

## Using Price Rigidities to Explain Pricing Strategies in the Organic Milk Chain

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### Abstract

The stickiness of prices and reasons for price changes are widely discussed in market analyses and marketing theory. Explanations and reasons of rigidities have shown that prices do not change as often in small retail stores and in markets with high concentration (Powers and Powers 2001, Hannan and Berger 1991). For organic products, until now there have been few clear results about pricing strategies and it can be assumed that consumers pay premium prices for organic products with increasing market shares of the sector. Hence the opportunities regarding pricing behaviour and pricing strategies in the organic milk supply chain up to now have not been discussed. This paper strives to close this research gap by examining rigidities in the organic milk market on the basis of organic retail scanner data. Using these results, pricing strategies in the organic retail sector are discussed.

### 1 Introduction

The milk market in Europe is currently experiencing greater volatility due to liberalisation, and the producers at the end of the chain are being negatively affected by price changes (Bullwhip Effect) (Lee et al. 1997). In the market for organic milk, the risks for farmers tend to be even more serious due to the intrinsic features of this niche market, which is characterised by high production costs because of specialisation (Hill and Lynchehaun 2002). Accordingly, in the attempt to reduce risks for the organic milk producers, the discussion around suitable producer prices has been steadily increasing. One alternative is to reach higher prices for organically produced milk in organic retail stores. However, theories about pricing strategies in the organic industry have not been widely discussed, despite the fact that price stickiness and reasons for price changes are frequently the subject of market analyses and marketing theories. This may be because research has shown that prices do not change as often and as much in small retail stores (Powers and Powers 2001). Additionally, a low level of marketing knowledge and market orientation within the organic sector can be assumed (Spiller et al. 2009). This paper strives to close this research gap by examining price rigidities in the organic milk market on the basis of organic retail scanner data in the timeframe 2005-2009. On the basis of these results, pricing strategies in the organic retail sector can be explained.

The main assumption of this study is that in the organic milk sector prices are not the outstanding buying argument for the consumers, as the prices are rather rigid compared to the conventional milk sector. To explain the context of these research questions, section 2 of this paper introduces the organic milk market in Germany. Section 3 provides several

illustrations of reasons for price stickiness/price changes. The methods are described in section 4, and on the basis of scanner data, rigidities of organic milk products are analysed in section 5. This is followed by a discussion of the results, focusing on the chosen pricing strategies.

## 2 Organic food retailing and the market for organic milk

Historically, organic retailing in Germany has differed from other European countries with separate marketing channels for organic food. Since the 1990s the organic retail sector has been confronted with increasing competition (Lülfes-Baden et al. 2009). Nearly all retailers in Germany, including conventional retailers and discounters, now offer organic products (AMI 2009).

**Table 1.** Distribution channels and market shares for organic food in Germany

Year	Total revenue (in billion €)	Organic food store	Conventional food retailing <sup>1</sup>	Producer/ Direct marketing <sup>2</sup>	Health food shop	Bakeries/ Butcher	Other <sup>3</sup>
1997	1.48	31 %	28 %	19 %	10 %	5 %	7 %
2000	2.05	28 %	33 %	17 %	10 %	7 %	5 %
2005	3.90	25 %	41 %	14 %	6 %	6 %	8 %
2008	5.85	22 %	57 %	8 %	3 %	4 %	6 %
2009 <sup>4</sup>	5.80	22 %	56 %	7 %	3 %	4 %	7 %

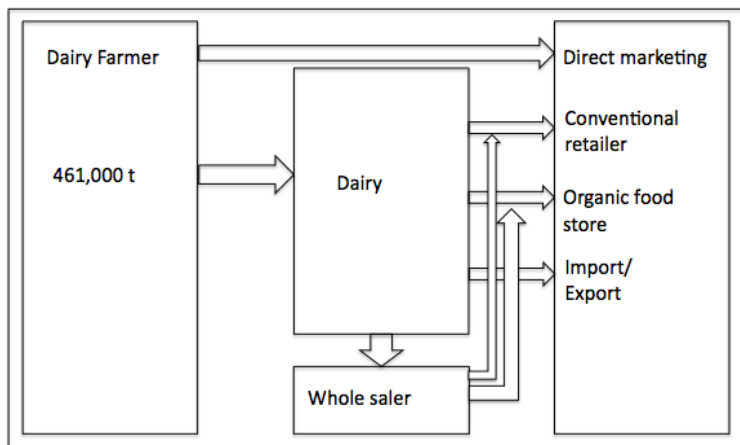
<sup>1</sup> Food retailer: discounter, delicatessen and delivery service included  
<sup>2</sup> Producer (farmer): farmer's market and delivery service included  
<sup>3</sup> Drugstore, mail order and processor  
<sup>4</sup> Preliminary estimation AMI (2010)

