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Stock Price Reaction to Regulation in the Meat Packing Industry

Mark S. Johnson, Ron C. Mittelhammer, and Don P. Blayney

Abstract. The results of this study suggest that a variety of regulations in the meat packing industry had significant, and sometimes unexpected, effects. The specific results of regulatory event testing show that many regulatory changes produce large significant impacts on the meat processing industry, in this study shown to be as large as 4% of shareholder wealth for a single informational event. The effects of each specific regulatory change on shareholders is dependent upon the type of regulation examined. These large impacts on the wealth of shareholders indicate that regulatory agencies and the regulations they create often serve the industry, as well as consumers. Finally, in this paper a refined Capital Asset Pricing Model (CAPM) analysis that adjusts for an errors-in-variables problem arising due to nonsynchronous trading is utilized which may be useful in future event studies relating to the agricultural sector.

Keywords. stock price, event study, regulation, meat packing

Cash receipts from farming in the United States totaled \$179,285 million in 1990. Meat animals were the largest category of receipts, accounting for approximately 29 percent of the total, with poultry and eggs accounting for another 8.5 percent (Agricultural Outlook). Situated between the producers of meat animals and poultry and the consumers of meat and poultry products is a well-developed meat packing and processing industry. This study examines the impacts of selected regulations and agricultural policies on that industry.

Researchers, policy makers and consumers should be concerned about the effects of agricultural policy and regulations on processing firms. In particular, the financial well-being of the industry can have important consequences for the future level of processing capacity and the prices of retail meat products.

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Until recently, the measurement of the impact of changes in government policies and regulations on sectors of the agribusiness sector has not explicitly utilized financial market data. This study utilizes common stock prices in the context of an event study to measure the effects of regulation on the meat packing industry. This approach, widely used by corporate finance researchers, is generally accepted as a valid approach for measuring the impact of events on the value of firms whose stocks are publicly traded on efficient financial markets. Events, in general, are defined as any changes in the economic environment which may affect the firm's value through changes in investor expectations about future risk and cash flows.

Previous event studies have examined a wide range of economic changes. The majority of published studies focus on the impact of firm-specific events such as mergers and acquisitions and issuances of debt and equity. However, several researchers have used the event study method to examine events that are not firm specific. Examples include the impact of government pronouncements on futures prices (Schroeder, Blair and Mintert) and the impact of regulatory changes on firm value. Studies of regulations include analysis of OSHA-imposed dust standards on textile firms (Hughes, Magat and Ricks), the impact of product recalls (Jarrell and Peshman), the effects of the Bank Holding Company Act of 1970 (Aharony and Swary), deposit ceilings (Dann and James), merger regulations (Schipper and Thompson), tobacco industry regulations (Johnson, Mittelhammer and Blayney 1991) and pesticide industry regulations (Johnson, Mittelhammer and Blayney 1992).

There are at least three major reasons for measuring the impact of regulatory events on the value of meat packing firm equity. First, such measurement provides a quantification of the effect of regulation on shareholder wealth in terms of returns on investment. Secondly, resource reallocation into or out of the meat packing industry may be induced by regulatory impacts on firm value. Such resource reallocation could affect future processing capacity, prices received by farmers, and ultimately the cost of meat to consumers. Reallocation of resources away from the firm occurs when capital budgeting is done to evaluate potential investments in new projects and events cause the net present value of such projects

to be reduced. When these effects are industry-wide, capital will be allocated out of the industry. Third, evidence obtained in this study may be useful in understanding the relationship between regulations and the regulated in other agricultural subsectors.

During the last 30 years, many events occurred that could have significant impacts on the value of meat packing firms. These events included, but are not limited to, import restrictions, health requirements, and grading changes. This study focuses on events which occurred during the 1960-90 period which were anticipated, *a priori*, to have a significant impact on the supply of meat to processors and/or the cost of meat packing. Eleven events were chosen for this study. Selection of the events was based on personal communications with livestock researchers and analysts in the U.S. Department of Agriculture, a review of livestock and meat marketing literature, and a review of agricultural legislation (McCoy and Sarhan, Hayenga et al., Packers and Stockyards Administration, and Lasley and Henson).

