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Food safety, the media, and the information market

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Abstract

Availability of information has increased rapidly over the past decades. Yet, information on food safety is still considered problematic. Economists have extensively researched the effects of imperfect information. However, little attention has been paid to the institutional organization of the supply of information and the incentive schemes in the information market. This paper analyzes how and when information is supplied by media organizations, and what the implications are. We first develop a theoretical framework and afterwards provide empirical evidence from media coverage of two recent food safety crises in Europe.

JEL classification: L82, P16, Q18

Keywords: food safety; media; information market; political economy

1. Introduction

> The . . . press appears to me to have passions and instincts of its own. . . . In America as in France it constitutes a singular power, so strangely composed of mingled good and evil that liberty could not live without it, and public order can hardly be maintained against it.
>
> —Alexis de Tocqueville, 1853

Although households are flooded with information through dozens of TV channels, plenty of newspapers, journals, and radio, the public is said to be poorly informed when consumption declines dramatically following media reports on food contamination, or when European consumers oppose the introduction of genetically modified organisms (GMOs) in their food, despite claims by scientists and official institutions that those products are safe.

The main (implicit) assumption in the extensive literature on the impact of imperfect information (see e.g., Akerlof, 1970; Stiglitz, 1993) is that such problems may be solved by improving provision of information. The problem is that information provision is assumed to be neutral. However, in reality, most information is not provided by institutions whose objective is to foster the public good, but by organizations that have an internal incentive to select certain information items and certain forms of information over others in their information distribution activities. Information is provided either by private sources with their own profit-maximizing objectives or by public sources that may formally be charged with providing objective information, but administrators and governments may have incentives to bias the information.

Increasingly, the most important ally of governments is no longer the police or the military; it is the media, as is illustrated in the following quote:

> The surest thing that Tony Blair was kick-starting an election campaign wasn't his traditional trip to Buckingham Palace to tell the queen. More important was Rupert Murdoch's early-May call on 10 Downing Street. Through two decades and three prime ministers, the News Corp.'s chairman has reigned as Britain's political kingmaker.
>
> —McGuire, 2001, p. 21

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A prime target of political organization is control over the media, as witnessed by recent maneuvering by, for example, Silvio Berlusconi in Italy and President Putin in Russia. The first target of a military coup or a popular uprising is no longer the police station, but the TV station, as is well illustrated by the following quote:

> The most important single pillar of Slobodan Milosevic's power [in Serbia] throughout the 1990s was state-run television, with its insidious diet of nationalist lies and regime propaganda . . . . The crucial moments of the Serbian revolution to overthrow Mr. Milosevic were also televisual. First the storming of the Belgrade Parliament, seen via satellite on CNN, BBC, and Sky and on embattled semi-independent provincial channels in Serbia itself. Second, the storming of the headquarters of state television, revealingly known as TV Bastille, and the subsequent appearance of the new president, Vojislav Kostunica, on that channel. Those were the two moments that told everybody it was over, even though all the traditional organs of power were still formally (and many so also very practically) in the hands of Mr. Milosevic. It had happened on television, so it had happened. Television made it true.
>
> —Ash, 2000

This issue is particularly relevant for food safety and consumers' associated risk perceptions. Over 90% of consumers receive information about food and biotechnology primarily through the popular press and television (Hoban and Kendall, 1993). Extensive media coverage of an event can contribute to heightened perception of risk and amplified impacts (Burns et al., 1990). For example, Johnson (1988) shows how media coverage of product contamination by the pesticide ethylene dibromide (EDB) resulted in important disruptions in the market for grain products. Other recent examples are the media coverage of the Alar scare in apples in the United States and bovine spongiform encephalopathy (BSE), commonly known as "mad-cow disease," in Europe, Japan, and now Canada.

Alar, the trade name for daminozide, which regulates fruit set, size, coloring, and ripening, is used primarily on apples. In February 1989, the U.S. television news program *60 Minutes* aired a story on the Natural Resources Defense Council's (NRDC) findings that Alar is a cancer risk to children. In the following months, a number of media organizations featured the Alar story, resulting in a panic. School systems removed apples from their cafeterias, and supermarkets took apples off their shelves. U.S. apple growers lost millions and announced a voluntary ban effective fall 1989. In hindsight, analysts argue that the media confused a long-term cumulative effect with imminent danger, resulting in unnecessary panic and losses (Negin, 1996).

The BSE outbreak and its effects on the livestock industry, beef demand, and consumers' food safety perceptions have been studied mainly in Europe where a large number of countries have been affected. Verbeke et al. (2000) find that television coverage on meat safety had a negative effect on demand for red meat after the BSE outbreak in Belgium. Younger people, and households with young children, were the most susceptible to such negative media coverage. Verbeke and Ward (2001) find that advertising had only a minor impact on meat demand compared to negative media coverage in Belgium after the BSE discoveries.

It is remarkable how little attention has been paid so far to how the industrial organization of the media industry and the structure of the information market affect the quantity and quality of information supply, although some recent studies have emerged on this issue, analyzing the impact of media structures and ownership on information distribution and economic welfare (Besley and Burgess, 2001; Besley and Pratt, 2002; Djankov et al., 2001). In this regard, the objective of this paper is to contribute to this understanding by developing a theoretical framework of the information market and comparing it with the empirical observations on media reporting on two recent food safety crises. The paper starts with a theoretical analysis of the organization and incentive structure of the media industry, looking at both supply and demand factors, and discusses a set of general hypotheses on the characteristics of information provided by the media industry. This section draws from a formal model of the information market developed in Swinnen and McCluskey (2003). The second part of the paper compares the hypotheses with the results from an empirical study of media reporting on two recent food safety crises in Western Europe: the 1999 dioxin crisis that originated in Belgium, and the 2001 foot-and-mouth disease (FMD), which originated in the United Kingdom (Swinnen and Francken, 2002).

