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Media Analysis on Volatile Markets' Dynamics and Adaptive Behavior for the Agri-Food System

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ABSTRACT

The volatility of agricultural markets has increased remarkably in recent years. In spite of this, the way in which supply chain actors perceive market volatility has only rarely been analyzed. This paper seeks to close this research gap by presenting empirical findings about how the volatility of agricultural markets is perceived, how increasing market volatilities are being explained, and what adaptations to the volatile external environments are being suggested. Based on a large-scale media analysis, we have identified perceptions, which vary greatly over time, especially with regard to the perception of the threats and opportunities volatility creates for farms and firms and the most frequently identified reasons for volatile prices.

Keywords: agriculture, media analysis, public discourse, shared assumptions, volatility

1 Introduction

Due to the recent financial and economic crisis, the world economy as a whole is facing new challenges. Even the agribusiness sector has been affected. The first effects are already visible. On the one hand, capital procurement on financial markets has become more difficult, and, on the other, due to the US sub-prime crisis, commodities in general have become attractive investment opportunities. But at the same time, because of financing problems, hedge funds in particular had to liquidate their positions in agricultural markets immediately (Hitzfeld, 2009). This has led to a formerly unknown volatility in agricultural markets (ZMP, 2008/2009). More pronounced amplitudes of agricultural prices have become visible in recent years due to such factors as the globalization of markets, reduced stocks of agricultural products, more evident consequences of climate risks, subsidies for bio-energy production in large parts of the world and CAP reforms in the European Union. The effects of these changes on the volatility of agricultural markets have been intensified by the current developments in the course of the world financial and economic crisis (von Witzke et al., 2009).

Volatile markets require food chain actors to adapt to changing prices and quantities. Not only farmers but all actors in the agribusiness sector are confronted with volatile agricultural markets because the upstream and downstream stages of the food value chain are closely linked to each other (Lazzarini et al., 2001; Bijman et al., 2006). Due to the close relationships within the food value chain, strategies for coping with volatilities and reducing the risks of fluctuating prices that are pursued by food manufacturers and others may also impact their supply chain partners in fundamental ways.

How agribusiness firms adapt to volatile markets very much depends on their perceptions of volatility. Weick (1979) has identified the enacted environment perspective, according to which firms deliberately refer to specific parts of their external environments (and, at the same time, neglect others) and, in doing so, define those parts of the environment they consider most relevant ("enactment"). According to this perspective, there is no objective external environment; only enacted environments determine how companies behave strategically. The interpretive perspective in organization theory has taken this idea

one step further by claiming that what we call a firm's environment is a socially created symbolic world made up of strategists' social knowledge (Smircich, Stubbart, 1985). Against this background, it is not volatility *per se* but how agribusiness managers perceive volatility that is decisive for their reactions.

Nonetheless, in-depth analyses of food chain actors' perceptions of price volatility and adaptations to volatile markets are still scarce. This paper seeks to close this research gap by presenting empirical findings about how the volatility of agricultural markets is perceived, how increasing market volatilities are explained, and what adaptations to volatile external environments are being suggested. The remainder of the paper is organized as follows: In section 2, we review the existing literature on the management of volatility. In section 3, the methodology and results of the media analysis are presented. A discussion of the results and our conclusions can be found in section 4.

2 Literature review

2.1 Volatility as a management challenge

The notion of volatility was first developed in financial market theory. The term refers to the uncertainty of returns on investments and is in most cases stated as the standard deviation (Chen, 1996). Meanwhile, the term is widely used in general management theory as well as in agricultural economics in order to indicate market amplitudes mainly with regard to prices (price volatility) but sometimes also with regard to supply and demand quantities (see, for instance, Gillen, Lall, 2002). Volatile prices on product and factor markets are part of the overall business risks enterprises face (Mußhoff, Hirschauer, 2010). These risks result in uncertainty concerning the success of firm operations; they go along with decisions that have to be made on the basis of incomplete information (Löw, 2008). Uncertainty increases the requirements for gaining and processing information; therefore, it is a central reason for using decision heuristics in individual problem solving processes (Simon, 1976).

