VARIATION IN FARM GATE MILK PRICES AND THE COOPERATIVE YARDSTICK REVISITED – PANEL EVIDENCE FROM THE EUROPEAN DAIRY SECTORS

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Abstract

With an average market share of about 57%, the European dairy industry is dominated by cooperatives. Large diversity exists in the importance of cooperatives across the EU-27. The cooperative yardstick school of thought suggests that agricultural cooperatives drive competition towards efficiency and "fair" prices. We revisit this argument by analyzing, whether the relative strength of cooperatives in dairy, as measured by market share, explains price variation in average national farm gate milk prices in the EU-27. Our panel data analysis shows that milk prices increase with member states´ market share of cooperatives, when controlling for GDP, fodder prices and new member states. We relate these findings to the policy debate on agricultural cooperatives and conclude that policies promoting cooperatives have the potential to increase farmer welfare.

Key Words

EU-27, Dairy, Cooperatives, Cooperative Yardstick

1 Introduction

In the year 2011, about one million European dairy farmers have produced 127 million tons of milk with a value of 45 billion Euros – representing 13 per cent of the European´s food and beverages industry´s turnover (EUROMILK, 2012). Concerns about malfunctioning competition on various levels of the food chain have triggered a debate on how to improve competition to the benefit of consumers in the EU-27. Milk and dairy products have often been in the center of attention. Especially regarding processing, many irregularities have been observed, leading national competition authorities to start investigations of the sector (ECN, 2012). In Germany, for instance, a recent study finds that competition is far from perfect, especially in processing (BUNDESKARTELLAMT, 2012).

In Europe, many dairy farmers trade with cooperatives. With a turnover share of about 57%, cooperatives are dominating the dairy market (HANISCH, MÜLLER and ROMMEL, 2011). The "Cooperative Yardstick Theory" states that the more powerful agricultural cooperatives are the better and "fairer" are prices farmers receive for their produce (COTTERILL, 1987; COTTERILL, 1984). With a few notable exceptions (CAZZUFFI, 2012; MILFORD, 2012), the theory has not been empirically tested and there is, as of yet, no cross-national study on European dairy markets. Previous work has largely neglected the structural arguments – rooted in the logic of imperfect competition in the Industrial Organization literature – of the "Cooperative Yardstick Theory." Instead it has very much focused on comparing individual investor-owned firms (IOFs) with cooperatives (HEYDER, MAKUS and THEUVSEN, 2011; SAUER, GORTON and WHITE, 2012; SOBOH, OUDE LANSINK and VAN DIJK, 2012).

In this paper we take up the idea of the "Cooperative Yardstick Theory," and analyze whether price variation in farm gate milk prices across the EU-27 can be explained by variation in the strength of dairy cooperatives. By so doing we also contribute to the ongoing debate on price

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formation in non-competitive dairy markets (e.g. GRAUBNER, BALMANN and SEXTON, 2011; GRAUBNER, KOLLER, SALHOFER and BALMANN, 2011). Towards this end the remainder of this paper is organized as follows. In the next section we provide some background on dairy cooperatives, milk markets and policy. In the third section we review the arguments of the "Cooperative Yardstick Theory" and why price dispersion prevails in integrated markets. We then present our empirical approach and data and thereafter discuss our results. A final section concludes.

2 Background

Cooperatives process and market the major share of milk produced by farmers, in Europe and elsewhere (CHADDAD, 2007). In the United States, cooperatives control about 83 percent of the dairy market (USDA, 2011). In the European Union, cooperatives account for about 57 percent of dairy turnover. In 2009, more than 60 percent of the milk produced in Germany – Europe´s largest dairy producer – was handled by cooperatives (HANISCH, MÜLLER and ROMMEL, 2011). As illustrated by Table 1, also among the largest European dairies, about half of the companies are cooperatives.

