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- A better functioning food supply chain in Europe

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COMMISSION STAFF WORKING DOCUMENT

***The evolution of value-added repartition along the European food supply chain***

*Accompanying document to the*

**COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN  
PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL  
COMMITTEE AND THE COMMITTEE OF THE REGIONS**

**A better functioning food supply chain in Europe**

{COM(2009) 591 final}

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## COMMISSION STAFF WORKING DOCUMENT

### The evolution of value-added repartition along the European food supply chain

#### 1. INTRODUCTION AND BACKGROUND

The Communication on "A better functioning the food supply chain in Europe" and its supporting Working Documents on "Analysis of Price transmission along the food supply chain in the EU" have contributed to better understand the price transmission mechanisms from agricultural commodity prices to food consumer prices. However, potential market malfunctioning still needs to be identified more precisely in order to lead to actionable policy recommendations to improve the functioning of the supply chain.

Since the summer 2008, the sharp decline in agricultural commodity prices has affected first and foremost the agricultural sector. Ensuring the supply chain is well functioning should remain a key priority of the European Union, in order to protect both consumers, with lower food prices and actors along the chain, through value-added growth across sectors and sustainable sharing of profits. It is thus timely to focus on the repartition of value-added within the food supply chain and to better understand how value-added is shared between sectors of the chain.

The value-added of a sector is defined as the difference between its gross output (total production value of the sector) and its intermediary inputs (costs of production inputs). It measures the amount of value created by the sector, to be then shared between labour (wages and compensations), capital (remuneration of capital and profits) and taxes. Value-added of a sector is a good proxy for its economic importance and its evolution provides insights on the sector's economic health. Moreover, within a supply chain, the value-added of the different sectors are linked since gross output of the upstream sector is a component of intermediate inputs of the downstream sector. Comparing evolution of the repartition of value-added along the food supply chain can then be informative on the evolution of bargaining power along the chain and on the inability for a sector to maintain its value-added faced with an increase of costs of intermediate inputs. The objectives of the analysis are then threefold:

- Describe how the repartition of value-added between the 3 main sectors of the food supply chain (agriculture, food industry and distribution) has evolved over time,
- Gain a better understanding of key factors explaining this evolution and especially the impact of the evolution of prices along the food supply chain (agricultural commodity prices, food producer prices and food consumer prices),
- Derive key insights on the functioning of the food supply chain and potential policy implications.

The analysis of evolution of repartition of value-added along the food supply chain will rely mostly on the EU KLEMS database – see box 1.

#### **Box 1: Data coverage and limitations of the EU KLEMS database**

The EU KLEMS database is the result of a three year European Commission funded research project publically available for free public use at <http://www.EUKLEMS.net>. Its purpose is to provide data for growth accounting in order to better understand components of growth in value-added at sector level (NACE rev. 1.1. classification). For each sector, variables covered by the database include value-added, gross output, intermediary inputs and a set of explanatory variables to their evolution, most importantly price and volume components and labour information (labour productivity, labour inputs).

The time period covered is 1995-2005. Geographical coverage includes all countries of the EU, with the exception of Romania and Bulgaria; value-added will be analysed for the 4 main following country-aggregates: the EU25, EU15, EU10 and Euro Area (EA12). The food supply chain is defined as connecting the 3 following activities: agriculture (sector 1 in NACE rev. 1.1. at 2-digit level classification), the food and beverage industry (15), and the distribution sector, composed of wholesale trade (51) and retail trade (52).

The major limitations in the use of the EU KLEMS database for the study of value-added evolution along the food supply chain are the following:

- (i) Data are only available for the total wholesale and retail sectors and not at the disaggregated food wholesale and retail level. Complementary data from EUROSTAT will be used to assess value-added for food distribution activities,
- (ii) Data from EU KLEMS focus on local production and thus reflect local value-added created by a sector, not taking into account potential changes in integration patterns,
- (iii) No consistent data are available across the sectors of the food supply chain on gross output and intermediary inputs values. The analysis will thus focus on value-added evolution only.

The methodology used to analyse value-added and its evolution along the chain is presented in Section 2. Section 3 describes the actual evolution of value-added by sector of the food supply chain over the 1995-2005 period. Potential causes of value-added evolution in the food supply chain are discussed in Section 4 and the breakdown of distribution of value-added between labour and capital is analysed in Section 5. The last section concludes.

## **2. METHODOLOGY FOR ANALYSIS OF VALUE-ADDED EVOLUTION**

### **2.1. Definition of value-added**

The value-added of a sector (VA) is defined as the difference between its gross output (GO) and its intermediary inputs (II):

$$VA = GO - II \quad (1)$$

Thus, a decrease of the value-added of a sector can thus either relate to a decreasing output (either through lower volumes or lower prices) or to increased costs of intermediary inputs.

### **2.2. Analysis of value-added evolution**

Value-added growth can be disaggregated into several growth components that provide interesting insights on the cause of value-added evolution. A first disaggregation aims at

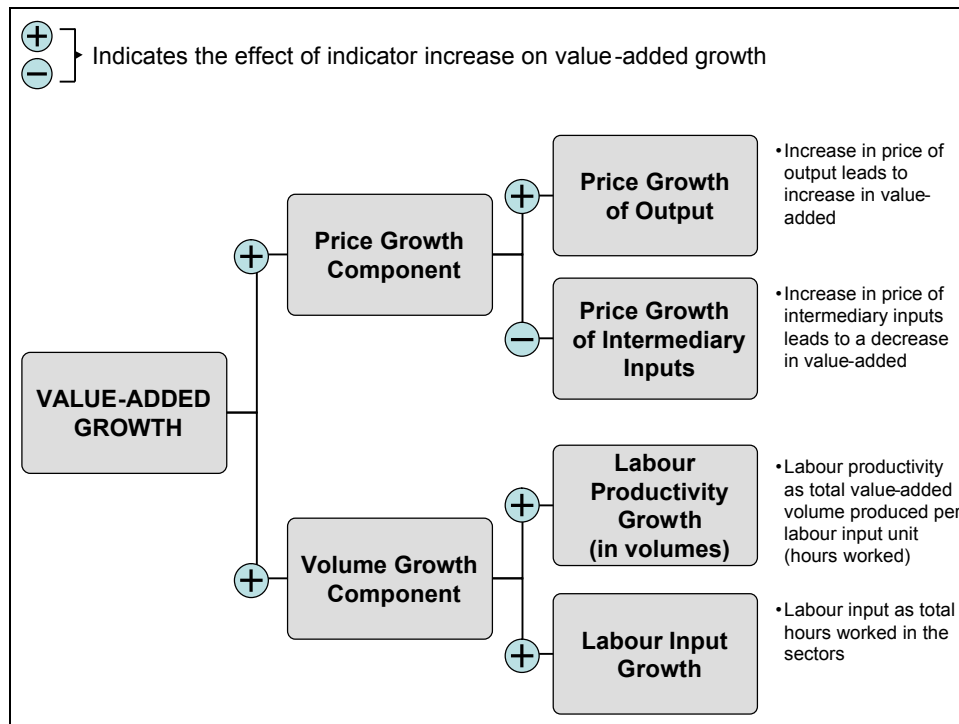
differentiating the impact of price and volume evolutions on total growth. With  $P_{VA}$  and  $V_{VA}$  the price and volume indices for value-added, and with  $\delta$  the growth rate, we have:

$$\partial VA \approx \partial P_{VA} + \partial V_{VA} \quad (2)$$

However, one should pay attention that the value-added price index is a proxy for the relative evolution of output prices of the sector (e.g. for the food industry, prices of producer food prices) vs. the intermediary inputs prices (e.g. for the food industry, prices of agricultural commodities, prices of energy...). It is thus necessary to compare growth of output and input prices to understand the evolution of the value-added price index.

The value-added volume index can also be broken down into two components: labour productivity and labour input. A decreasing value-added can thus be linked to a decline in labour productivity or in the number of people involved in the activity - See figure 1.

**Figure 1: Structure of analysis of value-added evolution for a given sector**



### 2.3. Sharing value-added within a sector

The value-added created by a sector is then shared between labour (LAB) and capital (CAP) compensations:

$$VA = LAB + CAP \quad (3)$$

Capital compensation includes remuneration of capital invested in the sector, tax compensations and profits distributed within the sector. Consequently, a decrease in value-added can lead to lower compensations for the workers active in the sector, or lower capital remunerations – e.g. lower investments, lower profits,...

The evolution of labour compensations across sectors will be analysed through the evolution of unit labour compensation (labour compensation per hour worked).

### 3. EVOLUTION OF VALUE-ADDED IN THE EU FOOD SUPPLY CHAIN

This section shows the different sizes of sectors of the food supply chain and presents how the repartition of value-added has evolved within the food supply chain over the decade 1995-2005.

#### 3.1. Repartition of value-added along the food supply chain in the EU

The total value-added of sectors composing the food supply chain in Europe represented more than €1 150 billions in 2005 in the EU25, *i.e.* ~11% of total EU25 value-added. In the new Member States, this share is slightly higher, amounting to ~13%. Approximately 90% of the food supply chain value-added in Europe is created in the old Member States.

