % in relation to reference run.
- Beef production loses competitiveness in the Agenda scenarios. In scenario "Agenda 1" we can observe a decrease in output by 6 % due to price reduction of 30 %. More moderate price changes in scenario "Agenda 2" (-20 %) lead to

a stagnation in beef production in relation to scenario "Ref 2005".

4.2 Income

Results of the reference run (1995 - 2005)

- In the reference scenario total agricultural income (net value added at factor cost NVA_f) increases from 1995 to 2005 by about 6 % (table 3.3). If one assumes that the trend of reduction of the agricultural labour force of about 3 % p.a. continues, the average income per labour unit would increase by about 40 % until 2005 (in nominal terms; real income development depending on the inflation rate).

Results of alternative scenarios in relation to the reference run

- In the "Agenda 1" scenario the NVA_f decreases by about 12 % in relation to "Ref 2005", whereas in the "Agenda 2" scenario, only a slight decrease of NVA_f (2 %) can be observed. These income effects are the result of different impacts of price changes, changes of the production structure and modifications of subsidies.
- Price decreases, however, lead c.p. to reduction of agricultural production. The positive allocational effects of the fall in compulsory set-aside in favourable locations in Germany partly compensate the negative implications of price reduc-

Table 3.2: Production quantities in Germany (RAUMIS) ('000 t)

	Base Year (1995)	Ref 2005	Agenda 1	% var.	Agenda 2	% var.
Cereals	39500	42191	38051	(-10)	46048	(+9)
Pulses	409	395	413	(+5)	399	(+1)
Oilseeds	2443	2983	4874	(+63)	3240	(+9)
Milk	28576	26833	27171	(+1.3)	27178	(+1.3)
Beef	1380	1407	1320	(-6)	1409	(0)
Pig meat	3255	3452	3545	(+3)	3477	(+1)
Poultry meat	585	724	723	(0)	718	(-1)

Source: Institute for Agricultural Policy, Bonn 1998

tions. Nevertheless, the sectoral GVA_M decreases in the "Agenda 1" scenario by about 21 %. A lower price reduction in "Agenda 2" leads to a smaller decrease of GVA_M (-12 %).

- Agricultural subsidies increase in both Agenda scenarios by about 33 %. While the area related premiums increase only slightly (+8 %), the animal related premiums increase drastically (table 3.4).
- Although the NVA_f in the "Agenda 1" scenario is much lower than in the scenario "Ref 2005", the NVA_f per labour unit still increases in relation to the base year 1995 by about 23 %. Due to the lower reduction of NVA_f in "Agenda 2" the average income per labour unit is in this scenario nearly as high as in the reference run.
- Figure 2 visualises the new composition of the NVA_f . The total agricultural income consists of higher shares of transfer incomes in both Agenda scenarios. The sectoral share of transfer income in NVA_f is about 40 % in the reference run and about 60 % in "Agenda 1".

- The income impacts of the Agenda proposals vary from one region to another. In regions where conditions are naturally favourable, areas previously set-aside are brought back into production. Therefore, the reduction of market income is below average in those regions. This can also be observed in regions where, for example, pig production or potato production increases.

- The share of subsidies in NVA_f in the "Agenda 1" scenario is extremely high in those regions which have a high share of set-aside area on agricultural area or have a high share of beef production in income generation (cf. maps 3.3 & 3.4). In less favoured areas the shares of fallow land in total area are particularly high in the agenda scenarios. This is mainly the case in some parts of East Germany (Brandenburg, Saxony, Thuringia and Mecklenburg-Western Pomerania). In those Bundesländer the share of subsidies in net value added is higher than in the average of Germany.

- In regions with a high share of permanent crops or potatoes on agricultural area, the negative effects on NVA_f are very limited. We can

Table 3.3: Incomes in Germany (RAUMIS) (mio Ecu)

	Base Year (1995)	Ref 2005	Agenda 1	% var.	Agenda 2	% var.
Gross output	31123	30143	27029	(-10)	28520	(-5)
Intermediate consumption	17094	15039	15023	(0)	15238	(+1)
Gross value added (M)	14029	15104	12005	(-21)	13282	(-12)
Subsidies	5226	5169	6842	(+32)	6909	(+34)
Taxes on production	613	640	639	(0)	640	(0)
Depreciation	6621	6882	6946	(+1)	7024	(+2)
Net value added (F)	12022	12751	11262	(-12)	12526	(-2)
Workforce in labour unit	703800	533602	534199	(0)	537941	(+1)

Source: Institute for Agricultural Policy, Bonn 1998

Table 3.4: Subsidies in Germany (RAUMIS) (mio Ecu)

	Base Year (1995)	Ref 2005	Agenda 1	% var.	Agenda 2	% var.
Subsidies	5226	5169	6842	(+32)	6909	(+34)
Area premiums		3377	3653	(+8)	3652	(+8)
Animal premiums		454	1863	(+310)	1928	(+325)
Other subsidies		1337	1326	(-1)	1328	(-1)

Source: Institute for Agricultural Policy, Bonn 1998

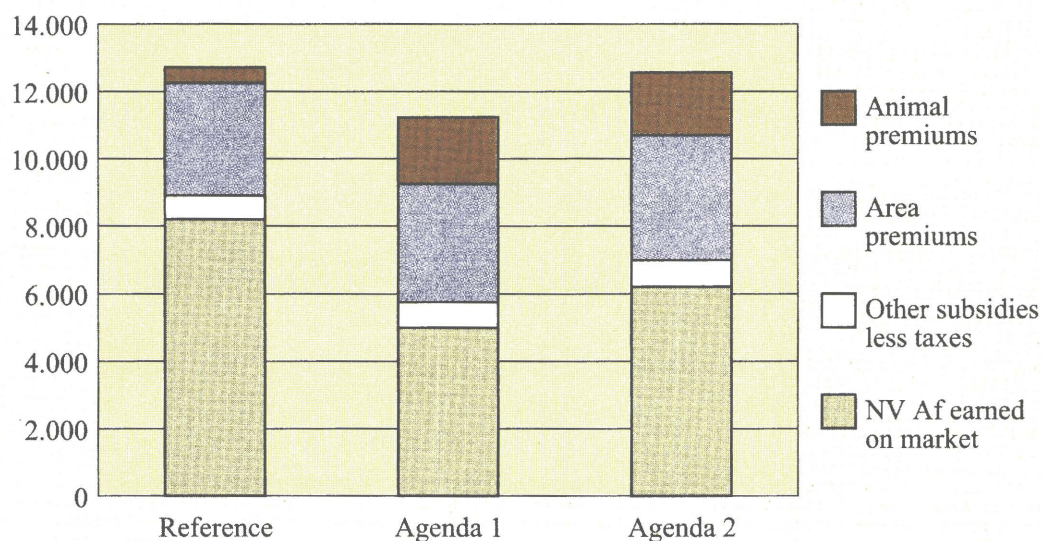
observe a high reduction of NVAf in relation to the reference run in those regions which had in the scenario "Ref 2005" a high reference yield for oilseeds (e.g. Schleswig Holstein, Mecklenburg-Western Pommerania) and suffer in the Agenda scenarios from a huge decline in compensatory payments (up to -45 %).

4.3 Environmental impacts

Results of the reference run (1995 – 2005)

- Trend of sectoral relief in nitrogen surplus per hectare agricultural area in RAUMIS ex-post data base continues in the period from 1991 to 2005 (Reference run):
 - 1991: 73 kg (cf. table 3.5)
 - 2005: 71 kg (cf. table 3.5)

Figure 3.2: Impacts of the agenda proposals on the development of sectoral market and transfer incomes (mio Ecu)



Source: Institute for Agricultural Policy, Bonn 1998.

Table 3.5: Nitrogen balance in the base year 1991 and in the simulation scenarios for the target year 2005 (kg/ha agricultural area)

	Base Year (1991)	Ref 2005	Agenda 1	Agenda 2
Commercial fertilizer	110	105	101	109
Farm manure	86	70	71	71
Other inputs	36	35	35	35
Total application	233	210	207	215
N-extraction by crops	133	118	117	123
Ammonia losses	26	21	22	22
Total extraction	159	139	139	145
N-balance	73	71	69	71

Source: Institute for Agricultural Policy, Bonn 1998

■ Most important reasons:

- reduced total application of fertilizer (organic and mineral) by nearly 10 % to ca. 210 kg/ha agricultural area (cf. table 3.5),
- lower nitrogen extraction by crops (-11 %) as a result of increased share of less intensive crop production and the 17.5 % set-aside obligation.

- The regional analysis of the reference run reveals highest concentration of nitrogen surplus in western parts of Germany (cf. map 3.6), esp. regions with high livestock density of Northrhine-Westfalia, Schleswig-Holstein and Danube basin in southern Germany.

Results of alternative scenarios in relation to the reference run

- Slight reduction in nitrogen surplus in 2005 from Reference run (71 kg/ha a.a.) to "Agenda 1" (69 kg/ha a.a.):

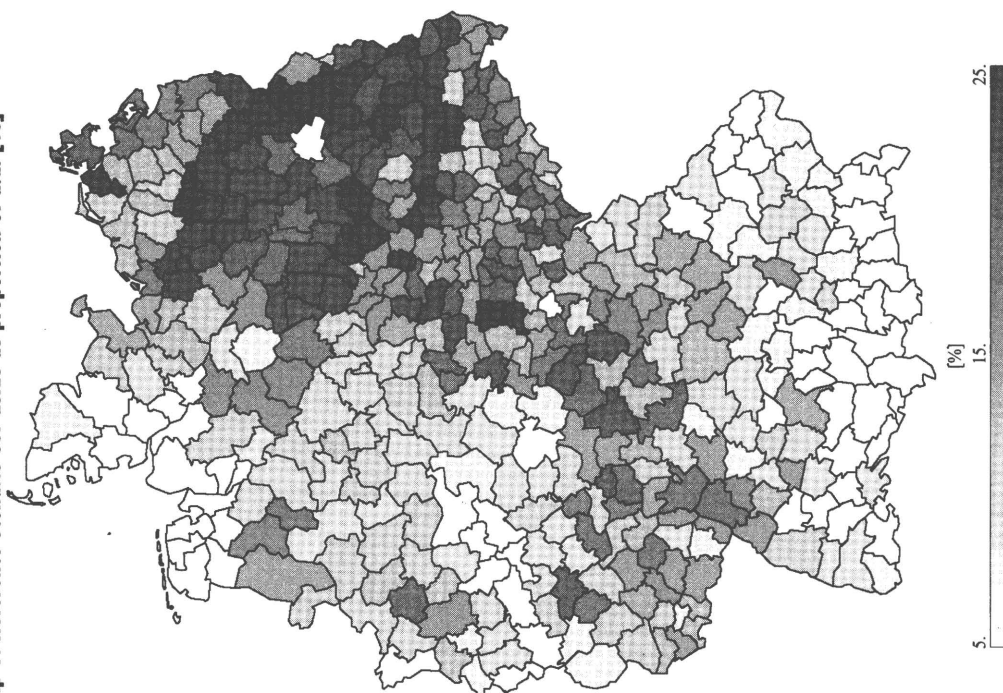
- caused by reduction of optimal special intensity of production processes in line with changes in relative prices of intermediate inputs and products,

- slight increasing pressure on the environment in favourable locations by setting the obligatory set-aside at 0 %, the additional cultivation of areas and the change in the structure of production in favour of more intensive products,
- decreasing pressure on the environment in less favoured locations,
- slightly higher share of mechanical/technical production alternatives in crop production. "Agenda 1" increases the relative competitiveness of no-tillage alternatives.

- Similar pressure on environment in "Agenda 2" (71 kg/ha a.a.) as in the reference run, resulting from:

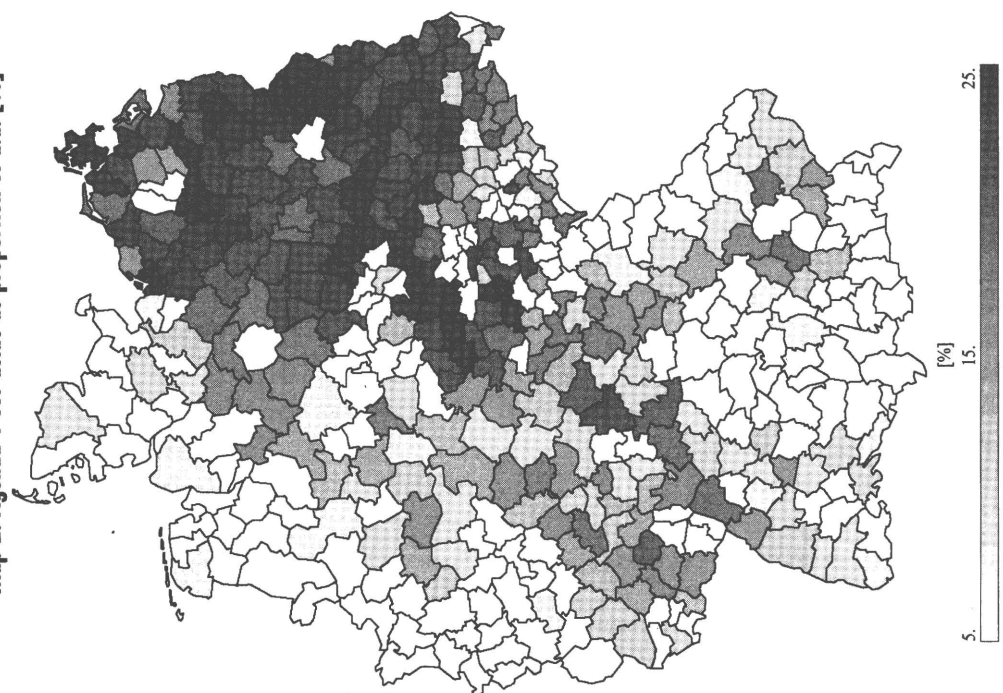
- lower price reduction in crop production causes less facultative set-aside percentage; regions where production was reduced due to price cuts in "Agenda 1" are now in cultivation:
 - more input of commercial fertilizer,
- higher intensity of crop production compared with "Agenda 1", leading to higher N-extraction by plants.