2. A positive theory of media and information

Newspapers, TV, radio, and other media simultaneously decide *what* (which issues) to report, *how*, that is, in which format (pictures, interviews, text, etc.), and which aspects (positive vs. negative aspects; business vs. environment effects; etc.). Therefore, define a "story" as a unit of media coverage. Each story is characterized by the issue on which it contains information, and by its attributes. Define $m(\theta)$ as the number of stories on a specific issue, with θ the set of attributes of the story. The attributes are a variety of characteristics, such as ideology, attitude (e.g., negative vs. positive), format, and regional coverage. For each of these attributes, one can assume a single-dimensional space between two extremes. The supply of stories and their attributes will depend on the structure of the media industry and on the demand for information on the issue.

2.1. *Supply side of the market*

Private commercial sources of information are increasingly important. While in the United States news coverage has always been largely in the hands of commercial companies, the emergence of private companies as the dominant source of information is a relatively new phenomenon in Europe. Until recently European TV and radio broadcasting were largely in the hands of state broadcasting companies, and companies publishing daily newspapers and popular journals were often closely aligned with political parties. All that has changed dramatically. Commercial TV and radio stations have emerged in Europe and are now the dominant channels. The written press has gradually devolved itself of the patronage of the political parties and is driven more by commercial than political objectives.

Nevertheless, many media organizations, either because of the preferences of their owners or because of the preferences of journalists who have sufficient autonomy to influence decision making of the media organization, do have their own attribute preferences, for example, on the ideological perspective of the stories. We therefore assume that the media organization is driven by the need for profits and its own attribute preferences. Each media company j has the following objective function for producing a story located at θ in attribute space:

$$U_j^m(\theta, \theta_j^m) = -\alpha(\theta - \theta_j^m)^2 + \beta\pi(\theta), \tag{1}$$

where $\pi(\theta)$ is the profit function for the media company. Further, θ^m is the media company's preferred location in attribute space, and the parameters α and β reflect the relative importance of the profit objective in the company's objective function. For example, in case of the ideology attribute, if ideological propaganda is very important, α is large compared to β. An extreme example of this weighting would be the *Pravda*, the former Soviet News Agency. On the other hand, for commercial media companies, α is smaller, and can be zero if the company only cares about profits. Except for the two extreme cases, the company will trade-off between ideology and profits. The same holds for the other attributes. We define profits as $\pi(\theta) = pm(\theta) - F$, where p is the exogenous price of stories and F is the fixed cost of production.

We will first consider the case of a monopolist. The firm chooses the location to maximize its objective function

$$\max_{\theta} -\alpha(\theta - \theta^m)^2 + \beta pm(\theta) - F. \tag{2}$$

The first-order condition is the following:

$$-2\alpha(\theta^* - \theta^m) + \beta pm'(\theta^*) = 0. \tag{3}$$

The first-order condition exhibits the firm's trade-off between ideology and profits. The supply is determined by the ideological choice, θ, which solves the firm's first-order condition (3). The ideological choice and exogenous price determine the number of stories supplied:

$$m^* = m^*(\alpha, \beta, p, \theta^*, \theta^m). \tag{4}$$

The equilibrium number of stories can be found by setting supply equal to demand.

Now we consider adding additional firms. In general, each media company will choose an ideological location, θ_j, to maximize its objective function relative to the location of the competition. When firms care about both location and profit, we obtain

$$\theta_j = \theta(\alpha, \beta, p, \theta_j^m, \theta_1, \ldots, \theta_{j-1}, \theta_{j+1}, \ldots, \theta_n). \tag{5}$$

Adding additional media firms affects the ideological choice of media firm j because it now wants to differentiate its product relative to the competition. The decision making of the company will obviously be affected by the structure of the media industry and by the preferences of consumers. In a media environment characterized by competition and free entry, companies whose editorial policies are mainly concerned with ideology may find themselves either facing losses or a small part of the market unless the ideological preferences of the population fit perfectly with that of the media organization.

2.2. *Demand side of the market*

The reader uses the information provided by the newspaper to reduce the variance of his/her estimate of truth, which could relate to many things, including the financial health of a firm (as suggested by Mullainathan and Shleifer, 2002) or which politician will be elected. For simplicity, we just assume here that the consumption of media products will positively affect his/her income through an increase in the reader's knowledge on certain issues.[1] A consumer further obtains positive utility from consuming leisure and all other goods and obtains negative utility from consuming media stories that diverge from his or her attribute preference. Specifically, the utility a consumer obtains from m stories located at θ in attribute space is

$$U^c(\theta, \theta^c, L^l, x) = g(L^l, x) - cm(\theta - \theta^c)^2, \tag{6}$$

where θ^c is the location in attribute space of the consumer's favorite type of attributes, c is a scaling parameter, m is the number of media stories purchased, L^l is time spent on leisure, $g(\cdot)$ is a concave function, and x is all other goods. The squared difference between the location of the media products and the consumer's favorite type of media negatively affects utility. That is, consumers get disutility from reading stories that diverge from their favorite types. For now, we assume that all consumers are identical except for ideological preferences. We assume that there are n consumers whose favorite ideological locations, θ^{ci}, $I = 1, \ldots, n$, are uniformly distributed in the ideological space.

The consumer maximizes utility subject to a budget constraint,

$$x + pm = f(L^w; k(mL^m)), \tag{7}$$

and a time constraint,

$$1 = L^l + L^w + L^m, \tag{8}$$

where p is the exogenous price of news stories, $f(\cdot)$ a concave production function, L^w is time spent working, L^m is time-processing media stories, and k is the level of knowledge or informational content gained from consuming media stories. The price of all other goods, x, is normalized to 1. Note that knowledge is gained from both story purchases and the time taken to process stories. Both are necessary for obvious reasons. Media consumption increases utility by increasing income as knowledge increases.

