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Analysis of the European Food Industry

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List of abbreviations

CAP	Common Agricultural Policy
CES	Constant Elasticity of Substitution
CET	Constant Elasticity of Transformation
CGE	Computable General Equilibrium
CIAA	Confederation of the EU Food and Drink Industry
cif	Cost, Insurance, Freight
CMEA	Council for Mutual Economic Assistance
CU	Customs Union
EFSA	European Food Safety Agency
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	Food and Agriculture Organization Statistical Database
FDI	Foreign Direct Investment
fob	Free On Board
FTA	Free Trade Area
GAMS	General Algebraic Modelling System
GDP	Gross Domestic Product
GM	Genetically Modified
GMO	Genetically Modified Organisms
GTAP	Global Trade Analysis Project
HACCP	Hazard Analysis Critical Control Point
ICT	Information and Communications Technologies
IPR	Intellectual Property Rights
ISO	International Organization for Standardization
IT	Information Technology
NACE	Nomenclature Générale des Activités Économiques
R&D	Research and Development
SAM	Social Accounting Matrix
SME	Small and Medium-sized Enterprises
SPS	Sanitary and Phytosanitary
TNC	Transnational Company
TNI	Transnationality Index
TRIPS	Trade-Related aspects of Intellectual Property Rights
UNCTAD	United Nations Conference on Trade and Development
USDA	United States Department of Agriculture
WIIW	The Vienna Institute for International Economic Studies
WTO	World Trade Organization

Region abbreviations

EU	European Union: Belgium (BE), Bulgaria (BG), Cyprus (CY), Czech Republic (CZ), Denmark (DK), Germany (DE), Estonia (EE), Spain (ES), Finland (FI), France (FR), Greece (GR), Hungary (HU), Ireland (IE), Italy (IT), Lithuania (LT), Luxembourg (LU), Latvia (LV), Malta (MT), the Netherlands (NL), Austria (AT), Portugal (PT), Poland (PL), Romania (RO), Sweden (SE), Slovenia (SI), Slovak Republic (SK) and the United Kingdom (UK)
EU-27	European Union (27 Member States since 2007)
EU-15	European Union (15 Member States before 2004)
EU-10	European Union (10 Member States which acceded in 2004)
EU-25	European Union (25 Member States: EU-15 plus EU-10)
NMS	New Member States of the EU (2004 and 2007 enlargements)
ACP	African, Caribbean and Pacific Group of States
ANDEAN	Andean Pact of South American countries
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of South-East Asian Nations
BAFTA	Baltic Free Trade Area
CEFTA	Central European Free Trade Agreement
CIS	Commonwealth of Independent States
EFTA	European Free Trade Association
FSU	Former Soviet Union
LDC	Less developed countries
MERCOSUR	Mercado Común del Sur (Southern Common Market)
NAFTA	North American Free Trade Agreement
OECD	Organisation for Economic Co-operation and Development
TR	Turkey
USA	United States of America

Scenarios conducted with GLOBE

Simulation	Description
BASE	Initial situation (in 2001)
REMEXPTAX	Removal of only bilateral export taxes between members of the EU-27
REMIMPTAR	Removal of only bilateral import duties between members of the EU-27
REMTRADBAR	Removal of both bilateral import duties and export taxes between members of the EU-27, i.e. a FTA
COMTRADPOL	Adoption of common external tariff rates by the EU-27, i.e. a CU
COMDOMPOL	Adoption of only common factor use taxes for agriculture and food by the EU-27, i.e. a CAP
HARM	All the above components
TECHCHG	Enhanced technological change in all NMS
HARM&TECHCHG	Combination of the two previous scenarios

Preface

This report is based on a study assigned to the Centre for European Policy Studies (CEPS) by the European Commission's Joint Research Centre, Institute for Prospective Technological Studies (JRC-IPTS) to investigate recent developments in the European food industry and the impact of foreign direct investment (FDI) and trade flows on the food industry in the EU-25.

The report illustrates trends in and the structure of the European food industry. Past and possible future developments are analysed, identifying the drivers behind development of the food industry and assessing the impact on production, structures, farmers and trade.

Another key feature of this report is to assess the impact of EU accession and of harmonisation of trade policy for agricultural commodities and processed agri-food products on both the EU-15 and the new Member States (NMS).

The report is divided into two parts:

Part A analyses the features of the European food industry and how it has developed over the last two decades. Figures are taken from a database containing indicators for the food industry in the EU-25 (available upon request). Part A also pinpoints the main drivers and singles out differences between the NMS and the EU-15.

Part B provides an analysis based on the GLOBE computable general equilibrium model simulating potential development scenarios for the food industry in the EU; particular attention is paid to the impact of FDI on productivity gains in the food industry in the NMS.

Policy simulations have been conducted, based on two assumptions – perfect and imperfect competition. Only selected results of this analysis are reported. Additional tables are available upon request.

The present report has been undertaken by Johan Swinnen and Eleni Kaditi from the Centre for European Policy Studies (CEPS), Martin Banse from the Agricultural Economics Research Institute (LEI), Scott McDonald from the Oxford Brookes University and Sherman Robinson from the University of Sussex and coordinated by Stephan Hubertus Gay (DG JRC, IPTS), Robert M'barek (DG JRC, IPTS).

Executive summary

This study was commissioned by the European Commission's Joint Research Centre, Institute for Prospective Technological Studies (JRC-IPTS) to investigate recent developments in the European food industry and the impact of foreign direct investment (FDI) and trade flows on this sector.

It looked at a wide variety of material to obtain the main statistics on the food industry in the EU and identify trends and drivers of change. Their impact on the agri-food sector was made visible by means of computable general equilibrium (CGE) modelling.

Development of the European food industry

The food industry is an intrinsic part of the food supply chain which is influenced by a range of factors and therefore plays an important role within the food system.

The European food industry generates a significant share of the total value added in all EU Member States and is one of the biggest employers. Since the enlargement of the EU with 12 new Member States (NMS), the macroeconomic relevance of the agri-food sector has even increased. In general, agriculture plays an important role in many rural areas throughout the EU. In the medium term, agricultural income is expected to grow, though this clearly remains subject to considerable uncertainties, for example the outcome of the Doha Development Round of trade negotiations, the risks linked to animal diseases such as avian influenza, which could have far-reaching implications for the future pattern of EU agricultural markets, and the effects on prices caused by the increasing use of biofuels in Europe. Farm units in the EU are also expected to continue to increase in size and decrease in number. Both the agricultural labour force and the area under cultivation are likely to decline, while productivity is expected to increase.

This process of consolidation will undoubtedly continue to shape the whole supply chain in the near future. The power of food retailers will continue to grow as they further consolidate and supermarket chains will remain the key drivers in the food industry. However, the question remains whether supermarkets will also drive structural changes at farm level. It has been argued that the growth of supermarkets is having a significant and growing effect in NMS, not so much in terms of quality, but in the form of price and other

demand being imposed on the upstream companies. Finally, the increasing phenomenon of vertical contracting will have a significant impact on the NMS markets.

The main findings can be summarised as follows:

i. processed foods – as opposed to traditional agricultural commodities – are becoming increasingly important in agricultural trade;

ii. food manufacturing shows one of the highest degrees of transnationality and foreign production by food multinationals is increasing;

iii. the major companies are playing a key role in this process;

iv. significant international expansion and organisational changes are taking place in the retail industry;

v. there has been a significant increase in cross-border mergers and acquisitions of retailers; and

vi. a very small number of major retailers are playing an increasing role in globalisation of food systems, affecting competition in the distribution of food products.

In particular, in the NMS the following developments have been observed:

i. after the regime change, the food industry was suffering from a lack of quality supply;

ii. foreign investors entered the processing sector relatively rapidly, leading to a rapid increase in value-added production and consequent demand for homogeneous, high-quality, standardised supply;

iii. the concentration within the food industry has had an impact on the different levels of vertical coordination;

iv. there have been dramatic changes in the retailing sector, where international chains have also appeared;

v. large retailers may also have an impact on improving product quality, on vertical and horizontal integration and on rationalisation of the delivery system;

vi. small producers are affected as well, having almost no bargaining power when negotiating contracts and prices, yet benefiting from assistance policy.

One general conclusion is that the structure of the food industry is changing. As a driver, integration of the European and global markets has had a more direct impact as a result of FDI. FDI generates employment and income, provided it does not put local firms out of business. It removes capital constraints, encourages transfers of technology and spurs innovation. However, FDI could also lead to concentration of global market power and repatriation of profits.

These findings set the framework for the quantitative analysis using the GLOBE model to show the impact of FDI and the importance of EU membership for the agri-food sector in the NMS.

Quantitative analysis of EU accession

The simulations conducted using the GLOBE model and its imperfect competition variant (GLOBE_IC) indicate the impact which enlargement of the EU will have on the incentives for agriculture and the food sectors within the EU and in the NMS.

GLOBE is a multi-country, SAM (social accounting matrix)-based CGE model, in which the SAM serves to identify the stakeholders and monetary flows in the economy and provides the database for calibration. The GLOBE model is calibrated on a set of SAMs derived from the Global Trade Analysis Project (GTAP) database. Two groups of simulations were conducted with both the perfect competition and imperfect competition versions of the GLOBE model. The first considers the impact of enlargement of the EU and of the harmonisation of policies associated with EU membership, while the second assesses the impact of technical changes induced by the combination of EU accession and FDI. In cases where a policy shock consists of changes in a number of different policy instruments (e.g. import tariffs, domestic sales taxes and export taxes), separate simulations were run for each set of changes in the relevant policy instruments to provide an assessment of the impact of each component of the overall shock, which was finally analysed in a cumulative scenario that combines all the policy changes. Consequently, the final experiment in each group may

be considered the core experiment. For instance, although assessment of EU accession and policy harmonisation could be viewed as a single exercise, modelling such an event will typically involve running a number of different simulations to understand the roles of bilateral trade tax reductions and domestic policy harmonisation.

In general, EU membership has had a positive impact on production and income in the agri-food sector in the NMS. The liberalisation of internal trade between the members of the single European market is an efficient instrument for integration of the agri-food sector into the European economy. With full membership, the agri-food trade balances of the NMS are improving, which indicates an increase in the competitiveness of the agri-food sector in the NMS. Productivity in food processing is of particular importance in this context. The scenario analyses clearly indicate the importance of improving factor productivity in the agri-food sector. Continued FDI and domestic investment in the agri-food sector in the NMS would enhance the positive developments shown in these analyses.

Conclusions

The competitiveness of the EU agri-food sector improves only slightly under the conditions of the enlarged market of 27 Member States. In the case of the single European market, the impact of enlargement on the position of the food industry in the EU-15 Member States is rather limited. Introduction of the *acquis communautaire* does not change the rules of business for farmers and food processors in the EU-15 countries.

However, the single European market both provides an opportunity and, at the same time, poses a threat for the agri-food sector in the NMS. On the one hand, the single European market means an extended free trade area for producers in the NMS with greater market potential. On the other, farmers and food processors have to compete with their neighbours from the EU-15 countries.

To seize these opportunities, the food industry has to make the food-processing sectors more attractive for FDI. However, properly functioning factor markets is another precondition for this kind of successful development. Market imperfections, such as high labour immobility, significantly reduce the benefits of EU membership. The results show that with high labour immobility, the overall impact of EU membership can be negative if no structural change is taking place.

Competitiveness improves as a result either of a reduction in the raw material prices or of higher productivity growth in the specific industry concerned. Under these circumstances, total value added will increase. Higher productivity might be the result of higher value added induced by innovation, production differentiation or economies of scale.

As shown in the analysis, on many markets the introduction of the CAP in the NMS leads to an increase in agricultural producer prices. On those markets the CAP provides an incentive to expand agricultural output and to gain market share on the single European market. As FDI in the food-processing industries in the NMS becomes more attractive, integration of the agri-food sectors in the NMS into the single European market will become even stronger.

However, the functioning of agricultural and food markets after enlargement is crucial in terms of production and trade in agri-food products. This analysis shows that under imperfect competition in the food-processing industries, demand for agricultural products by the downstream processing sector will be much smaller than under properly functioning markets. Under distorted market conditions with imperfect competition, the positive effects of EU accession will be much smaller. The presence of imperfect competition will damp down the expansion of trade owing to the smaller changes in the prices of agricultural products due to the margin-taking activities of the processors.

Only functioning markets can guarantee that the potential of a growing agri-food market in the enlarged European Union will be fully harnessed in the new Member States.

PART A:
The European food industry on a dynamic global market

1 Profile of the European food industry

"Urbanisation, industrialisation and globalisation mean that the food system can no longer be viewed simply as a way of moving basic staples from farm to (local) plate. Food is increasingly produced by commercial growers, feeding long and sophisticated supply chains, and marketing often processed and branded products to mainly urban consumers" (Maxwell and Slater, 2003).

"Modern food markets are responding to consumer preferences at a local level, as the food industry becomes more global" (Regmi and Gehlhar, 2005).

In 2005, the European Union (EU) was the world's largest producer of all foodstuffs. In fact, the European food industry was the largest manufacturing sector with production worth over € 836 billion and accounting for about 14% of total manufacturing turnover. The sector processes more than 70% of the agricultural raw materials produced in the EU and is a leading exporter, with a total of € 47.6 billion and a positive trade balance *(Confederation of the EU Food and Drink Industry, CIAA)*.

The food industry is also relatively fragmented, with a few multinationals competing on the global market with global brands and a large range of products, while smaller enterprises serve local markets and concentrate on regional preferences. With almost four million employees, this industry is the leading employer in the EU, with the majority employed in small and medium-sized enterprises (SMEs).

France, Germany, Italy, the UK and Spain are the leading producers of food and drink in the EU-15.[1] In the new Member States (NMS), the food industry plays an important role in the process of integration, as a competitive sector that receives substantial foreign direct investment (FDI).

Given the importance of the food industry in Europe, the main objective of this report is to enhance knowledge of this sector across the EU and the Member States. It gives an overview of the food industry and of the major trends on EU and world markets, with

[1] The term "EU-15" is used for the Member States of the European Union (EU) before May 2004. "New Member States" (NMS) is used for all the countries which have joined since then. "EU-25" means the EU

reference to a compilation of indicators taken mainly from Eurostat, FAOSTAT, WIIW and UNCTAD datasets.

1.1 Defining the food industry

The food industry is very broad, but is defined here as the preparation of food and drink products ready for sale and consumption. It involves the sourcing of ingredients, processing, preservation and packaging. It also includes product research and design, taste-testing and marketing. The food industry is therefore considered a significant link in the food chain, which comprises agriculture and fishing, food and drink manufacturing, distribution and warehousing, wholesaling, retailing, food services and catering.

The food industry is made up of a number of product sub-sectors:

- cereal products (biscuits, bread and bakery products, breakfast cereals, cakes, desserts and cake mixes);
- beverages (including tea, coffee, soft drinks, alcoholic beverages, fruit juices, mineral water and spring water);
- confectionery and snacks;
- fish and fish products;
- fruit and vegetable processing (jams and preserves, herbs and spices, sauces and condiments and salads);
- meat processing and meat products;
- oils and fats, margarines and spreads;
- poultry and poultry products.

The industry also produces specialist products for a range of dietary requirements and lifestyle, religious, cultural and personal preferences (e.g. infant formulae and weaning foods, organic products, meat-free meals, soya-based products, etc.). Food and drink products are,

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Member States before the accession of Bulgaria and Romania and “EU-27” covers all the current EU Member States. “EU” will be used as a generic term.

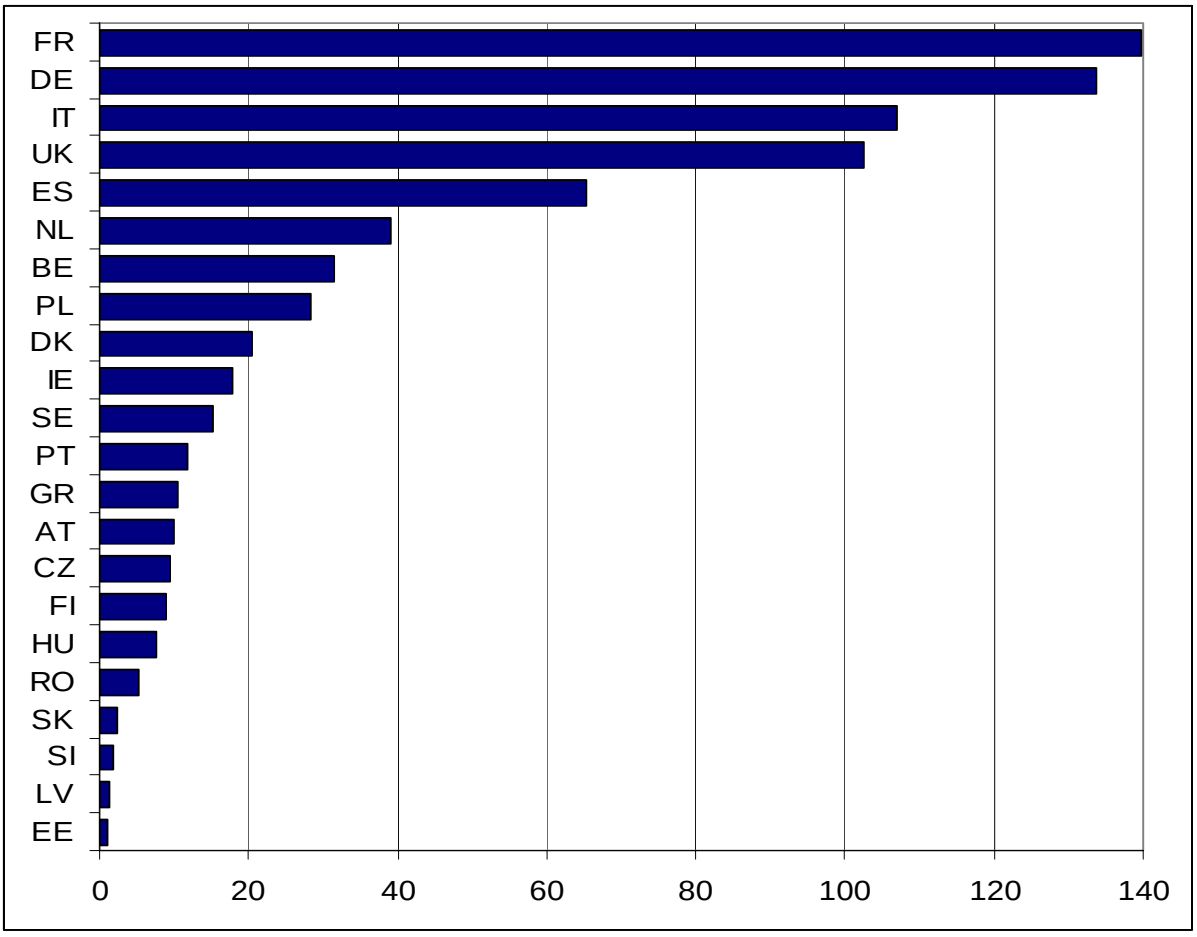
finally, made available in a wide variety of forms, e.g. frozen, chilled or at ambient temperature, packaged in glass jars and bottles, cans, plastic containers, paper or cardboard.

The data presented in this report cover the whole food and drink industry, as defined in division "DA" of the EU classification of economic activities (2-digit level of the NACE Rev. 1 nomenclature).

1.2 Structure

The food and drink industry is the leading manufacturing sector in the EU in terms of both production (13.4%) and employment (11.8%). In Ireland, Denmark and the Netherlands, a quarter of the manufacturing workforce are employed in the food and drink industry, while in Spain it generates 18.4% of total manufacturing production. In terms of turnover, France, Germany and Italy show the highest values among the EU-15.

Figure 1.1: Food and drink industry turnover by Member State (€ billion)



Note: 2005 data or latest available, National Federation and CIAA.
Source: CIAA (2007)

Looking at labour productivity as a reflection of competitive conditions in the food industry, Ireland, the Netherlands and the UK have the highest rates, followed by Denmark and Finland. Food and drink processing therefore remains a key sector of production and employment, even in the most developed economies, with big employment and business opportunities for SMEs.

In the NMS and the candidate countries too, food and drink is the key industry in terms of shares of output and employment. In Bulgaria, Romania and the Baltic States it accounts, on average, for about 25% of manufacturing output. Production has been growing in Poland, Slovenia and the Czech Republic, whereas in Bulgaria, Romania, Estonia and Lithuania output has declined over the last decade. Apart from in Hungary, employment in this sector is declining. Labour productivity has improved in the Czech Republic, Hungary and Estonia, but in Romania and Latvia it has deteriorated.

Overall, turnover in the food industry in the EU has been growing slowly, by an estimated 1.01% in 2003 compared with 2002 and 2% in 2004 compared with the previous year. In interpreting these figures, it must be borne in mind that the NMS are still recovering from the sharp drop in output in the early years of transition. In various countries (including the Netherlands, the UK, Denmark and some NMS) employment in the food industry is also on a downward trend, while profitability remains low in most NMS. This is the result of industrial restructuring in the NMS and the creation of thousands of small and medium-sized processing and retail enterprises, which have limited access to finance for reinvestment and modernisation. Furthermore, some firms in the NMS are finding it a challenge to meet EU food quality and hygiene standards and this is contributing to a lack of competitiveness against imports on the domestic market, at the same time as making it difficult to export to the EU-15 markets. Nevertheless, as will be shown later, there has been a significant reorientation of external trade towards the EU-15.

Table 1.1: The food industry in the EU, 2003

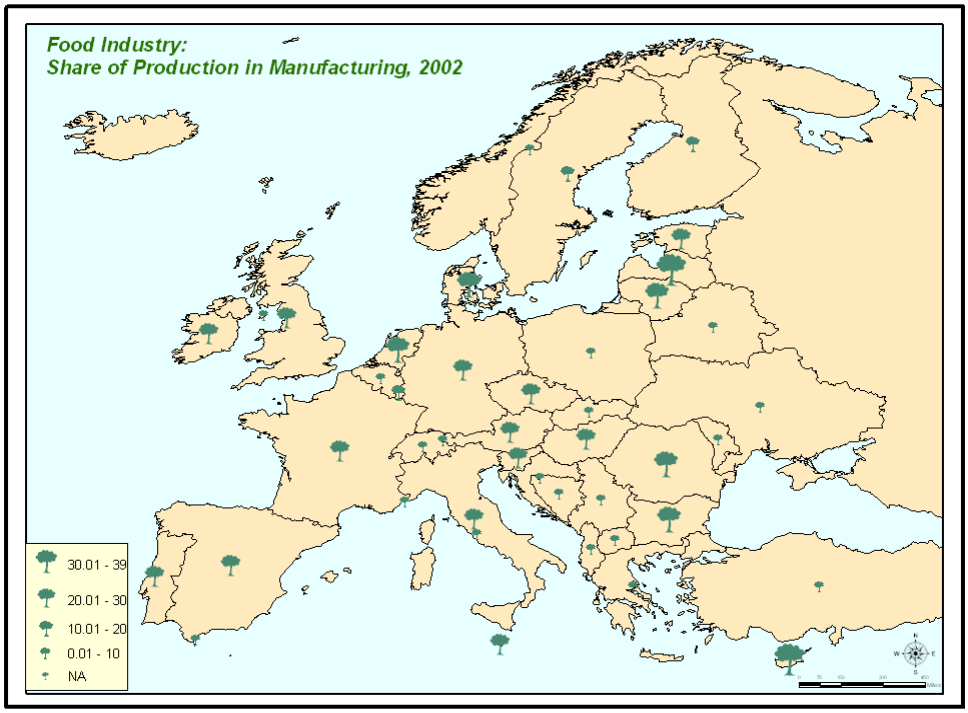
	Labour productivity	Growth of employment (%)	Unit labour cost	Share of production in manufacturing	Share of employment in manufacturing
BE	58.7	:	37.5	16.4	15.9
CZ	15.3	-3.9	7.4	13.0	10.6
DK	58.8	-2.5	37.8	27.3	19.3
DE	40.7	3.8	28.2	11.1	11.9
EE	9.8	-4.3	6.0	18.0	14.5
GR	:	:	:	:	:
ES	44.3	0.2	25.1	18.4	14.6
FR	45.1	-0.2	31.1	15.2	16.6
IE	147.8	-1.8	38.1	21.1	21.8
IT	42.5	1.8	29.6	13.3	9.6
CY	23.0	12.6	15.3	39.2	34.0
LV	9.0	-10.5	3.7	27.7	21.9
LT	7.5	3.0	4.2	22.7	20.2
LU	45.3	15.0	28.8	9.3	13.8
HU	15.1	-0.9	8.0	16.9	16.5
MT	:	:	:	:	:
NL	77.9	-8.8	40.1	23.6	17.0
AT	49.0	-1.1	31.8	10.8	12.6
PL	20.2	:	6.4	24.0	18.8
PT	24.4	5.6	13.4	16.2	12.0
SI	22.1	-6.7	15.5	10.5	9.0
SK	9.4	:	5.7	10.3	11.1
FI	53.7	0.7	35.3	8.9	9.6
SE	:	:	:	:	:
UK	63.6	-0.9	31.5	17.5	13.9
BG	3.5	5.8	2.1	22.1	17.7
RO	4.7	-1.4	2.2	20.5	11.8

Source: Eurostat

* Labour productivity is measured as GDP per hour worked in euro currency.

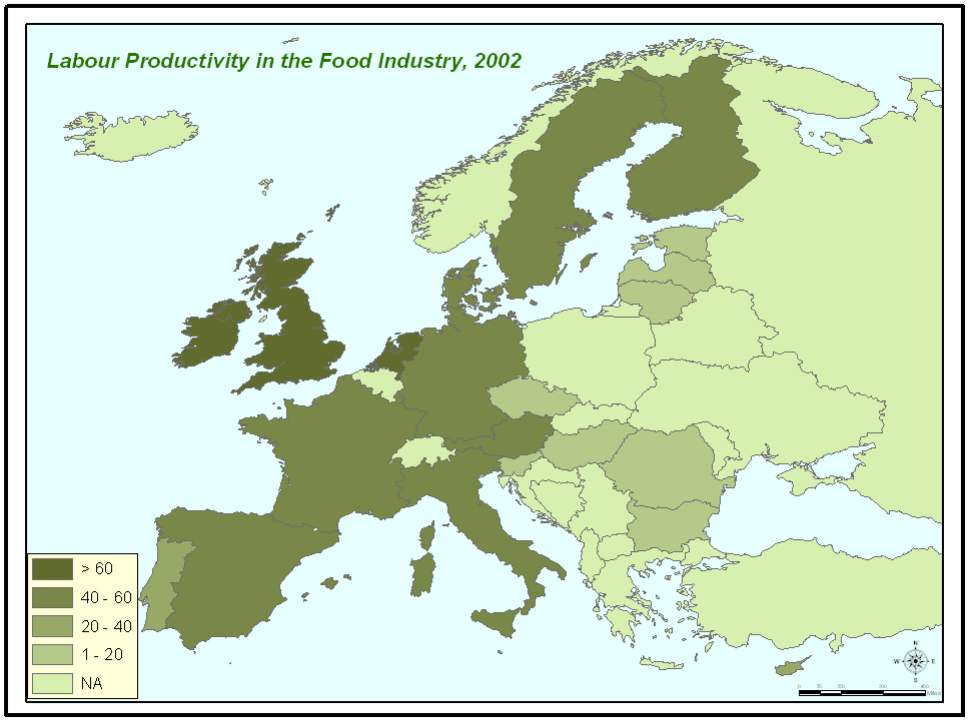
** The unit labour cost is the Unit labour cost is defined as personnel costs per employee in euros.

Map 1.1: Food industry: share of production in manufacturing, 2002



Source: Own presentation of Eurostat

Map 1.2: Labour productivity in the food industry (GDP per hours), 2002



Source: Own presentation of Eurostat

By way of international comparison, the EU-25 food industry produces, in value terms, significantly more than any other country (almost a quarter more than the USA). Even in terms of employment, the EU-25 employs more than twice as many people in its food industry as the USA (see Table 1.2). This is despite the fact that food production's share of total manufacturing in the EU-25 (14%) is significantly lower than in other countries (the highest share is in New Zealand, with 43%) and is only marginally higher than in the USA (13%). The same phenomenon is observed in employment. It therefore comes as no surprise that the food industry's contribution to GDP in the EU-15 is relatively low (2%). The fastest growing food industry is in China, with double-digit growth.

Table 1.2: International comparative table of food industries, 2003

	Production (€ billion)	% of total manufacturing	No of employees (thousand)	% of total manufacturing
EU-25	799	14	4 100	13
Australia	39	22	187	17
Brazil	77	17	1 015	19
Canada	55	13	241	11
China	137	-	-	-
India	135	-	1 600	-
Japan	223	10	1 568	14
Korea	41	8	296	7
Mexico	70	24	693	20
New Zealand	13	43	65	27
South Africa	15	-	-	-
USA	581	13	1 784	9

Source: OECD

1.2.1 Food industry by Member State

Table 1.3 sets out the information available on turnover and employment in the EU food industry for 2000 and 2003. Situations differ, depending on the Member State. However, generally speaking, the growth in turnover was quite low but stable, and the number of people employed decreased slightly.

Table 1.3: Food industry by Member State

	Turnover per person employed in thousand €			Total number of employees		
	2000	**2003**	**2000/03**	**2000**	**2003**	**2000/03**
BE	272.7	309.0	0.13	103 764	100 381	-0.03
CZ	:	70.6		145 735	144 823	-0.01
DK	210.5	256.9	0.22	89 868	84 347	-0.06
DE	175.4	190.8	0.09	886 037	867 221	-0.02
EE	38.5	48.4	0.26	20 307	18 630	-0.08
GR	:	:		:	:	
ES	173.6	204.4	0.18	379 569	381 253	0.00
FR	224.7	237.5	0.06	633 726	653 244	0.03
IE	398.5	470.5	0.18	48 981	50 232	0.03
IT	206.2	241.6	0.17	438 126	457 170	0.04
CY	101.7	90.7	-0.11	10 488	13 745	0.31
LV	:	32.8		:	35 528	
LT	26.9	33.0	0.23	57 034	54 526	-0.04
LU	137.3	151.9	0.11	4 424	5 124	0.16
HU	58.9	77.8	0.32	123 166	140 756	0.14
MT	88.7	:		4 404	:	
NL	:	395.4		:	134 997	
AT	156.5	163.0	0.04	80 432	78 419	-0.03
PL	:	67.2		:	445 694	
PT	102.8	108.6	0.06	106 581	106 277	0.00
SI	:	89.2		:	22 022	
SK	46.8	59.0	0.26	50 509	45 762	-0.09
FI	204.0	225.5	0.11	41 284	40 340	-0.02
SE	215.6	:		66 798	:	
UK	227.1	231.1	0.02	535 494	489 572	-0.09
BG	:	23.4		110 615	112 726	0.02
RO	21.8	28.9	0.33	232 257	204 484	-0.12
EU-25	175.2	:		45 576	:	

Source: Eurostat

1.2.2 Sector-by-sector breakdown

The food industry produces a wide range of foodstuffs. The key figures for nine broad sub-sectors are presented below. The chart shows only part of the diversity of foodstuffs produced in the EU Member States, from semi-processed products to end-products adapted to individuals' changing needs and demands. As in the previous section, comparisons can be made of the structure of the food industry, using one of three indicators: the relative share of each sector in the total output, value added or employment in the food industry. In addition, derived indicators can be calculated (such as a comparison of relative average labour productivity in each sector).

Looking at the individual sub-sectors, meat, beverages and dairy products together account for 50.6% of total turnover and 41.5% of the total number of employees in the food

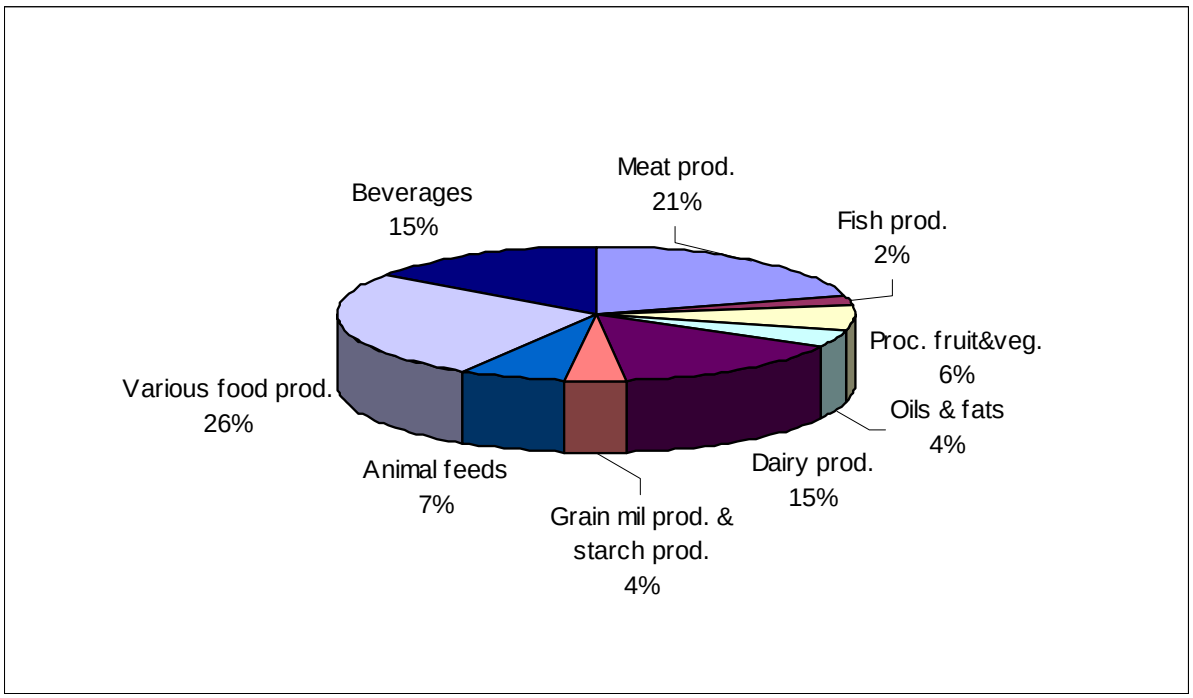
industry. Breakdowns of turnover, number of employees, value added and number of companies by sub-sector for 2001 are given in the figures below. Table 1.4 presents an overview of labour productivity, employment and production value of three sub-sectors as a share of total manufacturing for each country in the EU in 2001. Meat is consistently the biggest sector, accounting, on average, for around 2.9% of total employment in manufacturing, considerably more than its share of food industry output, indicating that it is a more labour-intensive part of the industry. The dairy industry accounts, on average, for 1.2% of total manufacturing employment, but is particularly big in Ireland and Lithuania (4.3%) and smaller in Germany (0.5%). There are also noteworthy differences in the relative size of the sugar sector, which is particularly big in Lithuania (0.5%), but non-existent in Cyprus and Estonia.

Table 1.4: Percentage of the food industry by sub-sector, 2003

	Dairy			Meat			Sugar		
	Labour productivity	**Output share**	**Employm. share**	**Labour productivity**	**Output share**	**Employm. share**	**Labour productivity**	**Output share**	**Employm. share**
BE	50.6	1.8	1.1	49.8	2.7	2.4	139.5	0.6	0.2
CZ	10.5	2.0	1.0	7.3	2.9	2.1	:	:	:
DK	:	:	:	53.8	7.6	5.1	:	:	:
DE	65.0	1.5	0.5	30.5	2.1	2.8	119.8	0.2	0.1
EE	8.7	5.5	2.4	8.0	3.3	2.1	:	0	0
GR	:	:	:	:	:	:	:	:	:
ES	50.2	1.7	1.0	33.5	3.7	2.7	107.4	0.3	0.1
FR	47.9	2.6	1.6	32.7	3.5	4.2	102.6	0.4	0.2
IE	67.5	3.8	4.3	44.0	3.6	5.5	:	:	:
IT	54.3	2.1	1.1	41.3	2.0	1.2	47.1	0.2	0.1
CY	26.4	4.7	3.9	26.3	7.5	3.3	:	0	0
LV	11.7	5.5	3.3	7.6	4.5	3.4	:	:	:
LT	6.4	6.1	4.3	3.1	3.3	3.7	9.7	0.9	0.5
LU	:	:	:	29.4	1.2	2.3	:	0	0
HU	15.6	1.8	1.1	10.0	4.3	4.1	41	0.5	0.2
MT	16.9	1.1	0.8	20.0	1.4	1.1	:	0	0
NL	74.3	3.5	1.4	45.2	4.0	3.0	:	0.4	:
AT	48.8	1.6	0.7	33.2	2.2	2.7	:	:	:
PL	:	2.9	:	:	4.8	:	:	1.3	:
PT	32.7	2.0	0.8	16.9	2.4	1.7	67.2	0.4	0.1
SI	:	1.7	:	:	2.6	:	:	:	:
SK	8	2.0	1.1	2.5	2.4	2.2	19.4	0.5	0.3
FI	51.7	1.8	1.2	47.8	2.0	2.4	:	:	:
SE	50.3	1.6	1.1	41.3	2.1	1.9	:	:	:
UK	52.8	1.4	1.0	40.7	2.6	3.1	:	:	:
BG	3.1	1.3	1.2	1.8	2.7	2.6	:	:	:
RO	3.3	1.3	1.0	0.3	4.3	1.8	2.4	0.6	0.3
EU-25	**44.2**	**2.0**	**1.2**	**31.9**	**2.8**	**2.9**	**:**	**:**	**:**

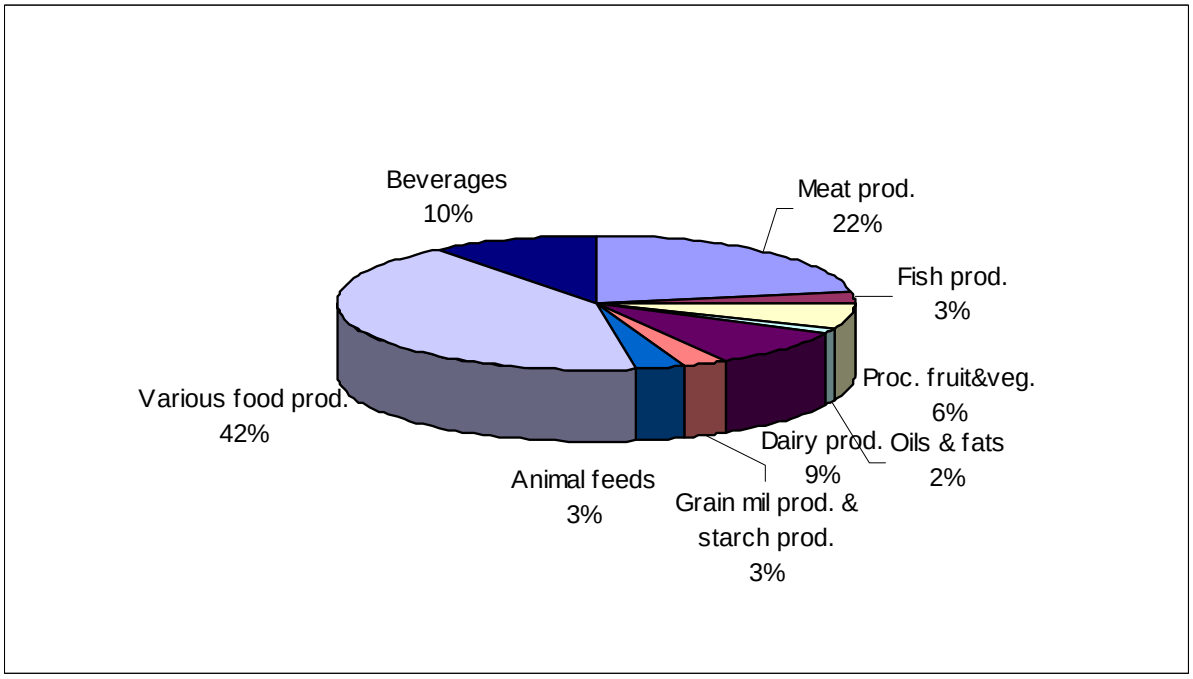
Source: Eurostat

Figure 1.2: Breakdown of turnover by sub-sector, 2001



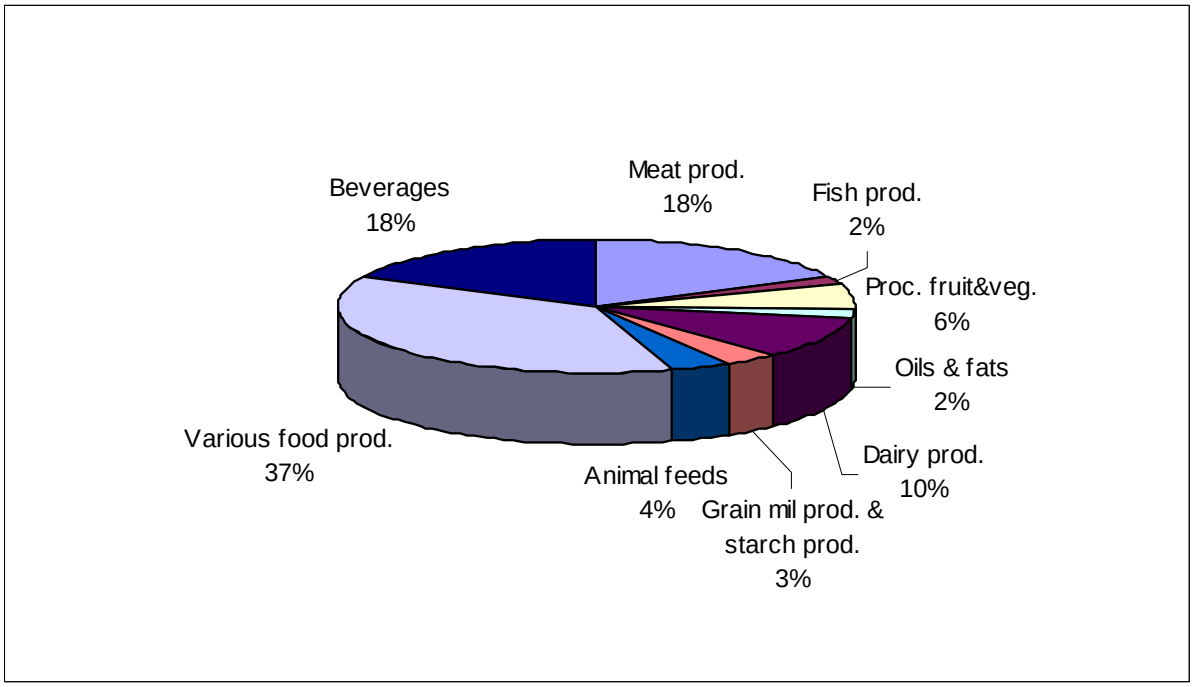
Source: Eurostat

Figure 1.3: Breakdown of employment by sub-sector, 2001



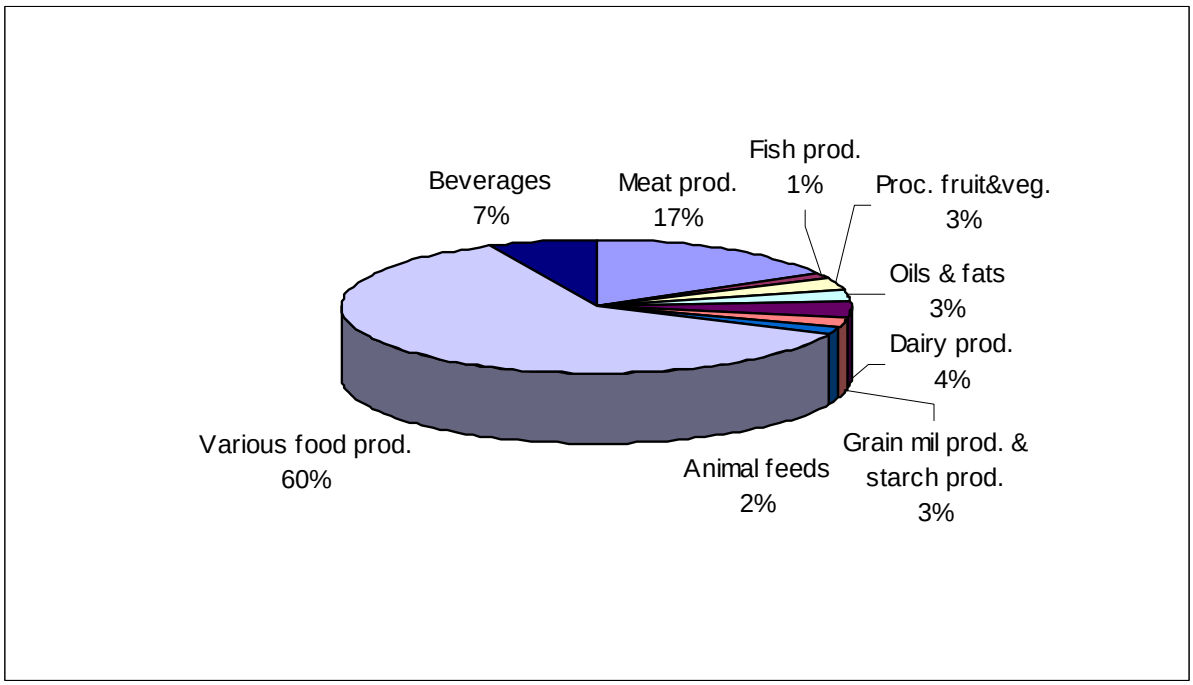
Source: Eurostat

Figure 1.4: Breakdown of value added by sub-sector, 2001



Source: Eurostat

Figure 1.5: Breakdown of food companies by sub-sector, 2001

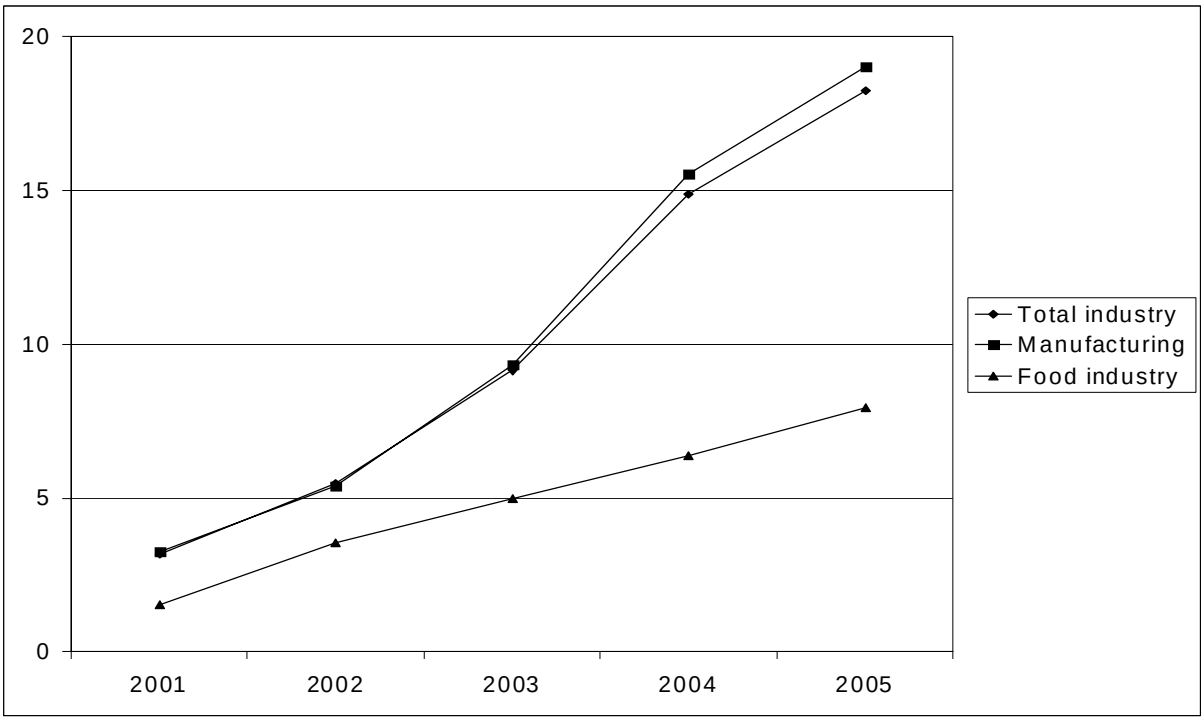


Source: Eurostat

1.2.3 Production growth

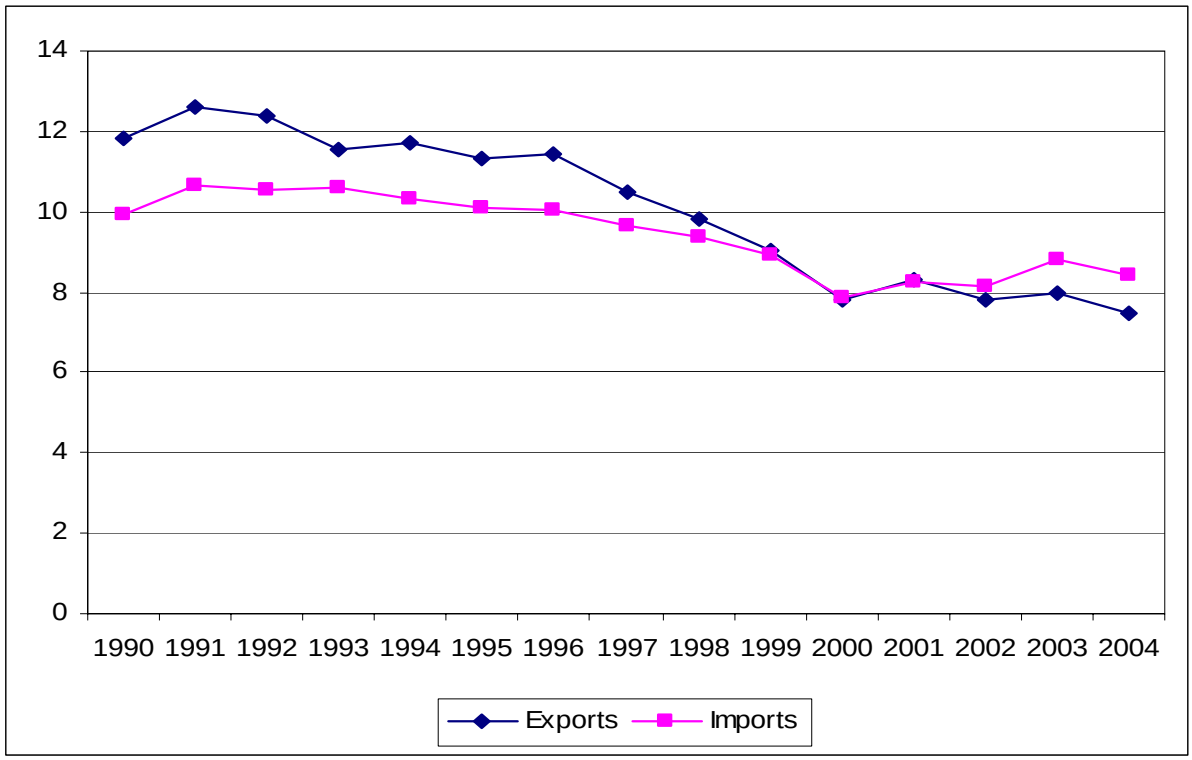
According to the Eurostat database, the European food industry has recorded annual production growth over recent years, along with manufacturing and industry as a whole (see Figure 1.6). The food industry's contribution to the EU-15's gross domestic product (GDP) totalled around 1.8% in 2001; the contribution by manufacturing was 19.1%. The corresponding shares for the NMS were 4.2% in GDP and 19.9% in manufacturing value added the year before. The importance of this sector to national economies is underlined in Figure 1.7, which shows food imports and exports as a percentage of total imports and exports at EU-25 aggregate level. Both indicators have been on a declining trend since 1999, especially exports.

