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# The impact of the Food Safety and Modernization Act on firm value

Food Safety  
and  
Modernization  
Act

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## Abstract

**Purpose** – The purpose of this paper is to determine the impact of the passage and signing of P.L. 111-353, the Food Safety Modernization Act (FSMA), on the market value of agribusiness firms.

**Design/methodology/approach** – The authors conduct an event study of the shareholder value effects of FSMA. The short-window analyses estimate the three-, five-, and seven-day market responses to three key event dates: passage by the House, passage by the Senate, and the signing of FSMA by President Obama. The long-window analyses examine a time period that encompasses the three informational events, as well as the 30 months after the signing of FSMA. To control for the effects of market-wide fluctuations, the authors use two alternative models of the returns generating process to calculate abnormal returns, the Capital Asset Pricing Model (CAPM) and the Fama-French three-factor model.

**Findings** – The short-window analyses show no evidence of a significant reaction to the passage of FSMA by the House or the Senate, but evidence of a significant negative reaction to the signing of FSMA by President Obama. The long window results which span the of passage by House, passage by the Senate and signing by the President indicate a decline in the average market value of agribusiness firms on the order of – 10 percent over the period. Additionally, the authors find some evidence that this effect is not evenly spread out across different types of agribusiness firms (wholesale, grocery, and processing).

**Originality/value** – The study is the first to examine the impact of P.L.111-353 on the market value of agribusiness firms.

**Keywords** Corporate finance, Event study, Firm value, Federal law, FSMA, PL 111-353

**Paper type** Research paper

## Introduction

The Food Safety Modernization Act (FSMA or P.L. 111-353) is the largest expansion of the federal government's authority over food safety since the Food, Drug and Cosmetics Act of 1938. Passed in response to millions of reported incidents of food-borne illnesses during the 2000s, FSMA aims to ensure that the US food supply is safe by shifting the focus of federal regulators from contamination response to contamination prevention. The bill was signed by President Obama on January 4, 2011, after clearing the Senate by unanimous voice vote on December 20, 2010 and clearing the House in a 215-144 vote the following day.

There are an estimated 47.8 million cases of foodborne illness, 127,839 hospitalizations, and 3,037 deaths in the USA each year (Center for Disease Control and Prevention, 2011). Tainted food has cost the food industry billions of dollars in recalls, lost sales and legal expenses (FDA, 2015a). Among its many provisions, FSMA expanded the FDA's authority to conduct a mandatory recall of contaminated food products; required enhanced surveillance systems to investigate foodborne illness outbreaks; established new preventive controls and food safety plans at some food processing facilities and farms; required an enhanced FDA traceability capacity within the nation's food



distribution channels; increased inspection frequencies of high-risk food facilities (both domestic and foreign facilities); and expanded FDA's authority and oversight capabilities with regard to foreign companies that supply food imports to the USA. FSMA is also the first piece of legislation to address intentional adulteration and food defense.

The Congressional Budget Office estimated that the cost to the FDA of implementing FSMA regulations would be \$1.4 billion over five years. Since the FSMA was passed in the final days of the 111th Congress, responsibility for funding was left to the 112th Congress. The 2010 mid-term elections shifted power in the House to Republicans, resulting in several FSMA funding delays and, as a result, delays in the release of key implementation rules. Under FSMA, the FDA is responsible for more than 50 regulations, guidelines, and studies. However, FDA actions on major FSMA provisions have yet to be finalized include rules governing requirements and conditions for establishing preventative controls in food facilities, rules governing food safety standards for produce growers, and rules governing food importers. Most rules have been delayed well beyond the implementation dates specified in FSMA. Many regulations were to have been proposed or, in some cases, finalized within one to two years of FSMA enactment (roughly January 2012-2013). Other rules were to have been submitted within 18 months of enactment (roughly mid-2012). These deadlines were generally not met. However, between August 2015 and May 2016 several key sections of FSMA will be published in the Code of Federal Regulations.

Melanie Neumann, executive vice president and chief financial officer of food safety consulting firm The Acheson Group, points out that the FDA's implementation rules also create high costs for US agribusiness firms due to the cost of assessing supply chain risks (Food Safety News, 2015). These costs arise from documentation rules that require traceability technology and improved record keeping. The FDA estimated that under the re-proposed Produce Rule, alone, 1.57 million acute illnesses would be prevented with benefits to society valued at \$930 million annually. According to FDA estimates, this would cost the domestic producer sector \$386.23 million per year and the foreign producer sector \$529.62 million per year (FDA, 2015b). Agribusiness firms will be unlikely to pass on all of these costs to customers, implying negative shareholder value effects from the passage of FSMA.