For organizations, managing uncertainty is a central challenge. There is extensive literature dealing with how firms cope with uncertainty. Contingency theory, for instance, has identified uncertainty as an important determinant of the design of organization structures (Lawrence and Lorsch, 1967). The isolation of supply chain activities within an enterprise against external uncertainty is regarded as a precondition for effective and efficient task fulfilment. It has been argued that organizations protect their "technical core" from (too much) uncertainty by implementing boundary-spanning units that buffer the organization from its unstable environment (Thompson, 1967). In strategic management literature, it is argued that strategic flexibility helps firms stay competitive in highly uncertain environments (Volberda, 1999). Furthermore, the development of organizational capabilities and organizational learning are considered to be crucial in quickly changing external environments (Teece et al., 1997). In resource dependence theory, vertical integration is discussed as a means of reducing uncertainty stemming from dependence on external owners of resources (Pfeffer, Salancik, 1978).

In general, enterprises can choose between two alternative ways of coping with uncertainty: first, reducing the amount of uncertainty and, second, improving an enterprise's ability to cope with uncertainty (Grote, 2004). Uncertainty can be reduced by such means as buffering (for instance, handling demand and supply peaks through increased stocks), smoothing (for example, increasing demand by setting lower prices in times of usually weak demand conditions) and the vertical integration of sources of uncertainty (Thompson, 1967). Enterprises' ability to manage uncertainty can be improved by forecast planning, well-trained employees, non-bureaucratic and decentralized organization structures, organization-wide shared professional or cultural values and generally high levels of organizational flexibility (Grote, 2004; Mintzberg, 1989; Sanchez, Mahoney, 2004; Volberda, 1999).

In a similar form, both packages of measures—reduction of uncertainty as well as improved capacity for managing uncertainty—are also discussed in the risk-management literature. On the one hand, this strand of research discusses various strategies for reducing the amount of risk and, thus, the uncertainty enterprises have to deal with: avoiding and limiting risks (by, for instance, withdrawing from risky activities), risk diversification (by such means as diversifying business activities), risk sharing and compensation (through insurance etc.) and risk relocation (for instance, by outsourcing firm activities). On the other hand, the literature also discusses strategies for improving firms' ability to cope with risks. The main aim of these strategies is to increase a firm's ability to withstand the occurrence of negative economic outcomes, by such means as accumulating the slack resources of increasing liquidity buffers (Harrington, Niehaus, 2003). Whereas attempts to increase a firm's capacity for coping with volatility usually have an internal focus, strategies that seek to reduce the amount of risk enterprises have to deal with often affect relationships with supply chain partners.

2.2 Volatility management in agricultural economics

Volatility as a management challenge has also gained growing attention in agricultural economic research. Most of the publications attempt to figure out the reasons agricultural markets are becoming more and more volatile. It is a widely shared view that a growing world population and the higher incomes in developing and emerging countries, which result in higher calorie intakes and a growing consumption of food products of animal origin, will lead to increased demand for agricultural produce in the long run (Trostle, 2008; Armbruster, 2009). At the same time, lower productivity increases and limited opportunities for extending arable land result in decreasing stocks of important agricultural commodities (Rudloff, 2009). Moreover, short term effects (von Witzke et al., 2009), like weather risks, fluctuating exchange rates and oil prices (Karali, Power, 2009; Harri et al., 2009), the changing prices of substitutes (Busse, Brümmer, 2009) and decisions in the field of agricultural policy (Rudloff, 2009, Cadot et al., 2009), greatly impact the volatility of agricultural markets.

The extent to which speculation has increased the volatility of agricultural markets still remains controversial (Rudloff, 2009). Brümmer et al. (2008) have analyzed whether speculation fostered the extreme price peak in the years 2007 and 2008. They argue that this price level cannot be explained sufficiently by reference to fundamental data; therefore, they consider it probable that the price peaks were intensified remarkably by speculative influences. In contrast, Irwin et al. (2009) argues against the responsibility of speculation for the interim price boom. They claim that there is a historical pattern in which speculation has frequently been identified as a major cause of price amplitudes during periods of extreme volatility; furthermore, under these circumstances, perceived market action is often assessed as market failure. Surveys indicate that many firm managers in the agribusiness sector are convinced that speculation has a strong impact on price developments on agricultural markets (Theuvsen et al., 2009).

Agricultural economists address not only the reasons but also the consequences of increasingly volatile and temporarily extremely high agricultural prices. These studies take into account such factors as the world food situation with special reference to food security (von Witzke et al. 2009, Qaim, Fischer, 2009) or political consequences (Makenete et al., 2008). How farmers perceive risks and which instruments in the field of risk management they pursue has been analyzed from a microeconomic perspective (Schaper et al., 2008). Similarly, Morales et al. (2008) surveyed 1.047 European farmers and found that farmers perceive price volatility — following weather risks and potential threats from natural disasters — as the second most important risk affecting their businesses.