Figure 1.6: Production growth in% (Base year 2000)



Source: Eurostat

Figure 1.7: Role and importance of the food industry (trade as % of total)



Source: EarthTrends database

1.3 Trade

In 2005, the EU exported €47.6 billion worth of food and drink products to non-EU countries, whilst it imported €43.1 billion. Food and drink exports from the EU rose by 5.3% in 2004/2005, significantly faster than foodstuffs turnover.

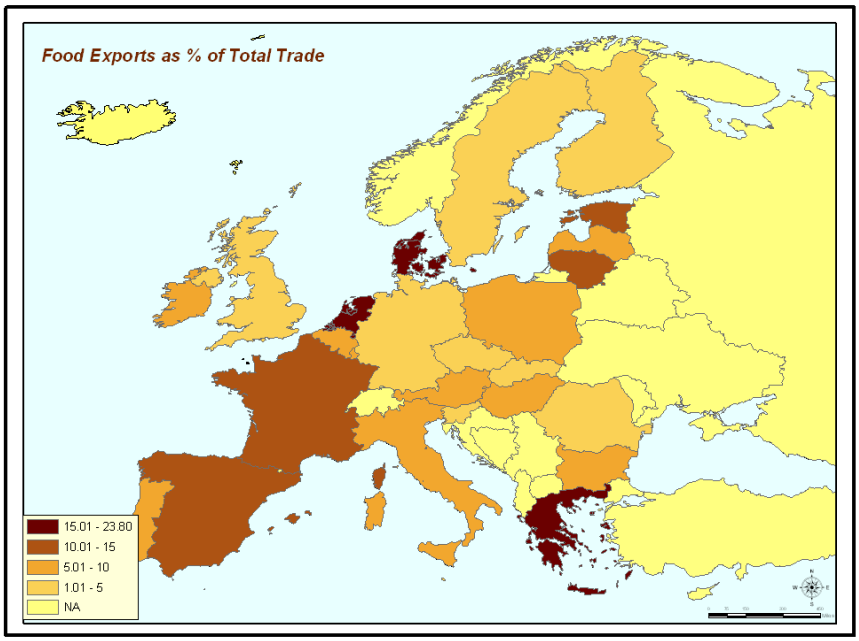
Table 1.5 shows the relative size of the European food industry in terms of food imports and exports as a percentage of total imports and exports for every EU country in 2004. The food industry is significantly larger in the Netherlands and Greece and relatively smaller in the Czech Republic and Slovakia.

Table 1.5: Size of the food industry by country, 2004

	Food exports as % of total	Food imports as % of total
AT	6.3	6.3
BE	8.6	8.2
BG	10.4	5.4
CZ	3.4	5.0
DK	18.6	11.8
EE	7.4	8.8
FI	1.9	5.6
FR	11.2	8.2
DE	4.1	6.8
GR	20.0	11.4
HU	6.6	3.9
IE	8.4	7.9
IT	6.6	9.3
LV	9.2	10.7
LT	11.3	8.1
LU	6.5	10.7
MT	4.6	11.4
NL	14.9	10.4
PL	8.4	5.7
PT	7.7	12.2
RO	3.0	6.3
SK	3.5	5.0
SI	2.7	5.9
ES	14.5	9.5
SE	3.3	7.6
UK	5.7	9.0

Source: EarthTrends database

Map 1.3: Food exports as a percentage of total trade, 2001



Source: Own presentation of EarthTrends database

In 2003, international trade had been on a rising trend over the last five years (see Figure 1.8). The majority of processed food is exported to APEC, NAFTA and Mediterranean countries (70% of total exports), whereas most imported processed food comes from APEC, Mercosur and ASEAN countries (60% of total imports). Moreover, the EU is a net exporter to APEC, NAFTA and the Commonwealth of Independent States. On the other hand, the EU ran a substantial trade deficit with the Mercosur and ASEAN countries over the period 1999-2004.

In detail, the USA is by far the leading destination (€9 billion), followed by Japan (€3.7 billion), Switzerland (€2.6 billion) and Russia (€2.6 billion). In percentage terms, the ASEAN countries (Brunei, Indonesia, Malaysia, Philippines, Singapore and Thailand) received 3.7% of EU exports, Mercosur 1.6% and the Andean Group (Bolivia, Colombia, Ecuador, Peru and Venezuela) 1.5%. Brazil, the USA and Argentina supply 30% of imports to the EU.

Among the wide range of foodstuffs, four sectors stand out in terms of trade with non-EU countries: beverages, dairy products, meat-processing and various food products (including goods like chocolate, biscuits, confectionery, pasta, prepared meals, etc.). Meat, dairy and starch products recorded weak export performance, on average, in 2005.

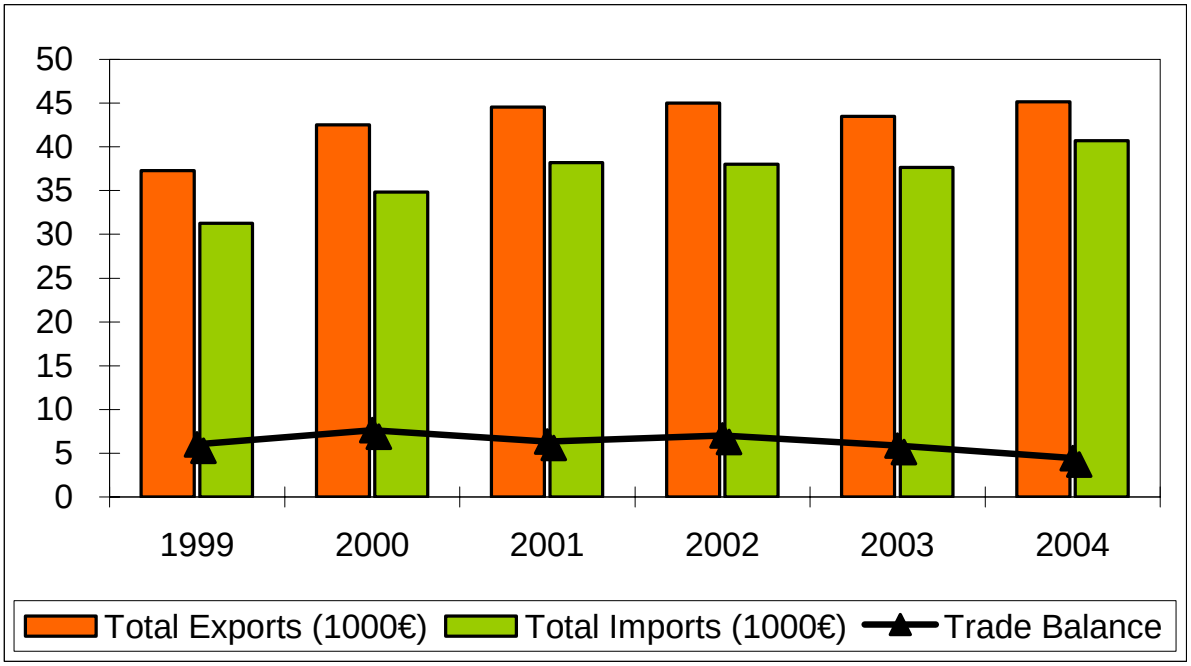
Within these categories, value-added products like cheese or processed pigmeat are continuing to record significant sales on non-EU markets.

Animal oils and fats and prepared animal feed are deeply in deficit, due to imports from NAFTA, Mercosur and Thailand. The other two categories where the EU has a heavy trade deficit are (i) processed and preserved fish and fish products, with imports at €11.07 billion and exports of only €1.87 billion and (ii) processed and preserved fruit and vegetables, with imports of €4.93 billion and exports of €2.55 billion. These two categories have been identified as key export opportunities for developing countries.

In the NMS, trade with the EU was not particularly significant prior to the accession process (except for Hungary and Poland) and the sector contributes only a fraction of manufacturing exports to the EU (except for Bulgaria, Poland and Hungary). Nevertheless, all the NMS were affected by trade liberalisation policies in the run-up to EU membership, under the bilateral Europe Agreements with the EU-15, two regional agreements (the Central European Free Trade Agreement – CEFTA – and the Baltic Free Trade Area – BAFTA) and

their membership of the WTO. Overall, CEFTA and BAFTA have had a limited effect on trade in food products. The Europe Agreements have been more important and have helped turn the EU into the NMS' major trading partner for food products. During the early transition years, most NMS ran a substantial deficit on food trade with the EU; in recent years, however, this deficit has narrowed as output and exports from the NMS have risen. Finally, trade in food products with Russia, historically the largest trading partner for most NMS, fell sharply in the early 1990s after the collapse of the Council for Mutual Economic Assistance (CMEA). This decline accelerated again in 1998 following the financial crisis in Russia.

Figure 1.8: EU processed food exports* and imports*



* only extra trade
Source: Eurostat Comext

Table 1.6: EU processed food exports and imports by country (million €)

	Exports			Imports		
	2003	**2004**	**04/03**	**2003**	**2004**	**04/03**
ALL NON-EU-25	**43 497.40**	**45 153.31**	**0.04**	**37 629.08**	**40 706.14**	**0.08**
Algeria	624.71	627.68	0.00	23.01	23.54	0.02
Argentina	43.24	47.43	0.10	3 517.73	3 674.51	0.04
Australia	852.40	954.37	0.12	1 067.30	1 222.10	0.15
Brazil	358.90	374.88	0.04	4 245.47	4 723.55	0.11
Bulgaria	221.32	262.42	0.19	227.46	259.44	0.14
Canada	1 454.76	1 474.42	0.01	481.56	474.37	-0.01
Chile	83.84	86.98	0.04	820.66	936.28	0.14
China	497.19	612.72	0.23	1 552.34	1 675.25	0.08
Croatia	607.98	627.18	0.03	227.92	153.23	-0.33
Egypt	248.36	299.00	0.20	69.54	112.08	0.61
India	79.83	92.69	0.16	726.34	771.60	0.06
Israel	487.88	488.44	0.00	267.90	269.56	0.01
Japan	3 484.36	3 633.12	0.04	94.42	93.16	-0.01
Mexico	579.55	510.77	-0.12	195.51	189.24	-0.03
Morocco	256.45	297.75	0.16	715.31	714.90	0.00
New Zealand	119.58	135.38	0.13	1 458.19	1 419.35	-0.03
Norway	1 248.63	1 328.12	0.06	1 265.11	1 237.40	-0.02
Romania	485.75	614.90	0.27	137.36	159.05	0.16
Russia	3 114.54	3 521.65	0.13	552.55	497.47	-0.10
South Africa	295.71	348.87	0.18	777.92	823.09	0.06
South Korea	732.36	881.99	0.20	114.42	99.72	-0.13
Switzerland	2 942.73	3 016.77	0.03	1 361.38	1 480.29	0.09
Syria	167.09	161.14	-0.04	69.93	70.33	0.01
Tunisia	193.24	210.99	0.09	168.71	501.83	1.97
Turkey	380.15	446.53	0.17	1 106.89	1 368.18	0.24
Ukraine	491.23	505.06	0.03	380.40	370.00	-0.03
USA	10 057.52	10 089.57	0.00	2 971.20	2 985.61	0.00

Source: Eurostat Comext

2 Links in the food chain

2.1 Consumers

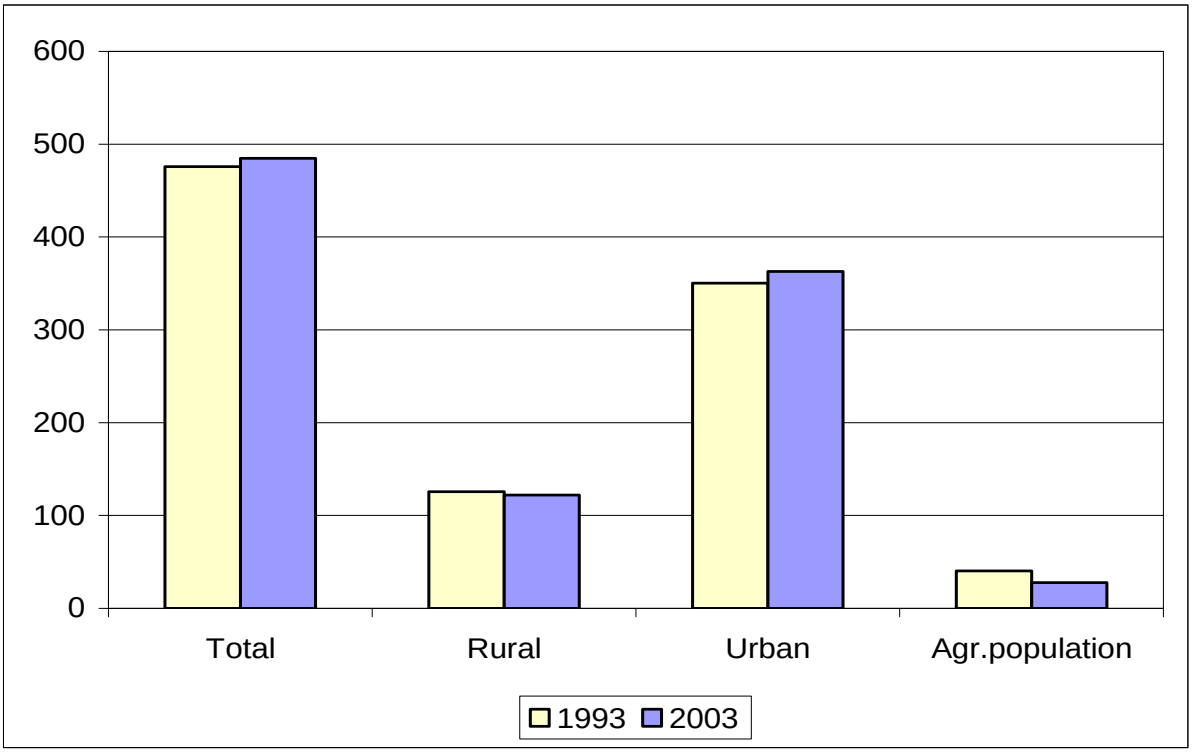
According to FAOSTAT data, the current population of the EU-27 is approximately 485 million. This is the number of people present-in-area (de facto), which includes all persons physically present within the present geographical boundaries of the countries concerned at the mid-point of the reference period. The FAO method classifies the population as follows:

- *Urban population*: usually the urban area is defined and its population calculated. The rural population is the residual after subtracting the urban population from the total population.

- *Rural population*: (i) agricultural population – all persons depending for their livelihood on agriculture, hunting, fishing or forestry, or the population actively engaged in agriculture; and (ii) non-agricultural population – this is the residual after subtracting the agricultural population from the total rural population.

Analysing the population, Figure 2.1 shows that 125 million people lived in rural areas in 1993, whereas in 2003 the rural population was 121 million people. The urban population is considerably higher, while in 2003 the agricultural population accounted for only 5.7% of the total.

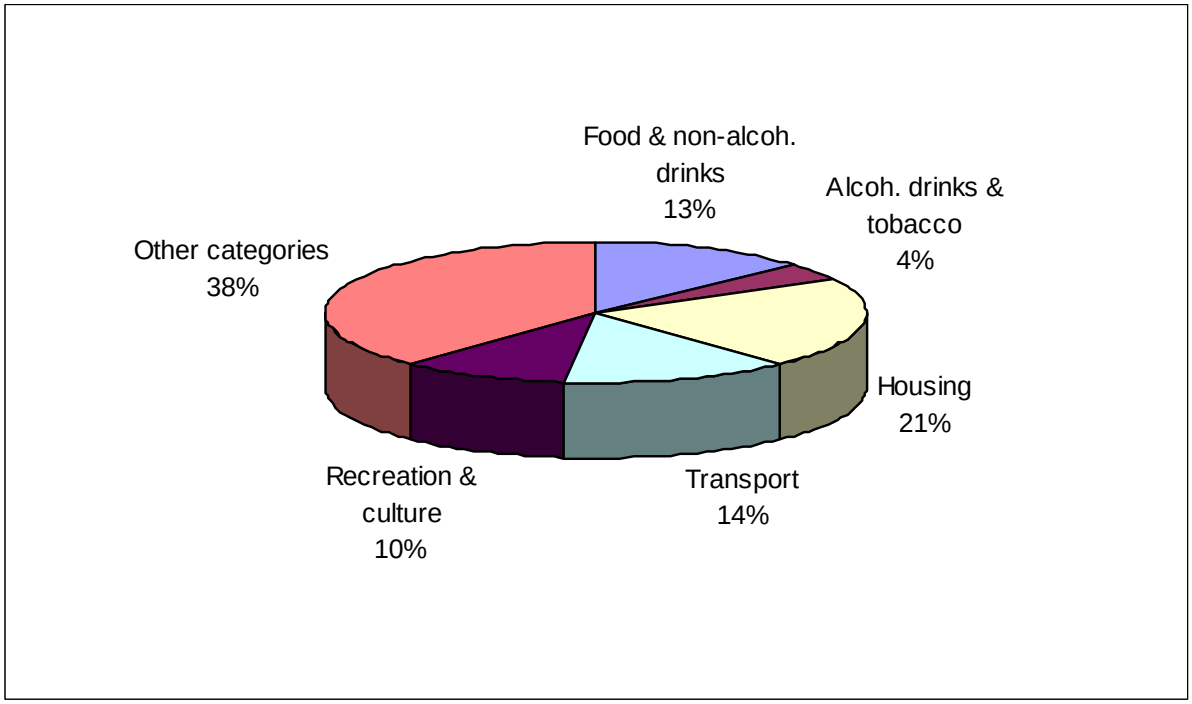
Figure 2.1: Population estimates in 1993 and 2003 for the EU-27 (million)



Source: FAOSTAT

Food is a subject dear to most people's hearts. Eating, shopping for food and cooking are fundamental activities. As a result, food and drink used to account for the largest share of household consumption, before gradually being overtaken by other necessities such as housing, transport and leisure (see Figure 2.2).

Figure 2.2: Breakdown of final household consumption expenditure in the EU-25 in 2002 (% of total)



Source: Eurostat

As can be seen from Table 2.1, there are significant differences between EU Member States in consumption of food and non-alcoholic drinks. The lowest share of expenditure was found in the UK (9.7%) and the highest in Lithuania (31.3%) in 2002. In the NMS in particular, the share of food and drink in household expenditure remains high, averaging 22%, against 12% in the EU-15. Table 2.1 also shows expenditure on food and non-alcoholic beverages in 1995 and 1999, highlighting the fact that the proportion of consumer spending on food is continuing to fall and that the overall size of the market for food is therefore diminishing relative to other sectors of the economy.

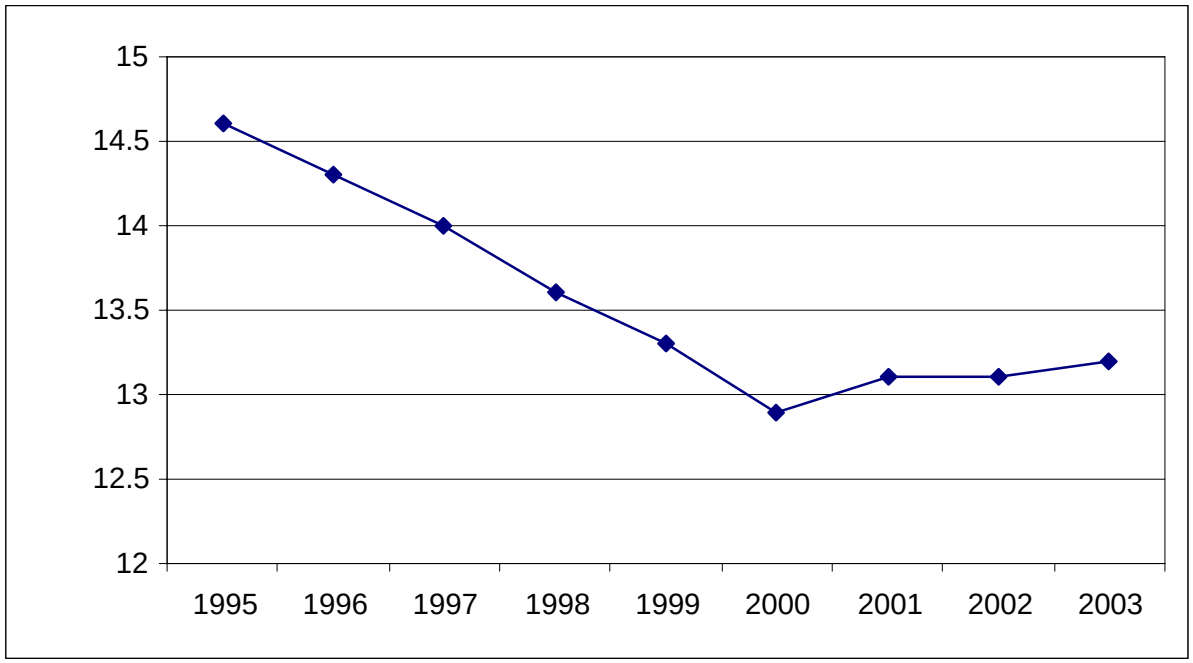
Table 2.1: Household consumption expenditure on food and non-alcoholic drinks in the EU-25 (% of total)

	2002	1999	1995
UK	9.7	9.7	11.2
IE	10.7	12.0	15.7
NL	11.2	11.6	13.0
AT	12.1	12.4	13.4
DE	12.1	11.8	12.5
DK	12.6	13.0	14.0
SE	12.6	12.6	14.4
FI	12.8	13.0	14.8
BE	13.6	13.2	14.5
FR	14.5	14.4	15.1
IT	14.6	15.0	16.8
GR	15.8	16.8	18.2
ES	15.9	15.3	17.7
SI	17.2	:	:
PT	18.8	19.1	20.7
CZ	18.8	:	:
HU	19.4	:	:
CY	19.6	:	:
PL	19.9	:	:
MT	20.4	:	:
SK	22.1	:	:
EE	22.9	:	:
LV	25.5	:	:
LT	31.3	:	:
EU-15	12.8	12.9	14.2
EU-25	13.2	13.6	14.6

Source: Eurostat
Note: 2001 for the UK, Ireland, France, Portugal, Lithuania and Cyprus; 2000 for the Czech Republic and Latvia.

The continuous decline in the share of household expenditure (see Figure 2.3) can be attributed, to some extent, to the relative fall in prices of food products (slowly rising prices), which increases purchasing power per capita and allows people to spend more on other necessities. Changing lifestyles are also seen as responsible for the decline.

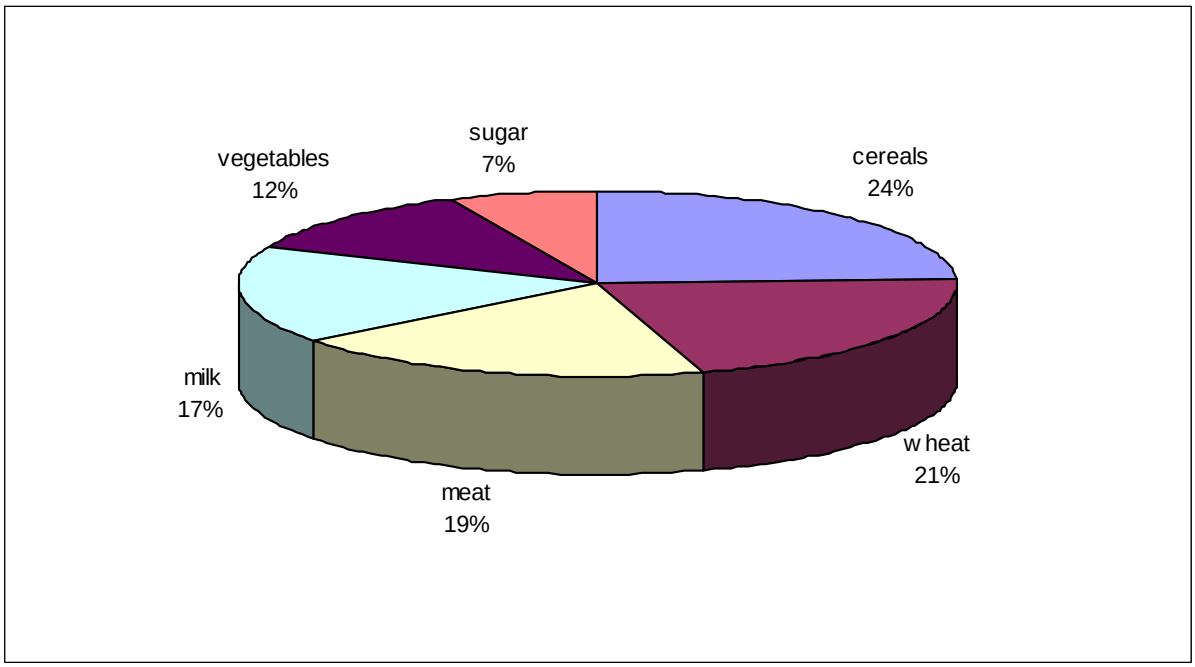
Figure 2.3: Share of food in household expenditure (%)



Source: Eurostat

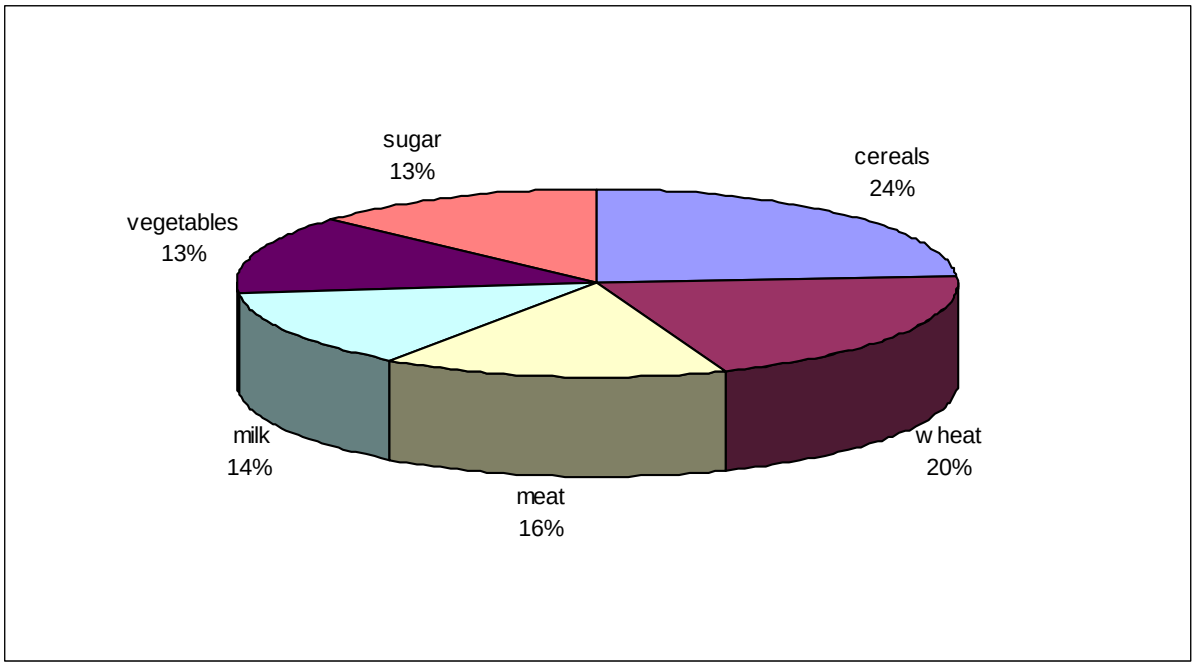
Data from the FAOSTAT Supply Balance Sheets (see Figure 2.4 and Figure 2.5) show the distribution of human apparent consumption of six main food items in the EU-15 and EU-25 respectively in 2002. Note that the Supply Balance Sheets estimate food availability to the consumer and not actual consumption by households. The harmonised indices of consumer prices for various food items for the EU-25 are also outlined in Figure 2.6.

Figure 2.4: Gross human apparent consumption in the EU-15 (%, 2002)



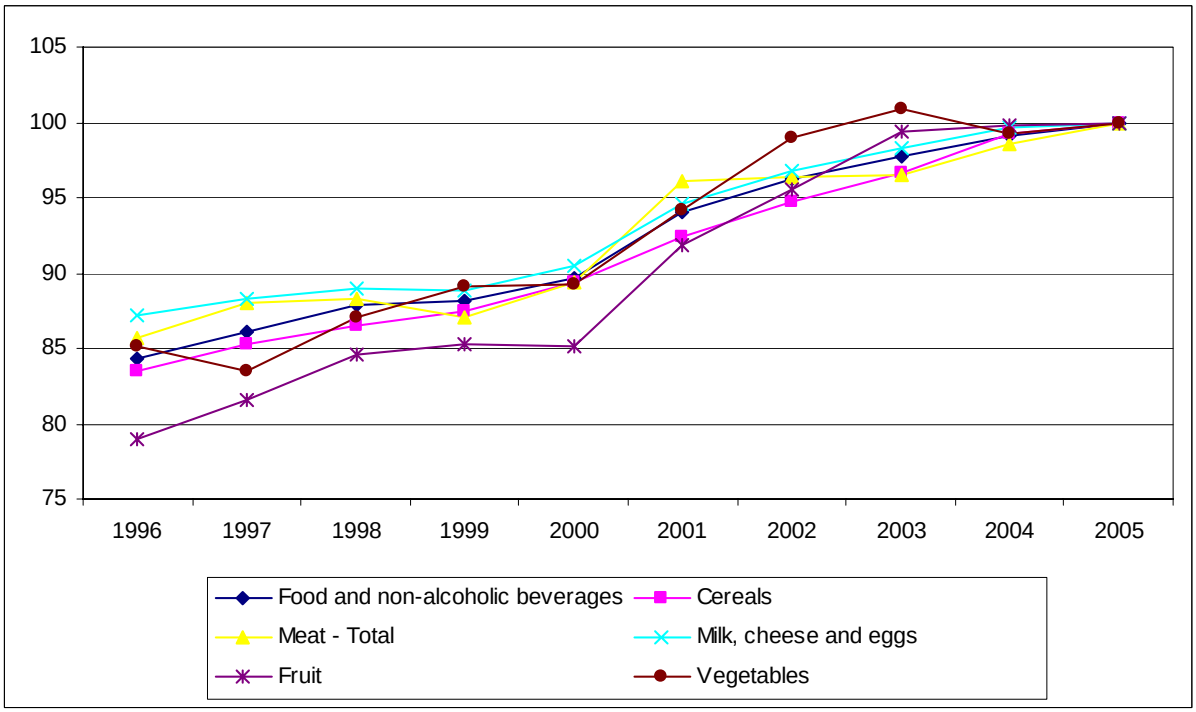
Source: FAOSTAT

Figure 2.5: Gross human apparent consumption in the EU-25 (%, 2002)



Source: FAOSTAT

Figure 2.6: Harmonised index of consumer prices in EU-25 (Index: 2005 = 100)



Source: Eurostat

2.2 EU food companies

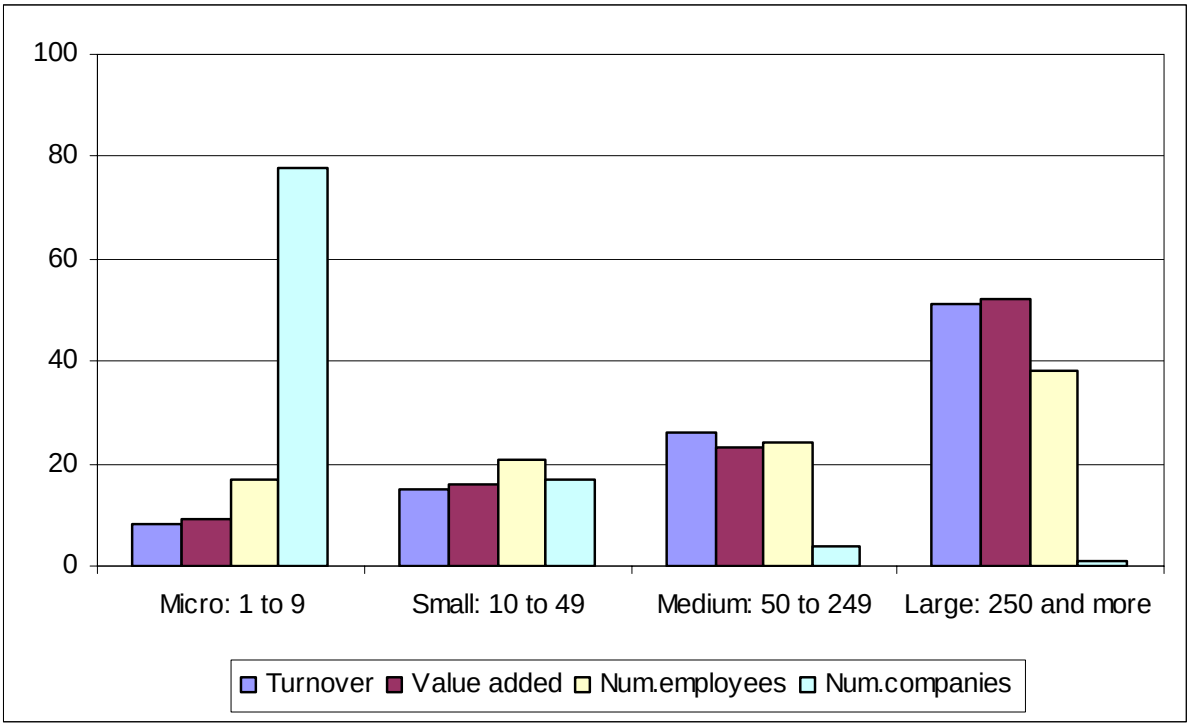
As mentioned earlier, the food industry plays an important role in every European Union country. Its relative importance can be measured in a number of ways. The two most important indicators are the shares of the food industry in value added and in employment. These can be calculated relative either to the whole economy or to the manufacturing sector. Another measure of the role of the food industry in national economies might be the share of processed food in total trade. This section therefore examines the relative importance of the food industry and of its individual sectors in each EU country, giving additional information on the size of food companies and on the top EU food companies.

The European food industry is made up of a relatively large number of companies – some 300 000 across the EU-27. Figure 2.7 provides a breakdown of turnover, value added, number of employees and number of enterprises based on the size of food companies. It clearly shows that the food industry is dominated by a large number of SMEs (with fewer than 250 employees). In 2001, SMEs made up 99.1% of all food companies and employed 2.7 million people. In terms of value, SMEs accounted for 48.5% of total production in the EU.

In the NMS in particular, there was a sharp increase in the number of enterprises from the start of the transition period until the mid-1990s, but since then numbers might be expected to fall because of consolidation and rationalisation. A fragmented structure does not allow firms to reap benefits from economies of scale and, closely linked to this, small businesses may not have the money to invest in the new technology necessary to meet the stricter sanitary and phytosanitary rules in force.

Overall, the size structure of the food industry and changes in that structure have significant implications for the industry's competitiveness. However, it is important to avoid preconceptions about the direction of these effects. For example, larger size may be important in enabling firms to reap the benefits of economies of scale at manufacturing plant level, while also giving rise to economies of scale and scope for marketing. On the other hand, downsizing may reflect the further structural reform necessary in the food industry in the wake of the vertical integration policies pursued in the central planning era.

Figure 2.7: Breakdown of turnover, value added, employment and number of companies in the EU-25 by size class, 2001 (%)



Source: Eurostat

Despite the large number of small companies, the food industry, both globally and in Europe, is increasingly dominated by a small number of very big players. Table 2.2 shows the top 20 food manufacturers worldwide, a list dominated by US companies such as Cargill, PepsiCo and Mars. But Europe too has its giant food manufacturers. Unilever, Danone and Heineken are in the top 20 and the list also includes Nestlé which, by some measures, has become the world's largest food processor.

Of the EU companies, Nestlé has 253 000 employees and global sales of €58.8 billion, Unilever 206 000 employees and sales of €39.7 billion, Diageo 22 000 employees and sales of €14.2 billion and Danone 88 000 employees and sales of €13.0 billion worldwide. Numerous firms in the "other food" products (Cadbury Schweppes, Associated British Foods and Tate & Lyle), drink (Heineken, Interbrew, Carlsberg and Pernod Ricard) and dairy (Bongrain) sectors have a strong international presence.

Table 2.2: Global agri-food companies by total sales in 2005

Rank based on 2002 food sales	Company	Country of registry	Sales (in € billion)
1	Cargill	USA	60.5
2	Nestlé	Switzerland	58.8
3	Unilever	UK/Netherlands	39.7
4	Anheuser–Busch company	USA	35.3
5	Archer Daniels Midland	USA	28.9
6	Kraft foods	USA	27.4
7	PepsiCo	USA	26.2
8	Tyson foods	USA	20.9
9	Bunge	USA	19.5
10	Coca Cola	USA	18.6
11	Mars	USA	14.5
12	Diageo	UK	14.2
13	Danone	France	13.0
14	Sara Lee Corp	USA	12.8
15	SABMiller	USA	12.3
16	Kirin Brewery Company	JP	11.9
17	InBev	BE	11.7
18	Heineken	NL	10.8
19	Asahi breweries	JP	10.4
20	Cadbury Schweppes	UK	9.5

Source: CIAA

Table 2.3: European food manufacturing firms, ranking based on 2005 food sales in Europe

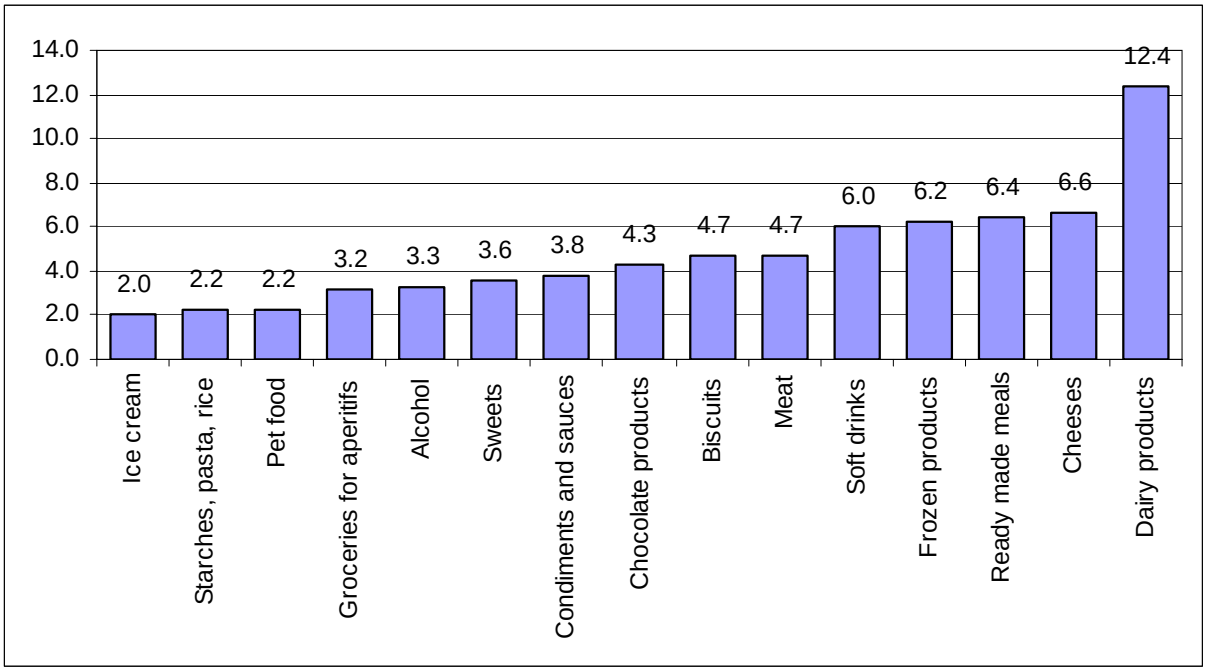
Rank	Company	Country of registry	Sales (€ billion)	Employees (thousand)	Main sector
1	Nestlé	Switzerland	17.8	69.1	multi-prod.
2	Unilever	UK/Netherlands	16.2	49.0	multi-prod.
3	Heineken	Netherlands/UK	8.2	n/a	beer
4	Danone	France	8.2	32.2	multi-prod.
5	Danish Crown Amba	Denmark	6.5	28.6	meat
6	Diageo	UK	5.6	n/a	alcoholic beverages
7	Tate & Lyle	UK	5.4	9.3	sweeteners, starches
8	Südzucker	Germany	5.3	19.9	sugar, prepared food
9	Associated British Foods	UK	5.2	75.0	sugar, starches, prepared food
10	InBev	Belgium	5.1	n/a	beer
11	Groupe Lactalis	France	4.9	26.5	dairy
12	Carlsberg	Denmark	4.9	30.3	beer
13	Scottish & Newcastle	UK	4.8	15.6	alcoholic beverages
14	Ferrero SpA	Italy	4.6	n/a	confectionery
15	Royal Friesland Foods	Netherlands	4.4	16.4	dairy
16	Oetker-Gruppe	Germany	3.6	21.3	multi-prod.
17	Cadbury Schweppes	UK	3.4	21.6	beverages/confectionery
18	Bongrain	France	3.3	18.1	dairy
19	Campina	Netherlands	3.1	6.8	dairy
20	Nutreco	Netherlands	3.0	7.0	meat

Source: CIAA

Innovation is a vital part of the food industry. Areas such as new product development, new markets, new technology, formulation, packaging and merchandising are constantly under review. However, in terms of investing in R&D in the food sector the EU-25 remains at the lower end. Despite an increase of 20% in R&D between 1997 and 2001, the EU spent only 0.24% of output in 2001, which is far behind its main competitors (on average 0.35%). Moreover, R&D intensity in the EU differs from country to country. For example, the Netherlands and Finland achieve R&D intensity of over 0.50% in the food industry, while the figure for the Czech Republic is a mere 0.02% (CIAA).

In Europe, the dairy sector, including cheeses, is the leader in terms of innovation, followed by ready-made meals, frozen products and soft drinks (see Figure 2.8).

Figure 2.8: The 15 most innovating categories in Europe, (share %)



Source: CIAA

The spread of information and communication technologies (ICT) throughout the food industry reflects its structure. That is, large companies operate globally and small and medium-sized companies operate locally. Large companies also tend to be the most technologically advanced. Most companies are equipped with basic IT infrastructure, although, for example, more than one third of small enterprises still do not use e-mail (see Table 2.4).

Table 2.4: Use of IT infrastructure, 2003/2004 (% of companies)

	All sectors	All enterprises	0-49 employees	50-249 employees	250+ employees
Computer	94	87	86	99	100
Internet	84	74	73	97	100
E-mail	81	67	67	90	98
Intranet	30	20	19	47	55
Extranet	9	5	5	13	13

Source: The European e-business report, 2004.

Government expenditure on R&D projects related to food safety is still limited in most EU Member States. Table 2.5 presents government expenditure on R&D projects relating to agricultural production and technology and to food technology.

Table 2.5: Government expenditure on R&D projects relating to food safety, 2002 (€ million)

	Agr. technology	Food technology
BE	31.47	:
CZ	17.62	0.65
DK	116.23	:
DE	333.65	33.53
ES	215.09	25.22
FR	330.79	:
IE	:	27.6
CY	0	0
NL	143.89	19.29
AT	40.03	:
PT	116.08	:
SI	4.85	:
SK	14.78	:
FI	78.16	:
UK	427.77	7.26
RO	5.23	:

Source: Eurostat

Although different methods of privatisation have been adopted in each NMS, it is possible to identify some common features. In general, small enterprises were usually privatised by being sold directly or by auction to the highest bidder. Large enterprises were normally turned into joint stock companies, with a subsequent transfer of shares to various foreign and/or local owners. One distinctive characteristic of the privatisation process was, therefore, the sale of whole enterprises or of shares to foreign investors. For instance, in Hungary foreign ownership accounted for 60% of all private ownership by the end of 1998. By contrast, in the Czech Republic, direct participation by foreign capital in privatisation remained limited, as in that case privatisation preceded attempts to attract foreign investors. Privatisation in Romania, which had been lagging behind the other candidate countries, has advanced rapidly more recently, with significant state ownership remaining in only the fruit

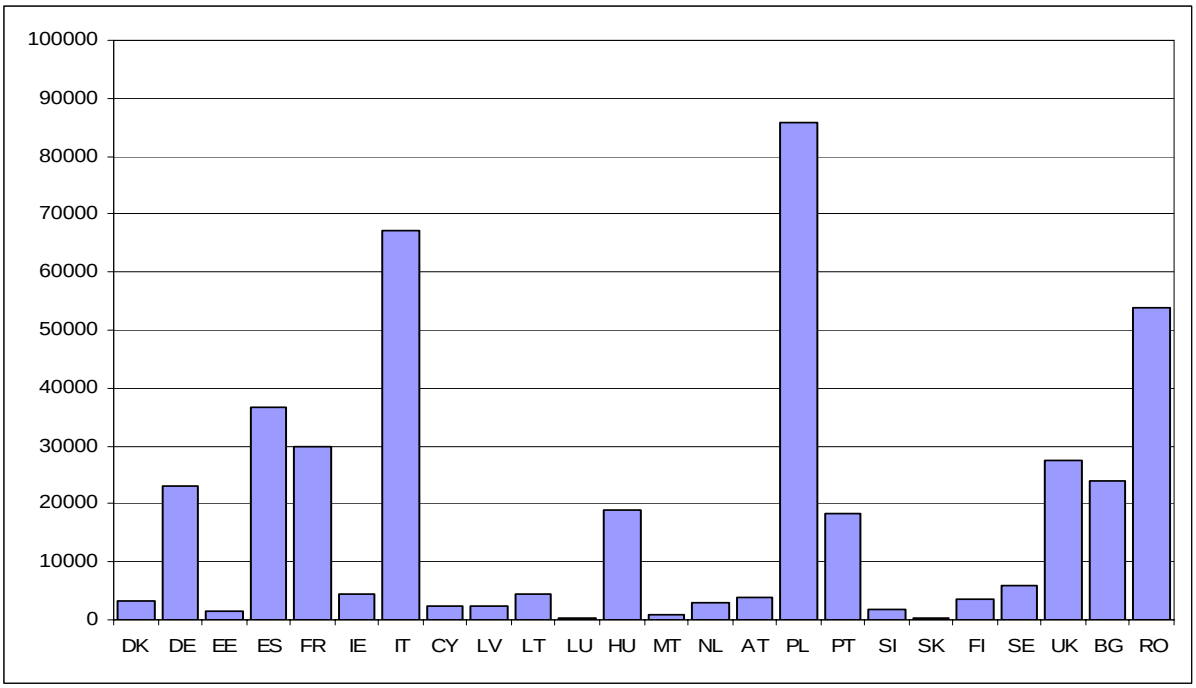
and vegetable processing, prepared animal feeds and tobacco manufacturing sectors. The process has been relatively slow in Bulgaria.