### **Hypothesis development**

McEntire (2013) argues that the five largest impacts of FSMA on the agribusiness supply chain are: traceability requirements, sanitary transportation costs, records access costs, Foreign Supplier Verification Program and Voluntary Qualified Importer Program documentation, and produce safety/ preventative controls. Table I provides a summary of these five costs. Categories 1, 3, and 5 require substantial increases in record keeping, traceability, verifiability, and transparency. Category 2 requires enhanced safety and control in the shipping wholesale portion of the supply chain. Category 4 requires greater accountability and record keeping for importers.

Our sample of agribusiness firms includes processors, wholesalers and shippers, and grocery chains. The factors in Table I are likely to increase supply chain costs for all firms, but the costs are likely to vary across the sectors of the industry. For example, the wholesalers and shippers in our sample are likely to bear greater sanitary transportation costs (i.e. Category 2 costs) because so much of their economic activity involves distribution and transportation. Similarly, food processors are likely to be the hardest hit by records access requirements (i.e. Category 3 costs), as they now need to keep improved records relating to manufacturing processing and packaging.

Actions implemented under FSMA	Proposed rule date	Supply chain impacts
(1) Traceability	March 4, 2013 – final report issued	(A) develop and demonstrate methods for rapid and effective tracking and tracing of foods in a manner that is practicable for facilities of varying sizes, including small businesses; (B) develop and demonstrate appropriate technologies, including technologies existing on the date of enactment of this Act, that enhance the tracking and tracing of food; and (C) inform the promulgation of regulations under subsection (d)
(2) Sanitary transportation	January 31, 2014 – proposed rule issued	Requires shippers, carriers by motor vehicle or rail vehicle, receivers, and other persons engaged in the transportation of food to use sanitary transportation practices (1) prescribe such practices as the Secretary determines to be appropriate relating to: (A) sanitation; (B) packaging, isolation, and other protective measures; (C) limitations on the use of vehicles; (D) information to be disclosed: (i) to a carrier by a person arranging for the transport of food; and (ii) to a manufacturer or other person that: (I) arranges for the transportation of food by a carrier; or (II) furnishes a tank vehicle or bulk vehicle for the transportation of food
(3) Records access	April 3, 2014 – final report issued	Greater access to records Records relating to manufacturing, processing, packing, receipt, holding or importation Access to facility food safety plans and related records documenting implementation of their plans Authority exists now
(4a) Foreign supplier verification program	September 2014 – proposed supplemental rule	Importers have increased responsibility for product safety Must verify that foreign suppliers use preventive controls Food is not adulterated Importer may conduct site inspections, inspect records, test products
(4b) Voluntary Qualified Importer Program	June 2015 – draft guidance	Provide importers who are “doing things right” to have an expedited entry process Specific requirements for participation will be outlined in a FDA guidance document Importers will need to apply to the program and pay a fee Importers can use third party auditors to verify the facilities are producing food are in compliance with US laws and regulations
(5) Produce safety/preventative controls	January 12, 2015 – draft guidance	PC Supplier Verification PC Product testing

**Table I.**  
The top five impacts of FSMA rules on the agribusiness supply chain

While the five factors in Table I are likely to lead to increased costs for firms in the agribusiness industry, there will also be benefits in the form of a decrease in the likelihood of food recalls and lawsuits associated with defective or dangerous food products, as well as a possible increase in reputation and credence. Thomsen and McKenzie (2001) and Salin and Hooker (2001) show that food recalls significantly reduce firm value for firms that experience recalls. Thus it is reasonable to conclude that a reduced likelihood of food recalls and lawsuits as a result of implementing the provisions of the FSMA will be associated with an increase firm value. These effects are more likely to be beneficial for the food processing firms, compared to other agribusiness firms, because they bear the direct costs of such actions. Finally, the stricter rules under FSMA may provide consumers with an enhanced view of the quality of processed foods and the legitimacy of processors' health and cleanliness claims. This increase in reputation and credence may allow processors to charge higher prices and may result in increased sales in response to existing food marketing programs. A priori, we do not know whether the net effect on agribusiness firms of these various costs and benefits is negative or positive. Thus, stated in null form, our hypothesis is:

*H1.* The passage of the FSMA is unassociated with changes in the market value of agribusiness firms.

