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Stock market reactions to unfavorable product information: A case study of comments on beef safety made on an Oprah Winfrey Show

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ABSTRACT

This study examines the impact of unfavorable media coverage on the stock market prices of major food companies, an issue of increasing importance to the food industry. The study focuses on the 16 April 1996 *Oprah Winfrey Show,* a popular television program that raised questions about the safety of the U.S. beef supply. The show resulted in considerable controversy, and some cattle feeders blamed the show for a drop in cattle prices. The focus of this study is on the impact of the program at other stages of the food system. We examined the stock returns of two major beef packers and leading fast-food hamburger restaurants during the days immediately following the show. Standard event study methods were used to determine the normal behavior of stock returns and to identify abnormal stock returns that could be attributed to the program. Our results suggest that the program did have a negative and statistically significant impact on the stock returns of a portfolio of fast-food companies. One of the two beef packers also experienced adverse stock price reactions to the television program. The paper concludes with recommendations and avenues for further research.

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INTRODUCTION

An important issue facing the food industry is the impact of major media sources on consumer perceptions of the safety and health attributes of food products. One highly publicized incident occurred on the 16 April 1996 *Oprah Winfrey Show*. This program featured a discussion on consumer safety. One of the three segments of this discussion focused on "mad cow disease" and the extent to which it poses a threat to the American consumer. Statements made by Winfrey's guests questioned the safety of including animal byproducts as ingredients in feed rations and raised concern that mad cow disease poses a potential danger in the United States. At one point in the program, Winfrey stated, "It has just stopped me cold from eating another burger," (Hayenga, 1998). Some cattlemen's organizations were not happy with Winfrey's show and blamed it for a substantial drop in the cash price for fed cattle that occurred during the following weeks. Furthermore, two large Texas cattle feeders and other businesses filed charges under product defamation laws, alleging that the show made false statements that led to lower prices.

Hayenga (1998) provided an outline of the economic issues and analysis that were presented during the lawsuit. One economist who testified at the trial developed a model to analyze Texas cattle price behavior. He used a regression method to estimate a cattle price model for the Texas-Oklahoma market area. This model accounted for supply-and-demand factors that could potentially influence price during the specified period surrounding the program. On the basis of the estimated model, the economist concluded that beef prices were influenced by forces outside of the typical supply-and-demand factors. This implied that the price drop could have been caused by Winfrey's show, but he never directly stated this. Other economists argued that there are many factors influencing price behavior at a given point in time and that it is almost impossible to trace the given price drop to a specific event, for example, Winfrey's show. This case was closed with the decision that there was not enough evidence to connect the *Oprah Winfrey Show* to the drop in cash cattle prices.

In this paper, our major objective was to provide

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Meet the Student-Author

I am a graduate with honors of the American Farm School, Thessaliniki, Greece. I received my Associate Degree in Agricultural Business from the Dimitris Perrotis College of Agricultural Studies (DPCAS), also in Greece. As an outstanding graduate of DPCAS, I was sponsored for continuing my studies here at the University of Arkansas. I graduated in May 2000 with a degree in agricultural business, with a concentration in agricultural economics. I have been recognized on the Dean's List at all institutions I have attended. In addition, I am a co-recipient of the Sigma Alpha (professional agricultural sorority) Silver Award for maintaining at least a 3.25 grade point average. After my graduation, I plan to further my education at the University of Arkansas, pursing a master's degree in statistics. My plan is to work as a research specialist.

When I first heard about this research project from my advisor, Dr. Michael Thomsen, I got very interested in it and decided to work with him. My research gave me an opportunity to apply my knowledge I have gained from most of my undergraduate courses, especially agricultural statistics, econometrics, and agricultural finance. In addition, I had a chance to become familiar with scientific research, which I think will better prepare me for the future.

more insight into how major media forces affect the food and agriculture industry. Specifically, we used daily stock market data to examine the impact of a demand-shaping force, i.e., a television program, on stock price returns of beef packers and retailers. We looked at major beef packers (IBP and ConAgra) and some of the leading fast-food hamburger restaurants that are publicly traded in the United States. Our analysis was aimed at determining whether abnormal stock returns resulted from the 16 April television program. Our models were based on the standard event study methodology. This methodology uses past company behavior to develop forecasts of stock returns during the days surrounding an event of interest. The method enabled us to determine whether abnormal stock returns resulted from the television program.