Map 1: Reference scenario set-aside as proportion of a.a. [%]



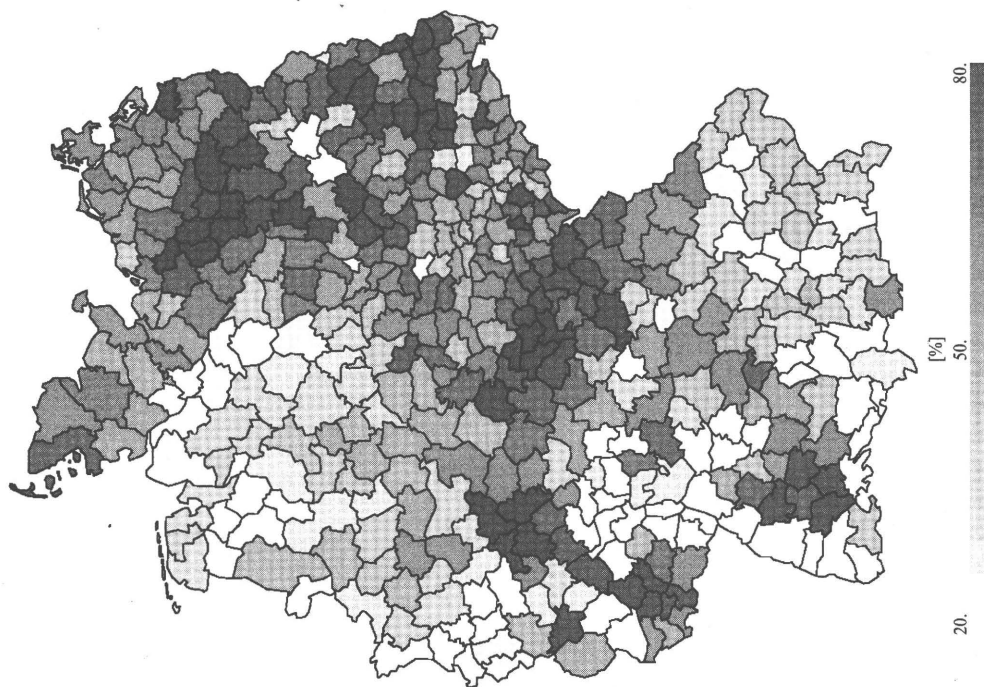
Source: Institute for Agricultural Policy, Bonn 1998.

Map 2: Agenda 1 set-aside as proportion of a.a. [%]



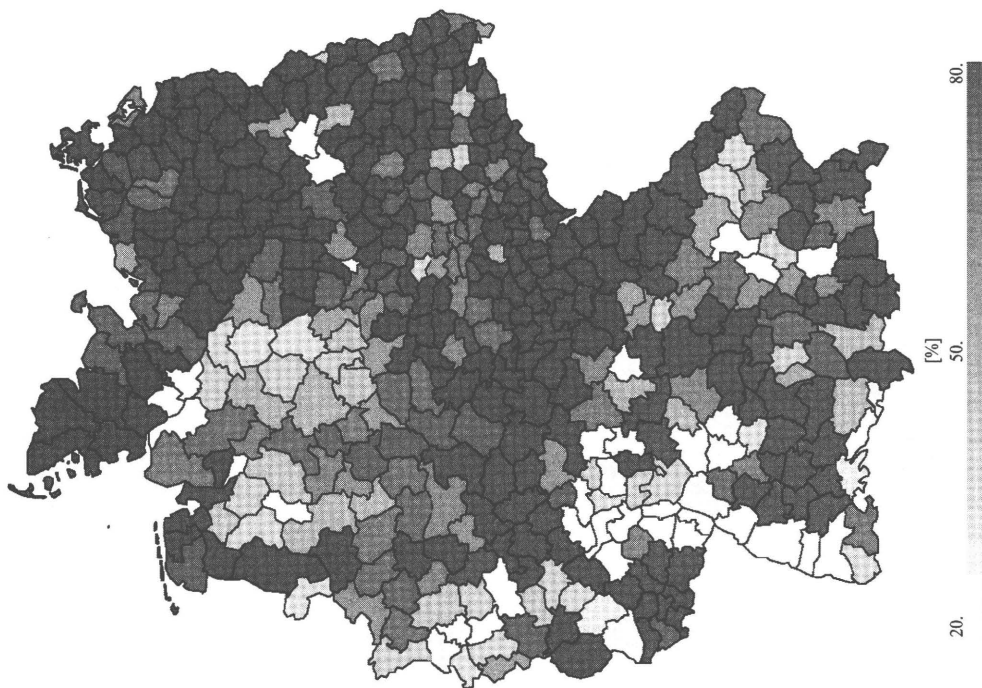
Source: Institute for Agricultural Policy, Bonn 1998.

Map 3: Reference scenario: Share of Subsidies in NVAf [%]



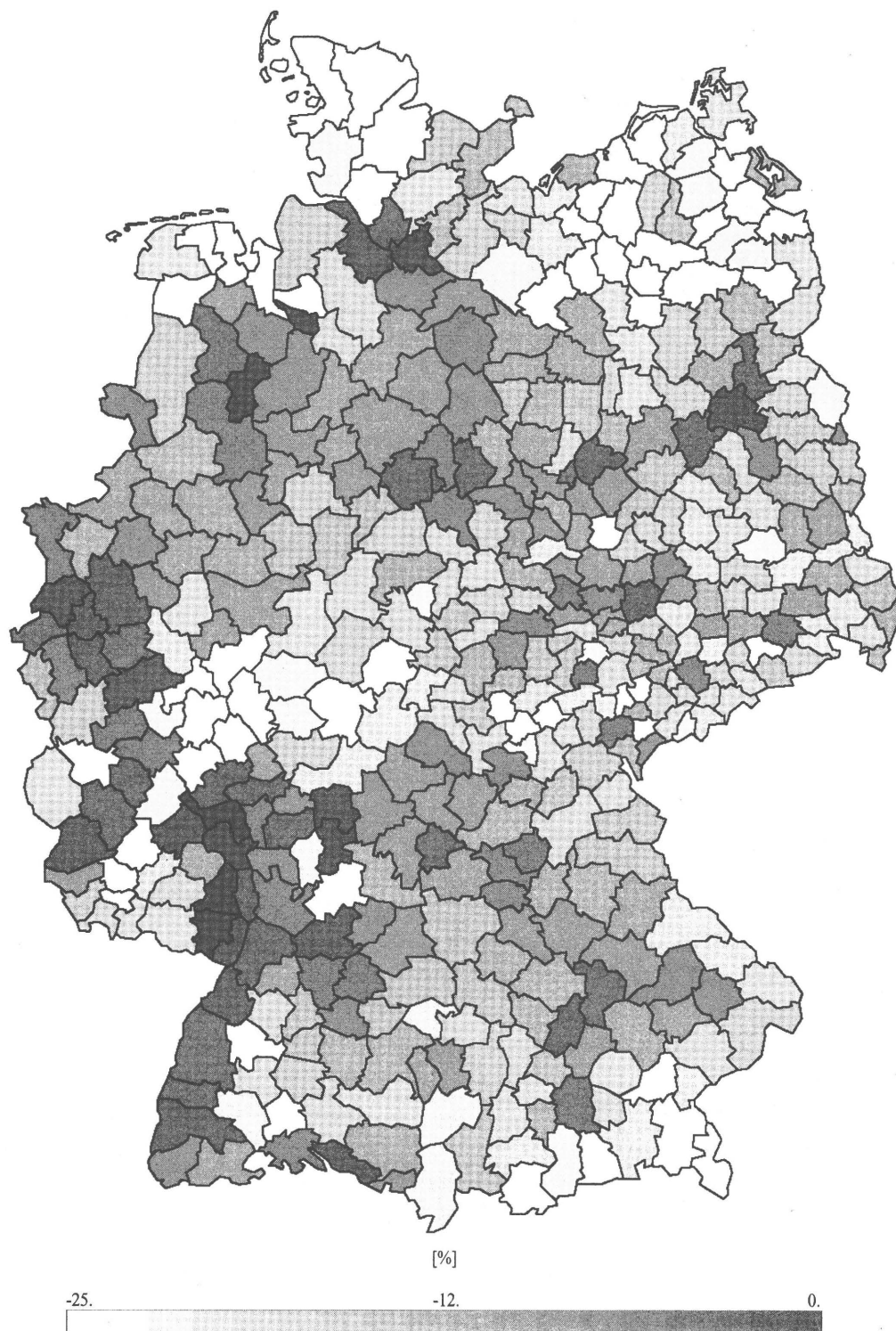
Source: Institute for Agricultural Policy, Bonn 1998.

Map 4: Agenda 1: Share of Subsidies in NVAf [%]



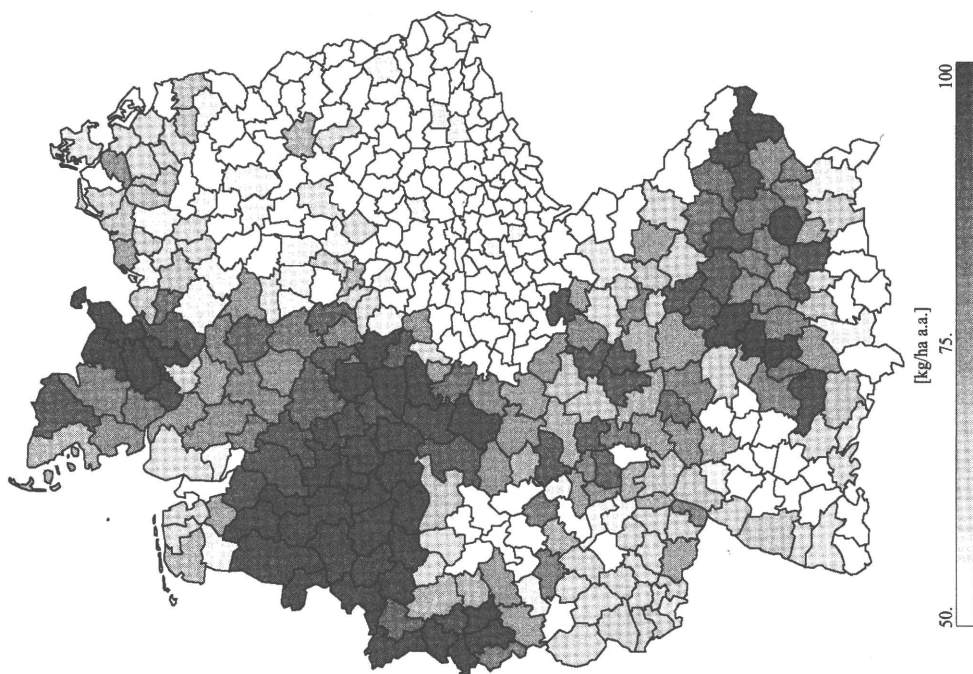
Source: Institute for Agricultural Policy, Bonn 1998.

Map 5: Reduction of Net value added at factor costs, Ref. 2005 to Agenda 1 in % points



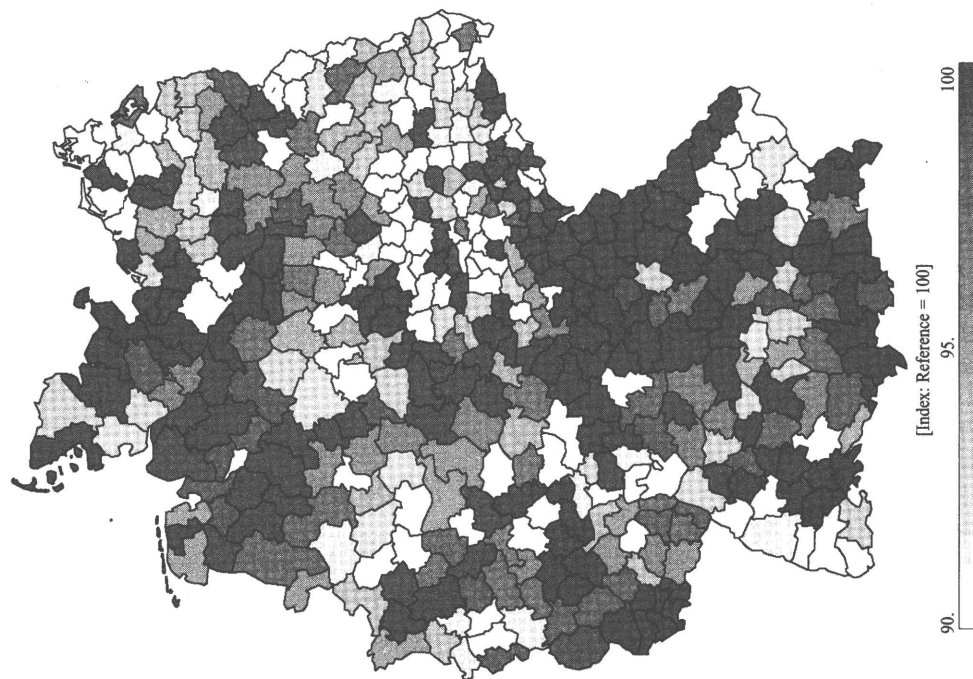
Source: Institute for Agricultural Policy, Bonn 1998.

Map 6: N-balance in Ref. 2005 [kg/ha a.a.]



Source: Institute for Agricultural Policy, Bonn 1998.

Map 7: Development of N-balance: Ref. 2005 to Agenda 1 [%]



Source: Institute for Agricultural Policy, Bonn 1998.

Bibliography

The following publications can be classified in two groups: The first group (A) contains publications in which the RAUMIS model is described. The second group (B) contains publications with a main focus on model results.