Five of the events are regulations that directly impact the beef and pork processing industries. These include the Meat Import Bill of 1964, the Revision of the Meat Import Bill in 1979, the Fair Packaging and Labeling Act of 1966, the Federal Meat Inspection Act of 1967, and the Humane Slaughter Act of 1978. Three of the events are regulations that directly impact the broiler and turkey processing industries. These events are the Poultry Products Inspection Act of 1968, the Amendment to the Poultry Products Inspection Act in 1982, and the Poultry Producers Financial Protection Act of 1987. One event selected directly impacts the entire industry—the creation of the Office of Occupational and Safety and Health Administration (OSHA).

The final two events examined in this study, the Dairy Tobacco Adjustment Act of 1983 and the Food Security Act of 1985, were chosen because it was believed they might potentially influence the supply of meat to processors to such an extent that input prices of the raw commodity would be changed. The acts had an impact on the beef supply to processors through programs designed to reduce milk production in the United States by sending greater numbers of dairy cattle to slaughter. Such increased supply of cattle for slaughter, and the subsequent impact on the meat packing industry, would be a secondary effect of these government policies.

The remainder of the paper is presented in four sections. Section two describes the central tenet of

the event study, the efficient market hypothesis. Section three describes the modified Capital Asset Pricing Model (CAPM) methodology used in this study. Section four provides an examination of the events and their impacts. Finally, a summary and conclusions are provided.

The Efficient Market Hypothesis and Event Measurement

The event study approach assumes that the efficient market hypothesis (EMH) is descriptively valid for markets in which a firm's stock is traded. The EMH implies that stock prices will reflect all available information that influences the firm's risk and expected future cash flows. The firm's stock price, and thus the value of its equity as perceived by analysts and investors, is the discounted value of future cash flows. The discount rate is determined by the perceived riskiness of the firm. Therefore, changes in stock prices, and thus firm value, reflect changes in expectations about future cash flows and risk. Because investors and analysts continually re-evaluate firm values, new information is quickly incorporated into stock prices.

A question that has been examined closely in the corporate finance literature is "What information is quickly incorporated into stock prices?" At this point, most research indicates that stock markets in the United States are semi-strong efficient (Weston and Copeland). Such markets quickly reflect all publicly available information. Therefore, it would be expected that any publicly available information about regulation will be quickly incorporated into stock prices if the information changes investors' expectations regarding risk or future expected cash flows. Based on this observation, the event study approach focuses upon stock price changes at and around the time period information is released to the public, defined as the "event period." It is crucial to any event study that the time at which information is released to the public be identified as clearly possible.

Pinpointing the times when information is released to the public is particularly difficult when examining the effects of regulation. There are two major reasons for this difficulty. First, regulatory agencies often make multiple public announcements about possible regulatory changes prior to a final decision regarding the changes. Second, information occasionally leaks to the public from inside the regulatory agencies prior to official announcements. A detailed discussion of the rationale for the event period choices in this study is presented

in a subsequent section entitled "Analysis of Events"

Binder points out an additional aspect that is crucial to any event study the determination of the effect which new information has on investor expectations Investors expect a "normal" rate of return from holding a stock These normal returns, in the form of dividends and capital gains, depend on the state of the macro-economy, the overall performance of the stock market and the perceived risk of the firm Thus, when examining the impact of regulation on firm value, it is inappropriate to simply calculate the market value of the firm's equity before and after the regulatory event and attribute all of the change in value to the regulatory event The impact of a regulatory event on the firm's value should be measured as the total change in returns at the time of the event minus the returns attributable to general market movement The remaining effect is referred to as an abnormal return The procedure used to identify abnormal returns is detailed in the following section

The Model and Data

Three methodologies have been used to analyze abnormal returns, the mean-adjusted approach, the market-adjusted approach, and the risk adjusted capital asset pricing model (CAPM) The CAPM is used in this study for two reasons First, simulation results have indicated that the power of test statistics associated with the mean adjusted method is low under conditions of clustering (Brown and Warner 1980, 1985) Clustering is a condition where firms in the sample are from the same industry, as is the case in the current study Second, the CAPM is theoretically more appealing because it does not assume that the comovement of each firm's returns with the market is exactly one for one and that all firms' normal returns are the same on any given day The market-adjusted approach does not allow the normal return level to vary when an asset's market risk changes This may be seen by the fact that in the market-adjusted approach all firms are assumed to have the market return as the normal rate of return on any given day Thus, the abnormal rate of return is assumed to be the same for all firms, and no adjustment is made for the specific riskiness of an individual firm

