The Impact of the Bio-terrorism Act on the Supply Chain and Firm Value

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Abstract

On June 12, 2002, President Bush signed into law the Public Health Security and Bioterrorism Preparedness and Response Act of 2002. The Bioterrorism Act requires domestic firms and importers to register their agribusiness facilities with the U.S. government, to notify Homeland Security prior to shipment of agricultural products, and to keep records on the origination of agricultural inputs and the destination of agricultural outputs. Thus, the Act significantly altered the U.S. regulatory climate for both U.S. and foreign food industry firms who do business in the U.S. We present evidence that the passage of the Bioterrorism Act resulted in an average 3.2% decline in the market value of equity of domestic food industry firms. Cross-sectional analysis suggests that costs are increasing in the diversity of the firms' supply chains. Contrary to the conclusions of prior research, we also find that the Bioterrorism Act does not constitute a non-tariff barrier to Canadian food firms. We base this conclusion on the fact that the negative wealth effects for U.S. firms are similar in magnitude to those previously reported for Canadian firms.

I. Introduction

The Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (hereafter, the Bioterrorism Act or the Act) was signed into federal law by President Bush on June 12, 2002. The Act requires domestic firms and importers to register their facilities with the U.S. government, to notify Homeland Security prior to shipment, and to keep records on the origination of inputs and the destination of outputs. The Act received a considerable amount of attention for several reasons. One, it represented a response by Congress and the White House to the terrorist attack of 9/11/2001. Two, the act was far-reaching and contained five titles that potentially impacted a variety of sectors in the U.S. economy[1]. Three, Title III of the Bioterrorism Act provided four provisions that were predicted to substantially alter the cost and revenue structure of food and beverage firms by increasing supply chain costs of importation, processing, handling and record keeping (O'Rourke 2003B). Consistent with higher costs for food industry firms, many food and beverage firms lobbied against the implementation of the Act (Abboud, 2003B). Some analysts viewed the provisions as appropriately balancing potential costs incurred by firms with the U.S. government's desire a safe and secure food supply (Fox 2005; India-West 2010). Finally, some have claimed that the Act sacrifices trade relations for national security concerns because it disadvantages firms outside the U.S. relative to U.S. firms (Boisen 2007).

The passage of the Bioterrorism Act raised at least two basic concerns for U.S. firms. One concern is that the act had a significant negative impact on supply chain costs. If this is

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true, it would be helpful to know just how large the effect is. A second concern seems to go in the opposite direction. It has been suggested that the Act created a non-tariff trade barrier for Canadian food firms importing in the U.S. If the Act puts Canadian firms at a cost disadvantage relative to U.S. firms, then we would expect an increase in the revenues and market values of U.S. firms in the food industry. Another possible positive effect of the Act is that added quality and safety assurance, combined with the fact that the demand for food is relatively inelastic, may allow U.S. firms to raise prices.

A better understanding the potential costs and benefits of the legislation can be provided by the examination of characteristics of two very different food industry firms, Green Mountain Coffee and Kroger Company. During the time period of our study, Green Mountain Coffee was a regional Northeast U.S. distributor of fair-trade coffee. Green Mountain is likely to experience lower compliance costs than the average firm in the industry (Coffee Distributing Corporation November 14, 2014). One, Green Mountain already had tight control over their supply chain because their strategy required the provision of assurance to customers that their suppliers were following fair trade practices. Thus, the record keeping requirements of the Act probably did not represent a significant change in their supply chain costs. Two, as a U.S. only firm, the Act may have reduced the competition that could have been provided by Canadian firms.

On the other hand, grocery stores such as Kroger Company are likely to experience negative effects from the Act. Kroger Company spans many states and has thousands of different fresh and processed grocery products that fall under the Act's provisions. Hence, the costs of expanded record keeping and possible border delays (which can cause fresh food to spoil) may imply a more expensive, riskier supply chain and a negative effect on the grocery store's market value.

We are aware of only one study that has considered the impact on U.S. firms (Taylor 2004). Taylor estimated, from survey data, that U.S. and Canadian firms would jointly lose approximately 13 billion dollars each year from increased supply chain costs. Other studies have examined only Canadian firm effects and typically conclude that the Act served as a non-tariff trade barrier. These studies take various approaches to the question including: surveys of management and government officials' opinions about the impact of the Act (Murphy 2004), self-reported survey data on expected supply chain cost increases (Murphy 2004), self-reported survey data on actual cost increases (Ontario Chamber of Commerce 2005, Taylor 2004, MacPherson 2008), and an event study that examined the impact of the act on Canadian food firms (Johnson et al. 2013).

Surveys that attempt to quantify the costs of the Act to Canadian firms have produced varying cost and revenue estimates. The Ontario Chamber of Commerce study (2005) provides an estimate of $5.25 billion dollars loss to the Canadian economy. Taylor provides a combined estimate of $10.3 billion per year of lost value to the U.S. and Canadian economies, which represents 2.7% of the total value of 2001 merchandise trade between the two countries. Finally, MacPherson (2008) finds that the Act disrupted supply chains in significant ways such that firms lost revenues and experienced higher costs. Further, MacPherson finds that smaller firms were impacted more heavily than larger firms. MacPherson does not provide an industry or economy wide estimate of the supply chain cost, but concludes that the Act is a non-tariff trade barrier

between the U.S. and Canada because of these costs. Johnson et al (2013) used event study methodology to examine the impact of the Act and found that Canadian firms lost at least 2% of their equity value due to the Act. They conclude that their evidence seems to support the idea that the Act is a non-tariff trade barrier.

In this paper we provide a market-based estimate of the impact of the Bioterrorism Act on publicly traded U.S. food and beverage firms. The study will proceed in a manner similar to previous regulatory event studies. First, we assemble a list of food and beverage firms that are publicly traded firms in the U.S. Then we examine press announcements and the Congressional Record to identify informational events that we think might provide investors with value-relevant information about the content of, and likelihood of passage of the Act. We use the market model to determine normal returns for the firms over the event periods. We then calculate abnormal returns equal to the actual returns minus the normal return predicted by the model. The abnormal returns measure the overall wealth effect of the Bioterrorism Act on the food and beverage industry in the U.S.