Model-based analyses highlight macro-economic consequences as well as farmers' reactions to volatility (Lips, Rieder, 2005; Banse et al., 2008). Furthermore, systematic risk management strategies (Tomek, Peterson, 2001) and the use of selected risk management instruments, such as weather derivatives (Mußhoff et al., 2009), have also been discussed. Nonetheless, studies on how food manufacturers cope with market uncertainties have remained rare (Calum, 2007). Moreover, despite the close relationships between producers and processors in agri-food networks, changes with regard to the relationships between supply chain partners in the face of volatile markets have only rarely been analyzed. Wocken and Spiller (2009), for instance, discuss various alternatives to contract design, whereas Schulze et al. (2006) introduce improved supplier relationship management as a way of coping with volatility. Moreover, it has been stated that long-term contracts between producers and processors are a suitable method for managing price risks (Huith, Sichler, 1996). Wilson and Dahl (2009) introduce contract designs that reduce the risk of opportunistic behaviour on the part of producers, for instance, farmers not fulfilling their pre-contracts in times of rising prices.

Nonetheless, large-scale empirical research on how food chain actors perceive and cope with uncertainty in the face of volatile agricultural markets remains scarce. How enterprises on the upstream and downstream stages of food value chains perceive risks, how they manage these risks and what this means for the adaptation of food chains to volatile markets have only rarely been analyzed. In order to close this research gap, we present the results of a media analysis on how the price volatility of agricultural products is perceived, to which factors the strong price movements are attributed and what adaptations are being recommended in response to increasing volatilities.

3 Perceptions of price volatility in the media

3.1 Methodology

The extreme bull market and the sudden and unexpected fall of agricultural prices between 2007 and 2009 have led to intense discourse about the reasons for price volatility, the consequences of the world financial and economic crisis and potential adaptations of agribusiness firms to changing market conditions. In modern, differentiated societies, public discourses typically take place in the media, which

present various topics society is interested in and make these themes accessible to a wider public audience (Gerhards, Neidhardt, 1991). The media allow people to exchange individual perceptions and provide an arena for negotiating conflicting viewpoints (Daele, Neidhardt, 1996), to learn about topics and opinions they consider relevant and to develop their own interpretations, preferences and attitudes (Callaghan, Schnell, 2001). Therefore, viewpoints found in the media are not equivalent to single agents' perceptions; instead, they represent consensus already shared by a larger group of participants in the discourse after exchanging information (Gerhards, Neidhardt, 1991).

Media discourses distribute and construct collectively shared perceptions and interpretative patterns that structure ways of thinking and can guide action (Jäger, 2001). Against this background, media discourses can be regarded as indicators of future decisions (Rogers et al., 1991). Moreover, a discourse taking place in the mass media represents a "master forum" (Ferree et al., 2002: 10) that integrates various more specific social sub-discourses and differing viewpoints. These special or expert discourses are, however, not reproduced neutrally. Instead they are altered as a result of media selection strategies and the pre-existing interpretative views of mass media journalists (Weischenberg, 1995). Furthermore, mass media coverage is addressed to the layman, i.e., to a non-expert audience. Therefore, special interest themes, such as the price volatility of agricultural products, will not be treated in depth. If one is interested in uncovering a broad range of detailed and informed arguments and positions in the discourse on the price volatility of agricultural products, special interest media represent an appropriate object of analysis.

With regard to political discussions of general interest, like labour market politics or the future of bio-energy production, the mass media, including national quality newspapers, are often considered the relevant arenas in which public discourse takes place (e.g., Hess et al., 2009; Zschache et al., 2009). The situation is different with regard to special interest themes, such as the price volatility of agricultural products. In these cases, public discourse that reflects supply chain actors' perceptions of their (enacted) environments typically takes place in specialized media, such as the weekly or monthly journals that are read by most actors. In order to better understand how market volatilities are currently perceived, we conducted a discourse analysis that included five German practitioner-oriented agricultural and agribusiness journals. In all, 235 articles published between January 2006 and June 2009 and dealing with price developments in international agricultural markets were analyzed. Articles describing exclusively local cash markets were excluded from the content analysis. Therefore, articles on (in most cases regional) markets for potatoes and pork were not analyzed at all. Of the 235 articles analyzed, 60.4 % were published in *dlg-Mitteilungen*, 20.4 % in *top agrar*, 15.7 % in *Neue Landwirtschaft*, 0.9 % in *Kraftfuttermagazin* and 2.6 % in *Brauindustrie*.