Value-added of the agricultural sector in the EU25 was ~€130 billions in 2005 (1.2% of total value-added). Value-added of the food and beverages industry was 1.4 times bigger, with ~€180 billions (1.9% of total). The total distribution (wholesale and retail trade) sector value-added amounted to ~€860 billions, almost 3 times as much as the agricultural and the food industry sectors combined. However, the value-added of the distribution sector of food products only is much smaller: based on estimations from EUROSTAT data, food distribution amounts to 25% to 30% of total distribution activities – see box 2 for more details.

#### Box 2: Share of food distribution in total distribution in the EU25

	Share of food distribution in total distribution (2005)			Variations in share of food distribution in total distribution (2000-2005)		
	Wholesale	Retail	Total Distribution	Wholesale	Retail	Total Distribution
<b>Value-added</b>	18%	34%	25%	+ 0.3%	-1.8%	-0.7%
<b>Turnover</b>	19%	38%	28%	-0.4%	+ 0.2%	0.1%
<b># of persons employed</b>	22%	38%	32%	0.0%	+ 0.4%	0.3%
<b>Personnel costs</b>	19%	38%	28%	-0.3%	+ 2.6%	1.3%

Source: EUROSTAT Structural Business Statistics; the food wholesale sector includes G512 (Wholesale of agricultural raw materials, live animals) and G513 (Wholesale of food, beverages and tobacco); the food retail sector includes G5211 (Retail sale in non-specialized stores with food beverages or tobacco predominating) and G522 (Retail sale of food, beverages, tobacco in specialized stores).

Value-added of food distribution activities in the EU25 represents approximately one fifth (18%<sup>1</sup>) of total wholesale trade and one third (34%) of total retail trade. Data for other indicators (turnover, number of persons employed) are of similar magnitude, suggesting that distribution of food products is similar to other distribution activities in terms of business model. However, a closer look to results suggests that food distribution is more labour intensive than average distribution (higher share of persons employed than of value-added) and that the food retail activity creates less value-added than average retail activity per euro of

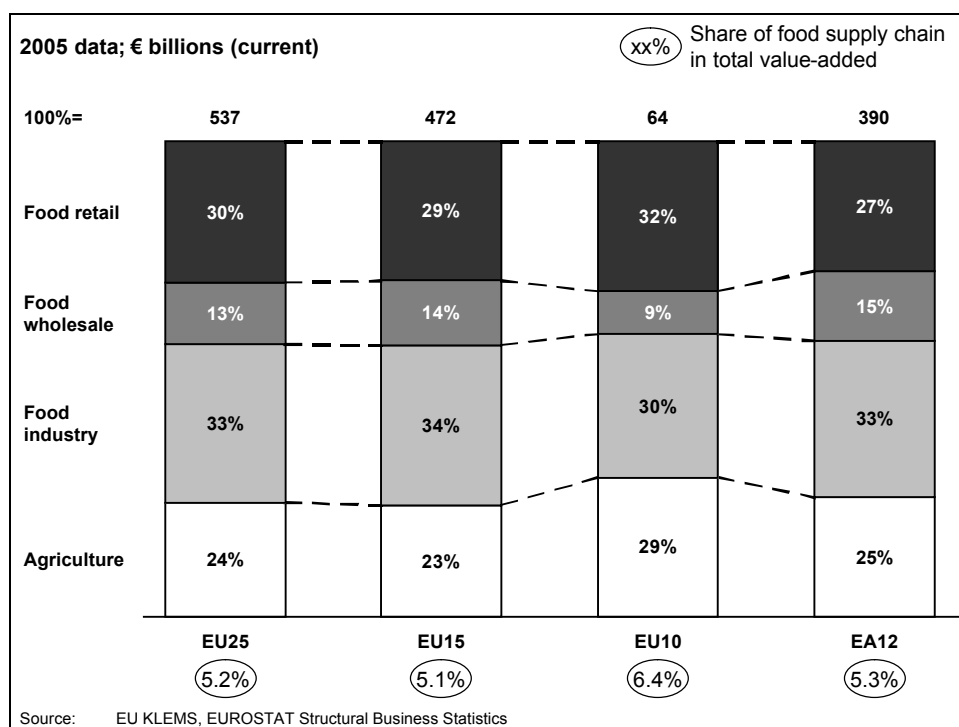
<sup>1</sup> This 18% figure includes the wholesale trade of agricultural products (3% of total wholesale trade).

sales. The fact that the share of food wholesaling in total wholesale is significantly smaller than the share of food retail in total retail also indicates that the food supply chain is less fragmented vertically than other retail chains, with a higher share of direct sales between producers and retailers.

The dynamic vision of the share of food distribution in total distribution also provides interesting insights on the trends affecting the distribution sector. The share of food wholesale value-added over total wholesale has been almost stable over the 2000-2005 period (+0.3% in 5 years) while the share of food retail value-added has been decreasing (-1.8% in 5 years). However, the share of food retail in total turnover has remained stable; this might indicate that food retail is becoming less efficient than other retail activities.

The repartition of value-added between the sectors of the food supply chain is presented on figure 2 for the year 2005 and the 4 main geographic aggregates considered.

**Figure 2: Repartition of value-added in the food supply chain for EU25, EU15, EU10 and EA**



Total value-added for the food supply chain in the EU25 in 2005 was ~€540 billions, *i.e.* 5.2% of the total value-added of the European economy. The agricultural sector represented 24% of this total, the food industry 33% and the distribution sector 43% (13% for wholesale and 30% for retail). The value-added of each sector is thus increasing moving downwards along the chain: in 2005, the food industry value-added was 1.4 bigger than the value-added of agriculture and the distribution sector was 1.3 bigger than the food industry.

The structure of the food value-chain is homogeneous across the main considered country aggregates. The repartition in the new Member States (EU10) is nonetheless slightly different



than in old Member States (EU15): agriculture has a higher weight (29% vs. 23%), equivalent in size to the food industry sector. The breakdown of the distribution sector is also specific with a much weaker wholesale sector (9% vs. 14%) and consequently a larger retail sector (32% vs. 29%). Moreover, the weight of the food supply chain in the economy of new member states is higher than in old member states (6.4% vs. 5.1%).

### **3.2. Evolution of repartition of value-added along the food supply chain**

The food supply chain has overall been growing at a low pace over the 1995-2005 decade in the EU25 at 1.2% per year, significantly below the growth of the total EU25 value-added (3.2%). In all geographic aggregates, total value-added growth has been higher than food supply chain growth. The difference is the lowest for new Member States where growth has also been the highest (3.1% for the food supply chain vs. 4.7% for the overall economy)<sup>2</sup>.

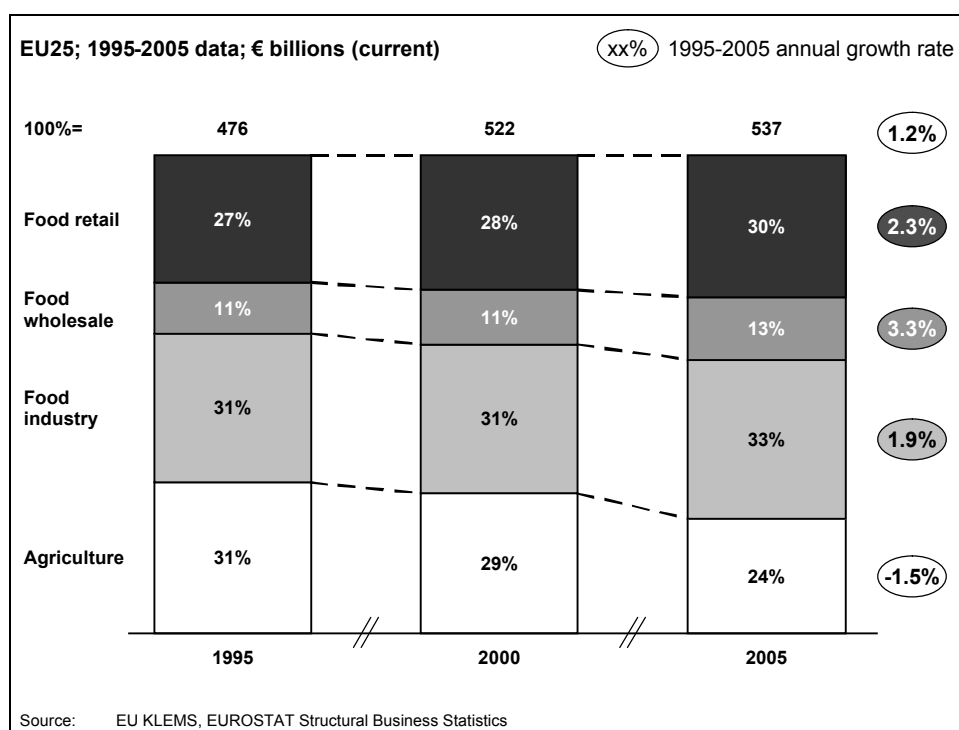
However, each sector of the chain has experienced a different growth pattern. Agriculture value-added has declined over the 1995-2005 decade, with a 1.5% per year decrease. One should note that 2005 has been a bad year for the agriculture sector with a 13% value-added decrease in one year compared to 2004. However, notwithstanding the temporary effect of year 2005, it still remains that the agricultural sector has experienced negative growth in the period<sup>3</sup>. In the meanwhile, the other sectors of the chain have grown over the period, though none of them has significantly overcome the total growth of EU25 value-added: +1.9% per year for the food industry, +3.3% for the food wholesale sector and +2.3% for the food retail sector – See figure 3.