Our analysis will provide additional evidence on the merits of the Bioterrorism Act. Our market based approach is useful for at least two reasons. First, it provides investors' assessments of total costs over time, not merely an estimate of losses in a given year. Thus, it reflects expectations of a firm's future ability to adjust operating procedures and minimize the impact of the Act over the long run. Second, it provides evidence that has not originated from the firms themselves. Self-reported information may include a managerial bias since managers may choose to minimize or maximize the reported impact of the Act to suit their own purposes. A market study of the type presented here will reflect investor views of the impact of the Act.

The paper will proceed in a manner similar to previous event studies. Section 2 discusses the Act as it relates to food and beverage firms and presents our hypotheses. Section 3 explains the research design and also describes the sample firms and methodology. The main results are presented in Section 4. Section 5 provides evidence on whether earlier federal legislation in the 1990's also impacted supply chain costs. Section 6 summarizes the analyses and offers conclusions.

II. Overview

This section discusses the prior literature and develops several hypotheses about the impact of the Bioterrorism Act on U.S. food industry firms.

The Bioterrorism act is a multifaceted act that contains five major Titles. Title III, "Protecting Safety and Security of Food and Drug Supply," directly impacts the food and beverage industry. Its four key provisions include: facility registration regulations, regulations requiring prior notice of food imports, administrative detention, and record keeping requirements. The food facility registration title requires all domestic firms and foreign importers to register their facilities with the U.S. government. The prior notice title requires importers to notify Homeland Security prior to shipment of food items. The administrative detention title allows foodstuff that are being imported to be detained if contamination or violation of the rules is suspected. The record keeping title requires food firms to keep records of the origination of

inputs and the destination of outputs. Table I lists the food items covered by the Act. (For additional background, see Food and Drug Administration 2012, Abboud 2003A, and Foley 2003).

Table I. Food products included and excluded by Title III of the Public Health Security and Bioterrorism Preparedness and Response Act of 2002

Included	**Excluded**
Dietary Supplements	Food contact substances
Infant Formula	Pesticides
Beverages (including alcoholic)	
Fruits and Vegetables	
Fish and Seafood	
Dairy Products & Shell Eggs	
Raw Agricultural Commodities	
Canned and Frozen Food	
Baking Goods & Snack Foods	
Live Animals for Food	
Animal Feeds and Pet Food	

Previous event studies in the supply chain and operations management literature have examined a variety of events: new supply chain management tools, supply chain disruptions, adoption of six sigma, ISO certification, changes in inventory turnover, food-borne disease outbreaks, and e-commerce initiatives. (See Table II for a summary.) Despite the large number of supply chain event studies, none examine the impact of regulation on the supply chain. In contrast, the finance, accounting, and economics literatures include many examples of regulatory event studies on a variety of topics: U.S. trade policy impacts on semi-conductor firms (Hughes et al., 1997); the impact of export taxes on Canadian softwood lumber (Joy et al 1998); the impact of product recalls (Jarrell and Peltzman, 1985); the effects of food recalls (Salin and Hooker, 2001); the effect of meat and poultry recalls (Thomsen and McKenzie 2001); deposit ceilings (Dann and James, 1982); merger regulations (Schipper and Thompson, 1983), environmental regulation and disclosure (Blacconiere and Patten, 1994) ; electric utility deregulation (Johnson et al 1998), and others.

Table II. Previous Event Studies on Supply-Chain and Operations Management Topics

Supply-Chain Management Tools	Joo-Hong 2008 Hendricks 2007 Ranganathan 2006 Filbeck 2005 Im 2001 Santo 1993
Supply-Chain Disruption	Hendricks 2005 Hendricks 2003
Adoption of Six Sigma	Shafer 2012
ISO Certification	Paulraj 2011
Changes in Inventory Turnover	Steinker 2013
Food-borne Disease Outbreaks	Sherwell 2006
E-commerce Initiatives	Dewan 2007 Subramani 2001

Our paper examines several aspects of the possible wealth effects of the Bioterrorism Act on the U.S food and beverage industry. These effects may occur due to cost and logistical problems that the Bioterrorism Act imposes on firms. The results also have implications for trade policy through a comparison of any impacts noted here for U.S. firms to effects previously noted for Canadian firms. From the hypotheses developed below, measures of the magnitude of economic losses to U.S. firms will be provided.

Taylor et al's results imply increased supply chain costs for both U.S. and Canadian firms, implying negative shareholder wealth effects from the passage of the Act. The effects may be caused by higher costs associated with record keeping and transportation of products or input across the border into the U.S., (including possible increases in spoilage and labor costs due to prior notice and possible administrative detention at the border). These costs are anticipated to be higher because they may increase documentation costs associated with tracking and keeping record of the supply chain they will have bear the increased costs associated with crossing the border with products into the U.S. Whether the cost is economically significant enough to cause significant negative ARs for U.S. firms is unknown without further study. On the other hand, McPherson claims that the BA is a non-tariff trade barrier. If the act is a non-tariff trade barrier then the impact of the informational events could be positive, as Canadian firms are disadvantaged relative to U.S. firms.

A major difficulty associated with testing the impact of the act is to choose the appropriate informational events. Specifically, at what times, and in what form, does the market receive information valuable to the process of forming expectations of future values for industry firms? In this study, we chose the most straightforward set of informational events we were able to find. The informational events and dates were obtained by examination of The Wall Street Journal, The Congressional Index, and The New York Times. We examine the introduction of the Bioterrorism Act in the House, its passage in the House and the Senate, and the signing of the Act by President Bush. We select the original introduction because this event provides the

market with a comprehensive indication of the likely regulatory impact of the Act. Subsequent passages in both houses of Congress are likely to revise market participants' expectations regarding the eventual passage of the Act. The fourth and final information event examined is the signing of the Act into law by President Bush. Since the law was highly complex, market participants are unlikely to know the costs implied by the final version until it is signed by the president. The chronology of the legislative actions that serve as our informational events appears in Table III.

