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# Price transmission along the food supply chain in the European Union

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# Price transmission along the food supply chain in the European Union

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**Abstract.** Agricultural commodities and consumer food prices have experienced strong variations over the last 2 years, both upwards and downwards. This increased volatility, combined with long-term prospects of rising food prices, highlights the necessity to increase the efficiency of the food supply chain to ensure consumer food prices reflect the evolution of inputs prices. This paper aims at better understanding price transmission mechanisms along the chain across European Union Member States. Significant differences across Member States in magnitude of pass-through of agricultural commodity prices variations to consumer prices, as well as price transmission asymmetries, suggest potential market fragmentation within the EU. Country-specific regulatory frameworks, as well as discrepancies in competition intensity and competitive practices along the chain can impact price transmission significantly. In particular, differences in bargaining power between suppliers and retailers for selected food products have been identified as sources of cross-country discrepancies in price transmission.

**Keywords:** Food, regulation, market structure, competition, pricing.

## 1. Introduction

In the second half of 2007 price increases of many agricultural commodities accelerated rapidly and by early 2008 reached exceptional levels. These increases have been mainly driven by a temporary imbalance between demand and supply – against the background of a structural increase in demand for food products across the globe. The agricultural commodity price surge generated a rapid increase in consumer food prices, which peaked in July 2008. Since then, agricultural commodity prices have decreased sharply. However, structural factors like the growth in global demand and the decline in food crop productivity growth are likely to hold up these prices in the medium term.

This paper aims to better understand how the degree of competition in the food industry and the downstream retail markets may have affected price developments and to identify regulatory practices that may help to lessen the impact on consumers of price volatility on agricultural commodity markets. Improving the functioning of the food supply is particularly important in the present economic circumstances. In order to sustain the purchasing power of European households it is essential that the downward price movements in commodity markets are transmitted without delay to consumers. Households devote, on average, one sixth of their expenditures to food and beverages. This share is even higher for low income households.

This investigation into the functioning of the food supply chain is the first in-depth market monitoring exercise organised as a follow-up to the November 2007 Single Market Review<sup>1</sup>. Such market monitoring exercises aim to analyse the functioning of markets and sectors along different dimensions, such as regulation, integration, competition and innovation. By investigating the dynamic interactions between market structure, firms' conduct and economic performance the in-depth monitoring of the food supply chain permits the derivation of more evidence based policy recommendations.

The paper is organised as follows. Section 2 provides a description of the food supply chain. The focus of analysis is on the food processing industry and the distribution sector. Section 3 makes an analysis of the food price transmission mechanism, looking in particular at the pass-through of price developments along the food supply chain. The structure of the different markets along the food supply chain is discussed in section 4 while section 5 analyses the impact of regulation and business practices on the functioning of this chain. Section 6 concludes.

## 2. Description of the food supply chain

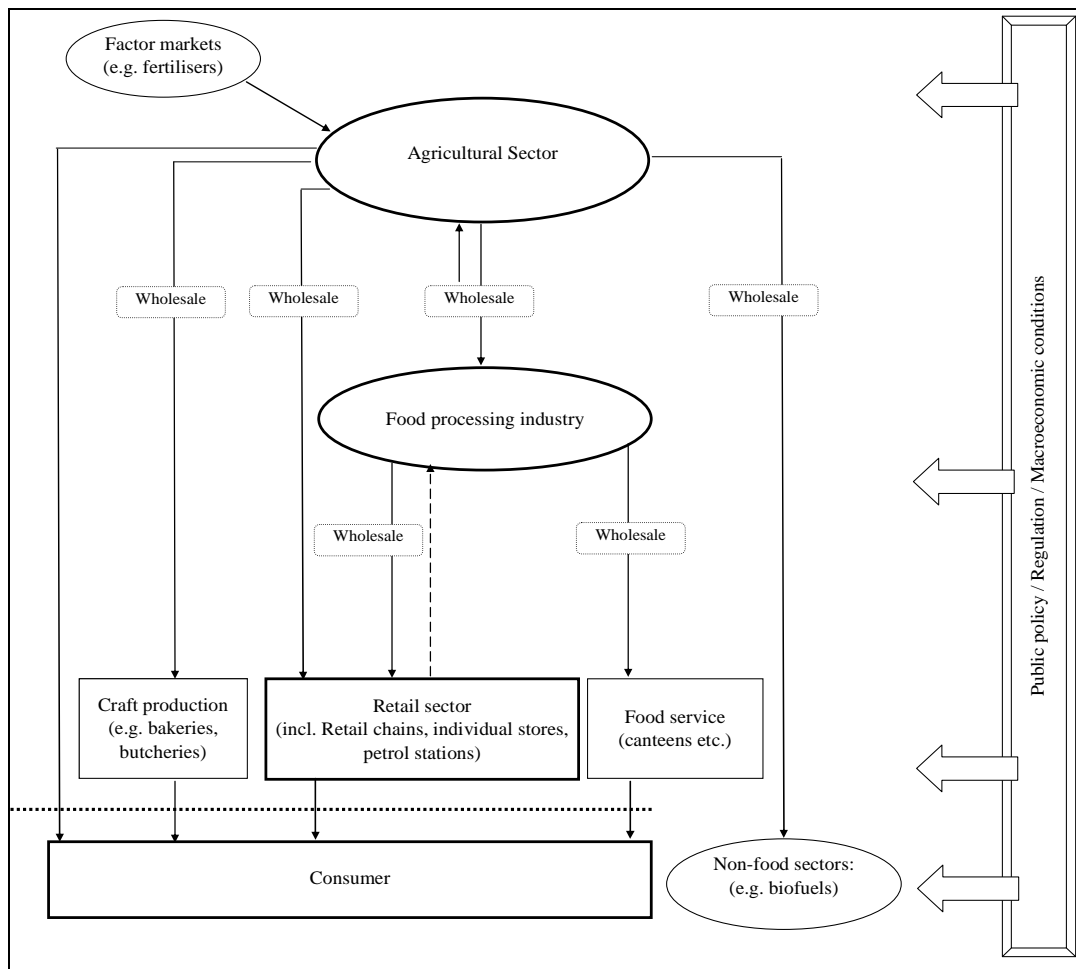
The food supply chain is composed of a wide diversity of products and companies which operate in different markets and sell a variety of food products. The regulatory framework affects the food supply chain at all levels from the agricultural sector down to the retail sector. The degree of market power held by the firms along the chain varies by product category, depending on the relevant markets in which these firms operate. It has an impact on the contractual relationships between the main players along the chain and can influence the degree of transmission of the increase in agricultural commodity prices to consumer prices. Given this complexity, general conclusions regarding the functioning of the food supply chain have to be drawn with caution. Therefore, this analysis will not necessarily come up with concrete policy recommendations but will rather identify a number of issues that merit further investigation. This better understanding of the functioning of the food supply chain will also contribute to a more informed debate on policy proposals with stakeholders.