The first-order conditions yield the usual result that the net marginal benefit of time must be equal across the uses of processing media stories, work, and leisure. This model yields a demand equation for consumer i for news stories:

$$m_i = m_i(\theta, \theta_i^c, p, x), \tag{9}$$

where demand is a function of the attributes of the stories, the consumer's favored attributes, price, and consumption of other goods.

3. Rationally ignorant consumers and negative news coverage

3.1. *The rationally ignorant consumer hypothesis*

A first result from this model is that it is rational for consumers to be imperfectly informed. There are three reasons why it is rational for most consumers not to inform themselves fully on an issue. First, most obviously, if the price (p) of news stories is high compared to the marginal benefits of information, it will cause consumers to stop purchasing information. With decreasing returns to information we see that it is rational for individuals not to be fully informed. Consumers will prefer to inform themselves only up to a

[1] The model in Swinnen and McCluskey (2003) is less restrictive and formally includes dynamic aspects and more details on how consumption of newspaper stories affects information variance and income.

point where further acquisition of information will be too costly, either because (with decreasing returns to information) the increase in income from more information becomes less than the cost (price p).

Second, reducing the price of stories will increase consumer information, but only up to a point. Even when stories are free, consumers will stop acquiring more information when the opportunity costs of processing the information become larger than the growth in income, or both. Opportunity costs play an important role, especially when considering trade-offs involved in information accumulation on many issues and problems.

A third reason why consumers may choose to be less than fully informed has to do with the attributes of the stories presenting the information. As explained above, consuming a story may have a negative impact on consumer welfare because of the story's ideological bias. From the first-order conditions, the marginal disutility from consuming media with a divergent ideology must be equal to the marginal net benefit from the increase in income due to knowledge. With decreasing returns to information, there is a point where consumers prefer not to inform themselves any further if consumer attitude preferences differ from those offered by the media.

3.2. Bad news hypothesis

A second result is that the generally recognized tendency of the popular media to publish mostly negative aspects of news items is driven by the demand of their audience, rather than by inherent preferences of the media itself. To understand this, consider for a moment that there are two types of stories: positive stories or "good news" ($\theta^A = G$) and negative stories or "bad news" ($\theta^A = B$). Think of good news as stories about happy endings, in which people made the right choices. Bad news stories are about unhappy endings, in which people made the wrong choices. When consumers read good news stories, they can make similar choices to increase their incomes. When they read bad news stories, they can choose to avoid bad outcomes and the resulting income losses.

Define the $m^B = m(\theta^A = B)$ as the demand for bad news stories, and $m^G = m(\theta^A = G)$ as the demand for good news stories. Assuming that the costs involved in purchasing and processing good news and bad news stories is identical, it follows that individuals are more interested in bad news, m^B, than in good news, m^G. The expected value of additional information is higher when it concerns an issue with negative welfare effects than with positive welfare effects. Since $g(\cdot)$ is concave, the marginal loss in utility from not consuming the first bad news story is greater than the marginal gain in utility from consuming the first good news story. Consumers will choose story types until the marginal utility across story types is equal. By concavity, consumers will choose to consume more bad news stories than good news stories $m^{B*} > m^{G*}$.

4. Tabloids and the elite press

So far we have not considered variations in consumer characteristics and preferences. If consumers are heterogeneous, a variety of media products will emerge in an environment that allows entry of new media products and organizations.

To illustrate this, consider the simple case of a population with "high-skilled" and "low-skilled" people. Skills will affect preferences for both the types and the format of stories. First, skills affect consumers' ability to process the information contained in the stories, and therefore high-skilled consumers will prefer stories that contain more information, even if that makes the story less easily digestible ("more words and less pictures").[2] Second, skills will affect the relevance of the stories for the consumers. High-skilled people typically are more mobile, both professionally between sectors and geographically. This means that high-skilled consumers are more interested in stories that contain information that goes beyond local issues than are low-skilled consumers.

This will lead to the emergence of two differentiated media products. The first, which we refer to as the "elite press," targets the high-skilled part of the population bringing news with a wider geographical focus and in a format that is more difficult to process but contains more information. The second, which we refer to as the "tabloids," has a more local selection of news items, and is presented in an easily accessible format.

[2] There is some trade-off here since high-skilled people may have higher opportunity costs.

5. The dynamics of a story

An important extension of this simple model is to include the dynamics of the choice, i.e., not only *whether*, but *when* to publish a story. Collection of information requires time, effort, and other costs. Full information on an issue, in particular when it is a story about a "novel" item, emerges only gradually. Typically, early on only part of the information is available. Publishing a story based on part of the information has the risk of giving a "biased" perspective on the issue—and for the consumer it carries the risk of drawing incorrect conclusions, and thus of having possibly negative welfare effects. The risk for the media is that reporting a biased story may hurt its reputation, and thereby future profits.

However, bringing a story early, even based on limited information, and therefore probably biased, has potential benefits for both consumers and the media. A media organization which brings the story early may capture a larger market share and profits if consumers want whatever information they can get on a new issue. Consumers also face a trade-off. If the issue is something very important they know nothing about and which is potentially very important for their welfare (say, the first information about Anthrax letters sent to U.S. government offices), they may well be willing to take the risk of getting very biased stories in exchange for getting whatever information available ("any news is better than no news").

However, in other cases consumers may not accept very biased news, and may well react to this by adjusting their future story consumption (i.e., buying other newspapers if they feel that the information provided is too biased, even if it informs them earlier).

More generally, the trade-off between current profits and future profits will depend on the structure of the media market, on the characteristics of the company (tabloids vs. elite press), and on the demand side (consumers).