In the CAPM, normal returns for each firm are determined by the comovement of a firm's returns with the market rate of return Normal returns are the returns associated with the component of the firm's risk that cannot be diversified away by holding a diversified portfolio of stocks in the

marketplace "Abnormal" returns are the returns which can be attributed to the event being examined As such, abnormal returns are obtained by subtracting normal returns from the actual returns for a firm observed in the market

Use of the CAPM requires estimating a normal return generating equation for each firm from a pre-event period In its simplest form, the relationship may be specified as in equation 1 and estimated via ordinary least squares (OLS)

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

where R_{it} is the actual return for firm i on day t , R_{mt} is the actual market return on day t , and e_{it} is a random error term The value, $\alpha_i + \beta_i R_{mt}$, represents the normal return for firm i on day t attributable to general market movements

Following the convention of previous studies and the findings of Brown and Warner (1980, 1985), an equal-weighted index is used as a proxy for the market rate of return in (1) The market index is calculated using all firms on the New York Stock Exchange (NYSE), approximately 1,500 firms, and refers to a portfolio where one share of common stock is held for each firm on the exchange Even though many stocks are traded on other exchanges (e.g., AMEX, NASDAQ), the equal-weighted index is likely to be a good proxy because of its large number of firms and the diversity of firms in the portfolio The return on the market index of all firms on the NYSE on day t is calculated as

$$R_{mt} = \frac{\sum_{i=1}^{1500} P_{it} - \sum_{i=1}^{1500} P_{it-1} + \sum_{i=1}^{1500} D_{it}}{\sum_{i=1}^{1500} P_{it-1}}, \quad (2)$$

where P_{it} equals firm i 's price on day t and D_{it} is any dividend payment on day t

The actual return for firm i on day t is calculated as the change in the firm's price from day $t-1$ to day t plus any dividends distributed on day t , all scaled by price on day $t-1$

$$R_{it} = \frac{P_{it} - P_{it-1} + D_{it}}{P_{it-1}}, \quad (3)$$

where P_{it} is the price of firm i 's stock on day t , and D_{it} is the dividend for firm i on day t

In contrast to most regulatory event studies, which examine the impact of regulation on large firms

(e.g., Johnson, Mittelhammer and Blayney 1991), the firms in the meat packing industry vary widely with respect to their equities market value, from amongst the smallest public firms to amongst the largest public firms in the U.S. Hence, some of the firms in the sample have actively traded stock while others have stock which may be traded sporadically, perhaps not even being traded each and every day the stock markets are open. This creates a potential serious econometric problem when using daily stock price returns to estimate equation 1. Scholes and Williams suggest that an errors-in-variables problem exists because of this "nonsynchronous" trading.

The model previously described assumes that daily stock price returns are computed using closing prices for each stock. Therefore, it is assumed that all returns reflect investor returns of holding the asset for a one day holding period while the market is open. The last trade of the day for a specific firm's stock may occur hours before the close of the market and be reported as the closing price, or the reported closing price may even be from a previous trading day if no trades have occurred. At other times, the reported closing price may reflect a transaction which occurred moments before the close of the market. Thus, the calculated daily return may not reflect the true return for an investor who holds the security for one trading day, and observations on R_{it} and R_{mt} may not be synchronized.

Few, if any, securities in the meat packing industry are so actively traded that prices are recorded continuously. The problem is likely to be more extreme the smaller the firm being examined. Given that prices are available only at distinct random intervals, "completely accurate calculation of returns over any fixed sequence of periods is virtually impossible" (Scholes and Williams). Scholes and Williams suggest an instrumental variable approach for estimation of the return generating process to solve this problem, where the instrument is an equally weighted moving average of the market rate of return. We follow this approach for estimating equation 1 where the specific instrument suggested by Scholes and Williams is given in equation 4, below.

$$MAM_t = \frac{R_{mt-1} + R_{mt} + R_{mt+1}}{3}, \quad (4)$$

where MAM_t is a moving average of the market rate of return, and R_{mt-1} , R_{mt} and R_{mt+1} are defined as the equal weighted market return on days $t-1$, t , and $t+1$, respectively.