**Figure 3: Evolution of value-added within the EU25 food supply chain between 1995 and 2005**

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<sup>2</sup> See Annexe A.1 for more details.

<sup>3</sup> The start in 2005 of the implementation of CAP reforms aiming at decoupling direct aid to farmers has further amplified the measured drop in value-added in the agricultural sector. For the sake of clarity, the reference period has been kept as 1995-2005 – however, all analyses in this paper have been conducted as well for the period 1995-2004, confirming the results and trends presented relative to the agricultural sector.



Consequently, the pattern of distribution of value-added across the food supply chain has significantly changed in the EU25 during the 1995-2005 decade. The share of agricultural industry has consistently decreased under the combined effect of its negative value-added growth and the much more dynamic growth of the other sectors. The share of agriculture in food supply chain has decreased from 31% in 1995 (equal to the share of the food industry) to 24% in 2005 (with a food industry at 33%). The distribution sector has increased its share in the same period by 2% for the food wholesale sector (from 11% in 1995 to 13% in 2005 and by 3% for the food retail sector (from 27% to 30%). It is then interesting to note that the relative size of sectors has increased downwards along the chain. In 1995, the ratio of the food industry value-added over agriculture value-added was 1.0; it has increased up to 1.2 in 2005. The ratio of food distribution value-added over food industry value-added has increased from 1.2 to 1.4 in the same period. In summary, each sector has increased its size compared to the sector directly upwards in the chain.

This pattern of increasing differences in size of sector at each interface of the value-chain is pervasive across all geographic aggregates considered – see annex A.2. The share of agriculture value-added in the food supply chain value-added has decreased by 7% in the EU15, 12% in the EU10 and 7% in the EA12. This share has been taken up by the food industry (+2% on average) and by the distribution sector (+6%). The New Member States have however experienced an even stronger increase of the share of food retail in the supply chain (+9% over the period).

### 3.3. Recent evolution within the European food supply chain

The EU KLEMS database does not contain data for years after 2005. However, the analysis of short-term business statistics can provide insights on the potential evolution of value-added in the most recent period from 2005 to 2008.

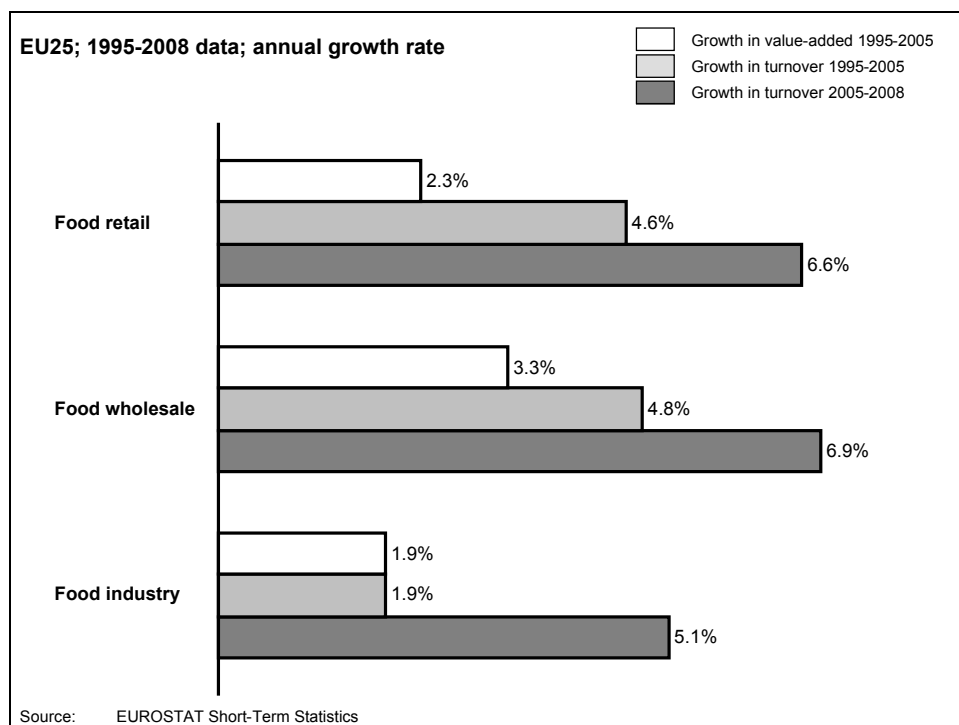
The Economic Accounts for Agriculture provide data for the evolution until 2007. Value-added growth rate in the EU25 for the Agriculture sector between 2005 and 2007 has been

declining at -0.4%, at a lower pace than in the 1995-2005 period. Similarly to the 1995-2005 decade, the decline has been sharper in the EU15, with a -1.2% growth rate.

Figure 4 describes the respective evolution of value-added and turnover for the food industry, food wholesale and food retail sectors.

First, it is interesting to note that in the 1995-2005 period, value-added and turnover follow similar trend in each sector. The analysis of turnover evolution during 2005 and 2008 can then be used as an indicative proxy towards value-added evolution in each sector – assuming that average prices of inputs in each industry has not significantly changed in the period. For all sectors downwards in the food supply chain, turnover has increased faster in recent years than in the 1995-2005 decade: at ~7% per year between 2005 and 2008 for food retail and wholesale compared to ~5% between 1995 and 2005, and at ~5% for the food industry compare to the previous 2%. It is then likely that value-added for the food industry and the food distribution sectors has kept on increasing at steady rates above 2% in recent years. Moreover, value-added in the food industry may have increased faster than in the distribution – retail and wholesale – sectors.

**Figure 4: Comparison of value-added and turnover growth rates between 1995 and 2005 in the EU25 food supply chain**



As a conclusion, the analysis of recent trends confirms the growing gap between agriculture and the rest of the food supply chain in terms of value-added growth. However, the increase in relative size of the food distribution sector and the food industry might have come to an end given the very high turnover growth of the food industry in the past three years.

Key insights provided by the analysis of repartition of value-added within the food supply chain are summarised in box 3. Given the strong changes undergone by the food supply chain, it is important to understand what factors have been at play and what can explain the relative decline in agricultural weight within the food supply chain.

**Box 3: Key messages on the evolution of repartition of value-added along the food supply chain in the European Union**

The Food supply chain makes ~5% of total value-added in the EU25 and ~6% in the new Member States and is thus an important sector of the European economy, however growing slowly compared to the overall European economy (+1.2% per year vs. 3.2%).

In 2005, value-added was distributed between the 3 main activities of the chain according to the following pattern: agriculture (24%), food industry (33%) and distribution (43% – 13% for wholesale and 30% for retail). Thus, downwards sectors of the chain create more value-added than their upwards counterpart in the food supply chain.

Moreover, this situation has become more marked over time between 1995 and 2005. The relative size of food industry vs. agricultural sector and the relative size of distribution vs. the food industry have increased. This highlights the fact that more and more of the value-added of the chain is created downwards along the chain

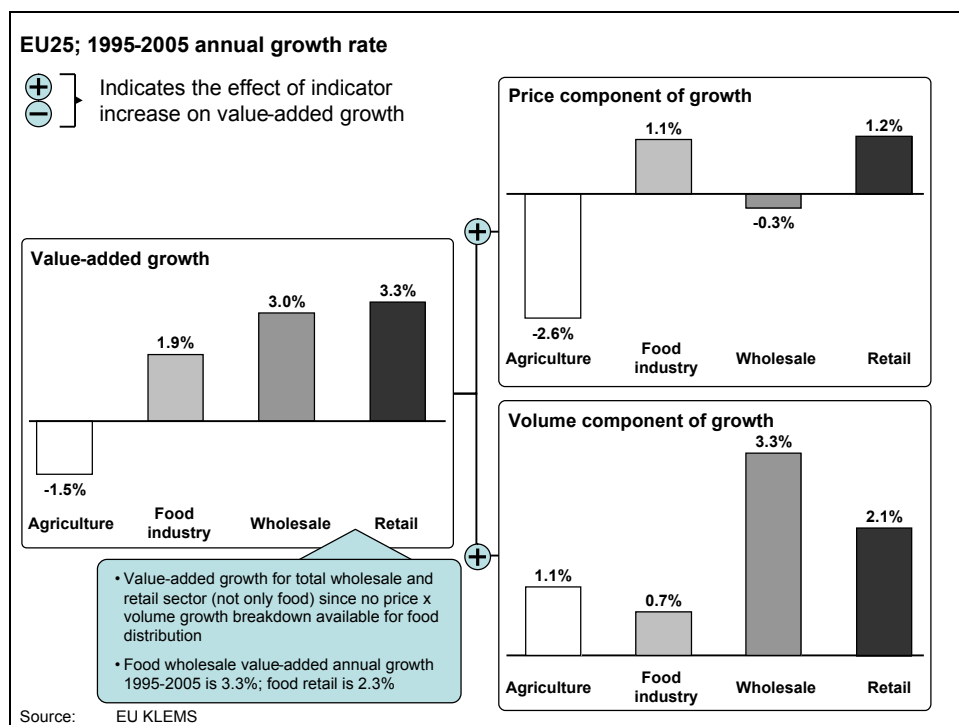
## 4. POTENTIAL CAUSES OF EVOLUTION OF VALUE-ADDED

The aim of this section is to provide complementary analyses to understand why the different sectors of the food supply chain have experienced significantly different value-added growth rates over the 1995-2005 period. The methodology discussed in section 2 will be leveraged to break down value-added growth into a price and a volume growth component. Each component will then be analysed separately. Given the availability of data in EU KLEMS, indicators for total wholesale and total retail will be used as proxy for food wholesale and food retail. Given the discussion in box 2 on relative evolution of food distribution and total distribution, this should not distort conclusions significantly.

