Structural Analysis of Mergers and Acquisitions in the Food Industry

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Determinants of merger and acquisition activity in the food industry are analyzed using logit regression analysis. Factors affecting the food processing, food retailing and food service sectors are considered. Results indicate merger and acquisition activity in all three sectors are significantly influenced by anti-trust activity, profitability and real gross domestic product.

During the 1980s, there was extensive merger and acquisition activity within the food industry. Mergers occur as two or more firms combine into a single organization, and acquisitions occur as one firm purchases business units of another firm. While this activity has decreased during the 1990s, it has, by no means, become trivial. As exhibited in Figure 1, the number of mergers and acquisitions ranged from 291 to 584 between 1982 and 1994. Since 1991, the number of mergers and acquisitions has increased from 291 to 433. All major sectors of the food industry including manufacturing, wholesaling, retailing and food service have experienced merger activity. Padberg et al note that merger and acquisition activity leads to "a more clearly defined conglomerate structure in food manufacturing and greater market concentration in parts of the food sector." Indeed, mergers and acquisitions accounted for two-thirds of the increase in concentration in food manufacturing between 1977 and 1988 (Marion and Kim). Similar trends are evident in other sectors of the food industry. While many studies have investigated effects of mergers in the food industry, few studies have focused on the determinants of mergers and acquisitions. Since mergers and acquisitions may affect the structure of the food industry, it is important to understand the motives of such activities.

Understanding the determinants of merger and acquisition activity in the food industry is important for four reasons. First, mergers and acquisitions in the food industry typically rank among the largest in size and make up a large proportion, by value, of total merger activity. The food industry ranked fifth in the value of merger transactions recorded between 1982 and 1991. The largest transactions recorded in 1986, 1988 and 1989 were food acquisitions. Second, the food industry has many characteristics that differentiate it from other industries and may have unique factors motivating its merger activity. While there is extensive work on determinants of mergers and acquisitions for the aggregate U.S. economy, and manufacturing and mining industries, these studies have provided little insight into overall merger and acquisition trends especially for the food industry. Third, merger frequencies vary greatly among industries (Gort). During the merger movement in the 1980s, activity in the food industry peaked two years later than other industrial sectors and the number of food mergers decreased at a faster rate than in other industries after this period (Nayda). Fourth, the food industry is very diverse and may have varying determinants of mergers and acquisitions within the industry. Figures 2, 3, and 4 show merger and acquisition activity in the food processing, food retailing and food service sectors behaves differently. Merger and acquisition activity in the food retailing and food service sectors peaked in 1986 while activity in the food processing sector peaked in 1988. Further, merger and acquisition activity declined in the food processing sector over the past two years but increased in both the food retailing and food service sectors.

The purpose of this paper is to determine motivating factors behind merger and acquisition activity in the food industry. First, we identify determinants of merger and acquisition activity that have been used in modeling sectors outside

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of the food industry. Then characteristics which differentiate the food industry from other sectors of the U.S. economy are explored. From this discussion, a model is developed to analyze determinants for merger and acquisition activity within the food industry. We partition the food industry into four components; (1) processing; (2) wholesaling; (3) retailing; and (4) food service. The food service sector includes both commercial and non-commercial restaurants.

Figure 1. Food Marketing Mergers and Acquisitions.