For most events in our study, the return-generating model was estimated for each firm using 60 days of data prior to the event. The 60-day period was chosen because it allowed most of the models to be estimated without contamination from prior events. The presence of a prior event in the estimation period can result in biased estimates of returns-generating models if the prior event produced abnormal returns which are large in absolute value.

When 60 days of daily data were not available between event periods, two alternatives for selecting the pre-event period were employed: 1) if at least 45 days of return data were available, the model was estimated based upon the maximum number of returns available between the event periods, or 2) if less than 45 days of return data was available, then the period prior to the contaminating event was utilized for model estimation. It was felt that these rules provided a reasonable trade-off between having sufficient observations to accurately estimate the returns model and the need for model estimation to be based on data reasonably close to the time of the event.

The estimated abnormal return, or equivalently the return associated with the event that cannot be explained by the normal return generating process, is specified in equation 5 for firm 1 on day t .

$$AR_{it} = R_{it} - [\hat{\alpha}_1 + \hat{\beta}_1 R_{mt}] \quad (5)$$

The abnormal return is the actual return minus the return predicted from the normal return-generating equation.

Abnormal returns are commonly examined not only on the day of the event but also before and after the event to account for possible information leakage or late arrival of information to the market. A 3-day event window, spanning the day of the event plus the trading days before and after the event, is used in this analysis. An event window is the time period over which the impact of the informational event is examined. Information leakage to the market could occur if some market participants are privy to discussions among policy makers prior to public announcements of policy actions. Late arrival of information could also occur. For example, public announcements made at or near the end of the trading day for the stock exchange would not generate market reactions until the next trading day. For announcements that did not occur on a trading day, the day after

the announcement was used as if it were the announcement day because it was the first opportunity the market participants would have to react. Therefore, the 3-day abnormal return can be computed as in equation 6

$$TAR_{it} = \sum_{t=t-1}^{t+1} AR_{it}, \quad (6)$$

where TAR_{it} is the 3-day abnormal return for firm i for event day t . TAR_{it} is then used to determine the impact of an event on firm i .

To determine the overall impact of the event on the industry, we calculate the 3-day average abnormal return by summing across the N firms in the industry as in equation 7

$$TAAR_t = \sum_{i=1}^N \frac{TAR_{it}}{N}, \quad (7)$$

where $TAAR_t$ is the 3-day average abnormal return for the industry for event day t .

To examine whether the event had a significant value impact upon the industry, a test of the null hypothesis that the 3-day average abnormal return across firms equals zero is performed using the test statistic as suggested by Brown and Warner (1980)

$$t = \frac{TAAR_t}{\sqrt{\hat{\sigma}^2}}, \quad (8)$$

where $\hat{\sigma}^2$ is the estimated average daily abnormal return variance over the estimation period. Letting $t = 1$ represent the day of the event, the variance is calculated as in equation 9

$$\hat{\sigma}^2 = \frac{\sum_{t=-e}^{t-1} \left(\frac{1}{N} \left(\sum_{i=1}^N AR_{it} - \frac{1}{e} \sum_{t=-e}^{t-1} \sum_{i=1}^N AR_{it} \right) \right)^2}{e - 1}, \quad (9)$$

where e designates the first day of the estimation period. Thus, the variance of the average abnormal return in the pre-event period is being used in the test of the null hypothesis that the mean industry effect is zero.

Daily stock returns were obtained from the CRSP (University of Chicago Center for Research in Security Prices) data base for the twenty three

meat processing firms listed in table 1. The firms listed in table 1 consist of all firms listed under the standard industrial code for meat packers and processors which, as best as we can determine, are actively involved in some level of meat animal slaughtering for which sufficient return data was available from CRSP. Firms that are not known to be engaged in slaughtering activities were excluded from the sample to be utilized because of potential problems that arise if such firms are included. Specifically, firms not engaged in slaughtering activities should be excluded because most of the regulatory events to be examined only impact firms that slaughter animals. Otherwise, noise introduced by inclusion of firms not effected by regulations impacting slaughter operations may obscure the significance of a regulatory event that only impacts slaughter firms. A firm is utilized in the analysis of a specific informational event if the informational event date is included in the time interval listed in the right-hand column of table 1, i.e., if the requisite returns data is available for both the event period and the estimation period.