Source: Own compilation following AMI (2010) and Hamm (2006)

The market share for organic products was about 3.1 % of the total food sales in Germany in 2008 (BÖLW 2010). 22 % of organic sales took place in specialised organic food stores in 2009, as examined above (see table 1). Besides conventional food retailing, these stores are the most important marketing channel for organic products (Lülfes-Baden et al. 2009). Although the market share of conventional food retailers has increased in recent years, organic food stores have gained a higher market volume. Store formats of specialised organic retailers are differentiated by their sales area. As some retailers with less than 300 m<sup>2</sup> of sales area have gone out of business because of increasing competition, the number of stores with over 300 m<sup>2</sup> has grown in recent years (BÖLW 2010). Meanwhile, chain stores dominate this segment with a market share of 53 % and increasing (Offeney and Kreuzer 2011).

In 2008 nearly 5.9 % of the farmers in Germany were certified for organic production (BÖLW 2010), even though it was still a niche market. Due to market growth, the organic milk production increased from 379,000 t in 2005 up to 461,000 t in 2008 (BÖLW 2010) which corresponds to 1.7 % of all milk produced in Germany. Organic milk and milk products generated 18 % of the whole organic revenues in 2008 (BÖLW 2010). The markets for organic and conventional processed milk are quite different (Bundeskartellamt 2009). The supply chain for organic milk is overall more differentiated than the conventional milk supply chain (see figure 1). Wholesalers gain higher market shares in the organic retail sector whilst they are underrepresented in conventional marketing channels due to the high

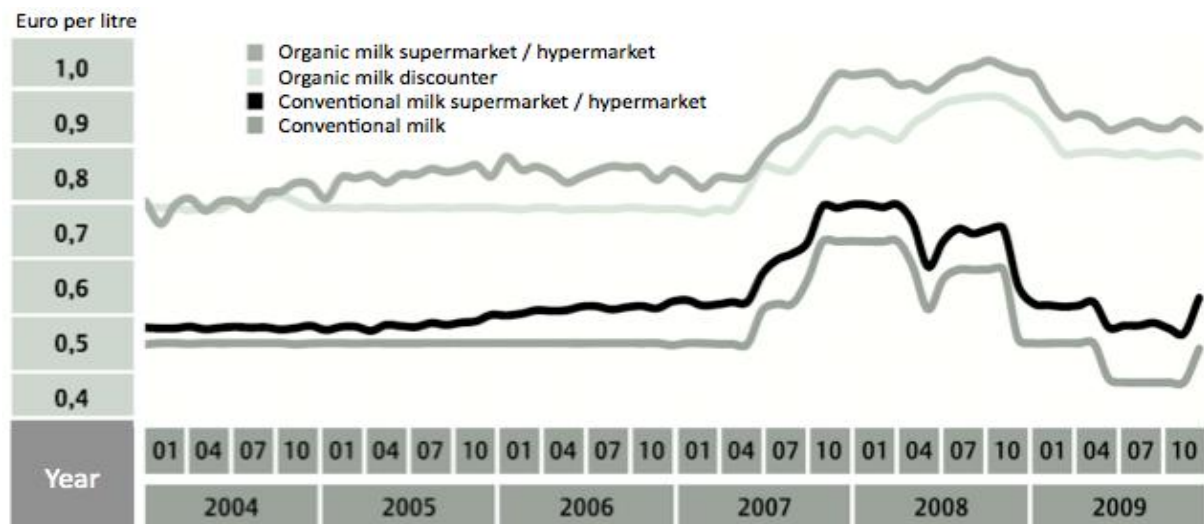
concentration ratio on the retail level, leading to direct relationships between processors and retailers (disintermediation) (Gerlach et al. 2005).