A) Description of the RAUMIS model

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Sectorial impact analyses

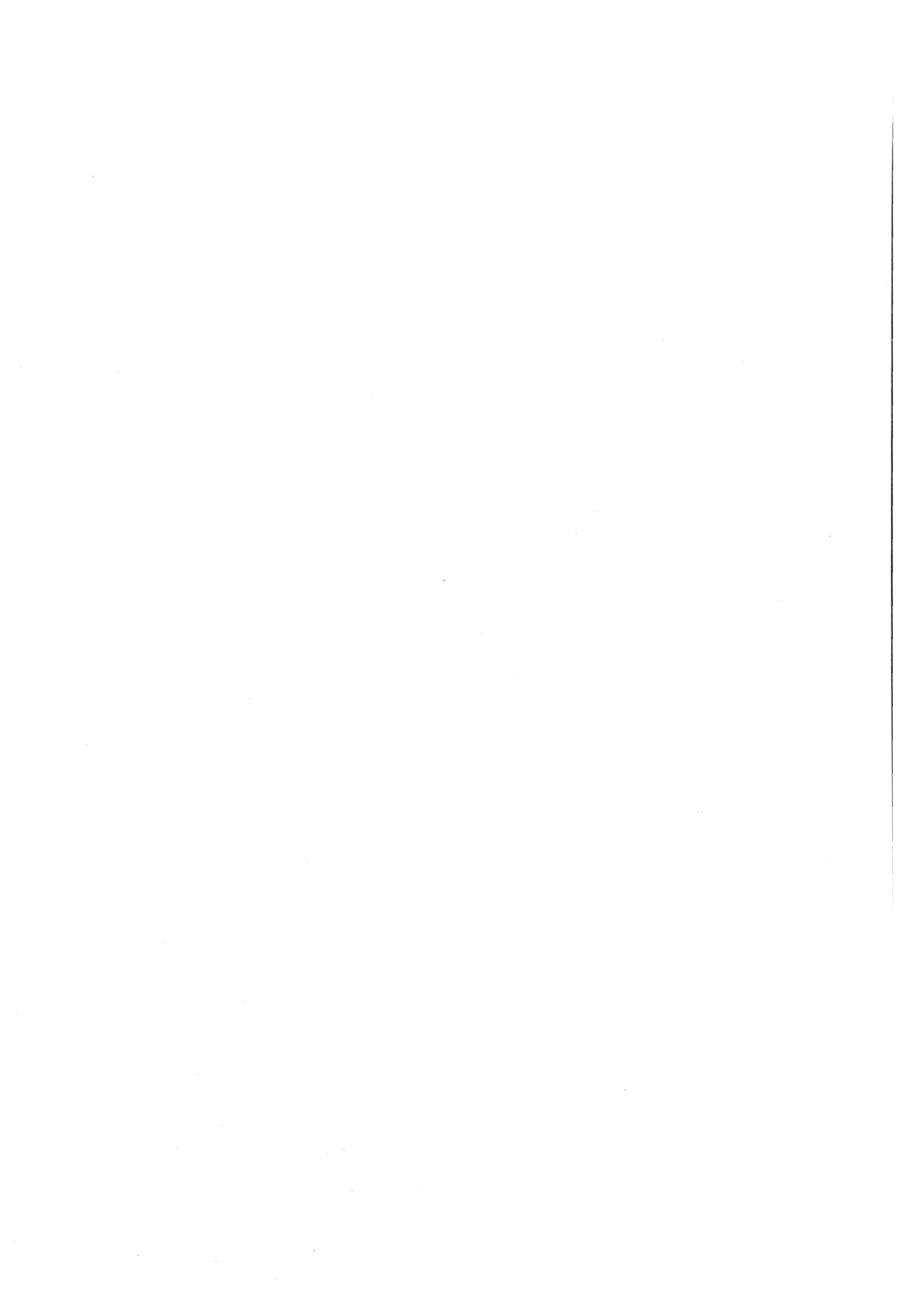
**Simulations with the
SPEL/EU-MFSS and
the RAUMIS model
systems**

**Comments and addi-
tional considerations**

**By the Institute for Agricultural Policy (IAP)
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Chapter IV

Simulations with the SPEL/EU-MFSS and the RAUMIS model systems

Comments and additional considerations

1. Introduction

The March 1998 proposals for a further reform of the Common Agricultural Policy (CAP) cover price reductions for cereals, beef and milk and an increase resp. introduction of compensatory payments in these production branches.

On request of DG VI, Eurostat F-1 carried out simulations on the impacts of Agenda 2000 proposals¹⁵ (cf. Part A, Chapter II). The Institute of Agricultural Policy (IAP), Bonn University, has been asked to comment on the SPEL/EU-MFSS results and to give additional information on the impacts of Agenda 2000 proposals by quantitative analyses for Germany based on the modelling system RAUMIS. A more comprehensive paper on RAUMIS results has already been presented to DG VI in April resp. June 1998¹⁶ (cf. Part A, Chapter III).

2. Comments on the scenario assumptions

The distinction of two price scenarios seems to be adequate. The scenario 1 is a "must" as an absolute limit under pessimistic price developments on the world markets for agricultural commodities. Also, the price vector of scenario 2 seems to be well chosen, in order to define a corridor of "possible" price developments. A further scenario, containing "most probable" price forecasts according to the present state of world outlook work, might be a useful third alternative.

More questionable are the exogenous assumptions on the degree of set-aside in the scenarios 1 and 2.

What are the theoretical reasoning and the empirical basis behind these assumptions? Two critical comments:

- it can be expected that the amount of set-aside depends on the degree of price cuts, therefore it should be larger in scenario 1;
- according to the experience with voluntary set-aside and RAUMIS calculations for Germany, the share of set-aside may be much larger than assumed, even if Germany is in this respect not representative for the EU.

3. Comments and additional considerations on the results

Allocational effects on production structure

Generally, the SPEL/EU-MFSS models the allocational effects as a function of changes in value added per unit of the production activities. Responses to changes in value added per unit (prices, premiums, etc.) are depicted by elasticities. These elasticities have been estimated on the basis of time series, where price changes and changes in production structure have been moderate. Thus, the impacts of drastic price changes on production structure and income is not easy to capture.

The same is true for the modelling of voluntary set-aside which has been assumed exogenously by DG VI in the Agenda 2000 scenarios. According to DG VI, this level has been set to about 2.2 mio ha in the EU for the two Agenda 2000 scenarios. The

¹⁵ Eurostat (1998), "Simulations with SPEL/EU-MFSS in the context of Agenda 2000 - Results for EU 15 - Report of Eurostat to DGVI", Luxembourg.

¹⁶ Henrichsmeyer, W. Löhe, W., Meudt, M., Sander, R. (1998), "Impact analyses of the Agenda 2000 proposals. Regionalized analysis for the German agricultural sector", Bonn. Actualized version of June 1998.

assumed level affects also the allocation of the production activities.

In contrast, models of the RAUMIS or the CAPRI-type determine the amount of voluntary set-aside endogenously. Cultivated areas and areas under set-aside programme are allocated according to their regional competitiveness. The modelling results for Germany (RAUMIS) reveal a high share of voluntary set-aside area in the total "crop area" (area planted to cereals, oilseeds and pulses plus set-aside). This share is about 21 % in version 1 and still approximately 15 % in version 2 whereas the aggregated levels of obligatory and voluntary set-aside reach a share of 23 % on the crop area in the reference run. In Germany, an exceptional high realization of voluntary set-aside can be observed ex-post too, so that these dimensions cannot simply be transferred to EU 15. However, the share of 4.8 % on crop area corresponding to the DG VI assumption of 2.2 mio ha voluntary set-aside seems to be quite low, not only in the context of the RAUMIS results.

The level of set-aside areas in the EU does also influence world market prices for agricultural commodities. Calculations with the WATSIM(92) model (database of 1992) reveal the impacts of alternative EU policy assumptions. If the set-aside rate is reduced from 17.5 % to 10 %, the EU cereal production could increase by about 4.3 % for soft wheat and by approximately 6 % for barley and maize. The resulting changes in EU net trade would lead to a decrease of world market prices of about 3 % for soft wheat, 5 % for barley and 2 % for maize. The examples show that the amount of set-aside areas is directly affecting prices too, and consequently changing relative competitiveness between the production activities.

The allocational changes of oilseed production are mainly influenced by the relative competitiveness between oilseeds, cereals and set-aside. The simula-

tions of SPEL/EU-MFSS on the Agenda 2000 proposals reveal a slight increase of oilseeds cultivation (4 % resp. 2.9 % in relation to reference run) although incomes per hectare decline because of the reduction of compensatory payments for oilseeds by 35 % in EU average according to Agenda 2000 proposals.

Analyses with the regionalized modelling system RAUMIS reveal a significant influence of changes in compensatory payments on the competitiveness of oilseeds. Sensitivity analyses on alternative relations of cereals and oilseeds prices show a high response of oilseeds production¹⁷. Therefore, an adequate analysis of oilseeds cultivation should take into account the interdependencies of changes in oilseeds production in the EU and responses of oilseeds prices on the world market (e. g. with the WATSIM model).

Regional impact analyses with RAUMIS show an extension of area under "grandes cultures" on favourable locations. In marginal areas we find a high share of voluntary set-aside area. This is due to a further decoupling of transfer payments in the Agenda 2000 proposals, since cereals, oilseeds and set-aside receive the same amount of compensatory payments. Therefore, market income becomes more important for the production decision of farmers.

The moderate proposals of Agenda 2000 concerning the milk market will have only little impact on the production structure. Especially the yield dependent compensatory payments for milk cows (according to the concept of "premium units") will compensate losses in gross value added due to price cuts for milk, so that an increase in the milk quotas (+2 % in the EU) will still keep the quotas restrictive in the Member States.

The simulations of SPEL/EU-MFSS project a slight increase of beef production under the Agenda 2000

¹⁷ For sensitivity analyses see: Henrichsmeyer, W., Löhe, W., Meudt, M., Sander, R. (June 1998), "Impact analysis of the Agenda 2000 proposals. Regionalized analyses for the German agricultural sector", Bonn.

scenarios. Since the direct payments under Agenda 2000 regulations do not fully compensate losses in production value, the reduction of production costs (intermediate inputs of fodder and young animals) leads to the observed phenomenon. In contrast, the RAUMIS model reveals a considerable decrease in beef output for Germany in version 1. The extent to which input costs are reduced depends partially on assumptions on how the price cut for beef is translated into price cuts for young animals. In order to give a better foundation for scenario assumptions, analytical work in this field should be extended. This is also true for assumed price adaptations of fodder stuff which is traded on the agricultural world market.

The SPEL/EU-MFSS results for pig meat, poultry and eggs seem to be plausible. In markets without regulation the lower production costs due to price cuts for feeding stuff (cereals) lead to an (immediate) increase of the profit margins. It depends on the slope of the demand curve on how the increase of production is translated into a decrease of meat prices and a corresponding reduction of profit margins.

Lower production costs and price adjustments will increase the international competitiveness of EU agriculture in these production branches and give a chance to get access to new markets in the world.

Effects on agricultural income

As described above, version 2 of the two Agenda 2000 scenarios seems to depict the more probable development of world market prices for agricultural commodities. Agricultural income, expressed as Net Value Added at factor cost, would decrease according to SPEL/EU-MFSS results by about 2.1 % in EU 15 in relation to the reference run. RAUMIS results for Germany show in tendency the same negative impact on agricultural incomes in Germany.

4. Conclusions

The analyses of the simulation runs with the SPEL/EU-MFSS lead to the following conclusions with respect to the content of the simulation results and the methodological concept.

Comments on the simulation results

The bottom line of the SPEL/EU-MFSS simulations is that compensatory payments will not fully compensate income effects of the proposed price reduction so that overall agricultural income development is slightly negative at EU level (at least in version 2). This politically important result corresponds more or less to the conclusions which can be derived from the RAUMIS simulations for Germany, and is not questioned by diverging results of the SPEL/EU-MFSS simulations on some aspects: e.g. rather small degree of set-aside (even in the pessimistic price scenario) and a rather low substitution elasticity between grain and oilseeds.

Comments on the methodological concept

The advantage of SPEL/EU-MFSS is that it covers all Member States of the EU 15, which enables the modelling of market responses on non-administered markets. A principal difficulty of econometrically based modelling approaches arises when estimated elasticities have to be applied for a range of commodity prices that had not been observed so far. This might explain the relative low supply response of grain and oilseeds, and excludes the possibility to model set-aside responses endogenously.

In this respect, the Linear Programming/Non-linear Programming based methodological concept of the RAUMIS model has comparative advantages. The high degree of regional differentiation enables rather smooth aggregate supply responses according to the

variation of regional marginal costs, as well as region-specific impacts on production, set-aside and income. But its major limitation is the restriction to the supply side.

Therefore, the complementary use of both models, SPEL/EU-MFSS and RAUMIS, seems to be advis-

able, at least at the present stage of model development. After the conclusion of the FAIR project, the CAPRI model might become the best choice for region specific analyses at EU level. On the other hand, the envisaged modification and new estimation of the SPEL/EU-MFSS model might increase its flexibility and forecasting power.

Sectorial impact analyses

Implications for European agriculture (CAPMAT simulations)

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Chapter V

Implications for European agriculture (CAPMAT simulations)

Abstract

In its Agenda 2000, the European Commission proposes 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. Since for wheat the gap between internal and external prices vanishes and for coarse grains, beef and dairy products it is reduced considerably, the measures amount, at the world market price levels prevailing in the early nineties, to a substantial reduction of export subsidies both per unit and in absolute terms. 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 proposal facilitates the accession of new members, and constitutes a well defined opening bid for the WTO negotiations, but the successful completion of these processes will presumably require further CAP adjustments.

1. Introduction¹⁸

The Common Agricultural Policy (CAP) underwent a significant reform during the period 1993-1995, as the European Commission moved its agricultural policy into a new direction. The thrust of the reform was a shift from price to direct income support, achieved by lowering the intervention prices, while compensating farmers via acreage and headage pre-

miums. A set-aside scheme was introduced as a means to reduce the production of cereals and oilseeds, and professional farmers were only eligible for compensation payments if they participated in this scheme. With the benefit of hindsight, it can be concluded that the measures relieved international tensions on agricultural export markets, and virtually saved the Uruguay Round. Furthermore, the compensation payments turned out to be generous as market prices became higher than anticipated.

While the CAP has essentially remained unchanged since 1992, the Commission concluded in Agenda 2000 that a deepening and widening of the 1992 reform was called for, in view of the 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 proposals were presented as the agricultural chapter of Agenda 2000, a broad package to prepare the European Union for the next century (CEC, 1997a), and elaborated upon in the draft regulations that were published in March 1998 (CEC, 1998a). In a nutshell, it is proposed to pursue the 1992 reform with lower internal prices and a further increase of headage and acreage premiums as compensating payments. The proposals also seek to improve market conformity by setting the set-aside rate to zero, and by allowing for an expansion of milk quotas. Agenda 2000 also aims at strengthening of rural policies, and emphasises the diversity of European agriculture (see also CEC, 1997c). In addition, food quality and safety concerns figure more prominently since widespread animal diseases have plagued the EU.

¹⁸ 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-DLO), both in The Hague, and the Centre for World Food Studies (SOW-VU, Amsterdam). M.A. Keyzer (SOW-VU) is project leader. The modelling tool was constructed by a team consisting of L.J.H. Betendorf (CPB), M.A. Keyzer, M.D. Merbis (SOW-VU), and A.J. Muskens (LEI-DLO). An earlier version that was based on the July 1997 proposals, was presented to the Dutch parliament (SOW-VU et al., 1998). The current version implements the March 1998 proposals and is based on the draft regulations as published by the Commission. The comments on earlier drafts by J. Schotanus, H.F. Smit, L.C. Smits, A.J. Vermuë of the Netherlands Ministry of Agriculture, Nature Management and Fisheries, P. Litjens of the Ministry of Foreign Affairs, P. Bascou from DG VI and the members of the FEA team are gratefully acknowledged.

This chapter studies the consequences of the agricultural market and price policies of Agenda 2000, focusing on those commodities (cereals, beef and dairy) for which GATT commitments on subsidised exports are constraining at present or will be so in the near future. It closely follows the specification of the March 1998 proposal with respect to the details of acreage and headage payments. 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 EU enlargement with CEECs. This model, the CAP-Modelling and Accounting Tool (CAPMAT), incorporates the CAP rules and farmers' behavioural response to a policy change.

The impact of Agenda 2000 is shown by comparing a reform scenario with a reference scenario that amounts to a continuation of current policies. This model is the successor of ECAM which was used to analyse earlier CAP reforms (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 this analysis, results are only presented for the commodities affected by Agenda 2000, either directly such as cereals, oilseeds and beef, or indirectly, e.g. pork and poultry products as these face lower feeding costs. Outcomes are presented for EU 15 aggregates only, starting in the model's base year 1995. The reform is introduced in 2000 and its effects are measured in 2005 and compared to the business-as-usual calculations for that year.

