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Investor reactions to food safety incidents: Evidence from the Chinese milk industry[2]

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ABSTRACT

Using a natural experiment in the Chinese milk industry as background, this paper investigates the reactions of individual and institutional investors to food safety incidents. By classifying firms as either honest or dishonest, we find that: First, honest firms significantly outperform dishonest ones and receive more investment flow. Second, individual investors react to incidents more negatively and intensely, especially toward dishonest firms, compared with institutional investors. This study offers important policy implications: First, our findings directly suggest that the government should enact appropriate policies to strengthen food safety and protect consumers' health. Second, the government should implement efficient mechanisms to strengthen firms' incentives to participate in social responsibility activities. Third, having institutional investors as corporate monitors is not a sufficient substitute for legal penalties.

Introduction

Darby and Karni (1973) labeled products whose quality cannot be verified by consumers even after consumption as credence goods, among which are organic foods, safety products, and medical supplements. Given the asymmetrical information between consumers and firms for credence goods, consumers often turn to product labels and brands to justify quality information before making a purchase (McCluskey and Loureiro, 2005; Caswell and Mojduszka, 1996). The degree of such dependence is directly associated with consumer trust (e.g., Roe and Sheldon, 2007). Nevertheless, when consumers experience difficulty in detecting product quality, firms are tempted to take hidden action to push for greater profit margins by lowering the quality of their products (Emons, 1997). Although third-party agencies (e.g., governments, regulators, and product reviewers) can step into firms' hidden actions (McCluskey, 2000), constant monitoring of product quality is prohibitively costly (Starbird, 2005) and hence not incorporated in many industries.

Based on the above-described argument, the following question naturally arises: Can firms refrain from acting dishonestly and follow ethical practices in lieu of corporate monitoring? The answer to this is disappointing as both the literature and anecdotal observations suggest that industries rarely monitor themselves for dishonest practices (Patterson, 1992; Emons, 2001). Hence, knowing whether a firm will be rewarded financially when proven honest by an investor is important. If such is the case, another question emerges: How do investors react to the issue? Using high-frequency data and a standard method in the market microstructure literature (Lee and Ready, 1991), we categorize traders as small (individual investors) or large (institutional investors). There are several reasons to suspect that small traders are more likely to display irrational behaviors compared with large traders. In particular, large traders are usually professional investors and investment advisors who are likely to have greater financial education, more experience, and more time to make investment decisions (Shanthikumar, 2004).

Using the 2008 melamine contamination incident in China as a natural experiment, we find that firms behaving honestly are rewarded in the financial market after their honesty has been verified. More specifically, within this confirmation period after an incident, the reward, measured as cumulative abnormal returns (CARs) in stock prices, increases. Furthermore, we find that different investors react differently. Individual investors react to the

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incident more intensely and negatively than institutional investors, especially toward dishonest firms.

Our paper extends the literature on investor responses to food safety incidents by studying the change in listed firms' market values. Consumers symbolize their feelings of security about a firm's production (Rousseau et al., 1998), and other research has shown that consumer recognition is essential to the activities of a firm (e.g., Schurr and Ozanne, 1985; Selnes, 1998; Singh and Sirdeshmukh, 2000). However, how consumers (also as investors) react to food safety incidents in the stock market and how their reaction affects firm values remain largely unexplored. In this paper, we present direct evidence on this issue in terms of firm values and financial market responses with a natural experiment in China.

Our paper also contributes to the literature on the relationship between marketing operations and firm values by identifying how investors respond to marketing operations over time. These have been identified as important issues on the research agenda for marketing operations and firm values (Srinivasan and Hanssens, 2009).

Empirical procedure

In this section, we introduce the industry background of the natural experiment and the empirical procedure for testing our hypotheses.

Industry background

Dairy consumption is gradually becoming important to Chinese consumers. The dairy industry had experienced rapid growth from 1998 to 2007, with the annual growth rate exceeding 20% (ACNielsen, 2009). For liquid milk, the market is dominated by domestic brands, and the top five brands have a market share of 90% (ACNielsen, 2009). For powdered milk, domestic brands compete closely with international brands, with the top five international brands gaining a market share of approximately 40%.