Table 1—List of firms in the sample during selected time periods

Firm	Firm Name	Period for which Data is Available from CRSP ^a
1	Armour & Co	2/4/64 - 12/16/70
2	Cudahay Co	2/4/64 - 12/16/70
3	Wilson & Co Inc	2/4/64 - 10/19/66 11/28/67 - 11/28/67 6/13/68 - 11/10/87
4	Morrell, John & Co Inc	2/4/64 - 7/23/67
5	Swift & Co	2/4/64 - 11/23/83
6	Sara Lee Corp	2/4/64 - 11/10/87
7	Hormel, George A., & Co	2/4/64 - 11/10/87
8	Hygrade Food Products Corp	2/4/64 - 12/16/70
9	Rath Packing Co	2/4/64 - 12/31/79
10	Chiquita Brands International Inc	2/4/64 - 11/10/87
11	Kane Miller Corp	5/25/66 - 11/23/83
12	Tobin Packing Inc	5/25/66 - 6/6/79
13	Iowa Beef Processors Inc	7/9/70 - 12/31/79
14	Missouri Beef Packers Inc	7/9/70 - 9/28/78
15	Oscar Mayer & Co Inc	7/10/78 - 12/31/79
16	Cagles Inc	7/10/78 - 11/10/87
17	Buring Food Group Inc	7/10/78 - 9/28/78
18	Bob Evans Farms Inc	7/10/78 - 11/10/87
19	Dinner Bell Foods Inc	7/10/78 - 11/10/87
20	Thorn Apple Valley Inc	7/10/78 - 11/10/87
21	Imark Industries Inc	7/10/78 - 11/10/87
22	Smithfield Foods Inc	7/10/78 - 11/10/87
23	Kaplan Industries	6/24/82 - 11/10/87

^aIf an informational event occurs within the specified period then sufficient data was available to establish the event window and estimate the model.

Analysis of Events

From the large number of regulatory changes that occurred during the last 30 years it is difficult to determine *a priori* which regulatory changes are likely to have had a significant impact on the financial condition of meat packers. As indicated previously, a cross-section of 11 regulations affecting the meat packing industry is examined. A list of the regulatory events appears in chronological order in table 2. After identifying the regulatory events, it is necessary to then determine when information regarding the changes is likely to arrive in the market.

Regulations during the period examined were usually motivated by one of two basic concerns. First, import regulations and supply control, of either the meat industry or of interrelated industries, was primarily motivated by a desire to support the incomes of farmers. Second, other regulations were usually motivated by a concern for the quality of meat being purchased by consumers.

Five of the events, 1, 7, 9, 10, and 11, are regulatory events that were motivated by a concern over the level of farm incomes. Specifically, events 1 and 7 focused upon beef producer prices and incomes through import supply control, events 9 and 10 were aimed at supporting dairy product producer incomes through reduction in dairy product output (partially through reducing the size of dairy herds), and event 11 was focused upon the financial security of poultry producers. *A priori*, events 1 and 7 would be anticipated to affect meat processors directly through increased input prices. Events 9 and 10 would be anticipated to affect meat processors indirectly through a potential increase in the supply of meat from the culling of dairy cattle. Finally, event 11 may indirectly affect processors by potentially increasing the financial security of poultry producers and thus affect the cost of poultry to processors.

Four of the events, 2, 3, 4 and 8, are regulatory events which were motivated by a concern from policy makers that consumers should be assured of having safe meat products of known quality. These regulations could potentially affect meat processors in two ways. First, such regulations are likely to increase the costs associated with packaging, labeling and inspecting meat products. Increased production costs may have a negative profit effect on the industry. Secondly, these regulations may positively impact profits of the industry by increasing the demand for meat products. This increased demand may occur because consumers believe that they are increasingly assured of receiving safe,

Table 2—Potentially significant regulatory events affecting the meat packing industry