The chapter is organised as follows. Section 2 describes the outlook for European agriculture under the business-as-usual scenario, which is compared with the Agenda 2000 scenario in section 3. This section also considers the implications of market prices falling less than the drop in intervention prices assumed in the Agenda 2000 scenario, the impact of lower world market prices for cereals, and discusses the outcomes of Agenda 2000 with respect to next

WTO round and enlargement. Section 4 concludes. Two annexes contain supplementary model outcomes, as well as a brief description of CAPMAT.

2. The business-as-usual scenario

2.1 Scenario assumptions

The implementation of a scenario requires assumptions on both exogenous and policy variables. The assumptions on exogenous variables such as population and GDP growth are maintained in all scenarios. This also applies for a set of variables directly related to agriculture. For instance, the rate of technological progress is taken to be the same albeit lower than in the past, and the availability of agricultural land continues its downward trend, falling from 150.6 mio ha in 1995 to 145.0 mio ha in 2005, a decrease of 3.7 %. More refined assumptions that differ among scenarios could have been developed, but these would not affect the overall conclusions of the study, while obfuscating the transparency of scenario comparison.

The aim of transparency has also guided the treatment of world market prices. It would be possible to let the EU trade position affect world prices, but as this effect strongly depends on the policy reactions by other countries, it was decided to treat world prices as exogenous. Price projections by OECD, World Bank and FAPRI serve as main source. Though these differ to some extent, they all assert that after the record levels in 1996, cereal prices will decline to the levels of the early 90s, and then rise again. 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. Clearly, these price projections did not anticipate the current slump in commodity markets, and assuming world prices to rise leads to an automatic alleviation of budgetary costs, since it reduces the export subsidies. To be on the conservative side we

assumed that the export prices of the EU for cereals and vegetable oils would drop until 2000 and would increase for dairy products, cakes, sugar and beef. After 2000 all export prices remain constant until 2005 in real terms.

As regards policy variables, the business-as-usual scenario supposes, in accordance with present regulations, that intervention prices and premiums per hectare and animal remain constant in nominal Ecu terms. In real terms this implies a modest 1 % decline due to inflation. Other main policy variables that are also kept fixed are:

- the set-aside rate is maintained at 5 %, which is the level of 1997;
- dairy and sugar quota are kept constant;
- intervention stocks are kept constant at 1995 level.

Furthermore, stabiliser 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;
- 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.

We notice that since 1985 the actual inflation rate in the EU has fallen from 5 % to 2 %. We use an even more conservative assumption of 1 % to prevent the evaporation of all budgetary problems of the CAP through Ecu inflation. If inflation turns out to be higher and prices are not adjusted, farmers will suffer and the EU budget will be lower in real terms. Combined with the assumption of constant real world prices, this assumption on inflation also implies that the gap between internal and external prices narrows by 1 % per annum.

Furthermore, the GATT commitments must be dealt with. These commitments impose ceilings on subsidised exports, and the EU will increasingly find it difficult to remain below these bounds. To reflect these we discuss three variants. First, the business-as-usual scenario neglects this part of the trade agreement altogether. Since intervention stocks are kept constant, the exportable surplus (production minus domestic demand) goes entirely to exports. The exports generated in excess of the commitments must then be viewed as a measure of the need for reform. Secondly, we consider an adjustment through higher public stock level. This has important budgetary implications but it makes the business-as-usual scenario perfectly GATT compatible. Finally, we consider the less costly option of raising the set-aside rate, which also guarantees compatibility but has negative effects on incomes from farming.

2.2 Main outcomes

Production and trade

Production growth continues for most products (cf. table 5.1). For cereals and oilseeds, the driving forces are a reduction of the set-aside rate from 15 % (in 1995) to 5 %, 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 almost 2 mio head. The negative impact of this reduction on beef production is amply compensated by growth in the non-dairy cattle sector after 2000.

In terms of quantities of farm produce, human consumption has for several years been more or less stagnant within the EU. Over the period 1995-2005, 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. The use of cereals substitutes (protein feeds and carbohydrates) as animal feed is also declining, so that the share of cereals in the feed mix has risen by about 2 %, following the drop in cereal prices within the EU.

Table 5.2 also shows the export commitments as agreed under the GATT (see GATT 1994). Comparison to observed and simulated export levels in 1995 and 2000 reveals that under the current provisions of the WTO Agreement on Agriculture, simulated exports exceed the commitments over the implementation period 1995-2000, in quantity terms. The comparison is not made in monetary terms, since it largely depends on world market price levels, and the commitments in quantities are generally thought to become more binding.

The results indicate that while GATT commitments tighten by 21 % over five years, simulated exports stagnate, and even expand in the case of cereals, due to satiated demand and yield-induced increases in supply. For wheat, simulated exports are 135 % higher than the GATT commitment. For bovine meat overshooting could arise easily, due to the uncertain long-term consequences of the BSE crisis. The annual balance of supply and demand is particularly deceptive here, since almost 700 000 t of stocks have accumulated, that must be sold eventually. With respect to dairy, commitments were already binding in 1995 and the tension has not attenuated since. Here a modification in product composition might offer some relief, since each of the four GATT commodities basically is a mix of two ingredients, fat and protein. The table does not show the GATT commitments for pigs, poultry and eggs, as the EU can meet these through the prevailing arrangements: since there is no intervention price for these prod-

Table 5.1: EU 15 production (mio t) and annual growth rate (%), 1995-2005				
	1995	2000	2005	Growth rate
Wheat	89.3	107.9	113.0	2.4
Coarse grains	89.9	103.7	106.5	1.7
Fats and oils	8.2	8.7	8.9	0.9
Fat from milk	4.8	4.8	4.8	0.0
Skimmed milk	109.1	109.2	109.3	0.0
Beef and veal	8.0	7.9	8.1	0.1

The impact on trading volumes follows these shifts in production and consumption (cf. table 5.2, last two columns). 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 the use of the protein component of milk in animal feed decreases. The figures in table 5.2 would slightly underestimate the export of dairy products since they are based on the assumption of the fat and protein contents in milk remaining constant, while both actually display upwards trends, fat especially.

Table 5.2: GATT commitments and EU 15 exports ('000 t)					
	Base quantity	GATT commitments		CAPMAT exports	
		1995	2000	1995	2000
Wheat and wheat flour	18276	20408	14438	15752	34058
Coarse grains	13725	13690	10843	8679	18100
Butter and butter oil	506	488	399	213	141
Skimmed milk powder	345	335	273	369	450
Cheese	407	427	321	520	344
Other dairy	1213	1185	958	1461	977
Bovine meat	1040	1137	822	876	776

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

ucts, the internal price can adjust downward whenever export subsidies have reached their ceilings.

Agricultural income

Let us return to the scenario outcomes. Real income from agricultural activities (table 5.3), defined here as net revenues including transfers, premiums and subsidies, would rise by 0.3 % per year during the period 1995-2005. This fairly modest increase is the net result of a much greater increase in production volume and a reduction in prices corrected for inflation. At the same time a significant reduction in the workforce takes place, by 2.2 % per annum. Consequently, the income per full-time agricultural worker increases by 2.5 % per year. Although an increasingly greater portion of income will have to be allocated to capital as opposed to labour, it can be concluded that total earnings in the agricultural sector will keep more or less in line with that of other sectors of the economy.

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 0.7 % per annum, in real terms, there would seem to be sufficient budgetary room for such modifications, while respecting the spending guideline. 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. Table 5.4 compares both options with the business-as-usual scenario (case 0). In case 1, the cereal exports are limited by the GATT limits (i.e. 25.3 mio t), and the remainder is stored (27 mio t). This leads to an eventual increase in annual storage cost of some 800 mio Ecu. In case 2, the set-aside rate is set at 17.5 % (which equals the “reference”

Table 5.3: Farming income and employment, EU 15

	1995	2000	2005	Growth rate
Total farming income (bio Ecu)	138.99	139.05	143.41	0.3%
Farm population (mio)	7.82	7.01	6.27	-2.2%
Farming income ('000 Ecu/cap.)	17.78	19.84	22.85	2.5%

Table 5.4: Impact of measures to meet the GATT cereal commitments, 2005 (bio Ecu)

	Set-aside rate	Income	Storage costs	Refunds	Premiums
Case 0. Exportable surplus is exported, GATT commitments ignored (business-as-usual)	5.0%	143.41	0.39	4.92	18.13
Case 1. Stock holding policy: GATT commitments respected, surplus is stored.	5.0%	143.41	1.20	4.21	18.13
Case 2. Set-aside policy: GATT commitments respected, surplus is stored.	17.5%	142.25	0.52	4.14	18.65

Notes: In case 2, COP area including set-aside is frozen per crop; storage costs, refunds and premiums reflect the main changes in EAGGF. Unit storage cost of cereals is set at 30 Ecu/t.

rate in CEC, 1997b). The exportable surplus for cereals in 2000 is then 25.4 mio t and this will rise to exceed the GATT commitments by some 4 mio t in 2005. Some additional stockpiling is then required. Net revenues for farmers drop by 1.2 bio Ecu.

In practice, the EU might resort to a combination of both policies, and provide for additional compensation for the higher set-aside rates. Whatever the combination chosen, the stockholding option will be costly and tends to accumulate over the years, while higher set-asides rates will leave valuable land resources idle, and will have to face the opposition by countries with a large cereal production.

The business-as-usual scenario: a summary

Under the business-as-usual scenario agricultural production will continue to grow, agricultural incomes per worker stay in line with growth in sectors, due to sustained labour outmigration, and the EAGGF does not increase in real terms and remains well within the spending guideline. However, this calculation ignores the costs of meeting the existing GATT commitments, which are substantial, especially for cereals.

Two further problems will have to be addressed if present policies are being continued. First, in the upcoming WTO negotiations, the EU will have little scope for responding to demands for further trade liberalisation. Agriculture will once more attract considerable attention, and impede progress on other subjects. Secondly, if the current policy is unchanged, 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.

3. The Agenda 2000 scenario

3.1 Scenario assumptions

Given the problems to be encountered when current policies are continued, the agricultural chapter of Agenda 2000 sets new levels for intervention prices and premiums. It introduces new rules for market organisation (CEC, 1997a), and the draft regulations have been developed since (CEC, 1998a). The following set of policy rules and model assumptions describes how these were incorporated within the CAPMAT model, to generate the Agenda 2000 scenario.

- As explained earlier, import and export prices are kept at the same level as in the business-as-usual scenario.
- The price proposals made in Agenda 2000 which refer to intervention prices are taken to be representative of market prices within the EU. This implies that every fall in intervention price transmits fully to market and farm gate prices. An alternative assumption, whereby the transmission is incomplete is considered in the Box.
- Intervention prices decrease: cereals by 20 %, beef by 30 %, milk by 15 %.
- Milk quotas are expanded by 2 %. The additional quota rights are distributed non-uniformly over Member States, favouring farmers in mountainous and arctic regions.
- The compulsory set-aside rate is set at 0 %, while compensating premiums are made more uniform: all cereals and oilseeds now receive the same premium (66 Ecu/t) with a mark-up for pulses (6 Ecu/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.

■ Dairy cows, expressed in standardised units producing 5800 kg milk per year, receive a headage premium (based on 215 Ecu/head); premiums are increased for suckler (215 Ecu/head) and male bovines (310 Ecu per bull, 222 Ecu per steer, to be handed out twice). Notice that the premium rates for males and sucklers include the top up of 50 % that may be handed out by national governments under the “national envelopes” (Agra-Europe, April 1998, p. 9). The deseasonalisation and extensification premiums are increased to 100 and 72.5 Ecu/head, respectively.

■ Premium outlays are capped by ceilings, in close agreement with the draft regulations. Spending on COP crops is limited to a reference acreage. If planted acreage 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 (CEC, 1997d, Annex I). 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 Annex I and II of the regulation on beef (CEC, 1998a). 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 deseasonalisation and extensification premiums.

■ 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, wine and sugar beet sectors are kept the same in both scenarios.

3.2 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 business-as-usual scenario in 2005.

Community preference

Agenda 2000 can be seen as a major step in reducing the gap between internal and external prices. Under the present regulations the gap already tends to tighten through inflation but Agenda 2000 substantially accelerates this process. In 2005, prices have come much closer to world market level, or even reached it (cf. table 5.5). Refunds vanish completely for wheat while for coarse grains there still is a difference of 23 Ecu/t. For beef, a small gap remains slightly in excess of 100 Ecu/t, as compared to an initial difference of 1000 Ecu/t. The drop is partly triggered by the assumption of a 1 % rate of inflation. This also applies to the refunds for fat from milk and skimmed milk that fall by 50-75 %.

Production and activity levels in Agenda 2000

In the CAPMAT model, changes in activity levels follow from changes in relative net revenues (cf. Annex A), triggered by changes in prices and premium rates. It appears that the net revenues of cereals and oilseeds have fallen. For cereals, the increase of premiums only partly compensates the 20 % price fall. For oilseeds the premiums have dropped. Lower

Table 5.5 : Ratio of internal and external price

	Business-as-usual		Agenda 2000
	1995	2005	2005
Wheat	1.37	1.22	1.00
Coarse grains	2.48	1.68	1.35
Fat from milk	4.41	1.88	1.59
Protein from milk	2.05	1.31	1.12
Beef	2.29	1.51	1.06

profitability of pasturegrass leads to an area reduction of 2 %. This area as well as the area freed from set-aside allows the area under cereals and oilseeds to rise despite lower net revenues per hectare. Net revenues 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 % reduction in livestock numbers. Non-dairy cattle basically remains a grass-based activity for which alternative usage is scarce. This explains the weak responsiveness of production to a strong fall in price (cf. table 5.6). Net revenues of dairy cattle fall in all Member States, on average by 10 %. Milk production expands nonetheless, following the expansion of milk quotas, which continue to be binding. There is a small expansion of the intensive livestock sector, driven by higher consumption.

Table 5.6 : EU 15 production in 2005 ('000 t)

	Business-as-usual	Agenda 2000
Wheat	113008	121315
Coarse grains	106500	109097
Pulses	7844	8049
Sugar refined	18635	18679
Fats and oils	8946	9407
Fat from milk	4815	4908
Skimmed milk	109274	111401
Beef and veal	8069	8020

Consumption and feed use

Dairy and meat consumption increases due to lower prices (cf. table 5.7). 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 6 mio t.

