

# What explains the widening gap between the retail and producer prices of food?

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The widening margin between the retail and producer prices of food has been documented in numerous empirical studies both in Europe and in the USA for many different food products. This paper explores the possible reasons for this phenomenon, with emphasis on the situation in Finland. Six conceivable explanations are recognized: 1) increased degree of processing, 2) better food hygiene, 3) differences in productivity growth across sectors, 4) agricultural policy reforms, 5) international trade, and 6) imperfect competition. In this paper each of the hypotheses is assessed in light of the available empirical evidence.

Key words: agricultural policy, consumer prices, farm-gate prices, food markets, price margin.

## Introduction

The widening gap between the consumer and producer prices of food has been documented in numerous empirical studies both in Europe and in the USA for many different food products (Digby 1989, Kinsey and Senauer 1996, Løyland et al. 2001, Reed et al. 2002, Kjuus 2004, Niemi and Jansik

2005). The concept of marketing margin, or farm-to-retail price spread, was developed to measure the difference between consumer expenditure for food and an associated farm value (Ogren 1956). Specifically, the margin is calculated by subtracting the net farm value equivalent of food sold at retail of the farm product (farm value less the value of any by-product) from the retail price. These margins

have been examined on many occasions, often in response to concern at a time of sharp movements in farm-gate or retail prices.<sup>1</sup>

Two aspects of retail pricing behaviour have been subject of frequent examination in the literature. The practices of levelling and averaging, introduced by Allen (1963), concern the relative movement of retail and producer prices. Levelling may be said to occur where short-run fluctuations in producer prices are filtered out so as to hold retail prices stable, whereas averaging refers to pricing and margin policy across a range of products. Averaging is said to operate when, faced with a low margin on beef for example, the retailer attempts to offset this by increasing his margin on pork. Various techniques have been employed in previous research to test for the existence of these two practices. These range from simple graphical representation of comparative data, to statistical investigation using regression analysis (Digby 1989).

Another common approach to estimating marketing margins and retail-to-farm price linkages for food commodities has been to assume that margin behaviour depends on the pricing practices of market middleman. Justification for this approach of margin behaviour is mainly empirical. The most extensive analysis is provided by George and King (1971), who find that a significant number of commodities displayed combinations of both constant absolute and constant percentage margins. This approach generally lacks theoretical justification, however. As Gardner (1975) remarks, "...no simple markup pricing rule – a fixed percentage margin, a fixed absolute margin, or a combination of the two – can in general accurately depict the relationship between the farm and retail price." In their empirical application to the beef market, Wohlgenant and Mullen (1987) find that the data are supportive of

the proposition that the markup pricing rule is mis-specified, in line with Gardner's observation.

Much of the attention in recent years has focused on testing for the presence of market power, as well as estimating the degree of market power. Generally two approaches have been taken in identifying and estimating oligopoly (or oligopsony) market power: structure-conduct-performance (SCP) studies and new empirical industrial organization (NEIO) studies. SCP studies have mainly used cross-sectional data to estimate the relationship between price-cost margins and concentration ratios to draw inferences about the presence of market power, while NEIO studies have generally tended to find some statistical evidence of market power by focussing on the determinants of the gap between price and the marginal cost (Wohlgenant 2001). There are number of empirical studies relating retail prices to concentration ratios of retailers. However, they arrive at very diverging conclusions. On the one hand, Hall et al. (1979), Marion et al. (1983), and various studies by Cotterill (Cotterill 1986, Cotterill and Harper 1995, Cotterill 1999) find that there is a positive correlation between retail concentration and food prices. On the other hand, Kauffmann and Handy (1989), and Binkley and Connor (1998) find a negative or insignificant correlation between concentration and food prices. Likewise, Binkley et al. (2002) find "little compelling evidence that consolidated markets engage in non-competitive pricing behaviour."

Technical change has been addressed in the empirical studies generally through use of a trend variable as a proxy for this effect. Such an approach makes it difficult to separate scale effects from technical change, however. Incorporating more sophisticated methods is not necessarily straightforward because of data limitations and convergence problems in the highly nonlinear empirical models (Sexton and Lavoie 2001). There is empirical evidence (Azzam and Schroeter 1995) that technical change is confounded with increased concentration through cost savings from plant scale. Marketing margins are also shown to be affected by other structural changes including vertical integration, cooperative behaviour, and government programs (McCorrison and Sheldon 1996, 1997).

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<sup>1</sup> The literature on marketing margins is closely related to the economic literature on value-added functions (Bruno 1978). The essential difference between the concept of margin and value-added is that value-added focuses on the contribution of intermediate inputs to GDP, whereas marketing margins only subtract the value of the farm input.

While a number of earlier studies interpret the increase of price margins as an indication of imperfect competition in the food markets, in general, other conceivable explanations should also be considered.

(1) The degree of processing has increased together with the increased consumption of convenience foods and semi-finished products. As consumers demand more marketing services in the form of greater convenience or processing, the farm value share declines.

(2) Introduction of more stringent standards for food hygiene have increased the costs of the food industry and the retail sector. These costs increase the consumer prices decreasing the share of the farm value.

(3) The costs and productivity have developed at different rates in agriculture, food processing and retail sectors. The ever-increasing productivity of agriculture has steadily decreased the real price of agricultural produce. This alone would cut the farmer's share of the retail prices even if the margins for processing and retail distribution just kept up with the inflation.