Table 1: Top 10 European Dairies by Turnover

Rank	Company name	Country	Legal form	Turnover w dairy products (billion €)	Dairy share of total turnover	Processed milk (in billion kg)
1	Nestlé	CH	IOF	21.2	19%	12
2	Danone	FR	IOF	12.3	77%	n.a.
3	Lactalis	FR	IOF	9.1	97%	10.2
4	FrieslandCampina	NL	Cooperative	8.8	98%	10.3
5	Arla Foods	DK/SE	Cooperative	6.9	100%	8.7
6	DMK	DE	Cooperative	4	100%	6.8
7	Sodiaal	FR	Cooperative	4	100%	5.2
8	Parmalat	IT	IOF	3.9	89%	3.6
9	Bongrain	FR	IOF	3.6	100%	3.1
10	Groupe Bel	FR	IOF	2.4	100%	1.6

Source: Adapted from ZUVIELZICHT/RABOBANK (2011)

Since the introduction of the Common Agricultural Policy (CAP), Europe´s dairy sector has been subject to numerous policy changes. In 1984, milk quotas with fixed production levels at the country level were introduced. In addition, instruments such as price stabilization through intervention, export subsidies, internal subsidies to increase consumption and private storage have been implemented. With the "Agenda 2000" reforms of the CAP, intervention prices for butter and skimmed milk powder were reduced by 15% and direct payments were introduced. In the year 2003, intervention prices were again reduced by 10% and the intervention prices for butter and milk quotas were prolonged until 2015. Direct payments of 3.55 Cent/liter were decoupled from milk production and since then depend on fulfillment of conservation and sustainability requirements, listed in "cross compliance" regulations. In 2008, the "Health Check" came to the conclusion that the milk quota system had to be abolished. With a slow and stepwise increase of country quotas, a "soft landing" for dairy farmers on the internationalizing dairy market was agreed upon. As a consequence, milk prices have become more volatile. In a period of extremely low milk prices in 2009, several "emergency market

interventions" were carried out. An evaluation of this "milk crisis" has also given rise to concerns about structural deficits in the dairy sector with its felt imbalances in bargaining power within the supply chain. Farmers face increasingly concentrating dairies, who themselves face concentrating retailers (ECN, 2012). The number of German dairies, for instance, has decreased by more than half, from 551 in 1981 to 198 in 2006, with the five largest dairies controlling more than one third of the market (HÜTTEL and VON SCHLIPPENBACH, 2010: 5). Likewise, concentration processes have resulted in a globalized food retail industry with a few dominant players, affecting the organization of dairy supply chains (FAHLBUSCH ET AL., 2011). Together with a stronger market orientation of the CAP this has also accelerated the still ongoing industrialization and internationalization of the dairy sector (HEYDER ET AL., 2011).

The European Commission´s latest reform endeavors culminated in the 2009 draft "milk package." For the time after the abolishment of the quota system, aspects of contractual relations between farmers and dairies, the EU-wide promotion of bargaining organizations and limits of firm concentration on the basis of national market shares (30%) or market shares in the EU (3.5%) were discussed to level the playing field for producers and processors (EUROPEAN COMMISSION, 2009). In this debate, the role of existing cooperatives has been sometimes praised and sometimes questioned.

3 The Cooperative Yardstick and Price Dispersion

Cooperative organization of dairy farmers has to do with both, the product attributes of milk and the nature of agricultural product markets. Because the production of fresh milk requires long-term initiative in infrastructure and skills development, dairy farmers seek to protect their investments by organizing market access. Fresh milk is perishable, vulnerable to quality differentials, mal-practiced hygiene and a comparatively heavy commodity. Consequently, farmers benefit from collective investments in transportation, processing and quality control. From a Transaction Cost Economics perspective, the dominance of cooperatives in dairy can be explained by moral hazard and "holdup" situations in supply chains for perishable goods (WILLIAMSON, 1981). Asset specificity of site-specific dairy farming equipment or human-specific skills on the farmer´s side and processing equipment on the dairy´s side favor contractual relations with a mid-term perspective and partial integration of transactions by means of "hybrid governance" (BONUS, 1986; MÉNARD, 2007). When cooperatives provide long-term organization of producers within regions on the basis of binding price and delivery agreements, membership and democratic control, they often achieve dominance in the dairy sector. Most contemporary contributions to cooperative theory focus on these organizational aspects and the dynamics of cooperative development (CHADDAD, 2007; COOK, 1995; COOK and ILIOPOULOS, 1999; HANSMANN, 1996; MÉNARD, 2007; NILSSON, 1999).

However, historically it has also been argued that the role of cooperatives is to organize "counter-vailing power" (GALBRAITH, 1952). The need to acquire a price-relevant market position may be an additional objective which dairy farmers pursue. One function often attributed to the cooperative enterprise is vertical integration into upstream or downstream positions of the supply chain and the provision of higher margins and "fair pricing" for member-owners in a situation where structural imbalances prevail (ROYER, 1995; SEXTON, 1986). Apart from the role cooperatives play in fair trade, specialty and organic segments of agricultural markets which concentrate on particular characteristics of the product (BACON, 2005; LEVI and LINTON, 2003), the question arises how cooperatives manage to provide "fair pricing" to their members for the bulk types of agricultural commodities.