### 4.1. Price and volume growth components

The analysis of price and volume contribution to value-added growth provides valuable insights to understand the decline of agricultural share in the food supply chain value-added – see figure 5.

**Figure 5: Volume and price growth components in value-added growth by sector of the food supply chain in the EU25**



Agriculture is the only sector of the chain where the value-added price index has significantly declined over the 1995-2005 decade (-2.6% per year). The volume growth of the agricultural sector has not been high enough (1.1%) to compensate this price decrease. The food industry growth has been driven by simultaneous growths of price and volume indices (respectively +1.1% and +0.7%). Last, growth in the distribution sector, and especially in wholesale, has been driven by a strong volume growth (+3.3% in wholesale and +2.1% in retail). Thus, three simplified patterns of value-added growth have occurred between 1995 and 2005 within the food supply chain. Value-added decrease in the agriculture sector driven by price decrease, value-added increases in the food industry driven by simultaneous price and volume increase and value-added increase in the distribution sector driven by volume increase.

The dynamic has been slightly different in the New Member States than in the rest of the Union – see Annex A.3. In all sectors, contribution of growth in volumes has been much more important than in old Member States (+2.3% volume growth in the agricultural sector, +3.7% in the food industry, +6.9% in wholesale and +4.1% in retail). Contribution of price growth has been similar to the ones observed in the rest of the EU with the notable exception of the food industry, where price growth has been null. Thus, in the EU10, the main factor explaining value-added growth is the volume component.

As a conclusion, it seems that an important factor of the decline in the relative share of value-added has been a decline in the relative prices of agricultural commodity prices vs. agricultural input prices.

#### **4.2. Price component of value-added growth**

Since the price component of value-added growth is an indicator of the relative evolution of output and input prices of a sector, the significant decrease in value-added price component over the 1995-2005 decade (-2.6% per year) suggests that agricultural commodity prices (gross output prices of the agricultural sector) have increased much less than prices of inputs to the agricultural sector over the period. This decline in agricultural value-added price index is similar in each of the country-aggregates analysed (-2.6% in the EU27, EU15 and EU10), potentially illustrating the integration of the agricultural sector, both in terms of output prices and of input prices (energy, other agricultural commodities...).

On the contrary, the food industry value-added price index has grown ~1% per year over the period, probably benefiting from lower input prices (and among them agricultural prices). However, one can note an important difference for the food industry in the new Member States, where value-added price indices have been stable for the past decade whereas the increase amounts to 1.1% or 1.2% per year in the EU15 and the Euro Area<sup>4</sup>. The price evolution of the distribution sector is more difficult to interpret since the data presented include the whole distribution sector, and not only the food distribution sector.

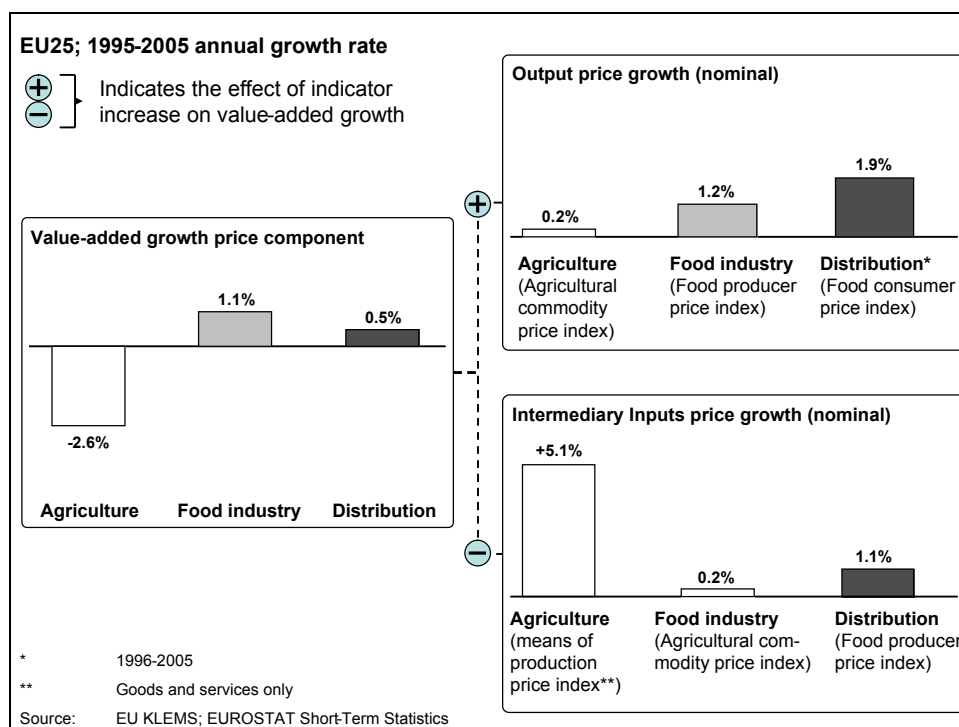
In order to validate these assumptions, it is interesting to compare actual variations of output and input prices for each sector of the supply chain. For the sake of simplification, only 3 sectors are considered: agriculture, food industry and distribution. The output of one sector of the chain is assumed to be the main input of the downward sector of the chain. Thus, agricultural commodity price indices are used to assess evolution of both output price of the agricultural sector and input price of the food industry sector. This analysis provides insights on whether the evolution of value-added price index stems from a variation in output prices or in input prices<sup>5</sup> - see figure 6.

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<sup>4</sup> A potential explanation for this difference would be a lower food producer price increase in the new member states than in the rest of Europe over the period.

<sup>5</sup> For evolution of price indices along the period considered, see annex A.4.

**Figure 6: Decomposition of price component of value-added growth in the EU25**



The sharp decrease of the value-added price index in the agricultural sector has been due to the conjunction of a very sharp increase in prices of agricultural means of production (+5.1%) and of stable agricultural commodity prices. This has in turn benefited the food industry, which has been able to increase its value-added prices by increasing its output prices by 1.2% per year over the 1995-2005 period. Last, the retail sector, faced with increasing inputs prices has also increased its output prices (by 1.9%) to reach a low value-added growth price component of 0.5%. This relative evolution of output prices in the sectors of the supply chain partly explains the evolution of value-added repartition within the chain and the fact that more and more of the supply chain value-added is created moving downwards along the chain.

#### 4.3. Volume component of value-added growth

The volume components of value-added growth have all been positive along the food supply chain over the 1995-2005 period – see figure 6. Volume growth has been larger in the distribution sector (+3.3% for wholesale and +2.1% for retail) than in the upward sectors of the chain (+1.1% for agriculture, +0.7% for the food industry). This volume growth has originated in labour productivity growth in all sectors of the chain (from 1.5% in the food industry to 3.2% in the agricultural sector – as a point of comparison, overall labour productivity increase in the EU25 between 1995 and 2005 amounted to 1.7%).