**Research design**

We use event study methodology to assess the impact of the FSMA on the market value of agribusiness firms. Schwert (1981) argues that the abnormal stock price reaction to an unanticipated change in regulation is an unbiased estimate of the regulation's impact on shareholder value. In our setting, the market will react to legislative events either when new information about the legislation's impact on shareholder value becomes available or there is a revision in the prior probability of the legislation's implementation. The nature of the legislative process makes it difficult to pinpoint when information about a law is revealed to the market. Legislative processes usually involve public hearings, studies, and multiple legislative and administrative procedures occurring over a lengthy period (Schwert, 1981; Binder and Summer, 1985).

From a number of possible legislative events (see Table II), we select the ones that, ex ante, we believe would have been difficult for the market to anticipate; and have an

Event study status	Date	Event
	September 26, 2008	HR7143 Introduce amendment to alter the Food Safety Modernization Act to require one-up and one-down labeling
	February 24, 2009	HR875 Reintroduce amendment to Food Safety Modernization Act
	March 3, 2009	Introduction S510 into Senate and referred to committee
Event 1	June 8, 2009	HR2751 Reintroduce again
	June 9, 2009	Pass House HR2751
	November 18, 2009	Senate: report S510 by committee
Event 2	November 30, 2010	S510 passes Senate
	December 19, 2010	Pass Senate with changes, wording from S510 inserted into HR2751
	December 21, 2010	House agrees to changes in HR2751
Event 3	April 1, 2011	Signed by president HR2751 becomes public law: PL111-353

**Table II.**  
Chronological listing  
of key FSMA  
legislative events

effect that would be clear to the market before the event occurs. We exclude bill introductions because only 4-5 percent of bills introduced to the House or Senate ever become law (GovTrack.us, 2015). We exclude committee passages because the circuitous discussions and hearings that take place prior to the committee vote make it difficult to determine market expectations prior to event reaction. We also exclude the final passage by the House and the final passage by the Senate because the overwhelming voting support suggests that these events were anticipated. Thus, our focus is on the intermediate passage of the final version of the FSMA by the House and the Senate, as well as the signing by the President.

Presidential vetoes are rare, so the signing of FSMA by the President was likely anticipated. However, the level of Presidential commitment to subsequent funding of FSMA was unknown. Congressional funding of the anticipated \$1.4 billion of implementation costs to be incurred by the FDA was uncertain because the mid-term elections shifted control of the House to the Republican Party. Thus, timely implementation of FSMA depended on the willingness of the White House to prioritize FSMA funding in its work with the 112th Congress. The bill signing was accompanied by a press release by the White House that included a strong affirmation of commitment to funding (White House, 2011).

To obtain our sample of agribusiness firms, we began with a list of all Food and Beverage firms publicly traded in the USA as identified by Yahoo Finance and the CRSP database. In all, 76 firms had sufficient data for our subsequent analyses, which include short-window and long-window tests around the three event dates and the entire legislative process. Table IV provides a list of these 76 firms along with their ticker symbol and NAICS code (Table III).

Measures of the stock market reaction to legislative events may be confounded by firm specific information released during the event period such as mergers, earnings announcements, and dividend announcements. Therefore, we searched the *Wall Street Journal* and the *New York Times* for confounding events, as well as information leakage about our legislative events. This examination revealed that during the entire time that the bill was considered, there were ongoing discussion of the implications and possibility of passage of a Food Safety Act. However we were not able to discern specific confounding information releases around our three events.

We test our hypothesis by examining the overall industry market reaction to each of the three informational events over both short daily event windows and longer monthly event windows which include all three events. To control for the effects of market-wide fluctuations, two different models of risk adjustment were used, the Capital Asset Pricing Model (CAPM) and the Fama-French three-factor model (FF3). The CAPM model is the oldest and most widely used model in the event study literature (Brown and Warner, 1985). The FF3 model is more recent and incorporates the fact that the stock returns of individual firms are explained by firm size and market to book factors, as well as the overall market return (Fama and French, 1996; Gaunt, 2004).

The CAPM estimation of expected returns is:

$$R_{it} = \alpha_i + \beta_i R_{mt} + e_{it} \quad (1)$$

where  $R_{it}$  the return for the  $i$ th agribusiness firm on day  $t$ ;  $\alpha_i$  the intercept for the  $i$ th agribusiness firm;  $\beta_i$  the slope coefficient for the  $i$ th agribusiness firm;  $R_{mt}$  the return on an equal-weighted market portfolio on day  $t$ ; and  $e_{it}$  the error term with mean 0.