In this perspective there is an interesting secondary, but important, dynamic component: once one media company (newspaper, radio, or TV) starts reporting on a story (no matter how biased), it is a free game: everybody will now use the first story as a base for their own reporting. The dynamics are well summarized by the following quote:

> In practice . . . even apparently responsible papers like *The Times* actually contribute to building up the [food] scare. Then, when the scare has run its course, they will argue against it. But when the scare dynamic is up and running, *The Times* and other broadsheets will join with the throng and become more tabloid than the tabloids.
>
> —North, 2000, p. 8

There are two reasons for this. First, the competition (and consumers) forces them to bring something on the issue, otherwise the consumers will ask: "why is this issue not addressed in my newspaper, or on this TV journal? I should look at other media!" The second reason is that by commenting on a story launched by another media company, it provides them cover in case things go wrong, i.e., when the early information turns out to be very biased. They can then hide behind the fact that they did not bring it and only commented and reflected on a story launched by another media company. In terms of our model, the first factor reduces the current losses in waiting too long with the story, and the second factor reduces future losses of reputation by not waiting long enough until more information is available.

These dynamic effects have important implications for the role of the media in the distribution of information and its impact. This is illustrated by the following quote from North (2000) on the "1678 Papist Plot":

> The central figure was a character called Titus Oates, who put about a series of lies to the effect that the Jesuits were planning to murder the king and invite in foreign powers to recover England for the Pope and Catholicism. In the ensuing panic, 35 entirely innocent people were executed. It was not until 1684 that the frenzy had completely subsided.

Interestingly, this "scare," indistinguishable in principle from modern scares, existed before even daily newspapers—much less television and radio—had been invented. That a scare dynamic can run without the media suggests that the media are not primarily responsible for the phenomenon. However, the Papist Plot ran for about 6 years, which suggests that the media intensifies the scale of the scare, while perhaps bringing it to a conclusion faster.

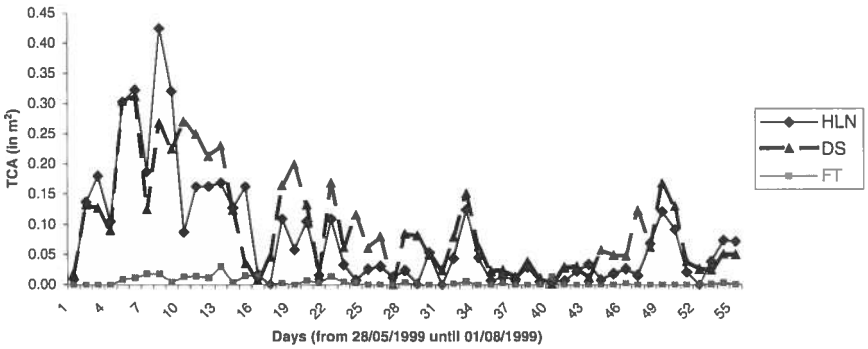

Figure 1. Total coverage of the dioxin crisis per day.

6. Empirical analysis of media reporting on food safety crises

This section summarizes the conclusions from an analysis of reporting by three newspapers on two recent food safety crises in Western Europe: the 1999 dioxin crisis and the 2001 FMD crisis. Both the newspapers and the crises were selected to analyze how different characteristics of the subjects and the media organizations affect the reporting.

6.1. Food safety crises

The dioxin crisis originated in Belgium. In May 1999, the media started reporting on dioxin contamination of food in Belgium. The resulting crisis caused strong consumer reactions, significant effects on food export markets, and had important political implications. Initially two government ministers were forced to resign, and it is widely believed that the dioxin crisis contributed significantly to the heavy electoral losses of the governing parties a few months later.

In February 2001, the FMD was discovered in the U.K. countryside. Despite drastic measures by the U.K. government, FMD was discovered on the European continent in the following weeks. The ensuing slaughter of millions of animals, blockades of local communities, and the associated effects, as well as the potential spread to other countries, were extensively reported in the West European press.

6.2. Newspapers

In order to draw conclusions about how reporting is affected by the characteristics of the event and by the nature of the media organization, reporting by three different newspapers on these two food crises that originated in different countries is analyzed. The newspapers include two Belgian newspapers that differ in audience and media strategy—a so-called "popular" newspaper (*Het Laatste Nieuws* [HLN]) and a so-called "quality" newspaper (*De Standaard* [DS])—and one international newspaper (*Financial Times*, International Edition [FT]). Figures 1 and 2 present typical covers of both newspapers to illustrate the differences between the "popular" and "quality" press.

Both Belgian newspapers are in Dutch, which is spoken by approximately 60% of the population. HLN is the most popular newspaper in the Dutch-speaking part of Belgium with a market share of 27%. Based on a ranking of the Belgian population according to income, profession, and education level of the household head from 1 to 8, its readership consists mainly of people from classes 3 to 5, with a large share of pensioners and both skilled and unskilled workers (CIM, 2001). In contrast, 56% of the readers of DS come from classes 1 and 2 of this ranking. DS has a total market share of only 8% but is considered the leading "quality" newspaper. More than half of its readers have a higher education degree (CIM, 2001).

The FT is a world business newspaper, based in London, with almost 5,000,000 issues sold per day and a global readership estimated at over 1.3 million

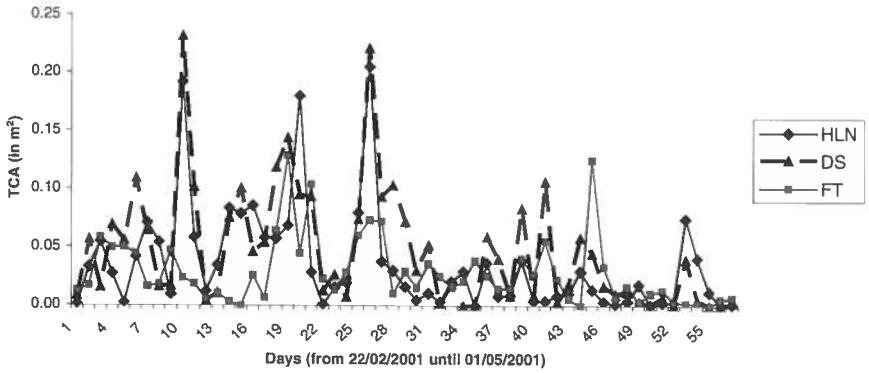

Figure 2. Total coverage of the FMD crisis per day.

people in more than 140 countries. Its audience consists mainly of business leaders, government employees, international entrepreneurs, bankers, investors, teachers, and students (Pearson, 2003).