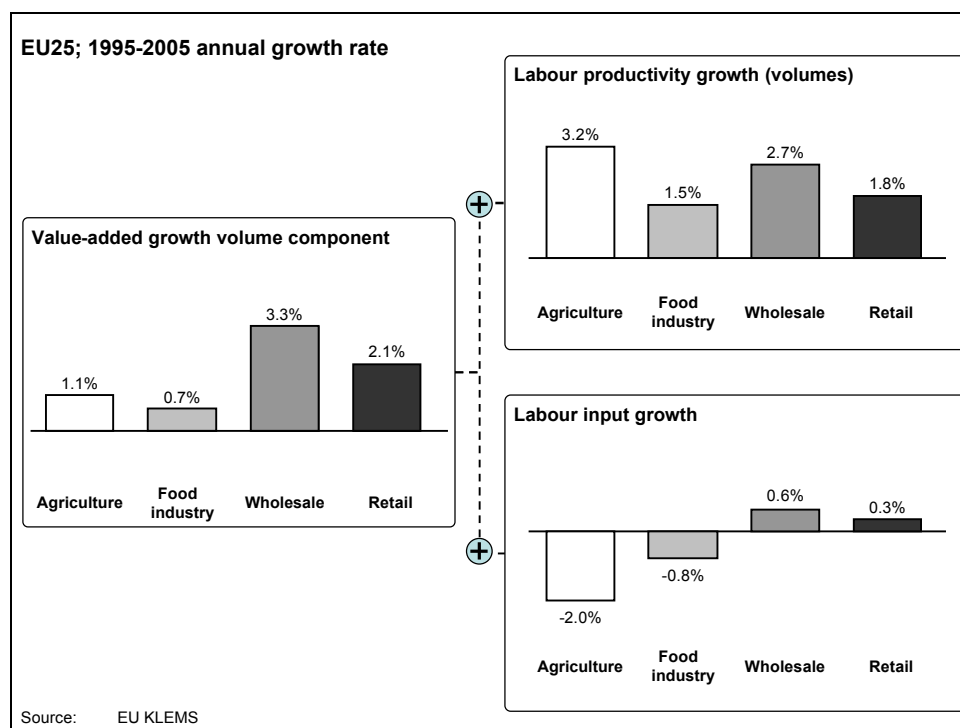
A major cause of differing value-added growths across sectors has thus been changes in labour inputs in the sector. Labour input (in total hours worked) has thus declined by 2.0% per year in the agricultural sector – see box 4, while it was increasing by respectively 0.6% and 0.3% per year in the wholesale and retail sectors.

#### Box 4: Decrease in labour input in the agricultural sector

Total hours worked in the agricultural sector is declining both in the EU15 and the EU10. This is mainly due to the decline in the number of persons engaged in the sector. In 1995, ~11 millions persons were working in the agriculture sector in the EU25; this number has fallen down to ~9 millions in 10 years. The number of hours worked by person engaged has on the contrary remained stable over the period. One should also note that within the food supply chain, people engaged in agriculture work on average 15% more hours per year than in other sectors (~2 000 hours per year vs. ~1 700).

Effects of labour productivity and labour input growth on value-added growth in each sector of the supply chain are summarised in Figure 7.

**Figure 7: Decomposition of value-added volume growth in the EU25 food supply chain**



Three different patterns of value-added growth can be derived for the agriculture, food industry and distribution sectors:

- Agricultural sector: strong increase in labour productivity and sharp decrease in labour input leading to medium value-added growth in volumes,
- Food industry: medium increase in labour productivity but slow decrease in human resources leading to medium value-added growth in volumes,
- Distribution sector: significant increase in labour productivity and low increase in human resources leading to significant increase in value-added growth in volumes. The data presented on figure 6 relate to the total distribution sector. However, as



analysed in Box 2, the share of persons employed in wholesale trade active in food wholesale has been stable, indicating that labour input and labour productivity for food wholesale trade are similar to those in wholesale trade. The share of people active in the retail sector has on the contrary slightly decreased, suggesting the labour productivity of the food retail activity has increased less than that of total retail trade.

These volume growth patterns are consistent across all geographical aggregates – see Annex A.5. Higher growth of value-added in volume for sectors of the food supply chain in the New Member States is explained by significantly higher labour productivity volume growth in all sectors (from +0.4% in the agricultural sector to +3/4% in the distribution sector compared to the EU15). The main potential factors explaining different value-added growth by sector of the food supply chain are summarised in box 5.

**Box 5: Key messages on causes of evolution of value-added within the European food supply chain**

A major explanatory factor of the increase in the dispersion of repartition of value-added along the food supply chain is the relative evolution of output prices in each sector of the chain. Moving downwards along the chain, output prices have increased more than input prices, leading to an increase in value-added.

All sectors have experienced labour productivity growth over the 1995-2005 period; however, the decrease in labour inputs in the agricultural and food industry sectors has mitigated this effect on value-added growth.

The value-added growth patterns have thus been very specific to each sector of the chain:

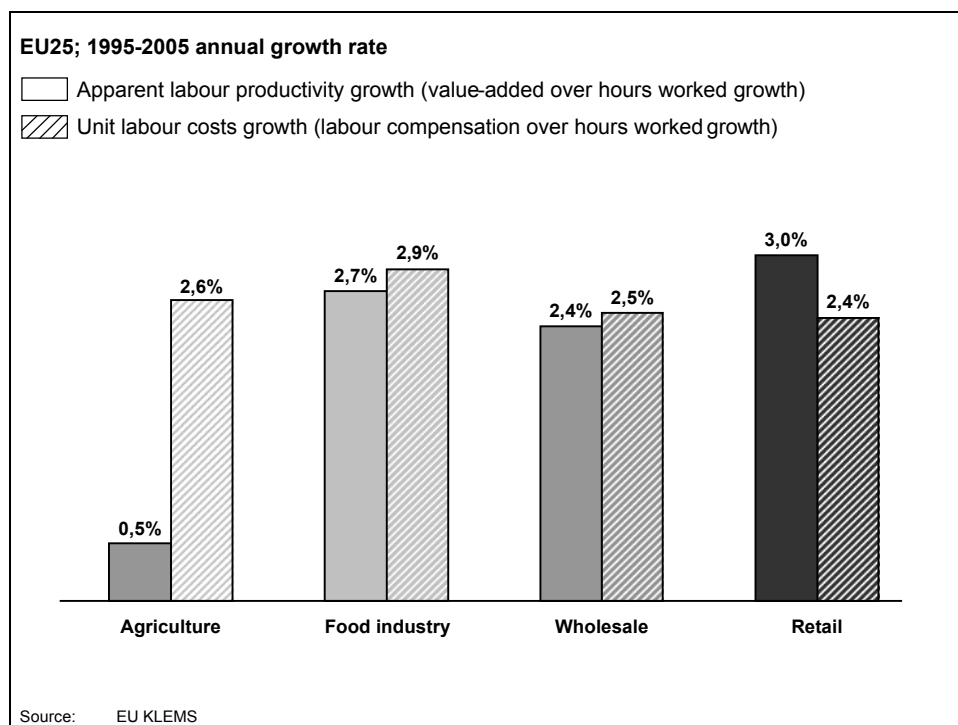
- (i) The decline in agriculture value-added has originated primarily in the conjunction of input costs increase and stability of agricultural commodity prices; it has been accentuated by the decline in labour input,
- (ii) Food industry has been able to increase output prices more than intermediary prices, thus increasing its value-added; however, a relative loss in efficiency has mitigated this increase,
- (iii) The key driver for value-added growth in the distribution sector has been volume output growth while maintaining its relative prices.

## **5. EVOLUTION OF LABOUR AND CAPITAL COMPENSATIONS**

### **5.1. Evolution of labour compensation share in value-added**

2 main factors impact the share of value-added redistributed as labour compensation: apparent labour productivity (gross value-added per hour worked) and unit labour compensation (labour compensation per hour worked). The share of labour compensation in value-added decreases when labour productivity increases faster than unit labour compensation. Figure 7 describes apparent labour productivity and unit labour compensation growths in the sectors of the food supply chain.

**Figure 8: Unit labour compensation and apparent labour productivity growth rates in the EU25 for sectors of the food supply chain**



Interestingly, unit labour compensation has increased in similar magnitude in all the sectors of the food supply chain, from 2.4% in retail to 2.9% in the food industry along the pace of the overall labour compensation in the European economy during the period (2.5% per year). However, the food industry and the distribution sectors have matched this increase with increased apparent labour productivity, whereas the agricultural sector apparent labour productivity has been lagging.

Thus, the share of labour compensation in value-added has significantly increased in the agricultural sector (~+20% in 10 years), reducing capital compensation and decreasing profits and investments. The only sector of the supply chain where the share of labour compensation in value-added has indeed decreased is the retail sector, where apparent labour productivity growth has been 0.6% higher than unit labour compensation growth. This evolution pattern is clearly amplified in the new Member States, where the gap between labour productivity growth and labour compensation growth is over 4%, compared to only 0.9% in the EU15.