The five journals were selected for the following reasons: In order to get an impression of food chain actors' perceptions of price volatility in agricultural markets, we selected practioner-oriented journals. Farmers' perspectives on volatile markets were included by adding three farmer journals (*dlg-Mitteilungen*, *top agrar* and *Neue Landwirtschaft*) to the sample. The perspective of other actors in the food chain dealing with agricultural commodities, for instance, processors using grain as an input factor, was acquired through the inclusion of the journals *Kraftfuttermagazin* (for the feed industry) and *Brauindustrie* (for the brewing industry). In order to be able to cover a longer period of relevant market developments without overusing limited research capacities, we decided to include only monthly journals. The journals were reviewed systematically for all articles dealing with "price volatility". Therefore, the share of each journal in the total number of articles analyzed is not the same for all journals. This can, at least for the agricultural journals, be explained by the characteristics of their editors and readers. The journal with the highest share of articles is published by the German Agricultural Society (DLG) and addresses mainly large-scale farmers as readers. Therefore, it has a strong general farm management perspective including price and risk management. *Top agrar* and *Neue Landwirtschaft* publish more articles than *dlg-Mitteilungen* on the latest developments in production techniques. The small number of articles on volatile agricultural markets in *Kraftfuttermagazin* and *Brauindustrie* was somewhat surprising. One explanation could be that farmers are more interested in growing price volatility on agricultural markets than other food chain actors since agricultural raw materials are not the only input factors for processors and, therefore, deserve somewhat less attention.

The articles were analyzed with regard to various criteria. The importance or relevance of a publicly discussed issue can be measured using various criteria (Früh, 1981). In our study, we used the following basic indicators: author's prominence and expertise (i.e., profession, such as journalist, market analyst or scientist/academic), the section of the journal the article was published in (for instance, markets or business management section) and the length of the article. To classify and analyze the articles, various categories were created: the market situation the article describes, the market the article refers to, the two most important reasons given for the price development observed and the adaptation recommended to farms or firms. The spirit of the article was measured on a five-point Likert scale from +2 ("very optimistic concerning price development") to -2 ("very pessimistic concerning price development").

Afterwards, the articles where analyzed univariately using the defined classifications and indicators. As both coding and discourse analysis were conducted by one person only, potential problems with interrater reliability were avoided.

When categorizing articles according to authors' provenience or section of the journal, double-counting did not occur. Articles published as title stories were published in a separate part of the journals and, therefore, were parts of neither the "markets" nor the "business management" sections. Double-counting was also avoided when categorizing authors' provenience. Journalists were either employed by the journals analyzed (especially in the case of farmers' journals) or freelancers (*Kraftfuttermagazin, Brauindustrie)*. Contributing scientists include academic staff from agricultural universities or national research institutions. Market analysts were categorized as such if they were employed by specialized market analysis enterprises (such as F.O. Licht) or market analysis departments of agribusiness firms (for instance, Toepfer International). Author names were also documented. Data was analyzed using MS Excel.

3.2 Results

Of the articles analyzed, 41.7% dealt with the grain market, 13.2% with the market for oil seeds, 5.1% with the milk market, 10.6% with the market for fertilizers or pesticides, 22.7% with price developments in general and 6.4% with another focus (for instance, bio-ethanol). The share of different markets addressed in journal articles is in line with market analyses showing that, in the time period observed, price volatility was higher for plant than for animal products (Hitzfeld, 2009).

Of the articles analyzed, 55.7% were written by journalists, followed by market analysts (25.1%). The staff of agribusiness enterprises, scientists and business consultants wrote between 3.8% and 4.7% of the articles. The remaining articles came from farmers, freelance journalists and various other authors. The share of the various author groups changed during the sample period. While in the first six months of 2006, 75% of the articles were written by journalists, they wrote only 39.5% of the articles in the first half of 2009. Consequently, the share of market analysts, business consultants and other authors increased over time. This demonstrates that the volatility of agricultural markets has become a more and more important issue for agribusiness enterprises over time.

During the examination period, 71.5% of the articles analyzed were published under the heading "markets", 11.1% as title stories, 7.7% in the business management section and 8.9% in other rubrics. The increasing perceived importance of the price developments on agricultural markets can be demonstrated through the rubric the article was published in. In the first half-year 2006 — before the boom for agricultural commodities — almost all articles were published in the category "markets" and only one article was printed as a title story. By the end of the first six months of 2007, 16.1% of the articles had already been published as title stories; a similar picture can be observed in the first half of 2008. With the outbreak of the financial crisis, an increasing number of articles were also published in the business management section. Most of these articles deal with the question of how farmers should react to the negative consequences of price volatility and the financial crisis.