Table III. Four Event Dates Associated with the Passage of the Public Health Security and Bioterrorism Preparedness and Response Act of 2002

Date	***Event***	Date	Legislative Action
12/11/2001	Event #1	12/11/2001	HR 3448 introduced in the House of Representatives
12/12/2001	Event #2	12/12/2001	HR 3448 passed by the House of Representatives
12/20/2001	Event #3	12/20/2001	Senate passes a version of the bioterrorism bill it will try to reconcile with a house bill passed back on December 12, 2002 NYT, HR 3448
6/12/2002	Event #4	6/12/2002	President George W. Bush signs into law; P.L. 107-188

Our earlier discussion suggests that the wealth effects of the Act could be positive or negative. Thus, our hypotheses are two-sided:

H1A: Introduction of the Act into the House changes the wealth of U.S. food industry shareholders.
H1B: Passage of the Act by the House changes the wealth of U.S. food industry shareholders.
H1C: Passage of the Act by the Senate changes the wealth of U.S. food industry shareholders.
H1D: Presidential signing of the Act changes the wealth of U.S. food industry shareholders.

Measures of the stock market reaction to legislative events may be confounded by firm-specific information releases 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 was ongoing discussion of the implications and possibility of passage of a Bioterrorism Act. However we were not able to discern specific events, which would be likely to alter investor expectations significantly.

The remaining hypotheses predict cross-sectional differences in the wealth effects of the Act explained by underlying economic differences in food industry firms' competitive situations. Two explanatory variables were used in this analysis, an indicator variable that captures whether the firm is a food processor and equity beta. We hypothesize that the Act imposes lower supply chain costs on processors, who have far fewer products (and, therefore, suppliers to track) than do, for example, grocery stores that sell thousands of consumer products. PROCES equals one if the firm's primary activity is food processing, zero otherwise.

As a measure of systematic market risk, a firm's beta can proxy for two attributes of a food industry firm's likely costs of complying with the Act. One, beta is a proxy for is the quality of the product being sold. Firms that produce superior goods tend to have higher betas. (For example, the demand for superior food products is more elastic than the demand for other food products implying higher risk.) Firms that produce higher quality products are likely to have better supply-chain control systems in place and are therefore likely to incur lower costs of complying with the Act's various provisions. Second, beta may proxy for is the degree to which the firm is diversified outside of the food industry. Firms in the food industry tend to have less market risk than the average firm in the market. Thus, high beta firms are likely to be more diversified outside of the food industry and, therefore, be less impacted by the Act. Each firm's equity beta, BETA, was obtained from the market model estimates used to calculate abnormal returns. Thus, our two final hypotheses are stated as:

H2A: Whether or not the firm is a processor will impact the size of returns experienced by the firm.
H2B: The firms Beta will impact the size of returns experienced by the firm.

III. Research Design

This section discusses the data and research design used in the study.

A list of all Food and Beverage firms publicly traded in the U.S. was assembled using Yahoo Finance and the CRSP database. Eighty-six firms had sufficient data for model estimation and testing. Table IV provides a list of these 86 firms along with their ticker symbol.

Table IV. Descriptive Data on 86 Sample Firms

#	*Name*	*Ticker*	*SIC*	*Firm Activity*
1	7 ELEVEN INC	SE	5411	Groceries, general line
2	ALBERTSONS INC	ABS	5411	Groceries, general line
3	AMCON DISTRIBUTING CO	DIT	5141	Groceries, general line
4	ANHEUSER BUSCH COS INC	BUD	2082	Malt beverages
5	ARCHER DANIELS MIDLAND CO	ADM	2041	Flour and grain mill products
6	AURORA FOODS INC	AOR	2051	Bread & other bakery products, except cookies and crackers
7	BOB EVANS FARMS INC	BOBE	5812	Eating places
8	BOSTON BEER INC	SAM	2082	Malt beverages
9	BRIDGFORD FOODS CORP	BRID	2013	Sausage & other prepared meat products
10	BROWN FORMAN CORP	BF	2084	Wines, brandy & brandy spirits
11	CAGLES INC	CGL	2011	Meat Packing Plants
12	CAL MAINE FOODS INC	CALM	2015	Poultry slaughtering & processing
13	CAMPBELL SOUP CO	CPB	2032	Canned specialties
14	CONAGRA INC	CAG	2041	Flour & grain mill products
15	CONSTELLATION BRANDS INC	STZ	2084	Wines, brandy & brandy spirits
16	CORN PRODUCTS INTERNATIONAL INC	CPO	2046	Wet corn milling
17	DEAN FOODS CO	DF	2024	Ice cream & frozen desserts
18	DEL MONTE FOODS CO	DLM	2033	Canned fruits, vegetables, preserves and jellies
19	DOLE FOOD INC	DOL	2033	Canned fruits, vegetables, preserves and jellies
20	DREYERS GRAND ICE CREAM	DRYR	2024	Ice cream & frozen desserts