Event study methods have been used extensively in finance literature and are widely used as an accurate indicator of stock market behavior. Binder (1998) provides a complete literature review of event study methods. These methods have been used to examine the impact of unfavorable product information, such as the impact of the 1982 Tylenol poisoning incident (Mitchell, 1989) and bank failures (Aharony and Swary, 1996). They have also been used to examine the effects of policy or regulations on affected companies (Lamdin, 1999, Edelman and Baker, 1996).

MATERIALS AND METHODS

Daily stock market prices were obtained by the Center of Research in Securities Prices (CRSP) at the University of Chicago. These data reflect all securities traded on the New York Stock Exchange, the American Exchange, and the NASDAQ. This allowed us to obtain the necessary information on the two major publicly traded beef packers, IBP and ConAgra, and the parent companies of five leading hamburger restaurants, McDonald's, Wendy's, Sonic, Foodmaker, and CKE enterprises. Foodmaker owns the Jack-in-the-Box chain, and CKE enterprises own Hardee's and Carl's Jr. chains. One major restaurant, Burger King, was not included in the analysis because it is a subsidiary of a large, foreign conglomerate for which we do not have data in the CRSP files. In total, the five fast-food companies studied account for at least 60% of the fast-food hamburger market (Horovitz, 1999).

The event study methods we used have been outlined by Campbell, Lo, and MacKinlay (1997). We first looked at the behavior of the stock prices during the estimation period, a period of time before the television program. The estimation period reflects a period of time not affected by the event in question and is used to estimate a model of normal stock performance. We then used our estimated model to forecast stock returns for the period surrounding the time the event took place; we defined this period as the event period. Finally, we compared the projected or normal stock returns during the event period with the stock returns that were actually observed. The difference between these normal and observed returns is defined as abnormal returns due to the event. We then conducted hypothesis tests to determine whether the estimated abnormal returns were statistically significant.

The actual return on a specific day is given by the following formula:

$$R_t = \frac{p_t}{p_{t-1}} - 1 \qquad \text{[Eq. 1]}$$

where R_t is the stock return on day t and p_t is the stock price on day t. The returns measure provided in the CRSP data files also incorporates dividends or cash adjustments that may have an impact on stock prices.

The market model that was used to estimate normal performance was estimated over the estimation period. This model is specified as follows.

$$R_t = \alpha + \beta R_{mt} + \varepsilon_t \qquad \text{[Eq. 2]}$$

where α and β are parameters to be estimated, R_{mt} is the return on market index, and ε_t is an error term. In this study, we used the CRSP value weighted return for the measure of R_{mt}. The value-weighted return reflects the performance of a weighted average portfolio of all stocks traded on the three major U.S. exchanges. The total value of shares outstanding is used as the weights. The results presented in the next section would not be substantially different if other common market indexes, such as the return on Standard & Poor's 500 composite index, were used in place of the CRSP value weighted return measure. We used t to index the trading days and defined day $t = 0$ as 16 April 1996, the day of the television program. The market model in equation 2 was estimated over days $t = -125$ to $t = -5$. This was our estimation period.

The next step was to calculate abnormal returns during the event period. The event period consisted of 26 days from $t = -5$ to $t = 20$. Abnormal returns at each day in the event period were calculated as follows.

$$AR_t = R_t - a - bR_{mt} \quad \text{[Eq. 3]}$$

where a and b are the ordinary least squares estimates of α and β.

Cumulative abnormal returns were calculated by:

$$CAR_{(\tau_1,\tau_2)} = k' \bullet AR \quad \text{[Eq. 4]}$$

where AR is a 1 x 26 vector of the AR_t as calculated in equation 3; $\tau_1,\tau_2 = [-5,20]$ where $\tau_1 \leq \tau_2$. We defined k' as a 26 x 1 vector with the value of 1 in positions between and inclusive of τ_1,τ_2 and a value of 0 elsewhere. The prime symbol is the transpose operator. Equivalently, [Eq. 4] can be expressed as follows:

$$CAR_{(\tau_1,\tau_2)} = \sum_{t=\tau_1}^{\tau_2} AR_t$$

The variance of AR_t is calculated as follows:

$$s^2_{(\tau_1,\tau_2)} = k'Vk \quad \text{[Eq. 5]}$$

where V is the 26 x 26 forecast variance matrix based on the estimated models specified in [Eq. 2].