Trade

Table 5.8 shows that total cereal exports increase by 4.7 mio t while wheat exports even rise by 6.4 mio t (remind that stocks are kept constant). Whereas the wheat price has reached world market level, coarse grains remain above world market level and exceed the GATT commitments by 50 % in quantity terms. Yet the difference from the assumed world market prices proves to be small and suggests that GATT commitments could be met if coarse grains prices are slightly reduced. This would stimulate domestic feed use but at the same time cause a production shift towards wheat. Dairy exports, especially of the fat component, increase, as domestic demand cannot keep pace with the expansion of the dairy quotas. In all, the reduction of the price gap will be helpful in meeting the GATT constraints, since refunds decrease substantially, for coarse grains by 54 % and for dairy by 43 %.

Table 5.7 : EU 15 consumption and feed/seed use in 2005 ('000 t)

	Consumption		Feed/seed use	
	Business-as-usual	Agenda 2000	Business-as-usual	Agenda 2000
Wheat	46298	46430	35501	37346
Coarse grains	31004	31049	62813	67013
Pulses	2470	2468	5908	5630
Sugar refined	14434	14391	150	151
Fats and oils	13756	13732	1186	1177
Protein feeds	—	—	15624	14546
Carbohydrates	—	—	9874	9343
Fat from milk	4520	4547	183	191
Skimmed milk	81401	81885	17248	17958
Beef and veal	7518	8135	—	—

Table 5.8 : EU 15 exports in 2005 ('000 t)

	Business-as-usual	Agenda 2000
Wheat	34058	40388
Coarse grains	18100	16453
Fats and oils	3247	3247
Butter	122	153
Skimmed milk powder	468	498
Cheese	297	373
Other dairy	849	1059
Beef and veal	776	570

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

Table 5.9 : Farming income and employment, EU 15

	1995	2000	2005	Growth rate
Total farming income (bio Ecu)	138.99	133.28	135.34	0.3%
Farm population (mio)	7.82	7.01	6.25	-2.2%
Farming income ('000 Ecu/cap.)	17.78	19.02	21.65	2.0%

Table 5.10 : EAGGF budget, Agenda 2000 (mio Ecu)

	1995	2000	2005
AGGF total	35200	41203	38559
o.w. Refunds on trade	7687	3127	2663
o.w. Premiums	19082	28307	26380

Revenue from farming

Total farming income, i.e. the net revenues including transfers, premiums and subsidies, falls by 5.6 %, compared to the business-as-usual scenario in 2005. Table 5.9 shows the development over time. The decrease in farming income per capita is mitigated somewhat by labour migration. Nonetheless farming income per worker falls by 5.3 % (compared to table 5.3). Though the intensive livestock sector enjoys lower feed costs, its output prices fall also due to competition and sluggish demand. At EU level net revenues are lower for pigs, and higher for poultry and eggs.

Will EU market prices follow the fall of intervention prices?

While the regime of intervention prices imposes a floor on the market prices prevailing within the EU, it is hard to predict whether these prices will actually fall as deep as the proposed cuts in intervention prices. The Commission argues that they will not, and that therefore farmers do not need compensation for the full price cut. To investigate the Commission's claim that a reduced fall in prices will maintain incomes at pre-reform level, the following sensitivity analysis can be conducted. Suppose that the rules for compensation still follow the Agenda 2000 proposal, but that the price fall is not as deep as the drop in intervention prices would allow. In CAPMAT this can be modelled by mitigating the fall in intervention prices. Suppose that for wheat, coarse grains, beef, and milk, prices decrease by 5 %, 15 % and 20 % and 12 %. We call this a mild variant of Agenda 2000. The change in relative prices leads to small adjustments in allocations. Compared to the business-as-usual scenario in 2005, cereal production goes up by 5.9 %, beef production falls by 0.3 %, compared to 5.0 % and 0.6 % in Agenda 2000, respectively. The impact on trade is equally small: cereal and beef exports are now 58.8 mio t and 0.62 mio t, respectively (56.8 mio t and 0.57 mio t in Agenda 2000). Since the premium rates are kept unchanged, the EAGGF budget is almost identical to that of Agenda 2000, although refunds increase by 1.0 bio Ecu compared to Agenda 2000. Farming income, however, is almost back to pre-reform level, as the consumers are being charged higher prices.

Impact on farmers and consumers

	Business as usual	Agenda 2000	Mild Agenda 2000
Farm income (bio Ecu)	143.4	153.3	141.4
Consumer expenditure (bio Ecu)	242.8	229.2	234.0

Agricultural Budget

The total of premiums exceeds the business-as-usual level by 8.2 bio Ecu, but the refunds are 2.3 bio Ecu lower (Annex A). As can be seen from table 5.10, the rise in EAGGF appears to respect the official guideline of 0.74 of GNP growth. One reason for the modest increase is that exogenous budget items were taken 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.

3.3 Agenda 2000: summary and assessment

Both the Agenda 2000 proposal itself and its effect according to CAPMAT bear a strong resemblance to the 1993-95 reform. The proposal is a further step towards liberalisation: the internal price of wheat reaches world level; for coarse grains, beef and dairy products the gaps become smaller, and refunds decrease. Though the acreage and headage premiums constitute a burden to the budget, EAGGF growth remains below the guideline. Incomes per capita fall, on average by 5.3 %. 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 13.6 bio Ecu, i.e. 36 Ecu per capita.

Besides improving the market orientation of the CAP, Agenda 2000 makes it easier to meet existing GATT commitments as well as new demands during the upcoming WTO trade round. The reform also seeks to facilitate the intended enlargement of CEECs. Yet, as is often the case, this CAP reform proposal is also characterised 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 liberalisation and CEECs accession.

With respect to trade liberalisation, four remarks are in order. First, Agenda 2000 basically leaves the import regimes intact, and this implies for cereals that the variable import tariffs are being maintained, 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 artefact that the EU keeps prices of wheat and feed grains moving in parallel. Secondly, Agenda 2000 does not expand market access. Developing coun-

tries 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 sets the compulsory set-aside rate to zero, and harmonises, with a few exceptions, the premiums for arable crops. Set-aside remains an option, but as a voluntary scheme. This significant harmonisation of premium rates per hectare strengthens the argument of support being decoupled to a great extent. Under the most strict interpretation, only decoupled premiums, such as R&D and extension services, qualify as WTO compatible. Whether these harmonised hectare premiums are to be accepted as such remains a matter to be settled during the new trade round.

With respect to the impact on the CEECs, the price reductions proposed in Agenda 2000 significantly reduce the price gap between the EU and these countries, and this facilitates their accession. However, it remains questionable whether the reduction is sufficient (CEC, 1998b) to avoid an important increase in consumer prices in CEECs upon accession. 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 still be wide. Moreover, it is unlikely that the CEECs will eventually be offered the full price package of Agenda 2000, because a number of them regularly has to cope with devaluation of their national currencies relative to the Ecu (Poland and Hungary had inflation rates of 20 % in 1996). Since it is highly unlikely that these countries will soon join the EMS, not to mention the Euro zone, these devaluations cause the revival of the old problem that countries with strongly depreciating currencies receive agricultural payments in Ecu (Euro) and benefit too much. The mechanism operates as follows. While the CAP specifies all

intervention prices and premiums in a common currency, actual payments are in national currency, based on the green exchange rate. After a devaluation, agricultural prices and subsidies rise overnight, while other prices and costs often adjust more slowly or only in part. This means that farmers in countries that devalue benefit temporarily, while consumers suffer. The current proposals do not indicate how the EU intends to deal with this issue, though the Commission recognises the problem when it announces that "They [the new Member States] are expected to participate in an exchange rate mechanism and avoid excessive exchange rate changes" (CEC 1997a, Part Two, I.3). This might be asking too much.

Finally, it must be stressed that the effectiveness of the reform will crucially depend on future world market prices. In particular, it is decisive whether the EU will be able to export wheat without subsidies in the period beyond 2000. Clearly, this will not be the case if the world market prices of September 1998 continue to prevail, as these lie more than 20 % below the value assumed in the scenario. But let us suppose that world prices recover to a level that is only 10 % lower. As high set-aside rates and stockpiling do not present feasible options -the reasons were given earlier in connection to the business-as-usual scenario-, then the only solution which meets the GATT commitments would be to lower cereal intervention prices by 10 % as well. For an unchanged COP area, this would require an increase from 66 to 78 Ecu/t of the premium rate for cereals to compensate the farmers, implying an additional budgetary outlay of about 2 bio Ecu.

4. Conclusions

(a) Simulation results show that continuation of present CAP regulations yields favourable outcomes for the EU budget and farm incomes, while raising serious problems with respect to satisfaction of existing GATT commitments, for both cereals and beef. 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 proposals in Agenda 2000 can be viewed as necessary supplements to the policy introduced in 1992.

- (b) Under current CAP regulations the EU has two possibilities to meet GATT requirements for cereals, viz. stockholding and set-aside. Under the first option cereal stocks will accumulate over the years, and hence the storage costs. Alternatively, the EU has the option of expanding its set-aside area. A set-aside rate of 17.5 %, compared to the present 5 % level, would be necessary to comply with the GATT requirements, which means that at least 8 mio ha of agricultural land would have to be taken out of production.
- (c) The effects of the Agenda 2000 proposal can be summarised as follows. The total premium amount will rise by 8.2 bio Ecu in 2005 in real terms, as compared to the business-as-usual scenario. Export refunds decrease by 2.3 bio Ecu, keeping the EAGGF budget below the official spending guideline. Average farming income in the year 2005 is lowered by 5.3 % per worker. Consumers gain as their tax burden increases by 5.9 bio Ecu, while they save 13.6 bio Ecu on food expenditures. The gain from the reform could be higher, if it results in improved efficiency within the non-agricultural sector.

(d) As regards the GATT commitments, it appears that if world cereals prices have by the year 2000 returned to the "generally predicted" level -as of September 1998 world prices lie more than 20 % below this level- it should be possible for the Community to export wheat without refunds. 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 ha and per animal) increase, while for crops the premium levels tend towards harmonisation. Whether this harmonisation will be sufficient to ensure GATT compatibility will have to be settled during the next trade round. If, over the period 2000-2005 world market prices for cereals happen to be 10 % lower than this "generally predicted" level, then, for an unchanged COP area, this would require an increase from 66 to 78 Ecu/t of the premium rate for cereals to compensate the farmers, implying an additional budgetary expenditure of about 2 bio Ecu.

- (e) The Agenda 2000 proposals 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 harmonise 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.
- (f) Reduction of the set-aside obligation to zero level increases the utilisation of agricultural land. Since the GATT requirements for coarse grains are already being exceeded at present, set-aside policies could still be needed, possibly under a voluntary scheme. The effective utilisation of resources improves also due to the expansion of milk quotas, though the change is modest, since half of the increase in the milk quotas is distributed to farmers in mountainous and arctic regions of the Community.
- (g) The Agenda 2000 proposals are conservative with respect to liberalisation of import access. The Commission still sees price stabilisation 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 proposals 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.

Annex A Additional scenario results for the year 2005

Table 5.11a : Net revenues and activity levels in 2005				
	Net revenue per unit (Ecu/ha or Ecu/head)		Activity level ('000 ha or '000 head)	
	Business-as-usual	Agenda 2000 ⁽¹⁾	Business-as-usual	Agenda 2000 ⁽¹⁾
Soft wheat	712.6	622.6	15638.1	16408.7
Durum wheat	602.8	608.4	3538.0	3641.0
Rye and maslin	345.3	269.8	1598.2	1604.8
Barley	416.0	380.1	12740.6	12705.2
Oats	274.9	240.2	2333.1	2329.9
Maize	831.2	672.8	4338.6	4286.5
Pulses	1232.0	1323.4	1935.6	1952.1
Sugar beets	705.2	699.4	1950.0	1947.7
Rape seeds	414.5	372.9	3335.5	3512.1
Sunflower seeds	384.1	263.0	2827.1	2952.6
Dairy cattle	352.7	318.9	62372.7	63392.4
Non-dairy cattle	824.5	567.4	12502.1	12257.7

(1): Full Agenda 2000 proposal

Table 5.11b : EAGGF/EU budget in 2005 (mio Ecu)		
	Business-as-usual	Agenda 2000 ⁽¹⁾
Refunds	4916.0	2662.8
Stockholding cost	389.1	389.1
Producer subsidies	4017.3	3851.4
Subsidies on demand	1501.0	1523.4
Premiums	18133.2	26380.8
Direct transfers	834.1	834.1
Other EAGGF	2917.5	2917.5
EAGGF total	32708.1	38559.1
Administration costs	3962.5	3962.5
Development aid	3753.4	3753.4
Other expenditure	14612.5	14612.5
Other funds	20427.8	20427.8
Total outlays	75464.4	81315.4
Levies on trade	438.6	254.5
Levies on production	1313.6	1316.9
Custom duties	13069.0	13069.0
National contribution	51403.6	57435.3
Other receipts	9239.6	9239.6
Total receipts	75464.4	81315.4

(1) : Full Agenda 2000 proposal

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 Utilisation 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 scrutinised up to and including 1995; EAGGF data for 1996 have been used to reflect the most recent policy stance. One distinguishing feature is the computerised aggregation procedure for Supply Utilisation 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. 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 maximise utility subject to a budget constraint, farmers maximise 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 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 Ecu/ha and Ecu/head. Monetary values are generally in '000 Ecu, but in mio Ecu when it concerns Revenue from farming and the budget. Prices are in Ecu/ha or Ecu/head (for poultry and laying hens in Ecu/'000 head). Quantities of the commodities on the supply utilisation account are listed below ('000 t denotes 1000 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
Wheat	'000 t
Coarse grains	'000 t
Rice, milled	'000 t
Pulses	'000 t
Sugar refined	'000 t
Fats and oils	'000 t
Protein feeds	'000 t of protein content
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 equivalents
Beef and veal	'000 t
Pork	'000 t
Meat from sheep and goats	'000 t
Eggs	'000 t
Poultry meat	'000 t

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Global impact analyses

Implications for consumers of agricultural products

**By the Directorate-General for Agriculture (DG VI)
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Chapter VI

Implications for consumers of agricultural products

1. Introduction

This chapter assesses the potential impact of the Agenda 2000 proposals for agriculture on EU consumers. More precisely, it aims at providing an order of magnitude of the possible benefits for the EU consumers of the proposed reduction in support price of some agricultural products (cereals, beef and milk), assuming a certain number of working hypothesis.

The analysis reported below provides an evaluation of the reduction in the consumer cost of the proposed policies under a static comparative approach¹⁹. 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 milk will amount to around 12.5 bio Ecu.

These benefits will first concern both the agricultural sector (1.9 bio Ecu in the short-run, but only 0.1 bio Ecu over the medium-term), which will 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 10 bio Ecu (i.e. around 1.9 % of their total food expenditure).

Total benefits for final consumers will mainly depend on future developments in the market prices of agricultural commodities and in the price transmission between the producer and the consumer stage. In that respect, alternative scenarios show that they can be expected to range from 8 to 15 bio Ecu.

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.