	INC			
21	FARMER BROTHERS FOODS INC	FARM	2095	Roasted coffee
22	FLEMING COMPANIES INC	FLM	5141	Groceries, general line
23	FLOWERS INDUSTRIES INC	FLO	2051	Bread & other bakery products, except cookies and crackers
24	FOODARAMA SUPERMARKETS INC	FSM	5411	Grocery Stores
25	FORTUNE BRANDS INC	FO	2085	Distilled & blended liquors
26	FRESH BRANDS INC	FRSH	5141	Groceries, general line
27	FRESH DEL MONTE PRODUCE INC	FDP	5149	Groceries and related products, not classified elsewhere
28	GALAXY NUTRITIONAL FOODS INC	GXY	2022	Natural Process and imitation cheese
29	GENERAL MILLS INC	GIS	2043	Cereal breakfast foods
30	GENESEE CORP	GENBB	2082	Malt beverages
31	GOLDEN ENTERPRISES INC	GLDC	2051	Bread & other bakery products, except cookies and crackers
32	GREAT ATLANTIC & PAC TEA INC	GAP	5411	Grocery Stores
33	GREEN MOUNTAIN COFFEE INC	GMCR	2095	Roasted coffee
34	GRISTEDES FOODS INC	GRI	5411	Grocery Stores
35	HAIN CELESTIAL GROUP INC	HAIN	2099	Food preparation, not elsewhere classified
36	HEINZ H J CO	HNZ	2032	Canned specialties
37	HERSHEY CO	HSY	2066	Chocolate & Cocoa products
38	HORMEL FOODS CORP	HRL	2011	Meat Packing Plants
39	INTERNATIONAL MULTIFOODS CORP	IMC	2041	Flour & grain mill products
40	INTERSTATE BAKERIES CORP DE NEW	IBC	2051	Bread & other bakery products, except cookies and crackers
41	KELLOGG CO	K	2041	Flour & grain mill products
42	KRAFT FOODS INC	KFT	2099	Food preparation, not elsewhere classified
43	KROGER COMPANY	KR	5411	Groceries, general line
44	LANCASTER COLONY CORP	LANC	2035	Pickled fruits, vegetables, vegetable sauces & seasonings
45	LANCE INC	LNCE	2052	Cookies & crackers
46	LIFEWAY FOODS INC	LWAY	2026	Fluid milk
47	MARSH SUPERMARKETS INC	MARSA	5411	Grocery Stores
48	MAUI LAND & PINEAPPLE CO INC	MLP	2033	Canned fruits, vegetables, preserves and jellies
49	MIDWEST GRAIN PRODUCTS	MGP	2085	Distilled & blended liquors
50	MORGANS FOODS INC	MR	2033	Canned fruits, vegetables, preserves and jellies
51	NASH FINCH COMPANY	NAFC	5411	Grocery Stores
52	NATIONAL BEVERAGE CORP	POPS	2086	Bottled and canned soft drinks
53	PATHMARK STORES INC	PTMK	5411	Grocery Stores
54	PEETS COFFEE AND TEA INC	PEET	2095	Roasted coffee
55	PEPSICO INC	PEP	2086	Bottled and canned soft drinks
56	PILGRIMS PRIDE CORP	CHX	2015	Poultry slaughtering & processing
57	POORE BROTHERS INC	POOR	2051	Bread & other bakery products, except cookies and crackers
58	PROVENA FOODS INC	PZA	2013	Sausage & other prepared meat products
59	RICA FOODS INC	RCF	2015	Poultry slaughtering & processing
60	ROCKY MOUNTAIN CHOCOLATE FACTORY	RMCF	2064	Candy and other confectionary products

61	RUDDICK CORP	HTSI	2281	Eating places
62	SAFEWAY INC	SWY	5411	Grocery Stores
63	SANDERSON FARMS INC	SAFM	2015	Poultry slaughtering & processing
64	SANFILIPPO JOHN B AND SON	JBSS	5141	Groceries, general line
65	SARA LEE CORP	SLE	2013	Sausage & other prepared meat products
66	SEABOARD CORP	SEB	2041	Flour & grain mill products
67	SENECA FOODS CORP NEW	SENEA	2033	Canned fruits, vegetables, preserves and jellies
68	SENSIENT TECHNOLOGIES CORP	SXT	2037	Frozen fruits, juices & vegetables
69	SHERWOOD BRANDS INC	SHD	2061	Cane sugar, except refining
70	SMITHFIELD FOODS INC	SFD	2013	Sausage & other prepared meat products
71	SMUCKER J M CO	SJM	2033	Canned fruits, vegetables, preserves and jellies
72	SUPERVALU INC	SVU	5141	Groceries, general line
73	SYNERGY BRANDS INC	SYBR	5141	Groceries, general line
74	SYSCO CORP	SYY	5142	Packaged frozen foods
75	TASTY BAKING CO	TSTY	2051	Bread & other bakery products, except cookies and crackers
76	TODHUNTER INTERNATIONAL	THT	2084	Wines, brandy & brandy spirits
77	TOFUTTI BRANDS INC	TOF	2024	Ice cream & frozen desserts
78	TOOTSIE ROLL IND INC	TR	2064	Candy and other confectionary products
79	TYSON FOODS INC	TYSN	2015	Poultry slaughtering & processing
80	UNI MARTS INC	UNI	5411	Grocery Stores
81	VILLAGE SUPER MARKET INC	VLGEA	5411	Grocery Stores
82	WEIS MARKETS INC	WMK	5411	Grocery Stores
83	WHOLE FOODS MARKET INC	WFM	5411	Grocery Stores
84	WILAMETTE VALLEY VINYDS INC	WVVI	2084	Wines, brandy & brandy spirits
85	WINN DIXIE STORES INC	WIN	5411	Grocery Stores
86	WRIGLEY WILLIAM JR CO	WWY	2067	Chewing gum

The hypothesis is tested by examining the overall industry market reaction to the four informational events. These potential informational events, discussed in Section 2.3 and listed in Table III, are the events associated with the introduction to the House, the passage by the House, and the passage of a parallel bill by the Senate, and the signing into law of Bioterrorism Act. For each of the informational event dates, the market reaction was determined by measuring daily abnormal returns, which are the difference between actual and expected returns. To control for the effects of market-wide fluctuations, the market model is used to measure expected returns:

$$R_{it}=\alpha_i+\beta_i R_{mt}+e_{it}$$

Where: R_{it} is the return for the ith agribusiness firm on day t,
α_i is the intercept for the ith agribusiness firm,
β_i is the slope coefficient for the ith agribusiness firm,
R_{mt} is the return on an equal-weighted market portfolio on day t, and
e_{it} is the error term with mean zero

Following the convention of previous event studies (e.g. Hughes et al. 1986; Jarrell and Peltzman 1985; Johnson et al. 1998, Brown and Warner 1980, 1985, and Binder and Summer 1985), an equal-weighted market index is used as a proxy for the market rate of return. The

parameters α_i and β_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 α_i and β_i have been estimated for each firm, the daily prediction errors (i.e., abnormal returns) for firm *i* were calculated as follows:

$$AR_{it} = R_{it} - [\alpha_i + \beta_i R_{mt}]$$

Where: AR_{it} is the abnormal return for firm *i* on day *t*.