Firm name	Event 1	Event 2	Event 3	Long window	NAICS	Ticker
99 Cents Only Stores	X	X	X	X	4,529	NDN
AMCON Distributing Co.	X	X	X	X	4,244	DIT
Archer Daniels Midland Co.	X	X	X	X	3,118	ADM
B & G Foods Inc. New A	X	X	X	X	3,114	BGS
Bob Evans Farms Inc.	X	X	X	X	3,116	BOBE
Boston Beer Inc. A	X	X	X	X	3,121	SAM
Bridgford Foods Corp.	X	X	X	X	3,116	BRID
Brown Forman Corp. A	X	X	X	X	3,121	BF
Cagles Inc. A	X	X	X	X	3,116	CGL
Cal Maine Foods Inc.	X	X	X	X	3,117	CALM
Campbell Soup Co.	X	X	X	X	3,114	CPB
Chiquita Brands Intl. Inc.	X	X	X	X	4,244	CQB
Coca Cola Bottling Co. Cons.	X	X	X	X	3,121	COKE
ConAgra Inc.	X	X	X	X	3,112	CAG
Constellation Brands Inc. A	X	X	X	X	3,121	STZ
Core Mark Holding Co. Inc.	X	X	X	X	4,244	CORE
Corn Products International	X	X	X	X	3,112	CPO
Dean Foods Co. New	X	X	X	X	3,115	DF
Del Monte Foods Co.	X	X	X	X	3,114	DLM
Dole Foods Inc. New		X	X		4,244	DOLE
Dr Pepper Snapple Group Inc.	X	X	X	X	4,244	DPS
Family Dollar Stores Inc.	X	X	X	X	4,529	FDO
Farmer Brothers Co.	X	X	X	X	3,119	FARM
Flowers Foods Inc.	X	X	X	X	4,531	FLO
Fortune Brands Inc.	X	X	X	X	3,121	FO
Fresh Del Monte Produce Inc.	X	X	X	X	4,244	FDP
General Mills Inc.	X	X	X	X	3,112	GIS
Golden Enterprises Inc.	X	X	X	X	4,244	GLDC
Great Atlantic & Pac Tea Inc.	X	X			4,451	GAP
Green Mountain Coffee	X	X	X	X	3,119	GMCR
Hain Celestial Group Inc.	X	X	X	X	4,244	HAIN
Heinz H J Co.	X	X	X	X	3,119	HNZ
Hershey Co.	X	X	X	X	3,113	HSY
Hormel Foods Corp.	X	X	X	X	3,119	HRL
Ingles Markets Inc. A	X	X	X	X	4,451	IMKTA
Inventure Group Inc.	X	X	X	X	3,119	SNAK
Kellogg Co.	X	X	X	X	3,112	K
Kraft Foods Inc. A	X	X	X	X	3,119	KFT
Kroger Company	X	X	X	X	4,451	KR
Lancaster Colony Corp.	X	X	X	X	3,119	LANC
Lifeway Foods Inc.	X	X	X	X	3,119	LWAY
MGP Ingredients Inc.	X	X	X	X	3,121	MGPI
Maui Land & Pineapple Co. Inc.	X	X	X	X	3,114	MLP
McCormick & Co. Inc.	X	X	X	X	3,119	MKC
Molson Coors Brewing Co. A	X	X	X	X	3,121	TAP
Nash Finch Company	X	X	X	X	4,451	NAFC
National Beverage Corp.	X	X	X	X	3,121	POPS
Peets Coffee and Tea Inc.	X	X	X	X	3,119	PEET
Pepsico Inc.	X	X	X	X	3,121	PEP
Pilgrims Pride Corp. New		X	X	X	3,119	PPC

**Table III.**  
Descriptive data on  
76 sample firms

(continued)