We conducted the following hypothesis test:

$$H_O: CAR_{(\tau_1,\tau_2)} \geq 0$$

$$H_A: CAR_{(\tau_1,\tau_2)} < 0$$

This is a one-tailed test. The alternative hypothesis is that the Winfrey show would have only a negative impact on stock returns.

RESULTS

The regression result are reported in Table 1. As shown, the R^2 value is not high, especially in the model for IBP. However, this not atypical for event studies. The F statistics, $F_{(2, 118)}$, are used to test the null hypothesis that $R^2 = 0$, i.e., no variance was explained by the model. The F statistics are large enough to indicate significance in all three models. However, the test for the IBP model is marginally significant at the 10% level. Both ConAgra's and IBP's slope terms are less than 1, indicating that these companies did not perform as well as the market portfolio. On the other hand, the slope coefficient for the fast food portfolio indicates that these companies were doing somewhat better than average in the market. The t statistics for the slope coefficients indicated significance at the 1% level, with the exception of IBP, which was marginally significant at the 10% level. We rejected the null hypothesis H_O: $\beta = 0$, in favor of the alternative, H_A: $\beta \neq 0$. All intercepts reported in this table are very close to zero. This is expected because if the market average approaches zero, the firm's returns should also be close to zero.

Looking at the cumulative abnormal returns tables, ConAgra was obviously affected more drastically (Table 2). The market responded instantaneously to the new information provided by Winfrey's program on the day of the show and for about a month of trading afterwards. The t statistics indicated that cumulative abnormal returns were significantly negative, mostly at the 5% level during days immediately following Winfrey's show and were significant at the 10% level on the later days. This provides enough evidence that ConAgra was strongly affected by Winfrey's show. On the contrary, this was not true for IBP, for which there was not sufficient evidence provided by our model to indicate an effect of Winfrey's show on stock returns. According to the t statistics, we failed to reject the null hypothesis that cumulative abnormal returns were greater than or equal to zero. There were only two exceptions to this; however, these reflect aggregations before Winfrey's show and thus are unlikely to have been caused by the program.

The value weighted fast-food portfolio (VWFFP) included McDonald's, Wendy's, Sonic, Jack-in-the-Box, Hardee's, and Carl's Jr. From these, Jack-in-the-Box, Hardee's, and Carl's Jr. are subsidiaries of a larger parent corporation. This is important because even if Winfrey's show had affected the Jack-in-the-Box chain, for example, it would not necessarily have had a drastic impact on

Table 1. Regression results from the estimation period.[z]

	ConAgra	IBP	Fast-food portfolio
Intercept	–0.0001	–0.0010	0.0002
	(–0.15)	(–0.43)	(0.17)
Market Return	0.7905	0.6363	1.1436
(slope)	(5.59)	(1.81)	(5.89)
R^2	0.2082	0.0268	0.2255
F test statistic	31.29	3.28	34.66
N	120	120	120

[z] t-test statistics for the parameter estimates are in parentheses.

Table 2. Cumulative abnormal returns for ConAgra.[z]

Ending period (τ_2)	Beginning period (τ_1)			
	–5	–3	–1	0
–5	0.01307	–	–	–
	(1.26854)			
–4	0.01573	–	–	–
	(1.06678)			
–3	0.00779	–0.00794	–	–
	(0.42810)	(–0.76868)		
–2	0.00769	–0.00804	–	–
	(0.36777)	(–0.54947)		
–1	0.00149	–0.01424	–0.00621	–
	(0.06346)	(–0.79024)	(–0.59976)	
0	–0.02679	–0.04251	–0.03448	–0.02827
	(–1.04076)	(–2.03168) c	(–2.34353) c	(–2.74079) c
1	–0.03867	–0.0544	–0.04636	–0.04015
	(–1.38491) b	(–2.32218) c	(–2.57523) c	(–2.74568) c
2	–0.02314	–0.03887	–0.03083	–0.02462
	(–0.77251)	(–1.50730) b	(–1.47554) b	(–1.36906) b
3	–0.02802	–0.04375	–0.03571	–0.02951
	(–0.87865)	(–1.56432) b	(–1.52244) b	(–1.41475) b
4	–0.02628	–0.04201	–0.03397	–0.02777
	(–0.77869)	(–1.39761) b	(–1.31460) b	(–1.18466)
5	–0.04645	–0.06218	–0.05414	–0.04793
	(–1.30643) b	(–1.93951) c	(–1.92827) c	(–1.85657) c
10	–0.08384	–0.09957	–0.09154	–0.08533
	(–1.91894) c	(–2.44590) c	(–2.44612) c	(–2.39551) c
15	–0.06182	–0.07754	–0.06951	–0.0633
	(–1.21373)	(–1.61251) b	(–1.53915) b	(–1.45000) b
20	–0.07179	–0.08752	–0.07949	–0.07328
	(–1.24327)	(–1.58373) b	(–1.51252) b	(–1.43449) b