We examine abnormal returns for the three-day window that includes the event day and the trading day immediately before and after the event. Inclusion of the trading day 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. We choose a short window of 3-days. Thus, our results are conservative and may underestimate the impact of the Bioterrorism Act. The three day cumulative abnormal returns for each firm were computed as below:

$$CAR_i = \sum_{t=-1}^{+1} AR_{it}$$

Where: CAR_i is the cumulative abnormal return for firm *i*,
AR_{it} is the abnormal return for firm *i* on day *t*, and
t=0 is 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:

$$CAAR = \sum_{i=1}^{86} CAR_i/86$$

Where: $CAAR$ is the cumulative average abnormal return for the sample, and
CAR_i is the 3-day cumulative return for firm *i* around the event.

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 cumulative average abnormal return across firms equals zero is performed using a generalized Z-statistic and a Crude Dependence Adjustment (CDA) test.

To examine how the wealth effects of the Bioterrorism Act vary across firms, we estimate the following model:

$$CAR_i=\gamma_0+\gamma_1 PROCES +\gamma_2 BETA$$

where CAR_i is defined above, PROCES is an indicator variable that equals one if the firm is a processing firm, else zero and BETA is the slope coefficient from the market model used to estimate abnormal returns. The hypotheses imply a two-sided prediction for the coefficient, γ_1, and a positive coefficient, γ_2. The cross-sectional regression results are discussed in Section IV.

IV. Results

This section discusses the results of the statistical analysis.

Table V. Three-Day Cumulative Average Abnormal Returns (CAARs) for 86 U.S. Agribusiness Firms Around Four Event Dates Associated with the Passage of the Public Health Security and Bioterrorism Preparedness and Response Act of 2002

Legislative Action	***Cumulative Average Abnormal Returns***	***Generalized Z-statistic (p-value)***	***Crude Dependence Adjustment Test (p-value)***	***# Positive/# Negative***
Event #1	-1.53%	-2.182 (.0146)	-1.513 (.0652)	31/55
Event #2	-1.21%	-.887 (.1876)	-1.192 (.1166)	37/49
Event #3	0.84%	1.722 (.0425)	.820 (.2061)	49/37
Event #4	-1.58%	-3.652 (.0001)	-1.732 (.0417)	23/63

Table V presents the cumulative average abnormal return results for the four legislative events. The mean cumulative abnormal return for Event 1, the introduction of the Bioterrorism Act, is -1.5%, which is statistically significant at the 0.065 level for the Crude Dependency Adjusted (CDA) test. The CDA is a more appropriate test statistic for a regulatory event study than is the generalized Z-statistic because the CDA controls for interdependency of returns that occurs when the event dates are the same for each sample firm. (See Brown and Warner 1980, 1985 for additional explanation.) However, the generalized Z-statistic is also provided, and inferences from the two test statistics are qualitatively similar. Events 2 and 3, passage by the House and the Senate, were found to have insignificant effects on the firms in the sample. However, Event 4, the signing by the president, produced a -1.58% return that is significant at the 0.4% level. The sum of the abnormal returns over events 1 and 4 events implies a 3.2% decrease in the market value of the average food industry firm in response to the enactment of

the Bioterrorism Act.

Table VI. Three-Day Cumulative Abnormal Returns (CARs) for 86 U.S. Agribusiness Firms Around Four Event Dates Associated with the Passage of the Public Health Security and Bioterrorism Preparedness and Response Act of 2002

Firm Name	***Event #1***	***Event #2***	***Event #3***	***Event #4***
7 ELEVEN INC	-0.0840	-0.0498	-0.0592	-0.0014
ALBERTSONS INC	-0.0992	-0.0907	0.0163	-0.1042
AMCON DISTRIBUTING CO	0.0106	-0.0290	0.1393	-0.0189
ANHEUSER BUSCH COS INC	0.0080	0.0044	0.0688	0.0191
ARCHER DANIELS MIDLAND CO	-0.0531	-0.0413	-0.0349	-0.0389
AURORA FOODS INC	-0.0014	0.0156	-0.0040	0.0714
BOB EVANS FARMS INC	0.0025	-0.0121	-0.0138	-0.0188
BOSTON BEER INC A	-0.0249	-0.1663	0.0825	0.0259
BRIDGFORD FOODS CORP	-0.0302	0.0193	-0.0308	0.0051
BROWN FORMAN CORP A	-0.0134	-0.0046	0.0544	-0.0176
CAGLES INC A	0.0139	-0.0966	0.0479	-0.0169
CAL MAINE FOODS INC	-0.0196	-0.0318	-0.0267	-0.0178
CAMPBELL SOUP CO	-0.0028	0.0078	0.0200	-0.0076
CONAGRA INC	-0.0182	0.0046	0.0017	-0.0168
CONSTELLATION BRANDS INC A	0.0132	0.0128	0.0656	-0.0426
CORN PRODUCTS INTERNATIONAL INC	-0.0107	0.0142	0.0263	-0.0239
DEAN FOODS CO	-0.0188	-0.0171	0.0248	0.1136
DEL MONTE FOODS CO	0.0089	0.0174	-0.0046	-0.0015
DOLE FOOD INC	-0.0048	0.0196	-0.0363	-0.0165
DREYERS GRAND ICE CREAM INC	0.0205	0.0496	-0.0260	0.0021
FARMER BROTHERS CO	0.0155	-0.0287	0.0215	-0.0454
FLEMING COMPANIES INC	-0.0855	-0.0691	-0.0239	-0.0339
FLOWERS FOODS INC	-0.0370	-0.0110	-0.0065	-0.0076
FOODARAMA SUPERMARKETS INC	-0.0036	0.0043	-0.0246	0.0163
FORTUNE BRANDS INC	-0.0084	-0.0029	0.0026	-0.0004
FRESH BRANDS INC	0.0263	0.0176	0.0923	0.0767
FRESH DEL MONTE PRODUCE INC	-0.0079	-0.0003	-0.0481	-0.0042
GALAXY NUTRITIONAL FOODS INC	-0.0219	-0.0401	0.0178	-0.0188
GENERAL MILLS INC	-0.0186	0.0034	0.0275	0.0254
GENESEE CORP B	0.1035	0.1088	-0.0025	0.0898
GOLDEN ENTERPRISES INC	0.0092	0.0224	-0.0308	-0.1142
GREAT ATLANTIC & PAC TEA INC	-0.2099	-0.1151	0.0380	-0.0812
GREEN MOUNTAIN COFFEE INC	0.0336	0.0216	0.0007	0.0134
GRISTEDES FOODS INC	-0.0777	-0.0240	0.0166	-0.0105
HAIN CELESTIAL GROUP INC	0.0055	0.0412	0.0074	-0.0301
HEINZ H J CO	-0.0148	0.0210	0.0086	-0.0294
HERSHEY FOODS CORP	-0.0081	-0.0022	0.0236	-0.0386
HORMEL FOODS CORP	0.0136	-0.0060	0.0023	-0.0160