2.3 Food distributors

The structure of the retail industry is changing dramatically as a result of consolidation, and major retailers are increasingly adopting internationalisation strategies. Of the top 20 retailers, eight are American, one is Japanese and the remainder are European (five German, three French, two British and one Dutch). Statistics on the number of non-specialised stores with food, beverages and tobacco predominating and their retail sales are presented in Figures 2.9 and 2.10. France, the UK, Germany, Italy and Spain are the countries with the highest retail sales, as these are the countries of origin of the largest European food retailers, as presented in Table 2.6.

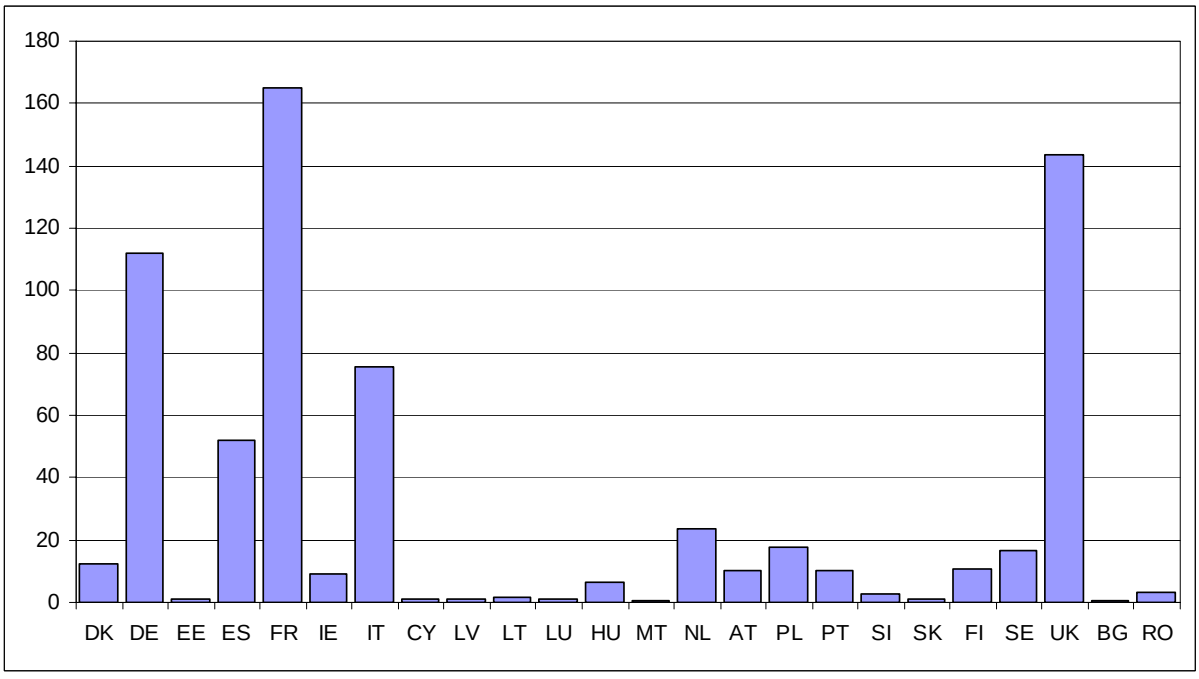
According to M&M Planet Retail, the world's top 30 grocery retailers in 2003 accounted for about one third of retail sales worldwide and for about two thirds in Europe, with the 10 leading European retailers taking 40% of total retail sales. Table 2.6 shows the top 20 retailers worldwide, with Wal-Mart the biggest player by far. But Europe's own retail giants, such as Carrefour, Metro, Ahold and Tesco, are also prominent. This trend suggests that food retailing in Europe will be dominated by fewer, but bigger, players, with a more international structure, with US retailers seeking to increase their presence significantly. Some analysts predict that global food retailing will be dominated by as few as four or five players in the near future.

Figure 2.9: Retail sales in non-specialised stores with food, beverages or tobacco predominating – Number of enterprises, 2002



Source: Eurostat

Figure 2.10: Retail sales in non-specialised stores with food, beverages and tobacco predominating, 2002 (€ million)



Source: Eurostat

Table 2.6: Top 20 food retailers in 2002

Rank	Retailer	Country of origin	Retail sales (million USD)	Countries of operation		
				2002	2000	1997
1	Wal-Mart	USA	229 617	12	10	8
2	**Carrefour**	**France**	**65 011**	**31**	**24**	**14**
3	Kroger	USA	51 760	1	1	1
4	**Metro**	**Germany**	**48 349**	**26**	**22**	**18**
5	Target	USA	42 722	1	1	1
6	**Ahold**	**Netherlands**	**40 755**	**27**	**25**	**13**
7	**Tesco**	**UK**	**40 071**	**10**	**10**	**6**
8	Costco	USA	37 993	8	7	6
9	Sears	USA	35 698	3	3	1
10	Albertson	USA	35 626	1	1	1
11	**Aldi Einkauf**	**Germany**	**33 837**	**12**	**11**	**8**
12	Safeway	USA	32 399	3	2	3
13	**Intermarché**	**France**	**31 688**	**7**	**8**	**9**
14	**Rewe**	**Germany**	**31 404**	**12**	**11**	**9**
15	Kmart	USA	30 762	1	4	6
16	**Edeka/AVA**	**Germany**	**26 514**	**6**	**7**	**5**
17	**J Sainsbury**	**UK**	**26 460**	**2**	**3**	**3**
18	Ito-Yokado	Japan	26 179	18	15	2
19	**Auchan**	**France**	**26 071**	**15**	**14**	**10**
20	**Tengelmann**	**Germany**	**23 209**	**14**	**16**	**10**

Source: M&M Planet Retail

2.4 Primary food producers

As mentioned earlier, other players are involved in the food supply chain apart from the food processors. These are mainly the consumers, the farmers and the retailers.

Table 2.7 sets out statistics on the number of holdings, the utilised agricultural area and the labour force.

Table 2.7: Regional distribution of agricultural holdings in 2003

	Number of holdings	Utilised agricultural area (ha)	Labour force directly employed by the holdings
BE	54 940	1 394 400	72 460
CZ	45 770	3 631 550	166 400
DK	48 610	2 658 210	60 710
DE	412 300	16 981 750	688 780
EE	36 860	795 640	37 520
GR	824 460	3 967 770	615 950
ES	1 140 730	25 175 260	997 770
FR	614 000	27 795 240	913 830
IE	135 250	4 371 710	160 010
IT	1 963 820	13 115 810	1 475 980
CY	45 200	156 380	32 200
LV	126 610	1 489 350	140 880
LT	272 110	2 490 960	222 130
LU	2 450	128 160	3 960
HU	773 380	4 352 370	525 790
MT	10 990	10 790	4 500
NL	85 500	2 007 250	186 260
AT	173 770	3 257 220	175 430
PL	2 172 210	14 426 320	2 190 870
PT	359 280	3 725 190	455 160
SI	77 150	486 470	95 370
SK	71 740	2 137 500	118 630
FI	74 950	2 244 700	97 540
SE	67 890	3 126 910	70 660
UK	280 630	16 105 810	352 220
BG	665 550	2 904 480	791 560
RO	4 484 890	13 930 710	2 699 510

Source: Eurostat

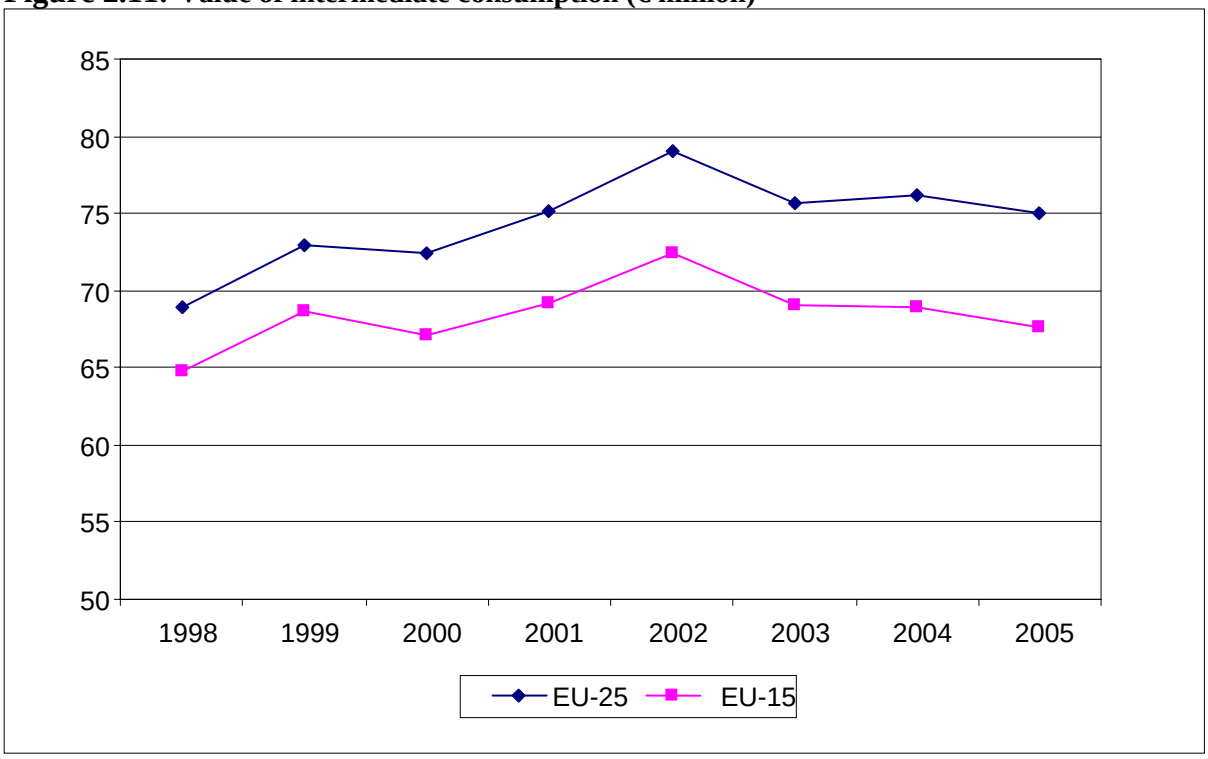
2.5 Inputs into the food industry

The value of intermediate consumption in agriculture over the period 1993-2004 showed a considerable increase in expenditure on seed and planting stock, plant protection products and veterinary items. Figure 2.11 shows the value of intermediate consumption in agriculture in the EU-15 and EU-25. Figure 2.12 provides information on two key agricultural inputs: consumption of fertilisers and the number of agricultural tractors in use in the EU-25 from 1990 to 2002. At EU level, consumption of fertilisers decreased over this period, while the number of tractors in use remained stable.

In general, intermediate consumption reflects the value of all goods and services used as inputs in the production process, excluding fixed assets recorded as fixed capital consumption. Various items enter into intermediate consumption in agriculture, viz. seeds and

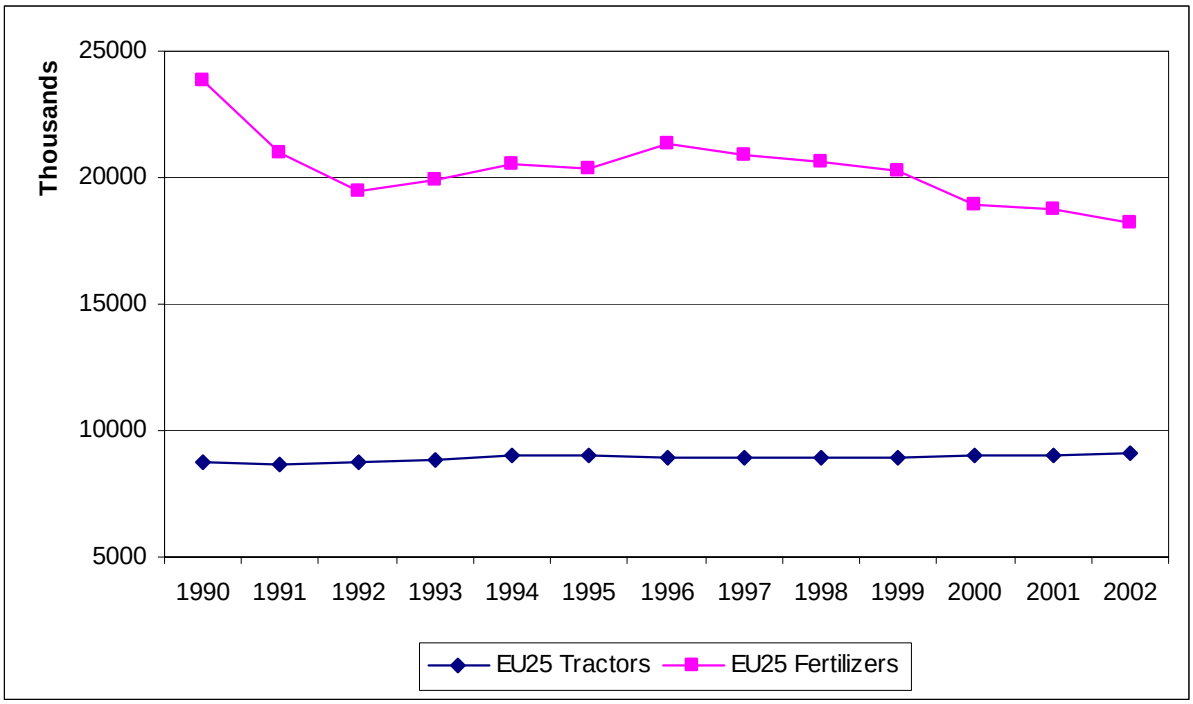
planting stock, animal feedingstuffs, fertilisers and soil improvers, plant protection products and pesticides, energy and lubricants, maintenance of materials and buildings, agricultural services and other goods and services. The first four items accounted for about 60% of overall intermediate consumption in agriculture in the EU-25 in 2004. Feedingstuffs accounted for almost two thirds of this, while only 5% went on veterinary expenses, which ranked behind fertilisers and soil improvers, plant protection products and seeds and planting stock. Among feedingstuffs, 37% were purchased outside the agriculture industry, while 24% were produced and consumed by the same holding. The remaining 3% were supplied by other holdings (see Figure 2.13).

Figure 2.11: Value of intermediate consumption (€ million)



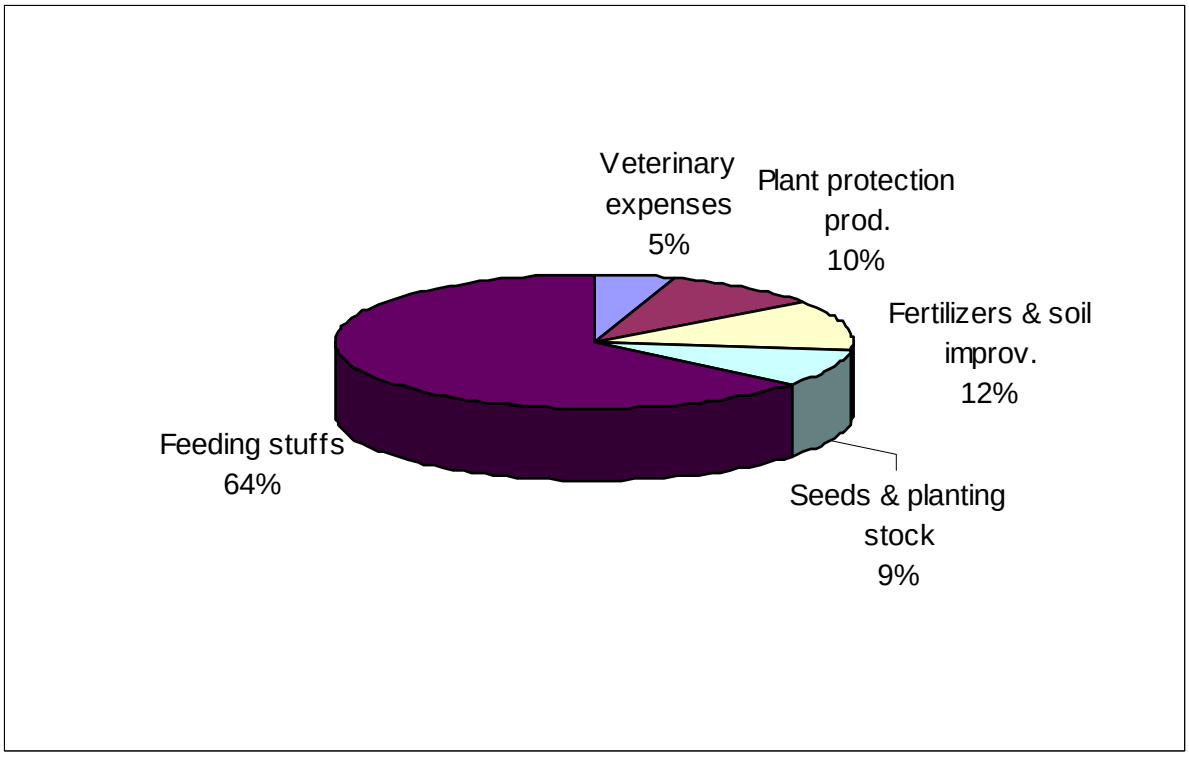
Source: Eurostat

Figure 2.12: Consumption of fertilisers (Mt) and tractors in use in agriculture (thousand)



Source: FAOSTAT

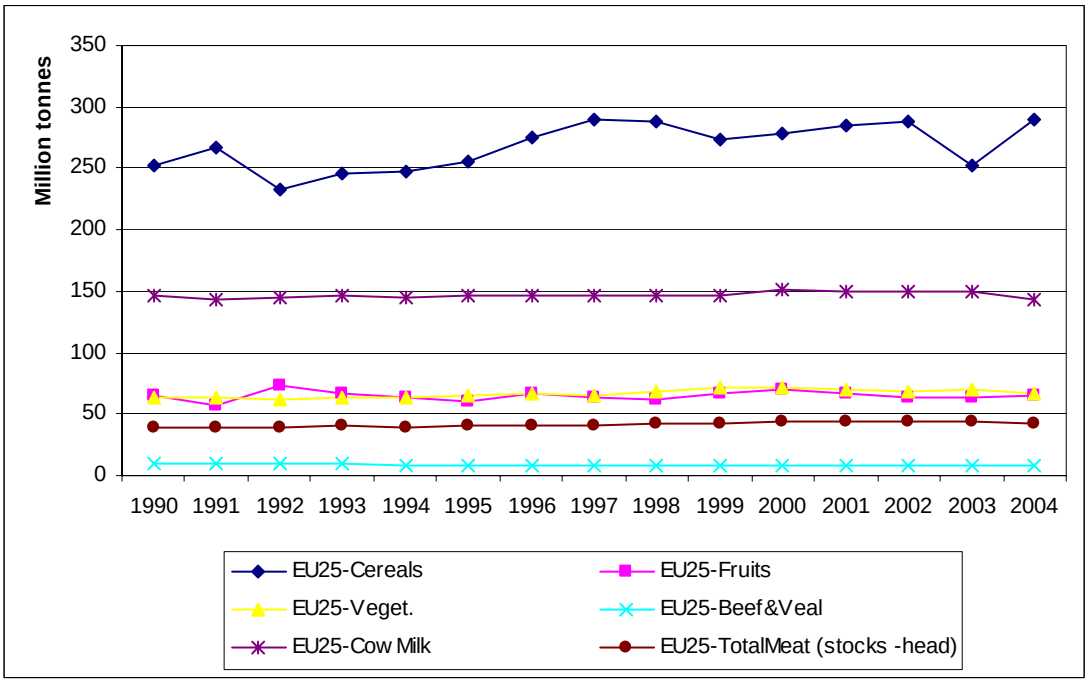
Figure 2.13: Value of intermediate consumption (basic prices) – contribution by selected inputs, 2004 (%)



Source: Eurostat

Figure 2.14 provides information on crops and livestock primary production using data from FAOSTAT and Eurostat. Production is stable in almost every case, with the exception of cereals.

Figure 2.14: Crops and livestock primary production (Mt)



Source: FAOSTAT

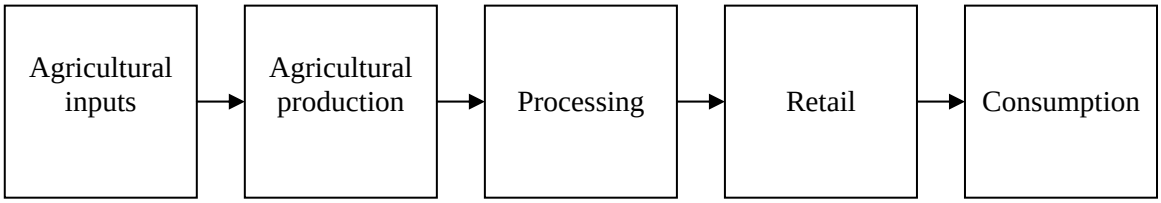
3 Globalisation of the food supply chain: main drivers and implications

3.1 Introduction

Integration of markets and increasing internationalisation of firms are among the most prominent trends in international business. A number of forces are driving these trends, including the removal of barriers to international trade and investment flows and the increasing freedom to move goods, services and knowledge between countries and different locations. Advances in transport and communication technologies have created new opportunities for development and growth of multinational firms. Advances in information processing and telecommunications are enhancing multinationals' ability to coordinate complex functions over long distances, resulting in lower costs for cross-border coordination. These forces are having structural, organisational and strategic consequences in a growing range of industries and a strong impact on trade patterns, specialisation, foreign direct investment and global capital flows. They have also fuelled the globalisation of food systems.

In particular, urbanisation, industrialisation, globalisation, technological innovation and social and demographic change are just some of the factors that are dramatically altering the way food is produced, distributed and consumed, and not just in Europe. As a result, the balance of power along the food supply chain has shifted away from farmers, who had significant power in the past, towards food processors, who have greater influence over production (see Figure 3.1). Nevertheless, the trends and drivers of change have also given significant power to supermarkets, which now exercise the greatest control, by dictating terms to farmers and food processors while influencing consumers too.

Figure 3.1: General overview of the food supply chain



Source: Own illustration

The objective of this report is, therefore, to examine the development of economic integration and global configuration in food systems, identifying the drivers behind development of the food industry.

3.2 The global market and trade liberalisation

As mentioned earlier, the food industry is changing in character, while food policy is changing its nature. One key driver of change in the food system is globalisation. Globalisation means the growing interdependence resulting from the increasing integration of trade, capital, people and markets.

International integration of markets means that agricultural and food products are increasingly traded across national borders. This trend will continue to grow, since open markets are coupled with growing consumer demand for an increasing variety of choice. Globalisation, in the form of vertical and horizontal integration and global expansion, is affecting all involved in the food supply chain.

There are various factors behind this globalisation of agriculture. Liberalisation of trade is undoubtedly a major driver of globalisation, affecting the EU food industry as a result of removal of trade barriers and growing market access.

Advances in technology and infrastructure have reduced the cost of transport and communications between different parts of the world. There have been far-reaching changes in international trade in agri-food products over the last two decades.

One relevant aspect is the increasing importance of processed, as opposed to raw, agricultural products. In this respect, the market forces of global integration are becoming stronger, and there is growing interest among processors for farm products meeting specific requirements: consistent quality, eco-compatible treatment, timely delivery, particular traits, etc.

Within Europe, the recent EU enlargements and increasing regional integration have brought easier access to agricultural supplies and also new consumers. Macroeconomic policy and exchange rates will therefore have a greater influence on food systems in the Europe of the future.

At world level, international trade in food products and agricultural commodities is growing fast. The removal of trade barriers facilitates international trade in food on the global market. Besides the direct impact on particular countries' economies as a result of trade and investment, the spillover effects between countries are evident as methods of production and distribution are spreading, along with changes in consumer behaviour and the adoption of common lifestyles associated with consumption of strong multinational brands.

As shown earlier (see Table 2.2), the new "globalised" food system is affecting the food supply chain by increasing the presence of large multinational corporations. Such corporate dominance is adversely affecting farmers, who cannot muster the same market power and organisational structure.

Moreover, the task of moving food from farm to fork has become more complex, involving a host of local, national and global operators and networks and opening up a gap between producer prices and retail prices. Consequently, reducing trade barriers and boosting trade liberalisation cannot always be guaranteed to facilitate international trade flows because of the complexity of the food chain. Farmers have traditionally served their local markets and have not been involved in decisions about food chain distribution.

Now, though, conditions have changed and new prospects are emerging, based on specific requirements of consumers and processors. All these changes are expanding the range of production at farm level, enlarging the local markets and internationalising demand.

As will be further discussed later, food markets are constantly evolving, driven not only by changes in consumer preferences, but also by technology, linkages between members of the food supply chains and prevailing policies and business environments. Sophisticated supply chains and distribution channels are now being adopted across regions and national boundaries.

Other factors are also contributing to globalisation of the agri-food sector. The recent advances in technology have been developed by the private sector, mainly inside multinational firms.

The rapid technological changes are dramatically affecting food industries and, increasingly, distribution channels (information technology, packaging, storing, transport, etc.) (see Table 2.4, Table 2.6 and Figure 2.9).

ICT is increasingly being used to improve efficiency at all stages of production, processing and distribution of food. There is nothing especially new in this, but the integration of information systems has perhaps the greatest potential to affect the food sector. In particular, food retailers are able to gather vast amounts of information about consumer preferences that can be used to determine what kind of foods manufacturers produce. Similarly, both retailers and manufacturers will exert increasing influence over farmers.

This improved knowledge has been transferred to commercial farms, leading to a decline in the world prices of many agricultural commodities and giving farmers a greater competitive advantage in supplying larger markets and a wider range of end-use processors. This “industrialisation of agriculture” is one of the consequences of globalisation.

The impact of liberalisation of trade on prices is also significant. It is the immediate short-term consequence of relative price changes at the border as a result of export liberalisation (removal of a quota), import liberalisation (reducing tariffs and freeing up imports) or currency devaluation, etc. If domestic prices are then lower than export parity prices, liberalisation has the effect of pushing up domestic prices. On the other hand, if domestic price levels remain higher than import parity prices, liberalisation will bring domestic prices down to world levels.

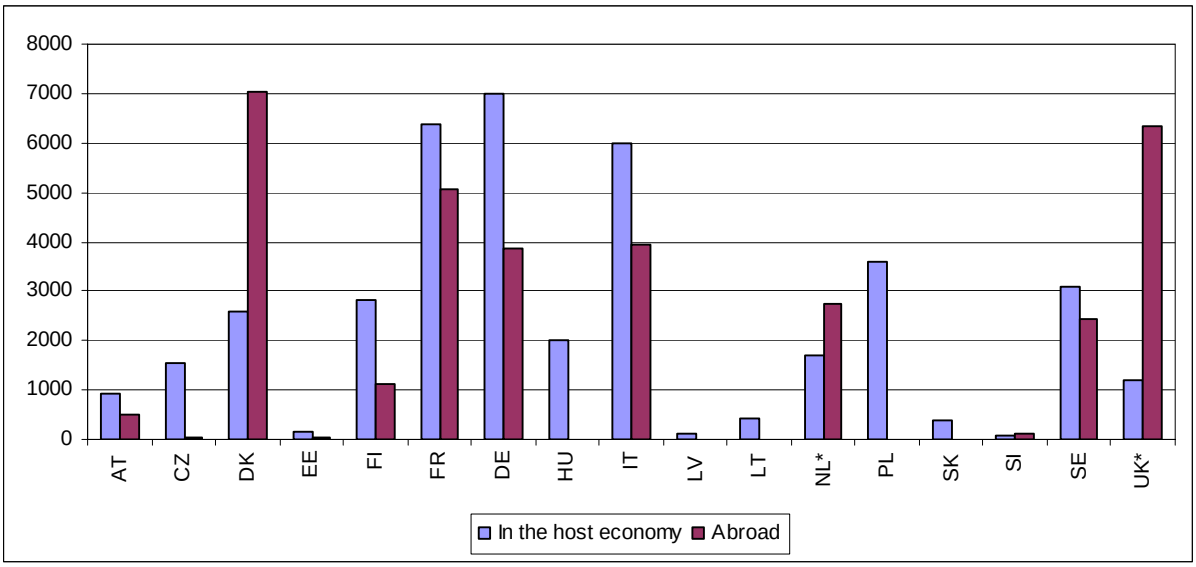
The other anticipated consequence of liberalisation of trade is price volatility (see Figure 2.6). Doing away with border protection exposes domestic sectors to world prices, so that greater fluctuations in world prices as a consequence of liberalisation filter through to domestic prices. Given the increasing importance of processed agricultural products in international activity in every EU Member State, these effects should be taken into account.

3.3 FDI and consolidation in the food sector

Overall, the food industry, in particular certain sub-sectors, has proved attractive to foreign investors. As shown in Figure 3.2, the UK, the Netherlands, France, Denmark and Italy are the main EU-based foreign investors in the food industry, while France, Germany, Italy and some NMS are the main recipients of foreign investment. In Poland, for example, 24% of FDI in manufacturing and 12% in the economy overall went to the food industry. However, in some countries, particularly in Slovenia, investment in the food industry has been slow, as a result of the fragmented ownership of share capital that was used as a method

of privatisation. In Slovakia and the Czech Republic too, the share of FDI going to the food industry has been relatively low (see Table 3.1 and Figure 3.3).

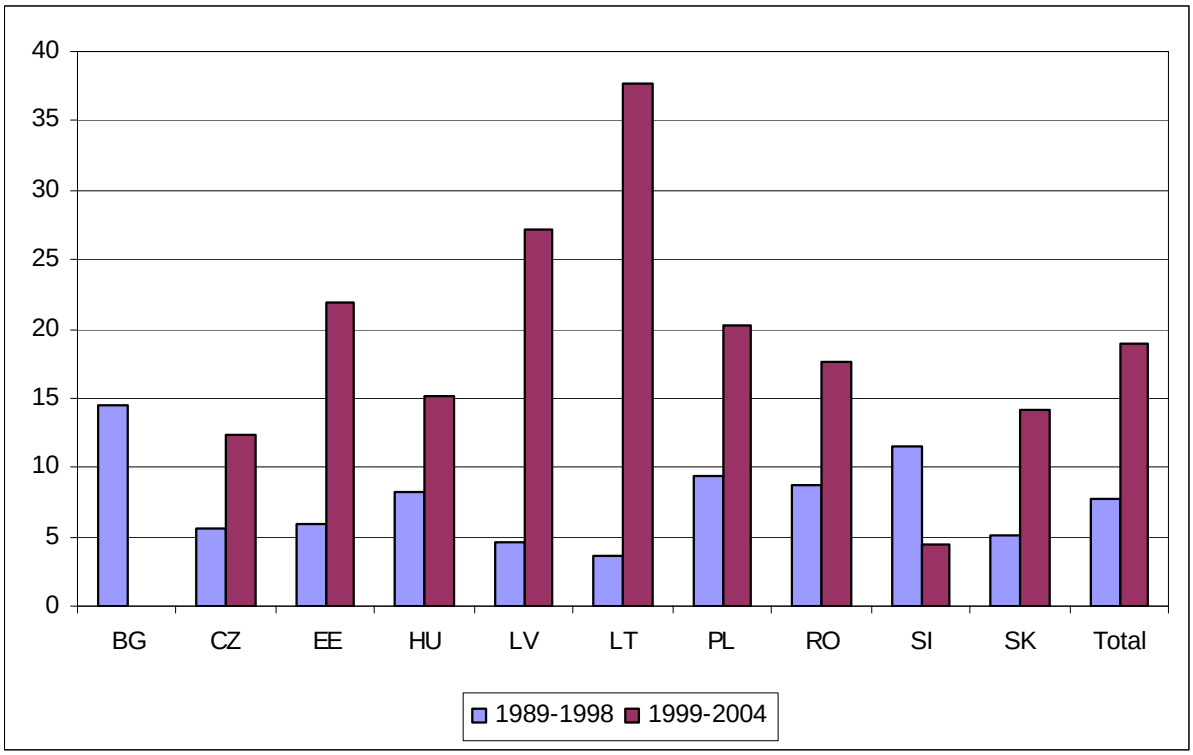
Figure 3.2: FDI stocks in the food industry by country, 2002 (€ million)



Source: UNCTAD and WIIW

The main sectors attracting FDI are high-value products, often with a significant share of output designated for export (e.g. tobacco, soft drinks, brewing, confectionery, oil refining and specific dairy products). Sugar-beet processing has also been a popular target, while most FDI in the NMS has involved takeovers of local firms, with subsequent restructuring, including new investment and transfers of new technologies and marketing expertise. In some countries (e.g. Bulgaria) privatisation has also been a route for foreign investment to enter the industry and FDI flows have tended to decline as privatisation has been completed. Finally, completely new production facilities have been established by FDI, such as for tobacco and pet food in Lithuania.

Figure 3.3: Inward FDI in the food industry by host country and year, 1989-1998 and 1999-2004 (% of total FDI in manufacturing)



Source: UNCTAD, WIIW and Alessandrini, S. (2000)

Table 3.1: Share of turnover controlled by foreign affiliates in the food industry

	1994	1995	1996	1997	1998	1999
CZ				11.4	13.6	18.7
FI		6.7	6	7.7	5.3	14.5
DE		13.3	12.6	11.9	11.8	
HU		52.9	51.4	51.5	57	59.7
IE	35.8	36.1	38.1	39	36.6	
NL		28.8	29.4	30.1	32.5	
PL				19.8		31.5
SE	17.4	19.9	26.9	26.4		25.8
TR	14	15.4	16.4	13.4	11	
UK			23.7	21.8	19.1	

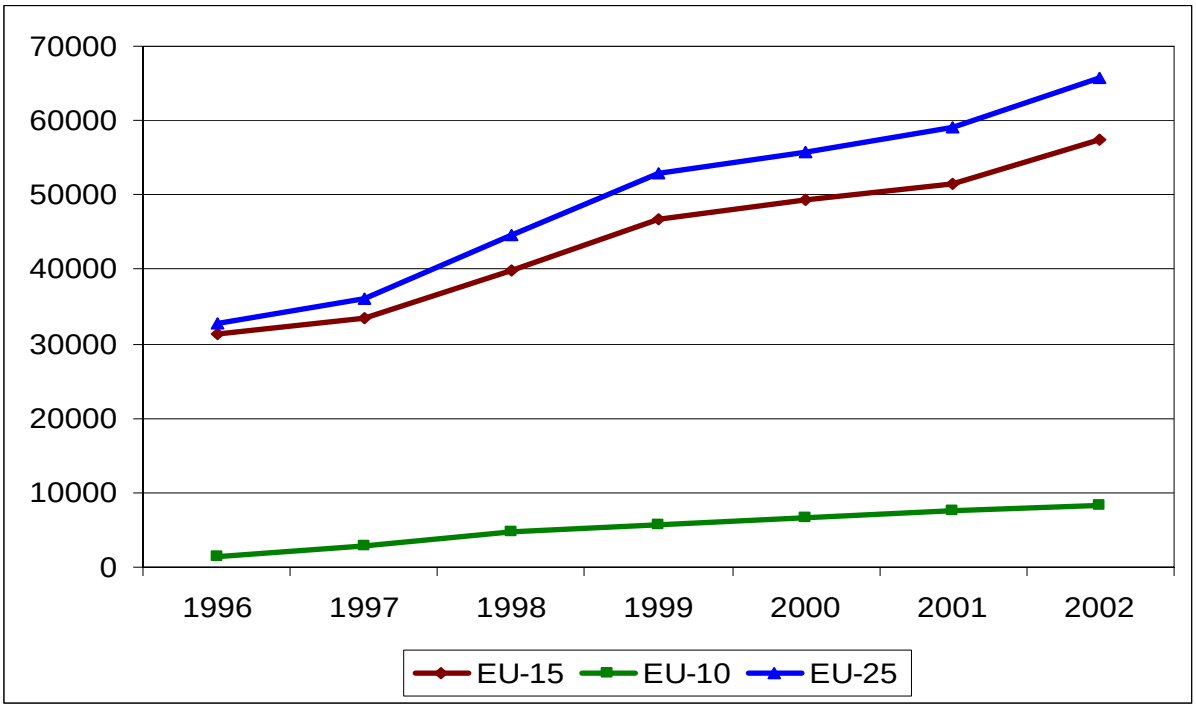
Source: OECD statistics

Factors mentioned as encouraging foreign investment include low labour costs, cheap raw materials and current or expected access to the EU market. In the case of some countries, their position as a gateway to markets to the east might also be important. Given the pattern of FDI, there are grounds for speculating that global food multinationals have also wanted to leverage their marketing expertise in brand management on the domestic markets of candidate countries.

Where countries have found it difficult to attract FDI into the food industry, this has been due to bureaucratic barriers and also to sudden and unpredictable changes in the legal framework, particularly taxation.

Overall, foreign direct investment is on an upward trend both in the EU-15 and in the NMS (see Figure 3.4). Inward FDI stocks in the food industry increased, on average, by 101% in the EU-25 over the period 1996-2002. Finland, Latvia and Denmark recorded the highest increases, while in Slovenia there was only a limited increase in FDI stocks. In France, the level of foreign investment fell slightly over the same period. Compared with the EU-15, the new Member States achieved a higher increase in FDI stocks in 1996 and 2002.

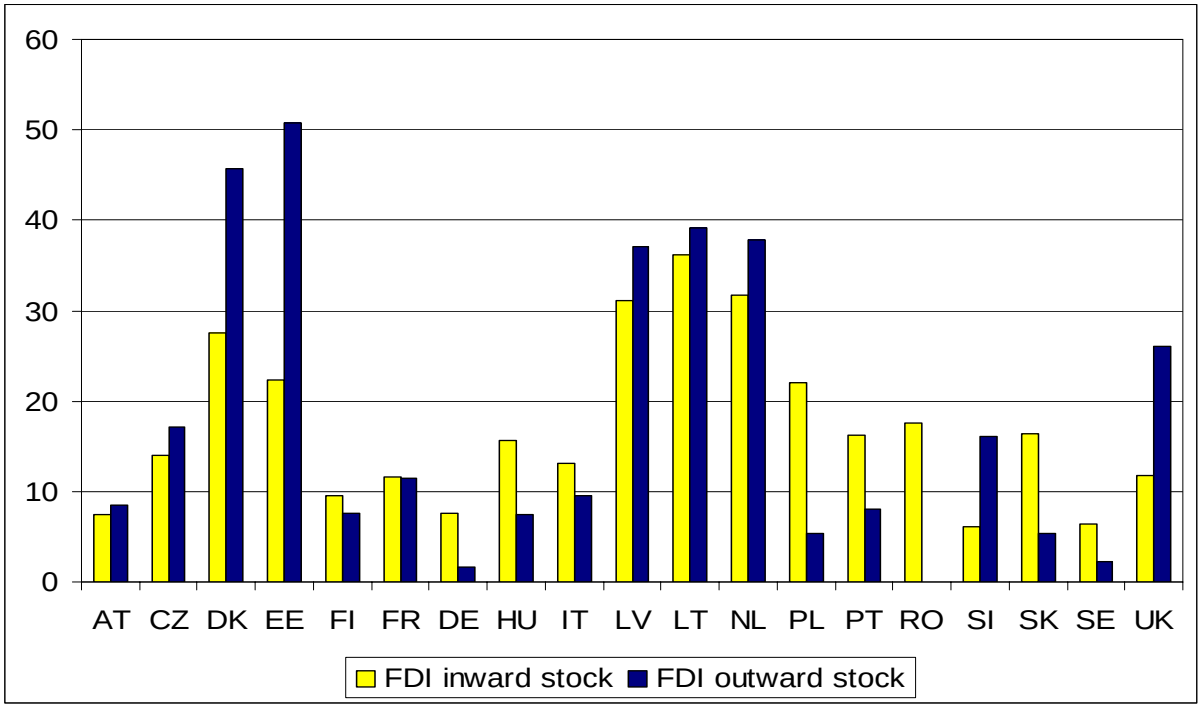
Figure 3.4: Inward FDI stocks in the food industry, 1996-2002 (€ million)



Source: UNCTAD and WIIW

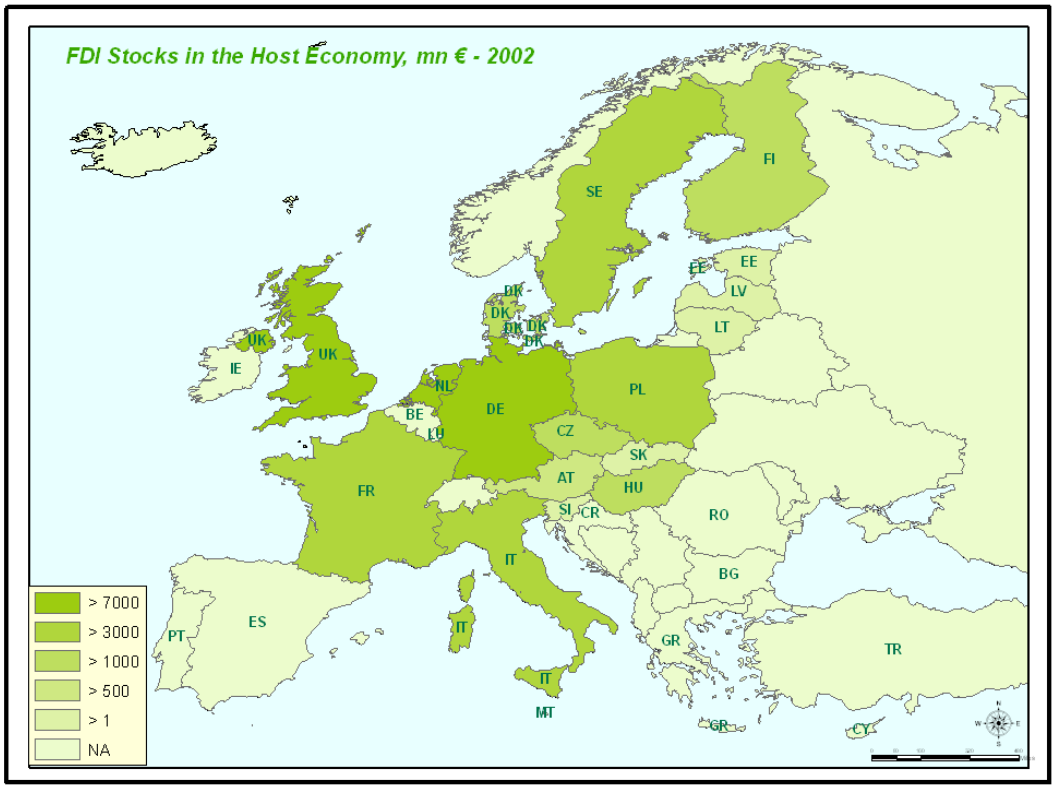
On average for all the NMS (including Bulgaria and Romania), 18.95% of the FDI in manufacturing went to the food industry over the period 1999-2004. The corresponding figure for 1989-1998 was 7.74% (see Figure 3.5). Lithuania and Latvia recorded the highest percentage, while in Slovenia the food industry attracted relatively lower FDI stocks over the second period.

Figure 3.5: FDI in the food industry as share of the total in manufacturing, 1994-2005 (%)



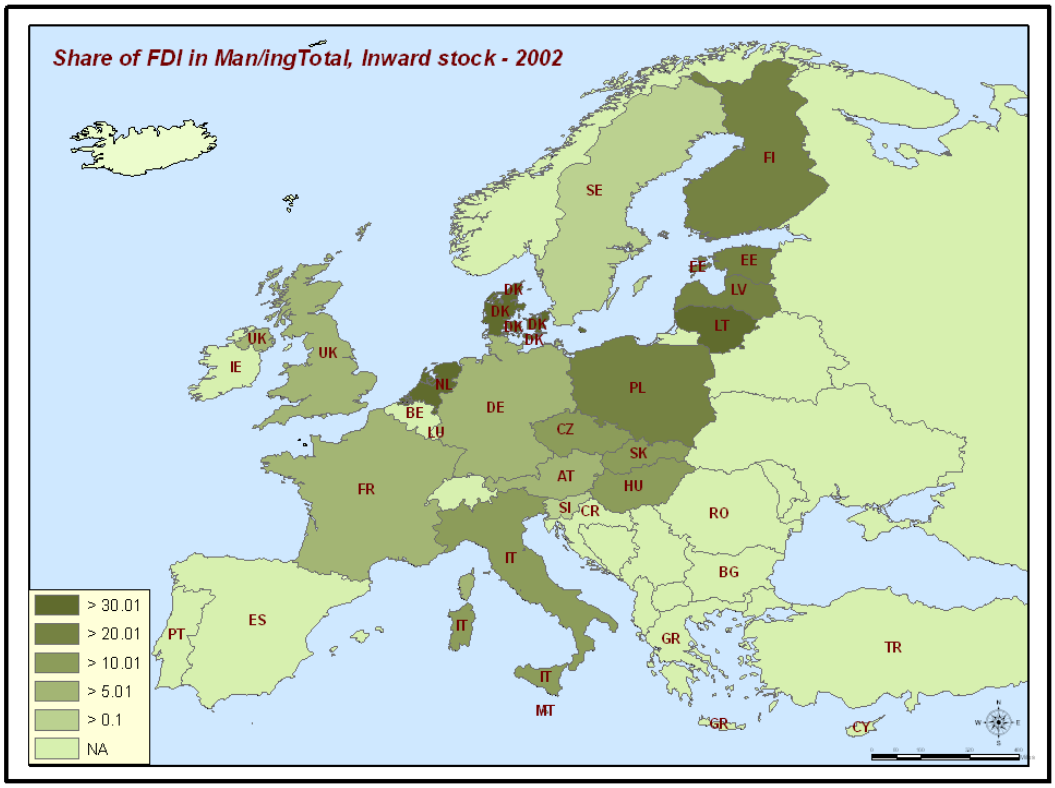
Source: UNCTAD and WIIW

Map 3.1: Inward FDI stocks in the food industry, 2002 (€ million)



Source: Own presentation of UNCTAD and WIIW

Map 3.2: FDI in the food industry as share of the total in manufacturing (inward stock, 2002)



Source: Own presentation of UNCTAD and WIIW

During the last two decades, there has been very strong growth in multinational activity. FDI has grown faster than either trade or income, fuelled by cross-border mergers and acquisitions. Food companies are well represented in the list of the 100 largest transnational companies (TNCs). The same picture emerges from an analysis of the transnationality index (TNI).[2] Food manufacturing shows a very high TNI (78.9% in 1999), second only to the media industry, which topped the list with 87%. Moreover, food manufacturing became more transnational over the period 1990-1999. The TNI of food TNCs increased substantially, from 59% to 79%. It is noteworthy that this increase of around 20 percentage points is the highest recorded. Multinational activity is, therefore, a relevant and growing phenomenon in food manufacturing (Senauer and Venturini, 2005).

[2] This index is calculated by UNCTAD World Investment Reports as the average of three ratios: foreign assets to total assets, foreign sales to total sales and foreign employment to total employment.

However, as shown in the first part of this report, there are a large number of small firms in the food industry, but there has been considerable consolidation by mergers and acquisitions in recent years, creating huge corporations that dominate food manufacturing. The variety of pressures in the industry – globalisation, price and availability of raw materials, increasing regulation on food safety, health and traceability and the costs of innovation – all contribute to the need to achieve economies of scale and the trend towards further consolidation. One key driver has been the desire to achieve dominant market positions by creating and controlling global brands, such as Heineken, Pringles, etc. (see Table 2.2 and Table 2.3).