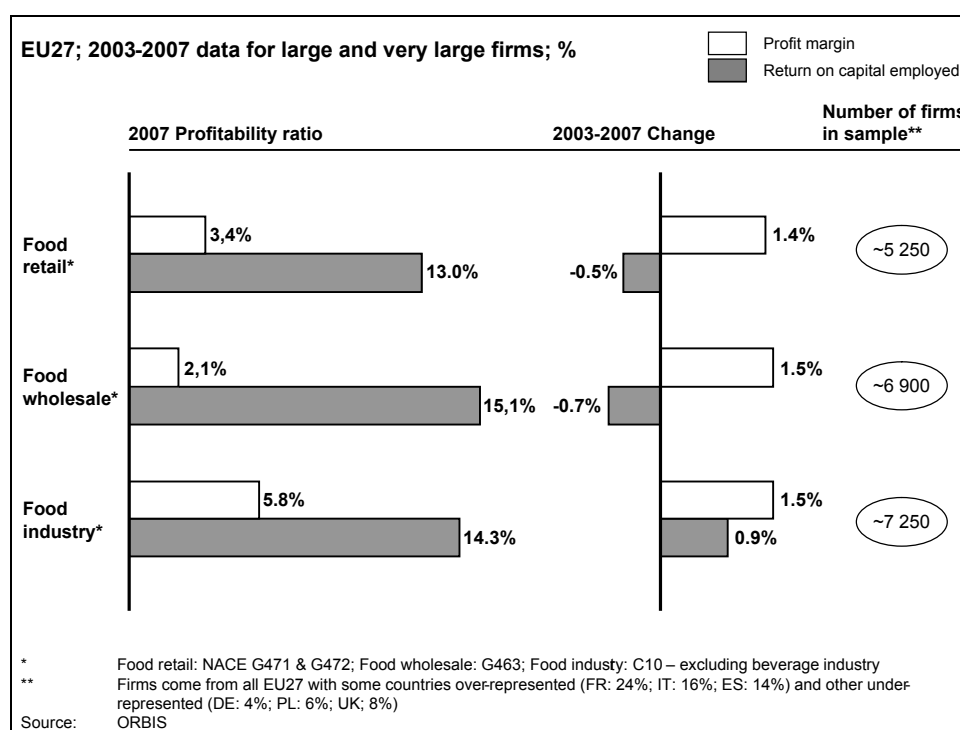
As a conclusion, the evolution of respective share of labour and capital compensations has evolved in the agricultural sector at odds with other sectors of the chain. In the agricultural sector, value-added has been decreasing due to slow apparent labour productivity growth and unit labour compensation has been maintained, thus leading to an increasing gap in capital compensation, reducing investments and profits. The other sectors of the chain have maintained over time the share of labour compensation; the retail sector has even increased the share of value-added available for profits and investments.

## 5.2. Evolution of profits along the value-chain

Assessing how profits have evolved in each sector of the value-chain over time is a complicated task due to the lack of relevant and comprehensive data. Moreover, profits – or

profit margin – can be a misleading indicator for how a sector performs and how much of the value-added of the chain it creates since each sector has its own business economics and specific uses of capital resources. The analysis presented here shows how two profitability ratios – profit margin and ROCE, Returns On Capital Employed<sup>6</sup> – have evolved in each sector of the value-chain over the period 2003-2007. Data are drawn from the ORBIS database that collects financial information at firm-level across Europe. An important drawback of the analysis is that it only includes large and very large firms<sup>7</sup> active in each sector of the food supply chain and thus provides only a partial view of the evolution of profits in each sector. Profits margins are usually higher for larger and more efficient firms benefiting from economies of scale; these firms may not be representative of the average profit margin of the sector, all the more so in sectors where a large number of SMEs are active, such as the food and beverage industry. For example, in the food and beverage industry, SMEs represent 99% of the total number of companies and generate ~50% of the sector turnover<sup>8</sup>. 2007 profitability ratios and the 2003-2007 changes are displayed in Figure 9. ORBIS database only enables to go back up to 2003 since for the years before, the sample size of firms for the sectors of the food supply chain are not large enough (less than 1 000 firms per sector). Moreover, data for agricultural undertakings were not included for the same rationale.

**Figure 9: 2007 Profit Margin and ROCE and 2003-2007 changes for large and very large firms by sector of the food supply chain in the EU27**



<sup>6</sup> Profit margin is defined as profit before tax over turnover; ROCE is defined as profit before tax over total assets (capital employed).

<sup>7</sup> Very large companies are defined by a turnover of over €100 million (or over 1 000 employees); large companies are defined by a turnover of over €10 million (or over 150 employees).

<sup>8</sup> See the Report on Competitiveness of the European Agro-Food Industry of the High Level Group on the Competitiveness of the Agro-Food Industry, March 2009.

Profit margins for large and very large firms of the food supply chain are above 2% and have increased since 2003. The food industry experiences the highest profit margin in the chain at 5.8% while margins in the distribution sector are somewhat lower – over 2% for food wholesale and over 3% for retail – reflective of the distribution business model. Growth in profit margins has been very similar in the three sectors for large and very large firms in the past years. The profitability picture is slightly different when considering the indicator Return on capital employed where the difference between sectors is less pronounced, with ratio varying from 13% for food retail to 15% for food wholesale. Interestingly, ROCE has decreased by around 0.5% between 2003 and 2007 in the distribution sectors while it has increased by almost 1% in the food industry over the same period. However, when looking at the evolution of ROCE year by year<sup>9</sup>, there does not seem to be a consistent pattern of differentiated evolution between the sectors of the chain.

These results, albeit very limited in scope, are insightful since they highlight that there has been no significant differences in profit margins evolutions between the food industry and the distribution sectors over the period 2003-2007. As expected by the trends outlined in the previous section, these sectors of the chain have been able to transform their increase in value-added in increased profits. It is moreover hard to assess any significant differences in profit margins and ROCE evolution across sectors.

#### **Box 6: Key messages on evolution of labour and capital compensation**

Labour compensation has evolved according to the same pattern than value-added in the downwards sector of the food supply chain in the EU25 – food industry and distribution. Unit labour costs (labour compensation over hours worked) and apparent labour productivity (value-added over hours worked) have experienced similar growth rates of ~2.5%-3%. This has not been the case however in the agricultural sector where unit labour costs have increased much faster (2.6%) than apparent labour productivity (0.5%).

The evolution of labour compensation and value-added in the food supply chain suggests that profits should have increased or remained stable in the food industry sector and the distribution sector but declined in the agricultural sector. This has been confirmed for the food industry and the distribution sector by the analysis of profit margin and ROCE evolution of large and very large firms in the EU27 between 2003 and 2007, which have shown a moderate increase in profit margins of around 1.5% in 4 years. However, the analysis of evolution of profit margins and ROCE over the period does not yield significant conclusions towards differentiated evolution of profits in each sector.

## **6. CONCLUSION**

The food supply chain has undergone important structural changes over the past years while value-added of each sector of the chain has grown at different pace. Value-added is increasingly created in sectors downwards in the chain, primarily in the distribution sector and to a lesser extent in the food industry. A major explanatory factor of the increase in the dispersion of repartition of value-added has been the relative evolution of output prices by sector. Moving downwards along the chain, output prices have increased more than input

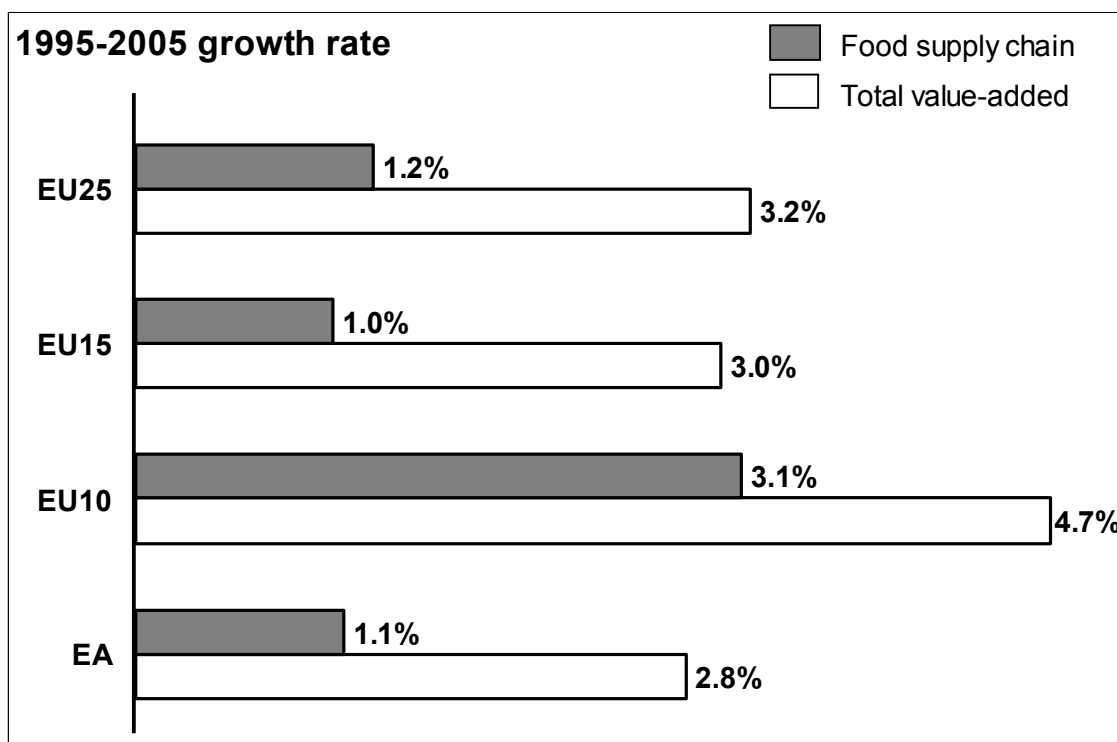
<sup>9</sup> See Annex A.7. for detailed evolutions of profit margins and ROCE along the food supply chain.

prices, leading to an increase in value-added for sector downwards in the chain and a decrease for the agricultural sector.