A particularly interesting approach to explain the function of a cooperative enterprise where markets are riddled by structural imbalances is the Competitive Yardstick Theory. Inspired by CHAMBERLIN´S (1933) seminal work on monopolistic competition, SHLEIFER (1985) has

developed a model of price control, based on inter-firm comparisons for public service industries such as hospitals. In a similar vein, COTTERILL (1984) develops a theory of cooperative price, investment and finance decisions under risk. He explains the pricing mechanism in a situation in which cooperatives and IOFs regionally coexist. In this situation, members of the cooperative can judge the fairness of IOF pricing by comparing it to the cooperative´s internal pricing mechanism they control. Over time, cooperative price information spills off into the public domain and serves market actors as a "yardstick." Cooperative prices then become disciplining factors for the prices competitors offer, thereby contributing to the efficient price development of the overall economy. Put shortly, "[in] the long run, cooperative price equals average cost" (COTTERILL, 1987: 196).

Obviously, this "Cooperative Yardstick Theory" is of high relevance for the regulation of cooperatives and agricultural policy more generally, as "welfare will depend mostly on the price received for their [the farmers´] output in environments of minimal agricultural policy support, the absence of social safety nets and a weak nonfarm rural economy which limits agricultural diversification" (SAUER ET AL., 2012: 165). Policies promoting farmer cooperatives – for instance by reduced taxation – could, thus, influence farm gate input and output prices. In the Northeastern part of the United States, for instance, it is perceived that market power of retailers – not processors – drives farm gate milk prices below efficient levels. This harms consumers, farmers and processors alike (COTTERILL, 2006). In such a situation, where perfect competition is too costly to implement, the "second best" policy option may be to support concentration processes also on the processor side (SCHERER and ROSS, 1990: 33ff.).

Previous work on price dispersion and the role of cooperatives largely refrains from structural reasoning and puts firms or farms as individual economic agents in the centre of the analysis (see SAUER ET AL., 2012, for a recent paper). These studies refer to the literature on price dispersion in industrial organization where the fact that "firms in the same market selling identical goods for different prices (at the same time)" (LEWIS, 2008: 654) is subject to a large body of theoretical and empirical work on firm level retail price dispersion. Price dispersion may be the result of unobserved heterogeneity in product characteristics. It has also been related to search and information costs borne by customers who are not fully informed (SALOP and STIGLITZ, 1982; SALOP and STIGLITZ, 1977; VARIAN, 1980). In one empirical study, LACH (2002), using price data on homogeneous retail products, finds that price dispersion prevails, even when controlling for spatial and temporal heterogeneity. Similar evidence is available for price variation in food retail prices (AALTO-SETÄLÄ, 2003) or for consumer electronics offered on an internet website (BAYE, MORGAN and SCHOLTEN, 2004). These findings suggest that search and information costs are important in explaining the failure of "the law of one price."

An example for a study analyzing farm gate price dispersion on the level of the farm would be SAUER ET AL. (2012) who analyze dairy farms in Armenia, Moldova and Ukraine. They find that in Armenia and Ukraine, where cooperatives with a market share of about 6% are relatively weak, dairy farmers who sell milk through marketing cooperatives receive slightly higher prices as compared to farmers engaged in trade with IOFs. In Moldova with a cooperative market share of about 60%, prices between IOFs and cooperatives do not differ much (SAUER ET AL., 2012). As opposed to the structural approach outlined by us, the authors do not compare general market aspects, such as the relative strength of cooperatives, but focus on the firm level, however.

Closer to our approach are authors who study structural price dispersion between average prices for identical goods across countries or regions and time. One such example would be GOLDBERG and VERBOVEN (2004) who use bi-annual data on average car prices in the European Union to study the effect of the start of the Euro Monetary Union on price

dispersion of different car models. By using difference-in-differences estimates they find that price dispersion has slightly reduced across member states which joined the European Monetary Union, as compared to non-members of the union. Much of the remaining price dispersion for non-members of the union can be explained by volatility in exchange rates. This argument finds additional support by the fact that for Denmark, a non-member, price dispersion has also reduced, owing to the central bank´s tight fixation of exchange rates. A discussion on the merits of using pricing data on the different levels of aggregation can be found in WOLSZCZAK-DERLACZ (2008).