Firm name	Event 1	Event 2	Event 3	Long window	NAICS	Ticker
Rocky Mountain Chocolate	X	X	X	X	4,452	RMCF
Ruddick Corp.	X	X	X	X	3,119	RDK
Safeway Inc.	X	X	X	X	4,451	SWY
Sanderson Farms Inc.	X	X	X	X	3,116	SAFM
Sanfilippo John B & Son	X	X	X	X	4,244	JBSS
Sara Lee Corp	X	X	X	X	3,116	SLE
Seaboard Corp	X	X	X	X	3,112	SEB
Seneca Foods Corp. New A	X	X	X	X	3,114	SENEA
Sensient Technologies Corp.	X	X	X	X	3,114	SXT
Smithfield Foods Inc.	X	X	X	X	3,116	SFD
Smucker J M Co.	X	X	X	X	3,114	SJM
Snyders Lance Inc.	X	X	X	X	4,244	LNCE
Spartan Stores Inc.	X	X	X	X	4,244	SPTN
SuperValu Inc.	X	X	X	X	4,451	SVU
Sysco Corp.	X	X	X	X	4,244	SYU
Tofutti Brands Inc.	X	X	X	X	3,114	TOF
Tootsie Roll Inds. Inc.	X	X	X	X	3,113	TR
Treehouse Foods Inc.	X	X	X	X	4,244	THS
Tyson Foods Inc. A	X	X	X	X	4,239	TYSN
United Natural Foods Inc.	X	X	X	X	4,451	UNI
Village Super Market Inc. A	X	X	X	X	4,451	VLGE
Wal mart Stores Inc.	X	X	X	X	45,211	SVU
Weis Markets Inc.	X	X	X	X	4,451	WMK
Whole Foods Market Inc.	X	X	X	X	4,451	WFM
Willamette Valley Vinyds Inc.	X	X	X	X	3,121	WVVI
Winn Dixie Stores Inc.	X	X	X	X	4,451	WINN
Total	74	76	75	74		

**Note:** X, denotes that return data was available for the given firm to include the firm in the event study analysis for the listed event

**Table III.**

Following the convention of previous event studies (e.g. Jarrell and Peltzman, 1985; Johnson *et al.*, 1998; Brown and Warner, 1980, 1985; Binder and Summer, 1985), an equal-weighted NYSE market index is used as a proxy for the market rate of return. The parameters  $\alpha_i$  and  $\beta_i$  were estimated using 255 trading days of daily return data. Generally speaking, in event studies, we want the parameters of the model to be estimated over a short time period before the event occurs. This involves a tradeoff. The closer the estimation period is to the event period; the less likely it is that sample firm betas have changed due to changes in leverage, management strategy, and firm investments, etc. But, estimation data from a period too close to the event period may be contaminated by abnormal returns that were caused during previous regulatory announcements or proceedings. We choose to estimate the parameters of the model using 255 days of data 46 days prior to the first event. Once the parameters  $\alpha_i$  and  $\beta_i$  were estimated for each firm, the daily prediction errors (i.e. abnormal returns) for firm  $i$  was calculated as follows:

$$AR_{it} = R_{it} - [\alpha_i + \beta_i R_{mt}] \quad (2)$$

where  $AR_{it}$  the abnormal return for firm  $i$  on day  $t$ .

We examine abnormal returns for the three-, five-, and seven-day windows that include the event day and the trading days before and after the event. Inclusion of the

trading days prior to the event controls for information leakage that may occur if some market participants are privy to discussions among policy makers prior to public announcement of policy actions. Inclusion of the trading day after the event accounts for late arrival of information to the market or adjustment to information that requires time for market participants to interpret. A window that is too large will include extraneous information. Conversely, a window that is too small will not fully capture the effects of information leakage or slow market adjustment. Since we are uncertain as to what the “best” daily event window is we choose to examine three windows of varying lengths. Cumulative abnormal returns for each window, for each firm were computed as below:

$$CAR_i = \sum_{t=-1}^{+1} AR_{it} \quad CAR_i = \sum_{t=-2}^{+2} AR_{it} \quad CAR_i = \sum_{t=-3}^{+3} AR_{it} \quad (3)$$

where  $CAR_i$  is the cumulative abnormal return for firm  $i$ ;  $AR_{it}$  the abnormal return for firm  $i$  on day  $t$ ;  $t=0$  the day of the event occurred.

To determine the average overall impact of the event on the industry, we calculate the three-day cumulative average abnormal return by summing across the  $n$  firms in the sample and dividing by  $n$  as below:

$$CAAR = \sum_{i=1}^n CAR_i/n \quad (4)$$

where CAAR is the cumulative average abnormal return for the sample; and  $CAR_i$  the three-, five-, and seven-day cumulative return for firm  $i$  around the event;  $n$  is equal to 74 for Event 1, 76 for Event 2, and 75 for Event 3.