**Figure 1.** The organic milk supply chain in Germany

Source: Own illustration based on AMI (2010), Wendt (2004) and Burchardi and Thiele (2004)

Prices for organic milk in the past year followed the volatilities and the price rise in 2007 as figure 2 shows. Whilst the prices for organic milk were much higher in the timeframe 2004-2009 than the conventional consumer milk prices, the price gap in 2007 was smaller than in 2009. The organic milk prices seemed to remain at a high level as conventional milk prices decreased in 2009. It should be noted that figure 2 shows consumer milk prices in the conventional retail sector, therefore average prices in organic food stores were probably even higher (Lülfes-Baden et al. 2009).



**Figure 2.** Consumer prices for conventional and organic milk in Germany

Source: BÖLW (2010)

In summary, this outline of the German organic market shows several important aspects. Firstly, the market can be considered as a niche market, implying higher production risks and costs. Additional higher consumer prices are expected for this niche market. The market shares of the small store segment remain stable at nearly 44 % (all retail formats included). The market is split in two main segments: First huge conventional retailers with high concentrated four leading companies and on the other hand small stores and especially specialised organic food stores. About this very different company structure, little is known

about pricing strategies in organic food stores, especially for organic milk products. Keeping in mind high consumer prices, the question now is which pricing strategies organic retailers follow. Do they act like they are selling branded products with Hi-Lo prices, or do they set prices near to the Every Day Low Price (EDLP) strategy as Herrmann and Moeser (2004) find for conventional retailers? Little is known about pricing strategies in niche markets. The following chapter introduces the alternative pricing strategies and provides explanations for price rigidities.

### **3 Pricing strategies and price stickiness**

Whilst little is known about pricing strategies in organic retail markets, several issues regarding the stickiness of prices or the frequency with which they change can be extrapolated from earlier research on conventional retail (Herrmann and Moeser 2004, Weber 2009) and other markets. These were discussed in different economic sectors: interest rates in banks (Hannan and Berger 1991), raw materials for industrial production (Carlton 1986), catalogue prices for non-food items (Kashyap 1995) and additionally in the food sector by means of scanner data (Slade 1999, Powers and Powers 2001, Herrmann and Moeser 2004, Weber 2009).

#### *3.1 Theory of price adjustment*

The costs of price adjustment include the importance and relevance of menu costs for firms and retailers (Kashyap 1995, Slade 1999, Weber 2009) in addition to decision cost (Chakrabarti and Scholnick 2007). Menu costs are defined as material costs for price adjustments as decision costs imply the managerial decision making process. Price adjustments may be required if the market prices change or increasing (decreasing) production cost arise (Sheshinski and Weiss 1993). Especially smaller retailers are affected by relatively high menu costs to adjust prices. This could be an argument for price stickiness, as the prices in smaller firms are not changed as often (Carlton 1986, Hannan and Berger 1991). In our context, organic retail formats cover smaller sales areas. Retail units with more than 500 m<sup>2</sup> sales area are rarely seen. In contrast to conventional retail where large sale areas are more common we hypothesise:

H1a: In small organic food stores prices are rigid compared to bigger conventional food stores.

In addition to H1a the market competition plays an important role for price adjustments (Axarloglou 2007). For food products Powers and Powers (2001) found in a study of rigidities for lettuce that higher concentration of a market implies higher stickiness of prices. We have shown in chapter two that the market for organic products experiences a high degree of differentiation, despite the fact that organic markets are much smaller than those in conventional retail. This leads to the following research hypothesis:

H1b: The prices for organic milk products change much more often than in the conventional retail sector due to lower concentration.

### 3.2 Pricing strategies in organic retailing

Retailers use Hi-Lo or Every Day Low Price (EDLP) strategies (Lal and Rao 1997), with the latter mostly being applied by discounters for retail brands (Hoch et al. 1994, Herrmann et al. 2009). The former is preferred to sell manufacturer brands. In addition to this, premium pricing strategies are also discussed (Spiller et al. 2009, Kotler and Armstrong 2010). These three pricing strategies differ in the maturity of prices or in the speed with which prices change (rigidity) and the price level for products (see table 2). From the frequency of price changes, price actions and price surges can be defined (Weber 2009). Price actions are assumed if the price changes are shorter than four weeks (short-term), price surges imply price changes for longer than four weeks (long-term) (Herrmann und Moeser 2004). In addition, our data provide prices on a daily basis from which we can derive non-strategic price changes.