This evolution helps us to better understand the different economic dynamic experienced by the sectors of the food supply chain in Europe. The distribution sector and the food industry have experienced a good economic outlook, with growing value-added and profits, driven by growing volumes and prices. At the other end of the chain, the agricultural sector has been struggling to maintain unit labour compensation in a context of declining value-added. This should have in turn led to a decrease in capital compensation and profits, especially for smaller agricultural undertakings.

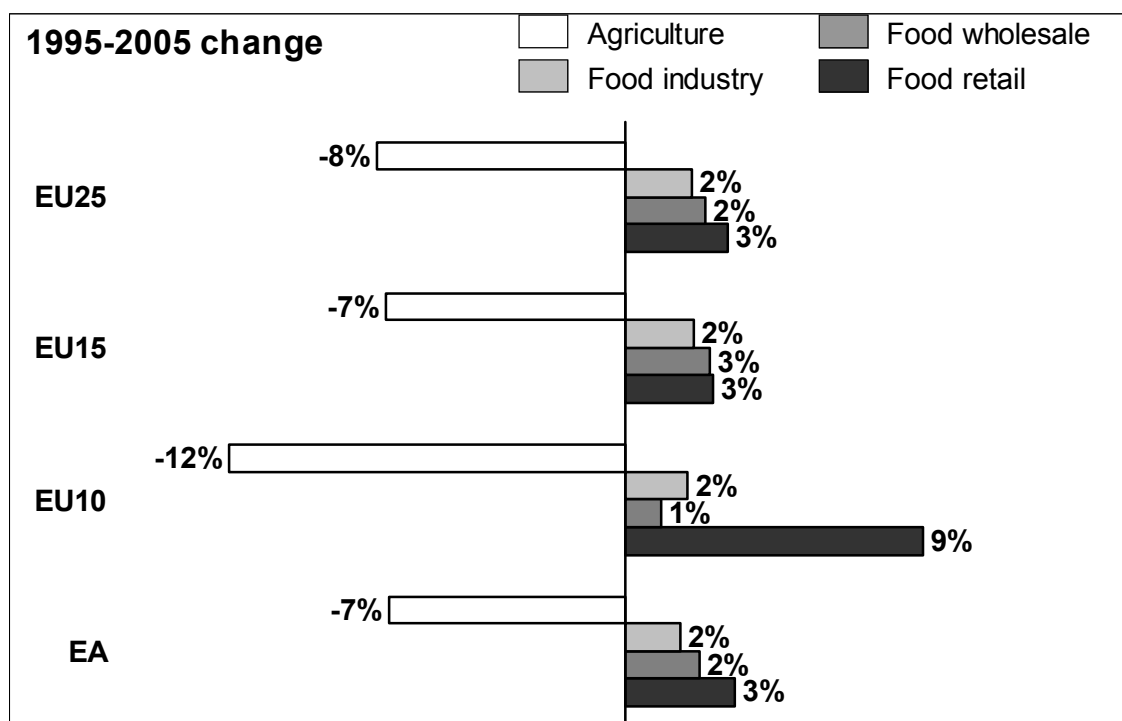
## 7. ANNEXES

**Figure A.1.: 1995-2005 growth rates of the food supply chain value-added and total value-added for selected country aggregates**



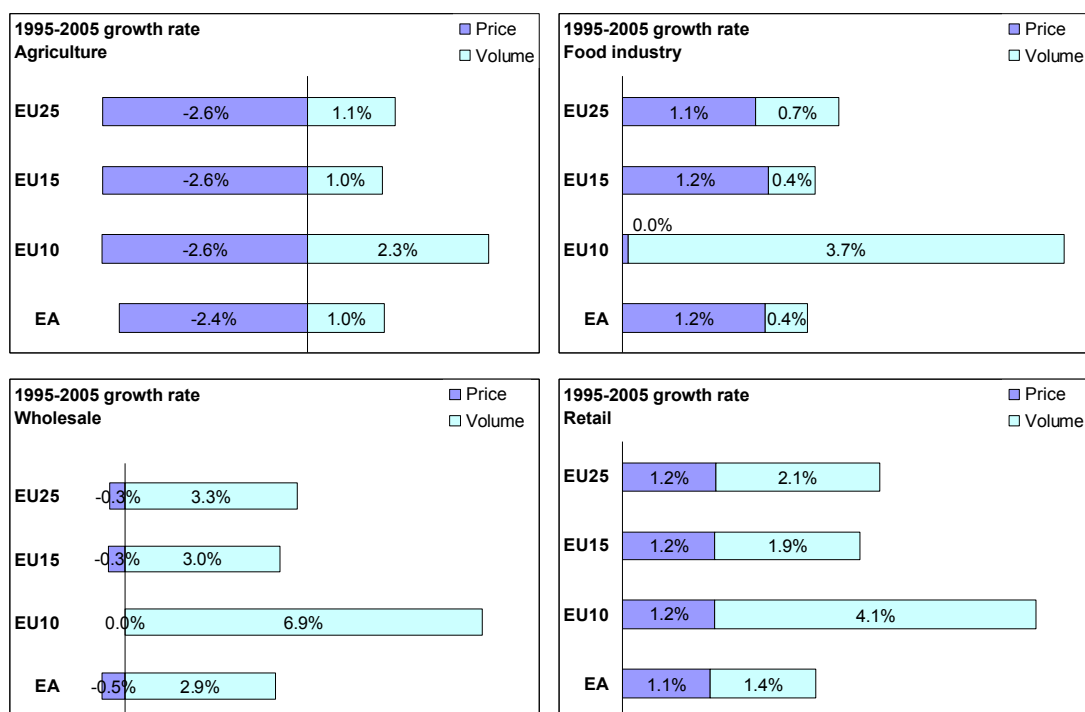
Source: EU KLEMS, EUROSTAT Structural Business Statistics

**Figure A.2.: Change in shares of each sector of the food supply chain by country aggregates between 1995 and 2005**



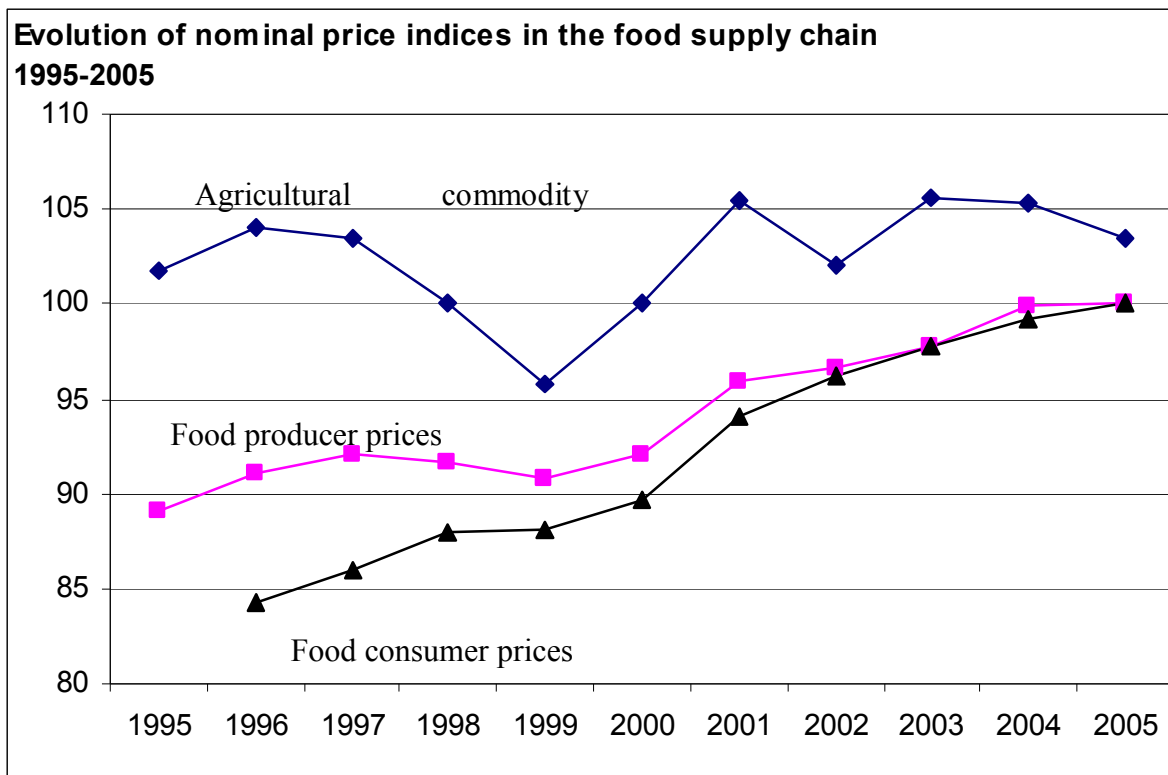
Source: EU KLEMS, EUROSTAT Structural Business Statistics

**Figure A.3.: Volume and price growth contribution to value-added growth by sector and by geographic aggregates in the food supply chain**



Source: EU KLEMS

**Figure A.4.: Evolution of nominal price indices along the food supply chain in the EU25**



Source: EUROSTAT Short-term Statistics, Agricultural price statistics, Harmonized index of consumer prices; Base year of agricultural commodity price index: 2000; base year of food producer and food consumer price indices: 2005