The food supply chain connects three main sectors (see Figure 1): the agricultural sector, the food processing industry and the distribution sectors (wholesale and retail). Basic agricultural commodities undergo, to varying degrees, an often substantial series of intermediate alterations before they are sold as final food products to consumers. A description of the food supply chain may improve the understanding of how prices are formed along this chain, how input costs are passed on, where interactions between firms take place and where different regulations may have an impact. However, since specific food supply chains exist for every single food item purchased by consumers, the following description is a necessary simplification.

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<sup>1</sup> The European Commission<sup>[1]</sup> provides recent information on the use of the market monitoring tool.

The first sector considered in the food supply chain is the agricultural sector. Its activities include crop production and the raising of livestock. As agricultural commodities comprise of very different products, the sector's distribution channels are equally diverse. Firms in the agricultural sector primarily sell their output to the food processing industry and to itself (e.g. animal feed), but also sell directly to retailers, final consumers or alternative markets (e.g. biofuels). The food processing industry is very heterogeneous and comprises of a number of varied activities. These include for example refining (sugar), milling (cereals), cleaning, cutting or drying (fruit and vegetables) and slaughtering and disassembling (livestock). The different inputs are processed in successive stages and to different degrees, packaged and dispatched to customers (e.g. distributors, food service). Another important activity of food manufacturers is to carry out market and product research leading to the development of new products, and to engage in marketing. The distribution sector (and retail in particular) is the principal outlet for food products and, being the final link in the supply chain, it interacts directly with final consumers. While the sector's main activity is the sale of products, in doing so, retailers may also carry out services for food manufacturers, such as promotional activities.



**Figure 1.** Schematic representation of the food supply chain

The transfer of intermediate goods can be directly between firms involved in production or sale to consumers or, as is often the case, via specific wholesalers. Such transfers can be analysed from both a contractual and a technical perspective. The contractual aspects essentially refer to buyer-seller interactions and are influenced by the relative market power of the firms along the chain. On the technical side, the transfer involves a series of activities which generate additional costs, such as those incurred for transport, storage and logistics. Therefore, besides the raw material – which in general accounts for only a small share of total costs – the cost structure of food production comprises of a number of other cost factors, most notably transport energy and labour, which are reflected in the final consumer prices. In addition, the functioning of the food supply chain is also affected by a number of external factors such as

regulation, public policy and the macroeconomic environment, which impact cost structures and price developments across Member States.

### 3. Determinants of consumer food price developments in the EU

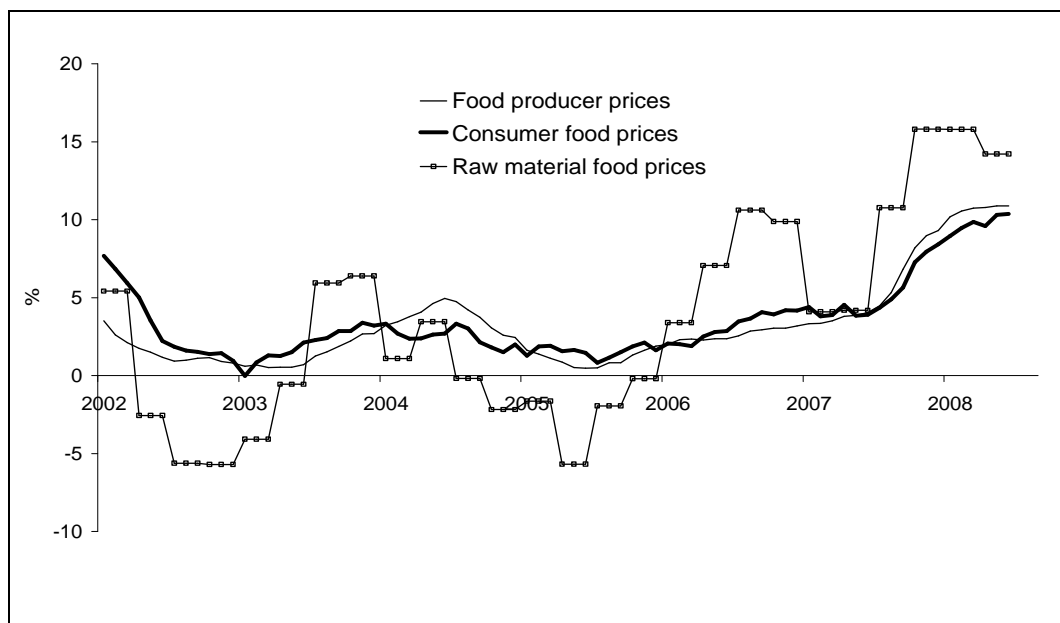
#### 3.1. Recent developments in food prices

In the second half of 2007, price increases of many agricultural commodities accelerated rapidly and reached exceptional levels by the end of the year. The agricultural commodity price surge generated a rapid increase in producer and consumer food prices within the EU (see Figure 2).

Member States have reacted very differently to the strong increase in agricultural commodity prices. In particular, the largest food price increases have occurred in the new Member States. In Bulgaria, Latvia and Lithuania price levels increased by more than 15% between July 2007 and August 2008. Among the old Member States, consumer prices rose by more than 6% over this period in Austria, Denmark, Ireland and the UK.

The relatively large increases in price levels in the new Member States may be explained not only by the generally higher levels of wage and price inflation in these countries, but also by the fact that agricultural commodities take up a greater share of the production costs of food items. Consumer food prices in new Member States could therefore be expected to be more sensitive to increases in the prices of agricultural commodities. Moreover, the weight of food in household consumption baskets is typically higher in new Member State and therefore, the contribution of food inflation to overall inflation is also higher in these countries. Prices and price changes may also be affected by the functioning of downstream market conditions in these countries. Currency appreciation, on the contrary, appears to have had a dampening effect on food price inflation in countries such as the Czech Republic, Poland, Romania and Slovakia.

After having reached its peak in May-June 2008, consumer food price inflation has been on a decreasing trend in all Member States with the exception of Slovenia. This decrease in consumer price inflation followed the declines in producer and agricultural price inflation. Differences between Member States in terms of the transmission of downwards price movements can also be observed. While in some countries consumer food prices appear to have adjusted downward rather quickly following the decline in agricultural price levels, in others, consumer prices have reacted more slowly.