Event No	Date	Event
1A	2/4/64	Introduction of a bill that would restrict meat imports below present levels
1B	7/28/64	Passage of the Meat Import Bill by Congress
2A	5/25/66	Introduction of a bill that would change labeling requirements and increase packaging standards
2B	10/19/66	Passage of the Fair Packaging and Labeling Act
3A	9/21/67	Introduction of a bill that would require individual states to have an inspection program in place, for all meat products other than poultry, matching federal guidelines
3B	11/28/67	Passage of the Federal Meat Inspection Act
4A	7/23/67	Introduction of a bill that would require individual states to have an inspection program in place, for poultry matching federal guidelines
4B	6/13/68	Passage of the Poultry Products Inspection Act
5A	7/9/70	Introduction of a bill which would create OSHA and give the occupational safety and health administration the obligation to oversee worker health and safety concerns
5B	12/16/70	Passage of the bill creating OSHA
6A	7/10/78	Introduction of a bill which would impose rules that ensure that animals are slaughtered in a humane fashion
6B	9/28/78	Passage of the Humane Slaughter Act
7A	6/6/79	Introduction of a bill that would amend the 1964 meat import law by adding a countercyclical component to the calculation of trigger levels that "turn on" or "turn off" quota restrictions
7B	11/18/79	Passage of the Meat Import Act
8A	9/9/81	Introduction of a bill that would amend the poultry production inspection act by changing the number of turkeys which may be slaughtered and processed without inspection under the 1968 act
8B	6/24/82	Passage of the 1982 Poultry Products Inspection Act Amendment
9A	6/22/83	Introduction of the Dairy Tobacco Adjustment Act which included a paid diversion program which could be accomplished by limited culling of dairy cows by farmers. This act potentially increased the supply of meat for slaughter
9B	7/19/83	Passage of the Dairy Tobacco Adjustment Act
10A	4/17/85	Introduction of the Food Security Act which authorized the whole herd buyout program. This act essentially increased the supply of meat for slaughter
10B	7/31/85	Passage of the Food Security Act
11A	10/8/87	Introduction of the Poultry Producers Financial Protection Act which would provide financial protection to poultry growers and sellers, and clarifies federal jurisdiction under the act
11B	11/10/87	Passage of the Poultry Producers Financial Protection Act

high quality products. Additionally, increased inspection by the entire industry may provide important reductions in liability or improve the ability of individual processors to compete in the marketplace. Thus, the net impact of such regulation is uncertain.

The remaining two events, 5 and 6, were motivated by a desire to protect industrial workers from unsafe practices and a desire to treat animals in humane fashion, respectively. These two events are examined because of their potentially large long-term impacts on the meat processing industry. These impacts may occur because rules can increase the labor cost of processing animals and increase the processing time required on a per-pound basis.

Choosing the announcements that provided the greatest possible information about regulation that occurred during the 1960-90 period was relatively straightforward. All of the regulatory events examined in this study are associated with bills passed by Congress and signed into law by the President. Two of the relevant regulations were contained in the 1983 and 1985 Farm Bills. The remaining regulations were established under separate bills. For all events, the first introduction of the bill into either the House of Representatives or the Senate and its passage by the originating body were the announcements examined. The original introduction was selected as an informational event because it provides the market with its first glimpse of changes generated by the political process that are likely to befall the industry. Passage of bills of this nature by the originating body are very rarely vetoed by the President, and thus passage of the bill signifies with "almost certainty" that there will be a regulatory change.

The introduction-passage process may be complicated, from the standpoint of investors and their formation of expectations, through leakage of information or firm-specific events, such as mergers, earnings announcements, and dividend announcements which may occur during the event window being examined. Firm-specific events could confound results of the study by causing stock price reactions that are not associated at all with the regulation being investigated. Therefore, the *Wall Street Journal index* (WSJ) was carefully examined in an attempt to detect either early release of information or confounding events. This exercise yielded no evidence of the early release of information prior to introduction of a bill or of the existence of confounding events during the event windows.

In addition to listing the regulatory actions examined, table 2 shows the dates of introduction and passage of the relevant legislation associated with the regulation. For example, event 1, the meat import bill of 1964, has two informational events associated with it: informational event 1A, introduction of the legislation, and informational event 1B, passage of the relevant legislation. In considering the results of analyzing the informational events it is important to consider not only the sign and significance of individual informational events, but also the overall pattern of effects. This holistic approach to the examination of results, as shown in table 3, is important because the regulatory environment is such that investors' expectations may be formed cumulatively on the basis of more than one informational event. This is especially true with legislative actions where the final bill may be revised before passage.