6.3. *Empirical methodology*

The coverage is analyzed over a period of 2 months after the news "broke": May 28–August 1, 1999 for the dioxin crisis and February 22–May 1, 2001 for the FMD crisis. The attention paid by the newspaper to the crises is measured by constructing indicators of area coverage by the articles. The global article surface is considered the most valuable unit (Berger, 1998). More specifically, the coverage area (CA_{ij}) of food crisis i in newspaper j is calculated as

$$CA_{ij} = \sum_{p=1}^{P} \gamma_p CA_{ij}^N, \tag{10}$$

where N is the total number of pages, γ_p is the weight of page number p, and CA_{ij}^N is the area covered by an article on food crisis i on page p. The weight of the pages in consumer perception (attention) or in the editors' choice is not known. To ensure that the choice of weights does not affect the results, a set of sensitivity analyses was run with different sets of weights. The conclusions were generally robust to the choice of weights. For each crisis and newspaper three different indicator variables were calculated per day: the "total coverage area" (TCA), which is the combination of the "illustrated coverage area" (ICA) and the "text coverage area" (XCA).

In addition, the reporting on the FMD crisis by the Belgian newspapers was categorized under either a "domestic" (Belgian) or "international" focus, following a simple approach to content analysis (see e.g., Budd et al., 1967; Marks et al., 2000a, 2000b). All articles with a focus on Belgium, for example, precautionary measures taken by the Belgian government, potential Belgian cases of the disease, national, and regional consequences of the outbreak etc., were categorized under "domestic" news. "International" news was regarded as news with an international (or "non-Belgian") focus.

6.4. *Empirical results*

The results of the analyses are summarized in the tables and figures. The first conclusion is the remarkable similarity between the Belgian newspapers in terms of total attention to the food safety crises (see Figures 1–4). The total coverage of the dioxin crisis and, to a lesser extent the FMD crisis, follows roughly the same pattern, with the bulk of the coverage in the first 20 days of the dioxin crisis and between days 10–30 of the FMD crisis. The correlation of daily total coverage (TCA) is 81% for the dioxin crisis and 76% for the FMD crisis (see Table 1).

The coverage by the FT is different: there is very little reporting on the dioxin crisis. As an illustration: the highest coverage of the dioxin crisis by the FT is on day 13, the day before the weekend of the elections in Belgium, when the FT speculates about the possible consequences of the crisis on the election outcome. The reporting on FMD is also less and more equally

Table 1
Correlation of the coverage dynamics

			DS & HLN	HLN & FT	DS & FT
DIOXIN		TCA	0.81	0.55	0.54
		XCA	0.81	0.49	0.52
		ICA	0.68	0.38	0.43
FMD	Total	TCA	0.76	0.21	0.46
		XCA	0.74	0.18	0.47
		ICA	0.60	0.19	0.27
	Domestic	TCA	0.81	n.a.	n.a.
		XCA	0.81	n.a.	n.a.
		ICA	0.77	n.a.	n.a.
	International	TCA	0.45	n.a.	n.a.
		XCA	0.37	n.a.	n.a.
		ICA	0.31	n.a.	n.a.

TCA = total coverage area; XCA = text coverage area; ICA = illustration coverage area; n.a. = not applicable. All these areas are measured in m^2.

spread over the day 10–50 period. Still, comparing FT reporting with HLN and DS shows a closer similarity between FT and DS, the two quality newspapers, with an average correlation of 50%, than between FT and HLN with an average correlation of 38%.

Despite the general similarities between HLN and DS in aggregate coverage, there are important differences in the format and focus of the coverage. There is a clear *difference in* terms of *format*: the average share of illustrations in total coverage is 35% in HLN, considerably more than in DS (26%) and in the FT (20%), although the illustration share in the FT is significantly higher for the FMD case, at 26% similar to that of DS (see Table 2).

There are remarkable *differences in regional coverage* between HLN and DS. DS covers more international aspects of food crises than HLN (see Figures 3 and 4). The difference in total coverage between DS and HLN in the FMD crisis is almost entirely due to differences in coverage of international aspects of the crisis. Table 1 shows how the correlation in daily total coverage of HLN and DS is almost identical for domestic aspects of the FMD crisis (81%, which is identical to the correlation for the dioxin crisis, which was—from a Belgian perspective—almost uniquely a domestic issue), and much larger than the 45% correlation coefficient for the international aspects.

Table 2
Illustration share (in %)

			HLN	DS	FT
DIOXIN		ICA/TCA	34	27	13
FMD	Total	ICA/TCA	35	25	26
	Domestic	ICA/TCA	32	24	n.a.
	International	ICA/TCA	43	25	n.a.

TCA = total coverage area; ICA = illustration coverage area; n.a. = not applicable. All these areas are measured in m^2.

This is also illustrated by the following cases. All three newspapers published their first article on FMD on the same day, but the focus was different. The title of the DS article was "Europe stops the import of British cloven-hoofed," focusing on Europe and not on Belgium in particular, whereas the HLN article was titled "Belgium prohibited the import of British cattle because of foot-and-mouth," an article with a complete national emphasis. Further, DS has the highest "international" coverage on day 19 (see Figure 4), when the first case of FMD was found on the European continent, specifically France. The epidemic was now crossing the borders. In contrast, HLN has the highest "international" coverage on day 53, when it reports that humans had been infected by FMD in the United Kingdom.

Further, while the *dynamics* of total coverage appear rather similar at first sight, there are important differences. The tabloid press, HLN, is earlier both in its initial coverage of the crises and in reducing attention. This is well illustrated in Figures 5 and 6, which compare the share of aggregated total coverage over time. It is clear from these figures that initial coverage is more intense in the popular press, but coverage also reduces faster in the popular press. This observation is consistent with the notion that the same forces of competition for an audience in the media leads to an intensification of the media attention early on, but also to rapid decline in attention afterward.