To our knowledge only two recent studies try to quantify the pro-competitive effect of cooperatives in the industrial organization literature of agricultural markets. CAZZUFFI (2012) analyzes price formation in investor-owned firms in comparison to cooperatives in three North-Italian provinces. She finds that cooperatives pay on average higher farm gate milk prices to their members. A different approach – similar to our study – is taken by MILFORD (2012). Instead of individual firms, MILFORD studies price formation on local coffee markets in Chiapas, Mexico and finds that the number of cooperatives in a region has a positive effect on farm gate coffee prices.

4 Empirical Approach and Data

Based on the Cooperative Yardstick Theory and structural work on price dispersion, we develop a simple econometric model in which prices paid to producers depend – among other things – on the relative strength of cooperatives in the sector (also see HARTE and O'CONNELL, 2007). Following our theoretical considerations, an increase in the share of cooperatives in a country shall raise producer prices through yardstick pricing (COTTERILL, 1987; COTTERILL, 1984; SHLEIFER, 1985). IOFs – in the vicinity of cooperatives – may have to pay price premiums to attract customers.

For our analysis we use Eurostat panel data on farm gate milk prices, maize fodder prices, per capita GDP and trade balances for the years 2000–2010 for the EU-27. To reduce skewness some of the variables were log-transformed. The Eurostat data on milk and maize are "quality-adjusted" so that the "identical good assumption" (GOLDBERG and VERBOVEN, 2004) holds. In addition, we use time-invariant data on the market share of cooperatives for the EU-27. These data are derived from experts´ assessment found in country reports within the "Support for Farmers´ Cooperatives" project (HANISCH, MÜLLER and ROMMEL, 2011).[3] An overview of the cooperative market shares per country and a short description of the studied variables are provided in the following tables.

Table 2: Market Share of Dairy Cooperatives in 2010 for the EU-27

Country Code	Share in %	Country Code	Share in %	Country Code	Share in %
AT	95	FI	97	MT	91
BE	12.5	FR	55	NL	80
BG	67	GR	35	PL	72
CY	10	HU	30.8	PT	70
CZ	66	IE	99	RO	10
DE	65	IT	42	SE	100
DK	94	LT	10	SI	80
EE	35.1	LU	10	SK	24.5
ES	40	LV	33	UK	50

[3] Within this project for each of the 27 member states a national report on agricultural cooperatives has been written by academic experts. As part of these reports, the experts were asked to provide information on the market share of major agricultural sectors, including dairy, for the year 2010. During discussions within the project, it turned out that for two countries – Belgium and the United Kingdom – the country experts provided very low estimates. After checking on these numbers with the respective cooperative umbrella organizations the figures for these two countries were corrected.

Source: Adapted from HANISCH, MÜLLER and ROMMEL (2011)

Table 3: Description of Study Variables

Variable	Description
MILKPRICE	Farm gate price in Euro for 100 kg milk
LNMAIZEPRICE	Natural logs of fodder maize price 100 kg
LNGDP	Natural logs of per capita GDP
TRADEBAL	Percentage of imports/exports of total production
NEWMS	=1 if country has joined European Union in 2004 or later
SOUTH	=1 if country is located in the South of Europe
COOPSHARE	Turnover market share of cooperatives in dairy (see Table 2)

Source: own design

We include prices of maize – an important input into dairy farming – in the analysis to control for national differences in fodder costs: "Price differences due solely to local cost differences do not create a buy-low-sell-high opportunity for arbitrageurs and so are feasible even if markets are perfectly integrated internationally" (GOLDBERG and VERBOVEN, 2004: 489). GDP may proxy income, demand, price levels and efficiency, labor and capital intensity of agriculture. For countries with a positive trade balance, our a priori assumption is that their potential competitive advantage should be reflected in lower domestic prices. We add dummy variables to control for new member states and countries in Southern Europe where dairy farming is usually more difficult due to less favorable agro-ecological conditions. Table 4 provides summary statistics for the pooled data.