Parallel to this, concentration in retailing has also been increasing. That is, food retailers are increasingly controlling the food chain with their ability to exert enormous influence over both consumers and suppliers, despite the presence of food manufacturing giants (see Table 2.6). The power of food retailers is continuing to grow as they consolidate further: the global grocery market is now dominated by just five companies. It could therefore be argued that supermarket chains have been the main drivers of change in the industry. Interviews with dairy processors and supermarket chains in the NMS yield some evidence of this. First, supermarkets are a major outlet for dairy companies in the NMS. All processors dealing with supermarket chains sign contracts. Second, changing procurement systems on the part of modern retail chains have a substantial impact on dairy processors.

However, the question remains whether supermarkets are also driving structural change at farm level. It is important to remember that foreign investment in processing preceded foreign investment in the retail sector in every NMS. Furthermore, no evidence emerged from the interviews that dairy assistance programmes were directly linked to the growing importance of the supermarket sector. It can therefore be concluded that the growth of supermarkets is having a significant and increasing effect in the NMS, not so much in terms of quality, but more in terms of price and other demands imposed on the upstream companies (Reardon and Swinnen, 2004).

In the NMS, the food industry is still in the process of transition from structures inherited from the past to the new market environment. Major progress is still required in terms of legislation and technical standards; considerable investment and upgrading of

facilities are therefore necessary. Output is now growing in some, but not all, of these countries, and significant restructuring is still underway. Nevertheless, there has been some success in attracting foreign investors from the EU-15.

Another trait of the food industry in Europe has been the consolidation of corporate structures. Consolidation allows a company to improve production efficiency by economies of scale and by closing less efficient plants. It is also a quick way for a firm to expand its product range and increase its market share. Major food and beverage manufacturers have been focusing on three primary strategies to achieve further growth: acquisitions and mergers, introduction of new products and expansion into new markets. In their quest for new markets, the largest EU-15 processors have therefore started operations on NMS markets, affecting competition on the local market.

The expansion of foreign processors on the food markets of the NMS has affected both local farmers and food industry competitors. As will be discussed below, vertical coordination between processors and their input suppliers has positive effects by addressing major weaknesses of farms. The industry is in need of finance for investment, technology and quality improvements, along with access to high-value markets. All these factors weaken the competitiveness of supply chains. Investment by modern processing companies and vertical coordination with suppliers play a significant role in addressing these weaknesses and improving the global competitiveness of the supply chain (Gow and Swinnen, 1999a, b).

The contention in some cases is that local processors cannot compete with the foreign affiliates of multinationals mainly because, at least at the beginning of transition, multinationals can offer local input suppliers more attractive contractual arrangements coupled with assistance programmes. On the other hand, local processors can benefit by imitating foreign affiliates and using the higher-quality inputs from their suppliers. As a result, foreign direct investment in the agri-food sector has significant positive backward and forward linkages (spillover effects) as a result of establishment of foreign affiliates in NMS; examples of this include improvements in product quality, growth of small local suppliers backed by assistance programmes and increased competition and productivity. Nonetheless, FDI could lead to the elimination of competitors and the creation of monopolistic or oligopolistic situations as small input-suppliers are undermined (Kaditi, 2006).

To sum up, under the influence of various factors, the structure of the food industry is changing and globalisation has had a more direct impact as a result of foreign direct investment. FDI generates employment and income, provided it does not put local firms out of business. It removes capital constraints, encourages transfers of technology and spurs innovation. However, FDI could also lead to concentration of global market power and repatriation of profits.

3.4 Vertical coordination and impact on farmers

Investment by foreign companies in processing and retailing and the opening-up of international markets have raised standards, leading in turn to extensive contracting and vertical coordination along the food supply chain. In most NMS, there have been significant efficiency gains and vertical coordination has had positive effects on farm investment and productivity, especially since the late 1990s. Evidence suggests that small farms have generally benefited from the vertical coordination, especially in the dairy sector (Swinnen *et al.*, 2006).

The simultaneous privatisation and restructuring of farms, input suppliers, processors and retail companies caused major disruption in the food supply chain during transition. Widespread contracting problems during transition included long delays in payment or non-payment for products delivered. Payment delays were a major drain on much needed cash flow for suppliers. In addition, farms did not gain access to credit and key inputs. Another problem was that processors often had severe problems with obtaining quality supplies, with suppliers failing to deliver the quality or quantity of raw materials for which they had signed contracts. The problems were worsened by the lack of public institutions necessary to support market-based transactions, such as for enforcing property rights and contracts. As a result of these and other disruptions, companies lacked reliable supplies while farms faced serious constraints in access to essential inputs and in selling their products (Swinnen *et al.* 2006).

In the absence of appropriate public institutions, private contractual initiatives have emerged to overcome these obstacles. A typical strategy for addressing these problems involves some form of vertical coordination. Successful vertical contracting has taken many forms, but has typically included conditions for product delivery and payment along with farm assistance programmes for suppliers. Foreign direct investment has been the most significant driver behind restructuring of the food supply chain and vertical coordination

programmes. FDI plays a significant role as an initiator of change and institutional innovation.

The introduction of basic forms of vertical integration requires access to outside financial sources, which foreign investors have, but others also. However, more sophisticated forms of vertical integration, with a stronger emphasis on quality and standards, are often introduced by foreign companies because they tend to pay greater attention to quality standards, leading to convergence as a result of spillover effects.

Vertical contracting has significant positive effects, both direct and indirect. As a result of restructuring of the supply chain and vertical coordination, exchange and payment problems have been substantially reduced. Farms have seen beneficial effects on output, productivity and product quality as a result of better access to inputs, timely payments and improved productivity with new investments. Direct loans and loan guarantee programmes have also contributed to investment in small and medium-sized farms.

One key concern is that this process of vertical coordination will exclude a large proportion of farmers, in particular small farmers. Surveys and interviews with companies generally show that transaction costs and investment constraints are a serious consideration. Companies tend to prefer to work with relatively fewer, but larger and more modern suppliers. However, empirical observations also show a very mixed picture of actual contracting, with many more small farms under contract than had been predicted. In reality companies work with surprisingly large numbers of surprisingly small suppliers (Swinnen, 2005).

3.5 Industrialisation, urbanisation, lifestyle changes and income growth

It is generally recognised that urbanisation and income growth are the main factors behind shifts in food consumption by leading to a shift in consumption patterns in favour of high-value food products (see Figure 2.2 and Figure 2.3).

Demographic and social changes have significantly altered the way people live and work and how they spend their leisure time. Over the last 50 years, Europeans have become wealthier and have come to enjoy a higher standard of living, marked by huge shifts in shopping and eating habits, with the expectation of ever cheaper food and increasing variety

all year round. One central objective of food policies in the past was to ensure the supply of "cheap food". This meant securing food supplies by subsidising agriculture, without which farmers would become gradually poorer in relation to the rest of the population and leave the land.

Although consumers with higher income levels spend more money on food, the share of total household expenditure spent on food is low for wealthier consumers, who typically spend a large share of their income on more expensive items, such as health care, energy and recreation (Regmi and Gehlhar, eds., 2005). Even in the 19th century, Ernst Engel observed that as family income increases the proportion spent on food declines. This means that poorer families spend a higher proportion of their income on food than wealthier families. Food products generally have a low price elasticity of demand, i.e. changes in price have little influence on demand, simply because there is a limit to how much one person can eat. This is reflected by the fact that, for at least the last 100 years, farm and food prices have been steadily declining, while the proportion of consumer spending on food continues to fall.

Consumers are now willing to consume "healthy" foods. Sophisticated equipment, etc. has improved product quality. Farmers and food manufacturers take the view that as long as there is sufficient food and people are not starving, they are doing their job. Until recently they ignored nutrition completely, but increasingly they are having to defend themselves against criticism that products are unwholesome and cause obesity. Some food manufacturers have realised the considerable potential in the "health market" and have therefore positioned themselves to supply "foods for health" also known as "nutraceuticals".

Other demographic and social changes which might have an influence on the kinds of food demanded and produced include:

- fewer children and having children later in life;
- fewer and later marriages and more marital breakdowns;
- increase in non-marital unions and rise in births outside marriage; trend towards smaller households with more people living alone;
- increase in single-parent families and the falling number of couples with children.

Another factor shaping the “new styles” in the food industry is the demand for ethnic foods, as a result of migration and foreign travel. These trends in turn mean that the overall size of the market for food is diminishing in relation to other sectors of the economy (see Figure 2.3). There is therefore considerable incentive for farmers and food processors to “add value” to their products to increase turnover, e.g. bread instead of flour or a ready-prepared meal instead of the raw ingredients. All involved in the food system will tend to “move up” the food value chain in search of consumers with higher disposable income, to segment the market and to offer a wider choice, especially specialist and luxury products. These long-term trends will inevitably continue.

3.6 Regulatory provisions on food safety and the food industry

Overall, safety and environmental concerns seem sure to grow and to shape farming and the food system in Europe. The White Paper on Food Safety established the general principles governing European food regulation and led to the adoption of regulatory provisions on food in 2002 and to the foundation of the European Food Safety Agency (EFSA) in the same year. As a result, Europe now has an integrated approach, with legislation in force, covering a wide range of food safety issues.

Food quality, safety and health considerations are major factors that are changing food consumption patterns globally. Food is plentiful and affordable but there are growing concerns about diet, public health, food safety and the environment. It is now recognised that good nutrition can help to reduce the prevalence of many common diseases, such as cardiovascular disease, cancer, diabetes and obesity. As a result, food and nutrition policy is now a cause for serious concern in connection with public health.

Consumers, regulators and processors are demanding structural changes, most notably standards and traceability. Application of standards, such as HACCP or ISO standards, has triggered changes all along the food supply chain to ensure that all food operators do their utmost to uphold and abide by them. This trend will continue, with the result that every food operator can be monitored and every operation traced back, to ensure the safe passage of food along the supply chain.

The emergence of standards can be attributed to two broad trends. First, product quality and safety standards have been imposed on farmers by the food industry in response to

consumer perceptions of food quality and safety. Second, two trade agreements under the WTO – one on intellectual property rights (IPR), the other on safety and quality standards and SPS measures – are also likely to have significant implications for food safety issues, particularly for the NMS. IPR featured prominently in recent discussions on globalisation and technological progress as a result of the agreements on trade-related aspects of intellectual property rights (TRIPS). Technology protected as intellectual property is now highly concentrated in a few large multinationals.

Genetically modified (GM) foods deserve a special mention. A high proportion of European consumers remains suspicious and would not purchase GM foods if given the choice. Legislation which came into force in May 2004 on GM food and feed means that any GM foods intended for sale in the EU are subject to a rigorous safety assessment, which is the responsibility of the EFSA. The rules also stipulate that any foods containing genetically modified organisms (GMOs), or ingredients produced from GMOs, must be clearly labelled.

3.7 Conclusions

To conclude, the food industry is an intrinsic part of the food supply chain and is, therefore, influenced by a range of factors acting on other parts of the food system. This report consequently drew on a wide variety of material to present briefly the main statistics on the food industry in the EU, the aim being to identify trends and drivers of change, including economic and technological trends, demographic and social changes and trends in consumer demand.

The main findings are summarised below:

(i) processed foods – as opposed to traditional agricultural commodities – are becoming increasingly important in agricultural trade;

(ii) food manufacturing shows one of the highest degrees of transnationality and foreign production by food multinationals is increasing;

(iii) the major companies are playing a key role in this process;

(iv) significant international expansion and organisational changes are taking place in the retail industry;

(v) there has been a significant increase in the scale of cross-border mergers and acquisitions of retailers; and

(vi) a very small number of major retailers are playing an increasing role in globalisation of food systems, affecting competition in the distribution of food products.

In particular, in the NMS the following developments have been observed:

(i) after the regime change, the food industry was suffering from a lack of quality supply;

(ii) foreign investors entered the processing sector relatively quickly, leading to a rapid increase in value-added production and consequent demand for homogeneous, high-quality, standardised supply;

(iii) the concentration within the food industry has had an impact on the different levels of vertical coordination;

(iv) there have been dramatic changes in the retailing sector, where international chains have also appeared;

(v) large retailers may also have an impact on improving product quality, on vertical and horizontal integration and on rationalisation of the delivery system;

(vi) small producers are affected as well, having almost no bargaining power when negotiating contracts and prices, yet benefiting from assistance policy.

PART B:
Quantitative assessment of the European food industry

4 Modelling of the food industry – an introduction

This part of the report deals with the quantitative assessments using the GLOBE model and its imperfect competition variant (GLOBE_IC). The simulations conducted using these models indicate the impact which enlargement of the EU will have on the incentives for agriculture and the food industry within the EU and in the accession and candidate countries. Two groups of simulations were conducted with both the perfect competition and imperfect competition versions of the GLOBE model. The first considers the impact of enlargement of the EU and of the harmonisation of policies associated with EU membership, while the second assesses the impact of technical changes induced by the combination of EU membership and foreign direct investment (FDI). In cases where a policy shock consists of changes in a number of different policy instruments, e.g. tax rates, separate simulations were run for each set of changes in the relevant policy instruments to provide an assessment of the impact of each component of the overall shock; this is in addition to simulations that included all the changes in policy instruments. Consequently, as a general rule and as is the case here, the final experiment in each group is the core experiment. For instance, although assessment of EU accession and policy harmonisation could be viewed as a single exercise, modelling such an event will typically involve running a number of different simulations to understand the roles of bilateral trade tax reductions and domestic policy harmonisation.

The analyses conducted for this study uses a large model, with some 80 000 variables, generating several million results. This greatly complicates discussion and analysis of the results and inevitably means that some aspects will not be covered in detail.

This part of the report is organised as follows: Chapter 5 provides a brief description of the GLOBE model (full documentation on the GLOBE and GLOBE_IC models is available separately) and gives details of the aggregation used for this study. The initial patterns of trade and production, trade and domestic policy measures and economic structure are described in Chapter 6 to provide a basis for understanding the impact of the policy simulations, which are described in Chapter 7. The results are analysed and discussed in Chapter 8 and Chapter 9 draws some conclusions.

5 Modelling approach: the GLOBE model

5.1 The GLOBE model

GLOBE is a multi-country, computable general equilibrium (CGE) model, descended from the approach to CGE modelling described by Dervis *et al*. (1982). It is a Social Accounting Matrix (SAM)-based CGE model, in which the SAM serves to identify the stakeholders in the economy and provides the database with which the model is calibrated. The SAM also plays an important organisational role since the groups of stakeholders identified in the SAM are also used to define sub-matrices of the SAM for which behavioural relationships need to be defined.[3] The GLOBE model is calibrated from the SAM representation of the Global Trade Analysis Project (GTAP)[4] database (McDonald and Thierfelder, 2004). This model, using the GAMS (General Algebraic Modelling System) software, is a direct descendant and extension of the single-country and multi-country CGE models developed in the late 1980s and early 1990s.[5]

5.1.1 International trade

Trade is modelled using an approach derived from the Armington "insight", namely domestically produced commodities are assumed to be imperfect substitutes for traded goods, both imports and exports. Import demand is modelled via a series of nested constant elasticity of substitution (CES) functions; imported commodities from different source regions to a destination region are assumed to be imperfect substitutes for each other and are aggregated to form composite import commodities that are assumed to be imperfect substitutes for their counterpart domestic commodities. The composite imported commodities and their counterpart domestic commodities are then combined to produce composite consumption commodities, which are the commodities demanded by domestic stakeholders as intermediate inputs and final demand (for private consumption, the government and investment). The presumption of imperfect substitutability between imports from different sources is relaxed where the imports of a commodity from a source region account for a "small" share (in terms

[3] As such, the modelling approach has been influenced by Pyatt's "SAM Approach to Modeling" (Pyatt, 1987).

[4] See Hertel (1997) for reference on the GTAP model and Dimaranan (2006) for the GTAP database.

of value) of imports of that commodity by the destination region.[6] In such cases the destination region is assumed to import the commodity from the source region in fixed shares: this is a novel feature of the model introduced to give a better reflection of the terms of trade effects associated with small trade shares.

Export supply is modelled via a series of nested constant elasticity of transformation (CET) functions; the composite export commodities are assumed to be imperfect substitutes for domestically consumed commodities, while the commodities exported from a source region to different destination regions are assumed to be imperfect substitutes for each other. The composite exported commodities and their counterpart domestic commodities are then combined to produce composite production commodities; properties of models using the Armington insight are well known.[7] The use of nested CET functions for export supply implies that domestic producers adjust their export supply decisions in response to changes in the relative prices of exports and domestic commodities. This specification is desirable in a global model with a mix of developing and developed countries that produce different kinds of traded goods with the same aggregate commodity classification and yields more realistic behaviour of international prices than models assuming perfect substitution on the export side.[8]

Stakeholders are assumed to determine their optimum demand for and supply of commodities as functions of relative prices, and the model simulates the operation of national commodity and factor markets and international commodity markets. Each source region exports commodities to destination regions at prices that are valued free on board (fob). Fixed quantities of trade services are incurred for each unit of a commodity exported between each and every source and destination, yielding import prices at each destination that include carriage, insurance and freight charges (cif).[9] The cif prices are the "landed" prices expressed in global currency units. Any import duties and other taxes are added to these and the resultant price is converted into domestic currency units using the exchange rate to obtain the import price for the specific source region. The price of the composite import commodity is a

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5 The GLOBE model is described in more detail in McDonald *et al*. (2006). For examples of earlier models, see Robinson *et al*. (1993) and Lewis *et al*. (1995). The World Bank global CGE model described in van der Mensbrugghe (2006) has a common heritage.

6 Import shares defined as small are case-specific and defined by the model user.

7 See de Melo and Robinson (1989) and Devarajan *et al*. (1990).

8 While the nested CET specification is widely used in both single- and multi-country trade-focused CGE models, it is not used in the GTAP model.

weighted aggregate of the region-specific import prices, while the domestic supply price of the composite commodity is a weighted aggregate of the import commodity price and the price of domestically produced commodities sold on the domestic market.

The prices received by domestic producers for their output are weighted aggregates of the domestic price and the aggregate export prices, which are themselves weighted aggregates of the prices received for exports to each region in domestic currency units. The fob export prices are then determined by subtracting any export taxes and converted into global currency units using the regional exchange rate.

Two significant features of the price system in this model deserve special mention. First, each region has its own numéraire and all prices within a region are defined relative to the region's numéraire. A fixed aggregate consumer price index is specified to define the regional numéraire. For each region, the real exchange rate variable ensures that the regional trade-balance constraint is satisfied when the regional trade balances are fixed. Second, in addition all exchange rates are expressed relative to a global numéraire. The global numéraire is defined as a weighted average of the exchange rates for a user-defined region or group of regions. In this application of GLOBE, the basket of regions approximates the OECD economies.

Fixed country trade balances are specified in "real" terms defined by the global numéraire. If the global numéraire is the US exchange rate and is set at one, then the trade balances are "real" variables defined in terms of the value of US exports. If the global numéraire is a weighted exchange rate for a group of regions, as in this case, and is set at one, then the trade balances are "claims" against the weighted average of exports by the group of regions in the numéraire.

5.1.2 Production and demand

The production structure is a two-stage nest. Intermediate inputs are used in fixed proportions per unit of output – Leontief technology. Primary inputs are combined as imperfect substitutes, in accordance with a CES function, to produce value added. Producers are assumed to maximise profits, which determines product supply and factor demand.

[9] Bilateral data on trade margins are not available in the GTAP database. Instead, trade margin services are assumed to be a homogeneous good; they are not differentiated by country of origin.

Product markets are assumed to be competitive and the model solves for equilibrium prices that clear the markets. Factor markets in developed countries are also assumed to have fixed labour supplies and the model solves for equilibrium wages that clear the markets. In developing countries, however, it is assumed that the real wage of unskilled labour is fixed and that the supply of unskilled labour is infinitely elastic at that wage. Consequently, labour supply clears the market and aggregate unskilled employment is endogenous rather than the real wage. In this specification, any shock that would otherwise increase the equilibrium wage will instead lead to increased employment.

Final demand by the government and for investment is modelled on the assumption that the relative quantities of each commodity demanded for these two purposes are fixed. This approach reflects the absence of any clear theory that defines an appropriate behavioural response by these stakeholders to changes in relative prices. For households there is a well-developed behavioural theory and the model incorporates the assumption that households are utility-maximisers who respond to changes in relative prices and income. In this version of the model, the utility functions for private households are assumed to be Stone Geary functions; for the OECD countries they are parameterised as Cobb Douglas functions, i.e. there is no subsistence expenditure.

5.1.3 Macro closure

All economy-wide models must incorporate the three standard macro balances: current account balance, savings-investment balance and the government deficit/surplus. How equilibrium is achieved across these macro balances depends on the choice of macro "closure" of the model. The default presumption in the GLOBE model is a "neutral" or "balanced" set of macro closure rules with flexible exchange rates.

The assumption of flexible exchange rates ensures that regional real exchange rates adjust to achieve equilibrium. The underlying assumption is that any changes in aggregate trade balances are determined by macroeconomic forces working mostly on asset markets, which are not included in the model, and these balances are treated as exogenous. This assumption ensures that there are no changes in future "claims" on exports across the regions in the model, i.e. the net asset positions are fixed.

The “balanced” macro closure ensures that changes in aggregate absorption are shared equally between private consumption, government and investment demands. The underlying assumption is that there is some mix of macro policies that ensures equal sharing of the benefits of any increase in absorption or the burden of any decrease between the major macro stakeholders: households, government and investment, i.e. final demand allocations are distributionally neutral. To satisfy the savings-investment balance, the household savings rate adjusts to match changes in investment. Government savings are held constant; direct income tax rates on households adjust to ensure that government revenue equals government spending plus government savings. The replacement tax instrument, direct taxes on households, is likely to be less distorting than the trade taxes that it replaces but there are reasons to be sceptical about how appropriate it is in the context of many of the least developed economies (see Greenaway and Milner, 1991).

However, the model code allows the user considerable flexibility with respect to both the macroeconomic closure conditions and the market-clearing mechanisms. Details of the range of options are given in McDonald *et al*. (2006).

5.2 Model aggregation

In the light of the foregoing discussion of regional and sectoral aggregations, the aggregation of the GLOBE model applied (McDonald *et al*., 2006) consists of 23 commodities and activities, 5 factors and 18 regions. These are shown in Table 5.1, while the mappings from the GTAP database accounts are shown in Table 5.2, Table 5.3 and Table 5.4. This aggregation of the database produces a model with 80 159 equations/variables, which is at the upper limit of model size for the results to be tractable.

Table 5.1: Model accounts

Label	Description	Label	Description
Commodities and activities		**Factors**	
gran	Grains	land	Land
scb	Sugar cane and beet	UnSkLab	Unskilled labour
ocrp	Other crops	SkLab	Skilled labour
pbf	Plant-based fibres	cap	Capital
lstk	Livestock	natres	Natural resources
mlk	Raw milk	**Regions**	
aprd	Other animal products	deu	Germany
mins	Minerals	ita	Italy
meat	Meat	aut	Austria
mprd	Meat products	gbr	United Kingdom
vof	Vegetable oils and fats	fra	France
dair	Dairy products	bnl	Benelux
suga	Sugar	espt	Spain and Portugal
ofd	Other food products	reu	Rest of the EU-15
btob	Beverages and tobacco	pol	Poland
bind	Basic industries	hun	Hungary
manu	Manufacture	cze	Czech Republic
mach	Machinery	reur	Rest of the EU-10
util	Utilities	robu	Romania and Bulgaria
cns	Construction	tur	Turkey
trd	Trade and communication	roecd	Rest of the OECD
tran	Transport	cis	Former communist bloc
serv	Services	merc	Mercosur
		row	Rest of the world

This aggregation provides for substantial disaggregation of agricultural and food sectors (commodities and activities) – seven of each – with a balance across crop and livestock agriculture and a similarly balanced composition of the food industries.[10] This gives a limited aggregation of the 14 agricultural sectors (including fishing and forestry) and the eight food sectors in the GTAP database; however, it does require substantial aggregation of the other sectoral accounts. The regional aggregation emphasises the European Union, with eight regions for the EU-15, five for the accession regions and one candidate region (Turkey) and four regions for the rest of the world. As with the sectoral accounts, the regions that are not the focus of attention have had to be heavily aggregated. The factor accounts are not aggregated from the five factor accounts in the GTAP database.

[10] Detailed discussion of the structural characteristics of the agricultural and food sectors for the regions in the model is left for the section on the descriptive statistics for this version of the model.

Table 5.2: Sectoral aggregation mappings

GTAP database		Aggregation	
Description	**Name**	**Mapping**	**Description**
Paddy rice	pdr	gran	Grains
Wheat	wht	gran	Grains
Cereal grains n.e.c.	gro	gran	Grains
Vegetables, fruit, nuts	v_f	ocrp	Other crops
Oil seeds	osd	ocrp	Other crops
Sugar cane/sugar beet	c_b	scb	Sugar cane and beet
Plant-based fibres	pfb	pbf	Plant-based fibres
Crops n.e.c.	ocr	ocrp	Other crops
Cattle, sheep, goats, horses	ctl	lstk	Livestock
Animal products n.e.c.	oap	aprd	Other animal products
Raw milk	rmk	mlk	Raw milk
Wool, silk-worm cocoons	wol	aprd	Other animal products
Forestry	frs	ocrp	Other crops
Fishing	fsh	aprd	Other animal products
Coal	coa	mins	Minerals
Oil	oil	mins	Minerals
Gas	gas	mins	Minerals
Minerals n.e.c.	omn	mins	Minerals
Meat: cattle, sheep, goats, horses	cmt	meat	Meat
Meat products n.e.c.	omt	mprd	Meat products
Vegetable oils and fats	vol	vof	Vegetable oils and fats
Dairy products	mil	dair	Dairy products
Processed rice	pcr	ofd	Other food products
Sugar	sgr	suga	Sugar
Food products n.e.c.	ofd	ofd	Other food products
Beverages and tobacco products	b_t	btob	Beverages and tobacco
Textiles	tex	manu	Manufacturing
Wearing apparel	wap	manu	Manufacturing
Leather products	lea	manu	Manufacturing
Wood products	lum	manu	Manufacturing
Paper products, publishing	ppp	manu	Manufacturing
Petroleum, coal products	p_c	bind	Basic industries
Chemical, rubber/plastic products	crp	bind	Basic industries
Mineral products n.e.c.	nmm	bind	Basic industries
Ferrous metals	i_s	bind	Basic industries
Metals n.e.c.	nfm	bind	Basic industries
Metal products	fmp	manu	Manufacturing
Motor vehicles and parts	mvh	mach	Machinery
Transport equipment n.e.c.	otn	mach	Machinery
Electronic equipment	ele	mach	Machinery
Machinery and equipment n.e.c.	ome	mach	Machinery
Manufacture n.e.c.	omf	manu	Manufacturing
Electricity	ely	util	Utilities
Gas manufacture/distribution	gdt	util	Utilities
Water	wtr	util	Utilities
Construction	cns	cns	Construction
Trade	trd	trd	Trade and communication
Transport n.e.c.	otp	tran	Transport
Sea transport	wtp	tran	Transport
Air transport	atp	tran	Transport
Communication	cmn	trd	Trade and communication
Financial services n.e.c.	ofi	serv	Services
Insurance	isr	serv	Services
Business services n.e.c.	obs	serv	Services
Recreation and other services	ros	serv	Services
Pub. admin., defence, health, education	osg	serv	Services
Dwellings	dwe	serv	Services

The sectoral mappings follow the principle of achieving a balanced representation of the agriculture and food sectors in the EU-25 and the accession and candidate countries. In addition, attention was paid to the rates of agricultural support recorded in the GTAP database to ensure that the key dimensions of policy harmonisation would be adequately covered in the database (see the section on policy experiments for further details on the modelling of policy harmonisation).

In contrast to the sectoral mappings, the regional mappings were primarily determined by political considerations – namely actual, pending or possible EU membership. The larger members of the EU-15 were kept separate, while the smaller members were aggregated to form a "rest of the EU-15" aggregate, except for Spain and Portugal which were aggregated as a pair. For the accession and candidate countries, Poland, Hungary and the Czech Republic were kept separate, Romania and Bulgaria were aggregated as a pair and the rest formed a single "rest of the EU-10" aggregate. Turkey, as a candidate country, was kept as a single region.

Table 5.3: Regional aggregation mappings – EU, accession and candidate regions

GTAP database		Aggregation	
Description	**Name**	**Mapping**	**Description**
Austria	aut	aut	Austria
Belgium	bel	bnl	Benelux
Denmark	dnk	reu	Rest of the EU-15
Finland	fin	reu	Rest of the EU-15
France	fra	fra	France
Germany	deu	deu	Germany
Greece	grc	reu	Rest of the EU-15
Ireland	irl	reu	Rest of the EU-15
Italy	ita	ita	Italy
Luxembourg	lux	bnl	Benelux
Netherlands	nld	bnl	Benelux
Portugal	prt	espt	Spain and Portugal
Spain	esp	espt	Spain and Portugal
Sweden	swe	reu	Rest of the EU-15
United Kingdom	gbr	gbr	United Kingdom
Cyprus	cyp	reur	Rest of the EU-10
Czech Republic	cze	cze	Czech Republic
Estonia	est	reur	Rest of the EU-10
Hungary	hun	hun	Hungary
Latvia	lva	reur	Rest of the EU-10
Lithuania	ltu	reur	Rest of the EU-10
Malta	mlt	reur	Rest of the EU-10
Poland	pol	pol	Poland
Slovakia	svk	reur	Rest of the EU-10
Slovenia	svn	reur	Rest of the EU-10
Bulgaria	bgr	robu	Romania and Bulgaria
Romania	rom	robu	Romania and Bulgaria
Turkey	tur	tur	Turkey

The remaining 59 regions in the GTAP 6 database were aggregated into four large aggregates: rest of the OECD, former communist bloc, Mercosur (+) and rest of the world (see Table 5.4). This was necessitated by the requirement to maintain a substantial degree of disaggregation of the EU regions. Finally, the factor accounts were taken without aggregation directly from the GTAP database.

Table 5.4: Regional aggregation mappings – Other non-EU-27 regions

GTAP database		Aggregation	
Description	**Name**	**Mapping**	**Description**
Australia	aus	roecd	Rest of the OECD
New Zealand	nzl	roecd	Rest of the OECD
Rest of Oceania	xoc	row	Rest of the world
China	chn	row	Rest of the world
Hong Kong	hkg	row	Rest of the world
Japan	jpn	roecd	Rest of the OECD
Korea	kor	roecd	Rest of the OECD
Taiwan	twn	row	Rest of the world
Rest of East Asia	xea	row	Rest of the world
Indonesia	idn	row	Rest of the world
Malaysia	mys	row	Rest of the world
Philippines	phl	row	Rest of the world
Singapore	sgp	row	Rest of the world
Thailand	tha	row	Rest of the world
Vietnam	vnm	row	Rest of the world
Rest of South-east Asia	xse	row	Rest of the world
Bangladesh	bgd	row	Rest of the world
India	ind	row	Rest of the world
Sri Lanka	lka	row	Rest of the world
Rest of South Asia	xsa	row	Rest of the world
Canada	can	roecd	Rest of the OECD
United States of America	usa	roecd	Rest of the OECD
Mexico	mex	roecd	Rest of the OECD
Rest of North America	xna	row	Rest of the world
Colombia	col	merc	Mercosur
Peru	per	merc	Mercosur
Venezuela	ven	merc	Mercosur
Rest of Andean Pact	xap	merc	Mercosur
Argentina	arg	merc	Mercosur
Brazil	bra	merc	Mercosur
Chile	chl	merc	Mercosur
Uruguay	ury	merc	Mercosur
Rest of South America	xsm	row	Rest of the world
Central America	xca	row	Rest of the world
Rest of FTAA	xfa	row	Rest of the world
Rest of the Caribbean	xcb	row	Rest of the world
Switzerland	che	roecd	Rest of the OECD
Rest of EFTA	xef	cis	Former communist bloc
Rest of Europe	xer	cis	Former communist bloc
Albania	alb	cis	Former communist bloc
Croatia	hrv	cis	Former communist bloc
Russian Federation	rus	cis	Former communist bloc
Rest of former Soviet Union	xsu	cis	Former communist bloc
Rest of Middle East	xme	row	Rest of the world
Morocco	mar	row	Rest of the world
Tunisia	tun	row	Rest of the world
Rest of North Africa	xnf	row	Rest of the world
Botswana	bwa	row	Rest of the world
South Africa	zaf	row	Rest of the world
Rest of South African CU	xsc	row	Rest of the world
Malawi	mwi	row	Rest of the world
Mozambique	moz	row	Rest of the world
Tanzania	tza	row	Rest of the world
Zambia	zmb	row	Rest of the world
Zimbabwe	zwe	row	Rest of the world
Rest of SADC	xsd	row	Rest of the world
Madagascar	mdg	row	Rest of the world
Uganda	uga	row	Rest of the world
Rest of Sub-Saharan Africa	xss	row	Rest of the world

Alternative model aggregations

The GLOBE model is designed to work with any aggregation of the GTAP database (Dimaranan, 2006) and has been tested with multiple aggregations of versions 5.4 and 6.0 of the GTAP database. The restrictions on aggregation are primarily those imposed by the tractability of the results produced by the model and the practical limitations of the algorithms in the PATH solver which the model uses. Experiments indicate that very large models can be used to conduct simple experiments but may take a long time to generate solutions. Moreover, the extremely large variations in the magnitudes of the transactions recorded in the GTAP database can have unpredictable implications for operation of the model; with aggregations that produce models of up to 100 000 equations/variables these are not excessively restrictive but may be difficult to isolate, whereas with aggregations that produce models of up to 50 000 equations/variables there have been few problems that cannot be easily overcome by modifying the way the simulation is implemented.

6 Initial situation

Understanding the impact of EU accession and trade policy harmonisation in the NMS on both the EU-15 Member States and the NMS will be facilitated by an appreciation of the initial situation. Thus the following section describes the initial situation with respect to production, trade and the magnitude of policy instruments in the EU-15 and the NMS.

6.1 Structure of production and trade in the initial situation

6.1.1 Production

In most countries and regions of the EU-15 agriculture plays only a minor role, with shares in total output between 0.9% in the UK and 3.7% in the region aggregated as the rest of the EU-15 (see Table 6.1). However, if the agri-food sector is taken into account the contribution of this industry is higher, with shares in total output between 5.8% in Germany and 9.7% in Spain and Portugal.

In the NMS the overall importance of agriculture is more diverse compared to the countries in the EU-15. While agriculture in the Czech Republic contributes only 3% to the value of total output, agriculture in Bulgaria and Romania accounts for almost 15% of the total value of production (see Table 6.1). The combined production share of agriculture and food processing is higher in all NMS than in the EU-15 countries; it is particularly high for Bulgaria and Romania, at more than 28%.

Table 6.1: Sectoral value of output in the EU in the initial situation (in 2001, USD billion)

	Germany	Italy	Austria	UK	France	Benelux	ES-PT	Rest EU-15	Poland	Hungary	Czech R.	Rest EU-10	RO-BG
Grains	5.6	3.1	0.5	2.4	6.0	0.4	2.1	2.4	2.3	1.0	0.7	0.7	9.5
Sugar cane and beet	1.0	0.4	0.1	0.4	0.7	0.7	0.3	0.3	0.4	0.1	0.1	0.1	0.4
Other crops	15.5	22.0	2.7	6.1	24.2	11.3	19.3	15.8	8.1	1.4	1.8	3.2	12.7
Plant-based fibres	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.4	0.0	0.0	0.0	0.1	0.4
Livestock	2.8	3.4	0.5	3.5	5.8	2.2	2.8	2.9	0.6	0.2	0.2	0.4	2.3
Raw milk	9.7	4.2	1.0	4.6	7.1	4.7	2.6	4.5	2.2	0.5	0.6	0.8	5.7
Other animal products	13.5	7.5	1.1	6.2	9.0	6.9	12.8	23.1	3.4	1.6	1.3	1.6	6.7
Agriculture	**48.2**	**40.5**	**5.9**	**23.3**	**53.1**	**26.3**	**40.0**	**49.3**	**17.1**	**4.8**	**4.7**	**6.8**	**37.8**
Minerals	7.2	4.1	0.9	21.9	3.1	6.6	2.9	5.5	6.3	0.4	1.6	0.8	5.7
Meat	8.9	10.4	1.8	10.5	9.8	4.5	7.6	8.2	2.5	0.4	0.9	0.9	2.2
Meat products	16.4	8.2	1.6	18.2	17.7	8.9	13.5	12.8	7.0	1.3	1.7	1.9	3.2
Vegetable oils and fats	20.9	5.7	0.2	2.1	3.0	3.9	5.6	2.7	2.7	0.2	0.7	0.8	1.4
Dairy products	23.6	13.1	2.4	20.0	19.8	9.9	8.0	13.8	3.3	0.7	1.4	1.4	2.6
Sugar	4.4	1.2	0.4	4.5	3.3	2.3	1.0	2.5	1.8	0.2	0.6	0.7	2.4
Other food products	41.7	39.4	7.2	62.0	41.3	28.1	28.6	19.4	13.1	2.6	3.2	4.7	11.3
Beverages and tobacco	39.1	17.9	3.4	21.8	19.2	13.4	17.7	10.6	9.8	1.1	3.2	3.4	11.7
Food processing	**155.1**	**95.9**	**16.9**	**139.2**	**114.1**	**70.8**	**82.0**	**69.9**	**40.3**	**6.6**	**11.8**	**13.8**	**34.8**
Basic industries	355.7	215.8	27.2	207.0	215.0	149.5	105.4	123.0	36.8	12.0	18.3	21.5	40.7
Manufactures	263.8	242.1	29.1	192.7	185.8	99.4	122.1	127.5	38.4	8.9	19.4	22.6	33.2
Machinery	570.8	189.4	38.4	248.8	273.8	100.5	104.1	156.4	36.3	20.8	29.2	20.0	22.9
Utilities	64.1	30.2	8.4	50.6	44.1	22.8	30.6	30.0	11.8	3.9	6.4	9.1	14.7
Construction	227.9	122.7	27.8	209.1	140.4	93.8	119.4	91.2	25.8	5.3	10.7	13.7	10.1
Trade	363.6	260.5	44.0	446.8	222.5	139.1	205.4	134.6	52.2	14.7	8.8	18.1	12.7
Transport	130.4	96.7	21.6	162.6	109.7	69.5	65.1	84.2	21.5	7.0	7.5	14.4	15.2
Services	1330.0	625.7	125.6	955.3	945.7	468.4	384.5	472.4	72.2	28.5	36.6	41.6	30.1
Total	**3516.9**	**1923.6**	**345.9**	**2657.1**	**2307.4**	**1246.7**	**1261.5**	**1344.0**	**358.7**	**112.9**	**155.0**	**182.5**	**257.9**
Share of agriculture	1.4%	2.1%	1.7%	0.9%	2.3%	2.1%	3.2%	3.7%	4.8%	4.2%	3.0%	3.7%	14.6%
Share of agri-food	5.8%	7.1%	6.6%	6.1%	7.2%	7.8%	9.7%	8.9%	16.0%	10.1%	10.6%	11.3%	28.1%

Source: GTAP data base Version 6 (Dimaranan, 2006).

A crucial concern for this study is the input cost structures of the agri-food sectors in the EU-15 and NMS; one useful summary indicator is the share of intermediate input use in total sectoral inputs. The importance of intermediate input in each sector is indicated by the per-unit ratio of net price to gross domestic price, which is presented in Table 6.2 below.

Table 6.2: Difference in share of sectoral value added in output in the NMS relative to the EU-15 average in the initial situation

	EU-15	Poland	Hungary	Czech R.	Rest EU-10	RO-BG
	Average Share (in%)	Percentage point difference from EU-15 average				
Grains	49.3	5.9	49.3	5.9	49.3	5.9
Sugar cane and beet	52.3	14.5	52.3	14.5	52.3	14.5
Other crops	64.7	1.1	64.7	1.1	64.7	1.1
Plant-based fibres	48.6	-26.1	48.6	-26.1	48.6	-26.1
Livestock	44.5	-15.1	44.5	-15.1	44.5	-15.1
Raw milk	49.9	-12.4	49.9	-12.4	49.9	-12.4
Other animal products	38.6	-12.0	38.6	-12.0	38.6	-12.0
Meat	24.4	14.3	24.4	14.3	24.4	14.3
Meat products	22.4	-8.5	22.4	-8.5	22.4	-8.5
Vegetable oils and fats	35.0	-9.7	35.0	-9.7	35.0	-9.7
Dairy products	27.7	-3.2	27.7	-3.2	27.7	-3.2
Sugar	37.8	-13.8	37.8	-13.8	37.8	-13.8
Other food products	30.1	-4.2	30.1	-4.2	30.1	-4.2
Beverages and tobacco	37.1	5.2	37.1	5.2	37.1	5.2
Manufactures	27.2	0.3	27.2	0.3	27.2	0.3
Services	57.5	-4.8	57.5	-4.8	57.5	-4.8
Average	45.1	-5.1	45.1	-5.1	45.1	-5.1

Source: GTAP data base Version 6 (Dimaranan, 2006).

On average, the share of value added in agricultural sectors is typically above the national average in EU-15 countries. These high rates of value added in agriculture are due to the relatively low importance of intermediate inputs in classical primary sectors including agriculture and the large proportion of income to land as the sector-specific factor in agricultural production. Intermediate inputs are more important in the food processing industries; notable characteristics of food processing industries are the high proportion of total input costs accounted for by either agricultural products or part-processed food products and the relatively narrow range of intermediate inputs used by food processing. In all countries and across all food processing sectors the shares of value added are lower than the national average.

In the NMS the national average shares of value added in total inputs are low compared to the EU-15 average. This substantive difference, compared to the EU-15, gives a first

indication of low productive efficiency in almost all sectors in the NMS compared to the EU-15. This is especially the case in Romania and Bulgaria, where the intermediate inputs account for more than 80% of the total value of inputs. Similarly, the food processing sectors also report low shares in value added. The scenario results will show that EU membership and the adoption of the policy instrument of the CAP together with an enhanced inflow of FDI have a significant impact on structural changes in the NMS.

6.1.2 Trade

Trade orientation is reported below by sector and region. Typically the most export-oriented sectors are general manufacturing, milk and meat processing.

In primary agriculture most activities are less export-oriented than manufacturing, although the French cereal sectors show strong export orientation. Comparing different countries, the Benelux countries dominate in export orientation in almost all sectors. The extremely high export share in plant-based fibres coincides with relatively small numbers in exports and production (see also Table 6.3).

Table 6.3: Share of sectoral exports in output in the EU in the initial situation (in %)

	Germany	Italy	Austria	UK	France	Benelux	ES-PT	Rest EU-15	Poland	Hungary	Czech R.	Rest EU-10	RO-BG
Grains	29.8	4.6	36.4	15.8	61.1	40.5	15.3	31.2	0.1	36.5	4.1	12.5	1.9
Sugar cane and beet	0.3	0.0	0.3	0.0	0.3	0.6	0.2	0.2	0.0	0.0	0.1	0.1	0.0
Other crops	16.8	16.1	11.4	12.2	15.3	73.5	35.2	15.3	5.1	25.1	14.0	22.9	2.3
Plant-based fibres	98.9	94.2	99.8	96.4	97.8	92.8	30.5	66.0	8.6	10.8	23.6	76.2	0.4
Livestock	8.5	0.7	7.4	8.2	14.5	15.8	3.7	6.9	20.0	42.9	9.1	7.4	5.9
Raw milk	0.0	0.0	0.4	0.0	0.1	0.0	0.2	0.1	0.2	0.2	0.6	0.6	0.1
Other animal products	7.6	4.9	8.2	14.5	12.3	25.3	7.1	9.3	3.3	9.3	7.7	9.4	1.0
Meat	18.3	3.2	13.2	3.8	7.0	55.4	6.4	18.1	3.1	8.7	3.1	4.2	1.6
Meat products	12.8	11.6	21.4	3.0	14.4	52.3	9.6	34.0	4.0	51.1	5.2	6.7	1.6
Vegetable oils and fats	3.3	16.0	22.8	5.9	10.5	38.0	21.0	15.6	0.4	17.1	4.9	5.4	2.8
Dairy products	19.4	9.1	22.4	4.9	20.7	57.8	11.9	25.4	13.3	17.5	18.2	28.2	1.4
Sugar	4.3	7.6	3.7	3.0	12.0	16.8	5.5	4.1	2.5	8.7	2.1	3.8	0.4
Other food products	19.5	11.4	15.3	7.0	14.9	50.9	15.0	37.6	8.8	17.0	13.9	17.5	1.7
Beverages and tobacco	9.7	18.3	26.1	27.2	40.8	43.1	14.2	20.4	2.1	11.7	9.2	10.5	1.3
Manuf. industries	40.8	31.9	54.3	31.6	34.6	59.6	32.6	50.4	25.3	60.4	43.8	47.2	15.1
Services	3.4	4.4	12.7	5.0	4.4	9.2	6.9	9.9	4.0	10.7	8.3	10.3	4.6
Total	**17.4**	**14.6**	**25.4**	**12.5**	**14.9**	**27.5**	**15.2**	**24.2**	**11.7**	**31.8**	**25.3**	**25.5**	**8.2**

Source: GTAP data base Version 6 (Dimaranan, 2006).

The economies in the NMS are characterised by lower degrees of export orientation than the countries in the EU-15. Only Hungary shows a high level of export orientation, with Hungarian manufacturing industries exporting more than 60% of their output (see Table 6.3). Romania and Bulgaria are the least export-oriented countries in this group; their manufacturing sectors only export 15.1% of production. These export ratios are quite low by international standards; they are probably less a reflection of an inward-looking strategy than of a low level of competitiveness on world markets.

On the import side, the picture that emerges when the shares of imports in aggregate composite demand (Table 6.4) and the share of imported intermediates in total intermediate inputs (Table 6.5) are considered is that for most EU-15 countries the manufacturing and food processing industries are more import-oriented than the crop and livestock sectors.

The low degree of integration in international trade in the NMS is also mirrored in the import ratios (see Table 6.4), although the import ratios are higher than the export ratios in most sectors. Comparing Table 6.4 and Table 6.5 it is evident that import-oriented sectors (in the sense of a larger share of imports) are also import-dependent (in the sense of a large share of imported intermediate inputs).

The trade data indicate that, in contrast to the EU-15, the NMS are characterised by relatively low degrees of integration into world markets. The full extent to which this is a consequence of trade policies, versus historical legacies, both in terms of prior political affiliations and technological heritage, can only partially be deduced from the transactions data. However, as the next section will indicate, there are reasons for suspecting that both policy and legacy are relevant determinants.

Table 6.4: Share of sectoral imports in total domestic demand in the EU-15 countries in the initial situation (in %)

	Germany	Italy	Austria	UK	France	Benelux	ES-PT	Rest EU-15	Poland	Hungary	Czech R.	Rest EU-10	RO-BG
Grains	14.0	32.4	21.0	24.2	11.8	86.7	47.4	22.8	7.7	4.7	4.5	28.9	1.6
Sugar cane and beet	0.3	0.4	0.6	1.0	0.4	0.6	0.4	1.3	0.0	0.1	0.2	0.2	0.0
Other crops	51.5	19.6	43.1	58.9	24.2	77.3	28.5	27.0	15.1	24.8	30.3	30.2	3.3
Plant-based fibres	99.8	99.7	100.0	98.6	97.2	94.2	65.3	30.2	73.5	72.4	96.1	92.3	14.5
Livestock	3.0	25.6	2.1	10.2	3.5	9.6	7.8	10.3	1.3	14.8	1.8	3.4	0.7
Raw milk	0.2	0.2	0.4	0.4	0.1	0.2	0.1	0.2	0.0	0.1	0.1	0.1	0.0
Other animal products	13.4	28.0	25.2	14.1	15.8	18.9	12.4	6.3	8.2	4.5	9.8	14.2	1.6
Meat	12.2	13.4	5.3	14.0	15.0	50.3	9.4	11.5	1.0	4.5	1.9	9.0	2.8
Meat products	23.0	21.6	23.3	15.8	9.9	30.5	7.1	15.9	3.5	15.7	7.0	16.3	9.1
Vegetable oils and fats	3.1	22.0	35.5	20.1	19.1	36.8	7.9	13.7	4.3	16.3	8.2	17.6	2.6
Dairy products	15.4	18.0	18.0	9.7	12.2	47.7	17.4	12.4	4.3	10.4	8.0	22.4	2.2
Sugar	7.2	8.1	22.3	29.2	10.1	10.9	35.1	10.8	0.6	4.7	4.3	3.1	7.1
Other food products	23.1	13.1	21.7	11.5	19.5	43.5	23.7	37.4	12.4	21.8	23.2	31.4	4.8
Beverages and tobacco	11.2	13.1	13.4	23.3	20.9	35.3	14.1	21.9	2.2	8.1	7.1	21.6	1.4
Manufactures	34.3	28.3	56.6	36.7	34.7	62.8	39.0	46.4	31.5	61.2	44.9	53.1	17.0
Services	5.7	4.6	12.9	4.5	3.7	10.0	4.3	10.2	3.7	9.0	8.6	7.4	3.7
Average	**19.8**	**16.9**	**38.0**	**17.0**	**17.7**	**43.8**	**21.1**	**29.7**	**18.0**	**48.1**	**37.7**	**44.3**	**11.4**

Source: GTAP data base Version 6 (Dimaranan, 2006).