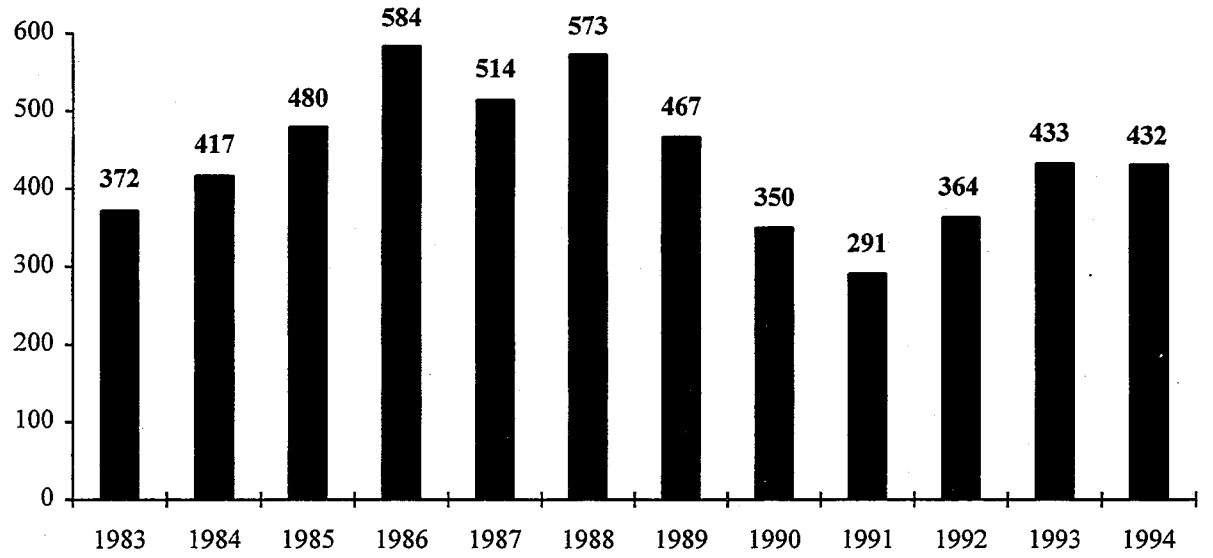


Figure 2. Food Processing Mergers and Acquisitions.

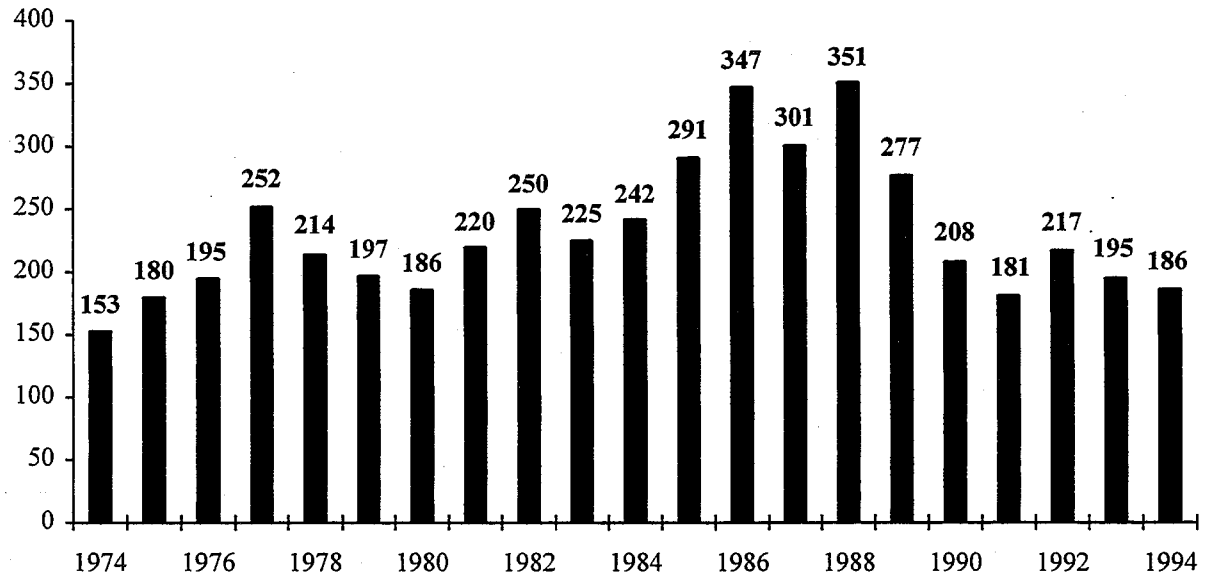


Figure 3. Food Retailing Mergers and Acquisitions.