Additionally, we provide a monthly analysis that covers all three events. A monthly analysis may prove to be useful if we have not adequately identified the days that value relevant information arrives to stock market investors. The potential difficulty associated with date choice is evidenced by a study of the Canadian stock market in which it was found that official regulatory announcements in the agribusiness sector in Canada do not move stock prices. Similar effects associated with official dates and announcements may exist in the US agribusiness sector (Schaufele and Sparling, 2011). For the long-window analysis the CAPM model was applied in a similar fashion using monthly return data, rather than daily return data, and the model was estimated using 36 months of monthly data ending 4 months before the first event.

In addition to the market rate of return, the FF3 model includes firm size (SMB) and market to book (HML) as additional risk factors. These factors are available on Fama (2016) website. The FF3 model used to predict expected returns:

$$R_{it} = \alpha_i + \beta_i R_{mt} + S_i(\text{SMB}) + H_i(\text{HML}) + e_{it} \quad (5)$$

where  $R_{it}$  is the return for the  $i$ th agribusiness firm on day  $t$ ;  $\alpha_i$  the intercept for the  $i$ th agribusiness firm;  $\beta_i$  the slope coefficient for the  $i$ th agribusiness firm with respect to the market;  $S_i$  the slope coefficient for the  $i$ th agribusiness firm with respect to small minus big;  $H_i$  the slope coefficient for the  $i$ th agribusiness firm with respect to high minus low;  $R_{mt}$  the return on an equal-weighted market portfolio on day  $t$ ; SMB the difference between the returns on portfolios of small and big stocks; HML the difference between the returns on portfolios of high- and low- book-to-market stocks;  $e_{it}$  the error term with mean 0.

Consistent with our CAPM estimations, we estimate the parameters  $\alpha_i$ ,  $\beta_i$ ,  $S_i$ ,  $H_i$  using 255 trading days of daily return data. Once the parameters  $\alpha_i$ ,  $\beta_i$ ,  $S_i$  and  $H_i$  were estimated for each firm, the daily prediction errors (i.e. abnormal returns) for firm  $i$  was calculated as follows:

$$AR_{it} = R_{it} - [\alpha_i + \beta_i R_{mt} + S_i(\text{SMB}) + H_i(\text{HML})] \quad (6)$$

where  $AR_{it}$  is the abnormal return for firm  $i$  on day  $t$ .  $CAR_t$  and  $CAAR$  were calculated in the same manner as for CAPM.

The long window effect of FSMA was estimated similar to the CAPM approach, using monthly returns and parameter estimation over the 36 months ending four months before the first event. In all, 74 firms were available for this analysis.

To examine whether each informational event had a significant average return effect on the industry, a test of the null hypothesis that the three-day, five-day, seven-day and long window cumulative average abnormal return across firms equals zero is performed using a Crude Dependence Adjustment (CDA) test. This test is the most appropriate because it adjusts for the cross-sectional dependency that exists when we examine firms that share the same event dates (Brown and Warner, 1985).

### Results

Table IV presents the cumulative average abnormal return results for the three legislative events over three-, five-, and seven-day windows for CAPM and FF3 risk adjustments. These measures may be confounded by firm specific information released during the event period. Therefore, we searched the *Wall Street Journal* and the

No. of event window in days	Legislative action	CAPM CAAR (%)	CAPM CDA (p-Value)	CAPM Pos/Neg (+/-)	Fama-French CAAR (%)	Fama-French CDA (p-value)	Fama-French Pos/Neg (+/-)	Number of firms
3	1	-0.85	-0.622 (0.688)	25/49	-0.74	-0.549 (0.2917)	23/51	74
	2	-0.06	0.087 (0.4654)	39/37	0.13	0.210 (0.4167)	41/35	76
	3	-2.28	-3.478 (0.00003)	16/59	-2.23	-3.545 (0.0002)	16/59	75
5	1	-1.38	-0.781 (0.2175)	22/52	-1.29	-0.741 (0.2294)	18/56	74
	2	-0.46	-0.548 (0.2918)	33/43	-0.36	-0.457 (0.3239)	35/41	76
	3	-3.13	-3.705 (0.0001)	12/63	-3.15	-3.881 (0.0001)	12/63	75
7	1	-1.74	-0.830 (0.2032)	17/57	-1.95	-0.773 (0.2199)	18/56	74
	2	-0.45	-0.449 (0.3267)	31/45	-0.53	-0.563 (0.2869)	30/46	76
	3	-3.37	-3.370 (0.0004)	11/64	-3.37	-3.509 (0.0002)	11/64	75