Table 6.5: Share of imported intermediate inputs in total intermediates in the EU-15 countries in the initial situation (in %)

	Germany	Italy	Austria	UK	France	Benelux	ES-PT	Rest EU-15	Poland	Hungary	Czech R.	Rest EU-10	RO-BG
Grains	14.0	33.4	21.0	19.7	11.8	86.8	46.6	21.7	3.6	4.7	4.5	28.0	1.5
Sugar cane and beet	0.2	0.4	0.6	0.7	0.4	0.6	0.4	1.4	0.0	0.1	0.2	0.2	0.0
Other crops	29.8	21.0	37.8	76.4	27.2	79.8	27.2	21.5	17.9	27.0	27.9	31.0	3.1
Plant-based fibres	99.8	99.7	100.0	98.6	97.2	96.0	66.1	30.7	89.6	82.6	99.9	93.4	14.4
Livestock	2.7	26.4	2.1	8.3	3.7	9.7	7.4	10.3	2.1	13.2	1.9	3.7	0.5
Raw milk	0.0	0.2	0.1	0.3	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.0
Other animal products	13.3	36.3	16.5	14.0	11.8	17.8	9.4	19.0	8.0	4.1	10.6	14.9	1.0
Meat	14.4	24.8	17.2	10.4	13.6	72.6	10.0	11.6	1.6	1.6	2.0	7.1	2.3
Meat products	26.4	36.2	41.9	18.2	9.0	43.0	7.5	14.1	3.2	15.1	7.0	15.7	6.9
Vegetable oils and fats	3.4	28.5	34.6	27.2	17.7	45.5	4.6	19.6	3.4	17.6	8.1	16.1	2.3
Dairy products	17.8	34.4	7.2	13.3	14.9	56.7	13.1	11.7	4.9	5.4	8.2	20.2	1.9
Sugar	7.5	10.8	32.8	30.0	16.8	12.0	42.9	13.8	0.8	6.6	4.5	3.1	6.0
Other food products	24.3	13.7	18.8	10.4	20.5	43.4	17.7	36.8	13.8	28.8	23.7	31.0	3.7
Beverages and tobacco	14.8	9.0	19.8	15.0	17.7	34.9	7.1	26.9	9.9	8.5	7.1	17.3	1.0
Manufactures	33.2	29.2	55.5	33.3	34.4	61.9	40.1	47.0	33.8	63.6	45.2	54.0	15.8
Services	8.5	9.0	21.7	4.2	5.3	17.9	7.3	13.0	4.9	15.0	9.5	8.3	3.2
Average	**25.2**	**25.6**	**55.9**	**19.1**	**23.6**	**66.3**	**29.5**	**39.7**	**25.5**	**69.4**	**43.2**	**56.3**	**11.2**

Source: GTAP data base Version 6 (Dimaranan, 2006).

6.2 Trade and agricultural policies in the initial situation

A substantive determinant of the impact of EU accession and the harmonisation of agriculture policies between the EU-15 and NMS will be the required changes in the levels of relevant policy instruments, i.e. trade taxes and domestic agricultural support instruments. Consequently, it is useful to consider the levels of these instruments prior to accession, since changes in the levels of these policy measures will be among the primary determinants of changes in production and trade after policy harmonisation.

6.2.1 Trade policies in the initial situation

The discussion below concentrates on the agri-food sectors; in part this reflects the focus of the study and in part the fact that for the non agri-food sectors most tariffs are zero or close to zero, which is in line with the so-called Europe Agreements that paved the way for free trade in non agri-food products before the candidate countries became full members of the EU. With the Europe Agreements export subsidies were eliminated between the EU-15 and the NMS. Therefore, export subsidies are not applied in trade between the EU-15 and the NMS in the initial 2001 situation. The structure of import tariffs in the NMS can be characterised by relatively low import tariffs on primary agricultural products, relatively high tariffs on food imports, and, in some cases, discrimination against EU-15 imports by higher tariffs than for imports from other candidate and former Soviet Union (FSU) countries. In several cases there is clear evidence of tariff escalation, e.g. livestock - meat - meat products. The adoption of free trade policies between the EU-15 and the NMS with EU membership therefore indicates that the changes in trade taxes for food processing will be substantial.

Before EU accession several NMS established a Central European Free Trade Area (CEFTA). However, as in the case of the Europe Agreements, agri-food products were excluded from this agreement and trade barriers between NMS were kept in place until EU accession.

In the following tables the bilateral tariff on agri-food products for the countries and regions selected for this study will be presented in form of ad valorem tariff equivalents.[11]

[11] Because of the EU's common external tariff, the following tables present only figures for the whole of the EU-15.

Other trade policy measures such as specific tariffs and in some cases also non-tariff barriers are encompassed by these ad valorem tariff equivalents.

Table 6.6: Import tariffs in Poland in the initial situation (ad valorem, in %)

	EU-15	Hungary	Czech R.	Rest EU-10	RO-BG	Rest OECD	CIS	RoW
Grains	38.6	9.1	22.7	22.2	17.8	21.0	13.3	30.5
Sugar cane and beet	14.1	0.0	0.0	0.0	0.0	0.0	0.0	8.5
Other crops	15.8	21.4	7.4	0.4	74.6	38.5	7.3	13.5
Plant-based fibres	0.1	0.0	0.0	0.2	0.0	2.4	0.0	0.0
Livestock	0.5	0.0	11.2	3.6	0.3	7.0	11.1	0.0
Raw milk	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other animal products	13.4	16.3	6.1	4.8	6.8	17.5	3.9	15.2
Meat	35.4	44.5	30.5	0.8	67.4	49.6	21.4	3.6
Meat products	22.5	64.0	7.5	22.0	53.3	30.2	20.3	29.0
Vegetable oils and fats	7.6	43.7	16.8	2.8	50.6	38.8	5.3	9.4
Dairy products	88.1	33.9	24.8	62.2	55.1	89.0	24.8	0.3
Sugar	19.9	20.0	20.0	19.9	19.8	19.9	16.1	4.3
Other food products	26.3	44.3	7.9	12.5	51.8	45.4	6.2	13.5
Beverages and tobacco	55.2	45.7	11.3	23.7	52.5	108.1	97.7	111.6

Source: GTAP data base Version 6 (Dimaranan, 2006).

Polish import tariffs (Table 6.6) indicate that grains, processed meat and dairy products are relatively highly protected. In the initial 2001 situation imports from both the EU-15 and other OECD countries faced relatively high tariffs, while imports from other candidate countries faced lower import tariffs than those from the EU-15 and other regions, with the notable exception of meat and vegetable oils and fats imports. Tariffs on imports from the countries of the former Soviet Union were lower than tariffs on imports from EU countries.

Table 6.7: Import tariffs in Hungary in the initial situation (ad valorem, in %)

	EU-15	Poland	Czech R.	Rest EU-10	RO-BG	Rest OECD	CIS	RoW
Grains	3.0	8.9	7.8	3.8	3.0	2.8	7.2	1.6
Sugar cane and beet	0.0	0.0	29.8	24.9	0.0	0.0	0.0	0.0
Other crops	8.7	13.1	11.8	15.0	17.8	18.1	3.9	15.5
Plant-based fibres	0.0	0.0	0.0	0.6	0.3	0.0	0.0	0.0
Livestock	2.0	0.0	15.1	9.2	28.7	11.5	16.7	6.3
Raw milk	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other animal products	2.7	14.9	14.9	14.9	15.3	9.6	8.8	9.9
Meat	28.0	18.6	26.7	25.2	25.4	22.2	14.2	3.1
Meat products	19.6	36.6	21.3	26.3	27.5	17.9	25.0	13.8
Vegetable oils and fats	12.4	27.5	21.7	20.2	1.4	7.8	5.1	2.4
Dairy products	44.6	40.4	27.9	49.6	44.6	34.8	32.0	4.9
Sugar	61.3	62.8	63.9	48.4	50.1	65.4	35.7	19.8
Other food products	22.0	32.3	28.6	28.4	31.0	25.6	18.3	18.4
Beverages and tobacco	49.1	41.0	32.2	28.2	47.7	50.9	66.6	45.4

Source: GTAP data base Version 6 (Dimaranan, 2006).

The tariff rates on Hungarian imports of agri-food products show relatively low rates for agricultural products with appreciably higher rates for processed food products. Other than in Poland there is no clear discrimination of imports from the EU-15 or the other OECD countries. With some exceptions the levels of tariff rates on imports of different origins are more even than those in Poland. These lower rates of protection are even more pronounced for the Czech Republic (see Table 6.8) where, with the exception of sugar and to lesser extents livestock and meat products from selected sources, the rates are even lower.

Table 6.8: Import tariffs in the Czech Republic in the initial situation (ad valorem, in %)

	EU-15	Poland	Hungary	Rest EU-10	RO-BG	Rest OECD	CIS	RoW
Grains	17.7	16.2	3.4	0.0	0.0	5.9	4.1	0.1
Sugar cane and beet	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other crops	6.3	6.0	6.9	0.1	7.1	4.8	3.2	2.0
Plant-based fibres	3.3	10.0	0.0	0.0	0.0	0.0	0.0	0.0
Livestock	0.7	24.1	2.0	0.0	14.3	4.9	0.0	0.0
Raw milk	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other animal products	0.7	1.7	0.9	0.0	0.4	0.1	0.4	0.2
Meat	9.6	14.4	6.9	0.0	0.0	11.8	11.9	0.7
Meat products	23.0	6.3	18.4	0.1	16.9	8.3	12.9	11.9
Vegetable oils and fats	3.1	14.9	17.7	0.1	4.9	1.0	1.2	3.7
Dairy products	19.8	12.0	27.1	0.0	0.0	3.1	13.1	5.3
Sugar	49.2	51.1	59.5	0.1	56.4	20.7	16.2	10.4
Other food products	8.5	7.9	7.6	0.2	7.3	5.6	4.4	2.2
Beverages and tobacco	36.4	22.0	35.9	0.8	45.4	23.4	60.1	19.4

Source: GTAP data base Version 6 (Dimaranan, 2006).

Table 6.9: Import tariffs in the rest of the EU-10 in the initial situation (ad valorem, in %)

	EU-15	Poland	Hungary	Czech R.	RO-BG	Rest OECD	CIS	RoW
Grains	13.0	2.7	7.9	0.1	0.2	0.5	5.7	2.3
Sugar cane and beet	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other crops	8.2	4.6	10.2	0.1	5.6	7.7	2.1	2.7
Plant-based fibres	0.1	0.0	10.0	0.1	0.0	0.0	0.1	0.2
Livestock	5.8	8.6	9.1	1.7	8.7	23.5	6.6	8.3
Raw milk	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other animal products	1.6	3.5	7.8	0.1	3.2	1.4	0.3	6.8
Meat	35.6	24.5	13.0	6.6	59.8	36.4	58.5	9.8
Meat products	17.6	29.2	14.1	1.5	11.7	27.3	17.5	22.5
Vegetable oils and fats	3.7	14.3	8.9	0.2	2.6	3.1	2.6	2.6
Dairy products	26.6	25.2	26.9	7.8	40.7	30.0	23.4	10.2
Sugar	9.2	30.6	24.5	5.0	13.5	15.4	8.3	14.6
Other food products	12.2	10.6	10.7	1.7	11.5	11.6	10.4	10.2
Beverages and tobacco	22.0	25.9	15.2	0.5	5.3	32.2	32.4	34.2

Source: GTAP data base Version 6 (Dimaranan, 2006).

The import tariff rates in the rest of the EU-10 show low rates on agricultural imports compared with imports of food products. With the exception of unprocessed meat and dairy products the tariffs for imports from the EU-15 were lower than the tariffs on imports from other candidate countries.

Table 6.10: Import tariffs in Bulgaria and Romania in the initial situation (ad valorem, in %)

	EU-15	Poland	Hungary	Czech R.	Rest EU-10	Rest OECD	CIS	RoW
Grains	15.4	0.0	9.9	5.5	0.0	11.6	24.1	7.2
Sugar cane and beet	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other crops	18.3	6.3	7.8	1.6	1.6	19.7	10.3	15.1
Plant-based fibres	0.3	0.0	0.0	0.0	10.8	0.0	0.1	0.0
Livestock	3.1	0.0	14.7	3.4	0.0	0.0	2.0	0.0
Raw milk	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other animal products	7.3	16.2	14.2	8.0	9.0	7.6	1.3	5.4
Meat	30.0	19.9	14.5	22.7	15.6	22.2	8.6	7.2
Meat products	42.7	24.6	22.5	22.2	28.7	43.6	15.1	39.9
Vegetable oils and fats	10.2	0.0	17.5	6.3	0.0	5.2	5.1	13.5
Dairy products	26.8	35.1	33.3	31.6	32.4	42.0	37.1	16.5
Sugar	28.3	28.5	24.5	39.7	47.1	35.8	2.0	25.8
Other food products	19.9	12.3	11.5	8.6	9.0	20.9	10.3	13.9
Beverages and tobacco	75.1	82.9	23.2	38.5	28.7	77.2	53.3	44.5

Source: GTAP data base Version 6 (Dimaranan, 2006).

As can be seen from Table 6.10, the import tariffs in Bulgaria and Romania are relatively low for agricultural products compared to those on processed food. Import tariffs on imports from the EU-15 are higher that those on imports from other candidate countries and from countries of the former Soviet Union (FSU).

Table 6.11: Import tariffs in the EU-15 in the initial situation (ad valorem, in %)

	Turkey	Rest OECD	CIS	Mercosur	RoW
Grains	3.9	6.8	2.0	25.8	33.9
Sugar cane and beet	0.0	0.0	0.0	0.0	0.0
Other crops	2.2	4.8	10.3	10.8	8.0
Plant-based fibres	0.0	0.0	0.0	0.0	0.0
Livestock	0.0	0.8	1.5	4.4	0.2
Raw milk	0.0	0.0	0.0	0.0	0.0
Other animal products	0.0	0.8	1.7	2.5	1.7
Meat	39.0	36.5	37.9	86.2	73.3
Meat products	23.4	14.0	6.8	27.6	19.3
Vegetable oils and fats	59.7	5.5	1.9	0.4	10.8
Dairy products	34.1	41.1	20.6	25.8	16.2
Sugar	70.3	37.4	80.4	170.2	118.5
Other food products	2.3	14.0	14.3	10.3	10.2
Beverages and tobacco	2.7	7.8	8.6	6.6	6.0

Source: GTAP data base Version 6 (Dimaranan, 2006).

Consequently, under harmonisation towards a common EU tariff and full liberalisation of intra-EU trade, trade flows will be redirected after EU accession. The common external tariff of the EU towards third countries is presented in Table 6.11. For most primary agricultural products there are only low import tariffs. However, food imports from third countries are levied with a high tariff. After EU accession the tariff for imports from the countries of the FSU are likely to increase significantly, and consequently trade with these countries can be expected to decline. An expectation based on these levels of trade taxes is that there will be a substantial redirection of trade flows.

6.2.2 Agricultural policies in the initial situation

With harmonisation of agricultural policies and the introduction of the protection level of the common agricultural policy, not only will trade tax rates change, there will also be changes in domestic support programmes after EU accession. In the database domestic support programme payments are recorded as payments to factors, and hence they are modelled as subsidies on input use: overwhelmingly they are treated as subsidies on land use. In the initial situation of 2001 the subsidies (presented as negative taxes) on land use are those reported in Table 6.12.

Table 6.12: Taxes on land use in the initial situation (ad valorem, in %)

	EU-15	Poland	Hungary	Czech R.	Rest EU-10	RO-BG
Grains	-91.9	-2.3	-11.2	-41.7	-22.9	1.7
Sugar cane and beet	-9.4	-1.6	-13.7	-37.5	-17.5	1.7
Other crops	-34.3	-1.0	-16.4	-40.1	-19.4	1.4
Plant-based fibres	-21.8	-6.0	-75.1	-82.9	-19.3	0.5
Livestock	-7.7	1.4	0.8	-0.7	0.3	0.9
Raw milk	-12.1	1.4	0.8	-0.8	0.1	1.8
Other animal products	-11.0	1.3	0.8	-0.5	0.1	2.2

Source: GTAP data base Version 6 (Dimaranan, 2006).

Direct payments are implemented not only in the EU-15 but also in most candidate countries, although the rates differ. For instance, in the Czech Republic subsidies on land use are higher for sugar beets and other crops than in the EU-15.

The taxes on labour use which are contributions to the social security system are almost at the same level between different agricultural activities, and differences between rates applied in the EU-15 and those applied in the candidates are rather small.

Table 6.13: Taxes on labour use in the initial situation (ad valorem, in %)

	EU-15	Poland	Hungary	Czech R.	Rest EU-10	RO-BG
Grains	44.3	41.8	40.9	51.1	30.6	7.6
Sugar cane and beet	43.7	41.8	40.9	51.1	33.0	7.4
Other crops	41.5	41.8	40.9	51.1	28.7	10.1
Plant-based fibres	34.2	41.8	40.9	51.1	22.9	18.9
Livestock	40.2	41.8	40.9	51.1	29.7	14.3
Raw milk	42.1	41.8	40.9	51.1	28.2	6.6
Other animal products	27.1	41.8	40.9	51.1	28.7	3.6

Source: GTAP data base Version 6 (Dimaranan, 2006).

Like the use of land, capital use is also subsidised in all sectors of primary agriculture. With the exception of livestock the subsidy rates for capital are higher for the candidate countries than for the EU-15 (see Table 6.14).

Table 6.14: Taxes on capital use in the initial situation (ad valorem, in %)

	EU-15	Poland	Hungary	Czech R.	Rest EU-10	RO-BG
Grains	-11.2	-17.3	-40.3	-21.1	-19.0	1.7
Sugar cane and beet	-7.6	-14.5	-44.7	-18.3	-14.8	1.7
Other crops	-3.3	-6.1	-40.1	-15.5	-3.0	1.4
Plant-based fibres	-21.6	-33.8	-93.4	-73.7	-12.9	0.5
Livestock	-80.6	-22.1	-45.4	-68.4	-29.0	0.9
Raw milk	-32.4	-18.0	-67.8	-69.4	-31.8	1.8
Other animal products	-4.8	-21.2	-48.6	-17.3	-21.0	2.2

Source: GTAP data base Version 6 (Dimaranan, 2006).

The harmonisation of agricultural policies in the NMS after EU accession will lead to changes in the level of subsidisation and taxation. In general terms, the following changes will occur in the NMS:

1. An increase in the user costs of capital due to lower rates of subsidies;

2. A decline in the user costs of land due to higher rates of subsidies on land use;

3. A relatively stable user cost of labour use due to small changes in the tax on labour use.

These statements are based only on the changes in the level of the policy instruments; they do not include any allowances for endogenous changes in the factor prices which might occur after EU accession.

7 Policy simulations

Two sets of policy simulations were conducted for the study, with a perfect and an imperfect competition model. The first considers the harmonisation of trade taxes and agricultural support instruments across the EU and the accession and candidate countries, while the second assesses the impact of technical progress in the food and agriculture sectors of the accession and candidate countries that may be induced by the combination of EU membership and FDI. Details of the shocks applied to the models for each of these policy simulation exercises are provided below. Some general comments about the modelling philosophy adopted for the policy simulations are called for to assist understanding of the detailed descriptions. Where a policy shock is composed of changes in a number of different policy instruments, e.g. tax rates, separate simulations are run for each set of changes in policy instruments so as to provide an appreciation of the impact of each component of the shock; this is in addition to simulations that include all the changes in policy instruments. Furthermore, sensitivity analyses are conducted for each and every set of changes in policy instruments. These sensitivity analyses are of two types: the first are concerned with different assumptions about the market clearing mechanisms and macroeconomic closure conditions – referred to in short as "closure conditions" – while the second assess the impact of changes in the presumed elasticities of substitution/transformation. Consequently, while an assessment of a change in a range of policy instruments, e.g. EU accession and policy harmonisation, may be viewed as a single exercise, the modelling of such an event will typically involve running a number of different simulations.

7.1 EU accession and policy harmonisation

The GTAP database contains three tax instruments that are relevant to EU accession and policy harmonisation:

- import duties,
- export taxes, and
- factor use taxes (these capture the agricultural support instruments).

Conceptually, EU accession and policy harmonisation in this instance can therefore be regarded as a three-stage process:

- the establishment of a free trade agreement whereby bilateral trade taxes between the members are abolished;
- the formation of a customs union whereby a set of common external tariff rates are adopted; and
- the adoption of a common agricultural policy whereby a set of common agricultural support instruments are established.

Accordingly, the impact on the EU of expansion to 27 countries is assessed in six simulations.[12] These are summarised in Table 7.1.

Table 7.1: Policy harmonisation simulations

Simulation	Description
Removal of EU-27 export taxes	Removal only of bilateral export taxes between members of EU-27
Removal of EU-27 Import duties	Removal only of bilateral import duties between members of EU-27
Removal of EU-27 trade taxes	Removal of both bilateral import duties and export taxes between members of EU-27, i.e. an FTA
Common EU-27 tariffs	Adoption of common external tariff rates by EU-27, i.e. a CU
Common EU-27 factor use taxes	Adoption only of common factor use taxes for agriculture and food by EU-27, i.e. a CAP
Full harmonisation	All the above components

The sensitivity analyses consisted of four different sets of closure rules and three sets of elasticities. The alternative sets of closure rules are summarised in Table 7.2, where the closure conditions with respect to the various market clearing mechanisms and macroeconomic conditions by region for each of four sets of closure conditions are specified. The closure rules were chosen with a view to reflecting the economic environments within the regions and interactions with the simulations. The actual closure options chosen are a small subset of the closure options available in the model.[13]

With regard to the assumption of unemployed unskilled labour in closures 3 and 4 the set *rluen* consists of the regions rest of the EU-10, Romania and Bulgaria, Turkey, former communist bloc, Mercosur and rest of the world, while *rleun* is the complement to *rluex*.

[12] In fact a substantially larger number of simulations were carried out, but only the results from these six are used to conduct the analyses reported in this study although the other simulations provided information that guided the analyses.

[13] There is always a trade-off when making these decisions between model size (the current model is a highly disaggregated model) and the range of closure options viable; the models are set up to allow the conduct of additional experiments and additional closure options. It should also be noted that the impact of changes in closure conditions was one of the considerations integral to the accompanying training.

Table 7.2: Alternative closure conditions

Category	Condition	Regions			
		Closure 1	**Closure 2**	**Closure 3**	**Closure 4**
Foreign account	Exchange rate flexible	All	All	All	All
Investment	Investment - absorption share fixed	All			All
	Investment - volume fixed		All	All	
Government	Absorption share fixed	All	All	All	All
	Income tax rate fixed	All			
	Income tax rate flexible		All	All	All
	Government deficit	All	All	All	All
Factor accounts					
Land	Mobile & full	All	All	All	All
Capital	Mobile & full	All	All	All	All
Unskilled labour	Mobile & full	All	All	rluex	rluex
	Mobile with unemployment			rluen	rluen
Skilled labour	Mobile & full	All	All	All	All
Numéraire	Consumer Price Index	All	All	All	All

Tax replacement

Because the simulations involved changes to tax instruments, the impact of such changes on the budgets of the governments must be accommodated. The expenditure dimensions were allowed for by fixing the (value) share of absorption accounted for by the government. On the income side the borrowings/net savings of the governments were fixed and the government accounts were cleared by variable income tax rates.

Full employment

Closures 3 and 4 provide a comparison of the results when some regions are not characterised by full employment. This evaluates the impact of the assumption of full employment.

Investment

If the volumes of investment are fixed at their base levels, there are no responses to increases or decreases in real incomes. Fixing the (value) share of absorption allows for some endogenously determined response. It is important to note that in a comparative static context it is very important to avoid a “free lunch” scenario. One alternative option is to allow investment expenditures to be savings-driven, i.e. the savings rates would be fixed exogenously: this option was rejected for the current purposes because of the a priori expectation that savings behaviour might be expected to change with EU expansion. However, it would be of interest to use the model to consider the sensitivity of the results to this change in a market clearing condition.

The sensitivity analyses with regard to the elasticities evaluated the impact of 50% increases and decreases in the import substitution and export transformation elasticities.

Overall, this set of simulations results in a model that generates 6 733 356 equations and variables that are reported. To assist in the analyses of the results, the values of the variables produced by the model solutions are used to generate (results) parameters that include a large number of summary measures and percentage age changes in the values of the variables and other derived results; these processes produce some 20 million parameters that are used in the analyses.

7.2 EU accession and technical change

In a comparative static model the inclusion of foreign direct investment (FDI) raises a number of issues. One approach would be to run simulations on the basis of capital accumulation at region, specific but exogenously determined, rates and then evaluate the impacts of allocating some of the capital growth in a subset of regions to another subset of regions. The net effect of this would be a change in the relative capital stocks of the different regions and consequently a change in the relative factor intensities in the different regions. In addition, it is not unreasonable to expect that FDI also involves the transfer of technologies between the source and destination regions. Thus the analyst is required to disentangle the impacts of capital growth, the distribution of capital between regions, reallocation of capital stocks within a region, changes in factor intensities and technical change. While this is an acceptable approach it does create some potential difficulties for interpretation.

If such an approach is adopted then FDI influences the supply of capital by region. But in a comparative static context an exogenous increase in the supply of capital in a region, through FDI, raises some issues, e.g.

- Where would the capital come from – would it be a reallocation from another region or “heaven-sent”?
- How would capital be allocated within a region - would it be allocated according to the relative rates of return to capital or constrained so as to be allocated only to the food industries?

The simulations relating to the impacts of technical change in the food industries of the accession countries induced by EU membership and associated FDI were assessed as a series

of seven simulations; these are summarised in Table 7.3. For the technical change rates it was assumed that EU membership produced a "basic" 3% increase in the technical efficiency with which primary inputs – land, labour and capital – were combined[14] and a "basic" 3% improvement in the efficiency with which non food and agriculture intermediate inputs[15] were utilised. These "basic" changes in efficiency were then conditioned upon the flows of FDI so that the larger the relative flow of FDI the larger the rate of technical change in the recipient country. The final shocks were limited to the food processing activities. The calculations of the regional differences in Table 7.3 are based on the FDI database in Chapter 3. This database provides numbers on FDI inflow to all industrial sectors on an annual basis. Because of the lack of information on the sectoral distribution of FDI, it has been assumed that the distribution of FDI is similar to the sectoral shares in total industrial output. The derived number of FDI to food processing is the lowest in the Czech Republic and the highest in the rest of the NMS and the different numbers in Table 7.3 mirror this; they show the relative "distance" to the Czech Republic's FDI inflow to the food processing sector.

Under this approach an increase in factor productivity increases incomes *ceteris paribus*. If savings rates are fixed then investment funds would increase and, given an appropriate market clearing choice, so would domestic investment. In this case we capture this effect by fixing the (value) share of absorption – the comparison is the case where the investment volume is fixed – and any changes in the savings rate provide information about the potential reasonableness of the changes in investment.

[14] The shock was applied to the determinants of the variable *ADVA*; see equation P2.1 in the model documentation (McDonald *et al.*, 2006).

[15] The shock was applied to the intermediate input coefficients *ioqint*; see equations P1.3 and P2.4 in the model documentation (McDonald *et al.*, 2006).

Table 7.3: Technical change simulations

Simulation	Shock (%)
Tech change Poland	-4.73
Tech change Hungary	-3.37
Tech change Czech Republic	-3.00
Tech change Rest of the EU-10	-4.81
Tech change Romania & Bulgaria	-3.77
Tech change all the EU-10	Rates for Poland, Hungary, Czech Republic and rest of the EU-10
Tech change all NMS	All the above

Comment: The shocks are negative due to the fact that the functions are written from a unit cost perspective. Therefore if a technology parameter declines it is a reduction in the quantity of the respective input per unit of output.

The simulations for the technical change shocks were conducted both with and without the policy harmonisation scenario so as to provide a means of distinguishing between the impacts of policy harmonisation and technical change.

7.3 Foreign direct investment and comparative static

Modelling foreign direct investment (FDI) in a global comparative static computable general equilibrium (CGE) model raises a number of methodological issues. The process of designing a crude FDI-based experiment can be broken down into four steps:

1. Identify both the source, or sources, and the destination, or destinations, of the FDI.
2. Define and simulate the base case, i.e. quantify the effects of changes in capital labour ratios without FDI.
3. Define and simulate the case with FDI, i.e. specify the changes in capital labour ratios relative to the base case that would occur without FDI.
4. Compare the results from the base case with the FDI simulations.

This approach approximates the method typically used in many recursive dynamic models; step 2 generates a baseline scenario where the pre-FDI experiment case is generated and then step 3 represents an alternative future scenario – in this case one where there has been an inter-regional reallocation of capital. Such an experiment is an acceptable approach when there is an a priori reason to argue that FDI simply represents inter-regional reallocations of capital stock with the technologies within regions being unchanged by the FDI.

But this assumes that it is possible to meaningfully measure capital, since the objective is to transfer a specified quantity of capital, e.g. a factory, from one region to another. In the GTAP database there are no quantity measures of capital, rather capital is measured in terms of the transactions value associated with the return on capital. Consequently, the basis for defining the quantities of capital that are to be relocated from the source regions to the destination regions is tenuous, since the valuations of capital are region-specific not global. Some form of approximation can be achieved if capital transformation matrices, i.e. matrices that transform investment expenditures into capital stocks, exist for each region and these are used to reallocate capital out of incremental investments; this method would allow for differences in the cost of capital across regions.[16]

However, it is arguable that a fundamental component of FDI is the change in technology associated with the FDI, i.e. that technology is embodied within the capital stock, and hence FDI is assumed not only to change the capital/labour ratios but also to change the technology parameters. In such circumstances FDI involves changes in both the capital/labour ratios and in the input technology parameters. This form of complex experiment can be difficult to interpret because two forces are unleashed simultaneously: first, factor substitutions are stimulated by the changes in capital/labour ratios and, second, input savings are induced by the changes in technologies.

Finally, in the context of this study there is an additional complication – the objective would require the generation of an FDI simulation where the FDI only entered into food processing activities, which requires that constraints are placed upon not only the destination region but also the destination activities. In such circumstances the substitution possibilities would require constraining, which further complicates the processes of interpretation.

Consequently, for this study it was decided that the FDI simulation should be limited to changes in the technologies used by the food processing activities in the recipient regions, and the changes would be determined by the differences in technological characteristics of the corresponding activities in the source regions. This simplification captures the effects that are of primary interest in the study, namely the impacts of changes in the cost structures within food processing activities upon the patterns of inter-regional trade.

[16] Note that because CGE models are specified in terms of relative prices the normalisation of prices is not a problem except when considering certain types of inter-regional transfer.

In the longer term more complex layered experiments, which include other dimensions of the impacts of FDI upon both recipient and source region, could be developed so as to build upon the understandings provided by the crude FDI case, but the issue of the units in which capital is to be measured would still need to be addressed.

7.4 Modelling imperfect competition

The additional feature in the GLOBE-IC model (McDonald, 2006), in contrast with the GLOBE model (McDonald, *et al*., 2006), is the addition of terms that allow for the inclusion of imperfect competition in selected commodity markets in selected regions. The approach to imperfect competition follows Harris (1984), François and Roland-Holst (1997) and François (1997); equations are introduced that allow for a mark-up between the producers' cost prices and the producers' selling prices. A brief description is provided below, but the interested reader is referred to the technical documentation for GLOBE-IC (McDonald, 2006).

The domestic consumer prices for commodities produced and sold domestically (*PDD*) are defined as the producer prices (*PDS*) increased (multiplicatively) by some commodity specific mark-up (*MKP*). The approach adopted here follows François and Roland-Holst (1997), which itself follows from François (1998). In a standard perfect competition model firms are assumed to face competitive factor and product markets, and hence firms are price takers on both input and output markets. A firm's output price is then (largely) driven by the cost structure of the industry. The other polar extreme is monopoly. Monopolists are not price takers but are able to exploit their market power by adjusting supply, and hence market (product) prices, so as to increase profits.

Consider, however, the situation in which there are homogenous products and oligopoly. One approach to pricing in such markets is the Cournot conjectural variations model, where the firms produce homogenous products, face a downward sloping demand curve and adjust volumes to maximise profits. A common market price provides the equilibrating variable. In an industry with n equal sized firms the total output is $Q = nQ_a$, where Q_a is the output of firm a. Firm a's conjecture as to industry output when it changes its own output is

$$\Omega_a \frac{dQ}{dQ_a}$$

such that Ω is common for all firms if the industry is made up of equal sized firms. In such a simple model the oligopoly price (mark-up) is given by

$$\frac{MC - P}{P} = \frac{\Omega}{n} . \frac{1}{\varepsilon}$$

where P is the output price, MC is the marginal cost and ε is the price elasticity of demand.

In the classic Cournot case $\Omega/n = 1/n$, i.e. firms assume no response. In the cases of extreme values for Ω there is the perfect competition case, i.e. $\Omega = 0$ gives average cost pricing, or the monopoly case, i.e. $\Omega = n$ gives perfect collusion, which is the same as monopoly.

However, the simple mark-up rule from the Cournot model needs adjusting for the case of models using the Armington assumption with trade in differentiated products. This is because the price elasticity of demand is no longer a clean concept. As François and Roland-Holst (1997) demonstrate, the simple price mark-up equation needs to be rewritten as

$$\frac{MC - P}{P} = \frac{\Omega}{n} . \frac{1}{\left(\sigma + (1-\sigma)\xi\right)}$$

where the revised elasticity is $\left(\sigma + (1-\sigma)\xi\right)$, and σ is the Armington substitution elasticity and ξ represents the firm's conjecture.

In the context of this model the mark-up over marginal costs can be defined as

$$MKP_c = cournot_c * \left[\frac{1}{\left(\sigma_c + \left((1-\sigma_c) * \left(\frac{PDS_c * QD_c}{PQS_c * QQ_c} \right) \right) \right)} \right]$$

where *cournot* is defined as Ω/n and ξ as the ratio of output sold to the domestic market (*QD*) to total domestic supply (*QQ*). The *cournot* parameter allows for different degrees of imperfect competition. However, while the theory derives from the Cournot model the application may be more arbitrary.

- For the cournot model *cournot* = the inverse of the number of firms, and therefore $0 < cournot = n\text{-}1 < 1$, where n is the number of equal sized firms.

- Alternatively *cournot* is set to some arbitrarily informed value (0 < *cournot* < 1) that represents the degree of effective market power.

The mark-up rate then serves to determine the relationship between the producer's "production" price (*PDS*) and the producer's "sale" price (*PDD*), i.e.

$$PDD_c = PDS_c * \left(\frac{1}{(1 - MKP_c)} \right)$$

Note 1: the mark-up operates solely on product markets and therefore the input/factor markets are unaffected and still operate under the competitive assumption.

Note 2: sensitivity analysis with respect to the Armington configuration will impact on the mark-up rate through the inclusion of the Armington substation elasticity in the specification of the mark-up rate.

Because the GTAP database does not record the mark-up transactions, it is not possible to use transactions data to calibrate the model with mark-up margins. Thus the replication solve for the model proceeds under the assumption that the parameter *cournot* is zero for all commodities and regions, i.e. the perfect competition case. Then an "experiment" is conducted in which the *cournot* parameter values are set on the basis of exogenous information and a solution is derived. This solution includes estimates of the mark-up transactions – the mark-up rate now being different to zero, household incomes, prices, etc. At this point the user has two alternatives. Either the global SAM generated as a solution to this experiment can be recovered and then used to reinitialise the model, or the user can define the results of the "base" experiment as the base for subsequent experiments. The GLOBE code allows users to choose either alternative.

8 Scenario results

The following three sections present the results of the policy harmonisation simulation, the impact of enhanced productivity growth in food processing industries in the new Member States (NMS) and the combined scenario for the model assuming perfect competition. For this study two model versions have been applied: one model version assuming perfect competition and a second assuming imperfect competition. The presentation of the results focuses on the perfect competition version while the results of the imperfect model version will be presented for the combined scenario only and will mainly focus on the differences between the results of the two model versions.

8.1 Policy harmonisation simulations

As outlined before, the consequences of the introduction of the CAP and the harmonisation of policies are analysed in 6 scenarios. Scenario 1 replicates the initial situation, while scenarios 2-4 look into the effects of the removal of bilateral export taxes (scenario 2), bilateral import duties (scenario 3) and the combination of both (scenario 4).

The harmonisation of agricultural policies, i.e. the formation of a customs union with a common external tariff and the introduction of common domestic policy instruments, is analysed in scenarios 5 and 6 respectively. The final one, scenario 7, includes all components simultaneously.

Table 8.1: Description of policy harmonisation scenarios

No	Simulation	Description
1	BASE	Initial situation (in 2001)
2	REMEXPTAX	Removal of only bilateral export taxes between members of the EU-27
3	REMIMPTAR	Removal of only bilateral import duties between members of the EU-27
4	REMTRADBAR	Removal of both bilateral import duties and export taxes between members of the EU-27, i.e. a FTA
5	COMTRADPOL	Adoption of common external tariff rates by the EU-27, i.e. a CU
6	COMDOMPOL	Adoption of only common factor use taxes for agriculture and food by the EU-27, i.e. a CAP
7	HARM	All the above components

The presentation of the results will focus mainly on scenarios 4, 5 and 7, with some side views on scenarios 1 and 2 for the setting of the assumption on closure 1 (see Table 7.2). The results for alternative closure options 2-4 will be discussed only for selected variables.

The impacts of enlargement from EU-15 to EU-27 on GDP for all regions and countries covered in this study are reported in Table 8.2. In total the impact at global level is limited; there is only a small increase in the world's total GDP in scenario HARM. The removal of bilateral trade barriers towards the twelve NMS has a positive effect on GDP in the Member States of the EU-15.

Table 8.2: GDP from expenditures under harmonisation scenarios

	BASE	REMEXP TAX	REMIMP TAR	REMTRAD BAR	COM TRADPOL	COMDOM POL	HARM
		in billion USD			in % relative to BASE		
Germany	18 522	0.0003%	0.0047%	0.0052%	0.0041%	-0.0005%	0.0037%
Italy	10 877	0.0002%	0.0049%	0.0051%	0.0035%	-0.0006%	0.0029%
Austria	1 896	0.0016%	0.0137%	0.0164%	0.0137%	-0.0016%	0.0121%
United Kingdom	14 254	0.0001%	0.0003%	0.0004%	0.0001%	-0.0001%	0.0000%
France	13 200	0.0002%	0.0017%	0.0020%	0.0017%	-0.0003%	0.0014%
Benelux	6 280	0.0003%	0.0024%	0.0030%	0.0006%	-0.0006%	0.0002%
Spain and Portugal	6 920	0.0003%	0.0019%	0.0023%	0.0014%	-0.0001%	0.0014%
Rest of the EU-15	7 177	0.0014%	0.0008%	0.0033%	0.0028%	-0.0006%	0.0022%
Poland	1 745	-0.0046%	-0.0143%	-0.0092%	-0.0252%	-0.1106%	-0.1375%
Hungary	511	-0.0078%	0.0196%	0.0215%	0.0118%	-0.1352%	-0.1567%
Czech Republic	553	-0.0072%	0.0380%	0.0380%	0.0181%	-0.0687%	-0.0506%
Rest of the EU-10	754	-0.0080%	0.0782%	0.0769%	0.0543%	-0.0557%	-0.0053%
Romania & Bulgaria	508	-0.0059%	-0.0315%	-0.0236%	-0.1004%	-0.7404%	-0.8507%
Turkey	1 466	0.0000%	-0.0027%	-0.0027%	-0.0020%	-0.0014%	-0.0034%
Rest of the OECD	166 060	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
FSU	6 254	0.0000%	-0.0019%	-0.0018%	0.0059%	-0.0005%	0.0054%
Mercosur	11 297	0.0000%	-0.0003%	-0.0003%	-0.0004%	0.0000%	-0.0004%
Rest of the world	42 075	0.0000%	-0.0003%	-0.0003%	0.0002%	0.0000%	0.0002%
Total	**310 348**	**0.0000%**	**0.0008%**	**0.0010%**	**0.0007%**	**-0.0024%**	**-0.0018%**

Comment: under closure condition 1 (see Table 7.2).

The introduction of a common external tariff and the domestic policy instruments of the CAP in the NMS have a slightly positive effect in Spain and Portugal, Austria and the UK. In total Italy, Austria, France and the Benelux benefit in terms of positive GDP growth from EU enlargement, while Germany, the UK, Spain and Portugal and the rest of the EU-15 face a small decline in total GDP under full harmonisation.

The effect of pure introduction of CAP has a slightly negative effect on the NMS. The underlying reasons for this slightly negative development can be explained by an increase in the exogenous change in agricultural policies and the fact that support for agriculture increases and direct payments have to be partly financed from domestic resources.

Changes in the closure conditions, as described in Table 7.2, are calculated for this study for different assumptions on investments (fixed absorption share vs. fixed volumes), on taxation (fixed vs. flexible income rates) and on factor accounts. For the latter we assume under closure options 3 and 4 mobile unskilled labour with unemployment in the rest of the EU-10, Romania and Bulgaria, the countries of the FSU, Mercosur and the rest of the World. For all other countries and regions (all EU-15, Hungary, the Czech Republic and Poland), we assume full employment.

Table 8.3: Impact of different closure conditions on GDP in different regions, scenario HARM

	BASE	Closure 1	Closure 2	Closure 3	Closure 4
	in USD billion	in % relative to BASE			
Germany	18 522	0.004%	0.004%	0.003%	0.003%
Italy	10 877	0.003%	0.003%	0.001%	0.001%
Austria	1 896	0.012%	0.012%	0.009%	0.009%
United Kingdom	14 254	0.000%	0.000%	0.000%	0.000%
France	13 200	0.001%	0.001%	0.001%	0.000%
Benelux	6 280	0.000%	0.000%	0.000%	0.000%
Spain and Portugal	6 920	0.001%	0.001%	0.001%	0.001%
Rest of the EU-15	7 177	0.002%	0.002%	0.001%	0.000%
Poland	1 745	-0.138%	-0.138%	-0.138%	-0.032%
Hungary	511	-0.157%	-0.157%	-0.165%	0.024%
Czech Republic	553	-0.051%	-0.051%	-0.052%	0.009%
Rest of the EU-10	754	-0.005%	-0.005%	-1.771%	-1.532%
Romania and Bulgaria	508	-0.851%	-0.851%	-10.876%	-9.096%
Turkey	1 466	-0.003%	-0.003%	0.010%	0.006%
Rest of the OECD	166 060	0.000%	0.000%	0.000%	0.000%
FSU	6 254	0.005%	0.005%	0.038%	0.044%
Mercosur	11 297	0.000%	0.000%	-0.003%	0.000%
Rest of the world	42 075	0.000%	0.000%	0.003%	0.004%
Total	**310 348**	**-0.002%**	**-0.002%**	**-0.022%**	**-0.017%**

Table 8.3 presents the results for total GDP from the HARM simulation under different closure assumptions. Different assumptions on investments and taxation are mirrored by differences in total GDP: see closure 2 vs. closure 1. However, different assumptions on factor markets will have an impact on total income. Bulgaria and Romania and the group of the rest of the EU-10 face a decline in GDP (closures 3 and 4) under EU conditions if labour markets are assumed to be inflexible.

Import demand in the EU-15 is positively affected by EU enlargement. Import demand will increase when bilateral tariffs are removed (scenario REMTRADBAR). However, under the scenario COMDOMPOL import demand declines slightly in the EU-15 countries, which is mainly due to the increased production in the EU-10 countries as a consequence of the

introduction of the common external tariff and the introduction of other CAP instruments in the NMS (see Figure 8.1).

Figure 8.1: Changes in total import demand in the EU-15 under harmonisation scenarios, relative to BASE, in %

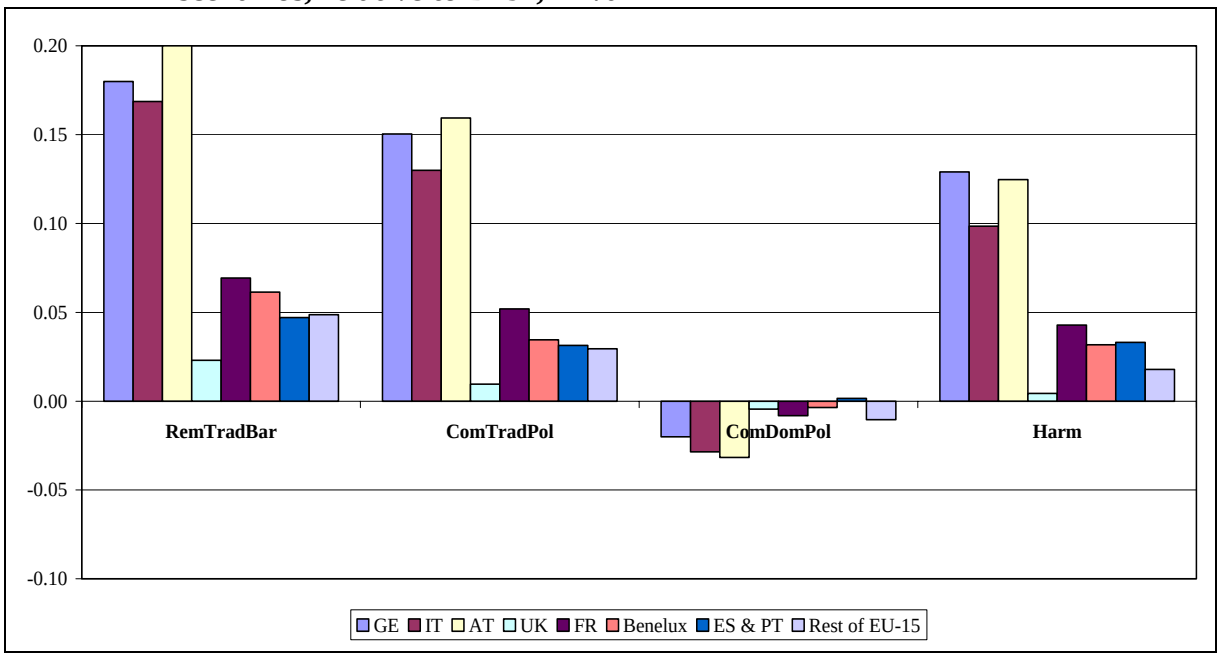
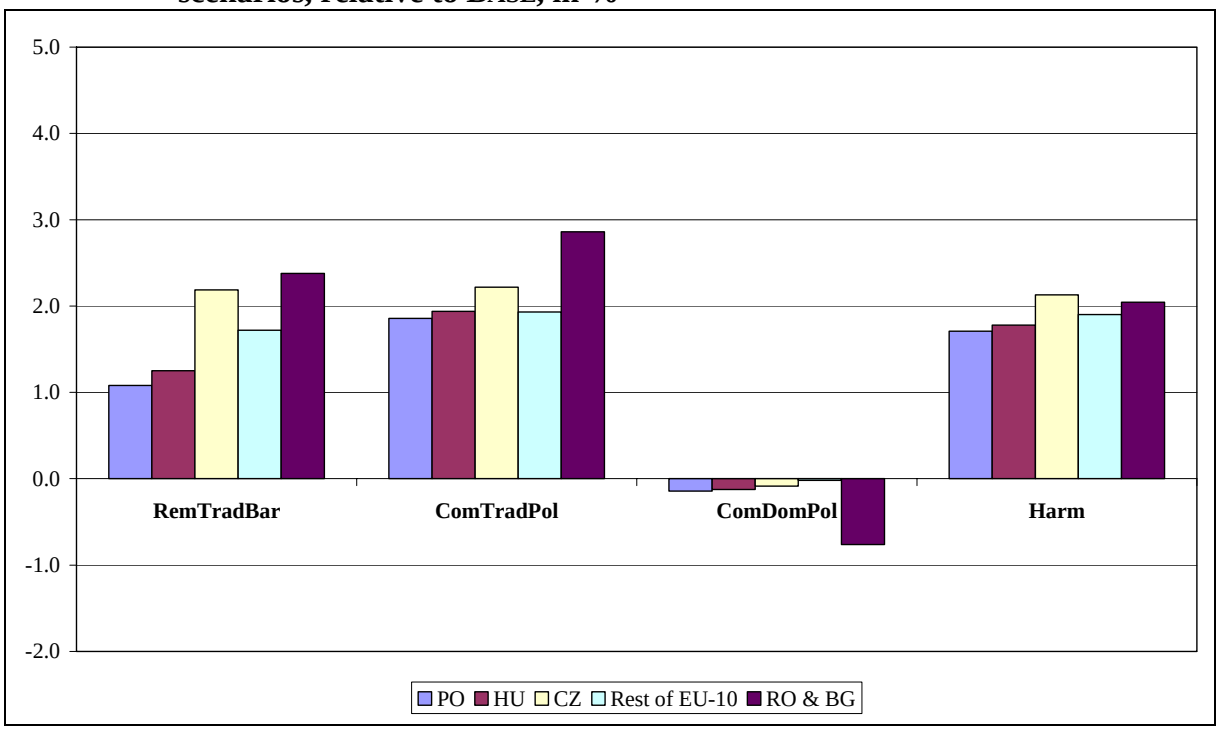


Figure 8.2: Changes in total import demand in the NMS under harmonisation scenarios, relative to BASE, in %



Comment: under closure condition 1 (see Table 7.2).