An interesting difference between HLN and DS can be found in the "*nature*" *of the coverage*. This can best be illustrated with some case studies. A first illustrative case is the "Klemskerke case," which is summarized in Box 1. The Klemskerke case was a dream for the popular media: it combined intense personal drama with high-level politics, the central role played by an organically raised lamb, yielding images of high emotional value, and with bargaining and uncertainty (!) on the final outcome, which lasted for several days. In

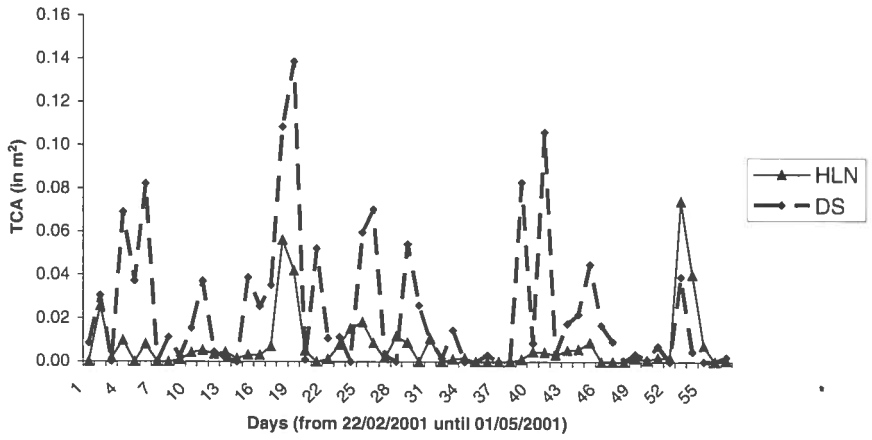

Figure 3. Total coverage of international news on FMD per day.

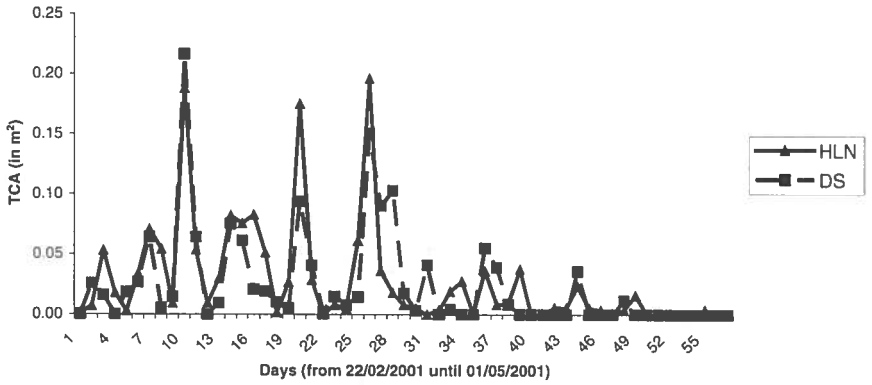

Figure 4. Total coverage of domestic news on FMD per day.

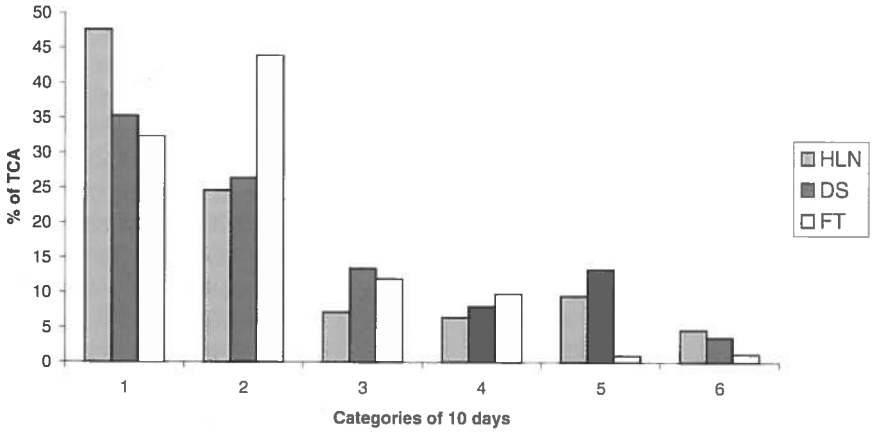

Figure 5. Total coverage (in % of TCA) of the dioxin crisis by the three newspapers.

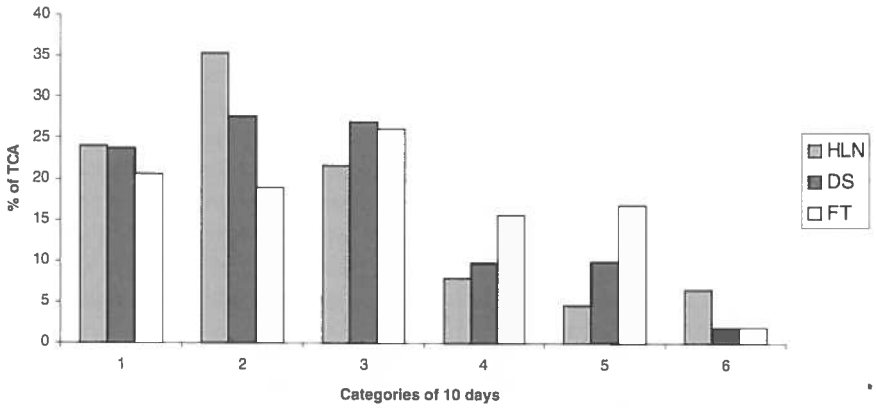

Figure 6. Total coverage (in % of TCA) of the FMD crisis by the three newspapers.