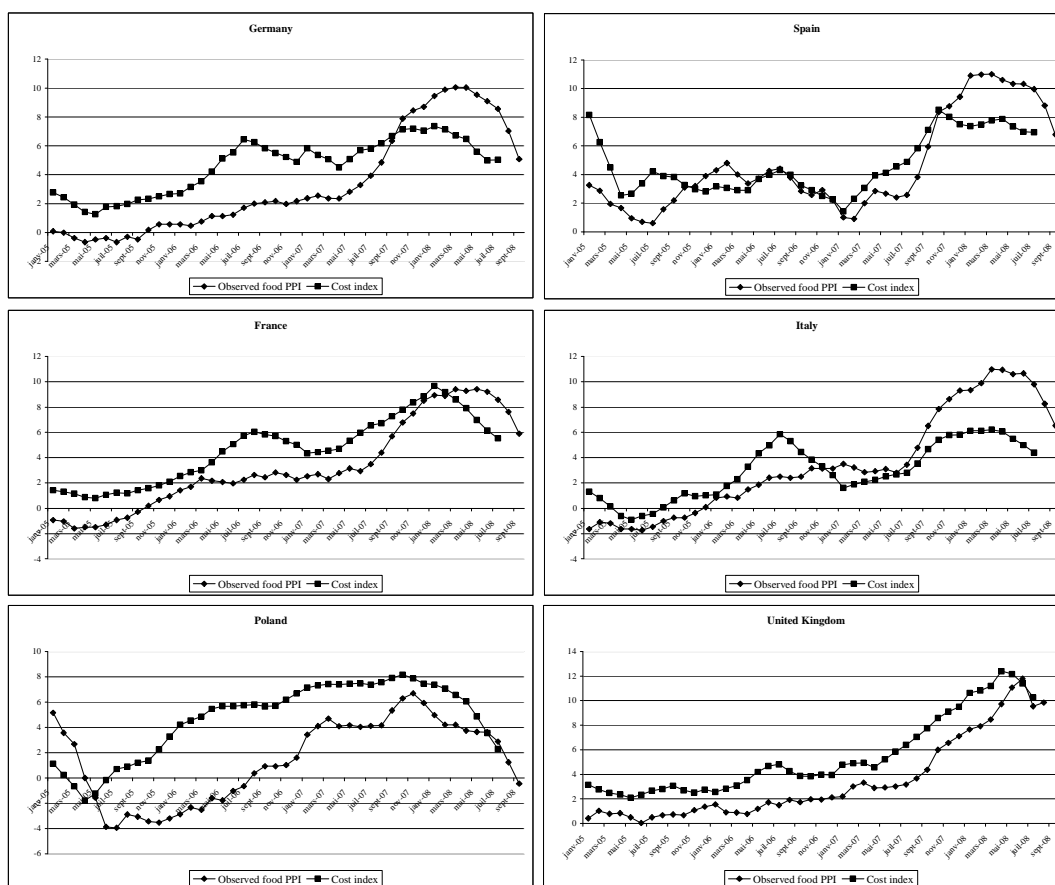
Source: Own calculations based on ESTAT.

**Figure 2.** Consumer, producer and raw material food price increases in the EU over the period 2002:1-2008:8 (y-o-y growth rates)

### 3.2. Production costs and producer prices in the food processing industry

This section aims to assess whether the observed changes in producer prices, i.e. the prices that the industry charges to wholesalers and retailers, reflect changes in the production costs in the food and beverages industry. As no direct information on production costs is available, price changes of the main inputs categories (i.e. compensation of employees, agricultural inputs, energy and transport, inputs coming from food processing industry itself, as well as other intermediary products) are summarised using input-output tables in a weighted cost index for the food and beverage industry of individual Member States. The changes in this calculated cost index are then compared to the observed changes in the producer price index for the food and beverage industry.

Figure 3 compares the evolution of changes in the calculated cost index with changes in the observed producer price index over the period 2005-2008 in the larger EU Member States. In all countries, the rise in input costs was relatively moderate early on but rose to higher levels later within this period before slowing down most recently, suggesting that the order of magnitude of observed price changes is to a large extent justified by changes in the underlying input costs. However, there seem to be differences between countries, which are more apparent in the recent period. While in the UK and, to a lesser extent, in the case of France and Poland, changes in producers prices seem to track changes in input prices, albeit with a small time lag, in the other large EU Member States, such as Germany, Italy and Spain, this seems to be much less the case.



**Figure 3.** Comparison between changes in the food and beverages producer price index and the production cost index

### 3.3. The pass-through along the food supply chain

This section aims to assess whether there are differences regarding the magnitude, speed and nature of the pass through of agricultural commodity prices into producer and consumer prices (see Box 1 for a definition of these concepts) along the food supply chain.

**Box 1. Magnitude, speed and nature of pass through**

Price transmission along the food chain has attracted considerable interest in the economic literature. During recent years the number of studies on the subject has grown rapidly. However, given the recent changes in the structure of food markets and evolving business practices, new questions are still emerging.

Vertical price transmission may be characterised by the magnitude, speed and nature (downwards or upwards) of the price pass-through between different segments of the supply chain. The magnitude of the pass-through measures how much of the initial price change is reflected in the changes in consumer prices observed. The shorter the lag with which consumer prices follow commodity and producer prices, respectively, the higher the speed of pass-through. Finally, if the speed and the magnitude of the pass-through differ depending on whether there is a price decrease or increase, price transmission is considered to be asymmetric. In order to raise their profit margins, actors along the food supply chain would have an interest in passing on price increases more rapidly than price decreases. As a result the measured pass-through would be higher in the case of price increases than in the case of price decreases.

The magnitude of the pass-through has typically been the focus of attention in the economic literature investigating the price transmission along the food supply chain. In more recent work, the issue of asymmetric price transmission has attracted an increasing interest (see Vavra and Goodwin<sup>[2]</sup>). The magnitude, the speed and the degree of asymmetry in the pass-through are influenced, among others, by cost structures and market conditions (see Zachariasse and Bunte<sup>[3]</sup> and Azzam<sup>[4]</sup>). In particular, Röller et al.<sup>[5]</sup> suggest a link between pass-through and the degree of market power held by firms, making reference to the finding by Feenstra et al.<sup>[6]</sup> of a U-shaped relationship between market share and magnitude of the pass-through.

**3.3.1 The pass-through from agricultural commodity prices to producer prices**

This section investigates the extent to which agricultural price increases have been passed through to producer prices. This analysis is based on a simple OLS regression. The estimated elasticity of producer prices to agricultural commodity prices ranges between 1% for Portugal and 22% for Poland. This suggests that agricultural commodity price increases/decreases tend to be transmitted to producer prices at a rate that varies across countries. The low rate of pass-through in Portugal could indicate that the increases/decreases in agricultural commodity prices tend to be absorbed by the food producer sector through a reduction of profit margins, whereas the opposite might be true in the case of Poland. However, the relatively high rate of pass-through in Poland could also be explained by macroeconomic factors (see Section 3.1). Nevertheless, this analysis provides a first indication that upstream factors can help explain why consumer food prices in different EU Member States have reacted very differently to the agricultural price shocks encountered in 2007 and 2008.