(4) Agricultural policy reforms can influence the price margins. In recent decade the shift in the emphasis in the agricultural support measures have been from price support to direct payments, for example. As a result, the producer share of the consumer prices can decrease even if its share of the total social cost of food remains constant.

(5) Markets for agricultural products and wholesale of food have opened up for international trade, whereas the retail markets remain locally confined. The bargaining power of the retail sector has reinforced in the food chain relative to the domestic agriculture and food industry as domestic suppliers compete with the foreign ones for the shelf space in the retail markets.

(6) The abuse of market power may indeed play a role. The major retail chains have gained purchasing power through mergers and acquisitions, and by introduction of international purchasing organizations and private labels, which may lead to abuse of the dominant market position. Buyer power is not restricted to food retailing, but the food processing industry may exert buyer power as well.

It is important that all these possible explanations are investigated together in order to improve the understanding of supply chain dynamics and of the need and nature of policy interventions. In this paper we assess each of the hypotheses in light of the available empirical evidence, with an emphasis on the situation in Finland. This paper can be considered as an exploratory study of the importance of alternative explanations available, with a view towards future work in this area. Cross-country comparisons and rigorous econometric or statistical analyses of the alternative explanations fall beyond the scope of the present paper.<sup>2</sup>

## Alternative explanations for increasing price margins

### Convenience foods and semi-finished products

The increased degree of processing provides an obvious explanation for the widening gap between the retail and farm-gate prices. The increased variety of convenience foods and semi-finished products has changed the consumption patterns of food, and an ever-increasing share of food-preparation activity that formerly took place in homes is nowadays conducted by food producing and retail firms. The food processing and retail firms are no longer just marketing agencies for the primary products produced in farms, but they also add considerable value to the products. While the increased degree of processing increases the consumer expenditures on food products, it also makes the calculation of the price margins more challenging. For convenience foods that consist of large numbers of different ingredients that come in relatively small amounts,

<sup>2</sup> The follow up study by Kuosmanen, Niemi and Sipiläinen (2009) investigates some of the explanations examined in this paper by using cointegration tests.

estimating the producer share becomes a demanding task.

Given the practical difficulties to estimate a producer share of the more complicated food products such as frozen pizza, the reported price margins have been typically estimated for standardized homogenous products with a relatively low degree of processing, such as liquid milk, wheat flour, or minced meat. The price margins have increased considerably even for these low-processed products that have remained virtually the same over the years and decades (Laurinen 1996, Peltomäki 2000, Niemi and Jansik 2005). Thus, from the outset, the increased degree of processing seems to have nothing to do with the reported price margins. Yet, two contrary remarks should be noted.

First, if the market share of the processed foods increases, this can decrease the production volumes of the low-processed products selected for the price margin analyses. If the food processing firms exhibit economies of scale, the decreased production volumes of the surveyed products imply that the processing costs of these products increase over time, a part of which is forwarded to the consumer prices.

Second, the food processing firms may find it profitable to cross-subsidize their highly processed foods at the expense of the low-processed products. Keeping the margins of the convenience foods and semi-finished products low and the margins of the low-processed products high, the food producing firms can influence the consumer behavior to their own benefit. Cross-subsidization of products does not necessarily imply market failure or harm to the consumers; multi-product firms can cross-subsidize their products in the competitive market equilibrium.

## Food hygiene

The value added of the food processing and retail sectors can also increase even if there is no notable change in the appearance of the food product. In recent decades, the standards of food hygiene have received increasing attention, which has prompted

the food processing and retail sectors to pay more attention on the quality and management of the food chain, either voluntarily or through government regulations.<sup>3</sup> In the processing industry the quality is to an increasing extent maintained through self-check programmes. These consist of instructions which secure high-quality production processes at all stages. Obviously, the higher standards of hygiene incur costs for the firms, which are passed on to the consumer.

The more stringent standards are more likely to show up in the dairy and meat products where the cold storage and transportation present significant costs, whereas the changes in the storage and transportation of cereal products such as wheat flour are likely to be less significant.

The more stringent standards may play a role in the long time series of price margins, or in the event of some exceptional regulatory measures to combat animal diseases (e.g. the outbreak of the mad cow disease in the Great Britain). In a relatively short time span, the changes in standards cannot explain much of the observed gap in price margins.

## Costs and productivity

The market prices change over time as a result of productivity growth, which decreases the real production costs. The producer share of the retail price can change over time if the rates of productivity growth differ in agriculture from those at the food processing and retail trade. The declining trend in the producer share would suggest that the productivity growth has been faster in the agriculture than in the subsequent stages of the food chain. In the past century, the productivity growth of agriculture has been tremendous. In particular, labour productivity has grown as a result of tractors and other machinery, chemical fertilizers, pesticides, GM crops, and other technical innovations. On the other hand, substitution of labour by other inputs does not *per se* increase

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<sup>3</sup> According to the WHO definition, food hygiene refers to all measures necessary to guarantee the safety of food at all stages of the food chain.

the total factor productivity (TFP); the estimated TFP figures are somewhat more modest.

Extensive industry level productivity study by O’Mahoney and van Ark (2003) has compared the productivity developments in Europe and in the USA. This study is based on the growth accounting method that uses the value shares of inputs in constructing the TFP index. A remarkable feature of this study is that the authors differentiate between the high skill and low skill labor and the ICT and non-ICT capital. Table 1 lists some of the TFP estimates reported by O’Mahoney and van Ark (2003) for the main sectors of the food cluster. We note that the TFP growth has been significantly higher in agriculture than in food industry or retail trade in all three periods considered. This can at least partly explain the decreasing share of the producer margin in the consumer prices. It is worth to note the big differences between EU-4 and the USA in the retail trade productivity in 1995–2000. As O’Mahoney and van Ark (2003) note, the slower productivity growth of the European retail trade sector is one of the main reasons for the European

economy to fall behind the growth rates of the USA (see also Gordon 2004).