In the reference scenario, the reduction in support prices of cereals, beef and milk is expected to result in a smaller reduction in market prices of these products, since the fall in support prices close to world market levels is expected to generate an expansion of demand both externally and internally.

¹⁹ Therefore, it does not provide for neither the dynamic process of the adjustment to these new policies, nor for 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.

Table 6.1 : Scenarios of changes in market prices following Agenda 2000

Reduction in market prices	High price decline scenario	Reference scenario	Low price decline scenario
Cereals	-20%	-12%	-10%
Beef	-30%	-25%	-20%
Milk	-15%	-15%	-12%

Table 6.2 : Expected benefits from the reduction in support prices (mio Ecu)

Changes in the price of:	Agricultural sector	Other sectors (incl. food & retail.)	Final consumers	Total
Cereals	100	232	541	873
Total meat	0	1281	5125	6406
Milk and eggs	0	1035	4139	5174
Total	100	2548	9805	12453

In order to assess the sensitivity of the results to the assumption on market price development, two additional scenarios are given. The three scenarios are as described in table 6.1.

4. Results

4.1 Reference scenario

Under the reference scenario, the reduction in support prices proposed in Agenda 2000 could lead to substantial consumer gains for the economy as a whole. These are estimated to amount to 12.5 bio Ecu (cf. table 6.2).

In the short-run, consumer benefits to the agricultural sector will reach around 1.9 bio Ecu (or about 15 % 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 producers²⁰. 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 prices²¹. Only benefits from lower seed costs would remain in the agricultural sector (in the order of 100 mio Ecu).

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, these benefits would reach:

- Around 2.5 bio Ecu (or 20 % of total benefits) for the food processing and retailing sectors (but also for other non-agricultural industrial sectors having agricultural commodities as primary inputs). Half of these consumer gains would come in the form of lower meat prices and benefit the meat and packing industry, whereas more than a third would be generated by lower milk and egg prices. Lower milk and beef prices would give rise to the highest gains with around 1 bio Ecu each. The overall impact of lower cereals prices on the prices of other meat and eggs is estimated at around 350 mio Ecu in terms of savings for the industrial and marketing sectors;
- Final consumers will benefit from an increase in their net welfare of around 9.8 bio Ecu. As for the non-agricultural sectors, around half will come from lower meat and meat products consumption cost (about 5 bio Ecu) and some 40 % from dairy products and eggs (around 4 bio Ecu).

²⁰ This analysis does not take into account the potential spillover impact of lower price of agricultural products on other input costs such as fertilizers and pesticides.

²¹ Pig meat, poultry meat and eggs are assumed to benefit from the reduction in the support and market prices of cereals that are used in their production as feed. On the basis of the cereal market share in the total feed cost and the share of feed cost in the market price for each product, the elasticity of price transmission between the market price of these products and the price of cereals has been estimated at around 0.32 for pig meat, 0.47 for poultry meat and 0.45 for eggs. No account has been taken of the potential impact of lower cereals prices on the price of other feedingstuffs.

The consumer gains from bread and cereal products will only amount to around 0.5 bio Ecu (or 6 % of the total final consumer benefits).

These results are confirmed by an evaluation of the impact of the reduction in support prices on the food expenditure of EU final consumers²². Even if these estimates may be considered as less precise than those presented above, they still allow to throw some light on the relative order of magnitude of the expected increase in the economic gains of final consumers. Assuming constant consumption volumes, the overall savings of EU final consumers on food would represent around 1.9 % of their total food bill: 0.8 % reduction in their expenditure on bread and other cereal products and around 4 % 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 1.9 % lower than otherwise would have been the case.

4.2 Alternative scenarios

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, in addition to the reference scenario, an

analysis based on two alternative scenarios of price development (as given in table 6.1) is carried out. A comparison of the results from these three scenarios reads as follows:

Table 6.3: Consumer benefits from the three price fall scenarios (mio Ecu)

	High price decline scenario	Reference scenario	Low price decline scenario
Agricultural sector	168	100	83
Other economic sectors	3166	2548	2054
Final consumers	11880	9805	7910
Total	15214	12453	10047

These results show that a drop in the market prices of cereals, beef and milk fully in line with the reduction in support prices would lead to a further increase in total consumer gains of around 3 bio Ecu. Conversely, a lower decline in market prices would reduce total consumer benefits as compared to the reference scenario. Yet, they would still reach around 10 bio Ecu (as opposed to 12.5 bio Ecu in the reference scenario). Therefore, depending on the future development in market prices, consumer gains for the whole economy should be expected to be in the range of 10-15 bio Ecu when the cut in support prices is fully implemented (with final consumers absorbing between 8 and 12 bio Ecu of these benefits).

It has been assumed in the reference scenario that part of the consumer gains (around 20 %) will be absorbed by the industrial and marketing sectors²³. Yet, if these economic sectors were to behave fully

²² This evaluation, that focuses on food expenditure of final consumers, allows to express the benefits for final consumers as a percentage of their total food bill. It is based on the likely impact of the proposals on the development of market prices of agricultural products, the transmission between the prices of agricultural products at producer level and the prices of food products at the consumer level and the share of the value of agricultural products in the value of food products.

²³ The process of transmission of agricultural producer prices through the food processing and marketing chain to the final consumer has been considered over a long-run perspective. Empirical research has shown that if producer and consumer prices may drift apart in the short-run, market forces tend to bring them back together in the long-run. No consideration is given here to the speed of adjustment and no transmission lag is taken into account in the calculations. It has been assumed that the response of consumer price to changes in producer prices is distributed over time and to its full in 2005.

The extent to which changes in producer prices will be passed on to consumer prices will depend on the degree of concentration in the food processing and marketing sectors. Agriculture may be expected to become increasingly integrated with the food industry in the future. Yet, a differentiated pace in the level of concentration between the food processing and marketing sectors and the (primary) agricultural production sector could lead to some oligopolistic structures. This would in turn change the balance in market power and could lead to some of the benefits from a reduction in agricultural support prices being captured by the processors and retailers. The consumer gains which have been presented in this document have been estimated on the working assumption that around 20 % of the decline in the price of agricultural products will be absorbed by the industrial and marketing sectors.

competitively, all consumer gains would be transmitted to final consumers and would reach between 10 and 15 bio Ecu, depending on the future market price developments.

Methodological annex

The consumer gains are estimated as the increase in consumer surplus resulting from the implementation of the proposed price reduction for all consumers in the general economy. In applied welfare economics, changes in consumer surplus are often used to measure changes in consumer welfare. The consumer surplus corresponds to the difference between the "total advantage" (or utility) obtained from consumption and the expenditure associated with this consumption. For each agricultural commodity, the increase in consumer surplus resulting from the price reduction is measured as:

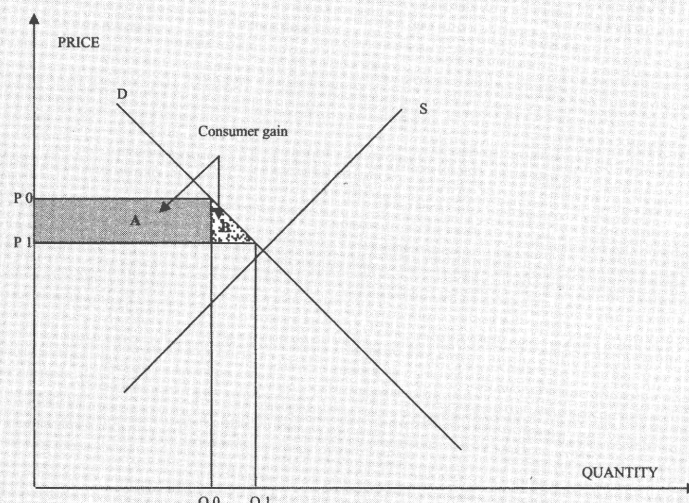
$$\Delta CS = [(P_0 - P_1) * Q_{d0}] + [1/2 * (Q_{d1} - Q_{d0}) * (P_0 - P_1)]$$

with ΔCS the change in consumer surplus, P the price of agricultural product and Q_d the quantity consumed.

This measure can be graphically depicted in the figure below where the sum of A and B represents the gain in consumer surplus from a drop in prices from P_0 and P_1 . The area A measures the consumer gain for the products that were already consumed before the changes in prices and the area B the gain from the increase in consumption.

The increase in demand has been estimated on the basis of price and income elasticities for most agricultural commodities: agricultural products directly concerned by the drop in support prices but also pig, poultry and egg that should benefit from lower (feed) cereal cost, this being passed on to consumers of these types of processed cereal products.

Figure 6.1 Graphical presentation of changes in consumer surplus



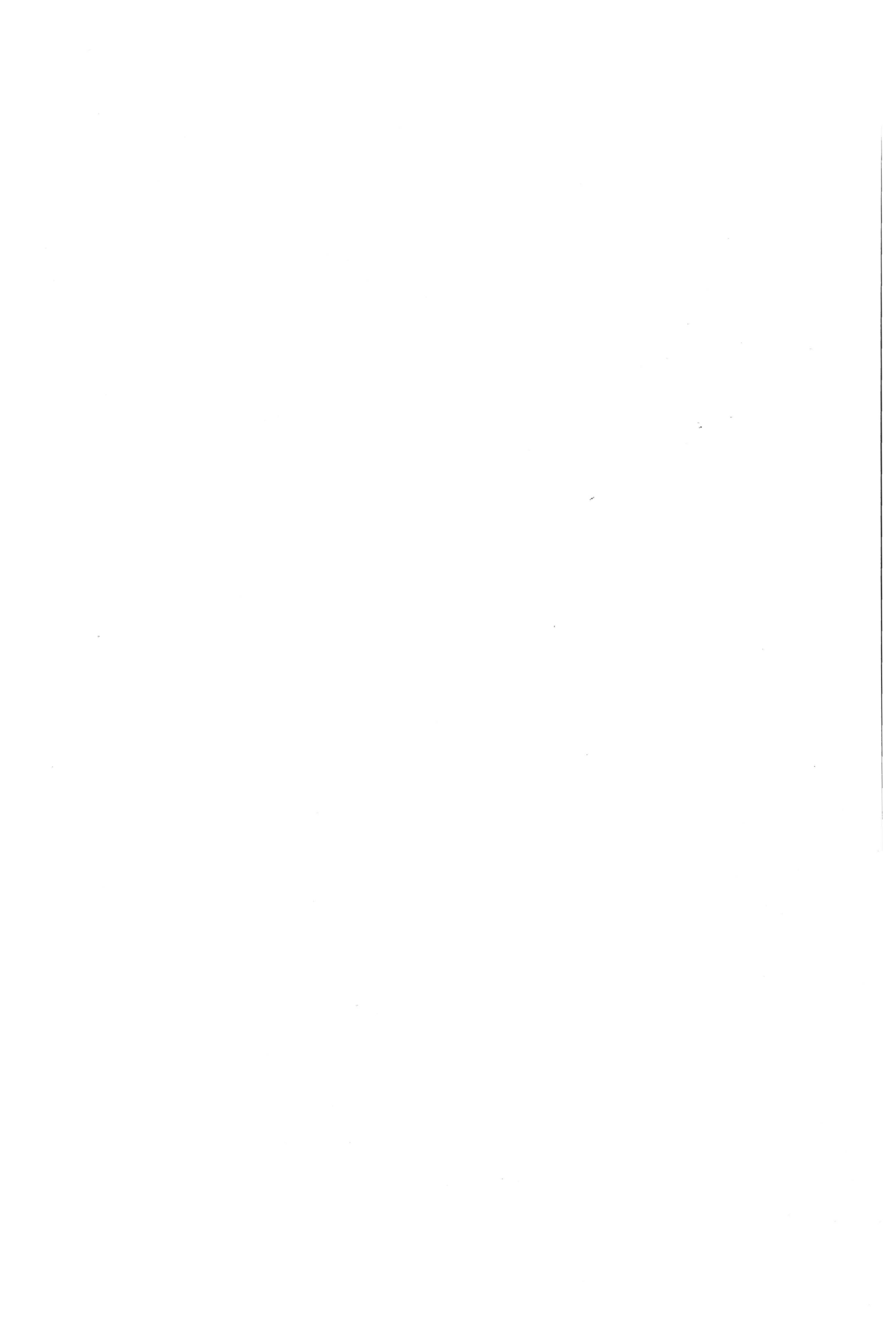
Global impact analyses

Overall evaluation of the Agenda 2000 proposals for CAP reform

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Chapter VII

Overall evaluation of the Agenda 2000 proposals for CAP reform

1. Introduction

Political discussions on the Agenda 2000 proposals frequently focus on partial national policy goals, in particular impacts on agricultural incomes. Furthermore, complicated procedures in the bureaucratic implementation of some policy measures are in the foreground of the actual critical discussion. Less attention has been given, so far,

- to the overall economic impacts of these Agenda 2000 proposals on different groups of society, and
- to the question of the conformity of the Agenda 2000 proposals with basic principles of a market economy and more general political objectives, as well as to the necessity of long-term adjustment.

The aim of this expertise is to shed some light on these issues of general economic and political importance.

2. Assessment of quantitative economic impacts

The economic impact analysis presented in this section is an example of applied welfare analysis. This approach permits a consistent aggregation of the economic impacts of the Agenda 2000 proposals on

- agricultural producer incomes;
- benefits to consumers of agricultural commodities;
- the EU budget.

The overall effect will be taken to be the sum of these effects affecting the relevant economic groups. This presupposes that the same weight is attached to an additional unit of income to each group. Viewed from a different angle, the overall effect answers the question whether the gaining parties of the Agenda 2000 proposals could potentially compensate the losers.

The quantitative impact analysis of this section will be based on the results of the SPEL/EU-MFSS model, a rather differentiated agricultural sector model for EU 15 Member States. The whole of agriculture as defined in the Economic Accounts of Agriculture is depicted in an activity based approach giving physical balance sheets and monetary values including income for a complete set of agricultural products and activities. Calculations of the downstream impacts on the processing sector and consumers, as well as on the EU budget supplement the SPEL/EU-MFSS simulations. Additional details on the SPEL/EU-MFSS model can be found in an appendix.

2.1 Reference situation and policy scenarios

The policy simulations refer to the revised Agenda 2000 proposals of March 1998. In accordance with DG VI, two policy scenarios have been distinguished with respect to the impact of administered prices on farm gate prices:

- in policy scenario 1 it is assumed that the proposed reductions in administered prices translate into a decrease of farm gate prices of exactly the same amount. More precisely, farm gate prices are assumed to fall by 20 % for cereals, by 30 % for beef and by 17 % for cow milk. This could happen under conditions of low world market prices when the intervention prices would deter-

mine farm gate prices (pessimistic price scenario);

- the policy scenario 2 is based upon the assumption that the cuts in administered prices would have a smaller impact on farm gate prices which can be expected under more favourable developments of world market prices (optimistic price scenario). More precisely, farm gate prices are assumed to fall by 10 % for cereals, by 20 % for beef and by 12 % for cow milk.