**3.3.2 The pass-through from producer to consumer prices**

This section considers the transmission from producer to consumer prices. In most of the euro area countries producer food prices started to rise faster than consumer food prices from mid 2007 onwards, whereas the opposite had been true in the period from 2002 to mid-2007. This could suggest that the more recent producer price increases were not fully transmitted to consumer food prices and that they were partially absorbed by the food retail sector through a reduction of profit margins. This hypothesis is confirmed by preliminary data for 2007 showing a decrease in profit margins in the euro area retail sector. In most of the new Member States, on the contrary, the increase in consumer food prices over the period July 2007 – July 2008 exceeded the producer price increases observed during that same period, which could be indicative of increased margins in food retailing.

A further investigation of the link between consumer and producer food prices reveals differences in terms of the magnitude and speed of the pass-through across the EU countries. Two methods have been used to investigate this link: an error correction model (see Box 2) and a simple OLS regression. Both methods give converging results, as shown by Figure 4.

**Box 2. The error correction model**

The empirical analysis is conducted in three main steps:

- First, the non-stationarity of all price series was examined using the augmented Dickey-Fuller test (ADF). It was found that all the series in logarithm were non-stationary.
- Second, the existence of a cointegration relationship between consumer food prices and producer prices was established by applying the standard Engel-Granger two-step procedure.



- Finally, the model containing an error correction mechanism was estimated for two groups of countries, namely the new EU Member States and the euro area countries. In addition, this model was estimated separately for Denmark, Romania, Sweden and the UK, due to the heterogeneity of these countries compared to the countries in the two above mentioned groups. We consider Romania separately, as the observed percentage point difference between inflation of consumer and producer prices was negative in Romania, whereas it was positive in the other new EU Member States. Moreover, consumer food price increases were lower in Romania compared to the other new EU member States. Denmark, Sweden and the UK are not euro area countries and they have experienced on average higher consumer food price increases than the euro area. Thus, the model was estimated separately for these countries.

The key feature of the chosen error correction model is that it postulates an underlying long-run equilibrium relationship between the food producer and consumer prices. This long-run equilibrium corresponds to a situation whereby consumer prices will remain unchanged if there is no change in producer prices.

The estimated error correction model is specified as:

$$\Delta f_t = \alpha + \sum_{k=1}^p \beta_k \Delta f_{t-k} + \sum_{k=1}^p \varphi_k \Delta p_{t-k} + \delta(f_{t-1} - \theta p_{t-1}) + \varepsilon_t$$

where  $f_t$  denotes the monthly index (log) of the consumer food prices;  $p_t$  is the monthly index of producer food prices, and  $\varepsilon_t$  is an error term.

In this equation, the variation in consumer food prices depends on their past rates of variation, the past rates of producer price variations as well as deviations from the long-run equilibrium. The coefficients  $\beta$  and  $\varphi$  measure the short-run pass-through (i.e. the impact of consumer and producer prices respectively). The term  $(f_{t-1} - \theta p_{t-1})$  represents the long-run equilibrium relationship between consumer and producer prices.

The coefficient  $\theta$  is the long-run elasticity of food consumer prices to food producer prices (i.e. how much the change in the producer price is passed on to the final consumer). For example a value of 0.6 for  $\theta$  means that 60% of the producer price change is passed on to the final consumer or in other words that a 10% increase in producer prices eventually leads to a 6% rise in the consumer prices. The coefficient  $\delta$  is the long-run adjustment parameter and represents the speed of adjustment to the long-run equilibrium. It shows how rapidly consumer food prices approach the long-run equilibrium after a deviation from this equilibrium. For example, a value of 0.1 implies that the deviation from the long-run equilibrium is reduced by 10% per month.

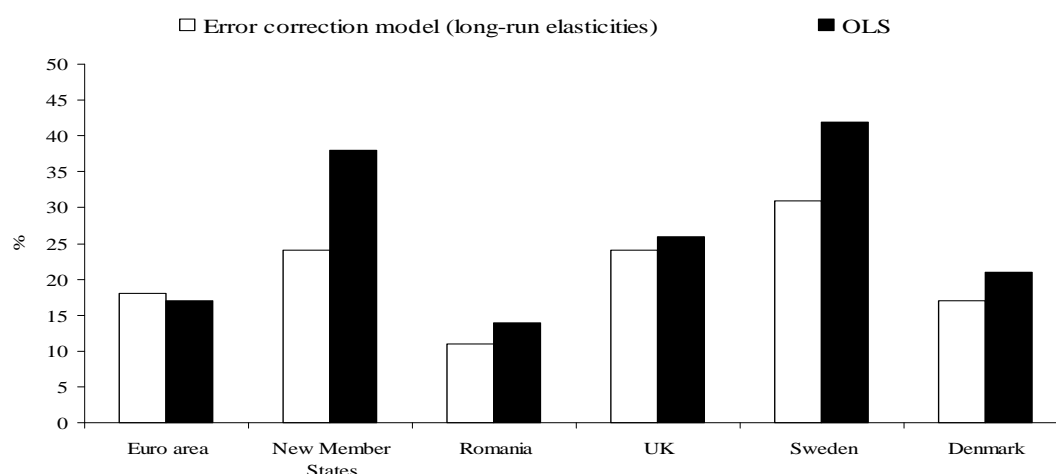
Finally, the robustness of the results obtained with the error correction model is tested by comparing these results with those obtained with simple OLS regressions carried out for individual countries. In these equations, consumer food price variations are regressed against lagged values of the dependent variables (and seasonal dummies) and of the producer food prices:

$$\Delta f_t = \alpha + \beta_k \Delta f_{t-1} + \varphi_k \Delta p_{t-k} + \varepsilon_t$$

where  $\Delta f_t$  corresponds to the monthly growth rates of the consumer food prices,  $\Delta p_t$  are the annual growth rates of the producer food prices, and  $\varepsilon_t$  is an error term.

Figure 4 shows the estimated elasticities of consumer prices to producer prices resulting from the application of the error correction model and the simple OLS regression, respectively. The results obtained with the error correction model reveal that the estimated long-run elasticity ranges between 10% and 30% for the group of countries examined. The lowest long-run elasticity is found for Romania and the euro area and the highest for the new Member States and Sweden. The estimates obtained by the OLS method confirm these results. This suggests that changes in consumer prices resulting from movements in producer prices vary across countries. The low pass-through in Romania and the euro area is an indication that the observed changes in producer prices are absorbed to some extent by a reduction in profit margins in the food retail sector. On the contrary, the high rate of pass-through in the new Member States and Sweden is a sign that changes in producer prices are rather more fully transmitted to consumer prices.

Finally, the magnitude of the pass-through from producer to consumer prices appears to be higher than the pass through from agricultural commodity prices to producer prices. A possible explanation for this observation could be that agricultural commodities represent only a small share of the total food production costs.



**Figure 4.** Elasticity of consumer food prices to producer food prices

Turning to the speed of adjustment, estimations indicate that, on average, the deviation from the equilibrium level is reduced by 21% per month for consumer prices in the euro area. Prices appear to adjust somewhat faster in the new Member States, with an average reduction of 27% per month. Even more rapid adjustment is estimated for the UK and Sweden. These results show that the speed of adjustment also varies across countries.