An examination of the articles taken as a group reveals that the public discourse on price developments on agricultural markets has passed through various phases, defined by differing expectations concerning future price developments and perceived reasons for price volatility.

For more in-depth analysis, the articles were classified into seven half-year groupings; thus, analyses always focused on time periods of the same length. Shorter periods are more sensitive to temporary price shocks, such as might occur in response to bad weather conditions that at first seem devastating but after some time turn out to be counterbalanced by other, positive factors. To filter these short-term effects, we decided to analyze standardized six-month periods. All the articles were analyzed to identify the two main reasons given by the authors for recent price developments. Over the entire sample period, it is consistently clear that fundamental data is perceived to be the single most important driving force for price change; nonetheless, its perceived importance varies with the phases. At the beginning of the observation period, namely in 2006, authors attach a higher importance to fundamental data for price development. Later on, the perceived relevance of fundamental data tends to decline although no clear trend was observed. Besides fundamental data, other driving forces of price change were also identified in the articles. Figure 1 shows the dominant frames that emerged over time and contrasts them with actual price movements on agricultural markets. Frames can be defined as basic categories into which perceptions and interpretations are organized. Frames define what is considered a problem, who is responsible for the problem and what solutions there may be (Donati, 2001; Gamson, 1992; Ferree et al., 2002).

The first half-year, January through June of 2006, can be labelled **"Eve of the commodity boom"** in order to illustrate the main public opinion found in the articles published during that period. Articles about

rising, constant or falling prices had nearly the same share. According to 73.3% of the articles, fundamental data is responsible for price developments on international agricultural markets. Further important determinants are weather, an increasing use of agricultural raw materials for bioenergy production and a slowly increasing interest in agricultural commodities on the part of financial investors. Compared to later phases, the articles are short, 85% of the articles analyzed having fewer than two pages. The mood in the articles is slightly optimistic (mean 0.44).

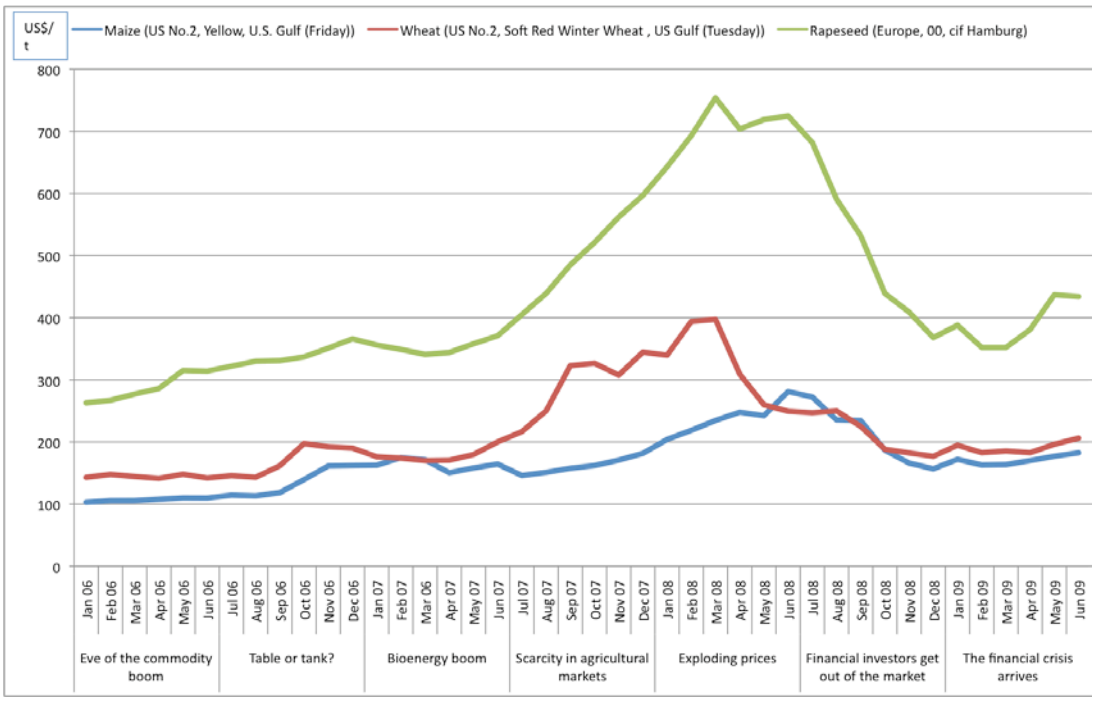

Figure 1.
Price development and public discourse
(Source: Authors' illustration, data: FAO, 2009)