[z] Student's *t* statistics are in parenthesis.

b indicates significance at the 10% level (one-tailed test).

c indicates significance at the 5% level (one-tailed test).

Table 3. Cumulative abnormal returns for IBP.[z]

Ending period (τ_2)	Beginning period (τ_1)			
	–5	–3	–1	0
–5	–0.01813	–	–	–
	(–0.70792)			
–4	–0.03536	–	–	–
	(–0.96429)			
–3	–0.04137	–0.00602	–	–
	(–0.91475)	(–0.23418)		
–2	–0.01946	0.01589	–	–
	(–0.37414)	(0.43704)		
–1	–0.05402	–0.01866	–0.03455	–
	(–0.92779)	(–0.41633)	(–1.34268) b	
0	–0.06665	–0.0313	–0.04719	–0.01264
	(–1.04139)	(–0.60142)	(–1.28985) b	(–0.49262)
1	–0.07328	–0.03793	–0.05382	–0.01927
	(–1.05543)	(–0.65109)	(–1.20222)	(–0.52980)
2	–0.04853	–0.01317	–0.02907	0.00549
	(–0.65149)	(–0.20542)	(–0.55938)	(0.12269)
3	–0.04904	–0.01369	–0.02958	0.00497
	(–0.61840)	(–0.19681)	(–0.50710)	(0.09586)
4	–0.03096	0.0044	–0.0115	0.02306
	(–0.36884)	(0.05882)	(–0.17889)	(0.39556)
5	0.00706	0.04242	0.02652	0.06108
	(0.07986)	(0.53205)	(0.37984)	(0.95123)
10	0.05592	0.09128	0.07538	0.10994
	(0.51468)	(0.90162)	(0.81006)	(1.24108)
15	0.02557	0.06093	0.04503	0.07958
	(0.20188)	(0.50945)	(0.40097)	(0.73306)
20	0.06017	0.09552	0.07963	0.11418
	(0.41899)	(0.69507)	(0.60931)	(0.89882)

[z] Student's *t* statistics are in parenthesis.

[y] *b* indicates significance at the 10% level (one-tailed test).

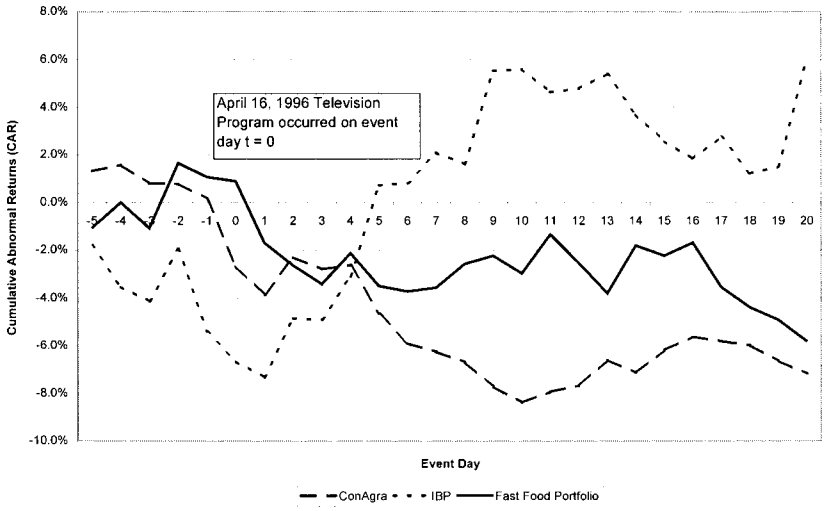

Fig. 1. Cumulative abnormal returns by event day.