**Table 2.** Pricing strategies differing by rigidity

	Every day low price	Hi-Lo	Premium pricing
Daily basis / non strategic price changes	High rigidity	Rigid	Low rigidity
Short-term / price actions , promotions	Rigid	Low rigidity	High rigidity
Long-term / price surges	Rigid / Low rigidity	Rigid	High rigidity
Price level	Low	Middle	High

Source: Own compilation following (Herrmann and Moeser 2004, Weber 2009)

EDLP products are offered with the lowest price guarantee for consumers to identify easily. This strategy results in rigid prices (Herrmann et al. 2009). In Germany and certain other European countries, a famous example of this strategy is ALDI with a consistent and aggressive lowest price strategy. Cost leadership is a necessary presumption, which can imply crowding out effects of competitors (Simon and Fassnacht 2009). “Hi-Lo” strategy or “Promotional Pricing” is often used for well known branded products in supermarkets. Such promotions include reductions in sales prices for a short time (rigidity low). Price sensitive consumers are attracted by communicating promotional prices via in-store merchandising (Hoch et al. 1994). Promotional pricing aims at short term price reduction on the basis of a middle price level with the advantage that it does not affect the general price image of the brand. Long-term price reductions may result in losses of consumer acceptance and brand image (Lal and Rao 1997).

The third strategy that is often discussed is a consistent premium price strategy, which is found for special products with a premium incentive to the buyer on a high price level (for example organic products) (Kotler and Armstrong 2010, Spiller et al. 2009). These premium products do not undergo price changes as they are rare products for the retailers and have to be protected by producers or the whole supply chain. Price protection seems to be one argument for sticky prices, which does not exclude price reductions based on sell by date articles. Another aspect of high prices for specialised organic retail is the lack of price influence on demand (Blinder et al. 1998). In willingness to pay studies, the main buying arguments for consumers are taste, healthiness and quality of organic food and additionally ethical and animal welfare beliefs (Magnusson et al. 2001, Hughner et al. 2007, Zander and Hamm 2010). Zander and Hamm (2010) also conclude that consumers are willing to pay a premium, however, the main obstacle to buying organic products in other studies has been the price (Magnusson et al. 2001, Hughner et al. 2007). For intensive and medium organic food buyers the incentives concern health, fairness and animal welfare aspects not the

premium price (Makatouni 2002, Cicia et al. 2010). Accordingly, Hill and Lynchehaun (2002) make clear in a qualitative study of organic and non-organic milk buyers that organically produced milk is purchased with health aspects in mind. Consciousness about high prices is only found among non-organic buyers. So it is obvious that prices are not the most important buying argument for organic consumers, which results in a higher rigidity. Following the argument that organic milk products are premium products and neither EDLP nor Hi-Lo strategies are used, therefore:

H2: The prices for organic milk products are rigid on a high price level

### *3.3 Pricing strategies in different organic retail formats*

The last aspect we want to introduce here are the differences inside the organic retail sector. Market orientation, competition and big industrialised farms are all aspects of increasing conventionalisation in the organic industry (Hall and Mogyorody 2001). Increasing competition among organic retailers was also concluded in chapter two. As we have seen, smaller retailers go out of business or increase their sales area. New organic supermarkets were the most frequently launched retail format in 2009 (BÖLW 2010). This trend will may result in pricing strategies similar to those in conventional retail. Beside this trend towards larger sales areas we assume that larger organic food stores adopt the price promotions of the conventional retailers, as the smaller ones do not change prices very often. Therefore the next research hypothesis is:

H3: In smaller organic food stores prices for milk products are rigid compared to bigger organic food stores.

## **4 Materials and methodological approach**

To analyse how milk prices in the organic retail sector change, scanner data from BioVista, a German market research organisation, were used in the timeframe 2005 – 2009. BioVista specialises in collecting scanner data from the organic retail sector in Germany. The data provide daily information on the sales volume, the sales price and the sales date of organic milk products. Sales from retailers from 80 (in 2005) to 160 in 2009 were recorded. Table 2 shows the product categories and the volume of each category for cow milk products (milk products of sheep, goat and substitutes based on soy beans or other crops were excluded). Outliers were identified by means of two ways. At first, the average prices of every product were calculated and those prices which vary more than a double standard deviation were excluded from the data. In a second step, products with less than 100 price observations in the timeframe were excluded.