Table 4: Summary Statistics for the Pooled Data

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
MILKPRICE	241	29.68	6.38	13.83	47.50
LNMAIZEPRICE	172	2.73	0.33	2.00	3.51
LNGDP	297	9.86	0.67	8.48	11.28
TRADEBAL	210	-0.01	0.04	-0.17	0.13
NEWMS	297	0.33	0.47	0.00	1.00
SOUTH	297	0.30	0.46	0.00	1.00
COOPSHARE	297	54.50	30.85	10.00	100.00

Source: own calculations based on Eurostat and Hanisch, Müller and Rommel (2011)

In our analysis we use fixed and random effects regression models. Fixed effects models effectively control for all time-invariant variables at the cost of higher standard errors/lower efficiency. Not controlling for time-invariant variables may, on the other hand, result in biased parameter estimates (ALLISON, 2009; RABE-HESKETH and SKRONDAL, 2008). To test for potential bias we use HAUSMAN´s (1978) specification test. Given that using the random effects model is justified, we then specify the models including the share of cooperatives and the additional time-invariant variables.

5 Results and Discussion

Table 5 depicts four model specifications including only the time-variant variables to test for potential bias arising from using the inefficient but consistent fixed effects model.

Table 5: Model Specifications Including only Time-Variant Variables

	F.E. (1)	R.E. (2)	F.E. (3)	R.E.(4)
LNMAIZEPRICE	6.3220***	6.0694***		
	(1.6770)	(1.3740)		
LNGDP	3.2128	3.4508***	7.6821***	5.6823***

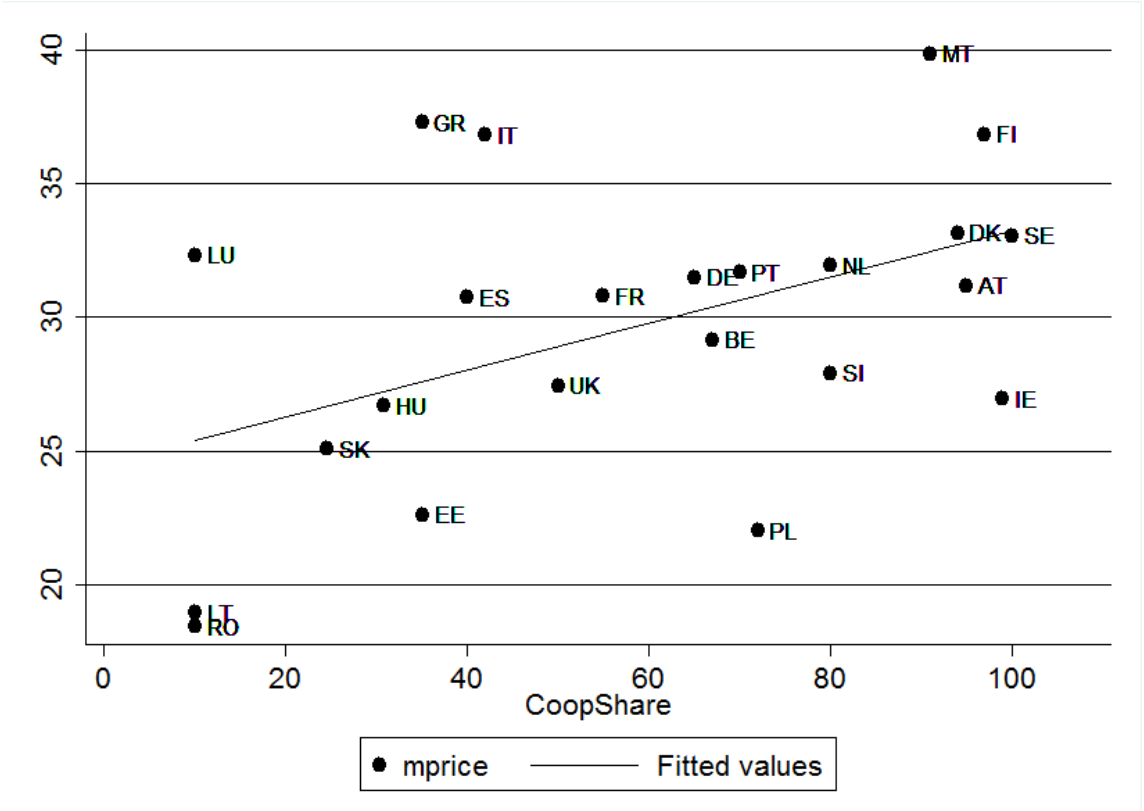
	(2.6218)	(1.1176)	(1.5906)	(1.0265)
TRADEBAL	-3.5234	-4.0928	-3.7752	-10.2606
	(9.4586)	(8.2278)	(9.0195)	(8.3368)
Constant	-19.2984	-21.3963**	-45.6682***	-25.9820**
	(23.7834)	(10.2427)	(15.7375)	(10.1408)
N	104	104	172	172
Chi²		48.5157***		33.3500***
Groups	16	16	23	23
Overall R²	0.4825	0.4831	0.2150	0.2310
F	10.9235***		13.0507***	