Klemskerke is the name of a village in Belgium. An organic farmer in Klemskerke imported 12 goats from Wales (Great Britain) before the FMD outbreak. After the FMD outbreak, the Belgian government decided that all the livestock of all farmers who had imported live animals from the UK had to be slaughtered. This included the organic farmer's stock of 270, mostly home reared and specially selected, organically raised goats. The government's decision resulted in wide protests from the local and organic community, attempting to block the implementation through political pressure, blockades, and legal action. While the actions proved ultimately unsuccessful and the government's decision was implemented, the story lasted for several days and strongly captured the attention of the media.

Box. 1. The Case of Klemskerke.

HLN more than 20% of total domestic coverage and 18% of total coverage of the entire FMD crisis over 3 months went to this single case (see Table 3). While DS paid less attention to this case, it is telling that, despite its "quality image," it still devoted more than 12% of aggregate total domestic coverage on the FMD crisis to this issue.

Another illustrative case is HLN reporting on FMD. On day 53, HLN reports that in the U.K. symptoms of FMD had been found in a human being. There are two interesting observations on this case. First, this is the most extensive coverage of international issues of the entire FMD crisis. Second, when a few days later it was announced that the person was not affected by FMD and that the symptoms were due to another cause, this was presented in a small article on page 17. Hence, this case provides worrying evidence on the selectivity of reporting, and of information distribution through the media. It seems to illustrate that "(only) those who shout first, get heard."

Table 3
Coverage of the Klemskerke case by the Belgian newspapers

		HLN	DS
Klemskerke	TCA	0.37	0.18
	XCA	0.23	0.12
	ICA	0.14	0.06
	% of TCA FMD domestic	23	13
	% of TCA FMD	18	7

TCA = total coverage area; XCA = text coverage area; ICA = illustration coverage area. All these areas are measured in m^2.

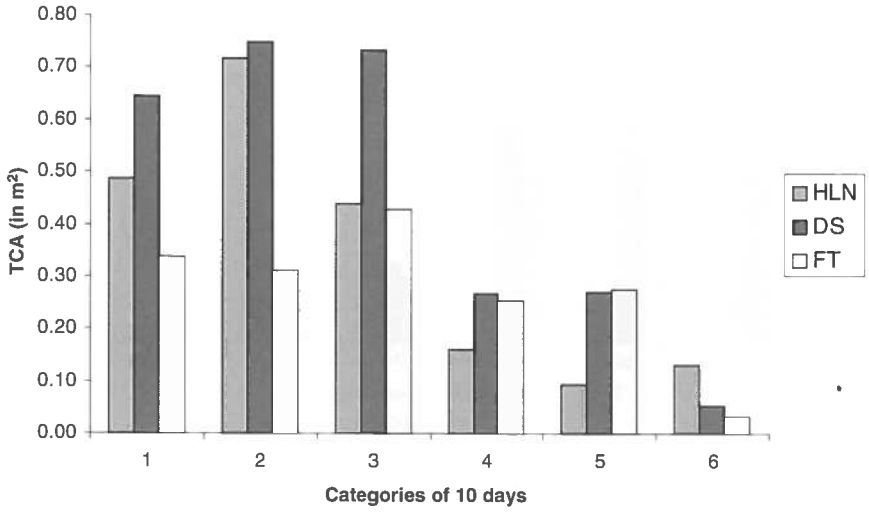

Figure 7. Total coverage of FMD after the first FMD case.

Finally, here is some evidence on "the bad news hypothesis." While it is hard to systematically collect evidence on good versus bad news, it appears that there is indeed a bias in favor of negative news reporting. In a way the entire reporting in the first months of the FMD and dioxin crises as essentially "bad news." Quite tellingly, in the months after the crises were under control, few articles appeared in the press. Figures 7 and 8 illustrate how in the 100 days after the last FMD case was diagnosed, every day that went by without a new case was "good news," hardly any articles appeared in the press. At the end of the 100 days, DS carried a small article announcing that the FMD crisis was now officially over. Nothing was reported in HLN. In the FT the announcement of the formal end of the FMD crisis was hidden inside a page 6 article on the costs of the FMD crisis—hence even the good news was buried in an essentially negative news story.

7. Conclusions

The availability of information has increased rapidly over the past decades. Yet, public information on

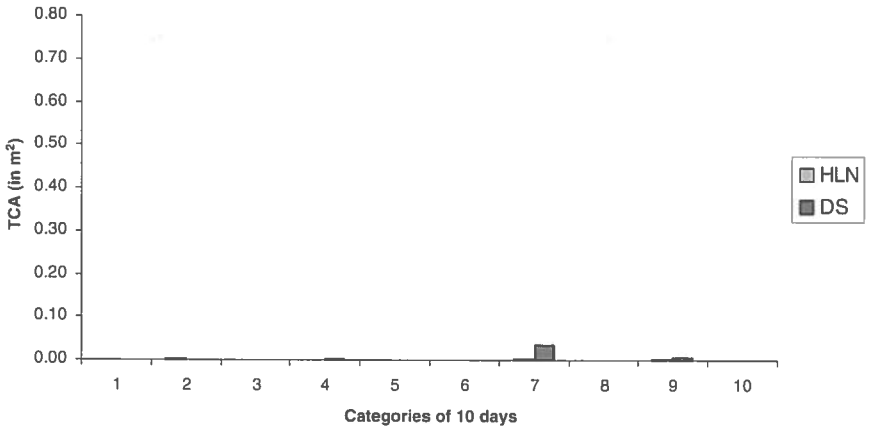

Figure 8. Total coverage of FMD after the last FMD case.

food safety issues is, rightly or wrongly, still considered problematic. While economists have extensively researched the effects of imperfect information, relatively little attention has been paid to the structure of the information market and its implications.

This paper makes a contribution to this emerging research field by studying how information is likely to be supplied by commercial media organizations, and how this is affected by the nature of the issue and by the characteristics of the population and the media industry structure.