INTERNATIONAL MULTIFOODS CORP	0.0074	0.0097	-0.0058	-0.0150
INTERSTATE BAKERIES CORP DE NEW	-0.0938	-0.0862	0.0281	0.0494
KELLOGG CO	-0.0147	0.0102	0.0071	-0.1044
KRAFT FOODS INC A	0.0046	0.0106	0.0344	-0.0096
KROGER COMPANY	-0.1987	-0.1440	0.0179	-0.0252
LANCASTER COLONY CORP	0.0142	-0.0233	-0.0293	0.2027
LANCE INC	-0.0275	-0.0590	-0.0417	-0.0194
LIFEWAY FOODS INC	0.0788	0.0158	-0.0056	0.0612
MARSH SUPERMARKETS INC A	0.0156	0.0004	0.0394	0.0849
MAUI LAND & PINEAPPLE CO INC	0.0136	0.0128	0.0031	-0.0031
MIDWEST GRAIN PRODUCTS INC	-0.0006	-0.0232	-0.0088	-0.0157
MORGANS FOODS INC	0.1671	0.0531	0.4982	-0.0184
NASH FINCH COMPANY	-0.0187	-0.0048	0.0089	-0.0337
NATIONAL BEVERAGE CORP	-0.0036	0.0098	0.0041	-0.0410
PATHMARK STORES INC	-0.0725	-0.0661	0.0142	-0.0057
PEETS COFFEE AND TEA INC	0.0074	-0.0426	0.0323	-0.0268
PEPSICO INC	-0.0127	0.0035	0.0355	-0.0097
PILGRIMS PRIDE CORP A	-0.0517	-0.0533	-0.0142	-0.0902
POORE BROTHERS INC	0.0303	0.0543	-0.0221	0.0836
PROVENA FOODS INC	0.1605	0.0934	-0.0977	-0.0822
RICA FOODS INC	-0.0492	-0.0863	-0.2209	-0.0359
ROCKY MOUNTAIN CHOCOLATE FAC IN	-0.0658	-0.0626	-0.0255	-0.1959
RUDDICK CORP	-0.0203	-0.0203	0.0108	0.0009
SARA LEE CORP	-0.1272	-0.0101	0.0169	-0.0294
TODHUNTER INTERNATIONAL INC DE	-0.0540	0.0122	0.0556	0.0067
SAFEWAY INC	-0.0853	-0.0854	-0.1601	-0.0236
SANDERSON FARMS INC	-0.0158	-0.0291	0.0113	-0.0352
SANFILIPPO JOHN B & SON	0.0352	-0.0136	0.0020	-0.2003
SEABOARD CORP	0.0211	0.0245	-0.0057	0.0167
SENECA FOODS CORP NEW A	-0.0319	0.0201	0.0232	-0.0039
SENSIENT TECHNOLOGIES CORP	0.0207	-0.0126	-0.0278	-0.0537
SHERWOOD BRANDS INC A	-0.0393	0.1162	-0.0135	-0.0405
SMITHFIELD FOODS INC	-0.0202	-0.0400	-0.0066	0.0280
SMUCKER J M CO	-0.1231	-0.0211	0.0378	-0.1024
SUPERVALU INC	0.0690	-0.1178	-0.0362	0.0258
SYNERGY BRANDS INC	-0.0244	0.0865	0.0793	-0.0461
SYSCO CORP	-0.0063	-0.0073	-0.0183	-0.1099
TASTY BAKING CO	0.0210	-0.0070	0.0133	-0.0232
TOFUTTI BRANDS INC	0.0206	-0.0024	-0.0279	-0.0157
TOOTSIE ROLL INDS INC	-0.0048	0.0004	-0.0033	0.0654
TYSON FOODS INC A	-0.0302	-0.0090	-0.0456	-0.0680
UNI MARTS INC	-0.0062	0.0340	0.0191	0.0286

VILLAGE SUPER MARKET INC A	0.0068	0.0169	-0.0252	-0.0071
WEIS MARKETS INC	-0.0195	-0.0192	0.0044	-0.0241
WHOLE FOODS MARKET INC	-0.0971	-0.0691	0.0194	-0.0145
WILLAMETTE VALLEY VINYDS INC	-0.0042	-0.0032	0.0882	-0.0297
WINN DIXIE STORES INC	-0.0808	-0.0605	0.0184	-0.0396
WRIGLEY WILLIAM JR CO	-0.0168	-0.0076	0.0317	-0.1026
Summary Data:				
Minimum	-0.2099	-0.1663	-0.2209	-0.2003
Maximum	0.1671	0.1162	0.4982	0.2027
Median	-0.0107	-0.0060	0.0031	-0.0176
25th Percentile	-0.0370	-0.0401	-0.0239	-0.0389
75th Percentile	0.0106	0.0142	0.0248	0.0021

Table VI presents the individual firm cumulative abnormal returns (CARs) for the 3-day event windows associated with the four events. For the first of the two significant events, Event 1, the 25th percentile CAR, -3.70%, is more than three times larger in absolute magnitude than the 75th percentile CAR, 1.06%. For the second of the two significant events, Event 4, the 25th percentile CAR, -3.89%, is more than 15 times larger in absolute magnitude than the 75th percentile CAR, 0.21%. Therefore, we conclude that the significance of the average CARs cannot be explained by a small number of outliers. However, an examination of the individual CARs shows that there is considerable heterogeneity. Hence, we also explore the factors that explain variation across firms in the magnitude of the CARs.