Melamine has been used as an adulterant to boost the nitrogen content of diluted or poor-quality raw milk (melamine is ~66% nitrogen) because many quality tests rely on the amount of nitrogen detected to infer the amount of protein, which is the most important composition of raw milk. The chemical was also used in pet foods exported to the United States and Canada that caused the death of more than 4000 dogs and cats as well as resulted in a significant number of product recalls (Weise and Schmit, 2007).

This contamination incident revealed that melamine can also be lethal to infants; it was confirmed as the cause of death of 6 infants who consumed tainted formula milk and led to the hospitalization of more than 800 infants (McDonald, 2008; Xiu and Klein, 2010). Melamine is regarded as harmful to adult health if a high dose thereof is taken. The most common chronic effects caused by melamine-contaminated foods are bladder and kidney stones, which can lead to bladder cancer. As a result, the U.S. Food and Drug Administration only allows less than 2.5 ppm of melamine in adult foods and none at all in infant foods. Nevertheless, limited clinical data on exactly what dosage is safe and for how long the related symptoms will appear are currently available. Although melamine can be detected from urine and blood samples in laboratories, consumers would not be able to detect its addition to milk. These data strongly suggest that dairy products are credence goods and that consumer trust in product safety is pivotal in driving purchasing decisions.

On September 11, 2008, a melamine contamination incident broke out in China. Sanlu Corporation, one of China's largest dairy manufacturers, announced that its products had been contaminated and immediately recalled all its products from the market. Two days later, 22 brands in China (with total market shares exceeding 90% in liquid milk and 50% in powdered milk) were also found to contain melamine (Chao, 2008). Subsequently, an increasing number of reports revealed that many dairy companies already knew that their products contained melamine long before the incident was publicized, and this discovery further angered consumers and regulators alike. Through rapid and extensive media coverage, the incident soon became a catastrophe that plagued the entire dairy industry.

For example, on June 30, 2008, Sanlu Corporation received consumer complaints that children from Hebei Province had developed kidney stones after being fed with their infant formula milk. On July 16, 2008, 16 children from Gansu Province fed with the same product were diagnosed with kidney stones. On July 24, 2008, Sanlu Corporation sent samples of its milk powder to the Hebei Province Inspection and Quarantine Center for examination. On August 01, 2008, the reports showed that most of the samples contained melamine. On September 12, 2008, the General Administration of Quality Supervision, Inspection, and Quarantine of China issued a command to examine the quality of milk powder throughout the nation. On September 13, 2008, 19 people were arrested in relation to this incident, and Baidu, China's top search engine, denied ever agreeing to bury negative news about Sanlu Corporation. On September 15, 2008, the Ministry of Health claimed that there were 1353 sick babies. On September 19, 2008, melamine was found in ordinary milk from three well-known dairies in China. On September 21, 2008, Chinese Premier Wen-Jiabao visited sick infants, and the Ministry of Health claimed that the number of ill babies who were receiving medical care already reached 12,892, of whom 104 were severely ill.

In the month following the incident, total sales went down by 20% in powdered milk and by 19% in liquid milk (ACNielsen, 2009). It took more than 1 year for sales to return to pre-incident levels. The incident also led to the bankruptcy of Sanlu Corporation, with its CEO being sentenced to life imprisonment and charged a fine of 24.68 million RMB (around 3.6 million USD). Therefore, the magnitude of the impact of the 2008 melamine incident on the industry exceeds that of the 1997 strawberry incident (Calvin et al., 2004) and the spinach incident (Calvin, 2007) in the United States.

Data

This paper uses the stock market trading data obtained from the RESSET Database. We mainly focus on the four dairy firms that are publicly traded on China's stock market (these are the only four publicly-traded dairy companies on China's stock market; one dairy company is publicly listed in Hong Kong's stock market). When computing the market return, we use all listed stocks (around 1, 600 firms).

Table 1 lists the four firms under study. Two of the firms, Yili Industrial and Bright Dairy, with the joint market share exceeding 35% on the liquid milk market, were found dishonest. Respectively, 9.4% and 6.8% of the sampled liquid milk products were found to contain high volumes of melamine by the Ministry of Health of the People Republic of China (MHPRC). The firm of Sanyuan Foods was proven honest by MHPRC as all its sampled products were melamine free. Before the incident Sanyuan Foods only had a less than 5% market share on the liquid-milk market. Huazi Industry, a wholesaler of raw milk, was also found not to be connected with any melamine-contaminated products.[3]

[3] Removing Huazi Industry from analysis does not qualitatively change any of the results. Details are available upon request.