Junka (2003) presents analogous TFP estimates for Finland. His growth accounting analysis differs from that of O’Mahoney and van Ark in that the aggregate labor and capital inputs are used without distinction of labor skill or ICT capital. Table 2 reports Junka’s estimates for the relevant sectors. In Finland, the TFP growth of agriculture has been somewhat slower; note however that these sectoral productivity indices also include forestry and fishing, which have much larger shares in Finland than in the rest of the EU or USA. On the other hand, the TFP growth of the food industry and the retail trade has been faster in Finland than in the rest of the EU. Thus, the higher TFP growth of agriculture does not fully explain the widening gap in Finland. However, if we look at the labour productivity (i.e. output / labour ratio), agriculture has exhibited faster growth than the food processing and retail sectors. Although the TFP takes comprehensively into account the total input use, the labour productivity figures may be more appropri-

Table 1. Average annual increase in total factor productivity in the relevant sectors in the EU and the USA.

Sector	EU-4*			USA		
	1979–90	1990–95	1995–2000	1979–90	1990–95	1995–2000
Agriculture, Forestry and Fishing	4.00	3.16	3.26	6.58	1.43	8.81
Manufacture of Food, Drink & Tobacco	0.66	1.02	-0.16	0.07	2.44	-7.28
Retail trade	1.45	0.77	0.79	1.49	1.01	5.34

\* EU-4 = France, Germany, Great Britain, and Netherlands. Source: O’Mahony and van Ark 2003.

Table 2. Average annual increase in total factor productivity and labour productivity in the relevant sectors in Finland.

Sector	TFP			Labour productivity		
	1976–90	1990–95	1995–2000	1976–90	1990–95	1995–2000
Agriculture, Forestry and Fishing	1.2	2.2	3.7	5.1	4.9	5.1
Food, Drink & Tobacco	1.7	4.0	2.8	3.4	6.6	3.2
Retail trade	1.5	2.6	3.1	2.5	4.5	2.6

Source: Junka 2003.

ate for the present discussion for two reasons. First, the food industry and retail trade remain relatively labor intensive sectors; in Finland, the capital intensity of these sectors has grown very slowly during the past 30 years (see e.g. Kuosmanen et al. 2009, Fig 4.4–4.6). Second, the capital inputs of agriculture have been subsidized by investment support and hectare-based payments, which gives farmers incentives to increase labour productivity at the expense of the capital productivity. As labour has been substituted by capital inputs, the labour productivity grows faster than the TFP.

## Agricultural policy reforms

Agriculture has been heavily regulated and subsidized both in Europe and in the USA. In recent decade the shift in the emphasis in the agricultural support measures have been from price support to direct payments. In the EU, for example, the intervention prices of cereals and beef were lowered closer to the world market prices as a result of the Common Agricultural Policy (CAP) reforms of 1992 and 1999. The price reductions were compensated for by means of direct payments, which is why support based on the area or number of animals (headage and area related payments) gained a central position in the product-specific price and market organisations of the EU (Niemi and Ahlstedt 2005). Now most of these payments for arable crops and livestock will be decoupled from the production as a result of the CAP reforms agreed in 2003 and 2008.

The price margins are influenced by the agricultural policy, in particular the direct and indirect subsidies. As a larger proportion of farmers' income consists of direct or indirect subsidies, neither the farm-gate prices nor the retail prices of food account for the full economic cost of production, which tends to bias the price margins. The following simplified example of liquid milk illustrates the point.

Figure 1 presents a decomposition of the price of liquid milk between the value shares of the primary production, food industry, and the retail sector, including also the value added tax (VAT) and

the agricultural subsidy. All figures mentioned in the example are hypothetical and are only given for the sake of illustration. The price margin calculations are usually consumer price oriented: they exclude the subsidy but include the VAT. The producer price margin compares the unsubsidized value share of primary production (25) with the retail price of food (= primary production + food industry + retail trade + VAT = 75), which gives  $25/75 \times 100\% = 33.3\%$ .

Another approach is to look at the share of primary production in the total revenues earned by sectors. This perspective includes the subsidy but ignores the VAT. Thus total milk revenue is equal to 80. The earnings of the primary production consist of the subsidy and the value share of primary production, which is  $15+25 = 40$ . Looking from the revenue side, primary production thus earns  $40/80 \times 100\% = 50\%$  of the total milk revenue.

Clearly, when a larger proportion of the primary production costs is subsidized, the price of the primary produce will decrease relative to the margins of the food industry and retail trade. The increased

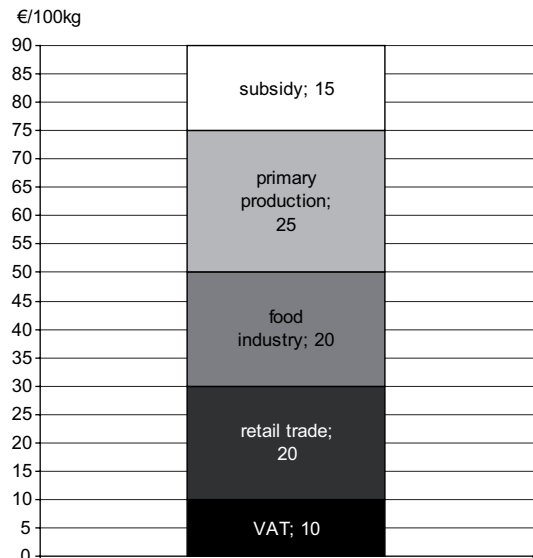


Fig. 1. Decomposition of the price of liquid milk in Finland between the value shares of the primary production, food industry, and the retail sector.

share of the subsidized part of the primary production costs can thus explain the decreasing producer price margins.