**Table 3.** Observed product categories

Category	Number of articles
Butter	58
Natural yoghurt	43
Cheese	330
Whey - Buttermilk	46
Curd	48
Cream	39
Milk	91

Source: Own calculation

Additionally, to discuss differences in pricing strategies linked to sales area we divide the data in a second step into four store groups:  $\leq 99 \text{ m}^2 = 11 \%$ ,  $100-199 \text{ m}^2 = 27 \%$ ,  $200-399 \text{ m}^2 = 37 \%$ ,  $\geq 400 \text{ m}^2 = 26 \%$ . Compared to the current situation bigger stores are overrepresented but may represent the trends towards greater sales areas in the organic retail sector (BÖLW 2010).

We follow the work of Powers and Powers (2001). The authors measure Price rigidity (PRIG) as the mean duration of unchanged prices:

$$\text{PRIG} = w/w_{PCH}$$

$w$  = number of weekly price observations

$w_{PCH}$  = number of weeks in which prices change

Rigidities are calculated as a ratio between the number of weekly price observations and the number of weeks in which prices change. They give indications about price flexibilities or otherwise about the stickiness of prices. In our work we use the reciprocal of every ratio which is interpreted as: “the prices change every XX weeks or XX days”.

Although rigidities do not have direct implications for pricing strategies, a comparison of different retailers, product categories and different segments is feasible even if the products are subject to the same market shocks (Weber 2009). For organically processed milk a comparison to conventional milk products is also possible. From these results hypothesis about pricing strategies of the organic retailers can be posited.

Our approach follows the work of Weber (2009) and Powers and Powers (2001) by making the following presumptions:

- Rigidities were calculated on a daily basis, following the studies of Weber (2009) and Powers and Powers (2001). To reduce errors by sales of near sell-by date articles we use the highest selling price per day of every article, or the price with the highest turnover per day. We follow the same formula as introduced above with daily observations.
- Rigidities on a weekly basis were calculated in order to cover the weekly frequency of price changes (Powers and Powers 2001). Additionally a comparison with the conventional sector is possible, as Weber (2009) calculated rigidities for conventional cheese on a weekly basis (weekly overall). Out of our data a weekly

average price for every product category was calculated. Changes in the price were taken as changes of more than 5 % (Herrmann and Moeser 2004).

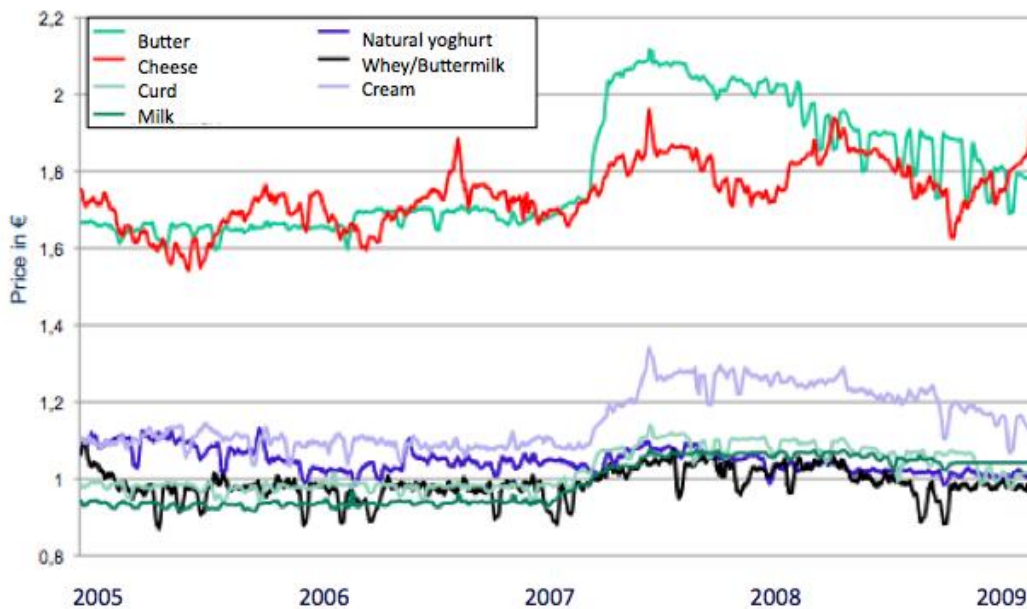
- In addition to daily and weekly price rigidities the length of the stickiness was differentiated into long-term and short-term price change. If prices do not change for longer than four weeks, this constitutes a price surge. Short-term changes (four weeks and briefer) are defined as price actions (Weber 2009). Within this differentiation conclusions for pricing strategies can be drawn (see table 2).