Table VII. Cross Sectional Regression Analysis and Correlation of Variables in the

Panel A: Regression Results

	Coefficient	*Standard Error*	*t-stat*	*p-value*
Intercept	-0.1004	0.0229	-4.4138	0.0001
PROCES	0.0737	0.0223	3.3110	0.0014
BETA	0.0488	0.0284	1.7204	0.0891
R2	0.1254			
Adj. R2	0.1043			
Std Error	0.0911			
N	86			

Panel B: Pearson Correlations

	CAAR	*PROCES*	*BETA*
CAAR	1		
PROCES	0.3069	1	
BETA	0.0993	-0.2355	1

Table VII presents the results of the cross sectional analysis. The results are consistent with the hypotheses presented in Section II of the paper. A simple two factor regression explains 10.9% of the variation in CARs across firms. The p-values associated with the slope coefficients are .0014 and .089 for PROCESS and BETA, respectively. Thus, processing firms and firms with high betas lost less wealth from the passage of the Bioterrorism Act than non-processing firms. One interpretation is that these firms have a less diverse supply chain, so incur lower costs associated with the record keeping requirements of the Bioterrorism Act.

V. Supporting Evidence from Earlier Legislation: The Wealth Effects of the Sanitary and Food Transportation Act

This section examines an addition food industry law in order to provide evidence that federal legislation regulating the food industry, in general, has a negative impact on U.S. food firms. The Sanitary Food Transportation Act of 1990 (the 1990 Act) was proposed and passed by the federal government. This legislation was an attempt to more closely monitor and regulate the food supply chain in the U.S. by regulating food transportation and shipping. The 1990 Act requires the Secretary of Transportation to issue regulations governing the transport of food in motor or rail vehicles that are also used to transport refuse or other nonfood products that may pose a health hazard to animals or consumers. The chronological process leading to the passage of the 1990 Act was very similar to that for the Bioterrorism Act: Introduction to the House, passage by the House, passage by the Senate, and signing by the President. We use the same methodology to examine these four events was identical as was used in sections 2 and 3 to examine the wealth effects of the Bioterrorism Act. That is, we estimated market model parameters using 255 days of trading data ending on the 46th day before the first event. Table 8 provides a summary of the results. Using the CDA statistic and a p-value cutoff of 10%, we conclude that the first three events are insignificant. Event # 4, the signing of the 1990 Act, produced a -1.15% effect on the industry. While this effect is smaller than that found for the Bioterrorism Act, this result nonetheless supports the idea that food regulation that is similar in spirit to the Bio-terrorism Act, overall, has negative consequences for the industry.

Table VIII. Three-Day Cumulative Average Abnormal Returns (CAARs) for 57 U.S. Agribusiness Firms Around Four Event Dates Associated with the Passage of the Sanitary and Food Transportation Act

Legislative Action	***Cumulative Average Abnormal Returns***	***Generalized Z-statistic (p-value)***	***Crude Dependence Adjustment Test (p-value)***	***# Positive/#Negative***
Event #1: Introduced in the House 10/02/1989	-0.33%	-1.767 (.0386)	-0.503 (.3073)	19/38
Event #2: Passed by the	0.36%	1.136	0.564	30/27

House 1/27/1990		(.1280)	(.2864)	
Event #3: Passage by the Senate 9/20/1990	0.79%	3.542 (.0002)	1.264 (.1030)	39/18
Event #4: Signed by the President 11/03/1990	-1.15%	-2.048 (.0203)	-1.839 (.0330)	18/39

VI. Summary and Conclusions

On June 12, 2002, President Bush signed into law the Public Health Security and Bioterrorism Preparedness and Response Act of 2002. The Bioterrorism Act altered the regulatory climate for any food industry firm with a presence in the U.S. Our study indicates that shareholders of U.S. food industry firms experienced significant declines in wealth in response to various events leading to the passage of the Bioterrorism Act.

The negative shareholder wealth effects are likely attributable to increased costs arising from the Act's requirements that agribusiness firms register their facilities with the U.S. government, provide notice prior to the shipment of food items, and keep record of the origination of food inputs and the destination of food outputs. Consistent with this argument, we find evidence of stronger negative wealth effects for firms with greater product diversity (and, hence, higher reporting costs), as proxied by the non-food processing sector of the industry and beta. Our results imply that the average magnitude of these costs may be as large as 3% of equity value.

Prior research that examines the impact of the Bioterrorism Act on Canadian food industry firms with a presence in the U.S. concludes that the Bioterrorism Act is a non-tariff barrier to trade (MacPherson, 2008). In contrast, we conclude that the Act does not constitute a non-tariff barrier to Canadian food industry firms because the negative wealth effects on U.S. firms are of a comparable magnitude to those reported for Canadian firms by Johnson et al. (2013).

References

Abboud, Leila, 2003A, "New rules aim at protecting the U.S. food supply," *Wall Street Journal* (Eastern edition), New York, N.Y.: Jan 30, pp. D.5.

Abboud,Leila, 2003B, "Antiterrorism's hidden costs --- food industry fights FDA's extensive new rules for imports," *Wall Street Journal* (Eastern edition), New York, N.Y.: Mar 26, 2003, pp. A.4.

Binder, J. and Summer, J., 1985. "Measuring the effects of regulation with stock price data," *Rand Journal of Economics* Vol. **16,** Issue 2, pp. 167–183.

Blacconiere, W.G. and Patten, D.M., 1994, "Environmental disclosures, regulatory costs, and changes in firm value," *Journal of Accounting and Economics* Vol. 18, Issue 3, pp. 357–377.

Boisen, Claire S, 2007, "Title III of the bioterrorism act: sacrificing U.S. trade relations in the name of food security." *American University Law Review* Washington: Feb 2007, Vol. 56, Issue 3, pp. 667.

Brown, S.J. and Warner, J.B., 1980, "Measuring security price performance," *Journal of Financial Economics* Vol. **8,** Issue 3, pp. 205–258.

Brown, S.J. and Warner, J.B., 1985, "Using daily stock returns: The case of event studies," *Journal of Financial Economics* Vol. **14,** Issue 1, pp. 3–31.

Coffee Distributing Corporation, Home page, http://www.cdccoffee.com/green-mountain-coffee-roasters-history.html (last accessed November 14, 2014).