### International trade

Traditionally, many countries protect their domestic agricultural production by imposing tariffs and import quotas. In recent decades there have been considerable pressures on trade liberalization. The Uruguay Round Agreement on Agriculture (URAA) signed in 1994 fundamentally changed the rules for international agricultural trade, whereby quantitative constraints for agricultural policies were established for all World Trade Organization (WTO) members. The URAA contributed to a reduction in agricultural protection by establishing new rules for agricultural import policy, and agreeing on disciplines for sanitary and phytosanitary measures. Currently, WTO members are engaged in a new round of multilateral trade negotiations, often referred as the Doha Development Round. In reference to agriculture, the round aims to further improve market access,

to reduce trade distorting domestic support, and to phase out all forms of export subsidies.

Liberalization of international trade has clearly benefited the retail firms which can purchase their inputs from highly competitive international markets while at the same time they can supply to locally confined consumer markets. As a result, the cross-country price variations are much greater in the retail prices of food than in the primary products. The effect of trade liberalization is often directly associated with the increased purchasing power of the food processing and retail firms. However, the liberalization of international trade can decrease the producer price margin also under conditions of perfect competition, as the following simple graphical example illustrates.

Figure 2 describes the markets of a hypothetical agricultural produce and the associated retail market of food. The left panel of the figure describes the agricultural produce market where farmers supply the produce to the food industry. The farmers supply curve is represented by ( $s$ ) and the food industry's demand curve by ( $d$ ). The food industry enriches the produce to consumption commodity, which is sold to the consumers through retail firms.

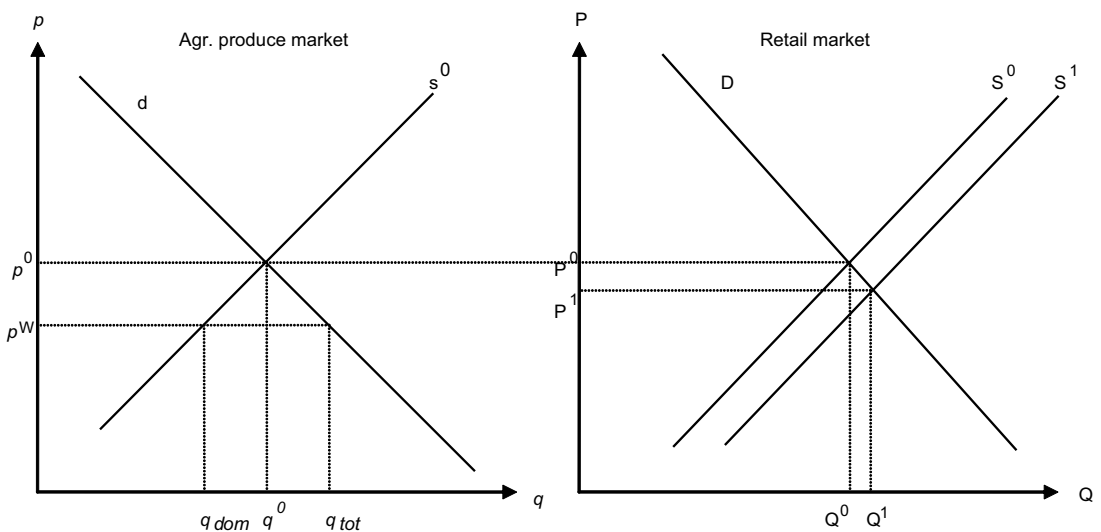


Fig. 2. Illustration of the impact of the international trade on price margins.

The right panel of the figure describes the retail market where the retail firms supply the commodity to the consumers. Note that the vertical axes of the left and right panels have different scales. The retail firms supply curve is represented by (S) and the consumer's demand curve by (D).

Suppose initially the domestic agricultural producers are protected from competition by heavy tariffs, and both agricultural and retail markets are domestically confined. The market of the agricultural produce is in the initial equilibrium ( $q^0, p^0$ ), and the prevailing market price exceeds the price at the world markets ( $p^w$ ). The retail markets are in the equilibrium ( $Q^0, P^0$ ). We assume  $P^0 > p^0$ . However, to illustrate the change in the relative price over time, the vertical axes of the left and right diagrams have been scaled such that initial prices are at the same level.

In period 1, the trade is liberated and the food industry can import the produce at the world market price  $p^w$ . As a result, domestic farms also sell at price  $p^w$  and the domestic supply decreases to level  $q_{dom}$ . The difference  $q_{tot} - q_{dom}$  represents the imports of agricultural produce. The supply curve of the retail firms also shifts right-ward from  $S^0$  to  $S^1$  due to the cheaper raw material. However, the cost of raw material is merely one component of the marginal costs of the food industry and the retail firms, so the effect of cheaper agricultural produce has a more modest effect on the retail markets. The new equilibrium at the retail market occurs in point ( $Q^1, P^1$ ).