However, several caveats should be kept in mind when comparing the size and the speed of the pass-through in the new Member States and in the euro area. There are a number of factors which may explain higher pass-through in the new Member States compared to old Member States. First, in the new Member States with the lowest price levels, the contribution of (unprocessed) food to the (final) retail price tends to be greater. Second, increases in indirect taxes during the period under investigation contributed to the relatively higher consumer food price increases in most of the new Member States. Third, energy price increases were stronger in most new Member states. Fourth, price arbitrage within the EU may have taken place and exerted upward pressures on food prices in the Member States with the lowest price levels. Finally, the increases in food prices may simply reflect the catching up process in the new Member States with the remainder of the European Union. Such a process may be reflected in changes in the retail market structure and increases in wage levels. Issues related to changes in market structure are analysed in more detail in Section 4.

### 3.3.3 The asymmetry in the transmission of producer prices to consumer prices

For the euro area, the magnitude of the transmission is similar in the case of a price increase and a price decrease. Moreover, price decreases are transmitted quite rapidly. Thus, the results seem to indicate that downward price stickiness is not an issue in the euro area. In the new Member States, on the other hand, there appears to be some evidence of downward price stickiness, as the magnitude of the pass-through of producer prices to consumer prices is larger when prices go up. The observed elasticity in case of price increases is even larger than one, which would seem to suggest that margins increase in this case. On the other hand, when producer prices decrease, the estimated elasticity is less than one and there are lags (see Box 3). This would lead one to conclude that there is an asymmetry in the transmission of producer to consumer prices in the new Member States. While it is difficult to generalise and these results should be interpreted with care, they suggest that the retail markets in the euro area are relatively competitive whereas this seems to be less the case for new Member States.

**Box 3.** The analysis of the asymmetric price transmission from producer to consumer food prices

The analysis of the asymmetric price transmission from producer to consumer food prices is based on the following simple OLS regression:

$$\Delta CP_t = \alpha + \beta \Delta P_t + \varepsilon_t$$

with

$$\beta = \begin{cases} \beta^+ & \text{if } \Delta P_t \geq 0 \\ \beta^- & \text{if } \Delta P_t < 0 \end{cases}$$

where  $\Delta CP$  is a change of the consumer food prices,  $\Delta P_t$  is a change of the producer prices<sup>2</sup> and  $\varepsilon$  is an error term.

The reaction of the consumer prices is symmetric to increases and decreases in P if  $\Delta\beta = \beta^+ - \beta^- \approx 0$ .

The estimates of  $\beta$  (and hence of  $\Delta\beta$ ) may be biased if the entire reaction of consumer food prices to changes in producer prices is delayed. In order to account for this possibility a regression with three lags is estimated:

$$\Delta CP_t = \alpha + \beta_1 \Delta P_{t-1} + \beta_2 \Delta P_{t-2} + \beta_3 \Delta P_{t-3} + \varepsilon_t$$

with

$$\beta_i = \begin{cases} \beta_i^+ & \text{if } \Delta P_{t-i} \geq 0 \\ \beta_i^- & \text{if } \Delta P_{t-i} < 0 \end{cases}$$

For  $i=1,2, \dots, 6$ .

According to the Wald test, the difference between the coefficients  $\beta^+=1.08$  (instant reaction) and  $\beta^-=0.85$  (3 lags) is significant at 1% test level in the case of the new Member States. Thus, the results show that the magnitude of the pass-through of producer prices to consumer prices is relatively large in most of the new Member States when prices go up. In fact, in this case, the elasticity is larger than one suggesting that margins increase. Interestingly, when producer prices decrease, the estimated elasticity is less than one and there are lags. In the euro area, on the contrary, the combination of the coefficients  $\beta^+=0.48$  (1 lag) and  $\beta^+=0.47$  (3 lags) does not differ significantly from the  $\beta^+=0.95$  (instant reaction). This is an indication that within the euro area the transmission mechanism of producer prices to consumer prices is symmetric.

**Table 1.** Transmission of producer price decreases and increases into consumer prices in the new Member States

Dependent Variable:	Consumer food prices increases				
Estimation sample	2005 January - 2008 August				
Explanatory variables		producer price decreases (-3 lag)	producer price increases (instant reaction)	R-squared	Adjusted R-squared
Coefficient		0,85**	1,08***	0,53	0,50
Std. Error		0,42	0,18		
t-Statistic		2,04	5,99		

(\*\*\*) - indicates significance at 1% test level.

(\*\*) - indicates significance at 5% test level.

(\*) - indicates significance at 10% test level.

**Table 2.** Transmission of producer price decreases and increases into consumer prices in the euro area

Dependent Variable:	Consumer food prices increases					
Estimation sample	2005 January - 2008 August					
Explanatory variables		producer price decreases (instant reaction)	producer price increases (-1 lag)	producer price increases (-3 lag)	R-squared	Adjusted R-squared
Coefficient		0,95***	0,48***	0,47***	0,40	0,36
Std. Error		0,29	0,18	0,18		
t-Statistic		3,31	2,65	2,59		

(\*\*\*) - indicates significance at 1% test level.

(\*\*) - indicates significance at 5% test level.

(\*) - indicates significance at 10% test level.

<sup>2</sup> Given that we observe very few  $\Delta P_t$  with negative value, we define  $\Delta P_t$  as second order differences or  $\Delta P_t = \Delta P_{t-1} - \Delta P_t$

## **4. The structure of markets along the food supply chain**

### **4.1. Fragmentation of the food supply chain**

As shown in the previous section, the shock caused by the recent upsurge in agricultural commodity prices has been absorbed differently across Member States. In particular, the analysis has shown that the food price increases have been stronger in most of the new Member States than in euro area countries. While some of these differences in national consumer food price increases can be explained by macro-economic factors or differences in cost structures, they are also an indication that the EU single market in food remains fragmented.

This conclusion is supported by other evidence as well. The import penetration rate in the food and beverage industry (0.28) is well below the EU average for manufacturing (0.63). Moreover, the share of cross-border M&A deals in the total number of deals (0.25) is lower than the average for manufacturing industries (0.29). This indicates that there are still barriers to trade and cross-border investment in this sector, particularly for SMEs. The relatively high degree of dispersion between food prices in different EU Member States is another indication of the fragmentation of food markets, which may be explained on the one hand by the diversity in national preferences of European consumers and on the other hand by cross-country differences in the regulatory environment and the behaviour of food processors.

For wholesale and retail trade, the only available indicator of market integration is the share of cross-border mergers. This indicator is below the EU average of services for the retail trade but not for the wholesale trade. Different factors may help explain the relatively low amount of cross-border investment in retail trade. For example, the high market share of large retailers in some countries makes market entry more risky and reduces the expected return of foreign investment because the national market is already saturated.