In the second half of 2006, reports on market developments were strongly influenced by increasing grain and oilseed prices as well as fertilizer and pesticide prices. Market experts already await a significant increase in prices of raw materials. The discussion about potential price increases is rather theoretical and deals for the first time with alternative uses of agricultural products for food and energy production (**"Table or tank"**). Compared to the first half-year, the number of articles referring to price developments has increased. The articles are also longer than before, which reflects the attribution of higher relevance to that topic; 56.7% of contributions have more than two pages. The prognosis for future price development is positive (mean 0.69).

The first half-year in 2007 is influenced by increasing prices for grain and oilseeds. According to public opinion, the positive price trend is caused by a **"Bioenergy boom"**. Furthermore, the growing world population is considered responsible for a remarkable shortage in the supply of raw agricultural materials. Due to temporary course corrections in the generally upward-bound price trend, the mood is—compared to the previous phase—more pessimistic (mean 0.45). This shows that the agri-food sector did not trust the upcoming bull market. Compared to the previous phase, the number of articles declined.

From July 2007 onwards, reports mainly focus on the **"Scarcity in agricultural markets"**. Most of the articles analyzed (70 %) point to a limited supply that is smaller than worldwide demand as the main reason for the positive price development. It is a widely shared view that the growing use of agricultural products for bioenergy production and a growing world population reinforce the situation. The strongly increasing prices result in an enthusiastic reporting style (mean 1.07); it is claimed that a new age for agriculture has begun.

In the first half of 2008, the prices for corn, rapeseed and wheat further increase, reaching their maximum — **"Exploding prices"**. Some of the articles (12.8%) attribute the observed price development to the growing world population and the interest of financial investors in agricultural commodities. Since, after a short time lag, the prices for fertilizers and pesticides also start to rise, these topics are also increasingly discussed in media reports. Since the profits realized as a result of the high output prices level out to

some extent in response to sharply rising input costs and the drastic output price decline in the last three months of the year, the mood is less optimistic (mean: 0.324).

In the second half of 2008, two driving forces for the generally negative price development are identified in the media—the role of speculation and wider supply balances. A number of the articles (16.2%) deal with the role of speculation in agricultural commodity markets (**"Financial investors leave the market"**). In the first six months of 2008, farmers had benefited from the US real-estate crisis, as investors flew to more secure investment opportunities, such as agricultural commodities. During that time, the negative consequences of the financial crisis also reached the agri-food sector. The mood during the latter half of 2008 is slightly negative (mean -0.233). Nevertheless, there was still some hope in the late summer due to unfavourable weather conditions in the US and the fact that harvest reports were still incomplete in July and August. The subsequent surprising fall in prices strongly affects article size. More than 37% of articles are longer than three pages. In this phase more and more "business management" contributions focus on risk management. The farmers find themselves in a situation where output prices have already fallen while input prices remain high. As a consequence, a considerable number of farmers face a shortage of liquidity.

In the first half of 2009, agricultural prices have recovered only slightly. Therefore, **"The financial crisis arrives"** is a common interpretation (18.6% of the articles). Furthermore, it is widely assumed that the price situation is caused by oversupply in food markets (44.2% of the articles). Article size reflects the great interest in these topics throughout the agribusiness sector: Nearly 47% of the articles are more than three pages long and, compared to the previous phase, more articles are published in journals. Discussion of the consequences of price volatility and the financial crisis increases, while the mood of the articles is more depressed than before (mean: -0.29).

All in all, the perception of market developments changed during the sample period. In the years 2006 and 2007, the positive price development is the subject of most of the articles. Price volatility is related to positive attributes. But, beginning with the second half of 2008, the sector faces extreme price falls. Authors more and more frequently refer to the negative consequences of volatile markets (for instance, lack of cash or loans). Additionally, market observers increasingly comment that the extreme rise in output prices has led to higher land rents, which have jeopardized the liquidity of farm businesses and in some cases have created severe economic problems (Fock et al., 2008). Nevertheless, the perceived mid- to long-term price trends remain somewhat optimistic (Isermeyer, 2007).