Source: EUROSTAT; own calculations

Note: Standard errors in parentheses, * p < 0.10, ** p < 0.05, *** p < 0.01

Models (1) and (2) include the price data on maize. Because the maize data have many missing observations and reduce the number of countries with sufficient data from 23 to 16, we estimated two more models ((3) and (4)) where the maize data are left out. Coefficients do not differ much between the first two models. The Chi² test statistic for Hausman´s test is 0.16 (p= 0.9845), indicating that the null hypothesis of systematic differences in coefficients cannot be rejected. Thus, the use of the more efficient random effects models is very unlikely to lead to biased estimates. Coefficients differ a little more between models (3) and (4). Here, the Chi² test statistic for Hausman´s test is 3.76 (p=0.1523), indicating larger differences in coefficients. Yet, the null hypotheses cannot be rejected at the 10% level, again indicating that it is justified to trade-off efficiency for consistency. The differences across all models, most probably, arise from sample selection: Models (3) and (4) include seven more countries which, for instance, result in higher coefficient estimates for the LNGDP coefficient. The countries with no data on maize prices for the period under study are Sweden, Poland, Malta, Latvia, Italy, Ireland, Finland and Estonia. The selection bias may arise from the drop-out of many Northern countries, where maize is typically not grown. Figure 1 plots market shares of dairy cooperatives against farm gate milk prices, averaged over the study period.

Figure 1: Cooperative Market Share vs. Average Milk Price 2000-2010



Source: own design

The figure suggests a positive relationship between the strength of cooperatives and the average milk price – very much supportive of the Cooperative Yardstick argument. Table 6 looks at this relationship in greater detail by presenting different specifications of random effects and pooled regression models, including the time-invariant variables.

Table 6: Coop Share Models Continuous

	Pooled (1)	R.E. (2)	Pooled (3)	R.E.(4)	Pooled (5)	R.E. (6)
LNMAIZEPRICE	3.9369***	6.4254***				
	(1.4073)	(1.5445)				
LNGDP	2.4365**	2.8285*	3.0476***	5.6053***	4.1068***	7.0595***
	(0.9578)	(1.5840)	(0.8258)	(1.3274)	(0.5999)	(0.7803)
TRADEBAL	-0.2175**	-0.0880	-0.2699***	-0.1579		
	(0.0973)	(0.1037)	(0.0785)	(0.0982)		
SOUTH	2.7542**	1.8641	5.3693***	6.1942***	5.8416***	7.3864***
	(1.0598)	(1.9199)	(0.8793)	(1.7222)	(0.6962)	(1.6858)
NEWMS	-4.0681***	-2.5522	-3.3374**	-0.0407	-2.4616**	1.2930
	(1.5095)	(2.8617)	(1.3666)	(2.4683)	(1.0157)	(2.0117)
COOPSHARE	0.0417**	0.0250	0.0438***	0.0443*	0.0440***	0.0369
	(0.0200)	(0.0345)	(0.0127)	(0.0263)	(0.0099)	(0.0260)
Constant	-7.2927	-17.1404	-3.4373	-29.4178**	-14.0445**	-43.8919***
	(8.7243)	(15.0847)	(8.5290)	(13.7158)	(6.1286)	(8.1782)
N	91	91	154	154	241	241
Chi²		59.1656		59.6145		128.1768
Adj. R²	0.6141		0.5550		0.6057	
Groups		15.0000		22.0000		23.0000
Overall R²		0.6121		0.5320		0.5845
F	24.8715		39.1577		93.1698	

Source: EUROSTAT; HANISCH, MÜLLER and ROMMEL (2011); own calculations

Note: Standard errors in parentheses, * p < 0.10, ** p < 0.05, *** p < 0.01

Again the maize data are left out in some specifications to increase the number of observations. For the same reason specifications (5) and (6) do not include the trade balance variable. The different sample selections lead to some changes in coefficients across the model specifications, but only in one case a coefficient changes its sign (NEWMS becomes positive in (6)). In general, signs of the coefficients are in line with theoretical expectations: Consistently and as one would expect a priori, higher maize prices lead to higher milk prices; milk is more expensive in countries with a high GDP; a positive trade balance is associated with lower milk prices; milk prices are higher in the South; milk prices are lower in new member states. Due to limited space we refrain from focusing in greater detail on these results and rather look at the coefficient estimates for the COOPSHARE variable, for which the estimates are relatively robust to sample selection.