### **4.2. Concentration and consolidation along the food supply chain**

Consolidation is taking place throughout the food supply chain. The retail sector in particular is characterised by an increased presence of large food retailers. Within a larger and increasingly integrated European Single Market, consolidation can lead to efficiency gains and put a downward pressure on prices. However, a vigilant competition policy is required to ensure that the beneficial effects of this consolidation process are not outweighed by potentially negative side effects (such as anti-competitive agreements or abuses of dominant positions) which might impede effective competition.

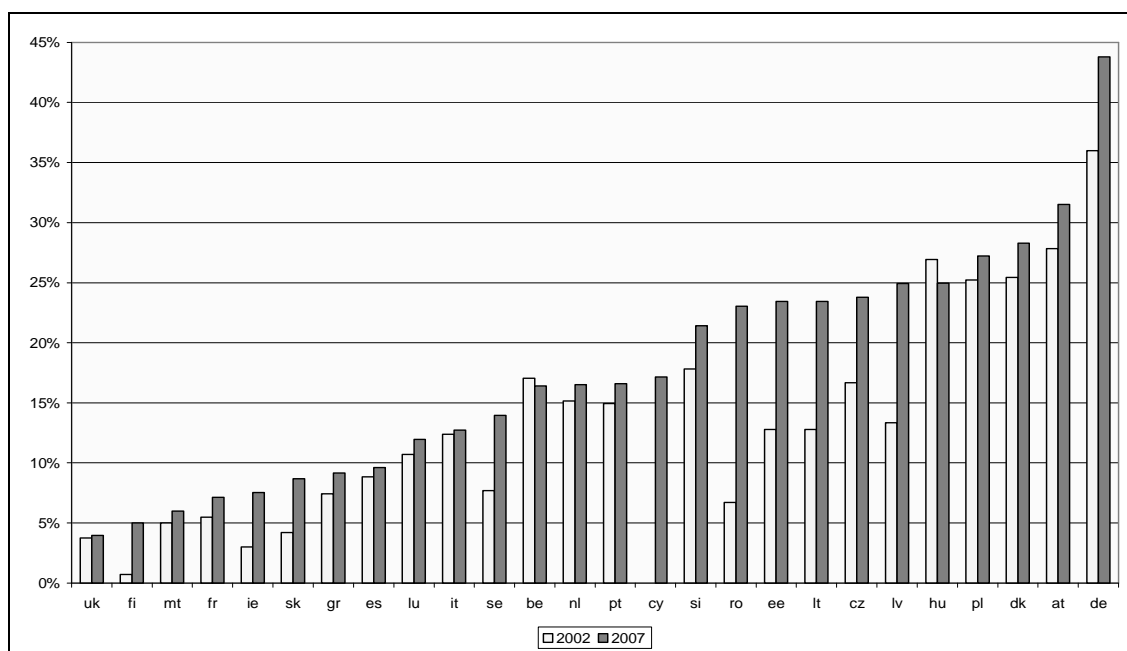
In the food processing sectors, concentration levels vary strongly across food categories and by extension food sub-industries. Palpacuer and Tozanli<sup>[7]</sup> show that in sectors such as biscuits and confectionery, the concentration ratio is above 60%. In general, the firms that are active in these most concentrated food categories operate at global level and typically offer internationally branded products. A strong brand may serve as a signal of quality, thus helping to secure consumer loyalty. At the same time it may make it harder for potential rivals to compete, dissuading them from entering the market and making it difficult for retailers not to carry the product (the so-called 'must-stock' products). Food products that are less differentiated such as bread, meat or flour are typically produced by food sub-industries that are less concentrated, including craft production (e.g. bakeries, butcheries). The incidence of private label and no-label products is more widespread in the latter categories. However, the geographic scope of these products is also likely to be narrower.

The EU food retail sector is characterised by a high degree of concentration: in most Member States the five largest retailer chains account for over 50% of the market. Concentration levels are higher in the old Member States.

A process of consolidation in the food retail sector is on-going across the European territory, but the consolidation movement is particularly strong in the new Member States. In these countries consolidation has gone hand in hand with an increase in food retail surface area, which can be explained both by a larger number of individual stores and an increase in average store size. The increase in the number of outlets appears to have offset to some extent the increase in food prices associated with surge in agricultural commodity prices.

In many of the old Member States, the consolidation movement has been accompanied by a switch from smaller to larger store formats (i.e. hypermarkets, supermarkets and discounters) as well as an overall reduction in the number of stores. With the exception of Sweden, the total food retail surface area has increased in all countries. Even though higher concentration levels may prima facie suggest weaker competition and therefore may lead to higher prices, the larger store formats may lead to increased economies of scale and scope resulting in lower prices. Nevertheless, the presence of more than one retail store in a catchment area is crucial for competition to occur.

Another trend which may contain retail prices is the increase in the market share of discounters, who typically focus on low prices at the expense of other product dimensions (see Figure 5). The presence of discounters exerts pressure on other retailers to increasingly focus on the price dimension and affects the profitability of other retail formats (see Cleeren et al.<sup>[8]</sup>). Their growing presence may also have been spurred on by changing household purchasing habits and a higher price sensitivity. Over the period 2002-2007, the share of discounters increased in almost all EU Member States and in particular in some of the new Member States (Slovakia, Romania and the Baltic States). With a market share of over 30%, discounters are by far most successful in Germany and Austria, where they have a long-established presence. In the new Member States, discounters are particularly strong in Poland, Hungary and the Baltic States, where they account for a significant market share (over 20%) and continue to grow at a high rate.



Note: Market share calculated as the share of discounters' turnover in turnover of large retailers (hypermarkets, supermarkets and discounters).

Source: Euromonitor International

Figure 5. Combined market share of retail discounters, 2002 and 2007

### 4.3. Bargaining power along the food supply chain

The degree of bargaining power held by the firms in vertically-related markets varies by product category and can potentially lead to imbalances in the food supply chain. It is influenced inter alia by the position of firms in the markets in which they operate, be it as suppliers or as buyers. For example, in the case of biscuits and confectionery, retailers seem to be in a much weaker bargaining position than in the case of dairy products where the upstream food producers are more fragmented as seen in Table 4. Consolidation in a sector may allow firms to thwart market or buyer power in a vertically-related market, but may also result in foreclosure.

In particular, the fact that many large retailers increasingly operate in more than one Member State and thus have access to a wider potential consumer base strengthens their position. A potential upstream consequence of consolidation at the retail level is that suppliers are limited in the number of alternative outlets. Analogously, when concentration occurs in the food industry, retailers themselves face a

reduction of alternative sources of supply. Ultimately, excessive concentration may result in anti-competitive developments leading to price increases. For this reason the developments in the sectors along the food supply chain and the behaviour of market participants need to be monitored closely to pre-empt anti-competitive situations that would fuel price increases.