Now, what happens to the produce price margin in this example? The initial producer price margin is given by  $p^0 / P^0 = 1$ . After the trade liberalization, the price margin is  $p^1 / P^1 < 1$ . *Ceteris paribus*, the trade liberalization has had a decreasing effect on the producer price margin. Note that this effect does not depend on the increased purchasing power of the food processing companies or retail firms: the effect occurs even when both agricultural produce and retail markets exhibit perfect competition (as we have implicitly assumed here). It is also not critically dependent on the assumption of domestically confined retail markets. The effect mainly occurs because the agricultural produce is merely one of the cost components among others

(e.g. processing, storage, transportation etc.), and thus a decrease in the price of agricultural produce will lead to a proportionally smaller decrease in the price of retailed food.

## Market power

Abuse of a dominant position in the market is frequently mentioned as an explanation for the decreasing producer price margins. This is clearly a plausible explanation. Clearly, the food industry, and the retail sector in particular, have consolidated through mergers and acquisitions and strategic alliances. Retail buying is becoming more and more concentrated, in part because retailers have become very large sellers and in part because retailers combine their buying activities. As a consequence, concentration is higher on the buyer side than the seller side throughout Europe (Dobson et al. 2003). In Finland, the increased concentration of the retail sector, with fewer outlets and the growth of the large supermarket chains, has been particularly fast. The two leading Finnish retail chains of food and daily goods increased their market share from 55 per cent in 1990 to nearly 75 per cent in 2007 (Niemi and Ahlstedt 2008).

Yet, proving the claims of abuse of market power is rather difficult because a large market share does not directly imply a large market power. According to the theory of contestable markets (e.g. Baumol et al., 1982), a market characterized by a small number of sellers – or even a monopoly – can exhibit competitive pricing if has low barriers of entry and exit. If a firm in a market with no entry or exit barriers raises its prices above marginal cost to earn abnormal profits, potential rivals will enter the market to take advantage of these profits. Thus, a highly concentrated market does not necessarily imply super-normal profits.

In fact, concentration may also be welfare improving for more than one reason. If there are scale economies in the industry, it may lead to important gains in efficiency (Demsetz 1973, Azzam and Schroeter 1995, Swinnen and Vandeplass 2009). Efficiency will also increase if transaction costs



are substantially lower as a result of high market power (Shervani et al. 2007). Further reason why retail consolidation may lead to lower retail prices is that high buyer power can lead to better bargaining power vis-à-vis the main suppliers, which may feed through to lower consumer prices eventually (e.g. Chen 2003, Dobson and Waterson 1997). Finally, when agricultural production is subsidized, the buyer power can be an offsetting force that reduces the market distortions and the deadweight loss of subsidies (e.g. Kuosmanen et al. 2009).

Although liberalization of trade and harmonization of regulations (EU, WTO) has lowered the barriers of entry and exit, some major barriers still remain. In Europe, there are considerable differences in the food culture across countries and regions. Only a few food products are sold throughout Europe; most foods are tailored for the local tastes and eating habits. In addition, there exist considerable differences in the disease, health control and environmental regulations across countries. While the aim of these regulations is to protect consumers, the cross-country differences in these regulations can hinder trade and competition. In the retail sector, restrictive land use planning regulations may prevent potential competitors entering the market.

## Price margins of light milk and minced meat in Finland (1975–2005)

This section examines the development of the price margins of light milk (1.5% fat) and minced meat beef steak (5% fat) in Finland during the 30-year period 1975–2005, critically assessing the significance of the effects identified in the previous sections. The consumer prices have been estimated by Statistics Finland and the farm-gate prices by the Information Centre of the Ministry of Agriculture and Forestry (TIKE) (see Statistics Finland 2005 and TIKE 2006 for further information about the sampling and estimation procedures). The price margins have been calculated by Siren (1971), Haljala (1981), Laurinen (1996), Peltomäki (2000), and Mäkelä and Niemi (2004).

The development of the raw material price margins of light milk and minced meat (as percent of the consumer price) is illustrated by Figure 3. The producer share of minced meat has declined from 40–45 percent in the late 1970s and early 1980s to less than 25 percent in 2002–2005. The producer share of light milk first dropped sharply in the early 1980s, then rose steadily throughout 1980s and 1990s, but has declined in the past 5 years.

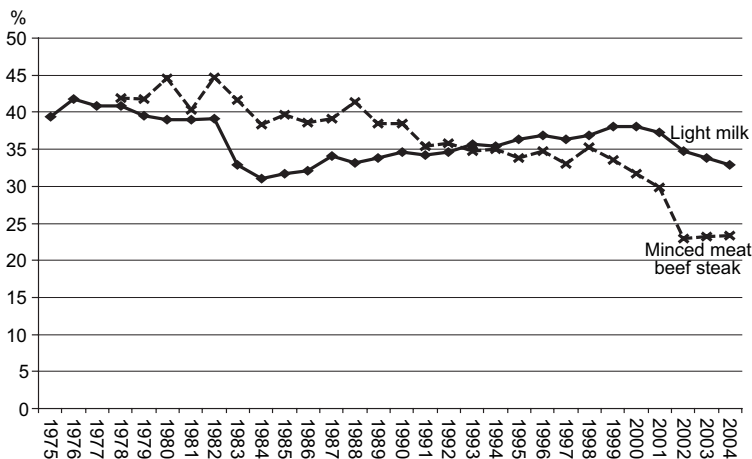


Fig. 3. Development of producer price margins (as a percentage of consumer prices) of light milk and minced meat during 1975–2005.