Table 4. Cumulative abnormal returns for fast-food portfolio.[z]

Ending period (τ_2)	Beginning period (τ_1)			
	–5	–3	–1	0
–5	–0.01072 (–0.75689)	–	–	–
–4	–0.00007 (–0.00330)	–	–	–
–3	–0.01077 (–0.43096)	–0.01071 (–0.75388)	–	–
–2	0.01642 (0.57124)	0.01649 (0.82033)	–	–
–1	0.01062 (0.32999)	0.01069 (0.43134)	–0.0058 (–0.40806)	–
0	0.00883 (0.24968)	0.0089 (0.30941)	–0.00759 (–0.37536)	–0.00179 (–0.12598)
1	–0.01691 (–0.44046)	–0.01684 (–0.52293)	–0.03333 (–1.34683) b	(–1.36919) b
2	–0.02643 (–0.64181)	–0.02636 (–0.74364)	–0.04285 (–1.49186) b	(–1.49832) b
3	–0.03414 (–0.77879)	–0.03407 (–0.88632)	–0.05057 (–1.56810) b	(–1.56122) b
4	–0.02133 (–0.45979)	–0.02127 (–0.51466)	–0.03776 (–1.06281)	–0.03195 (–0.99167)
5	–0.03498 (–0.71577)	–0.03492 (–0.79231)	–0.05141 (–1.33190) b	–0.0456 (–1.28487)
10	–0.02977 (–0.49558)	–0.0297 (–0.53070)	–0.04619 (–0.89793)	–0.04039 (–0.82476)
15	–0.0224 (–0.32001)	–0.02234 (–0.33790)	–0.03883 (–0.62547)	–0.03302 (–0.55029)
20	–0.05811 (–0.73208)	–0.05805 (–0.76409)	–0.07454 (–1.03180)	–0.06873 (–0.97879)

[z] Student's *t* statistics are in parenthesis.

b indicates significance at the 10% level (one-tailed test).

the stock return of Foodmaker, the parent enterprise that owns the chain. Because of space limitations, specific results are not reported by company. However, among the rest of these six fast-food restaurants, McDonald's stock returns were most adversely affected by the show. It should be mentioned here that McDonald's represents about 43% of the fast-food restaurant market (Horovitz, 1999).

A graphical representation of cumulative abnormal returns by event day are presented in Fig. 1. This figure indicates that for VWFFP and ConAgra, both of which were significantly affected by Winfrey's show, stock return prices dropped and did not recover for at least 20 trading days after the show.

DISCUSSION

As shown by the results presented, the media can drastically impact stock returns by causing a micro-crisis, in a sense, when unfavorable product information is supplied to the stock market. The stock market has the ability to adjust to any new information so fast, that often damage can be done even if the information is inaccurate.

One puzzle raised by these results is that IBP, unlike what we expected, was not significantly affected by Winfrey's show. On the contrary, the VWFFP and ConAgra were significantly affected. Focusing on the two larger beef packers, IBP and ConAgra, it is really interesting to observe that given the same information their stock behaved in a contradictory manner. There are several possibilities that could explain this phenomenon. First, the size and trading volume of each company is a major factor in the firm's responsiveness. We would expect a larger company, established in a given industry to be affected more, than a smaller more controlled company. Another indicator explaining these results may be the degree of diversification of each company. For example, a part of ConAgra's business is their feed-producing business and the television program raised concerns over feed ingredients used in cattle rations. Finally, the established communication networks of the company with its stockholders can be very important when new and adverse information enters the market. The above are only some possibilities and require further investigation.

Overall, the case studied here shows that veggie libel laws may not be very effective in ensuring producers against losses resulting from unfavorable media attention. This study raises another important implication of these laws, that negative publicity can have a spillover effect on food processors and marketers, who even if they have a valid case, may be unable to proceed with claims through the legal system. However, there are ways for the food industry to assure some protection from such exogenous forces. For example, we think the food industry should be more proactive in communicating and educating the public on emerging heath concerns, e.g., mad cow disease. Another approach can be for a company to form better partnerships with third parties, such

as governmental agencies or universities, that can provide credibility to product benefit claims.

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