The events that produced significant abnormal returns (AR's) may be grouped into three categories: 1) regulatory events aimed at assuring consumers that meat products are safe and of high quality, which directly effect processors through inspection costs or changes in consumer demand due to changes in the perceptions of consumers regarding the quality of products provided by the industry, 2) regulatory events directly impacting the manner in which animals are slaughtered,

Table 3—Three-day mean abnormal returns associated with events affecting firms known to be engaged in slaughter activities

Event No	TAAR	t-statistic	No of Firms with available data
1A	-1 0735	- 9365	10
1B	- 1877	- 1899	10
2A	1 7069	1 3652	12
2B	3 4336	3 8941*	12
3A	- 8052	- 4551	10
3B	1 1853	9343	11
4A	4 2491	2 9962*	11
4B	- 2218	- 1451	11
5A	- 7466	- 4916	12
5B	1 4385	9243	12
6A	-2 1358	-2 4412*	19
6B	-2 9093	-2 7635*	19
7A	1 5465	1 3658	16
7B	6752	5810	15
8A	1 5206	1 2421	12
8B	5856	5588	13
9A	1 4491	1 0922	13
9B	8716	7003	13
10A	- 0120	- 0094	11
10B	1 5033	1 1828	11
11A	- 3019	- 2551	11
11B	-3 8190	-2 8091*	11

*Significant at .05

thereby directly effecting production costs, and 3) regulation that directly impacts the stability and profitability of poultry processors through farm level financial support to producers

Informational events 2B and 4A are associated with new regulatory actions that are later modified. These actions increase the quality and safety assurance to consumers of beef and pork, 2B, and poultry products, 4A. Informational event 2B is the passage of the fair labeling and packaging standards. The impact of stricter labeling and packaging requirements, event 2, theoretically could be negative, positive, or produce no impact on the value of processing firms. While such a regulation imposes higher processing costs, it also may increase demand for meat products because of safety and quality assurance perceived by consumers. The combined effect appears as a positive 3.45% increase in shareholder wealth in the industry, as shown by the significance of informational event 2B, passage of the Fair Packaging and Labeling Act. This result suggests that when all processors bear similar additional costs, increased inspection can actually benefit the industry.

Informational event 4A is the introduction of the Poultry Products Inspection Act. The introduction of the Poultry Inspection Act, produced a positive 4.25% abnormal return. This positive impact may have been caused by one of two factors. First, the creation and enforcement of federal standards for the processing of poultry may have implied a reduction in poultry supply and/or the imposition of significant additional processing costs to poultry processors. Given that many consumers view pork and beef products as close substitutes, this Act may have improved the competitive position of the beef and pork processing firms in our sample relative to the position of poultry processors. Since the majority of firms in the sample are beef and pork processors this could explain the AR effect. Secondly, if consumers concluded that regulators were being diligent in their regulation of the entire meat industry, the imposition of new federal quality standards for poultry may have positively impacted the entire meat industry.

Category 2, regulations that could directly effect the cost and method of slaughter was found to have a large negative impact on the industry. Events 6A and 6B represent the introduction and passage of the humane slaughter bill. Both informational events produced significant negative AR's, -2.14 percent and -2.91 percent, respectively. Clearly, market participants believed that the new legislation was likely to impose strict and expensive new requirements for firms which slaughter animals.

Event 11 is the third type of significant regulatory event. Specifically, 11B is the passage of the Poultry Producers Financial Protection Act. This act gives specific financial guarantees to poultry producers. The significant negative AR of 3.82 percent can best be explained as a direct consequence of the fact that beef and pork processors are direct competitors with poultry processors. Thus, the financial support that this bill provides at the farm level may be viewed as providing an advantage to the poultry industry relative to the beef and pork industry.

Events 1, 3, 5, 7, 8, 9, and 10 were found to have no significant impact on the wealth of shareholders in the meat packing industry. Some likely reasons for the lack of significance are presented in what follows.