The developments of the consumer prices, decomposed into the raw material price, the margin of the food processing and retail firms, and the value added tax, are illustrated in Figures 4 and 5. All prices are expressed in Euro per unit (1 or kg), deflated at price level of year 2005 using the consumer price index of Statistics Finland. The consumer price of milk has shown relatively steady decline throughout the study period, driven by decline of both raw material price and the margins of the dairy and retail firms. Figure 4 includes the

linear trend lines for the price margins; remarkably, these trend lines have almost identical slopes. From Figure 5 we note that the price of minced meat shows greater fluctuations, which is mainly associated with the price margin of the butcher and retail firms. Overall, the raw material price has declined more steeply than the price margin of the industry and trade. The consumer prices dropped sharply in 1995 and remained low till 2001, but have partly recovered since 2002.

Fig. 4. Development of the consumer price of light milk (in real prices of 2005) during 1975–2005 decomposed into the raw material price, and the margin of the food processing and retailing.

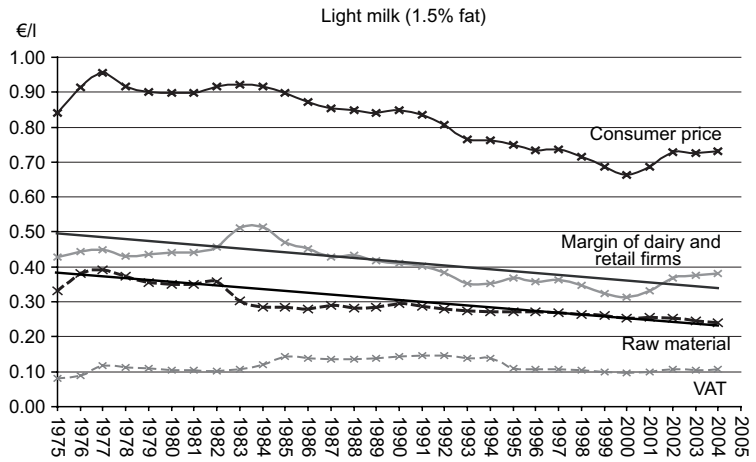
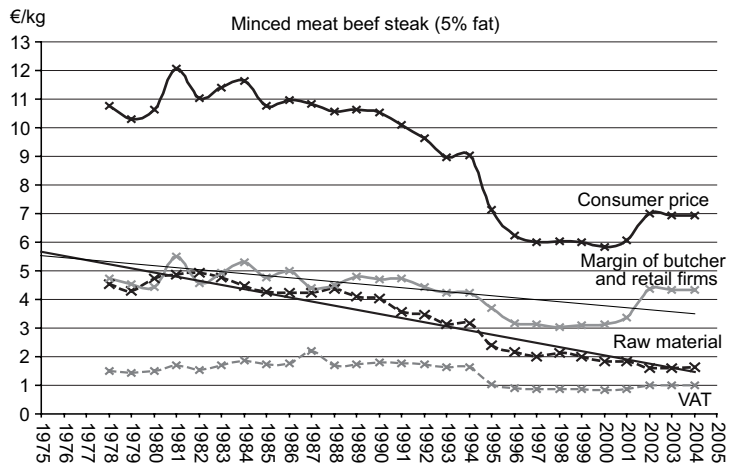


Fig. 5. Development of the consumer price of minced meat (in real prices of 2005) during 1975–2005 decomposed into the raw material price, and the margin of the food processing and retailing.



Now, what factors explain these different developments in the prices of milk and minced meat? We next examine the effects introduced and discussed above.

First, the increased degree of processing has little effect on these two products, which have been of homogenous quality throughout the study period. Although the consumption of liquid milk has been in decline, the increased exports have kept the scale of production at the same level. Despite some annual fluctuation, the scale of the beef meat production has also been rather constant. There is some reason to suspect cross-subsidization in the pricing of milk products: even though the producer price margin of full milk (3.5% fat) has been approximately 10 percent points higher than that of light milk throughout the study period, the dairy and retail firms have offset the difference in the raw material prices by charging lower margin for full milk, and as a result, the consumer prices of light milk and full milk have been almost identical throughout the study period. Nevertheless, the increased degree of processing seems a relatively unimportant effect for these two commodities.

Food hygiene has greatly improved during this 30-year study period. In-house control was made statutory for all operators in the food sector by legislation in 1995. Since 2005, the hygiene proficiency certificate has been required of every food sector employee who works in a food establishment and handles perishable, unpacked food. Hygiene proficiency requires continuous training and updating of knowledge, and thus incurs additional costs for the food processing firms. However, the improvements of food hygiene have occurred gradually as a part of the normal productivity development of the firms, and the costs of these improvements are very difficult to estimate. Nevertheless, improved food hygiene presents one potentially important effect to consider.

Productivity growth is clearly the driving factor behind the declining food prices in the long run. Productivity growth occurs throughout the food chain, but the industry level productivity studies (e.g. Junka 2003) do not give detailed enough picture of productivity developments within the industry; for example, productivity of dairy sector may

have developed differently from that of the meat processing sector. Comparing the price series of Figure 4 with the industry level productivity estimates of Junka (2003), we see that in the dairy sector the decline of both primary production and the industry and retail price margins is only about 1–1.5 percent per year over the study period, while the productivity growth estimates suggest annual TFP growth of 2.5–3 percent. Thus, the productivity growth must have been slower in the dairy sector than in the other parts of the food chain. From Figure 5, we see that the raw material price of beef meat has declined more rapidly or 4–7 percent per year, which exceeds the TFP growth estimates in agriculture as a whole. By contrast, the price margin of the industry and retail has declined only 1–2 percent, which is somewhat smaller than the TFP growth. In conclusion, the differences in productivity growth in the different stages of the food chain may explain the diverging trends in the minced meat margins, while there is no notable productivity effect in the price margins of light milk. This explanation is examined in more detail in the follow up study Kuosmanen et al. (2009).