The other components of the proposals are well known (Commission 1998a) and taken to apply equally to both policy scenarios 1 and 2:

- compensatory payments are increased for cereals and reduced to the level of cereals for oilseeds. Beef premia are increased and a new premium for cows is introduced to compensate for the milk price reduction. Ceilings on individual payments had to be ignored due to limitations of the SPEL/EU-MFSS model;
- the milk quota is increased by 2 % at the EU level;
- the rate of obligatory set-aside is set at 0 %.

The scenario simulations described will be compared with the results of the reference run which is based on the policy assumption that the present set of policy measures (1992 CAP reform and changes in the meantime) are maintained throughout the projection period. This includes in particular an obligatory set-aside rate of 17.5 % beginning in 1999 to fulfil the WTO obligations.

2.2 Production, supply and demand

The detailed results of the SPEL/EU-MFSS simulations for production, supply and demand are presented in Part A, Chapter II (Eurostat 1998). This section summarises these results on which the following sections will build upon.

In spite of a set-aside-rate of 17.5 % in the reference run, yield increases cause cereal production to exceed domestic use by more than 30 mio t in 2005. A sizeable growth in demand and production of white meats is another remarkable result. Beef demand is projected to recover from the BSE influences, but only to return on its long run declining trend.

The effects of Agenda 2000 on the arable sector are dominated by the reduction of the obligatory set-aside rate from 17.5 % to 0 %. As a consequence, the model predicts a certain increase in production for all "grandes cultures", which is lowest for oilseeds due to the harmonisation of compensatory payments. More optimistic price assumptions for cereals as in scenario 2 shift the composition of crop outputs in favour of cereals. Domestic use of cereals, pulses and oilseeds is increasing as well in the Agenda 2000 scenarios, but far less than production, resulting in a greater share of the EU on world markets (table 7.1).

Agenda 2000 effects on milk are determined by the increase in the milk quota which translates into higher production of milk products. Consumption increases following the price reductions but by less than production. Meat markets are affected by a whole set of interacting forces:

Table 7.1 : Changes in production and domestic use of selected agricultural products in the reference run and Agenda 2000 simulations (mio t)

	Average 1992-1996	Ref.Run 2005	Scenario 1 2005	% Change from Reference	Scenario 2 2005	% Change from Reference
Production						
Cereals (excl. rice)	182.0	203.9	216.3	6.1%	218.7	7.2%
Pulses	5.2	5.6	6.3	12.0%	6.2	10.1%
Oilseeds	12.0	12.3	12.7	3.2%	12.6	1.8%
Beef and veal	8.2	8.2	8.2	0.5%	8.3	1.0%
Pork and poultry	23.7	26.4	26.1	-0.8%	26.2	-0.8%
Milk products (raw milk eq.)	107.4	109.0	110.8	1.6%	110.9	1.7%
Domestic use						
Cereals (excl. rice)	158.6	171.1	174.8	2.2%	173.5	1.4%
Pulses	7.9	8.1	8.1	0.3%	8.1	0.4%
Oilseeds	33.3	31.4	31.5	0.6%	31.5	0.3%
Beef and veal	7.9	7.9	8.2	3.1%	8.1	2.0%
Pork and poultry	22.1	25.7	25.6	-0.7%	25.6	-0.5%
Milk products (raw milk eq.)	90.7	100.5	101.2	0.7%	100.9	0.5%

Source : Eurostat, 1998

- reduction of administered prices and increases of premia for beef;
- cost reductions due to declining cereal prices and indirect repercussions on raw fodder costs;
- endogenous price changes for white meats due to supply side shifts and substitution with beef on the demand side;
- slightly increased availability of calves (and, later, of old cows) due to the 2 % quota expansion.

According to the SPEL/EU-MFSS model, beef supply will expand by a small amount whereas beef demand increases stronger. Pork and poultry production and consumption are slightly reduced as consumers switch to beef, which becomes cheaper compared to white meats.

By and large, the model predictions of the Agenda 2000 effects seem to be plausible. This does not imply that all model results exactly coincide with our expectations (Henrichsmeyer, Löhe 1998).

2.3 Agricultural income

The combined effect of the Agenda 2000 proposals and endogenous responses within the agricultural sector results in a decrease of gross value added at market prices (GVAm) in scenarios 1 and 2 compared to the reference run by 15 % and 10 %, respectively. Subsidies increase considerably (+27 %), but do not fully compensate for the loss of market income. Consequently, agricultural incomes in terms of net value added at factor cost (NVAf) will fall due to the Agenda 2000 proposals. However, the decline in NVAf is only mild (-2.1 %) in the "optimistic" scenario.

Table 7.2 : Changes in agricultural incomes and their components in Agenda 2000 simulations compared to the reference run (mio Ecu)

	Ref. Run 2005	Agenda 2000 2005	Abs. change Agenda to Reference	% Change Agenda to Reference
Scenario 1				
Nominal GVAm	124687	105986	-18701	-15.0%
Subsidies	33708	42928	9220	27.4%
Nom. NVAf	120583	111101	-9481	-7.9%
Scenario 2				
Nominal GVAm	124687	112751	-11936	-9.6%
Subsidies	33708	43104	9396	27.9%
Nom. NVAf	120583	118042	-2540	-2.1%

Source : Eurostat (1998) and background data

Table 7.3 : Changes in agricultural incomes in Agenda 2000 simulations compared to the present situation

	Average 1992-1996	Scenario 1 2005	% Change to Average 92/96	Scenario 2 2005	% Change to Average 92/96
Nom. NVAf (mio Ecu)	106631	111101	4.2%	118042	10.7%
Real NVAf (mio Ecu)	106631	88096	-17.4%	93600	-12.2%
Labour force (1000 AWU)	7553	4959	-34.3%	4959	-34.3%
Real NVAf per AWU (Ecu/AWU)	14117	17763	25.8%	18873	33.7%

Source : Eurostat (1998) and background data

When considering whether the above loss in agricultural incomes in the EU is tolerable or not, it is useful to compare them to those of the historical base period 1992-96. This comparison is only meaningful after nominal values have been deflated to real values in constant prices of 1992/96 (based on an a 2.1 % inflation rate), and taking into account the continuing flow of labour out of agriculture, for which an annual rate of about 3.7 % was assumed in both scenarios (table 7.3).

The bottom line of this comparison is an increase of real net value added per annual work unit by 26 % (2.1 % per year) in the "pessimistic" scenario 1 and by 34 % (2.7 % per year) in the optimistic scenario 2 because the flow of labour out of agriculture from the base period to 2005 would more than offset the decline in real net value added at factor costs of

17 % and 12 %, respectively, in the two scenarios. Of course, with a lower rate of outmigration of about 2.5 %, as it could be observed in the recent past, income growth would be smaller, though still positive (around +0.8 % and +1.4 % of real NVAf per AWU, respectively). Of similar importance is the assumption on inflation. Real agricultural income development benefits from the fact that inflation is likely to be under control.

2.4 Spillover effects on other industries and final consumers

The benefits of the proposed price reductions to downstream industries and final consumers have been estimated based on the demand component of the SPEL/EU-MFSS (see the appendix). These ben-

Table 7.4 : Gains in consumer surplus compared to the reference run due to the Agenda 2000 proposals in 2005 in EU 15 (mio Ecu)

	Food Expenditure in Reference Run	Saved Expenditure without Adjustment	Gain in Consumer Surplus	in % of Reference Run Expenditure
Scenario 1				
Cereals	78591	1466	1466	1.9%
Meat	140078	9749	9835	7.0%
Milk products	79037	5366	5383	6.8%
Other	150522	458	460	0.3%
Total	448229	17038	17145	3.8%
Scenario 2				
Cereals	78591	733	733	0.9%
Meat	140078	6216	6259	4.5%
Milk products	79037	3788	3797	4.8%
Other	150522	251	252	0.2%
Total	448229	10987	11041	2.5%

Source : Own calculation based on background data for Eurostat (1998)

efits are measured as consumer surplus changes caused by the price changes in the Agenda 2000 scenarios (versions 1 and 2) 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 7.4).

The total effects in scenario 1 are very similar to those given in European Commission (1998) (+15 214 mio Ecu), the modest discrepancy being probably due to the fact that the full set of products was not included in this calculation (e.g. oilseeds). Consumer surplus gains exceed expenditure savings only by a small amount because price elasticities are low for food products. To give some indication of their relative importance, these gains have been expressed relative to food expenditures in the reference run.

2.5 Budgetary impacts

For the calculation of agricultural income effects and for consumer surplus gains in sections 2.2 - 2.4 above, a single reference run had been used for the presentation of Agenda 2000 effects in scenarios 1

and 2. This was justified because under status quo policies, EU prices would be determined by administrative prices both under favourable (scenario 2) as under unfavourable circumstances (scenario 2). With given administrative prices, however, lower world market prices in scenario 1 imply higher budgetary outlays for export refunds compared to the high price scenario 2. For the budgetary impact analysis it was necessary therefore, to distinguish two reference situations, i.e. to distinguish status quo budget developments under depressed world market conditions from that under buoyant world markets.

This budgetary impact analysis has been performed within DG VI, essentially relying on the same methodology and technical infrastructure as described in Commission (1998). To be consistent with the income and consumer surplus effects above, the relevant elements of the balance sheets in the SPEL/EU-MFSS scenarios have been used as inputs for these budgetary calculations and two reference runs depending on world market conditions have been distinguished, at least for cereals and beef. To simplify the calculation, only effects under a "central" projection have been computed for dairy and "other" agricultural products (table 7.5).

Table 7.5 : EAGGF (Guarantee) expenditures in the reference situation and according to the Agenda 2000 proposals in 2005 (mio Ecu)

	Ref. Run 2005	Agenda 2000 2005	Abs. change Agenda to Reference	% Change Agenda to Reference
Scenario 1				
Arable crops	19639	19350	-289	-1.5%
Milk and dairy	2680	4520	1840	68.7%
Beef and Veal	5790	7910	2120	36.6%
Other (pork...)	15475	15160	-315	-2.0%
Total	43584	46940	3356	7.7%
Scenario 2				
Arable crops	19081	19346	265	1.4%
Milk and dairy	2680	4520	1840	68.7%
Beef and Veal	5540	7910	2370	42.8%
Other (pork...)	15475	15160	-315	-2.0%
Total	42776	46936	4160	9.7%

Source : DG VI calculation

Under conditions of Agenda 2000 scenario 1, savings of export refunds are higher compared to scenario 2, causing the additional budgetary expenses to be lower. More pessimistic assumptions relating to export possibilities are also reflected in a lower level of unsubsidised exports of beef and cereals in reform scenario 1 compared to scenario 2, thus contributing to the differences in EU market prices in the two scenarios. The budgetary costs for beef are equal in both scenarios because lower costs for export refunds in scenario 2 are offset by higher stocking costs.

2.6 Overall effect

As indicated in section 2.1, adding up the positive impacts for consumers and the negative impacts on agricultural incomes and the EU budget gives the overall effect in terms of "economic welfare" in the EU.

Table 7.6 : Quantitative economic impacts of the Agenda 2000 proposals compared to the reference run (mio Ecu)

	Scenario 1 compared to Reference 1	Scenario 2 compared to Reference 1
Change in Agricultural NVAf	-9481	-2540
Gains in consumer surplus	+17145	+1104
Budgetary impacts	-3356	-4160
Total	+4308	+4340

Source : Tables 2, 4 & 5

As it turns out, the gains for consumers exceed the losses for taxpayers and agricultural producers by a wide margin. Compensation of these losses would be feasible, therefore, at least if costless compensation was conceivable. Thus the EU economy as a whole could clearly benefit from the reform package.

3. Compatibility with general economic goals

The Agenda 2000 proposals have to be conceived as another step in the ongoing process of CAP reform, which has started in 1992 and which will continue at least for another decade. Therefore, the Agenda 2000 proposals have to be evaluated

- as a reform step which should improve on the present status of the CAP;
- and which should contribute as well to a desirable development of the whole process of CAP reform in the long run.

The aim of this section is to complement the quantitative general economic impact analysis of the Agenda 2000 proposals with considerations on their compatibility with basic principles of a market economy and generally accepted social goals. Occasionally it will be useful to pay attention to aspects of political strategy relating to the complex process of political decision making on the EU level.

3.1 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 as 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 proposals are an attempt to proceed further in this direction. Whether the main thrust of this attempt is indeed towards the principles of a market economy and the criteria of allocative and distributive efficiency shall be evaluated in this section.

3.1.1 "Grandes cultures"

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 would 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 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 would have the chance to export grain without subsidies most of the time and would 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 would

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.

A closer connection of EU and world market prices 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 the proposed 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 futures 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 proposed unification of compensation payments for grains 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, like higher payments for pulses and durum wheat. In view of further decoupling, all agricultural land should benefit from the same payment per ha. To realise perfect decoupling crop related payments should be paid as fixed amount per ha 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, it has to be seen that the process of structural change and regional reallocation in European agriculture would be intensified, but in the longer term, this process will be unavoidable in any case. On the basis of past experience in Europe and elsewhere doubts may be raised also whether a general postponement of farm structure and regional adjustments is a reasonable strategy in the first place. Environmental considerations might necessitate some steering of this process to avoid excessive concentration on the one hand and abandonment of valuable landscapes on the other, but this should be an issue of environmental policy (see section 3.3).

3.1.2 Milk and beef production

The proposed significant reduction of price support for milk products has little immediate allocative consequences because the proposed 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. Further, it might signal 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 proposed, 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 fundamental reform step: the abolishment of the quota system, likely to occur some time after 2006. Switching towards a decoupled support system could significantly reduce administrative costs in the milk market, which have to be born in part by milk producers.

The Agenda 2000 proposals 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. Unfortunately, the latter are differentiated for beef categories and subject to upper limits per farm, implying intrasectoral distortions and an avoidable administrative burden. Compensatory payments for beef still have the character of production related subsidies. Therefore, 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 have 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 proposals.

3.1.3 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, 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.

To summarise the above: the future of compensatory payments should be transitory. Permanent payments might be justified as a remuneration of environmental services (see 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. 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 facilitate finding a compromise in the Council of Ministers. Such differentiation of payments according to national preferences would correspond to the principle of subsidiarity, under the condition that these payments were perfectly decoupled and hence did not distort competition in the Common Market.

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.

3.2 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 1992 CAP reform, to be continued according to the Agenda 2000 proposals 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 (see section 3.3). 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 proposals is in this respect, that European farmers are exposed to the yardstick for international competitiveness, the world market prices, at least in the areas of grains, grain substitutes and oilseeds. Some of the remaining Agenda 2000 proposals would contribute as well to more efficient factor use and production:

- setting obligatory set-aside at 0 % would make European farms "larger" and reduce their average costs. It would free administrative resources for more productive uses. In addition, it would remove 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" would reduce some allocative distortions between products and

enable more flexible adjustments to changing market conditions;

- adjustment of grain prices towards world market prices would reduce feeding costs for animals, especially in pork and poultry production, so that European producers would be on equal terms with their competitors in other parts of the world.