Total import demand will increase if bilateral trade barriers are abandoned and the single European market is extended to the NMS. Here, import demand expands in all NMS countries and after full harmonisation import demand increases by between 1.6% in Poland and 2.1% in the Czech Republic (see Figure 8.2).

At global level the modelling results illustrate the standard results of creating a customs union: members gain – while non-members loose. Total world trade is positively affected by the removal of the internal tariffs and total trade expands by around 0.1%. However, the creation of a customs union and the introduction of the other CAP instruments in the NMS have a negative effect on total world trade, with a decline of 0.34% in the HARM scenario relative to the base situation.

Export supply is also affected after EU enlargement. Figure 8.3 presents the results for the aggregated export supply under the harmonisation scenarios. Here, export supply expands in all NMS, while in most EU-15 countries total export supply remains relatively stable. Again, the creation of a customs union has a positive effect on all EU-27 countries: see scenario REMTRADBAR in Figure 8.3. However, the introduction of the common external tariff (COMDOMPOL) has a small negative impact on EU-15 exports due to trade redirection in favour of the NMS.

Figure 8.3: Changes in total export supply in the EU-15 under harmonisation scenarios, relative to BASE, in %

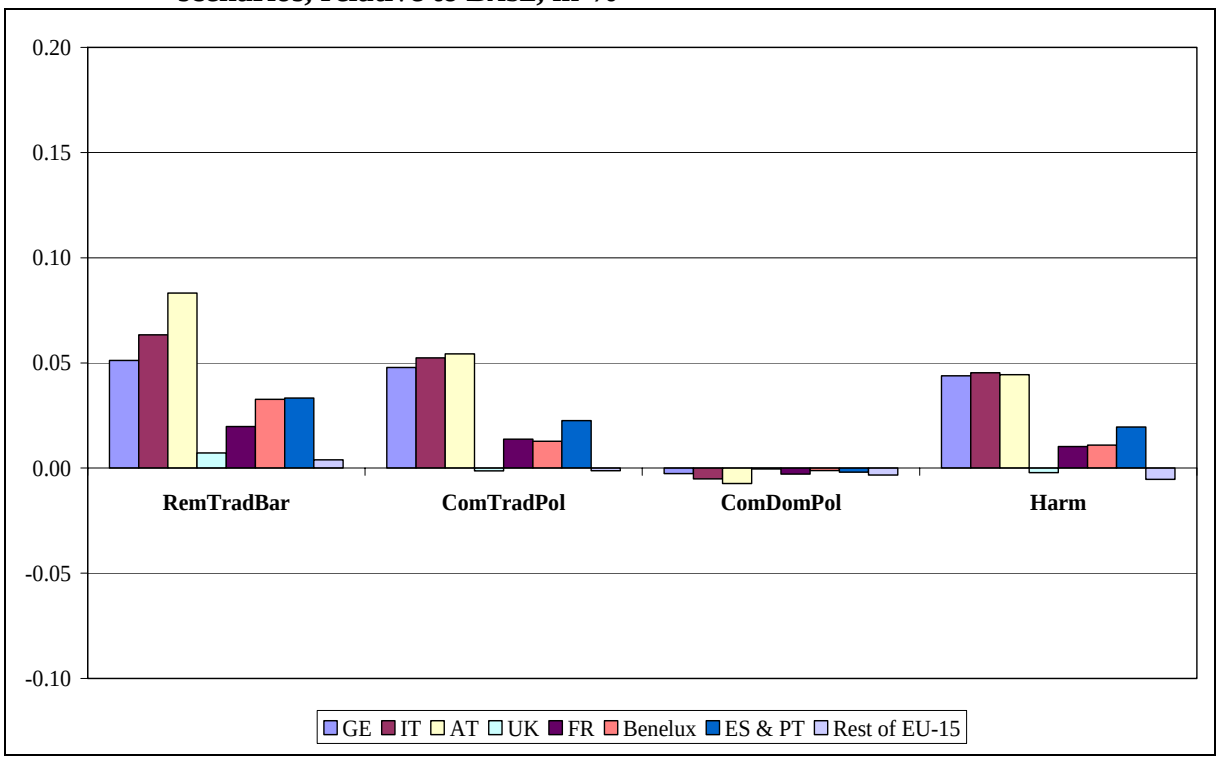
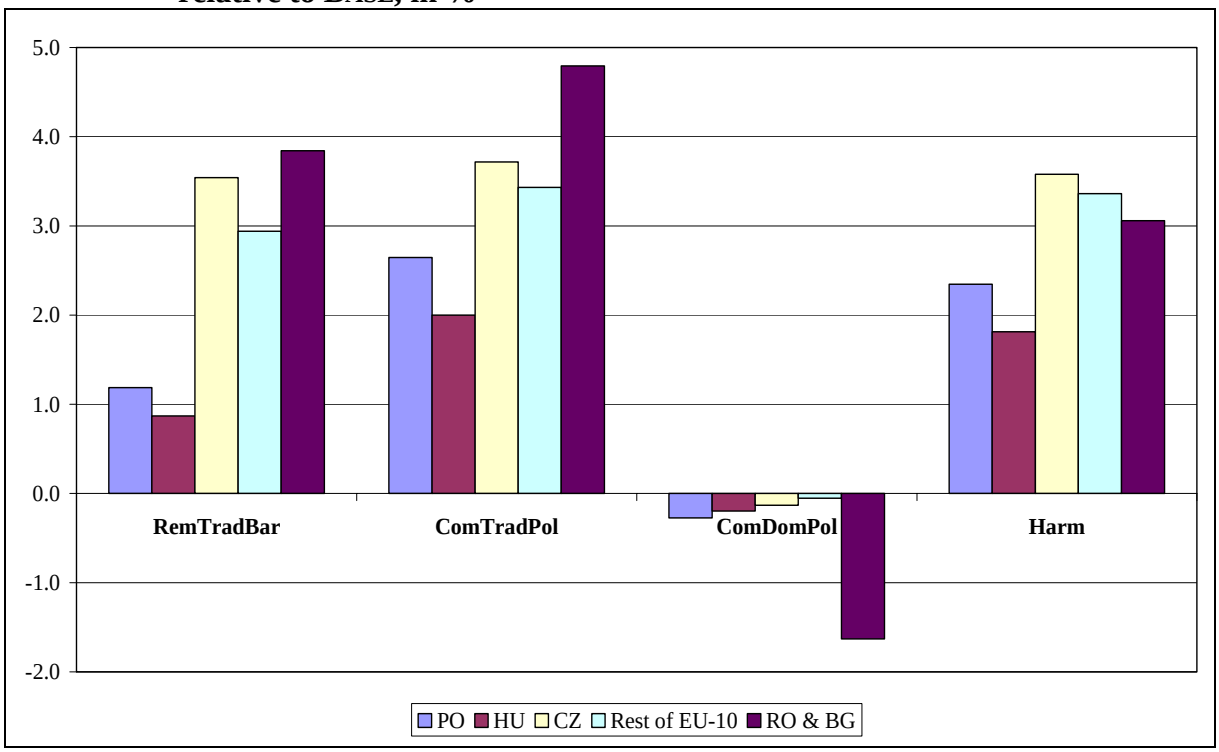


Figure 8.4: Changes in total export supply in the NMS under harmonisation scenarios, relative to BASE, in %



Comment: under closure condition 1 (see Table 7.2).

Exchange rates are assumed to be flexible under all closure options (see Table 7.2). The development of the exchange rates in different regions under the harmonisation scenarios are reported in Table 8.4. A negative change indicates an appreciation and a positive change, depreciation. Apart from Hungary all NMS face a small depreciation in the national currencies relative to the base situation. Apart from the UK and the rest of the EU-15 countries, all EU-15 Member States show a small appreciation under the HARM scenario; this is consistent with the small deterioration in the terms of trade mirrored by the decline in total exports for the UK and the rest of the EU-15.

Table 8.4: Changes in exchange rates under harmonisation scenarios, relative to BASE, in%

	RemTradBar	ComTradPol	ComDomPol	HARM
Germany	-0.06	-0.01	0.00	-0.01
Italy	-0.08	-0.04	0.00	-0.04
Austria	-0.10	-0.05	0.00	-0.05
United Kingdom	0.00	0.00	0.01	0.01
France	-0.05	-0.03	0.01	-0.02
Benelux	-0.02	0.00	0.00	0.00
Spain and Portugal	-0.04	-0.02	0.00	-0.02
Rest of the EU-15	0.01	0.02	0.00	0.03
Poland	0.38	1.26	-0.06	1.21
Hungary	-0.20	-0.03	-0.19	-0.21
Czech Republic	1.56	1.67	-0.11	1.56
Rest of the EU-10	1.28	1.62	-0.34	1.25
Romania and Bulgaria	2.10	2.52	-0.87	1.60
Turkey	0.08	-0.20	0.00	-0.21
Rest of the OECD	0.01	-0.03	0.00	-0.02
FSU	0.04	-0.15	0.02	-0.12
Mercosur	0.02	0.00	0.00	0.00
Rest of the world	0.02	-0.04	0.00	-0.04
World	0.00	0.00	0.00	0.00

Comment: under closure condition 1 (see Table 7.2).

The following figures and tables present the results for prices, production, consumption and trade at sectoral level. This study mainly focuses on the impact of EU accession and the impact in the NMS. Therefore, owing to the amount of output data, the results will be presented only for the NMS in the scenario HARM.

Figure 8.5 and Figure 8.6 present the impact of full harmonisation on output prices in the NMS. While for most agri-food products the output prices change significantly, there is only a limited change in the prices of non-food products (see Annex). Among agri-food products the price changes for primary agricultural products are much greater than for processed food products. In all acceding countries, grain output prices decline by between 8% in the rest of the EU-10 and almost 17% in Poland. The strongest increase for arable crops is for sugar beet in most NMS, while milk prices increase by between 9% in Poland and the rest of the EU-10 and more than 12% in Hungary. Owing to the increase in the price for refined sugar, beet prices also increase significantly after enlargement. Processed meat prices increase by more than 10% in Hungary. In Romania and Bulgaria, food prices remain almost unchanged after introduction of the CAP, which is due to the fact that both countries had only limited trade before accession. For most non agri-food products the price changes are less than 1%, between -0.8% for machinery in Hungary and +1.1% for trade and communication in the rest of the EU-10.

Figure 8.5: Changes in output prices for primary agriculture under scenario HARM in NMS, relative to BASE, in %

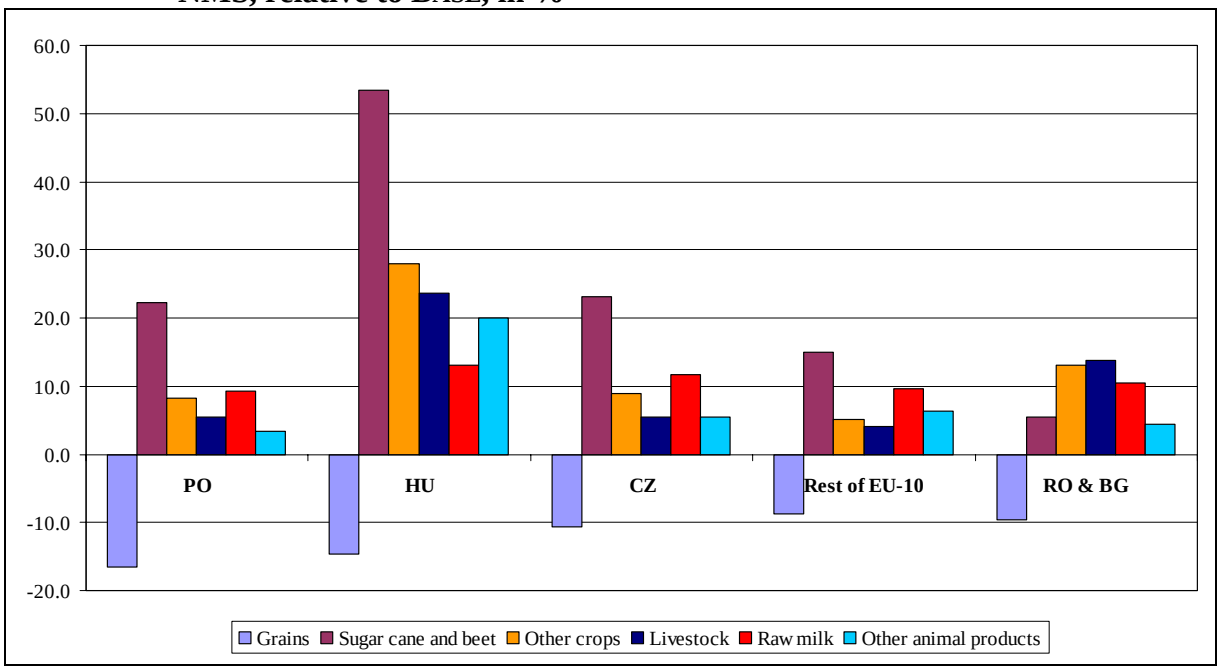
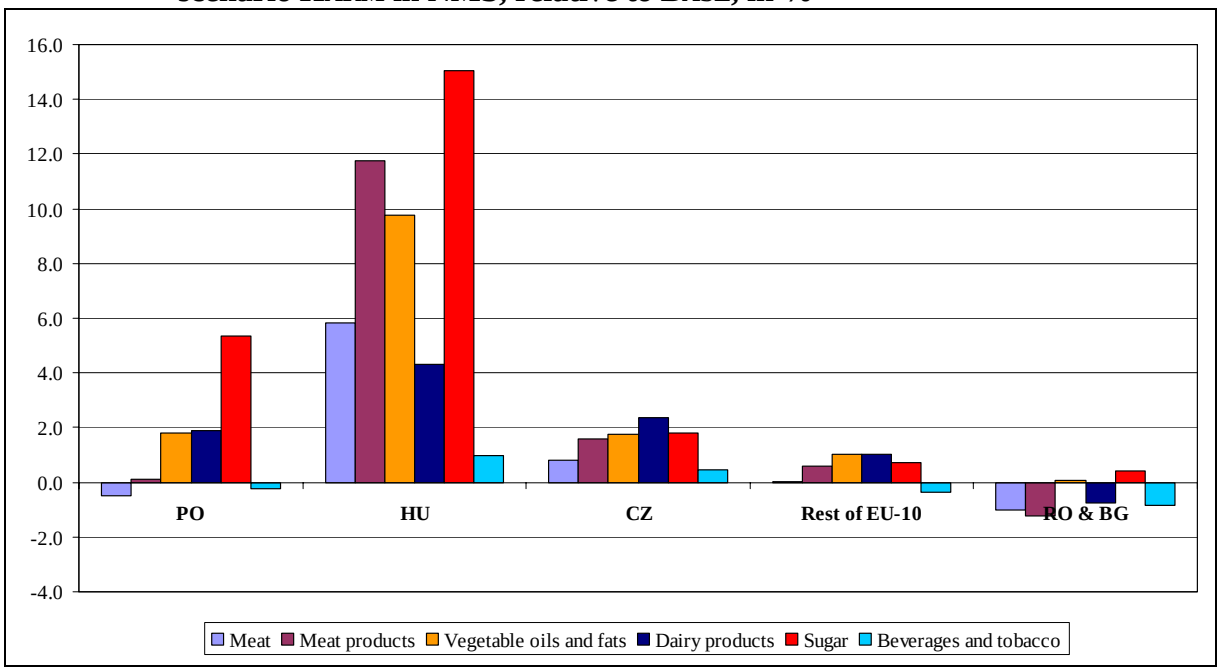


Figure 8.6: Changes in output prices for processed food primary agriculture under scenario HARM in NMS, relative to BASE, in %

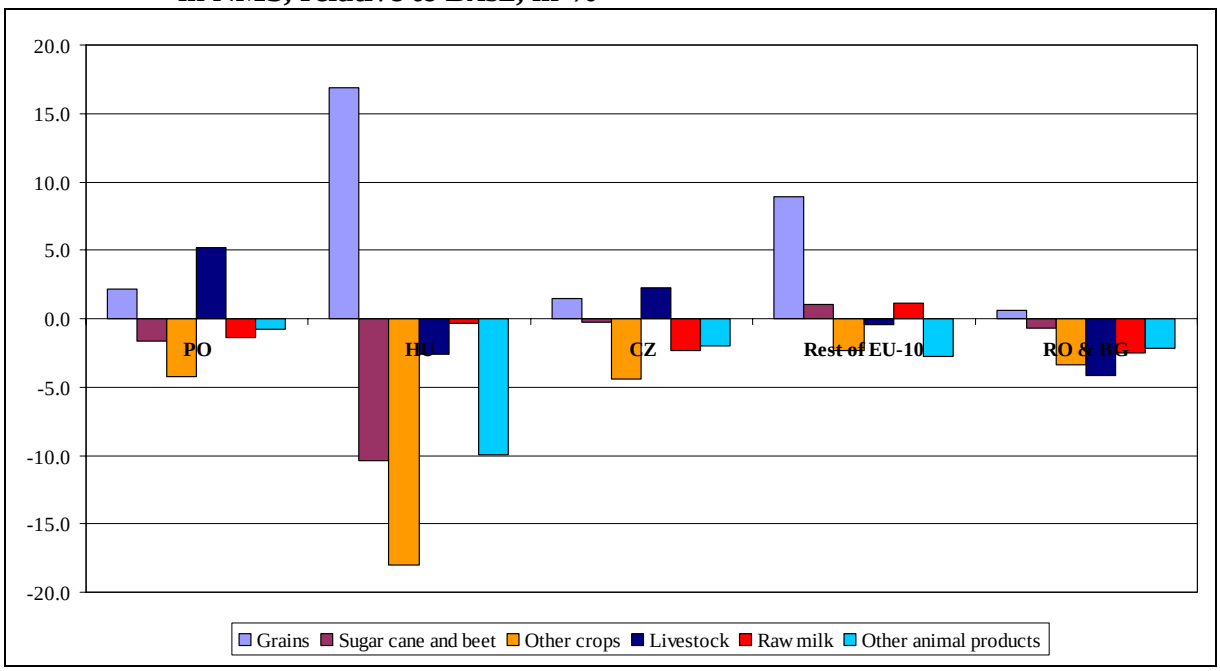


Comment: under closure condition 1 (see Table 7.2).

The changes in the output quantities for primary agriculture and processed food under the HARM scenario for the NMS are reported in Figure 8.7 and Figure 8.8. In general, grain production increases in all NMS while production of other crops declines in most of the NMS after introduction of the CAP; these changes are broadly consistent with the price changes. In Hungary, apart from grains, the supplies of all primary agricultural products decline. In

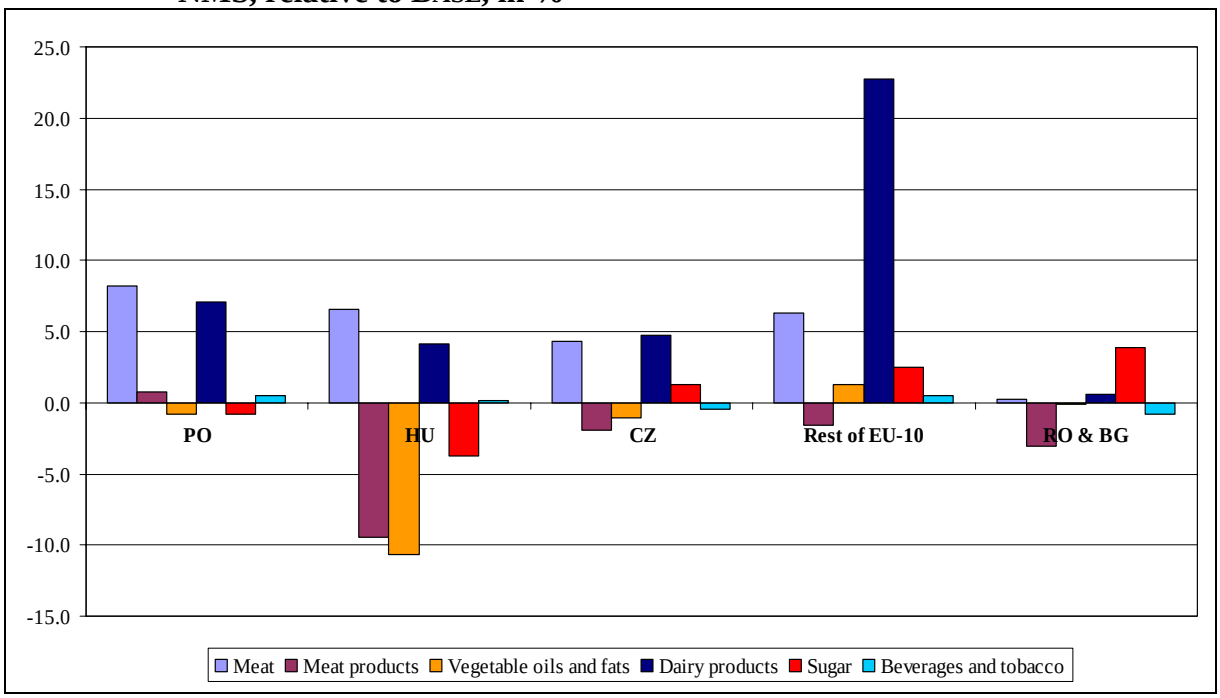
Poland, livestock supply increases by more than 5% in the HARM scenario. For livestock production the increase in prices also follows an increase in output in Poland and the Czech Republic. In the rest of the EU-10 an increase in raw milk and sugar beet prices has a positive impact on output level. The decline in other animal products (mainly pork and poultry meat) is caused by an increase in feed costs. The impact of enlargement for primary agricultural production in the EU-15 is rather limited. The largest impact is for grain production, which declines in most of the EU-15 Member States. The results indicate a shift of cereal production from the EU-15 Member States to the NMS of Central and Eastern Europe.

Figure 8.7: Changes in output quantities for primary agriculture under scenario HARM in NMS, relative to BASE, in %



For processed food, the production of meat and dairy products increases after EU accession, which can be explained by an increase in the prices of these products (see Figure 8.8). In Hungary production of vegetable oils and fats as well as processed meat and sugar production decrease under EU conditions. This decline is due to an increase in production costs triggered by higher input costs for raw products (sugar beet and livestock).

Figure 8.8: Changes in output quantities for processed food under scenario HARM in NMS, relative to BASE, in %



Comment: under closure condition 1 (see Table 7.2).

Foreign trade

The changes in import demand in the NMS are caused by the impact of the single European market with free trade amongst all Member States (see Table 8.5). In general, the strong increases in imports of processed food are triggered by lower import prices. Here, the initial trade shares in bilateral trade with the countries of the EU-15 determine the effects of trade liberalisation in the enlarged Union. For Poland, Hungary and the Czech Republic the single market leads to a strong increase in imports (with the exception of grains) while import growth in the rest of the EU-10 and in Bulgaria and Romania is rather small. Grain and meat imports decline for Hungary owing to higher import prices (+10% grain; +15% meat). In most NMS sugar imports decline significantly owing to an increase in import prices of between 16% in Poland and 67% in Bulgaria and Romania. In Hungary sugar imports increase under EU conditions owing to a decline in import prices of almost 13%.

Table 8.5: Changes in import demand under scenario HARM in new Member States, relative to BASE, in %

	Poland	Hungary	Czech R.	Rest EU-10	BG & RO
Grains	-5.30	-28.30	-17.09	-5.18	-7.51
Sugar cane and beet	19.79	29.68	10.74	5.01	-3.41
Other crops	13.45	17.54	3.81	2.73	17.92
Plant-based fibres	0.57	2.00	0.44	1.54	0.20
Livestock	-0.72	24.37	1.44	-0.51	2.08
Raw milk	7.99	15.12	9.80	10.00	7.94
Other animal prod.	5.54	4.89	0.07	0.68	-0.23
Minerals	0.39	0.43	1.21	1.40	-1.94
Meat	-7.13	-21.32	-34.20	-1.42	-26.44
Meat products	22.74	27.48	16.03	11.83	35.35
Vegetable oils	15.77	16.60	0.47	1.75	3.89
Dairy products	38.43	24.99	-6.13	-1.23	7.67
Sugar	-13.96	30.75	-0.35	-14.43	-48.09
Other food products	12.21	11.22	0.47	3.22	6.40
Beverages and tobacco	18.80	15.64	8.97	6.15	20.32
Basic industries	1.30	1.00	2.04	2.17	1.86
Manufactures	1.71	1.74	3.19	2.81	4.51
Machinery	0.41	1.76	2.83	1.78	1.38
Utilities	8.16	-0.08	-0.57	0.10	-1.32
Construction	-0.58	0.48	-0.38	-0.29	-1.73
Trade and comm.	-0.68	0.03	-0.78	-0.34	-1.94
Transport	-0.62	0.01	-0.22	0.54	-1.79
Services	-0.71	0.03	-0.90	-0.62	-1.85

Comment: under closure condition 1 (see Table 7.2).

Under the HARM scenario export supply in primary agricultural products shows a mixed picture. Cereal exports increase significantly in all NMS. However, exports of other crops show a general tendency to decline. Livestock and meat exports grow strongly in most NMS. Here, the NMS can deliver to the EU-15 after adoption of the single market regime. Also exports of dairy products and sugar increase in all NMS, triggered by lower import prices in other EU Member States. However, even the doubling of Polish meat exports is not reflected in large numbers: Polish meat exports increase in value terms from USD 78.2 million in the initial base situation to USD 168.2 million under scenario HARM. The increase in output in food processing industries in the NMS – presented in Figure 8.8 – is induced by an increase in foreign demand due to trade liberalisation within the enlarged EU.

Table 8.6: Changes in export supply under scenario HARM in new Member States, relative to BASE, in %

	Poland	Hungary	Czech R.	Rest EU-10	BG & RO
Grains	30.36	39.07	14.67	32.34	27.04
Sugar cane and beet	-7.81	-36.87	-14.18	29.26	-2.99
Other crops	-5.83	-24.22	-6.96	-3.06	-6.60
Plant-based fibres	-3.83	-15.00	-17.18	-1.01	-0.70
Livestock	17.45	-4.27	20.67	5.50	1.00
Raw milk	-9.47	-17.38	-12.07	-8.19	-10.89
Other animal products	-0.65	-12.53	-1.67	-3.64	-1.62
Minerals	0.52	3.99	1.63	3.51	2.62
Meat	115.06	72.28	87.91	84.28	33.07
Meat products	21.50	-6.64	8.95	7.12	26.18
Vegetable oils and fats	0.53	-12.28	2.17	3.03	18.00
Dairy products	42.72	32.60	23.40	56.34	46.86
Sugar	15.58	26.17	64.16	24.59	54.08
Other food products	6.65	7.80	1.94	5.56	7.28
Beverages and tobacco	3.60	2.74	1.07	0.97	5.19
Basic industries	2.18	1.80	3.27	3.94	3.11
Manufactures	1.53	0.26	1.60	2.65	3.67
Machinery	1.69	2.62	5.54	4.98	2.76
Utilities	1.10	0.82	1.47	0.58	0.78
Construction	0.24	0.13	0.70	0.49	0.83
Trade and comm.	0.60	-0.10	0.50	-0.46	1.32
Transport	0.93	0.25	1.37	0.61	0.76
Services	0.69	0.01	0.38	0.04	1.08

Comment: under closure condition 1 (see Table 7.2).

Factor markets

As already outlined, EU enlargement has only limited impacts on EU-15 agriculture. This is also mirrored by small changes in land prices in the EU-15. The removal of bilateral tariffs and the introduction of a joint common tariff cause almost no changes in land prices in the EU-15. The introduction of direct payments (ComDomPol) leads to an increase in grain production in the EU-10 – see above – and to an increase in cereal exports to the EU-15. This has a negative impact on EU-15 crop production and consequently a negative impact on land prices in most EU-15 Member States.

The introduction of direct payments in the EU-10 leads to a strong increase in land prices in the NMS. Land prices increase by between 240% in Hungary and 61% in the Czech Republic. The introduction of direct payments is modelled as subsidies on the use of factors, which drive a wedge between the user prices and the market prices. Lower user prices reduce the costs of land use while the prices in Table 8.7 represent the market prices of land.

Table 8.7: Changes in land prices under harmonisation scenarios, relative to BASE, in %

	RemTradBar	ComTradPol	ComDomPol	HARM
Germany	0.58	0.52	-0.36	0.09
Italy	0.19	0.21	-0.09	0.11
Austria	-0.99	-0.95	-1.96	-3.10
United Kingdom	-0.01	-0.02	-0.19	-0.23
France	-0.23	-0.23	-0.62	-0.92
Benelux	0.65	0.44	0.35	0.89
Spain and Portugal	-0.12	-0.11	-0.34	-0.59
Rest of the EU-15	0.57	0.37	-0.62	-0.36
Poland	1.64	3.27	97.78	103.70
Hungary	19.84	28.27	159.14	238.66
Czech Republic	2.66	4.75	53.64	60.81
Rest of the EU-10	5.12	11.60	82.18	105.90
Romania and Bulgaria	3.51	4.67	208.12	222.34
Turkey	-0.06	0.76	0.19	1.00
Rest of the OECD	-0.01	-0.04	0.01	-0.04
FSU	-0.08	0.07	-0.01	0.02
Mercosur	-0.05	-0.14	0.05	-0.08
Rest of the world	-0.02	-0.03	0.02	-0.01

Comment: under closure condition 1 (see Table 7.2).

Lower land prices for cropping affect those sectors where the cost shares of land use are highest. In all NMS the marginal product in land use is the highest for grains. Therefore, costs due to lower land user prices and the relatively high marginal product of land leads to a strong increase in land demand in all NMS. The pattern of land use shifts towards grains and cereals while production of other crops and also sugar beet declines.

Introduction of domestic instruments of the CAP (scenario ComDomPol) with introduction of direct payments has a small negative impact on land use (pasture and other grass land) for livestock, which is due to the fact that direct payments are linked to land use.

Table 8.8: Changes in land demand under different harmonisation scenarios, relative to BASE, in %

	Poland	Hungary	Czech R.	Rest EU-10	BG & RO
Scenario ComTradPol					
Grains	-0.04	2.86	0.45	3.17	0.21
Sugar cane and beet	1.13	1.77	0.95	0.48	0.41
Other crops	-0.98	-5.59	-0.51	-1.45	-0.15
Plant-based fibres	0.90	-3.53	-0.03	1.56	0.89
Livestock	8.49	6.03	3.85	-0.71	0.28
Raw milk	2.86	-0.17	1.42	2.76	-0.01
Other animal prod.	0.50	2.66	-0.82	-2.08	-0.35
Scenario ComDomPol					
Grains	46.74	42.39	37.66	46.38	31.87
Sugar cane and beet	-11.39	-24.15	-13.32	-12.28	-18.19
Other crops	-7.85	-23.42	-12.68	-9.63	-14.75
Plant-based fibres	-13.54	-34.89	-38.06	-13.88	-17.80
Livestock	-14.06	-22.11	-8.62	-11.98	-21.56
Raw milk	-13.13	-15.63	-7.46	-10.83	-18.72
Other animal prod.	-11.60	-24.15	-7.53	-10.97	-18.91
Scenario HARM					
Grains	46.68	48.13	38.09	50.71	32.05
Sugar cane and beet	-10.37	-24.73	-12.44	-11.93	-17.81
Other crops	-8.71	-29.34	-13.16	-11.31	-14.89
Plant-based fibres	-12.76	-38.15	-38.20	-13.02	-17.05
Livestock	-6.78	-19.46	-5.16	-12.96	-21.36
Raw milk	-10.66	-16.40	-6.15	-8.68	-18.69
Other animal prod.	-11.09	-24.75	-8.28	-13.13	-19.17

Comment: under closure condition 1 (see Table 7.2).

As already mentioned above, harmonisation has little impact in most countries with the exception of exemption, e.g. in Austria, where land demand for grain declines and for livestock uses expands.

Table 8.9: Changes in unskilled labour demand in agri-food industries under scenario HARM, relative to BASE, in %

	Poland	Hungary	Czech R.	Rest EU-10	BG & RO
Grains	-5.18	10.66	-4.72	2.89	-5.16
Sugar cane and beet	3.12	0.93	5.90	5.90	5.14
Other crops	-2.73	-11.69	-1.76	-1.87	1.70
Plant-based fibres	-0.46	9.56	-0.08	1.23	7.01
Livestock	7.57	5.11	3.76	0.30	3.36
Raw milk	1.57	7.51	1.17	3.44	3.32
Other animal prod.	3.85	-0.77	1.71	0.99	4.85
Meat	8.36	10.56	5.12	7.19	5.61
Meat products	2.40	-2.08	0.68	0.02	1.31
Vegetable oils	-2.64	-9.64	-4.53	-2.25	-2.91
Dairy products	8.02	6.46	5.53	20.42	1.12
Sugar	3.27	5.40	3.39	6.85	3.13
Other food prod.	0.72	0.27	-0.11	0.17	3.26
Bever. & tobacco	-0.41	-0.15	-1.44	1.05	2.11

The introduction of the CAP has some effect on agri-food production and consequently also on demand for labour. However, the changes in labour demand are relatively small compared to land demand. These different effects are due to the fact that land is a sector-specific factor in agriculture. On the other hand labour is assumed to be flexible and to be able to move into and away from agriculture. Production technology allows substitution between different production factors. Lower land user prices leads to an increase in land use and a decline in labour use in some cropping sectors, e.g. grains. Here, changes in relative factor prices lead to increases in labour intensity in grain production in Poland, the Czech Republic and Bulgaria and Romania. In the food processing industries, growing output in dairy and meat processing leads also to an increase in employment. New jobs are created in the meat and dairy industries, with an increase of between 5.1% in Czech and 20.4% in the rest of the EU-10 dairy industry.

In general, the introduction of the customs union has some positive impact on employment in the agri-food sector in the EU-15. However, the harmonisation of domestic policies towards a common policy has a small negative impact on employment in the agri-food sectors in the EU-15 Member States.

8.2 Technical change simulations

The presentation of the results of the "pure" technical change simulation is focused on production, trade and income effects in agri-food sectors in the NMS only. Chapter 8.3 below discusses the results of the combined harmonisation scenario and the technical change scenarios in more detail.

As outlined in Chapter 7.2, the impact of technical change in the food industries of the accession countries induced by EU membership and associated FDI is modelled via increased factor productivity. To identify the impact of this effect, the shocks in these scenarios were limited to food processing activities. For these scenarios the increases in productivity in food processing are analysed in separate simulations for each acceding country. In the last scenario (TECHCHG), the factor productivities in all EU-12 countries are changed simultaneously.

Table 8.10: Changes in production in meat and milk processing industries under different technological change scenarios, relative to BASE, in %

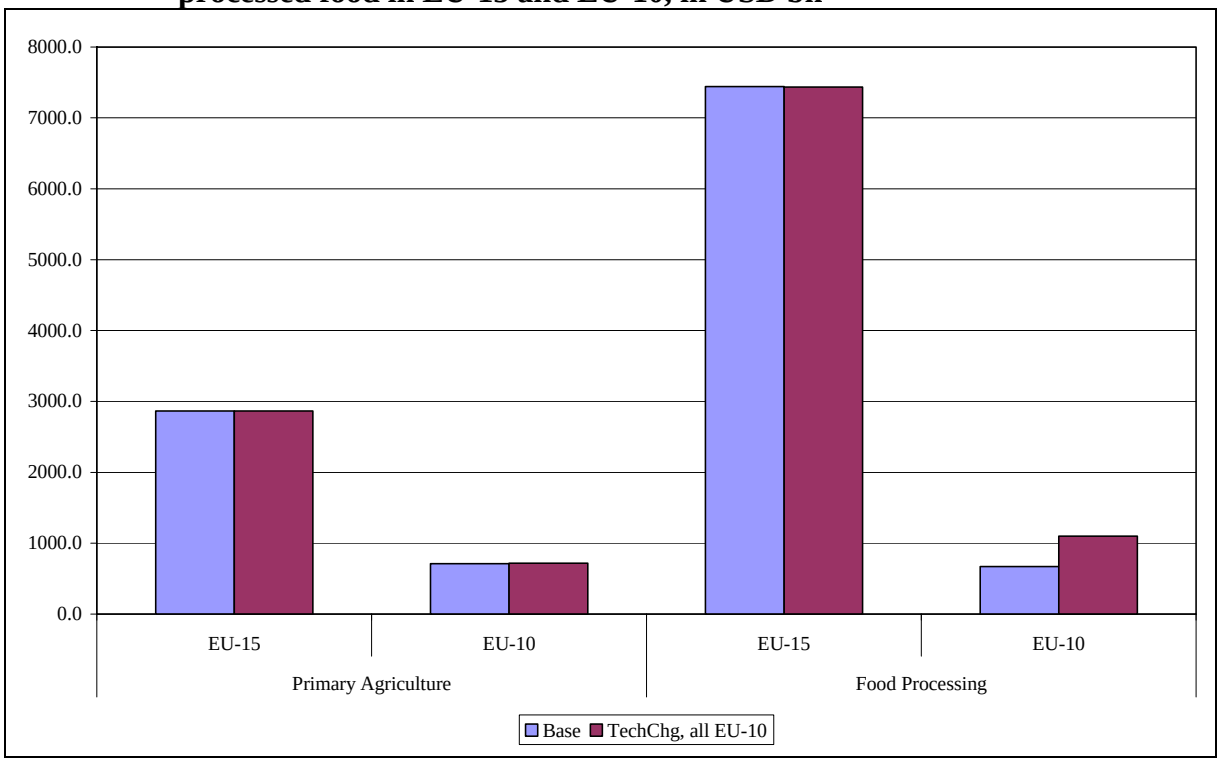
	Change in productivity in food processing in:					
	Poland	Hungary	Czech Rep.	Rest of the EU-10	RO & BG	All NMS
Meat production in:						
Poland	3.59	-0.01	0.00	-0.01	-0.01	3.56
Hungary	-0.08	2.65	-0.03	-0.17	-0.18	2.18
Czech Republic	-0.02	-0.02	1.95	-0.11	-0.02	1.76
Rest of the EU-10	-0.04	-0.04	-0.05	5.04	-0.02	4.88
Romania and Bulgaria	-0.02	-0.02	-0.01	-0.01	4.76	4.70
Dairy production in:						
Poland	4.50	-0.01	-0.03	-0.06	-0.01	4.38
Hungary	-0.06	2.91	-0.02	-0.13	-0.07	2.62
Czech Republic	-0.13	-0.01	2.56	-0.23	-0.02	2.16
Rest of the EU-10	-0.12	-0.03	-0.12	6.95	-0.01	6.65
Romania and Bulgaria	-0.01	-0.01	-0.01	-0.01	2.37	2.33

Comment: under closure condition 1 (see Table 7.2).

Table 8.10 shows results only for meat and milk processing. The increases in factor productivity in each country have strong impacts on production in that particular country, but the impact on other countries is limited. In most cases there is a small negative effect on the neighbouring countries, which can be explained by a crowding-out effect on the other countries through higher exports and/or smaller imports in the country with higher productivity in food processing due to increased competitiveness. The production effects on the non agri-food sectors in the NMS as well as in the EU-15 are almost zero. In most cases the impact on the non agri-food sectors are positive due to higher demand for intermediate products in the NMS. This is also the case for primary agriculture, which is the dominant source of intermediate inputs in food processing, e.g. in Poland grain and livestock production increase by more than 2%.

The limited impact of enhanced technological change in the food processing industries in the EU-10 on the aggregated agri-food industries in the EU-15 is illustrated in Figure 8.9. Among the sectors of the food processing industries there are some sectors in the EU-15 which are negatively affected by growth in factor productivity in the food processing industries in the NMS: the meat processing, vegetable oils and dairy industries are most affected. The strongest decline is in the Benelux countries and in Austria, where meat processing declines by around -0.2%, while vegetable oil production declines by -0.7% in Austria. Primary agriculture in the EU-15 is virtually unaffected by an increase in factor productivity in the NMS.

Figure 8.9: Impact of scenario TECHCHG on output in primary agriculture and processed food in EU-15 and EU-10, in USD bn



Comment: under closure condition 1 (see Table 7.2).

There is only a small impact on land allocation in the NMS under enhanced technological change in the EU-10 food processing industries. Changes in land demand in primary agriculture in the NMS are due to changes in the demand for raw material in the food processing industries. In some EU-10 countries there is a shift towards higher land use for cereals instead of other crops. In Poland, Hungary and the Czech Republic, more land is allocated to milk production owing to increased output by dairy industries. In Bulgaria and Romania the relative changes in land demand are smaller than in the other NMS; these relatively small changes are due to the lower degree of market integration of the Bulgarian and Romanian food processing industries.

Employment declines in almost all food processing sectors due to input-saving productivity gains after installation of FDI. The strongest decline in employment can be observed in sugar processing, followed by vegetable oil and meat processing, in all NMS. It should be mentioned that the changes in land and labour demand are all factor reallocation effects associated with the improved productivity in NMS, which causes increases in the price of value added in some sectors that subsequently result in changes in the marginal factor productivity. However, total changes in demand are zero.

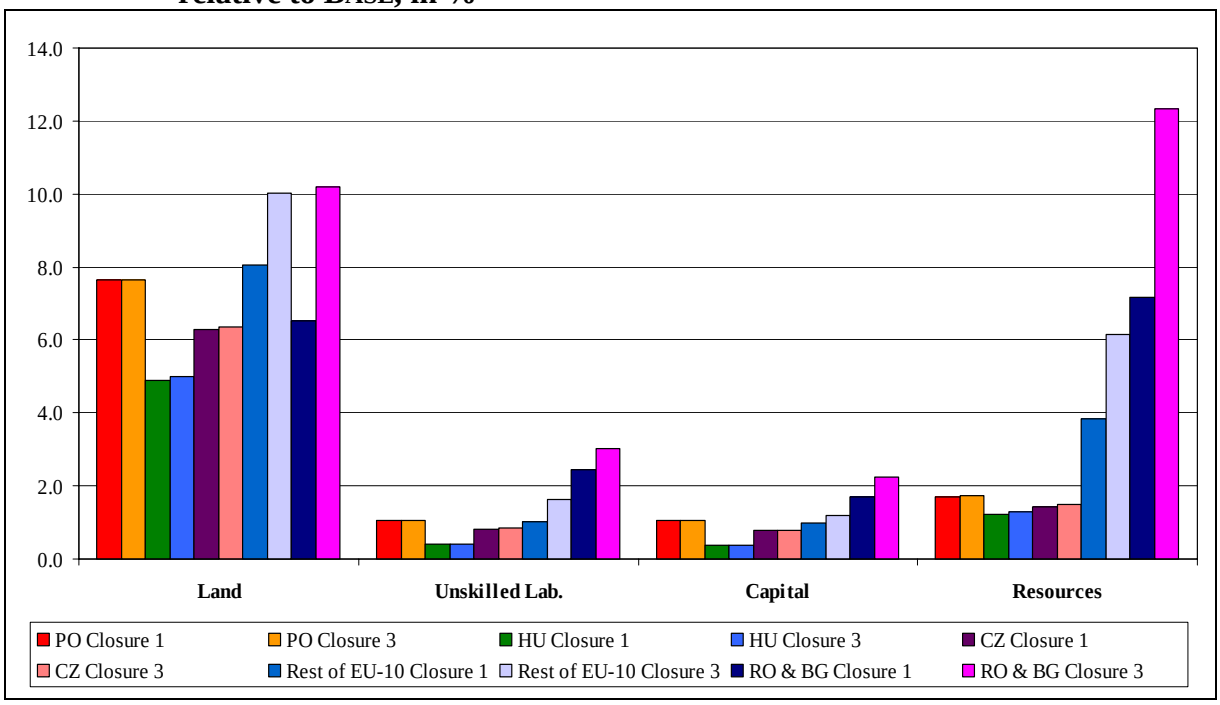
As already outlined in the previous section, alternative closure conditions have a significant impact on employment. Closure option 3 assumes that unskilled labour is in perfectly elastic supply in some regions and hence allows for increased – or decreased – employment at constant real wages immobility in the labour market in the rest of the EU-10 countries and in Romania and Bulgaria. For Poland, Hungary and the Czech Republic, however, flexible wage rates with full employment are assumed also in closure option 3. Because of the different closure option, a flexible versus a constant real wage rate in labour markets (closure 1 compared with 3) will reduce the decline in employment in those countries and regions significantly. In some sectors, e.g. meat and meat products, employment will even increase under closure 3 (see Table 8.11).

Table 8.11: Impact of different closure conditions on labour demand in agri-food sectors in TECHCHG, relative to BASE, in %

	Closure	Poland	Hungary	Czech Republic	Rest of the EU-10	Romania and Bulgaria
Grains	1	2.79	1.21	1.98	2.47	0.92
	3	2.80	1.24	2.00	3.18	2.31
Sugar beet	1	0.30	0.35	1.28	1.74	1.03
	3	0.30	0.36	1.29	2.40	2.45
Other crops	1	0.98	0.49	0.94	0.96	0.92
	3	0.98	0.49	0.94	1.66	2.34
Plant-based fibres	1	1.80	0.82	1.43	1.99	1.27
	3	1.80	0.82	1.43	2.73	2.81
Livestock	1	1.66	1.00	1.08	1.10	0.94
	3	1.66	1.01	1.08	1.71	2.31
Raw milk	1	1.63	1.36	1.14	1.88	1.01
	3	1.63	1.37	1.15	2.53	2.41
Oth. animal prod.	1	2.55	1.67	1.15	1.68	0.99
	3	2.55	1.70	1.16	2.31	2.39
Meat	1	-1.71	-1.32	-1.56	-1.37	-2.48
	3	-1.70	-1.31	-1.55	0.02	1.07
Meat products	1	-2.36	-0.20	-1.13	-0.50	-1.79
	3	-2.36	-0.20	-1.13	0.92	1.82
Vegetable oils	1	-3.60	-2.02	-1.53	-1.53	-4.48
	3	-3.60	-2.02	-1.53	-0.10	-1.12
Dairy products	1	-0.43	-0.35	-0.83	1.36	-4.09
	3	-0.43	-0.35	-0.83	2.85	-0.67
Sugar	1	-3.90	-2.29	-2.43	-4.03	-5.90
	3	-3.89	-2.28	-2.43	-2.68	-2.64
Other food prod.	1	-1.88	-0.99	-0.78	-0.96	-4.75
	3	-1.88	-0.97	-0.77	0.45	-1.43
Bever. and tob.	1	-0.36	-0.59	-0.56	-1.03	-5.46
	3	-0.36	-0.58	-0.55	0.30	-2.03

With the assumption of unemployed unskilled labour the percentage increase in the factor income is the same as the percentage increase in employment of unskilled labour. For factors in fixed supply, the percentage increase in factor incomes is the percentage increase in wage rates. Figure 8.10 illustrates the impact of different closure options on factor income. In general, factor incomes increase in those regions with constant real wage rates, e.g. labour income increases in Bulgaria and Romania by 2.5% under option 1 and by 3% under option 3. However, under option 3 those factors which are sector-specific such as land and natural resources benefit most. Land income in Bulgaria and Romania increases by 6.5% under closure 1 and by more than 10% under closure 3.

Figure 8.10: Changes in factor income under different closure conditions in TECHCHG, relative to BASE, in %



Enhanced technical change in food processing will also have an impact at macroeconomic level in the NMS. However, as presented in Table 8.12, enhanced productivity growth in the NMS has virtually no impact on the economies in the EU-15 and third countries outside the EU. Among the group of the NMS, the highest relative changes in domestic absorption range between 0.3% in Hungary and almost 2% in Bulgaria and Romania.