Finland's accession to the EU in 1995 brought with it major policy reforms for agriculture. The membership in the EU lowered the producer price level of milk and beef by 27 and 40 %, respectively (Niemi and Ahlstedt 2005). However, based on the time series of Figures 4 and 5, the policy reforms had surprisingly small impact on raw material prices. The explanation lies in the taxation principles of food stuffs in Finland before and after the accession. Before the EU membership, primary production in Finland was practically exempt from taxes, but from 1995 onwards a VAT of 17% has been in force. As a result, the inflation adjusted raw material price of light milk remained steadily on its long term trend line. The raw material price of minced meat dropped initially well below the long run average, but recovered also quickly, reaching almost its long term trend by 2001. Consequently, in case of light milk and minced meat, the permanent impact of the EU accession on raw material prices appears to be relatively small (Figs 4 and 5).

The membership in the EU resulted in profound changes in the Finnish foreign trade of food products. It was no longer possible to regulate the domestic market price level of food products through national border protection and export subsidies. All obstacles to the trade between member states were abolished immediately in the beginning of 1995, and EU regulations came into force in the trade with the third countries.

Consequently, the foreign trade of Finnish dairy and beef products has been characterized by an increase in imports during the EU membership years. This, in turn, has resulted more aggressive competition and cheaper raw material costs. The retail sector is able to take advantage of the competition between the domestic food companies as well as between the domestic companies and the foreign ones. In other words, the position of retail trade in the food chain relative to the domestic raw material production and food industry has strengthened.

Furthermore, the retail sector has concentrated heavily during the study period; in the past decade the retail market has been dominated by K- and S-group with 30-40% market shares each. The Finnish dairy sector has also been concentrated throughout the study period: In 2005, Valio dominated the sector with the market share of 80%, followed by Ingman (14%), and others (6%). The meat production has concentrated since the late 1980s, but the market remains more competitive than the dairy

sector: the main butchers of the beef meat in 2005 were Atria (43%), HK-Ruokatalo (36%), Saarioinen (12%), Snellman (5%), and Karjaportti (4%). The oligopolistic competition in the food industry and retail sectors is often blamed as the reason for the declining producer prices.

Figure 6 describes the development of the percentage price margin of the industry and retail firms for the two commodities considered. We see that the price margin of the processing and retailing as the percent of the consumer price of light milk has oscillated around 50% throughout the study period; the present margin is close to the average and falls short of the record levels in the early 1980s. In conclusion, the producer price margin for light milk proved rather immune to the effects of higher degree of processing, agricultural policy reforms, international trade, and imperfect competition. The minor changes observed can be explained by the improved food hygiene requirements and differences in productivity growth. The decline of the producer price margin of milk over the years 2000–2005 should be put on the perspective of the 30-year development of the margins throughout 1975–2005.

The producer price margin of beef meat showed more rapid decline and more heavy fluctuations over the years from 1975 to 2005. The price margin of butcher and retail firms as the percent of the retail price of minced meat has increased from

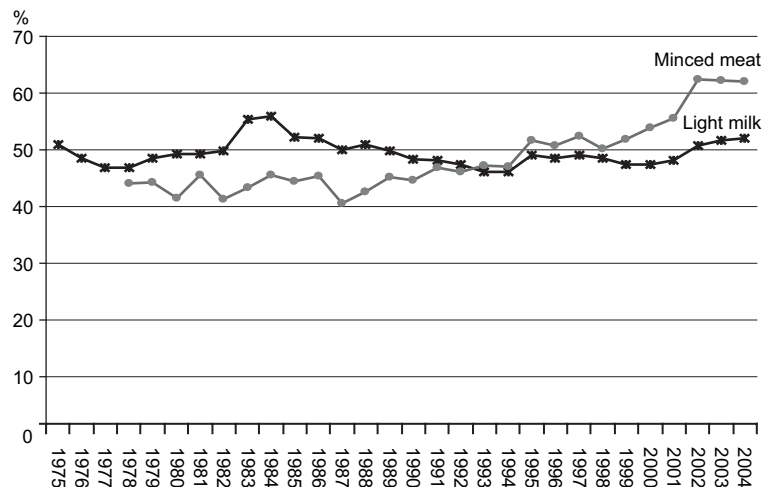


Fig. 6. Development of the margins of the food processing and retailing (as a percentage of consumer prices) in case of light milk and minced meat during 1975–2005.

about 45% in the early 1980s to over 60% in the early 2000s. It is difficult to attribute this increase to the abuse of market power by meat industry. Firstly, there is a large number of suppliers for minced meat than for light milk, which makes that cartel pricing by meat industry is more difficult to achieve. Secondly, the meat industry is dominated by producer cooperatives that are expected to maximize the joint profits from the primary meat production and processing and should not exhibit aggressive pricing towards producers. Third, the profitability of the meat producing firms has been rather poor in the past decade, with many producer cooperatives operating on loss. This is in sharp contrast with the supernormal profits from the abuse of market power. In conclusion, the costs of better food hygiene and the productivity differences in the beef chain present themselves as explanations for the increased price margin of the industry and retail of minced meat.