**Notes:** Dates December 19, 2010, Pass Senate with changes and December 21, 2010. House agrees to changes were also examined. Similar to the results for passage in the Senate and House the results were insignificant at the 10 percent level across all three windows and for both estimation methods. Although we have some concerns about small sample size in cross-section regression. We ran two regressions to capture the industry type on CARR against the null that no type (wholesale, grocery) is differentially affected by the legislative events relative to food processing firms. Using three-day CARs from the CAPM approach the regressions results are  $CAR_i = -0.02158 + 0.006613(\text{wholesale}) - 0.02041(\text{grocery})$ .  $R^2 = 0.064555$  and  $CAR_i = -0.02033 - 0.02041(\text{Grocery})$ ;  $R^2 = 0.057694$ . These regressions show that the legislation for the three-day window appears to have had a greater impact on grocery stores (-2 percent,  $p = 5$  percent) than wholesale and other agribusinesses. These regression results are essentially similar for the three and five day windows using the CAPM method. These results seem to suggest that the legislation might not have had a neutral effect across all agribusiness firms, although further statistical and economic investigation is required

**Table IV.**  
Impact on US  
agribusiness firms  
CAPM and FF3  
(three, five, seven  
day windows)

*New York Times* for confounding events, as well as information leakage about our legislative events. This examination revealed that during the entire time that the bill was considered, there were ongoing discussion of the implications and possibility of passage of a Food Safety Act. However we were not able to discern specific confounding information releases around our three event dates. Therefore, we think that the event windows potentially reflect value relevant information due to FSMA.

Generally speaking, the results are consistent across different event windows and across the two risk adjustment models. Specifically, Events 1 and 2, passage by the House and the Senate, were found to be insignificant at the 10 percent level for all three event windows and both risk adjustment models. The results are also consistent for the third event, the signing of FSMA by President Obama. Across the three windows and the two risk models, there is a significant, negative reaction ranging from  $-2.23$  to  $-3.37$  percent. We interpret the significance of this event as market surprise over the apparent commitment by the President to the funding of FSMA. Specifically, the White House press release states, "Already we know that the legislation did not include sufficient fee resources to cover the costs of the new requirements. In that, we will look to Congress to work with us to ensure that FDA has what's needed to achieve our shared food safety and feed defense goals."

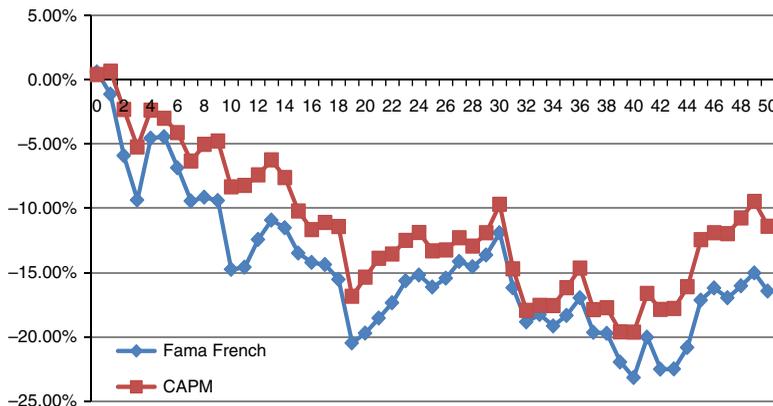
To provide evidence on the overall impact of FMSA on the market value of agribusiness firms, we look at long-window monthly returns over the 24 months beginning two months prior to Event 1, the passage by the House, and ending two months after Event 3, the signing by the President. The parameter estimation period is the 36 months ending four months before Event 1, and abnormal returns are estimated using both CAPM and FF3 risk adjustments. The results of this analysis are presented in Table V.

Results of the long-event window tests are dramatic. Returns over the 24 month period beginning two months prior to Event 1 and ending two months after Event 3 are  $-18.12$  percent ( $-24.55$  percent) using CAPM (FF3) risk adjustments. Similar results obtain when the window is shortened to the 22 month period beginning one month before Event 1 and ending one month after Event 3 and the 20 month period from Event 1 to 3. Specifically, the long window analysis provides a large negative result ranging from  $-16.19$  to  $-24.55$  percent abnormal return over the period in which we might expect information about the legislation to impact the industry. For five of the six windows, the abnormal returns are significant at the 5 percent level (the  $p$ -value for the insignificant window is 6.94 percent) From our short-window and long-window analyses, we conclude that FSMA is associated with a decline in the market value of agribusiness firms. Our results imply that the record-keeping and supply chain monitoring costs of the FSMA incurred by agribusiness firms exceeded likely benefits in the form of increased sales due to enhanced reputation and increased credence value of safer food products.