It was not only the perception of price volatility that changed during the sample period. The following section deals with suggestions given to actors in the food chain, especially farmers, on how best to react to volatile markets and changing prices. It is noteworthy that on average, 58.04% of the articles analyzed refrain from giving any suggestions on how to adapt to more volatile markets. Over the first six months of 2006, almost 70% of the articles include no recommendations on how to react. Table 1 shows the suggestions (see left column) that were given to farmers on how best to adapt to the sharp price changes.

From the beginning of 2006 until early 2008, agricultural prices increased. During this time, 24.1% to 38.5% of the articles suggest that farmers analyze the situation and wait before selling their products. The lowest share of articles with the suggestion "wait and analyze" can be found in the Bioenergy boom phase, when the extreme price boom was not foreseeable. Beginning with the second half of 2007, mid-term strategies for risk management are more often reported. In the period of high output prices, the reports mainly discuss how to identify the optimal selling point and whether and how to invest in storage facilities. Later on, risk management strategies (for instance, selling parts of the harvest before reaching the price maximum) are discussed more often. In order to improve decision making in volatile markets, farmers are advised to invest more time in analyzing commodity and capital markets (Deecke and Riedel, 2008) and, furthermore, to keep an eye on land prices, improve their risk management strategies and cultivate contacts with market partners (Umhau, 2007). In times of increasing input prices, strict cost management through the adaptation of machinery and labour costs to lower returns is suggested (Deecke, Riedel, 2008). It is also stressed that, due to the financial crisis, there is greater need for detailed and regular liquidity planning (Hares, 2009).

Table 1.
Adaptive behavior recommended to farmers
(Source: Authors' survey)

	First half-year 2006: "Eve of the commodity boom" N=17	Second half-year 2006: "Table or tank?" N=26	First half-year 2007: "Bio-energy boom" N=29	Second half-year 2007: "Scarcity in agricultural markets" N=31	First half-year 2008: "Exploding prices" N=42	Second half-year 2008: "Financial investors get out of the market" N=36	First half-year 2009: "The financial crisis arrives" N=37
Wait and analyze	35.2%	38.46%	24.14%	32.26%	2.38%	10.81%	6.98%
Sell part of the harvest	5.88%	11.54%	3.45%	9.68%	11.90%	8.11%	13.95%
Sign future contracts	0.00%	0.00%	3.45%	3.23%	7.14%	2.70%	6.98%
No recom-mendations	52.94%	50.00%	62.07%	48.39%	69.05%	56.76%	58.14%

Note: Percentages may not add up to 100% due to suggested adaptations that are not included in the table.

Table 2 describes the suggested adaptations to alternative price developments in greater detail. With regard to periods of falling output prices, 15 % of the articles suggest waiting and analyzing the situation. When prices were constant or tended to rise, this suggestion is found more frequently (in about 30 % of the articles). Fewer than 10 % of the articles suggest selling parts of the harvest early as a risk management strategy. Future contracts are of minor importance. Of the articles dealing explicitly with volatile markets, more than 50 % recommend the deliberate use of risk management measures and future contracts.

Table 2.
Adaptations to alternative price developments
(Source: Authors' survey)

	Falling agricultural output prices N=60	Increasing agricultural output prices N=85	Constant agricultural output prices N=13	Volatile markets N=26
Wait and analyze	15.00%	28.24%	30.77%	0.00%
Sell parts of the harvest	8.33%	9.41%	7.69%	26.92%
Future contracts	0.00%	2.35%	0.00%	26,92%
None	68.33%	56.47%	61.54%	38.46%

Note: Percentages may not add up to 100% due to suggested adaptations that are not included in the table. Articles dealing with other price developments such as increasing fertiliser or pesticide prices are not included in this table.

4 Discussion and conclusions

All in all, the analysis of discourse in agricultural and agribusiness media reveals an intense public discussion of price movements. The perceptions of volatility vary remarkably over time, especially with regard to the threats and opportunities volatility creates for farms and firms and the most frequently identified reasons for volatile prices. Not surprisingly, the adaptations that are recommended to supply chain actors—in most cases farmers—also vary remarkably, depending on the future price developments expected by the authors of articles on volatility and the reasons for price developments that are perceived as most important. These publicly discussed issues are part of a process through which actors in the

agribusiness share their interpretations and form expectations about and attitudes towards volatile markets. This underpins the notion that there is no objective market environment for agribusiness firms; instead, market developments are, at least to a certain degree, constituted by the perceptions of supply chain actors. This observation is very much in line with Karl Weick's (1979) enactment hypothesis, according to which decision makers deliberately refer to specific parts of their firms' environment and, at the same time, neglect others and, in doing so, define those parts of the environment they consider most relevant.