The highest coefficient – 0.0443 in (3) – and the lowest – 0.0250 in (1) – are fairly close. What is more, coefficient estimates are often statistically significant at least on the 10% level, indicating relatively little noise in the data. In four out of six models the coefficient estimate is above 0.04. Taking this number as a rough estimate of a (linear) relationship, would mean that a one percent increase in cooperative market share is associated with a four cent increase in milk price per 100 kg. Or – to exemplify these numbers –, farmers in a market with cooperatives controlling only ten percent of the market (a situation found for instance in Romania or Lithuania) receive about 3.60 Euros less for 100 kg of milk than farmers in a market which is almost entirely controlled by cooperatives (e.g. Sweden or Finland). With an average milk price of about 30 Euros per 100 kg in the pooled data (see Table 4) the amount would equal about 12 percent of the total price – a substantial difference that cooperatives can make for farmers.

Our results suggest that the "Cooperative Yardstick" exists on the level of national milk markets in the EU-27. In other words, dairy farmers who live in countries where cooperatives control larger market shares, receive higher prices for their produce. This finding is in line with theoretical predictions and empirical work, as for instance the recent study of MILFORD

(2012). It is important to highlight, that our findings do *not* show that individual cooperative enterprises pay more. Our analysis is carried out on the level of national markets and does not look into firm price data. Ironically, it may even be the case that cooperatives lead in the price setting process while IOFs are left to follow by paying a slightly higher price. Over time, cooperatives will keep members loyal by offering selective incentives (OLSON, 1965) like high interest rates on capital shares or market information and extension services to members and can also draw on their members´ loyalty. In fact, an explorative analysis of price data on the dairy level points into that direction (HANISCH, MÜLLER and ROMMEL, 2011).

Clearly, our results are limited by the available data. Even in the model with the maximum number of 241 observations, only 23 out of 27 member states are covered by our analysis. Also, we implicitly assume that the market share of cooperatives does not vary over time and that the experts´ assessment for the year 2010 can be taken as approximation for the rest of the study period. Collecting time-variant data on cooperative market shares would be helpful for further investigating the pro-competitive effect of cooperatives.

6 Concluding Remarks and Outlook

In the past, quota limits may have reduced the amount of surplus milk and the quality of milk processed by cooperatives, particularly so in countries with high quota rents such as Denmark or the Netherlands. Consequently, quotas have been very influential in shaping the institutional environment for milk producers and dairies. The abolition of quotas, reduced price intervention and the expected future increase in production, may result in price fluctuations similar to those observed in the past few years. In this situation it is important to understand both the nature of the milk producing firm and the nature of its processor. The reason why producers in Europe have chosen the cooperative as "the dairy organization of choice" lies in the internal governance structure and the relation of trust that has been built up over generations coupled with an often market dominating role of the cooperative enterprise promising a relatively safe haven in times of instability. Our results may contribute to explaining this phenomenon. Powerful dairy cooperatives may have the potential to secure "fair prices" for their farmer-members. We find that cooperatives can best play their roles if they possess a relevant market position because cooperative pricing then serves as an important signal for the price setting of the other market participants

More precisely, our analysis shows that the logic of "Cooperative Yardstick Competition" is applicable to the European dairy sector. Recent trends towards growth and concentration, organization in holding structures or international acquisitions, may, however, partly divert interest alignment between farmers and their cooperatives´ management. Eventually, this may even erode the "Cooperative Yardstick Effect." These concerns give further rise to the importance of analyzing internal governance in agricultural cooperatives. In this regard, future research should perhaps differentiate large cooperatives like FrieslandCampina or DMK from small specialty cooperatives and the newly emerging bargaining associations in dairy. For the moment, our results, however, indicate that policies promoting cooperatives and producer organizations are – via market shares – strongly linked to farm gate prices and subsequently to farmers´ welfare.

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