## Conclusions

We have examined six different explanations for the declining producer price margins in the consumer price of food. Our analysis suggests that there are many plausible reasons for the common declining pattern of producer price margins, which is worth keeping in mind when interpreting the price margin calculations. In general, isolation of the different effects seems very difficult. Understanding these mechanisms requires careful analysis of the available empirical evidence.

We assessed the plausibility of these six effects in explaining the developments in the price margins of light milk and minced meat in the Finnish food market in 1975–2005. The analysis highlighted the importance of taking a sufficiently long view; the declining trend in the producer price margin of milk in the past five years does not seem too alarming when one takes into account the preceding 20-year period when the price margin increased. Using the CPI deflated data also revealed the steady decline in the consumer prices due to the

productivity growth throughout the food chain. The empirical analysis suggested the international trade (especially in the beef meat), productivity growth, and the costs of improved food hygiene as the main reasons for the observed patterns in price margins. However, further work is needed to collect more conclusive evidence. Important areas for further research include estimation to what extent Finnish food markets are integrated to the corresponding international markets, study of international comparisons of marketing margins, and study of vertical price transmission from retail to farm level.

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## SELOSTUS

### Mistä johtuu kasvava ero elintarvikkeiden vähittäismyynti- ja tuottajahintojen välillä?

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Monissa empiirisissä tutkimuksissa Euroopassa ja USA:ssa on havaittu kasvava ero elintarvikkeiden vähittäismyyntihintojen ja tuottajahintojen välillä. Sama koskee useita eri elintarviketuotteita. Tämä ero, eli niin sanottu hintamarginaali, koostuu maataloustuotteiden hintoihin lisättävistä keräily-, jalostus-, kuljetus- ja vähittäismyyntikustannuksista. Hintamarginaalia käytetään yleisesti elintarvikejalostuksen ja kuljetuspalveluiden suorituskyvyn mittarina. Tuottajaryhmät, kuluttajajärjestöt sekä maatalouspolitiikan toimijat vetoavat tavallisesti juuri hintamarginaalilukuihin esitellessään näkemyksiään elintarvikeketjun tehokkuudesta.

Tässä tutkimuksessa tarkastellaan hintamarginaalien kasvun mahdollisia syitä ja merkityksiä Suomen näkökulmasta. Ilmiölle on löydettävissä kuusi mahdollista selitystä. 1) Yksi selittävä tekijä hintamarginaalien kasvuun on jalostusasteen nousu valmisruokien ja puolivalmisteiden kasvaneen kulutuksen myötä. Samalla kun entistä pidemmälle jalostettujen tuotteiden kulutus kasvaa, alkutuotannon osuus niiden vähittäishinnasta pienenee. 2) Elintarvikehygienian tiukempien standardien käyttöönotto on omalta osaltaan lisännyt elintarviketeollisuuden ja vähittäismyyntisektorin kustannuksia. Myös nämä kustannukset nostavat kuluttajahintoja ja pienentävät tuotteiden alkutuotantoarvon osuutta. 3) Elintarvikkeiden vähittäismyyntihintojen koostumisessa alkutuotannon osuus pienenee myös siksi, että kustannukset ja tuottavuus kehittyvät eri tavoin elintarvikeketjun eri osissa, kuten maataloustuotannossa, elintarvikejalostuksessa ja vähittäismyyntisektorilla. Maatalouden pitkään jatkunut tuottavuuden kasvu on

laskenut tasaisesti maataloustuotteiden reaalihintoja. 4) Myös harjoitettavalla maatalouspolitiikalla on vaikutuksensa hintamarginaalien kehitykseen. Maataloustuen seurauksena kuluttajahintojen tuottajaosuus saattaa laskea, vaikka tuottajan osuus elintarvikkeiden yhteiskunnallisista kokonaiskustannuksista pysyisi vakaana. 5) Maataloustuotemarkkinoiden ja elintarviketukkukaupan kansainvälinen avautuminen on myös osaltaan vaikuttanut hintamarginaalien kehitykseen, vaikka vähittäiskauppa onkin pysynyt paikallisena. Elintarvikeketjussa vähittäiskauppioiden neuvotteluasema on vahvistunut verrattuna kotimaisen maatalouden tai elintarviketeollisuuden toimijoiden asemaan. Kotimaiset tavarantoimittajat kilpailevat ulkomaisten toimittajien kanssa hyllytilasta vähittäismyyntimarkkinoilla. 6) Markkinavoimien hyväksikäytöllä saattaa myös olla merkitystä hintamarginaalien kasvuun. Suuret vähittäismyyntiketjut ovat lisänneet ostovoimaansa fuusioiden ja yrityshankintojen avulla sekä hyödyntämällä kansainvälisiä osto-organisaatioita ja kaupan omia tuotemerkkejä. Tämä on saattanut vaikuttaa johtavan markkina-aseman väärinkäyttöön. Ilmiö ei ole rajoittunut elintarvikkeiden vähittäismyyntiin, vaan myös elintarvikkeita jalostava teollisuus voi käyttää ostajan voimakasta asemaa hyväkseen.

Tämän tutkimuksen empiirisen analyysin mukaan kansainvälisen kaupan vapautuminen, tuottavuuskehityksen erot elintarvikeketjun eri osissa sekä lisääntyneet elintarvikehygienian kustannukset ovat tärkeimmät vaikuttajat hintamarginaaleissa havaittuihin kehityslinjoihin. Kattavamman empiirisen todistusaineiston kokoamiseen tarvitaan kuitenkin lisää tutkimustyötä.