Agricultural economists often apply a microeconomic approach that conceptualizes firm decisions as rational choices of utility-maximizing individuals who systematically react to economic incentives. In this vein, crop portfolio composition, for instance, is considered to reflect farmers' reactions to changes in (relative) prices (Ebmeyer, 2008). More recent studies have highlighted the role of bounded rationality (see, for instance, Musshoff et al., 2009) and decision anomalies (Schaper et al., 2010). Our empirical results suggest going one step further and adding a social constructionist perspective. Berger and Luckmann (1966) have stressed that all knowledge is derived from and maintained by social interactions. They hypothesize that knowledge is created by sharing subjective experiences with others (externalization), the transformation of subjective experience into social reality through such means as human typifications and institutions (objectivation) and the reappropriation of this reality by humans (internalization). We can conclude that price volatility does not exist as such on agricultural markets, but is the result of the perceptions of individuals, the relationships of these perceptions with those of other people, and the emergence of a common understanding of reality. As decision makers in agri-food supply chains act on this understanding, their shared knowledge of reality — in this case price volatility — is reinforced. Media discourse can be considered one element in this process of the social construction of reality.

One important implication is that interested parties could try to actively manage the expectations of supply chain actors. By, for instance, publishing information that influences addressees' perceptions or actively participating in public discussions on market developments and price movements, it is possible to influence how farm and firm managers perceive reality and what strategies they choose. Therefore, it can be very important for actors to have a dominant position in the public discourse in order to be able to propagate their positions and interpretations (Gamson, 1992).

An interesting question is which consequences similar expectations formed by public discourse can have on supply chain actors' behaviour. Economic as well as psychological research suggests that similar perceptions and expectations on the part of actors can result in similar reactions by decision-makers ("herd behaviour"; Rook, 2006). As a consequence, fashion trends can easily emerge in firm management and result in decisions that seek to meet external, institutionalized expectations even though they are technically inefficient (Walgenbach, 2007). This perspective has also inspired sociological research into how markets function and the role linkages between market partners stemming from micronetworks and macronetworks can have on various outcomes, including price volatility (Baker, 1984).

In organization theory, positive feedback processes due to shared assumptions on the part of actors have frequently been described. McGregor's (1960) theory X cycle, for instance, describes a situation in which firm managers perpetuate certain (but empirically wrong) negative assumptions concerning human behaviour and design organization structures according to those shared assumptions. This results in a vicious circle of decreasing human motivation and the implementation of even tighter control mechanisms that result in a further decrease in motivation. In such a case, managers are trapped in widely shared assumptions that they have learned, *inter alia*, in public discourse on people's capabilities and motivational predispositions and which do not allow them to redirect their behaviour.

Self-reinforcing processes have also been observed in strategic management. Miller (1993), for instance, describes a frequently observed pattern according to which once successful enterprises fail because firm managers stick to their once successful, now obsolete but still shared assumptions about what creates a firm's success. Similar self-reinforcing mechanisms are also stressed by some proponents of the resource-based view in strategic management. They argue that firms cannot easily change their strategic positions due to their limited ability to learn new knowledge and change their basic assumptions about how to do business (Teece et al., 1994; Teece et al., 1997).

More recently these scattered theoretical insights into the important role of shared perceptions for firm behaviour have been collected within the framework of path dependence research (Schreyögg, Sydow, 2010). It is argued that decision-makers sharing mental maps, strong organizational cultures and the emergence of organizational loyalty (Simon, 1991) can result in the selective search for and processing of information. In the end, decision-makers' perceptions are crucial for firm adaptations in the face of such challenges as volatility.

Future research should analyze in greater detail the role public discourse plays in the emergence of shared perceptions, assumptions and mental maps and the creation of social knowledge. Empirical research could compare the content of discourse and actual firm behaviour in order to contribute to a better understanding of how strong the influence of public discussions on firm decisions is. Qualitative, case study-based research methods could help to obtain more in-depth insights into the processes of externalization, objectivation and internalization hypothesized by Berger and Luckamnn (1966). This type of research promises to be of particular interest because it has been frequently observed that farmers do not always act in line with scientists' recommendations regarding such issues as investment in milk quotas or cultivation of crops after the decoupling of EU payments from production. This indicates that enacted environments and the social construction of reality are relevant to managerial decisions; this observation also reflects the notion that decisions are made, at least to a certain degree, independently of what is recommended in public discourse.

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