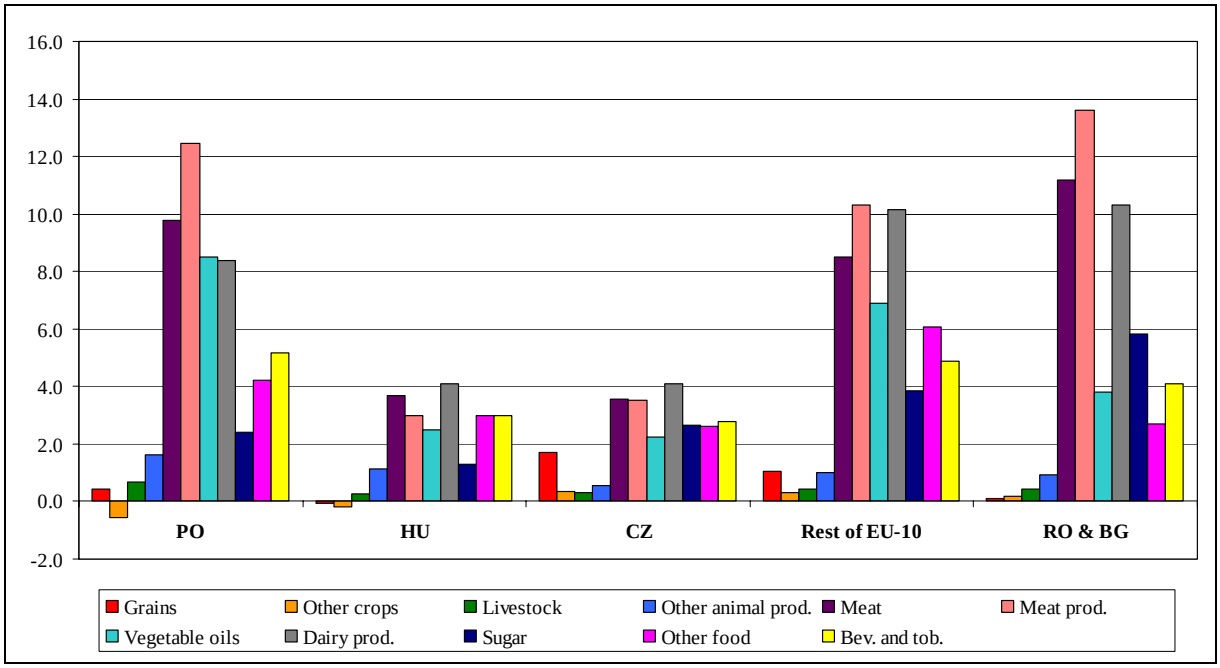
Table 8.12: Changes in macroeconomic totals in TECHCHG, relative to BASE, in %

	Absorption	Imports	Exports	GDP	Production
Germany	0.00	0.01	0.00	0.00	0.00
Italy	0.00	0.01	0.00	0.00	0.00
Austria	0.00	0.01	0.00	0.00	0.00
United Kingdom	0.00	0.00	0.00	0.00	0.00
France	0.00	0.00	0.00	0.00	0.00
Benelux	0.00	0.00	0.00	0.00	0.00
Spain and Portugal	0.00	0.00	0.00	0.00	0.00
Rest of the EU-15	0.00	0.01	0.00	0.00	0.00
Poland	0.82	0.09	0.28	0.92	0.51
Hungary	0.30	0.04	0.08	0.32	0.17
Czech Republic	0.47	0.07	0.13	0.54	0.24
Rest of the EU-10	0.65	0.10	0.22	0.79	0.44
Romania and Bulgaria	1.91	0.39	0.91	2.27	1.03
Turkey	0.00	0.02	0.00	0.00	0.00
Rest of the OECD	0.00	0.00	0.00	0.00	0.00
FSU	0.02	0.04	0.00	0.00	0.00
Mercosur	0.00	0.00	0.00	0.00	0.00
Rest of the world	0.00	0.00	0.00	0.00	0.00

Comment: under closure condition 1 (see Table 7.2).

With accession there is a strong tendency towards improved integration of the NMS economies in international trade, with a higher expansion of exports compared to the growth in imports. The strongest overall effects can be observed in Bulgaria and Romania. FDI and enhanced productivity growth create the highest output and income effects in these countries. This surprising effect can be explained by the fact that both countries start from very low productivity levels and are less integrated in international trade compared to the NMS. This development is also a reflection of the shares of agriculture and food in those economies, i.e. the weights are bigger. However, the differences are also mirrored by the fact that the TECHCHG scenario imposes different technical change shocks on different regions both in terms of the size of the shock and in terms of the magnitude of factor savings.

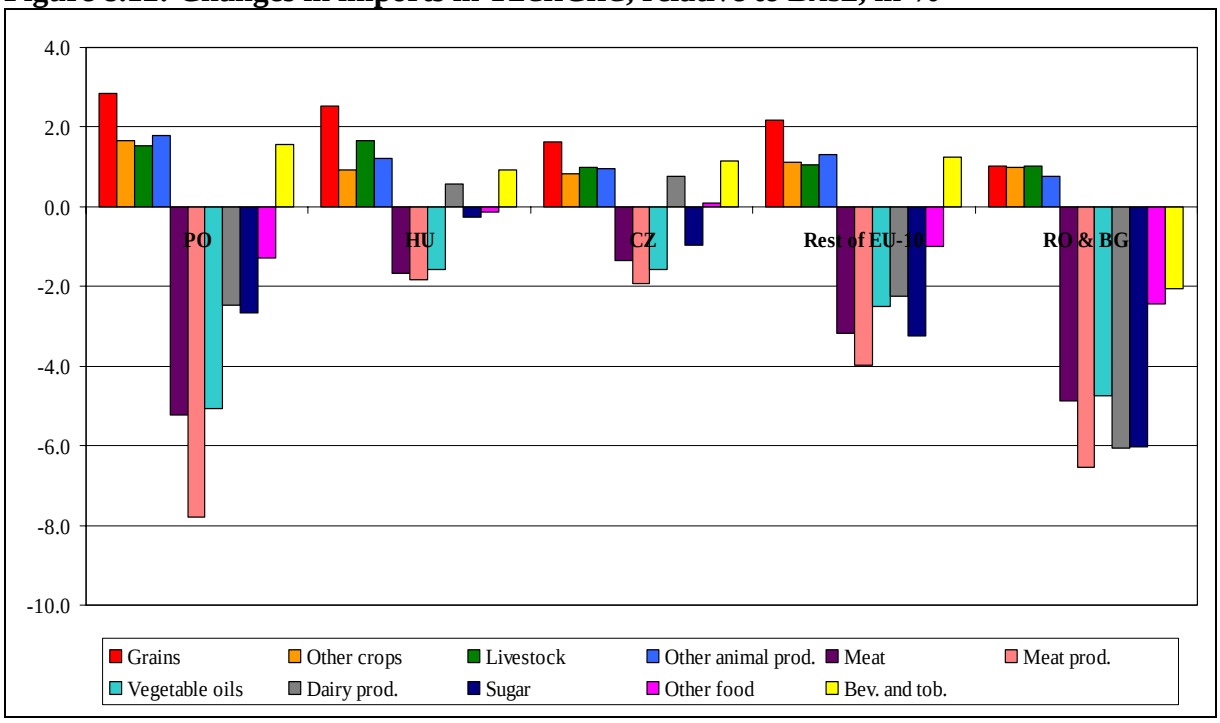
Figure 8.11: Changes in exports in agri-food products in TECHCHG, relative to BASE, in %



Comment: under closure condition 1 (see Table 7.2).

As already mentioned above, the enhanced productivity growth in food processing in the NMS will lead to improved international integration in most NMS. The additional output in food processing will follow a strong increase in food exports in all NMS. The strongest impact in exports can be observed in meat and processed meat products. Total food exports of the EU-10 expand by 5.3% and, as consequence of a decline in relative prices, total food imports decline in the EU-10 by more than 1.5% (see Figure 8.12 below).

Figure 8.12: Changes in imports in TECHCHG, relative to BASE, in %



Comment: under closure condition 1 (see Table 7.2).

8.3 Combined scenario: policy harmonisation and technical change simulations under perfect competition

After identifying the main results of the consecutive experiments of policy harmonisation (experiment 1) and technical change simulation (experiment 2), this section presents the results of the combined experiment where both policy harmonisation and technical change are run simultaneously. For experiment 3, the results of scenarios HARM, HARM&TECHCHG will be compared with the initial situation (BASE).

The expectation is that the effects of both experiments will be complementary; it is therefore important to note the extent to which the complementary effects mean that the combined effects are different from the sum of the individual effects. As in the presentation of the first experiment, the discussion of the results will first focus on changes in macroeconomic variables, and trade. Changes in output prices and quantities will be discussed, followed by changes in factor demand and prices.

At national level the impact of harmonisation and enhanced productivity growth in food processing is only small. Scenario HARM has a slight negative effect at national level due to

the introduction of direct payments and an increase in market price support. The combined scenario HARM&TECHCHG compensates for the negative effects of the HARM scenario. Real GDP increases in all EU-12 Member States compared to the base situation. Different closure conditions in the two regions (rest of the EU-10 and Bulgaria and Romania) have only limited spill-over effects to the other regions.

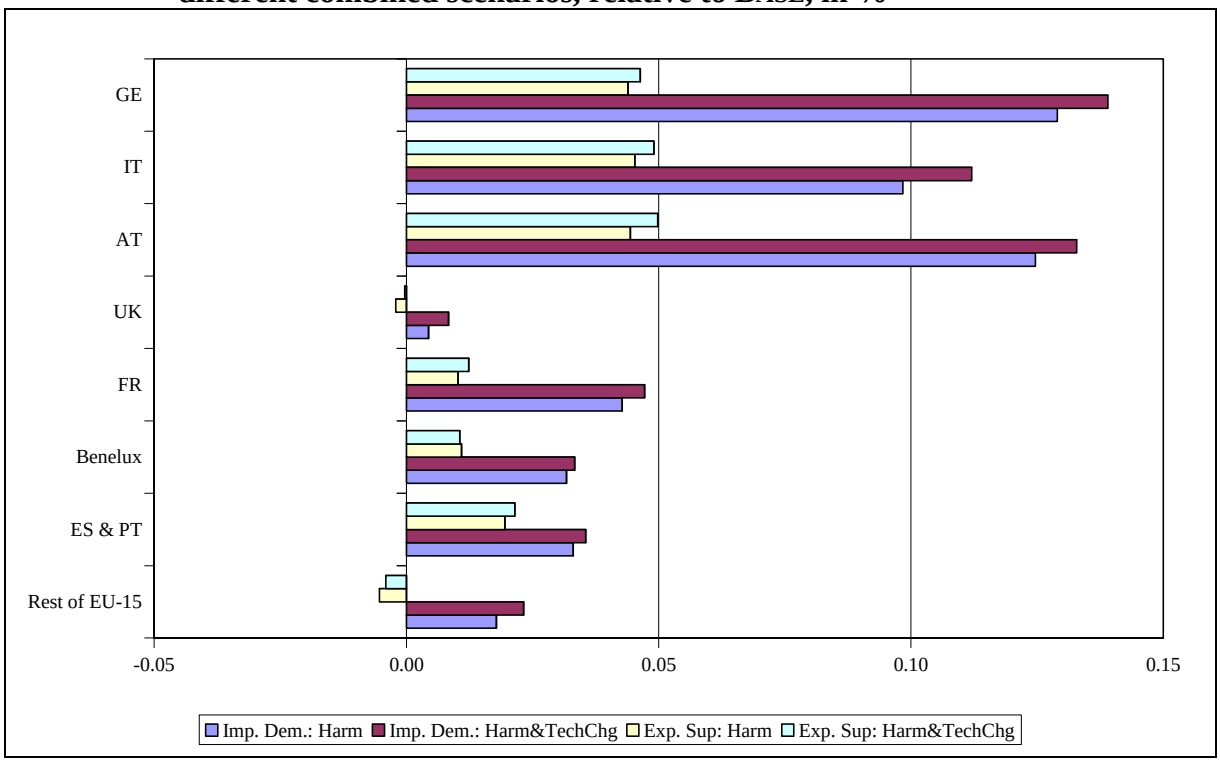
Table 8.13 clearly presents the variation in closure conditions at national level (closures 3 and 4): real GDP declines in the two regions relative to the base situation.

Table 8.13: Impact of different closure conditions on GDP in different regions, scenario HARM&TECHCHG, in USD bn

	Base	Closure 1	Closure 2	Closure 3	Closure 4
	in USD bn		in % relative to BASE		
Germany	18 522	0.004%	0.004%	0.003%	0.003%
Italy	10 877	0.003%	0.003%	0.002%	0.002%
Austria	1 896	0.012%	0.012%	0.010%	0.009%
United Kingdom	14 254	0.000%	0.000%	0.000%	0.000%
France	13 200	0.001%	0.001%	0.001%	0.000%
Benelux	6 280	0.001%	0.001%	0.000%	0.000%
Spain and Portugal	6 920	0.001%	0.001%	0.001%	0.001%
Rest of the EU-15	7 177	0.003%	0.003%	0.001%	0.000%
Poland	1 745	0.784%	0.784%	0.784%	0.898%
Hungary	511	0.163%	0.163%	0.155%	0.362%
Czech Republic	553	0.488%	0.488%	0.488%	0.559%
Rest of the EU-10	754	0.802%	0.802%	-0.433%	-0.200%
Romania and Bulgaria	508	1.404%	1.404%	-7.932%	-5.977%
Turkey	1 466	-0.003%	-0.003%	0.016%	0.010%
Rest of the OECD	166 060	0.000%	0.000%	0.000%	0.000%
FSU	6 254	0.006%	0.006%	0.049%	0.053%
Mercosur	11 297	-0.001%	-0.001%	-0.004%	-0.001%
Rest of the world	42 075	0.000%	0.000%	0.004%	0.004%
Total	310 348	0.011%	0.011%	-0.007%	-0.002%

The combined scenario HARM&TECHCHG has clear impacts on trade, since both scenarios HARM and TECHCHG already showed a tendency towards an increase in agri-food exports. Under the combined scenario, total import demand in the EU-15 declines owing to harmonisation. However, there is hardly any impact of higher productivity growth in the NMS food industries on agri-food trade in the EU-15 (see Figure 8.13).

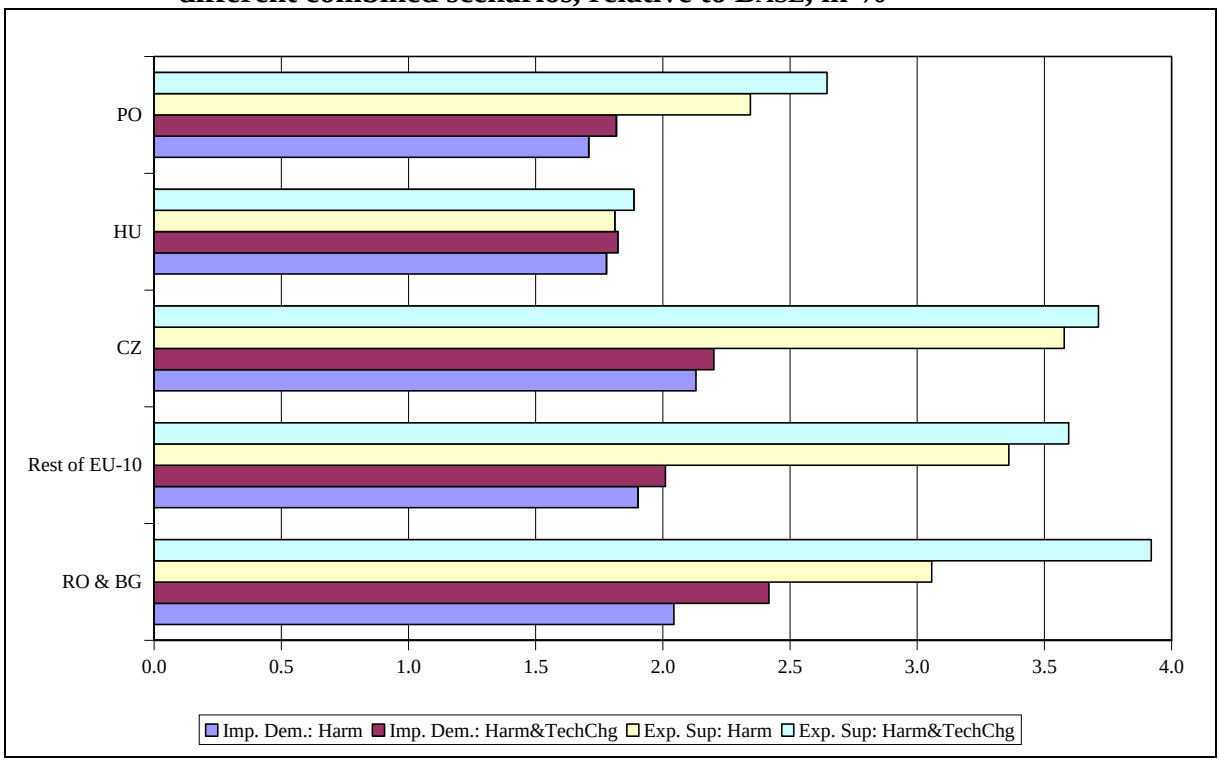
Figure 8.13: Changes in total import demand and export supply in the EU-15 under different combined scenarios, relative to BASE, in %



Comment: under closure condition 1 (see Table 7.2).

In the NMS import growth is driven by the impact of the single market (scenario HARM). Total import demand grows by between 1.5% in Poland and 2% in the Czech Republic. Under the combined scenario, the market integration of Romania and Bulgaria increases more strongly and total imports in Romania and Bulgaria increase by 2.4% (see Figure 8.14). Exports in the NMS increase as a result of both harmonisation and increasing productivity growth. Here, both effects add up and result in higher growth rates in total exports than growth rates in total imports in all NMS.

Figure 8.14: Changes in total import demand and export supply in the NMS under different combined scenarios, relative to BASE, in %



Exchange rates in the EU-15 show a small appreciation which is mainly due to harmonisation. The depreciation in the national currencies in the NMS under the HARM scenario even increases. Under enhanced productivity growth in the food industries in the NMS and Bulgaria and Romania, national currencies depreciate significantly. In the case of Bulgaria and Romania, the depreciation is around 3% under the combined scenario. Different closure conditions, presented in Table 8.14, have some impact on the development of the exchange rate. Under closure condition 4, exchange rates in the NMS show a slightly higher depreciation compared to closure condition 1.

Table 8.14: Changes in exchange rates under scenario HARM and HARM&TECHCHG under different closure options, relative to BASE, in %

	HARM		HARM&TECHCHG	
	Closure 1	Closure 4	Closure 1	Closure 4
Germany	-0.01	0.00	-0.01	-0.01
Italy	-0.04	-0.03	-0.05	-0.04
Austria	-0.05	-0.03	-0.05	-0.04
United Kingdom	0.01	0.01	0.00	0.00
France	-0.02	-0.02	-0.03	-0.03
Benelux	0.00	0.01	0.00	0.01
Spain and Portugal	-0.02	-0.02	-0.03	-0.03
Rest of the EU-15	0.03	0.03	0.02	0.02
Poland	1.21	1.65	2.11	2.52
Hungary	-0.21	0.36	0.06	0.62
Czech Republic	1.56	2.09	2.28	2.84
Rest of the EU-10	1.25	1.16	2.03	2.08
Romania and Bulgaria	1.60	0.88	3.05	2.88
Turkey	-0.21	-0.22	-0.22	-0.23
Rest of the OECD	-0.02	-0.02	-0.03	-0.03
FSU	-0.12	-0.08	-0.13	-0.10
Mercosur	0.00	0.02	-0.01	0.01
Rest of the world	-0.04	-0.04	-0.05	-0.05

Comment: under closure condition 1 (see Table 7.2).

In most of the NMS output prices show a strong increase for agricultural products, which are almost non-traded, e.g. sugar beet and raw milk. The strong increase in prices for dairy and refined sugar in Hungary leads also to an increase in sugar beet and raw milk prices. Here, higher input prices also influence the market prices of processed output. In the other acceding countries this relationship is not evident, owing to high productivity growth in food processing industries and smaller increases in prices for intermediate inputs. As a result of reduced price support after harmonisation, and a strong increase in production, cereal prices decline in all NMS. Lower border protection for beverages and tobacco also cause declines in prices for these commodities in all NMS.

Figure 8.15: Changes in output prices of primary agricultural products under scenario HARM&TECHCHG in NMS, relative to BASE, in %

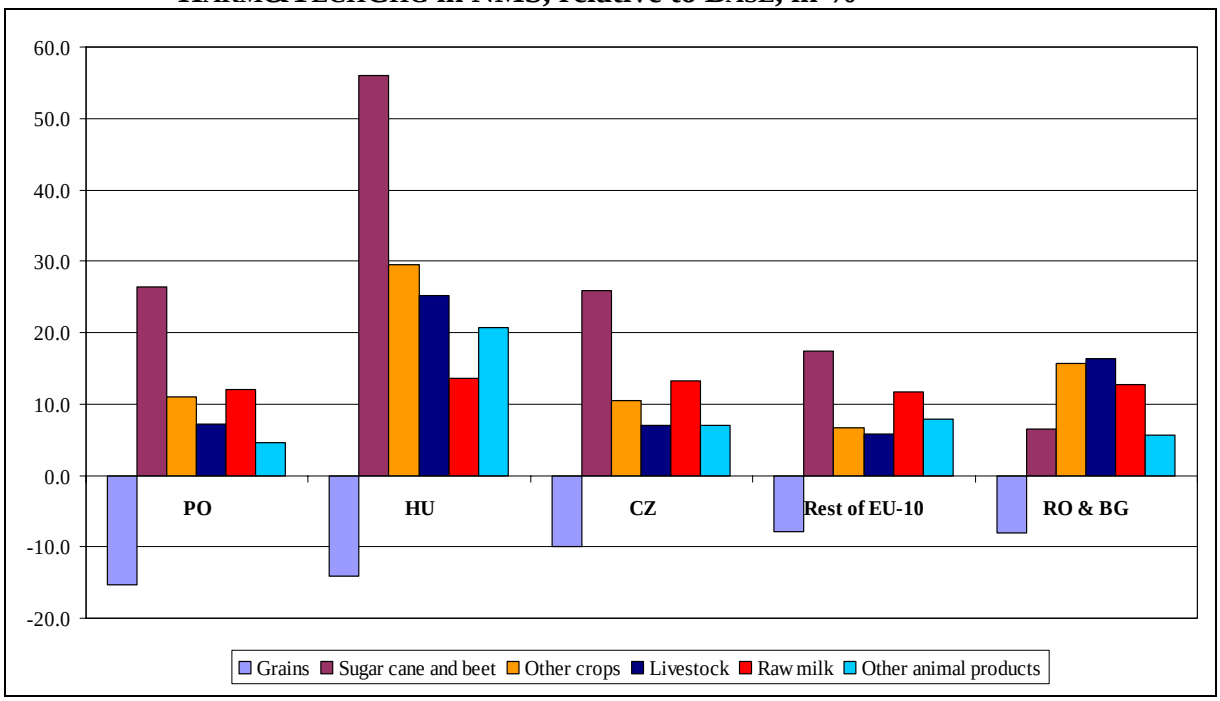
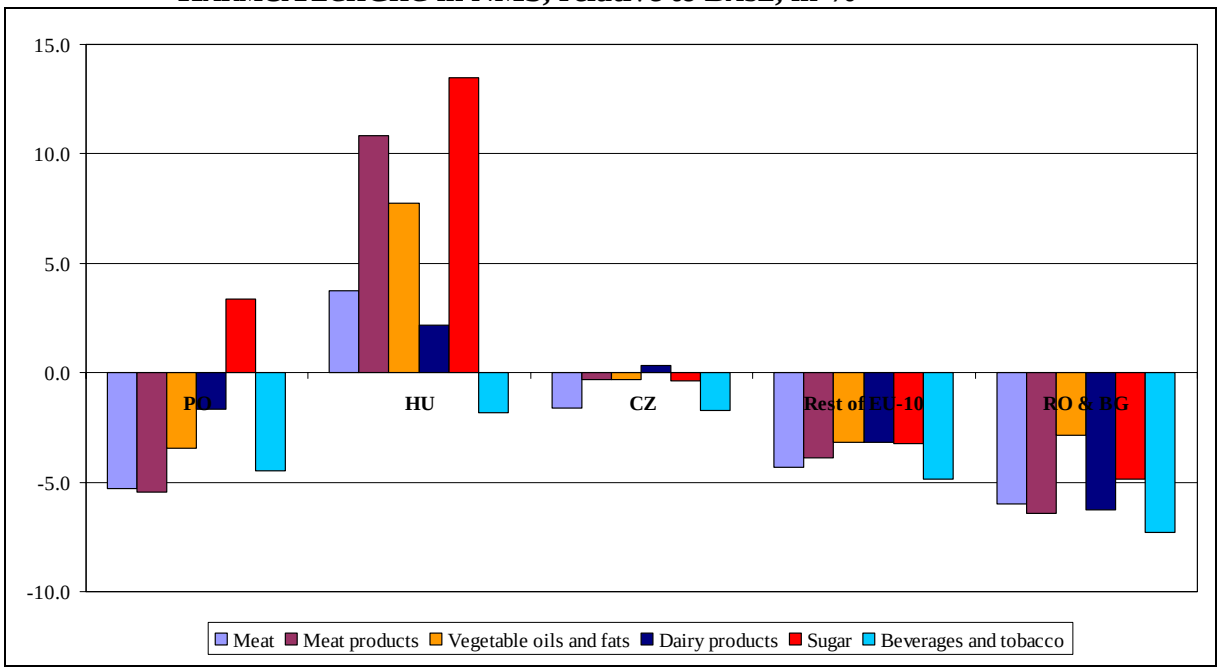


Figure 8.16: Changes in output prices of processed food products under scenario HARM&TECHCHG in NMS, relative to BASE, in %



Comment: under closure condition 1 (see Table 7.2).

Figure 8.17 presents the changes in output under the HARM&TECHCHG scenario for the NMS. Cereal production increases strongly in all NMS countries under the combined scenario, which is due to the introduction of direct payments. As explained above, decoupled direct payments reduce the user costs for land. Therefore those crops with the highest

marginal product, and a high cost share of land, will "benefit" most under this scenario. Agriculture production in the EU-15 is relatively stable with some decline in output in grains (Benelux) and sugar (UK).

Figure 8.17: Changes in output quantities for primary agriculture under scenario HARM&TECHCHG in NMS, relative to BASE, in %

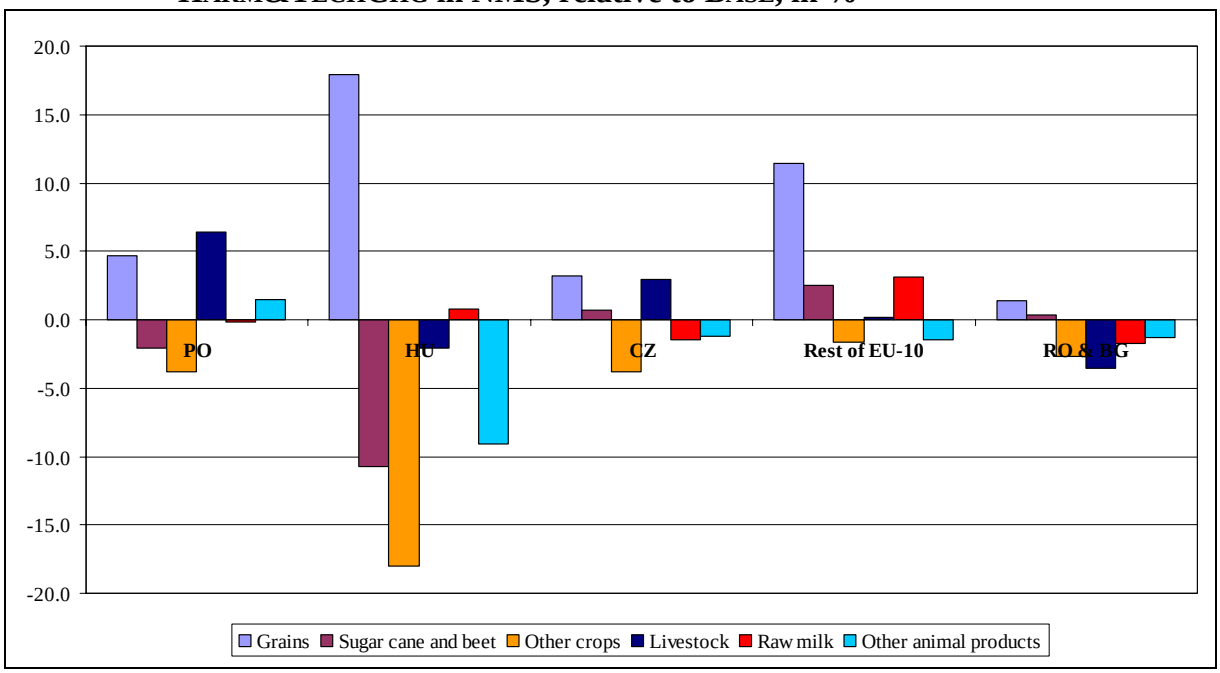
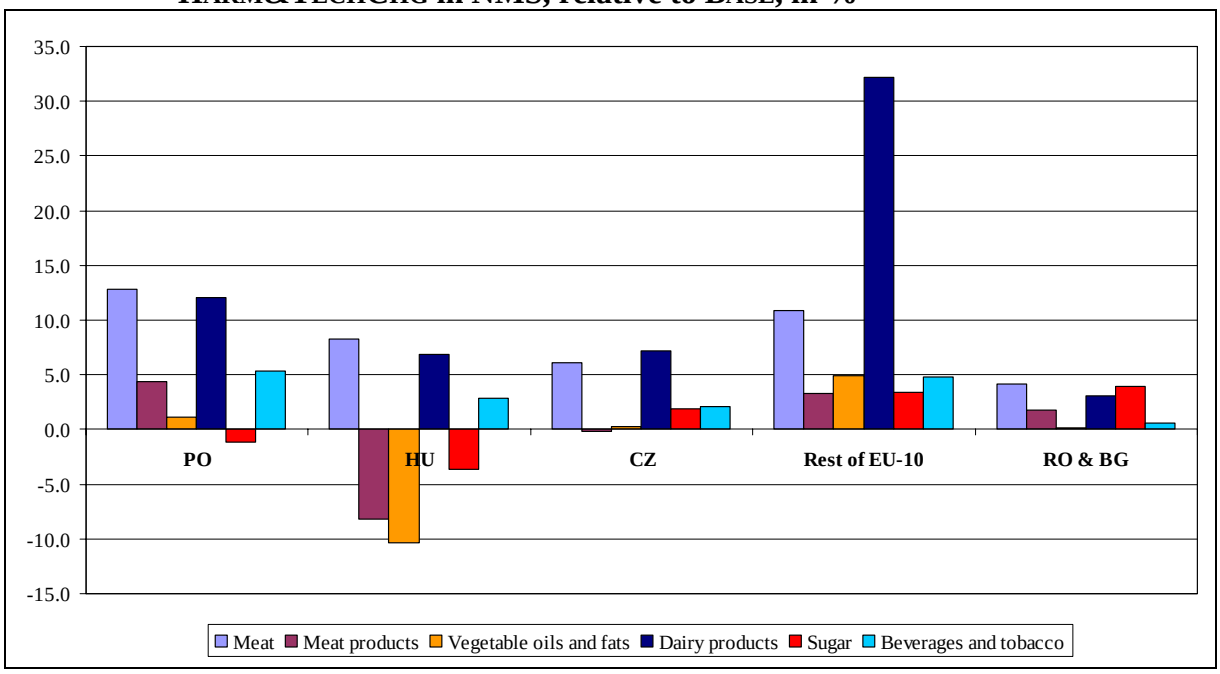


Figure 8.18: Changes in output quantities for processed food under scenario HARM&TECHCHG in NMS, relative to BASE, in %



Comment: under closure condition 1 (see Table 7.2).

Import demands in the NMS show, in general, strong increases for processed food triggered by lower import prices. Here, liberalisation within the single European market

shows the positive impact of the enhanced integration of the NMS markets into the European market. This increase depends on the degree of initial protection and the level of integration into the European markets prior to accession.

Figure 8.19: Changes in primary agricultural imports under scenario HARM&TECHCHG in NMS, relative to BASE, in %

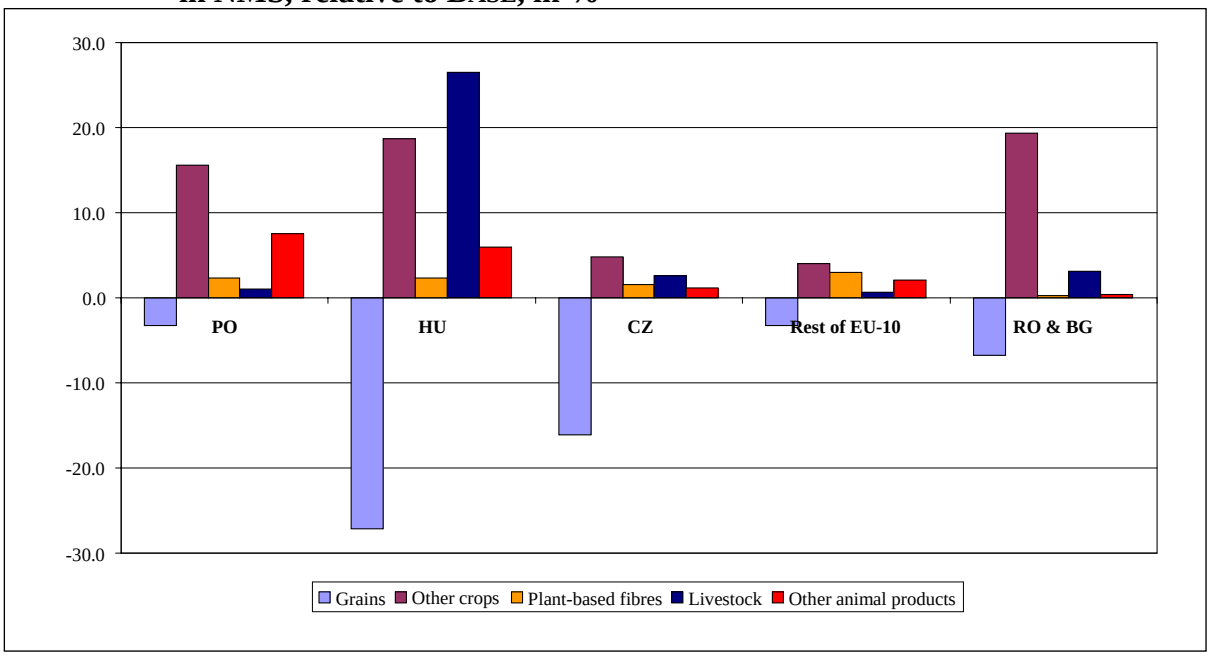
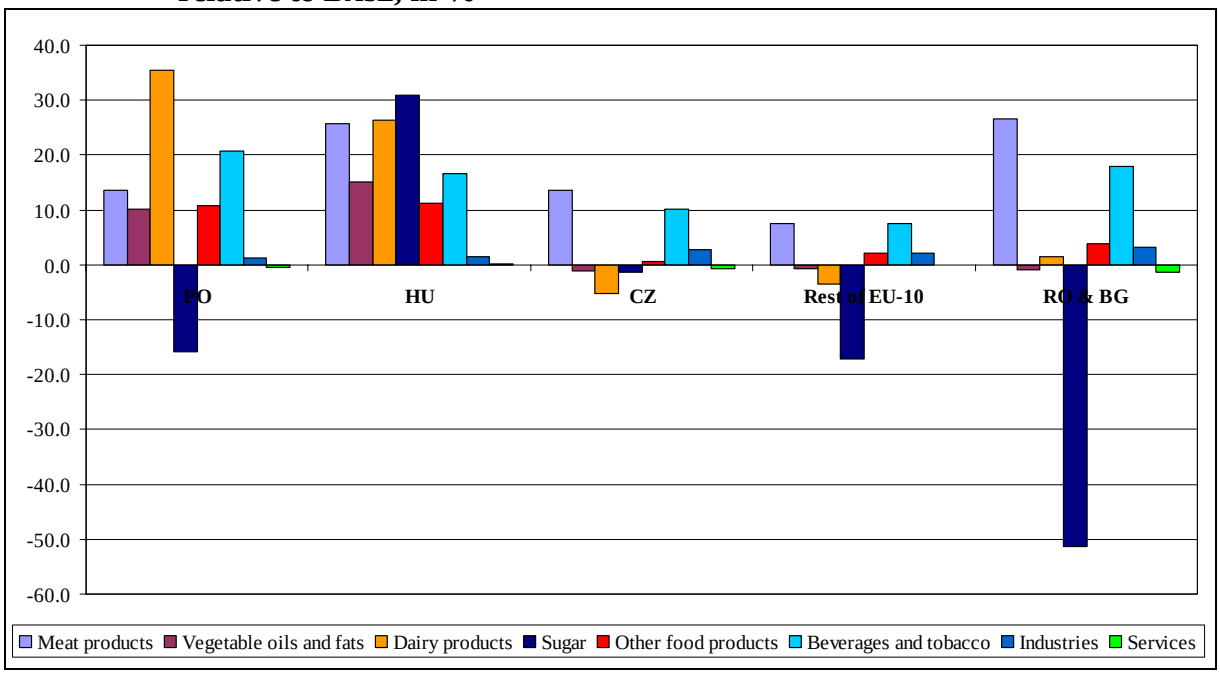


Figure 8.20: Changes in industries' imports under scenario HARM&TECHCHG in NMS, relative to BASE, in %

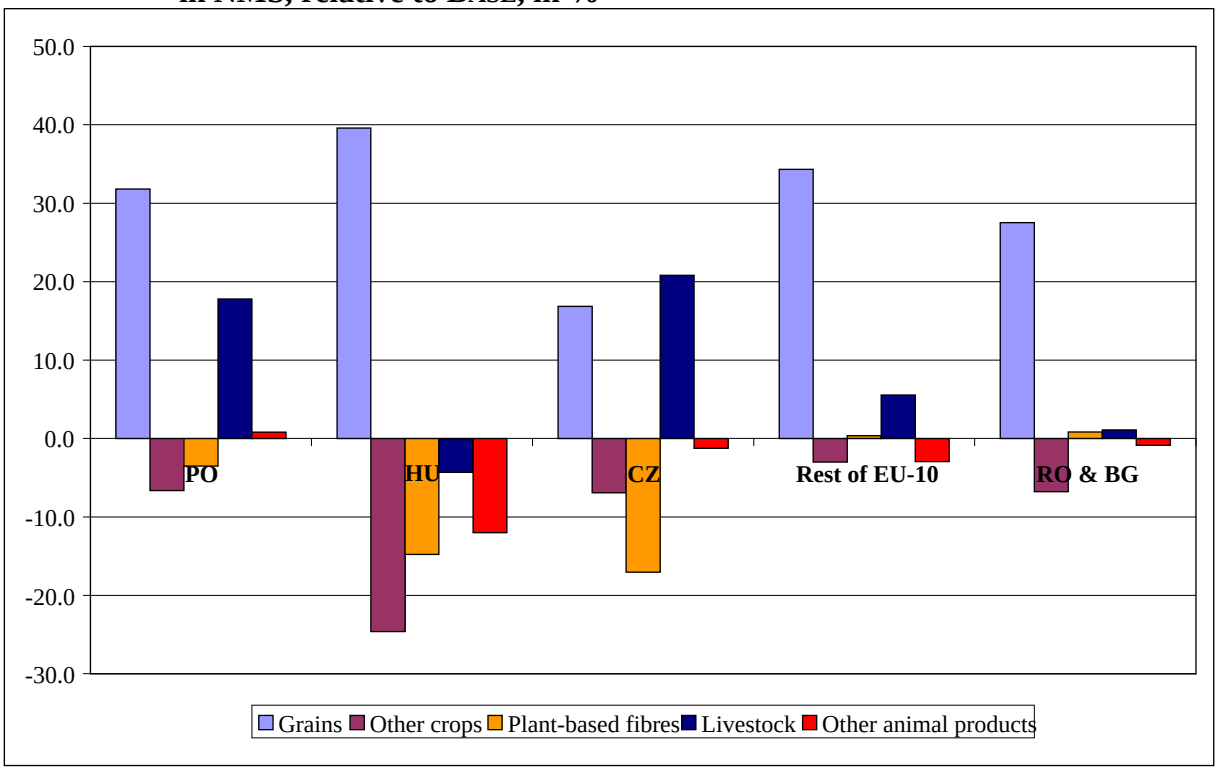


The higher the initial protection and market penetration, the greater is the increase in trade. These initial conditions determine the small changes in the rest of the EU-10 and

Romania and Bulgaria compared to the higher changes in Poland, Hungary and the Czech Republic. Grain and meat imports decline in Hungary as a result of higher import prices after accession (+10% grain; +15% meat) while sugar imports increase after a drop in import prices of -14%. In Poland dairy imports increase by more than 35% after EU accession owing to a strong decline in import prices.

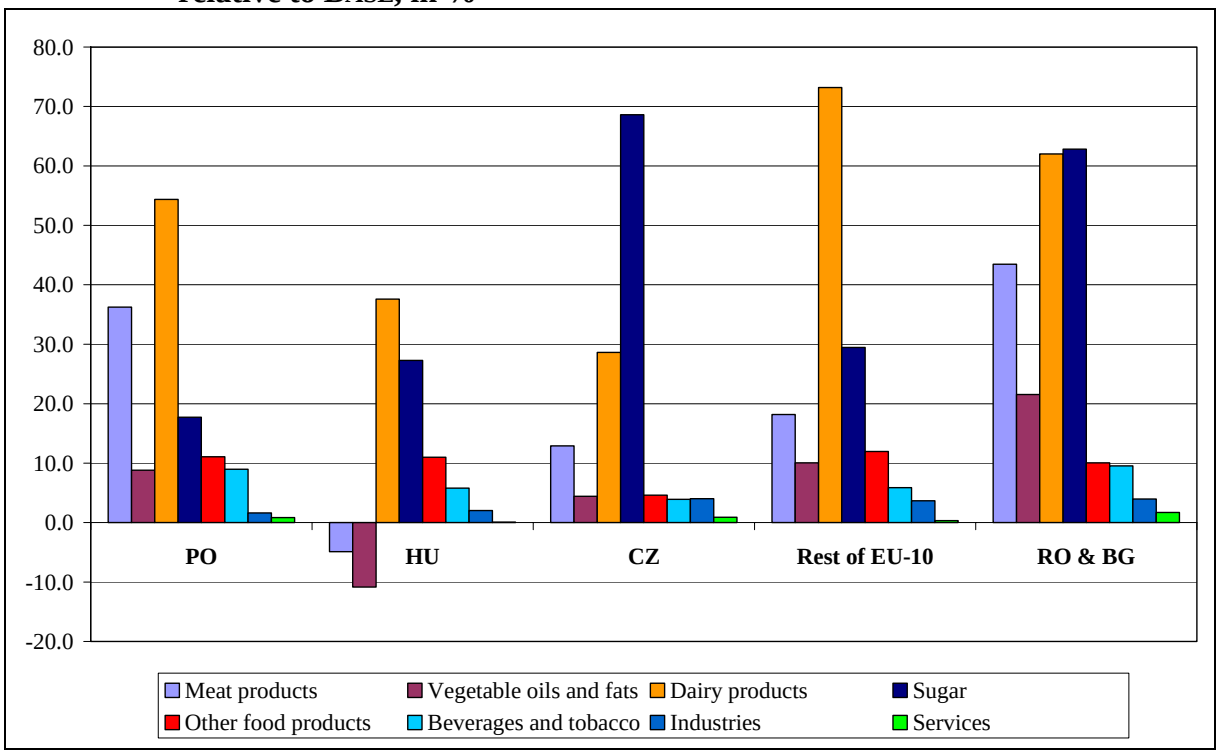
The differences in changes in export supply across the NMS are also due to the initial protection of the EU-15 and the NMS, as well as the degree of integration into international markets before enlargement. Under the combined scenario, exports of grains and livestock increase for all NMS; these increases are triggered by lower border protection in the EU-15 countries. Exports of other crops decline, however, in most NMS, which can be explained by lower excess supply in the NMS. Compared to primary agriculture, processed food exports grow even more strongly after EU membership. The meat, dairy and sugar industries show the highest increase in exports under the HARM&TECHCHG scenario.

Figure 8.21: Changes in primary agricultural exports under scenario HARM&TECHCHG in NMS, relative to BASE, in %



Comment: under closure condition 1 (see Table 7.2).

Figure 8.22: Changes in industries' exports under scenario HARM&TECHCHG in NMS, relative to BASE, in %



As already outlined in the previous section, factor prices do not change significantly in the EU-15 Member States; enhanced productivity growth in the NMS food processing industries has only minor impacts on factor prices and demand in the EU-15 countries. On the other hand, enhanced productivity growth in food processing will even fuel the increase in land prices in the NMS (see Table 8.15). Here, land scarcity increases in the NMS under the HARMTECHCHG scenario and land prices continue to increase. The strong increase in land price can also be explained by the fact that land is a fixed factor in agriculture which after accession receives big subsidies paid to land.

Table 8.15: Changes in land prices under combined scenarios, relative to BASE, in %

	HARM	HARM&TECHCHG
Germany	0.09	-0.03
Italy	0.11	0.07
Austria	-3.10	-3.10
United Kingdom	-0.23	-0.26
France	-0.92	-1.00
Benelux	0.89	0.69
Spain and Portugal	-0.59	-0.60
Rest of the EU-15	-0.36	-0.43
Poland	103.70	119.94
Hungary	238.66	252.31
Czech Republic	60.81	71.03
Rest of the EU-10	105.90	123.78
Romania and Bulgaria	222.34	241.82
Turkey	1.00	1.03
Rest of the OECD	-0.04	-0.05
FSU	0.02	0.02
Mercosur	-0.08	-0.09
Rest of the world	-0.01	-0.01

Table 8.16: Changes in land demand under different harmonisation scenarios, relative to BASE, in %

	Poland	Hungary	Czech Republic	Rest EU-10	Bulgaria & Romania
Scenario HARM					
Grains	46.68	48.13	38.09	50.71	32.05
Sugar cane and beet	-10.37	-24.73	-12.44	-11.93	-17.81
Other crops	-8.71	-29.34	-13.16	-11.31	-14.89
Plant-based fibres	-12.76	-38.15	-38.20	-13.02	-17.05
Livestock	-6.78	-19.46	-5.16	-12.96	-21.36
Raw milk	-10.66	-16.40	-6.15	-8.68	-18.69
Other animal prod.	-11.09	-24.75	-8.28	-13.13	-19.17
Scenario HARM&TECHCHG					
Grains	48.11	48.27	38.80	51.66	31.92
Sugar cane and beet	-11.57	-25.33	-12.31	-11.73	-17.65
Other crops	-9.26	-29.69	-13.48	-11.97	-14.85
Plant-based fibres	-12.74	-38.31	-38.31	-12.98	-16.72
Livestock	-6.73	-19.41	-5.34	-13.51	-21.30
Raw milk	-10.47	-15.98	-6.21	-8.08	-18.55
Other animal prod.	-10.15	-24.45	-8.40	-13.16	-19.05

Comment: under closure condition 1 (see Table 7.2).

The change in land price is mainly due to the strong increase in subsidies paid to this factor but also to changes in cropping pattern. The HARM scenario, with introduction of direct payments, has a strong impact on land demand for grains in all NMS. Land demand for sugar beet and for livestock declines, because of decoupled payments in livestock production. This tendency is even stronger in the combined HARM&TECHCHG scenario. The combined scenario HARM&TECHCHG has little impact in the EU-15 Member States, with the exception of Austria, where land for grain declines and for livestock uses expands.