A number of features other than the market share of firms involved in a vertical transaction may affect their bargaining power or already be a reflection of it. These features include product attributes, for example the relative importance of branded products, as well as contractual terms between vertically-related firms. These features are by and large legitimate activities, but deserve consideration in any deeper assessment of the food supply chain. Some of these practices are discussed in the next section.

Another trend that may affect the relationships between food producers and retailers is the growth in the share of private label products introduced by food retailers. The market share of such products varies by country, product-category and store format. In some Member States they now account for more than 40% of products sold (see Table 3) and for many store formats, in particular discounters, they represent the quasi-totality of listed products.

**Table 3.** Share of retailer brands (all products) by EU Member State, 2008

AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PO	RO	SK	SL	ES	SE	UK
22%	42%	n.a.	n.a.	27%	27%	n.a.	25%	32%	40%	n.a.	25%	n.a.	16%	n.a.	n.a.	n.a.	n.a.	23%	21%	31%	n.a.	33%	n.a.	34%	27%	43%

Source: Private label manufacturers association [http://www.plmainternational.com/en/private\\_label\\_en2.htm](http://www.plmainternational.com/en/private_label_en2.htm)

While private labels widen the range of available products and thus represent an additional source of competition, they may lead to foreclosure effects as supplier of branded products become a direct competitor to the retailer (Dobson and Waterson<sup>[9]</sup>). Similarly, although they provide opportunities for their producers to have access to a large customer base, they may also reinforce their dependency on a particular retailer. Given the different motivations for introducing own brands, it is difficult to predict their long-term impact on prices. However, recent evidence tends to show that they exert a downward influence on the price level of a given product category. For example, a recent market analysis by Planet Retail<sup>[10]</sup> comparing the prices of branded products and corresponding retailer brands finds that the latter are generally lower priced: in most cases analysed more than 30%. Analysing the impact of retailer brands in 35 product categories (30 of which are food products) on the basis of consumer household panel data for Sweden, Anselmsson et al.<sup>[11]</sup> find that the market share of retailer brands exerts a negative effect on the average price levels in the respective categories. This downward price impact is strongest immediately following the introduction of these products.

The increased bargaining power of retailers resulting from the introduction of private label products may be offset by the strong bargaining power of firms offering (internationally) branded products due to the 'must-have' status of such products. Producers of homogeneous products, for which brand awareness is not high, are likely to be in a much weaker position. A stronger brand image results from product differentiation through investment in product innovation, quality and advertising. Ultimately strong brands may constitute entry barriers, as new entrants would be faced with high levels of upfront costs they could not recover subsequently (endogenous sunk costs).

Advertising expenditure can be viewed both as a proxy for market entry barriers (i.e. an endogenous sunk cost) and a relative bargaining strength. Advertising by food producers help create a strong brand image, send signals of quality, differentiate the good from others and thus secure consumer loyalty. However, as indicated in the previous section, a strong brand image may also make it harder to compete against the concerned product.

## 5. The impact of regulations and business practices

### 5.1. Regulatory issues

The regulatory framework affects the food supply chain at all levels from the agricultural sector down to retail. Regulation may affect the functioning of markets through industry/sector-specific regulation (e.g. urban planning regulations and opening hours in the case of the retail sector) or economy-wide provisions (e.g. labour market regulation, or competition policy). The regulatory framework can raise compliance

costs for firms, which will be passed on to customers in the form of higher prices. Regulation can also directly affect prices through price regulation. Another aspect that needs to be taken into account is the level at which the regulatory framework is designed, decided and enforced (i.e. EU-wide, national, regional, local). To the extent that the applicable regulatory framework varies across countries (and even regions), the regulatory impact across the EU is consequently likely to differ as well and may explain price differentials to some extent.

While an analysis of regulation should take into consideration the costs imposed on firms and ultimately passed on to consumer prices, it should also take account of the regulatory benefits and the contribution of regulation to overall social well-being. For example, planning restrictions are often identified as competition-inhibiting regulations that raise entry barriers for potential entrants and protect incumbents. At the same time they may be devised to address congestion issues, noise pollution or considerations about the image of town-centres. Therefore, an in-depth examination of the impact of the regulatory framework on the functioning of the food supply chain needs to fully take into account the different objectives of regulations that are imposed on firms and whether those objectives are met in a proportionate way and in a manner consistent with other general policy objectives.

Three types of regulation affecting in particular the retail sector have been identified as potentially problematic for the functioning of the food supply chain: regulations creating entry barriers, regulations limiting price competition and regulations restricting shop opening hours. The McKinsey Global Institute<sup>[12]</sup> makes the argument that such regulations can explain a large share of the productivity growth gap between EU Member States and the US. The OECD regulatory indicators for the retail sector reveal that price controls and operational restrictions on retail trade (including restrictions on shop opening hours) are more common in many EU Member States than in the US, while this is less the case for entry barriers (see Conway and Nicoletti<sup>[13]</sup>). In total, Austria, Belgium, Finland, France, Greece, Luxembourg, Poland and Portugal seem to be more regulated than other EU Member States. .

Schivardi and Viviano<sup>[14]</sup> show that *entry barriers* exert a strong influence on incumbents' performance in Italian retail trade, increasing profit margins and prices and reducing productivity and ICT investments. Haskel and Sadun<sup>[15]</sup> find a similar result for the UK and suggest that the planning regulation reduced retailing productivity growth between 1998 and 2003. Griffith and Harmgart<sup>[16]</sup> also demonstrate that planning regulations represent an entry barrier in the UK, reducing the number of large supermarkets and leading to a welfare loss for consumers. However, they also indicate that this cost could be offset against any benefits which may result from reduced congestion. Finally, Bertrand and Kramaz<sup>[17]</sup> find that the zoning regulation introduced in France in the early 1970s to restrain the development of large retail stores has had a negative impact on employment. A similar result is obtained for Italy by Viviano<sup>[18]</sup> who compares retail trade employment growth in regions with more or less restrictive entry regulations.

General regulations on commercial establishments, or land and urban planning regulations affecting the attribution of construction permits, which limit the establishment of new stores, can thus create entry barriers with a negative impact on the performance of the retail trade. An informal survey carried out by the European Commission in 2008 amongst national competition authorities suggests that planning regimes place more limited constraints on the extension of existing stores by retailers compared with new entry. This gives a greater incentive to incumbent retailers to expand and thus make it less attractive for rival retailers to open up competing outlets. In general, these urban planning regulations foresee authorisation procedures for shops above a certain size. The procedure can be based on a number of criteria (amongst them criteria of an economic nature, such as the impact of the establishment on competitors or on the "balance" between different forms of shop formats) which give a very large margin of discretion to the authorities delivering the authorisation. The procedure itself does not necessarily guarantee an objective or impartial application of the relevant criteria.

Below cost selling restrictions and associated regulations fixing invoice price levels belong to this category of *regulations limiting price competition*. In many Member States restrictions on below costs selling are in place and aim to establish a certain threshold price under which operators are not allowed to sell except in a limited set of circumstances. However, the coverage of the prohibition of below cost selling varies widely across Member States (e.g. application of the prohibition to all retail sectors or only to certain firms or products; circumstances under which below cost selling would be allowed even if the practice is generally prohibited; elements included in the calculation of "costs", etc.).