Dann, L.Y. and James, C.M., 1982, "An analysis of the impact of deposit rate ceilings on the market values of the thrift institutions," *The Journal of Finance* Vol. 37, Issue 5, pp. 1259–1275.

Filbeck, Greg, Raymond Gorman, Timothy Greenlee, and Thomas Seph, 2005, "The Stock Price Reaction to Supply Chain Management Advertisements and Company," *Journal of Business Logistics*, Vol. 26, Issue 1, pp. 199-216.

Foley, Ryan J., and Mathews, A.W., 2003, "Regulators unveil rules to protect U.S. food supply."*Wall Street Journal* (Eastern edition), New York, N.Y.: Oct 10, pp. B.5.

Food and Drug Administration, 2012, http://www.fda.gov/RegulatoryInformation/ Legislation/ucm155769.htm (last accessed April 7, 2012).

Fox, Jeffrey L., 2005, "U.S. biosecurity advisory board faces delicate balancing act," *Nature Biotechnology* August, Vol. 23, Issue 8, pp. 905.

Hendricks, Kevin B. and Vinod R. Singhal, 2005, "An empirical analysis of the effect of supply chain disruptions on long-run stock price performance and equity risk of the firm," *Production and Operations Management* Vol. 14, Issue 1, pp. 35-52.

Hendricks, Kevin B. and Vinod R. Singhal, 2003, "The effect of supply chain glitches on shareholder wealth", *Journal of Operations Management* Vol. 21, Issue 5, pp. 501-522.

Hendricks, Kevin B., Vinod R. Singhal Jeff K. Stratman, 2007, "The impact of enterprise systems on corporate performance: A study of ERP, SCM and CRM system implementations," *Journal of Operations Management* Vol. 25, Issue 1, pp. 65.

Hughes, John S., Stefanie Lenway, and Judy Rayburn, 1997, "Stock price effects of U.S. trade policy responses to Japanese trading practices in semi-conductors," *Canadian Journal of Economics* Vol. 30, Issue 4, pp. 922-42.

Im, Kun Shin, Kevin E. Dow, and Varun Grover, 2001, "Research report: A re-examination of IT investment and the market value of the firm – An event study methodology," *Information Systems Research* Vol. 12, Issue 1, pp. 103-117.

India-West, Anonymous, 2010, "AAHOA lauds bioterrorism act," March 26, 2010, p. B.7.

Jarrell, G. and Peltzman, S., 1985, "The impact of product recalls on the wealth of sellers," *Journal of Political Economics* Vol. 93, Issue 3, pp. 512–536.
Johnson, M.S., Niles, M., and Suydam, S., 1998, "Regulatory changes in the electric utility industry: investigation of effects on shareholder wealth." *Journal of Accounting and Public Policy* Vol. 17, Issue 4-5, pp. 285-309.
Johnson, M.S., Zhao,C., and Garg, M., 2013, "The impact of the bio-terrorism act on the wealth of Canadian food and beverage firms," *International Research Journal of Applied Finance* Vol. 4, Issue 3, pp. 1182-1193.
Kroger Company, Home page, http://www.thekrogerco.com/ (last accessed November 14, 2014).
MacPherson, Alan., 2008, "The Impact of the U.S. bio-terrorism act upon Canadian exporters of food products to the United States: A firm level analysis," *The International Trade Journal* Vol. 22, Issue 1, pp. 17-38.
Murphy, Sean D., 2004, "Bioterrorism act's notice requirements for food imports," *The American Journal of International Law* Vol. 98, Issue 4, pp. 837-839.
New York Times, multiple issues.
Ontario Chamber of Commerce, 2005, "Cost of border delays to the United States economy," report prepared by the Ontario Chamber of Commerce Borders and Trade Development Committee. http://www.occ.on.ca/2004/CostofBorderDelayto-ontario-report/ (last accessed April 7, 2012).
O'Rourke, Morgan., 2003, "FDA proposes bioterrorism rules to protect U.S. food security," *Risk Management* Vol. 50, Issue 4, pp. 12-12.
Paulraj, Anthony and Pieter de Jong, 2011, "The effect of ISO 14001 certification Announcements on stock performance," *International Journal of Operations and Production Management* Vol. 31, Issue 7, pp. 756-788.
Ranganathan, C. and Carol V. Brown, 2006, "ERP investments and the market value of firms: Toward an understanding of influential ERP project variables," *Information Systems Research* Vol. 17, Issue 2, pp. 145-161.
Salin, V. and Hooker, N.H., 2001, "Stock market reaction to food recalls," *Review of Agricultural Economics* Vol. 23, Issue 1, Issue, pp 33-46.
Santos, Dos, Ken Peffers, and David C. Mauer, 1993, "The impact of information technology investment on the market value of the firm," *Information Systems Research*. Vol. 4, Issue 1.
Schipper, K. and Thompson, R., 1983, "The impact of merger-related regulations on the shareholders of the acquiring firms," *Journal of Accounting Research* Vol. 21, Issue 1, pp. 184–221.
Shafer, Scott M. and Sara B. Moeller, 2012, "The eEffects of six sigma on corporate performance: An empirical investigation," *Journal of Operations Management* Vol. 30, Issue 7-8, pp. 521-532.
Steinker, Sebastian and Kai Hoberg, 2013, "The impact of inventory dynamics on long-term stock returns – An empirical investigation of U.S. manufacturing companies," *Journal of Operations Management* Vol. 31, Issue 5, pp. 250.
Taylor, J.C., Robideaux, D.R. and Jackson, G.C., 2004, "U.S-Canada transportation and logistics: Border impacts and costs, causes, and possible solutions," *Transportation Journal* Vol. 43, Issue 4, pp. 5-21.
Thomsen, Michael R., and Andrew M. McKenzie., 2001, "Market incentives for safe foods: An examination of shareholder losses from meat and poultry recalls," *American Journal of Agricultural Economics* Vol.83, Issue 3, (2001): 526-38.

Vincent, Michel, 2007, "Extending protection at the WTO to products other than wines and spirits: Who will benefit," *The Estey Centre Journal of International Law and Trade Policy* Vol. 8, Issue 1, 57-68.
Wall Street Journal, multiple issues.