## 5 Results

### 5.1 Theory of price adjustment

For cheese, our results provide insight into price changes with different maturities. On a daily basis prices for cheese changed nearly every 26 days. This seems to be very frequent, although there is no possibility to compare. For the weekly basis a comparison for cheese out of the work of Weber (2009) is possible. Our results show an overall price change every 15.7 weeks, in comparison to the 27.4 weeks found by Weber (2009). In addition to this, price actions are more common in organic retail stores (18.4 weeks) than in the conventional retail sector (76.4 weeks). So for overall weekly price rigidities and price actions we cannot affirm hypothesis H1a, but H1b can be verified. But overall price surges, which imply real price changes with a long maturity, cannot be found in the organic retail sector (108.4) as in the conventional sector price surges were observed every 36.1 weeks. From this we can partly confirm H1a, that the prices in the long run are rigid compared to the conventional retail sector, however, more frequent price changes under less concentration cannot be implied.

### 5.2 Pricing strategies in organic retailing



**Figure 3.** Prices for milk products in organic retailing 2005-2009

Source: Own calculation

Regarding the pricing strategies in organic retail, one assumption is that the prices are rigid on a high level. The data in figure 3 show a high price level for all organic milk products. In comparison to the conventional retail prices we have shown in chapter two, the price distance for milk is about 0.20 € per litre.



Table 4 displays the main results. First of all it is obvious by means of daily rigidity that the prices over all categories varied nearly one time in a month. This is what was expected from table 2. Fixed sales volumes of the wholesalers could explain price changes on a daily basis. Especially in small organic retail shops this could cause problems, which they try to avoid by means of price reductions. According to the weekly rigidities we assumed a high rigidity keeping a premium price strategy of the organic retail sector in mind. This could not be confirmed as the short time price changes show that the prices vary nearly every 3-4 months. For short term rigidities price actions were observed which was not expected in the beginning. But overall, real price surges were not observed, as the prices are rigid in the long run. According to these results, H2 is accepted because of the high price level and the overall rigid prices for organic milk products, excepting the price actions in the short run. Additionally it seems that the prices are not the outstanding buying argument in the long run, but price actions were examined as well. Overall, the premium price strategy of the organic retail sector can be affirmed in this context. As we have examined price actions for organic milk products the next question is which retail form prefers such pricing strategies?

**Table 3.** Price rigidities with different maturities

Category	Daily basis	Weekly overall	Price actions	Price surges
Butter	32.2	15.8	21.1	64.1
Natural yoghurt	45.8	25.4	30.1	162.6
Cheese	26.2	15.7	18.4	108.4
Whey /	31.2	12.0	13.4	114.3
Curd	34.6	16.4	19.8	96.5
Cream	42.8	16.1	20.2	79.9
Milk	42.9	22.5	27.0	139.1

Source: Own calculations, data weighted by turnover per product category

### 5.3 Pricing strategies in different organic retails

Differences between sales areas were found as well (see table 5). It can be seen that smaller organic retailers do not change their prices as often as bigger organic supermarkets in the short term. This may be caused by costs of price adjustments for smaller retailers so it can be assumed from the results that they prefer price surges if they have to change the prices. This is possible when price recommendations, which are made by the wholesalers, change. Especially retailers with a sales area between 200-399 m<sup>2</sup> change their prices more frequently than organic supermarkets. This may be found in a higher competition between retail formats, as well as the increase in the number of organic retailers with larger sales areas and decreases in those with smaller areas (BÖLW 2010). Thus, hypothesis 3 that prices of smaller retailers are more rigid is accepted, accounting for the fact of assumed competition between middle growth (200-399 m<sup>2</sup>) and bigger organic retailers. An increasing conventionalisation of bigger retailers is assumed.