Event 1 is an act that restricts meat imports based upon the level of domestic meat production. Import restrictions are imposed only when a given trigger level of domestic production is reached. Event 7 amends the original Meat Import Bill of 1964 by engaging import restrictions based upon trigger levels that are calculated using a countercyclical formula. The countercyclical trigger is used in an attempt to smooth out domestic meat supply through a formula that assumes that domestic production moves naturally in a cyclical fashion through time and that the domestic supply can be smoother if the trigger, which imposes import restrictions, accounts for this "natural" cycle.

The lack of significant results for event 1 suggests that the initial import restriction program passed in 1964 did not induce a dramatic change in the supply of meat for processing in the United States. That is, the supply of meat to processors was not impacted enough by import restrictions to alter input costs to the extent that the long-run profits of processors were significantly impacted. This conclusion is reinforced by the fact that no import restrictions were triggered for meat products until 1968. Specifically, domestic production levels for meat products were not high enough to cause restrictions to be imposed during the 1965-67 period. Therefore the program provided no reduction in import levels during these years (U.S. Meat Import Law).

The lack of significant results for event 7 can probably be attributed to the fact that the addition of the counter-cyclical provision to the import law did not significantly alter the impact of the original bill. Simpson examined the behavior of the amended trigger mechanism under the 1979 counter-cyclical bill, for different states of the world, and he concludes that "The apparent

similarity of trigger levels under two radically different projections is an indication that, despite beliefs to the contrary, the 1979 bill cannot be considered particularly beneficial to the United States or exporting nations" Thus, the result in the present study appears to be in agreement with earlier evidence

The lack of significant results from testing event 5 is relatively easy to explain The development of OSHA and its powers to oversee and regulate industry developed over many years The specific duties and regulations that would be associated with OSHA were not known at the time the agency was created Thus, any impact on the industry examined in this study would have been purely speculative

Events 3 and 8 are similar events in that they modify inspection, packaging and labeling legislation and thus are logical extensions of existing legislation associated with events 2 and 4 It is worth noting that the original Fair Packaging and Labeling Act did have significant industry impacts while modification to the legislation seem to be of much less importance

Events 9 and 10 had no significant impact on the industry Event 9, the Dairy and Tobacco Adjustment Act, contained provisions designed to reduce milk supplies by paying dairy farmers to reduce their milk output Increased culling was one possible method available to farmers for achieving the reduced output The potential reduction in herd size, through culling, would primarily be a consequence of this paid milk diversion For event 10, the whole-herd buyout program, there was a similar effect on the supply of animals for slaughter Specifically, the federal government bought entire dairy herds in an attempt to reduce the production of milk These dairy cattle were to be exported or slaughtered in the United States The actual number of dairy cows slaughtered under the whole-herd buyout program outnumbered the quantity of livestock that farmers intended to slaughter under the milk diversion program These results consistently indicate that dairy programs have little impact on the industry, probably because of the relatively short-run nature of the impact on the supply of animals available for slaughter That is, while the short-run profit impact may be substantial the long-run effect is minor

Summary and Conclusions

This study has examined the reaction of stock prices in the meat packing industry to changes in

federal regulations and farm programs that were hypothesized to impact the industry As such, this study builds upon the results of previous event studies in determining conditions under which different types of regulations will impact the wealth of shareholders Three general conclusions are supported by this study 1) regulatory actions, such as safety and inspection programs, that increase processing costs can actually increase shareholder wealth if increases in demand due to increase in quality are expected to outweigh the impact of increased costs, 2) regulations affecting costs of slaughter can significantly impact the industry, and 3) market participants are adept at analyzing the net impacts of regulations

The specific results of regulatory event testing show that many regulatory changes produce significant impacts on the meat processing industry, in this study shown to be as large as 4 percent of shareholder wealth for a single informational event The effect of each specific regulatory change on shareholders is dependent upon the type of regulation examined Such large impacts on the wealth of shareholders suggest that regulatory agencies and the regulations they create often serve the industry and the public by reassuring the public that the food supply is safe It is suggested that these effects are large enough to create longterm impacts on the industry and should therefore be further investigated for other processing industries On a methodological note, we believe that future researchers will find that the Scholes and Williams approach, which adjusts for the existence of nonsynchronous trading, will be especially useful in future event studies involving other agricultural subsectors because many agricultural processing industries have a large number of smaller, lightly traded firms

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