Below-cost selling restrictions set a price floor limiting intra-brand price competition between retailers. As the price floor is often defined as the invoice price, such restrictions amount to resale price

maintenance. Furthermore, they lead to higher stock-management costs as retailers may face more difficulties in selling excessive stocks. These costs are likely to be higher for perishable products. Regulation defining how this price floor ought to be calculated can also exacerbate price stickiness. In market segments where food suppliers have considerable market power, these restrictions can lead to the establishment of relatively high price floors. Analysing the effects of below-cost pricing prohibitions, Collins et al.<sup>[19]</sup> and Biscourp et al.<sup>[20]</sup> find evidence of a reduction in intra-brand competition and an increase in grocery prices following its introduction.

Various regulations restricting the operational conduct of retail trade, including in particular *restrictions on shop opening hours*, are in place all across Europe and often even vary even within Member States. These regulations seem to be generally more restrictive in Austria, Belgium, Denmark, Finland, France, Greece, Luxembourg, Poland and Spain. They may also have a potential negative impact on competition but to a lesser extent than planning regulations, according to the survey made amongst national competition authorities. Such regulations may also reduce retailers' efficiency by limiting the possibility of selling their products, and thereby increasing operational, logistics and wastage costs of retail outlets. However, the efficiency considerations of lessening restrictions, such as those on shop opening hours, should be seen in the light of the potential social impact, notably on smaller shops and shop-keepers.

## 5.2. Business practices

The functioning of the food supply chain is affected by the degree of competition at all stages of the chain. In particular, a higher degree of competition is associated with lower mark-ups, greater efficiency and therefore better performances in terms of innovation, quality, and prices. The degree of competition along the food supply chain may be affected by a number of business practices. While such practices could give rise to competition concerns, it should be emphasised that very few practices can be considered anti-competitive per se. Cartels are the exception. Therefore, the business practices described below have to be examined on a case-by-case basis, always considering the context in which they take place. The consequences of interactions between firms are situation-specific and consequently need to be assessed in terms of their effect on competition as well as from an efficiency perspective – i.e. in terms of innovative performance, economies of scale and economies of scope.

*Cartels* are hard-core restrictions of competition. Recent experience shows that cartels can occur in the food sector. These cartels tend to vary in terms of territorial scope. Special attention should be given by competition authorities to uncovering the most harmful cartels amongst suppliers of both processed and non-processed foods.

The size and number of "*buying alliances*" in the food sector have grown considerably throughout the EU. The involvement of larger buyers in such alliances has led to increasing concerns expressed by food producers. These joint purchasing agreements can be used as a tool for obstructing rivals' access to essential inputs at competitive conditions and/or for competitors to engage in collusive behaviour on downstream markets. However, these purchasing agreements are often concluded by small and medium-sized retailers and wholesalers to achieve volumes and discounts similar to their bigger competitors. These agreements between SMEs are therefore normally pro-competitive since even if a moderate degree of market power is created, this is likely to be outweighed by efficiency gains resulting from economies of scale.

Practices relating to *resale price maintenance* restrict the buyer's (i.e. the wholesaler or retailer's) ability to determine the price level at which the products are sold to customers. As a result, price competition in the downstream market is significantly reduced. Practices relating to resale price maintenance often appear local in scope and National Competition Authorities are well equipped to address them.

Other vertical agreements such as *single branding* obligations, which require retailers to sell a single product, and certain tying practices, which make the purchase of a product conditional on the purchase of another product, may have either pro-competitive or anti-competitive effects. In terms of negative effects, the main competition risks would be the foreclosure of the market to competing and potential suppliers or a loss of in-store inter-brand competition. Similarly, the increased use of private label products by retailers may lead to foreclosure of existing and potential competing suppliers. This could reduce the number of product items on the shelves, thereby limiting consumer choice.

*Exclusive supply agreements*, which oblige the supplier to sell the goods specified in the agreement to one buyer only, can lead to a foreclosure of other buyers/retailers within the food supply chain. The market



position of competing buyers on the upstream market is thus crucial since competitors are only likely to be foreclosed if their market position is significantly smaller than that of the buyer benefiting from the agreement. If the buyer has market power downstream, significant negative effects for consumers can be expected. However, countervailing power of suppliers is also of relevance, since important suppliers will not easily allow themselves to be cut off from alternative buyers.

*Certification schemes* can be mentioned as an example of arrangements that could indirectly compel the suppliers to sell to only one buyer. These schemes may be useful for producers and consumers, as they guarantee quality and origin and therefore allow customers to make better informed choices. Nonetheless, the proliferation of schemes and labels in recent years has given rise to concerns about their transparency requirements, the credibility of the claims made and their possible effects on equitable commercial relations. In particular, the pressure to participate in more than one scheme because of different requirements entails a significant financial and administrative burden for agricultural producers, and especially small-scale producers.

*Mergers and acquisitions* are a normal business process. They essentially imply a pooling of assets or a reallocation of corporate control, through which firms want to achieve certain strategic goals. Mergers can take place at horizontal or vertical level. The motivations behind mergers are very diverse, ranging from efficiency considerations and cost savings to firm expansion or market access. The effects of mergers are also very diverse and only anti-competitive mergers are being prohibited. Among the mergers with a so-called 'Community dimension' analysed by the European Commission since 2000 in sectors relating to the food supply chain, the large majority were unconditionally approved, indicating that they did not give rise to impediments to competition. Only a small number were approved subject to conditions. This distribution is fairly consistent with merger decisions in other sectors of the economy, suggesting that mergers in sectors along the food supply chain do not a priori give rise to higher anti-competitive risks than those in other sectors of the economy.

## 6. Conclusion

The sharp fluctuations in agricultural commodity and food prices at a time of great uncertainty about the economic outlook illustrate the need to improve the functioning of the European food supply chain with a view to enhancing its efficiency and competitiveness. The conclusions of the analysis presented in this paper are that the rapid increase in food prices was due mainly to global demand and supply developments. However, problems in the functioning of the food supply chain, in terms of competition and regulation, may have played an important role as well and there is room to improve the efficiency of the food supply chain.

First, food price inflation differentials are a signal that the EU food market remains still fragmented. This fragmentation can be due to differences in regulation on market entry and pricing and to business practices such as exclusive supply agreements. Second, there are indications of differences in the conditions of competition across Member States. In particular, competitive pressures at the food retail level have absorbed some of the increase in producer prices in the euro area while this is not the case in the new Member States. Third, a consolidation is taking place throughout the food supply chain. This consolidation can lead to efficiency gains and hence to lower prices. However, it can also change the bargaining powers of actors in the different segments of the food supply chain and could deteriorate the competition conditions at the local level.

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