Yet many deficiencies would still exist and should be overcome in the political negotiation process on the Agenda 2000 proposals. Otherwise they will be left to further steps of CAP reform. Problems which might be tackled in the present Agenda 2000 negotiations are:

- further steps in direction of decoupling, which have already been asked for in section 3.1;
- the cancellation of upper limits for compensation payments per farm and other support measures;
- 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 (beyond Agenda 2000) should be to abolish the quota regulations for milk and sugar at all. In the case of sugar, this could be realised already now and without larg-

er 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 proposal seems to be adequate. However, the Agenda 2000 proposal 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, 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 proposed modifications of the Agenda 2000 proposals and 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 discussion on risks and uncertainties dominates the dispute on the Agenda 2000 proposals. 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.

3.3 Protecting the environment and landscape

Price reductions and steps towards liberalisation, starting in the 1992 CAP reform and continued in the Agenda 2000 proposals, 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 for the Agenda 2000 proposals (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 decou-

pling 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 extensions and differentiation of agri-environmental policy are scheduled in the Agenda 2000 proposals (additional funding for accompanying measures, LFA payments possible for regions with stricter environmental legislation, more restrictive conditions for extensification premium for beef). The basic orientation of these measures corresponds to the requirement 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. 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. An example of an environmentally motivated condition from the 1992 reform is the maximum stocking density condition for the calculation of beef payments. Among the Agenda 2000 proposals are included new environmental minimum standards to be specified at Member State level for eligibility for compensatory payments and for LFA schemes as well.

This "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 as a first step to relate the payments to their only rationale in the long run, being a payment for the delivery of public goods. Even completely decoupled compensatory payments could only be justified as transitory and declining payments (see section 3.1). 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 chances 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 might even become a permanent source of income to farm households in many regions.

3.4 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 proposals where the need for integrated rural development is emphasised. The basic ideas of this concept correspond very much to what agricultural and regional economists have asked for a long time. 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 proposals 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, simply 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.

The 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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Methodological appendix on the SPEL/EU-MFSS

The quantitative assessment has been based on the SPEL/EU-MFSS modelling system, which 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 see 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 (autoregressively) 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.

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 see 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 as presented in section 2... on theoretical grounds, but the approximation error is likely to be negligible given the small budget share of food items and their low income elasticities (Just, Hueth, Schmitz 1982, p. 374).

Components of demand other than human consumption are projected exogenously or derived from the supply side.

An external trade component allows incorporation net trade functions between the EU and the rest of the world.

Supply, demand and trade 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.

In the context of Agenda 2000 simulations, we would have liked to have a further regional breakdown beyond the Member State level and farm structure information included, but this is impossible in the present framework. Therefore, some of the Agenda 2000 measures had to be included in a rather crude way among the exogenous variables (translation of extensification premium for bulls into additional value added for the activity male adult cattle), others had to be neglected altogether (upper limits on total premiums per farm).

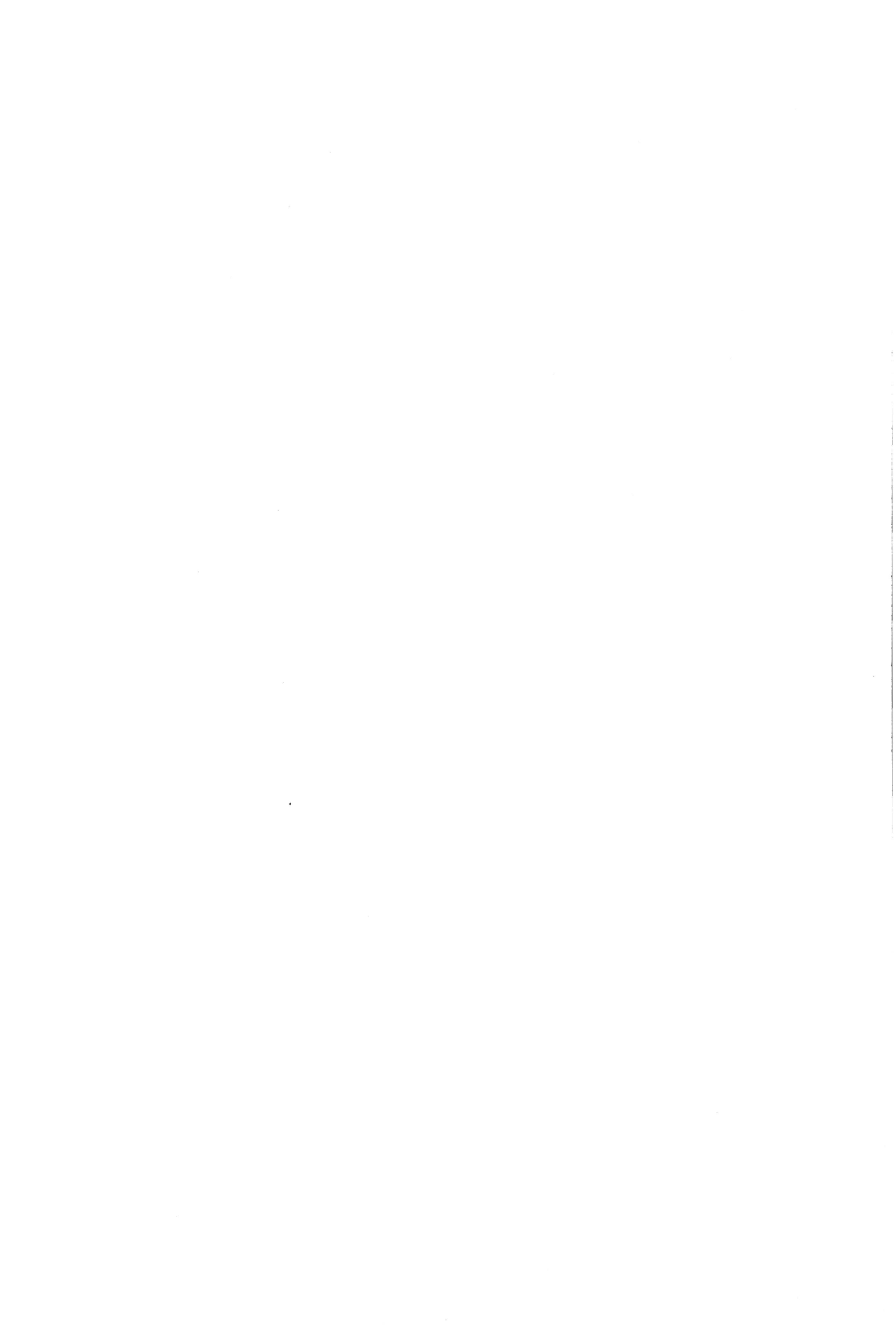
However, compared to other approaches to do quantitative assessments of the Agenda 2000 impacts, the SPEL/EU-MFSS represents an already fairly sophisticated and powerful modelling tool.

Global impact analyses

The macro-economic effects of the proposed CAP reform

**By the Directorate-General
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of the European Commission**

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Chapter VIII

The macro-economic effects of the proposed CAP reform

1. Introduction

The CAP reform proposals aim at reducing the differences between internal EU prices and world market prices by lowering the intervention prices in three sectors: arable crops (by 20 %), beef (by 30 %) and dairy (by 15 %), starting in year 2000, either in one step or gradually. 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 document is to give a quantitative account of these price effects originating from the proposed reform through simulation results from the Commission's Quest II model²⁴. 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 Price assumptions

The impact of the proposed 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.

The consequences of the reform have been assessed under three scenarios of price transmission. Only the two extreme scenarios, thus covering the full range of potential effects, have been retained for the present macro-evaluation. The first one (scenario 1a) assumes that the reduction in institutional prices is fully reflected in market prices which subsequently decline by 20 % for cereals, 30 % for beef and 15 % for milk. However, the reduction in support is expected to result in smaller reductions in market prices for the concerned products by generating an expansion of demand both externally and internally. The second scenario (scenario 1b) only assumes very partial transmission to market prices. In this scenario, market prices are reduced by 10 % for cereals (5 % for wheat, 15 % for coarse grains), 20 % for beef and 12 % for milk.

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 only 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 in 1995 as they result

²⁴ A description of the model structure is given in the appendix.

from national accounts and on the assumption of a constant real price.

In the first scenario (scenario 1a), agricultural prices fall strongly, leading to a decline in consumer prices by 0.45 % in year 2005 while scenario 1b assumes a more modest decline in agricultural prices and a fall in the consumer price level of 0.27 % on average in the EU.

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 2a and 2b) are presented where it is also assumed that consumer prices fall by 0.45 % and 0.27 % EU wide but different assumptions on wage behaviour are made.

In the first two scenarios 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. 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 cooperative 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 these assumptions 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 scenarios 2a and 2b.

3. Results

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

As can be seen from the tables 8.1 and 8.2, the macroeconomic effects of such a reform are positive for the EU both in the short and in the long run. Under the assumption that consumer prices fall by 0.45 %, real consumption can be up by 0.6 % after five years and remains at roughly this level permanently. The GDP effect sets in more slowly. GDP is increased by roughly 0.2 % after the first five years but continues to rise to approximately 0.4 % in the long run.

Table 8.1 : Macro-economic impact measured as percentage deviation from baseline levels : scenario 1a (large consumer price reduction, shifted onto firms)

	2005	2010	2020	2030
Gross Domestic Product	0.1916	0.3225	0.3793	0.4017
Private Consumption	0.5980	0.7880	0.7454	0.6852
Private Investment	0.6015	0.5885	0.5014	0.4640
Exports	0.1675	0.2197	0.2857	0.3274
Imports	0.7550	0.8507	0.7478	0.6631
Real Wage Costs	-0.0327	0.0041	0.0363	0.0351
Employment	0.1979	0.3367	0.3679	0.3847

**Table 8.2 : Macro-economic impact measured as percentage deviation from baseline levels :
scenario 1b (small consumer price reduction, shifted onto firms)**

	2005	2010	2020	2030
Gross Domestic Product	0.1258	0.2114	0.2486	0.2631
Private Consumption	0.3937	0.5177	0.4893	0.4492
Private Investment	0.3972	0.3880	0.3294	0.3047
Exports	0.1098	0.1444	0.1879	0.2149
Imports	0.5003	0.5638	0.4950	0.4385
Real Wage Costs	-0.0206	0.0042	0.0255	0.0247
Employment	0.1287	0.2186	0.2386	0.2494

In the case of a smaller decline of consumer prices (scenario 1b), consumption and GDP are up by 0.45 % and 0.26 % in the long run respectively. Similarly, employment only increases gradually, thus employment expansion induced by the CAP reform is not completed after five years in both scenarios. 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.

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 expenditure²⁵.

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 firms²⁶. This effectively means that firms are faced with lower

wage costs and they respond to the 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.

²⁵ This is an implication of the permanent income hypothesis.

²⁶ This is an implication of wage bargaining models of the labour market.

Such macroeconomic effects from the CAP reform are by no means trivial. This may become more obvious if one compares the quantitative effect to the estimated quantitative outcome of other policies such as tax reforms, for example. The employment effect of the CAP is equivalent to a reduction of labour taxes by about 4 %.

3.2 Results based on the standard wage rule with limited pass-through of consumer prices (scenarios 2a & 2b)

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 scenarios 1a and 1b 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.

This becomes evident by looking at results from scenarios 2a and 2b. If the reduction in consumer prices leads only to a 50 % pass through on wages then the results from scenarios 2a and 2b indicate that the GDP and employment effects could be substantially smaller compared to those from scenarios 1a and 1b. In the case of a strong reduction of consumer prices (cf. table 8.3), the long run GDP effect in the EU as a whole would be about 0.2 % (one half of the effect with full pass through) and the employment effect would be about 0.13 % (one third of the effect with full pass through).

**Table 8.3 : Macro-economic impact measured as percentage deviation from baseline levels :
scenario 2a (large consumer price reduction, benefits shared)**

	2005	2010	2020	2030
Gross Domestic Product	0.1275	0.1739	0.1906	0.1906
Private Consumption	0.4496	0.5781	0.5242	0.4663
Private Investment	0.6049	0.4407	0.3527	0.3058
Exports	0.1523	0.1671	0.2008	0.2207
Imports	0.6657	0.7176	0.6360	0.5729
Real Wage Costs	0.0409	0.0646	0.0751	0.0700
Employment	0.0872	0.1229	0.1280	0.1295

**Table 8.4 : Macro-economic impact measured as percentage deviation from baseline levels :
scenario 2b (small consumer price reduction, benefits shared)**

	2005	2010	2020	2030
Gross Domestic Product	0.0841	0.1147	0.1258	0.1259
Private Consumption	0.2967	0.3813	0.3460	0.3078
Private Investment	0.3986	0.2921	0.2335	0.2026
Exports	0.1006	0.1112	0.1339	0.1472
Imports	0.4398	0.4750	0.4207	0.3788
Real Wage Costs	0.0271	0.0431	0.0502	0.0469
Employment	0.0572	0.0803	0.0834	0.0843

The increase in consumption would still be substantial with 0.46 %, 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. Of course, as can be seen from table 8.4, with a smaller consumer price reduction (like in scenario 1b) the macroeconomic effects would be correspondingly smaller.

4. Conclusion

The proposed 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 price transmission mechanism and the ultimate size of the consumer price change but more crucially on wage behaviour. Under certain labour conditions the benefits of the reform can become quite significant in quantitative terms and persist/develop over the long run.

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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 micro-economic 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

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

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

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

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 $F(\cdot)$ 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.

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

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

$$K = J_t - \delta K_t \quad (4)$$

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

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

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

$$I_t = \phi(q_t / (PI_t / P_t) - 1)K_t \quad (6)$$

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

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

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 (τ_c) 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.

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

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

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

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 vct . In addition it is negatively affected by the mark-up the firm charges in product markets.

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

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 b which can take on values between zero (competitive labour market and no bargaining strength of work-

ers) 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

$$WC_t = (1 - \beta)(Z_t + L_t) / (1 - \alpha) + \beta[(\alpha + \eta(1 - \alpha))Y_t / N_t + wc_t \text{PROB}(LUR_t)] \quad (10a)$$

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 $\text{PROB}(LUR_t)$, 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

$$IM_t = S_m (PC_t / PM_t)^{\sigma_m} (C_t + G_t + I_t) \quad (11)$$

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 s_m 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

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

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

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

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

$$i_t^j = i_{us} + \Delta E_{t+1}^j / E_t^j + RP_{REM_t^j} \quad (15)$$

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 balances which stresses both transaction and speculative motives of holding money

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

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.

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European Commission
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This report brings together the findings of a series of impact analyses of the CAP reform proposals presented in the framework of Agenda 2000.

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