**Table V.**  
Long window tests of monthly CAARs based upon CAPM and FF3 modeling with 74 firms

Event window	CAPM CAAR (%)	CAPM CDA ( $p$ -value)	CAPM Pos/Neg	Fama-French CAAR (%)	Fama-French CDA ( $p$ -value)	Fama-French Pos/Neg (+/-)	Number of firms
(-2.21)	-18.12	-1.586 (0.0563)	28/46	-24.55	-2.337 (0.0097)	25/49	74
(-1.20)	-16.19	-1.480 (0.0694)	27/47	-18.78	-1.905 (0.0284)	25/49	74
(0.19)	-17.25	-1.655 (0.0490)	24/50	-20.39	-2.170 (0.0150)	24/50	74

As discussed in the Introduction, implementation of the FSMA was significantly delayed. If the market did not anticipate these delays, we expect a partial reversal of original market response to legislative events. To investigate this possibility, we examine the CAPM and FF3 CAARs from the month of the passage by the House to 50 months after the passage by the House (i.e. 31 months after the signing by the President). These CAARs are displayed in Figure 1. The CAPM and FF3 CAARs generally follow a similar path through time. Consistent with ongoing implementation delays and funding difficulties, we note that beginning in month 20 (i.e. the first month after the signing by the President); there is a partial reversal of the earlier negative returns. From Figure 1, the CAPM (FF3) results appear to indicate a long-term effect of approximately a 10 percent (15 percent) loss in value. However, the formal statistical tests reported in Table VI indicate that the reversal is not statistically significant, as evidenced by the insignificance of the cumulative monthly returns over any of the three windows spanning months 20-48, 20-49, and 20-50. Therefore, we have no statistically significant evidence of a reversal. The lack of significance of cumulative returns during the reversal period may be due to increased market volatility. Nonetheless, based on the CAPM estimates and the inclusion of the reversal window, we conclude that a conservative estimate of the loss to the industry from the passage of FSMA is approximately 10 percent.



**Notes:** From month 0 to 20 the CAARs are based on 74 firms. After month 20 the CAARs are based on 73 firms

**Figure 1.**  
Long-run impact of event three CAARs from month 0 to +50

Event window	CAPM CAAR (%)	CAPM CDA ( <i>p</i> -value)	CAPM Pos/Neg (+/-)	Fama-French CAAR (%)	Fama-French CDA ( <i>p</i> -value)	Fama-French Pos/Neg (+/-)	Number of firms
(20,48)	4.86	0.387 (0.3493)	44/29	4.37	0.385 (0.3501)	43/30	73
(20,49)	6.03	0.472 (0.3183)	46/27	5.28	0.459 (0.3231)	44/29	73
(20,50)	4.27	0.329 (0.3711)	45/28	3.98	-0.340 (0.3669)	45/28	73

**Notes:** All three event windows are post even. Long window tests of monthly CAARs based upon CAPM and FF3-factor modeling with 73 firms

**Table VI.**  
Testing long run event windows after the event to examine persistence

## Conclusion

The results of this paper show that the expected cost of regulating and implementing strict and safe food production practices as imposed by the FSMA reduced firm values in the agribusiness sector by about 10 percent on average. From this evidence, we conclude that the market believed that the costs of record-keeping and supply chain monitoring associated with following the FSMA's new food safety and monitoring rules exceeded likely benefits from consumer perceptions of a safer food supply and the potential reduction in food recalls and lawsuits. Additionally, the results reported in footnote 2, Table IV, provides some evidence that supply-chain costs and benefits from FMSA are not evenly distributed across different types of agribusiness firms (wholesale, grocery, and processing).

Since the full impact of the FSMA is yet to be fully realized through additional rule making and implementation, the full cost of the act to the industry is yet to be felt or fully understood. Estimating the impacts of food safety regulations on food industry's value is useful not only to agribusiness firms, but it also provides policy makers with additional information on the net cost to agribusiness firms of regulation aimed at ensuring stricter and safer food production practices. We hope to further explore the impact of the new FDA regulations in the coming year as changes have been implemented by businesses. That is, we would like to discover the average magnitude of the impact of FSMA and to see how to determine which types agribusinesses are most heavily impacted.

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### Further reading

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