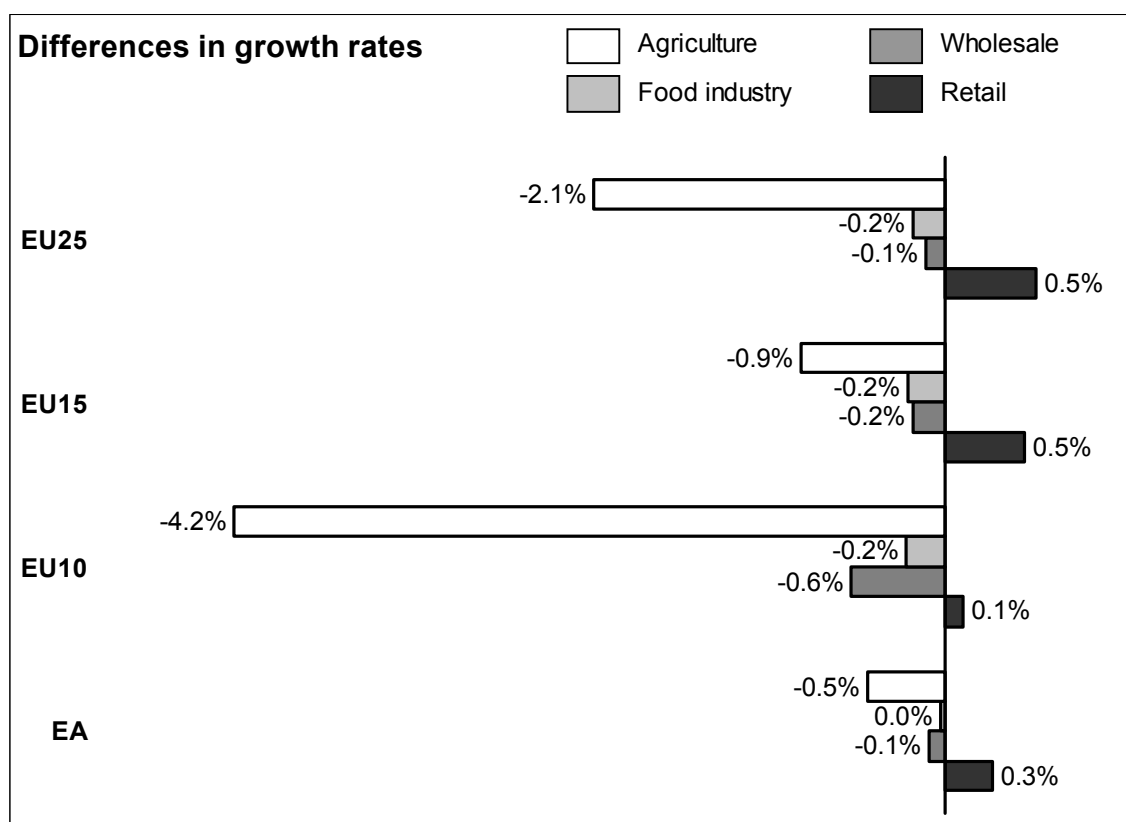
**Figure A.5.: Contribution of labour productivity and labour input growths in value-added volume growth by sector of the supply chain**





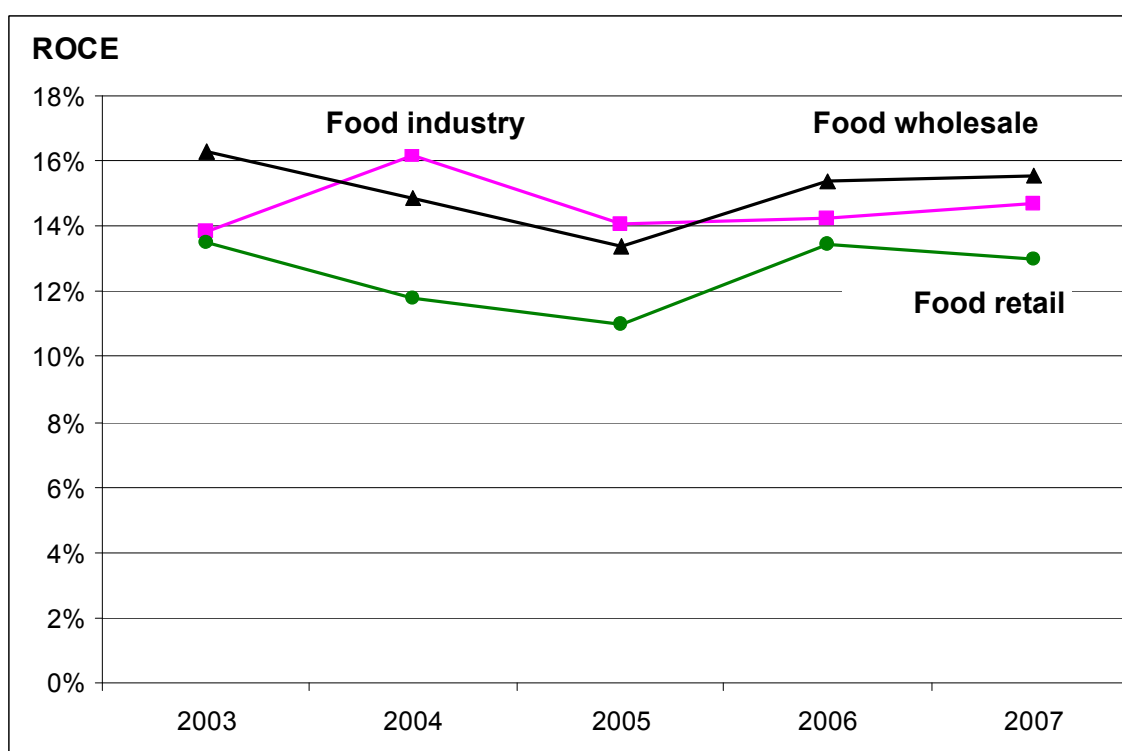
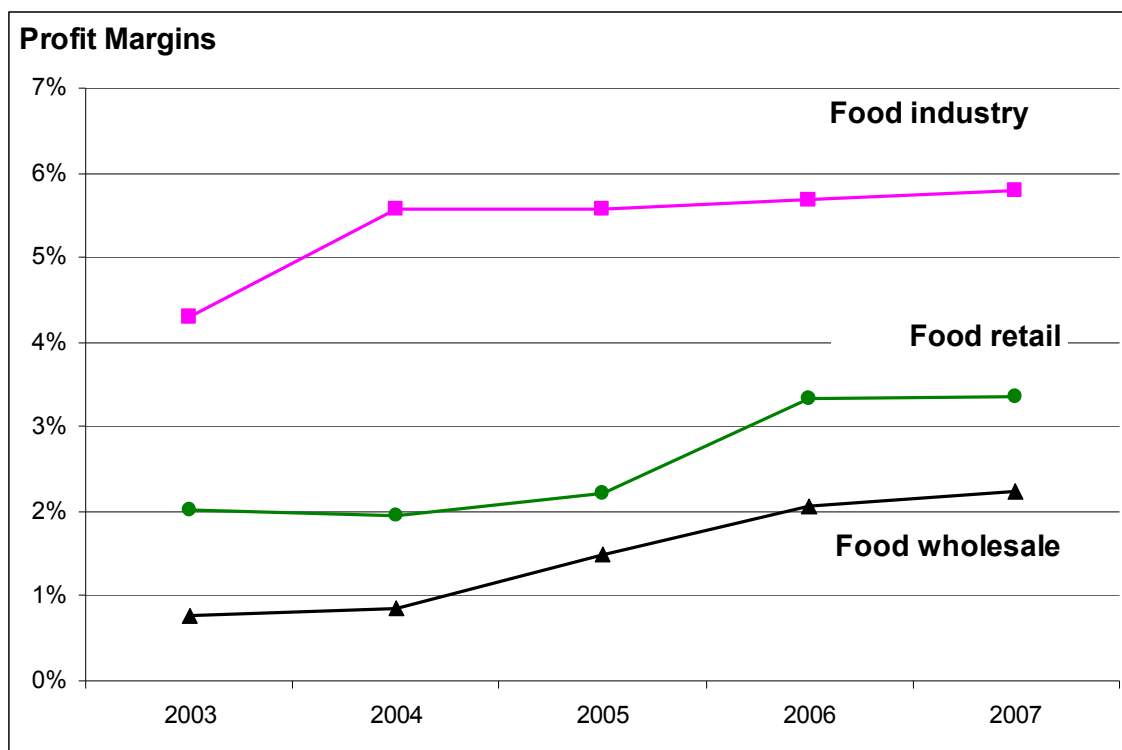
Source: EU KLEMS

**Figure A.6.: Differences in 1995-2005 growth rates of apparent labour productivity and unit labour costs within the food supply chain**



Source: EU KLEMS

**Figure A.7.: Evolution of profit margins and ROCE of large and very large firm in the food supply chain in the EU27, 2003-2007**



Source: ORBIS