Table 8.17: Changes in unskilled labour demand in agri-food industries under scenario HARM&TECHCHG, relative to BASE, in %

	Poland	Hungary	Czech Republic	Rest EU-10	Bulgaria & Romania
Grains	-5.18	10.66	-4.72	2.89	-5.16
Sugar cane and beet	3.12	0.93	5.90	5.90	5.14
Other crops	-2.73	-11.69	-1.76	-1.87	1.70
Plant-based fibres	-0.46	9.56	-0.08	1.23	7.01
Livestock	7.57	5.11	3.76	0.30	3.36
Raw milk	1.57	7.51	1.17	3.44	3.32
Other animal prod.	3.85	-0.77	1.71	0.99	4.85
Meat	8.36	10.56	5.12	7.19	5.61
Meat products	2.40	-2.08	0.68	0.02	1.31
Vegetable oils	-2.64	-9.64	-4.53	-2.25	-2.91
Dairy products	8.02	6.46	5.53	20.42	1.12
Sugar	3.27	5.40	3.39	6.85	3.13
Other food prod.	0.72	0.27	-0.11	0.17	3.26
Bever. & tobacco	-0.41	-0.15	-1.44	1.05	2.11

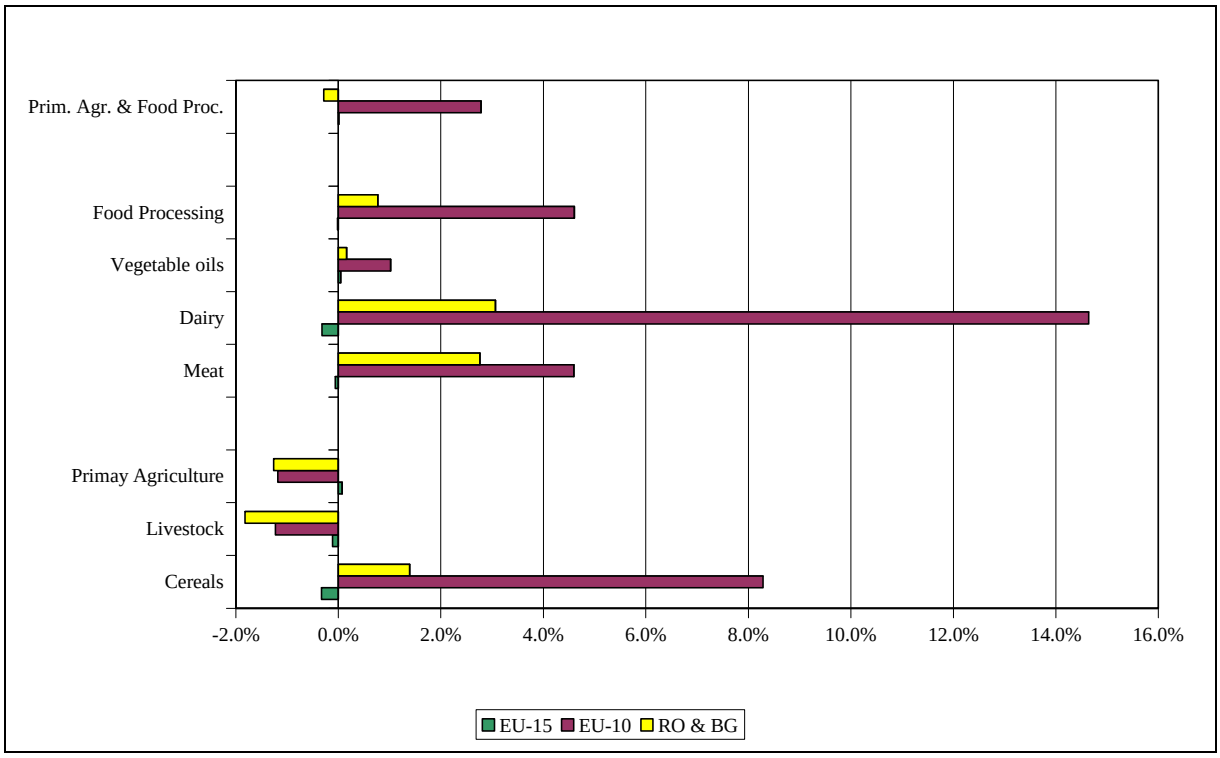
Comment: under closure condition 1 (see Table 7.2).

The impact of HARM&TECHCHG on labour demand in agricultural sectors is less marked compared with the changes in land demand. Compared to the HARM scenario, the employment effects are greater under the combined HARM&TECHCHG scenario. Here, the additional production incentive in primary agriculture in the TECHCHG scenario leads to an increase in employment in agri-food industries. The combined scenario shows a small negative impact in employment in the agri-food sectors in the countries of the EU-15.

8.4 Combined scenario results and comparison with actual developments

This section provides an overview of the main results of the combined scenario HARM&TECHCHG under perfect competition for aggregated regions of the EU. These summary graphs will also compare the scenario results with actual developments in production and trade in the area of agriculture and food processing. The grouping for this chapter will be the EU-15, the EU-10, Romania and Bulgaria. The latter are treated separately from the other NMS as the available actual data refer to 2005, thus before the accession of Romania and Bulgaria to the EU.

Figure 8.23: Changes in agri-food production under scenario HARM&TECHCHG in the EU, relative to BASE, in %



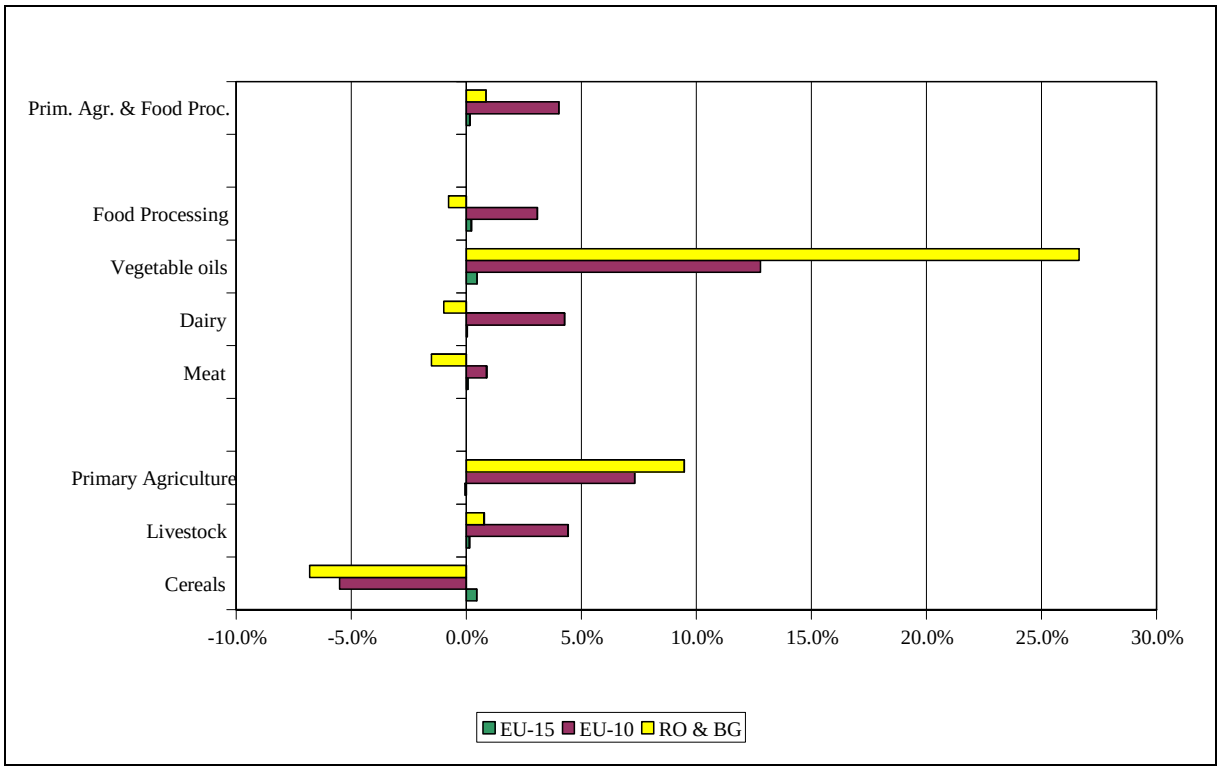
After enlargement to EU-27, production of processed food increases in the NMS, which is due to the creation of the single market and enhanced technical progress in the NMS. Livestock production accounts for more than 50% of the total value of agricultural production. Therefore, with the projected reduction in livestock output in the NMS after EU accession, production in primary agriculture declines slightly in the EU-10 (see Figure 8.23). On the other hand, EU-10 cereal production increases by more than 8%.

The supply of processed food products increases more significantly compared to primary agriculture. In the EU-10, output of processed food products increases by more than 4% while dairy production grows even more strongly, by almost 15% compared to BASE. In the EU-10, the slight decline in primary agriculture is more than compensated by an increase in the food processing sector, and total agri-food production increases after accession. For Bulgaria and Romania, the decline in agricultural production is not compensated by an increase in food production. As a consequence, aggregated agri-food output declines slightly in total after accession. As already discussed above, the difference between the EU-10 and Romania and Bulgaria can be explained by the more intensive integration of the agri-food sectors in international trade in the EU-10.

Comparing the real development of agri-food production in the EU-10 after accession with the modelling results, it becomes clear that the projection of cereal, vegetable oil and meat production is similar to the actual development. According to Eurostat data, cereal output in the EU-10 grew by almost 15% between the average production of 2000/02 and 2005. In this period, vegetable oil production also grew by more than 9% in the EU-10 and meat supply increased by almost 10%. The projected increase in dairy production does not correspond with real development. After accession, supply in dairy products declined slightly in 2005 compared to the average supply of 2000/02.

However, it can be expected that the integration of the agri-food sectors of Bulgaria and Romania into the single market and trade with third countries will increase significantly within the next decade. First signals can also be derived from this analysis where the relative changes in imports and exports after EU accession are the highest for Bulgaria and Romania (see Figure 8.24 and Figure 8.25 below).

Figure 8.24: Changes in imports of different agri-food commodities under scenario HARM&TECHCHG in the EU, relative to BASE, in %



The changes in trade in the EU-10 and Romania and Bulgaria are mainly due to the harmonisation of tariffs towards the level of the CAP and the full liberalisation of trade after the creation of the single market. As shown in Figure 8.24, total agri-food imports of the EU-

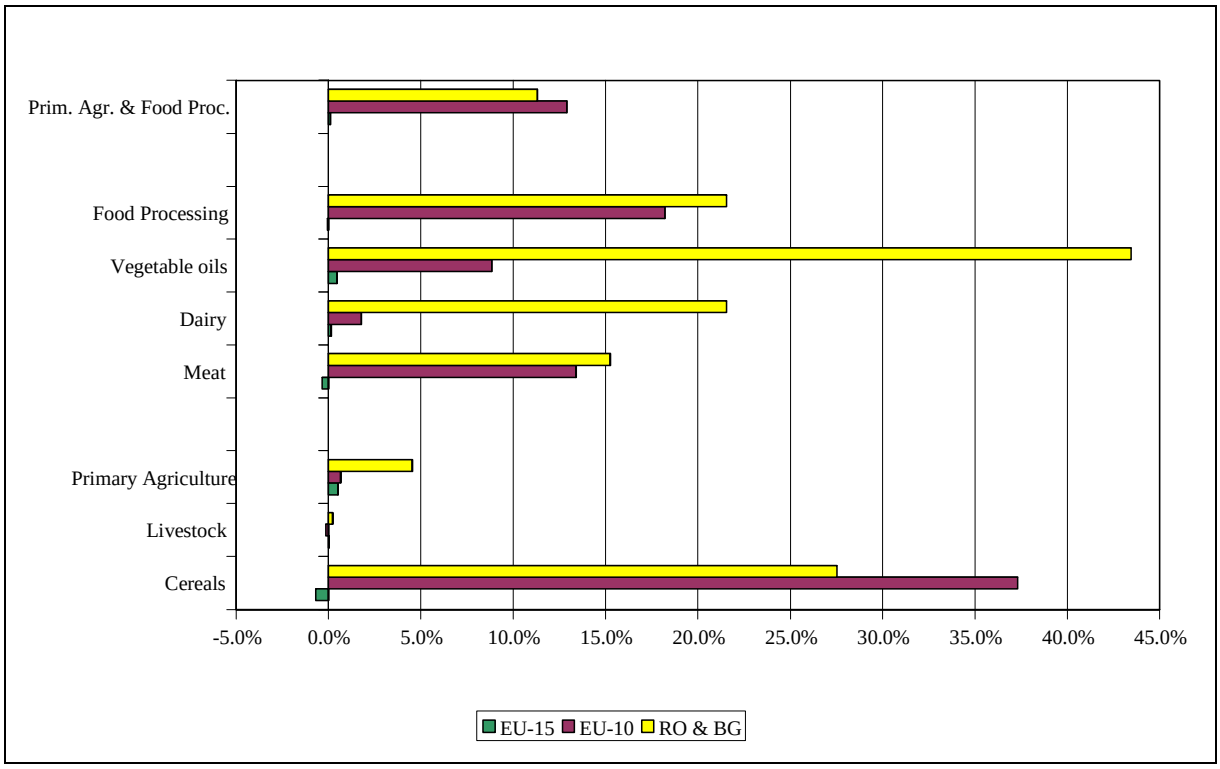
10 are projected to increase by 4% after EU accession. Imports of primary agriculture products increase by 7% and imports of processed food increase by 3%. Within primary agriculture there is a difference in the development of crop products such as cereals and livestock products. Cereal imports of the EU-10 decline by more than 5% after accession while livestock imports increase by 4%.

Comparing the scenario results with the actual development in imports, it becomes clear that the general direction of the modelling results and the real changes correspond; cereal imports decline and imports in livestock increase. However, the magnitude of changes in real import flows is different from compared to the modelling results. According to Eurostat data, cereal imports declined by more than 22%, comparing the imports of 2005 with the average imports of 2000/02. Beef and pigmeat imports into the EU-10 increased by almost 140% and 260% respectively.

After EU accession the changes in exports in the EU-10 and in Romania and Bulgaria are much higher than the changes in imports. The quantitative analysis indicates that the incentives of the single market and the enhanced inflow of FDI lead to an increase in exports of agri-food products of 13% in the EU-10 and 11% in Romania and Bulgaria. Strong growth of exports of food products contributes to this significant increase. Food exports increase by 18% in the EU-10 and more than 20% in Romania and Bulgaria. Within primary agriculture, cereal exports grow by more than 37% in the EU-10 and 27% in Romania and Bulgaria.

Again, like the changes in imports, the scenario results for exports also reflect the real development between 2005 and 2000/02. Cereal exports of the EU-10 grew, however, by more than 120% between average 2000/02 and 2005. Within that period vegetable oils grew by 116%, while the scenario results indicate an increase of 44% for the EU-10. A similar development is found for the development of meat exports. The analysis shows an increase in meat exports of around 14% in the EU-10, while the change in most meat exports has been much greater. Most meat exports from the EU-10 more than doubled between 2000/02 and 2005.

Figure 8.25: Changes in exports of different agri-food commodities under scenario HARM&TECHCHG in the EU, relative to BASE, in %



The comparison of real developments and the quantitative results of this analysis reveal also the limitations inherent in foresight analysis of quantitative analysis-based CGE modelling. While developments in real life depend on various parameters such as relative prices, trends, weather, etc., CGE analysis only considers changes in relative input and output prices and in income as the main drivers of supply and demand. This abstraction allows the impact of policy changes in the course of EU enlargement to be identified, but with only limited ability to predict all drivers influencing production and consumption.

8.5 Combined scenarios: policy harmonisation and technical change simulations under imperfect competition

After identifying the main results of the consecutive experiments of policy harmonisation (experiment 1) and technical change simulation (experiment 2) and of a combed scenario, this section presents the results of the combined experiment under the assumption of imperfect competition in food processing industries in all EU Member States. All scenario assumptions are exactly the same as applied for the combined scenario in

Chapter 8.3. All results are compared with the results of the combined scenario HARM&TECHCHG under perfect competition.

The following scenario compares the level of real GDP under perfect and imperfect competition in scenario HARM&TECHCHG. While real GDP grows in the perfect competition version of the model (relative to the initial situation), real GDP declines slightly in the imperfect competition version under EU membership and enhanced productivity growth in the food processing industries.

Table 8.18: Real GDP from expenditures under perfect and imperfect competition, HARM&TECHCHG scenario, in USD bn

	Base	Perfect competition	Imperfect competition
Germany	18 522	0.00%	-0.02%
Italy	10 877	0.00%	-0.05%
Austria	1 896	0.01%	-0.07%
United Kingdom	14 254	0.00%	0.00%
France	13 200	0.00%	-0.01%
Benelux	6 280	0.00%	-0.03%
Spain and Portugal	6 920	0.00%	-0.03%
Rest of the EU-15	7 177	0.00%	0.00%
Poland	1 745	0.78%	-0.14%
Hungary	511	0.16%	-0.20%
Czech Republic	553	0.49%	-0.15%
Rest of the EU-10	754	0.80%	-0.07%
Romania and Bulgaria	508	1.40%	-1.07%
Turkey	1 466	0.00%	0.00%
Rest of the OECD	166 060	0.00%	0.00%
FSU	6 254	0.01%	0.00%
Mercosur	11 297	0.00%	0.00%
Rest of the world	42 075	0.00%	0.00%
Total	310 348	0.01%	-0.01%

Comment: under closure condition 1 (see Table 7.2).

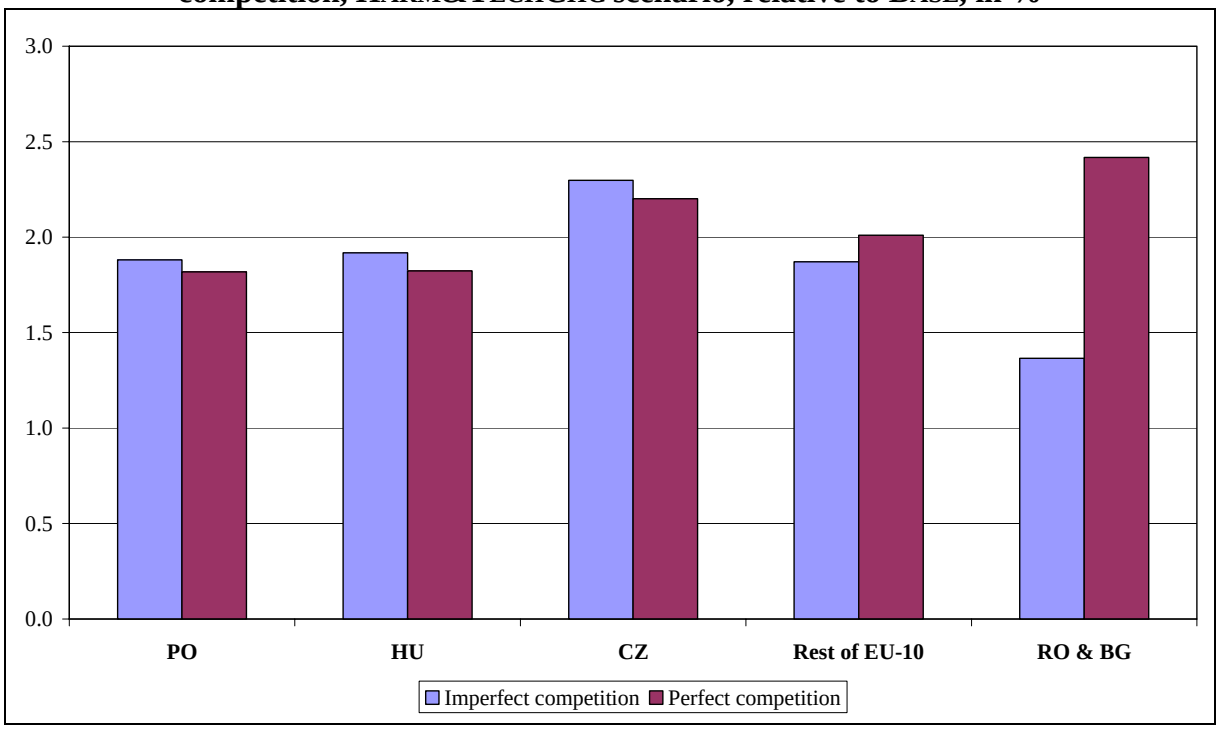
These differences are at first glance surprisingly small. Imperfect competition as modelled here leads to losses in economy-wide efficiency. The impact on income distribution is not visible in the aggregate GDP. The mark-up of monopolistic rents is transferred to the regional household.

In both model versions, import demand in the NMS increases under the combined scenario HARM&TECHCHG. However, there are regional differences: in Poland, Hungary and the Czech Republic, total import demand is higher in the imperfect competition version than in the perfect competition version. For the rest of the EU-10 and Bulgaria and Romania, import demand under perfect competition increases more compared to the change in imports under imperfect competition in food processing industries. In Bulgaria and Romania,

domestic food prices are higher in the model scenario with imperfect competition than with perfect competition, therefore import prices are relatively lower and imports of food products are higher.

On the other hand, prices for agricultural products in Hungary are lower owing to the monopolistic power in the food processing industry. Therefore, agricultural imports are smaller under imperfect competition than under perfect competition. This effect, which can also be observed in the other regions, dominates in Hungary, and leads to a slightly lower increase in imports under imperfect competition in food processing industries compared to the model version which assumes perfect competition.

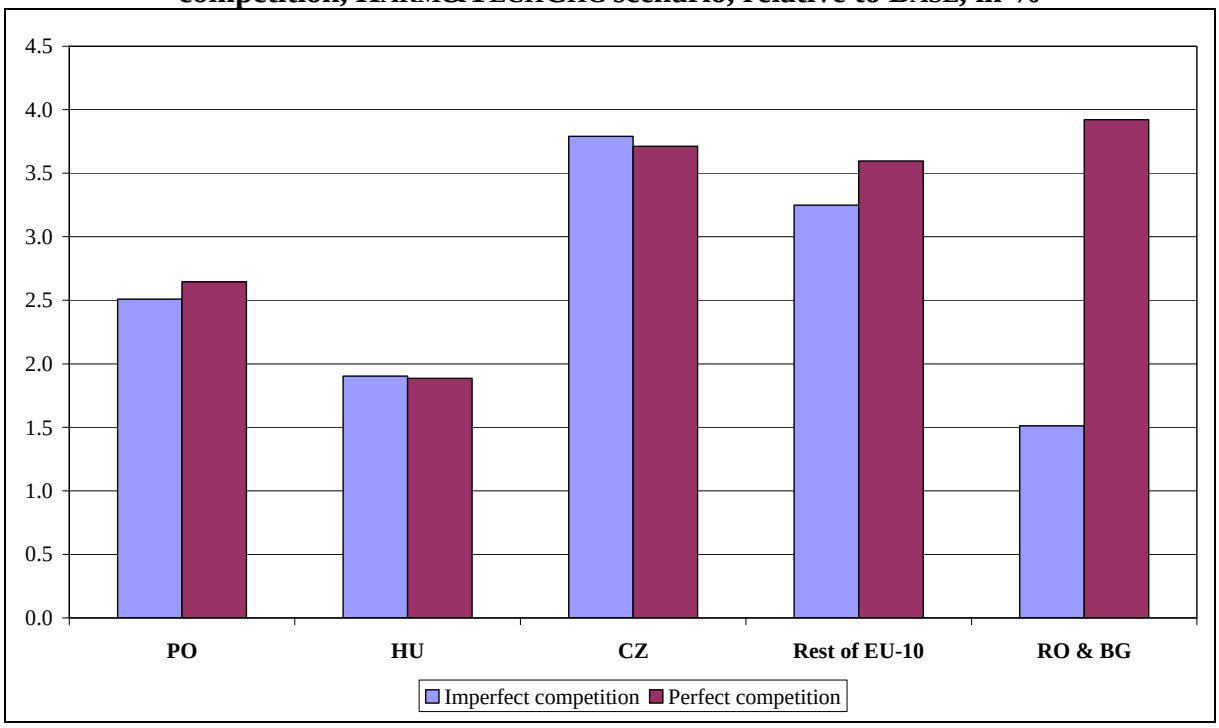
Figure 8.26: Changes in total import demand in the NMS under perfect and imperfect competition, HARM&TECHCHG scenario, relative to BASE, in %



Comment: under closure condition 1 (see Table 7.2).

In most NMS, total export supply differs only a little between the two model versions. However, in Bulgaria and Romania, total exports increase by only 1.5% under imperfect competition compared to almost 4% under perfect competition (see Figure 8.27). This marked difference is due to lower food exports under imperfect competition. Bulgarian and Romanian food processors lose international competitiveness owing to higher prices for food products.

Figure 8.27: Changes in total export supply in the NMS under perfect and imperfect competition, HARM&TECHCHG scenario, relative to BASE, in %



Comment: under closure condition 1 (see Table 7.2).

Figure 8.28 below compares the evolution of producer prices for three NMS, Poland, Hungary and Bulgaria/Romania. Under imperfect competition, agriculture producer prices are lower compared to price changes under perfect competition in food processing. On the other hand, because of market power, food prices are higher under imperfect competition than under perfect competition, as has already been discussed above.

Market power is also reflected in the development of output in both model versions. In almost all cases, food supply increases less under imperfect competition compared to the perfect competition scenario results (see Figure 8.29).

Figure 8.28: Changes in producer prices for agri-food sectors under perfect and imperfect competition, HARM&TECHCHG scenario, relative to BASE, in %

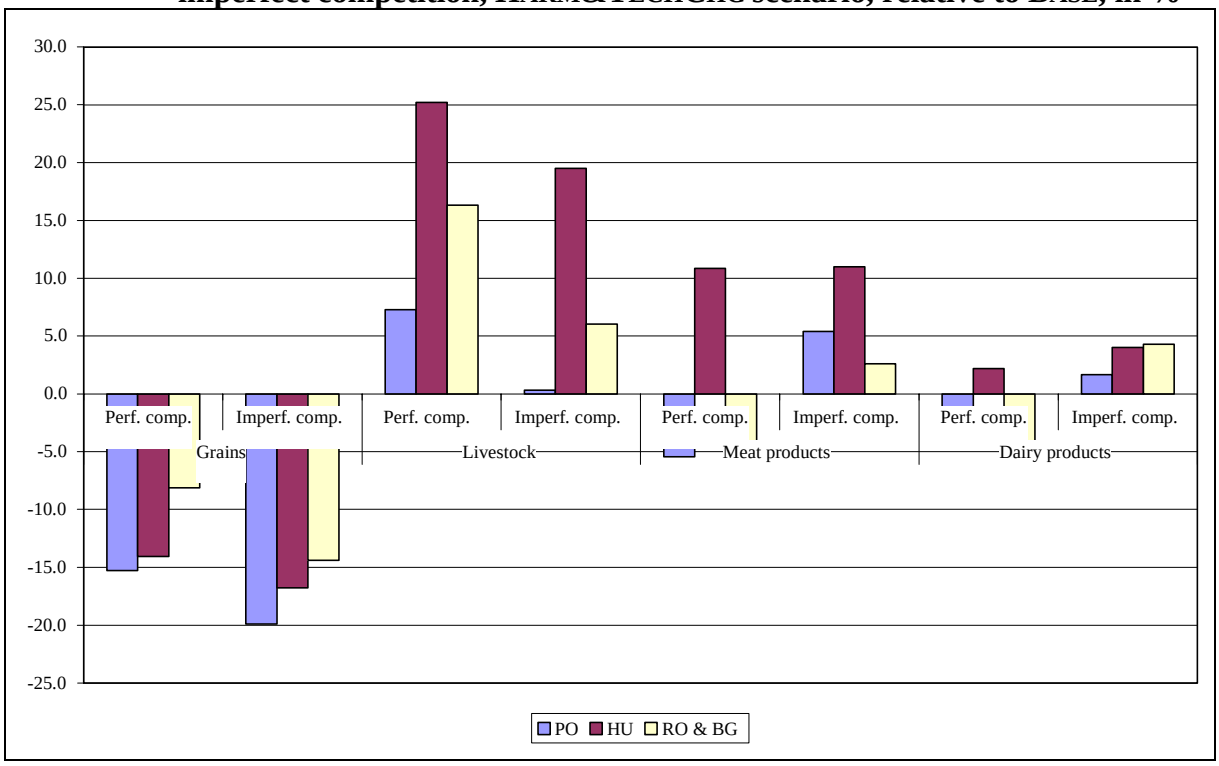
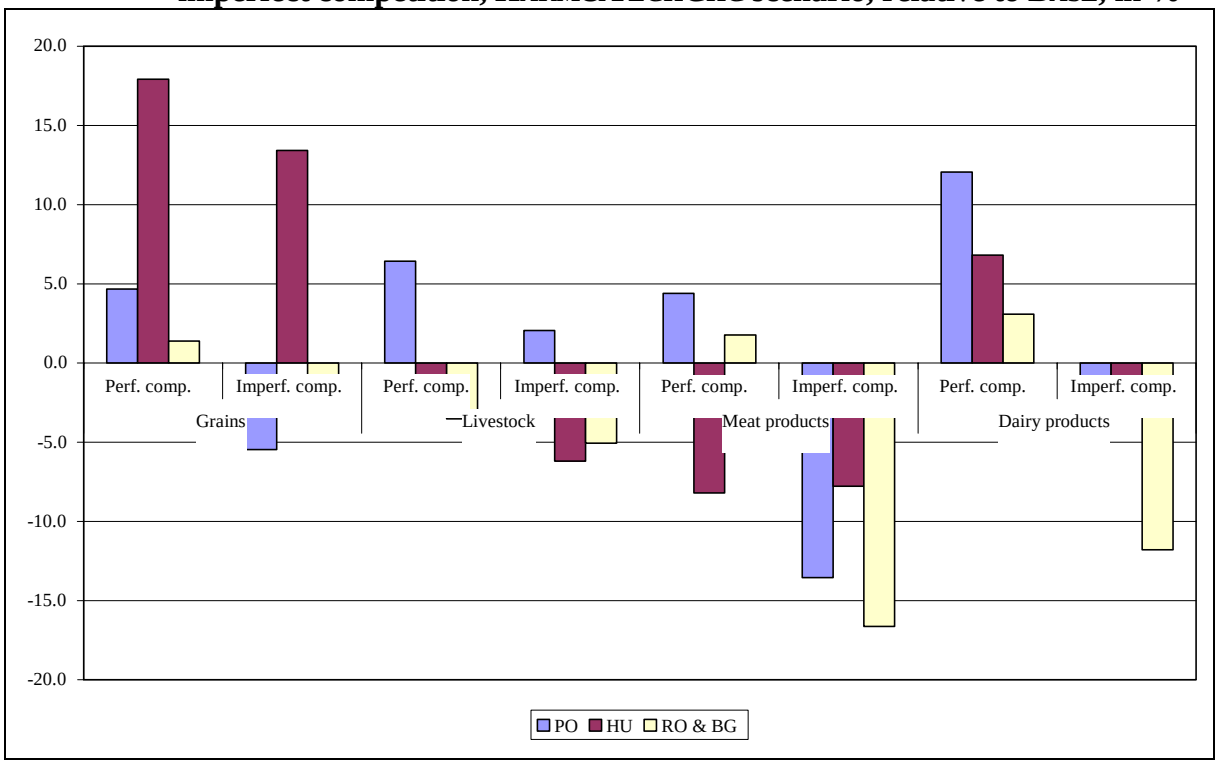


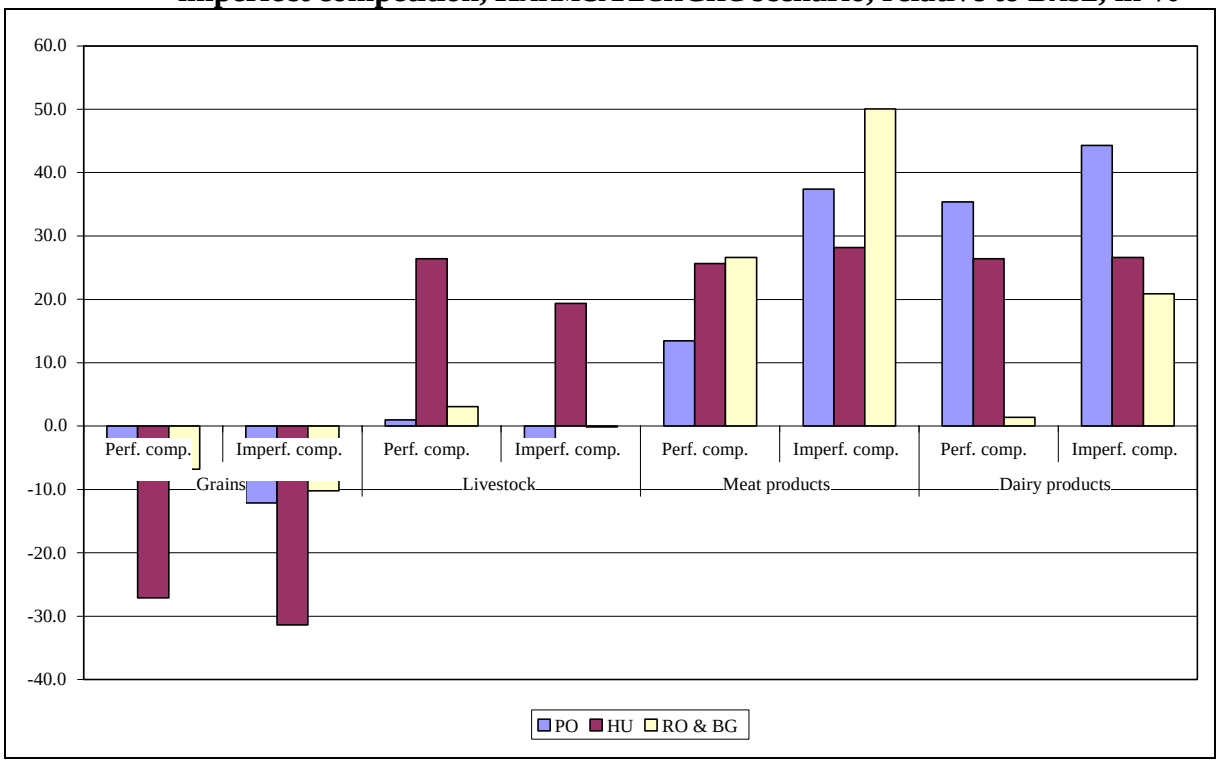
Figure 8.29: Changes in output quantities for agri-food sectors under perfect and imperfect competition, HARM&TECHCHG scenario, relative to BASE, in %



Growth in import demand for primary agricultural products is smaller under imperfect competition owing to the lower prices on domestic markets (see Figure 8.30). So the degree of integration of primary agriculture into the single European market is inhibited by the

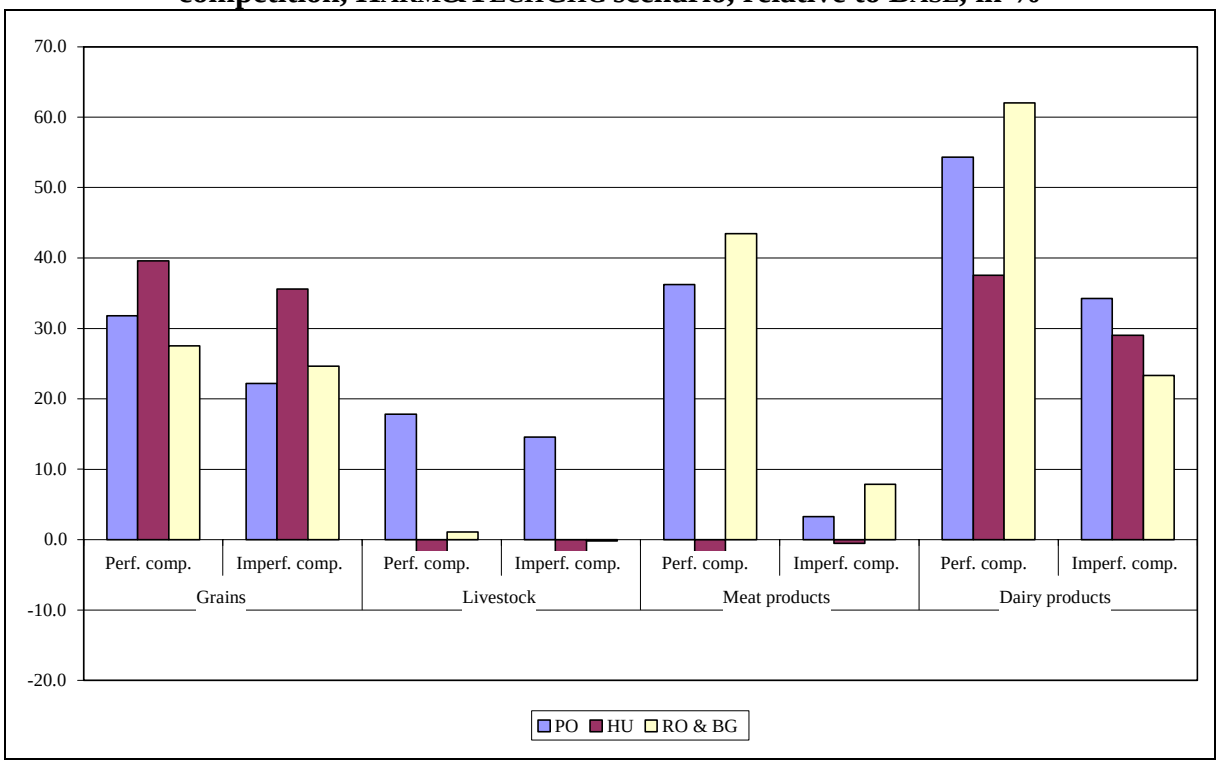
market power of food processing in the NMS. This is also the case for exports of primary agricultural products (see Figure 8.31). For processed food, imperfect competition leads to higher domestic food prices and higher import demand for food. The following figure presents the developments for meat and dairy products. Polish dairy imports increase by 32% in the scenario with perfect competition compared to an increase in dairy imports of more than 42% under imperfect competition.

Figure 8.30: Changes in import demand for agri-food sectors under perfect and imperfect competition, HARM&TECHCHG scenario, relative to BASE, in %



Under imperfect competition the excess supply declines for both primary agriculture and food products. As a consequence, export growth is lower under imperfect competition than in the competitive scenario.

Figure 8.31: Changes in export supply for agri-food sectors under perfect and imperfect competition, HARM&TECHCHG scenario, relative to BASE, in %



Comment: under closure condition 1 (see Table 7.2).

As already outlined in the previous sections, factor prices do not change significantly in the EU-15 Member States under perfect competition. The following table, however, shows also a decline in land prices in the EU-15 Member States in the imperfect competition scenario. Here, the enlargement of the EU as a customs union leads to a decline in land prices in all Member States of the EU-15. On the other hand, imperfect competition reduces the increase in land prices in the NMS. Here, land demand is lower in the imperfect scenario and land scarcity is less obvious than under perfect competition. As with the results for the model with perfect competition, the change in land prices is explained by the introduction of big subsidies on land in the NMS.

Table 8.19: Changes in land prices under perfect and imperfect competition, HARM&TECHCHG scenario, relative to BASE, in %

	Perfect competition	Imperfect competition
Germany	-0.03	-18.52
Italy	0.07	-18.77
Austria	-3.10	-18.99
United Kingdom	-0.26	-24.18
France	-1.00	-18.41
Benelux	0.69	-11.26
Spain and Portugal	-0.60	-21.17
Rest of the EU-15	-0.43	-14.55
Poland	119.94	61.45
Hungary	252.31	199.31
Czech Republic	71.03	27.31
Rest of the EU-10	123.78	75.82
Romania and Bulgaria	241.82	163.64
Turkey	1.03	0.58
Rest of the OECD	-0.05	-0.02
FSU	0.02	0.05
Mercosur	-0.09	-0.07
Rest of the world	-0.01	-0.01

Table 8.20: Changes in land demand under perfect and imperfect competition, HARM&TECHCHG scenario, relative to BASE, in %

	Poland		Hungary		Czech Republic		Rest EU-10		Bulgaria & Romania	
	PC*	IC**	PC*	IC**	PC*	IC**	PC*	IC**	PC*	IC**
Grains	48.11	41.83	48.27	47.01	38.80	34.86	51.66	47.94	31.92	31.88
Sugar cane and beet	-11.57	-15.04	-25.33	-26.81	-12.31	-14.28	-11.73	-14.46	-17.65	-18.32
Other crops	-9.26	-6.70	-29.69	-28.44	-13.48	-11.92	-11.97	-10.43	-14.85	-15.00
Plant-based fibres	-12.74	-12.83	-38.31	-38.01	-38.31	-38.17	-12.98	-15.10	-16.72	-17.17
Livestock	-6.73	-6.39	-19.41	-21.17	-5.34	-4.74	-13.51	-11.63	-21.30	-20.36
Raw milk	-10.47	-8.53	-15.98	-17.36	-6.21	-4.54	-8.08	-7.63	-18.55	-17.94
Other animal prod.	-10.15	-15.27	-24.45	-23.54	-8.40	-7.78	-13.16	-13.01	-19.05	-19.45

Comments: *PC = perfect competition; **IC = imperfect competition; under closure condition 1 (see Table 7.2).

The reduced growth rates in agricultural output in the imperfect competition model version reduce also the land demand for all primary agricultural commodities. The strong shift towards cereal production in the perfect competition scenario is marginally reduced under imperfect competition.

Table 8.21: Changes in unskilled labour demand in agri-food industries under HARM&TECHCHG scenario, relative to BASE, in %

	Poland		Hungary		Czech R.		Rest EU-10		BG-RO	
	PC*	IC**	PC*	IC**	PC*	IC**	PC*	IC**	PC*	IC**
Grains	-5.18	-12.57	10.66	7.01	-4.72	-11.27	2.89	-2.17	-7.99	-5.16
Sugar cane & beet	3.12	-6.80	0.93	-4.38	5.90	-1.13	5.90	-0.37	1.51	5.14
Other crops	-2.73	-5.08	-11.69	-12.81	-1.76	-4.85	-1.87	-3.79	-1.30	1.70
Plant-based fibres	-0.46	-5.17	9.56	7.00	-0.08	-4.67	1.23	-4.29	3.80	7.01
Livestock	7.57	3.01	5.11	0.25	3.76	-0.63	0.30	-1.35	1.69	3.36
Raw milk	1.57	-0.84	7.51	3.56	1.17	-1.88	3.44	1.35	1.31	3.32
Other animal prod.	3.85	-5.55	-0.77	-1.73	1.71	-2.44	0.99	-1.94	1.52	4.85
Meat	8.36	-0.14	10.56	6.08	5.12	-0.37	7.19	0.13	-1.00	5.61
Meat products	2.40	-7.70	-2.08	0.22	0.68	-5.32	0.02	-7.70	-6.59	1.31
Vegetable oils	-2.64	-11.22	-9.64	-14.59	-4.53	-10.31	-2.25	-9.23	-6.15	-2.91
Dairy products	8.02	1.16	6.46	0.40	5.53	1.03	20.42	14.94	-4.37	1.12
Sugar	3.27	-4.86	5.40	-0.06	3.39	-2.34	6.85	0.12	-1.08	3.13
Other food prod.	0.72	-6.59	0.27	-5.40	-0.11	-6.94	0.17	-6.84	-1.12	3.26
Bever. & tobacco	-0.41	-9.58	-0.15	-8.23	-1.44	-9.51	1.05	-7.72	0.22	2.11

Comments: *PC = perfect competition; **IC = imperfect competition; under closure condition 1 (see Table 7.2).

Similar to the less pronounced demand for land is also the demand for labour under imperfect competition. Here, employment in agriculture as well as food processing declines as a consequence of imperfect competition in food processing industries. Employment in almost all sectors of food processing is reduced under imperfect competition. Imperfect competition shows similar tendencies in the agri-food sectors in the EU-15 Member States, although these are less significant than in the NMS.

9 Conclusion of the quantitative analysis

The simulations carried out with the GLOBE model and its imperfect competition variant (GLOBE_IC) indicate how the enlargement of the EU will impact upon the incentives faced by the agriculture and food sectors within the EU-15 and the NMS.

The specific aggregation of the GLOBE model for this study consists of 23 commodities and activities, 5 factors and 18 regions. The sectoral mappings follow the principle of achieving a balanced representation of the agriculture and food sectors in the EU and the accession and candidate countries. Additionally, attention is given to the magnitude of the rates of agricultural support recorded in the GTAP database in order to ensure that the key dimensions of policy harmonisation are adequately covered in the database.

The impact of EU membership and introduction of the CAP in the NMS is mainly driven by the differences in the level of support for agriculture prior to accession and the intensity of bilateral trade relations before EU membership. The impact of CAP introduction at the level of the overall economy largely depends on the initial share of the agri-food sector in the accession countries. Here, in general, agriculture and food processing play a stronger role than in the EU-15.

Two sets of policy simulations were conducted for this study with a perfect and an imperfect competition model. The first considered the harmonisation of trade taxes and agricultural support instruments across the EU and the accession and candidate countries, while the second assessed the impact of technical progress in the food and agriculture sectors of the accession and candidate countries that may be induced by the combination of EU membership and FDI.

As shown in the analysis, the introduction of the CAP in the NMS leads in many markets to an increase in agricultural producer prices. In those markets the CAP provides an incentive to expand agricultural output and to gain market shares in the single European market.

The introduction of the CAP affects agri-food production and consequently also demand for labour. However, the changes in labour demand are relatively small compared to land demand. These different effects originate from the fact that land is a sector-specific factor in

agriculture. On the other hand, labour is assumed to be mobile and able to move into and away from agriculture. The production technology allows substitution between different production factors. Lower land user prices lead to an increase in land use and a decline in labour use in some cropping sectors, e.g. grains. Here, changes in relative factor prices increase labour intensity in grain production in Poland, the Czech Republic and Bulgaria and Romania. In the food processing industries, growing output in dairy and meat processing leads also to an increase in employment.

In both model versions – the perfect as well as the imperfect competition model – import demand in the NMS increases, with regional differences. In Bulgaria and Romania, domestic food prices are higher in the model scenario with imperfect competition, therefore import prices are relatively lower and imports of food products are higher. In Hungary, prices for agricultural products are lower owing to the monopolistic power in the food processing industry. Consequently, agricultural imports are smaller under imperfect competition than under perfect competition. This effect, which can also be observed in other regions, dominates in Hungary, and leads to a slightly lower increase in imports under imperfect competition in food processing industries compared to the model version which assumes perfect competition.

The competitiveness of the EU agri-food industry improves only slightly under the conditions of the enlarged market of 27 Member States. In the case of the single European market, the impact of enlargement on the position of the food industry in the EU-15 Member States is rather limited. Introduction of the *acquis communautaire* does not change the rules of business for farmers and food processors in the EU-15 countries. However, the single European market provides both an opportunity and a threat for the agri-food industry in the NMS. On the one hand, the single European market means an extended free trade area for producers in the NMS with greater market potential. On the other, farmers and food processors now compete with their neighbours from the EU-15 countries.

To seize these opportunities, the food industry has to make FDI more attractive. The scenario analysis of this study identifies the importance of FDI for production, trade and income in the NMS. With enhanced attraction of FDI, the integration of the agri-food sectors in the NMS into the single European market will become even stronger. However, properly functioning factor markets is another precondition for this kind of successful development. Market imperfections, such as high labour immobility, significantly reduce the benefits of EU

membership. The results show that with high labour immobility, the overall impact of EU membership can be negative if no structural change is taking place.

However, the functioning of agricultural and food market mechanisms after enlargement is crucial in terms of production and trade in agri-food products. This analysis shows that under imperfect competition in the food processing industries the demand for agricultural products by the downstream processing sector will be much smaller than under properly functioning markets. Under distorted market conditions with imperfect competition, the positive effects of EU accession will be much smaller. The presence of imperfect competition will damp down the expansion of trade owing to the reduced changes in the prices of agricultural products due to the margin-taking activities of processors.

Only functioning markets can guarantee that the potential of a growing and integrated agri-food market will be fully harnessed in the new Member States of the enlarged European Union.

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Database sources (PART A)

Food industry data are taken from various sources:

- **Eurostat**: Statistical Office of the European Communities;
- **FAOSTAT**: FAO (Food and Agriculture Organization of the United Nations) Statistical Databases;
- **OECD**: Organisation for Economic Co-operation and Development – Statistics;
- **UNCTAD**: United Nations Conference on Trade and Development – FDISTAT;
- **WIIW**: The Vienna Institute for International Economic Studies – Industrial Database and Database on FDI;
- **EarthTrends-Database**: on Agriculture and Food, supported by the World Resources Institute while the data are provided by the World Bank;
- **M&M Planet Retail**;
- **Euromonitor International**;
- **USDA**: United States Department of Agriculture – Foreign Agricultural Service.

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Abstract

This report is based on a study assigned to the Centre for European Policy Studies (CEPS) by the European Commission's Joint Research Centre, Institute for Prospective Technological Studies (JRC-IPTS) to investigate recent developments in the European food industry and the impact of foreign direct investment (FDI) and trade flows on the food industry in the EU-25.
The report illustrates trends in and the structure of the European food industry. Past and possible future developments are analysed, identifying the drivers behind development of the food industry and assessing the impact on production, structures, farmers and trade. Another key feature of this report is to assess the impact of EU accession and of harmonisation of trade policy for agricultural commodities and processed agri-food products on both the EU-15 and the new Member States (NMS).

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