More specifically, the analysis shows that consumers are likely to remain imperfectly informed on most issues because of the costs of information, primarily the opportunity costs of information processing. Second, a series of characteristics (related to novelty, emotional value, credibility, and uncertainty) that affect the demand for information from specific sources are identified, and an explanation is provided on how negative news coverage is likely to dominate positive news stories because of the welfare effects. Finally, the ways in which tabloids and elite presses are likely to emerge endogenously with sufficiently heterogeneous populations are discussed. In a dynamic framework, tabloids are likely to launch stories, but that if the issue is important enough, competitive forces will induce elite presses to follow, even before being able to fully verify the story.

The empirical evidence from an analysis of Belgian newspapers shows that there is a similarity between them in terms of total attention to the food safety crises, while there are important differences in the format and focus of the coverage. In terms of dynamics, the popular press is both earlier and more intense in its initial coverage of the crises, but loses interest more quickly. This observation is consistent with the notion that the same forces of competition for an audience in the media leads to an intensification of media attention early on, but also to rapid decline in attention afterward.

There is also evidence that early claims, even when false, are reported much more extensively than eventual corrections. This selectivity of reporting, and of information distribution through the media, seems to illustrate that "(only) those who shout first, get heard." Finally, while it is hard to prove formally, it appears that there is indeed a bias in favor of negative news.

Based on previous studies, media coverage of a food safety crisis increases the perceived risk of consuming the associated product. In turn, increased perceived risk affects demand for the product. This provides a strong additional incentive for firms to avoid causing food safety hazards. If an incident does occur, firms have an additional incentive to employ corrective measures as soon as possible to limit damage. The problem of false claims is serious and results in tarnished firm reputations. Because the tabloid press is more likely to get the story out fast, the probability of errors is increased. Liability issues should be considered in this area.

References

Akerlof, G., "The Market for 'Lemons': Qualitative Uncertainty and the Market Mechanism," *Quarterly Journal of Economics* 84 (1970), 488–500.

Ash, T. G., "Winner in a Long-Running Soap Opera: The Television Camera," *International Herald Tribune* (November 29, 2000).

Berger, A. A., *Media Analysis Techniques*, 2nd edition (Sage: Thousand Oaks, CA, 1998), p. 240.

Besley, T., and R. Burgess, "Political Agency, Government Responsiveness and the Role of the Media," *European Economic Review* 45 (2001), 629–640.

Besley, T., and A. Pratt, "Handcuffs for the Grabbing Hand? Media Capture and Government Accountability," CEPR working paper no. 3132 (2002), p. 39.

Budd, R. W., R. K. Thorp, and L. Donohew, *Content Analysis of Communications* (Macmillan: New York, 1967).

Burns, W., R. Kasperson, J. Kasperson, O. Renn, S. Emani, and P. Slovic, "Social Amplification of Risk: An Empirical Study," Unpublished report available from Decision Research, Eugene, Oregon (1990).

Centrum voor Informatie over de Media (CIM). Available at http://www.cim.be.

De Tocqueville, A., "Democracy in America," Reprinted in Vintage Classics Edition (Vol. 1) 1990 (1853), p. 185.

Djankov, S., C. McLiesh, T. Nenova, and A. Shleifer, "Who owns the media?" NBER working paper no. w8288 (2001), p. 29.

Hoban, T. J., and P. A. Kendall, *Consumer Attitudes about Food Biotechnology* (North Carolina Cooperative Extension Service: Raleigh, NC, 1993).

Johnson, F. R., "Economic Costs of Misinforming about Risk: The EDB Scare and the Media," *Risk Analysis* 8, no. 2 (1988), 261–270.

Marks, L. A., N. G. Kalaitzandonakes, K. Allison, and L. Zakharova, "Time Series Analysis of Risk Frames in Media Communication of Agrobiotechnology," in: Paper Presented at the Fourth International Conference of the Economics of Agricultural Biotechnology, Ravello, Italy, August 24–28, 2000 (2000a).

Marks, L., S. Mooney, and N. Kalaitzandonakes, "Quantifying Scientific Risk Communications of Agrobiotechnology," in: Paper

Presented at the Fourth International Conference of the Economics of Agricultural Biotechnology, Ravello, Italy, August 24–28, 2000 (2000b).

Mullainathan, S., and A. Shleifer, *Media Bias*. Harvard Institute Research working paper no. 1981; MIT Department of Economics working paper no. 02-33 (2002).

McGuire, S., "Blair vs. The Press," *Newsweek* (May 21, 2001), pp. 18–22.

Negin, E., "The Alar "Scare" Was for Real: And So Is That 'Veggie Hate-Crime' Movement," *Columbia Journal of Review* 35, no. 3 (1996), 13–15.

North, R., "Scared to Death: The Anatomy of the Food Scare Phenomenon," in Paper Presented at the Symposium "Gezond Voedsel: Genese en Dynamiek van een Crisis," Katholieke Universiteit Leuven, March 31, 2000 (2000).

Pearson. Available at http://www.pearson.com.

Stiglitz, J. E., *Information and Economic Analysis* (Oxford University Press: Oxford, 1993).

Swinnen, J., and N. Francken, "Food Crises and the Political Economy of the Media," PRG working paper (2002). Also available at http://www.econ.kuleuven.ac.be/prg.

Swinnen, J., and J. McCluskey, "The Rationally Ignorant Consumer, Negative News, and Other Theories of the Information Market," PRG working paper (2003).

Van Dooren, P., "Report of workshop on Greenpeace and the Agricultural Industry," *Ethical Perspectives* 7, no. 2–3 (2000), 172.

Verbeke, W., and R. W. Ward, "A Fresh Meat Almost Ideal Demand System Incorporating Negative TV Press and Advertising Impact," *Agricultural Economics* 25 (2001), 359–374.

Verbeke, W., R. W. Ward, and J. Viaene, "Probit Analysis of Fresh Meat Consumption in Belgium: Exploring BSE and Television Communication Impact," *Agribusiness* 16 (2000), 215–234.