**Table 4.** Rigidities depending upon sales area

Sales area in m <sup>2</sup>	Butter	Natural yoghurt	Cheese	Whey / Buttermilk	Curd	Cream	Milk
≤99	30.8 (56.3) <b>(72.3)</b>	40.5 (120.4) <b>(82.2)</b>	26.4 (84.7) <b>(46.3)</b>	14.8 (87.4) <b>(39.0)</b>	23.1 (102.3) <b>(66.3)</b>	24.4 (101.1) <b>(72.8)</b>	43.5 (141.8) <b>(83.3)</b>

100-199	27.3 (72.8) <b>(45.8)</b>	32.2 (146.1) <b>(63.4)</b>	19.4 (88.4) <b>(29.4)</b>	17.4 (106.6) <b>(38.0)</b>	21.0 (90.8) <b>(42.1)</b>	25.7 (88.7) <b>(47.2)</b>	30.7 (136.7) <b>(57.8)</b>
200-399	21.0 (62.6) <b>(26.5)</b>	28.9 (166.8) <b>(44.1)</b>	17.4 (111.7) <b>(24.5)</b>	12.4 (120.5) <b>(28.7)</b>	19.1 (101.1) <b>(31.2)</b>	20.1 (85.9) <b>(38.2)</b>	25.7 (142.1) <b>(33.2)</b>
≥400	19.1 (63.6) <b>(30.9)</b>	30.4 (167.3) <b>(39.7)</b>	18.9 (113.8) <b>(24.8)</b>	13.3 (112.9) <b>(30.2)</b>	19.9 (93.9) <b>(32.1)</b>	18.7 (71.1) <b>(41.0)</b>	26.4 (136.9) <b>(43.0)</b>

Source: Own calculations, Legend: Data: Weekly basis: price actions (Weekly basis: price surges) (Daily Basis)

## 6 Discussion and conclusions

The organic milk supply chain is confronted with higher costs due to the specialisation of production and greater differentiation of marketing channels. In this context, price systems to gain higher margins for the whole supply chain are discussed. Additionally there were stable and growing groups of organic consumers in the timeframe 2005-2009 (Buder et al. 2010). The results show that consumers in the organic food sector are confronted with many price variations on a daily basis and price actions (short term rigidity), which were not initially expected. Nevertheless, the pricing behaviour of organic consumers seems to outweigh prices, as the long-term price rigidities have shown that prices are rather rigid compared to the conventional milk sector. Prices are not the outstanding buying argument (Hill and Lynchhaun 2002, Makatouni 2002, Cicia et al. 2010). Hence a premium price strategy can be affirmed, as the comparison between conventional and organic scanner data (Weber 2009) may be criticised, as the conventional retail does not underlie the same market structures (Gerlach et al. 2005). Additionally we assume higher costs of price adjustments in small organic retailers which may explain the observed rigidities (Hannan and Berger 1991, Carlton 1986). Another argument which was not dealt with in this context, but may give indications about price stickiness, is price synchronisation. If retailers do not synchronise their prices it could be explained by staggering which especially seems to be possible in a vertical supply chain like it could be assumed for organic milk (Loy and Weiss 2002).

Differences between smaller and bigger organic stores were noted as another result. It seems that professional organic retail stores with a greater sales area use professional price promotions as an increasing conventionalisation was examined here (Hall and Mogyorody 2001). This may not be the intention of organic retailers and of the whole supply chain to increase competition (Michelsen 2001) as this specialised chain may be not able to ignore social and ecological aspects which it prevents (Campbell and Liepins 2001). In addition another result may be seen in a kind of price competition between organic supermarkets ( $\geq 400 \text{ m}^2$ ) and smaller organic retailers. In this context it may be of interest in the future to further examine the psychological pricing point to shed some light on pricing barriers, which was not dealt with here.

The panel data provide no description of special offer prices and sales promotions of the organic retailers, as these have already been examined in other studies (Slade 1999, Herrmann and Moeser 2004). In this context we hypothesised that promotions and price actions are considered if the prices change short-term. Further research is needed for the questions of regional or seasonal implications of price changes. Additionally it may be helpful to examine differences between retail and manufacturer's brands which was not

dealt with in this context. Another limitation can be seen in the data for cheese. Only EAN-code products were recorded, as cheese sales over the counter were not included.

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