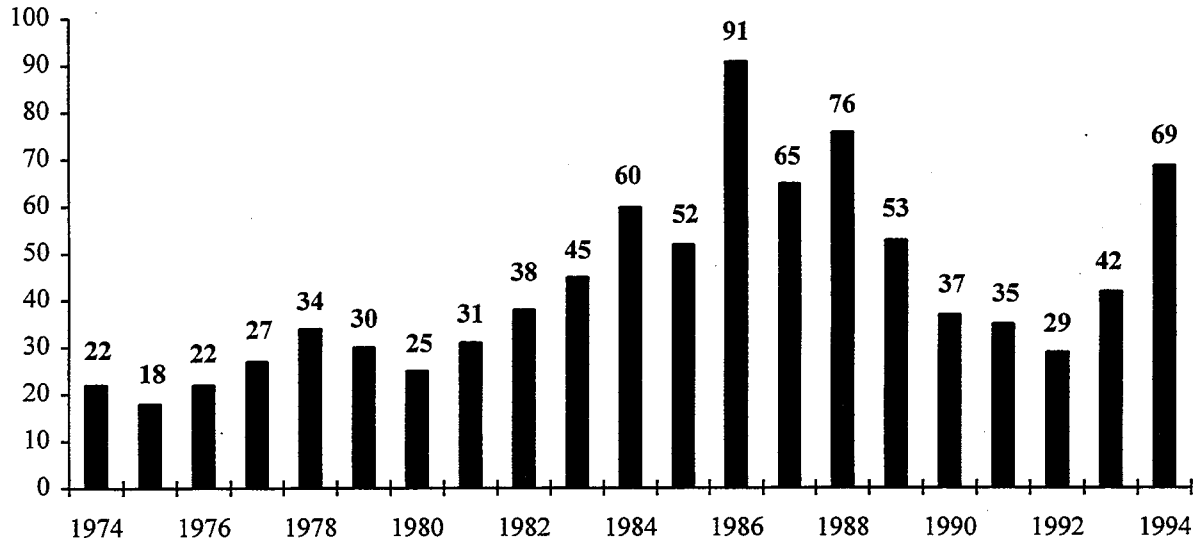
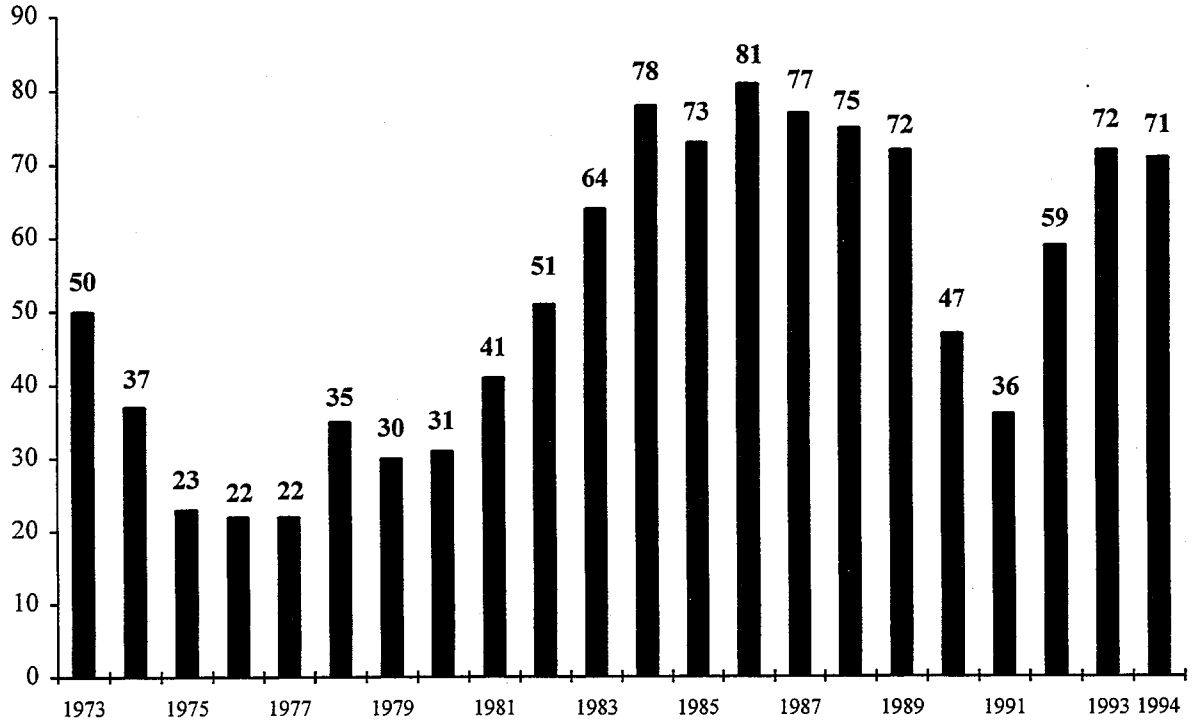


Figure 4. Food Service Mergers and Acquisitions.



Previously Hypothesized Determinants of Merger and Acquisition Activity

Merger and acquisition activity has been an important area of study since 1950 when George Stigler wrote *Monopoly and Oligopoly By Merger*. Since then, there have been several studies on the four historical merger waves, those in the 1900s, late 1920s, late 1960s and 1980s, all with various hypotheses explaining their occurrence. Previous studies have focused mainly on the manufacturing and mining industry or the entire U.S. economy, due largely to the availability of data. The majority of these studies deal with multiple causes since few principal cause hypotheses have been put forth (Gort). Principal cause models suggest one primary motive for mergers while multiple cause hypotheses rely on a combination of the motivating factors. Principal cause models have met with little success because they apply only under limited circumstances and provide little insight into general merger trends. It is widely accepted that most mergers are controlled by multiple motives since several parties are involved. Hence, multiple cause models are used most often.

Although numerous and diverse determinants have been examined, the majority fit into four categories: efficiency, managerial, monopoly, and speculative gains. Mueller, recognizing these broad motives, states "if firms maximize profit, mergers will take place only when they produce some increase in market power, when they produce a technological or managerial economy of scale, or when the managers of the acquiring firm possess some special insight into the opportunities for profit in the acquired firm which neither its managers nor its stockholders possess."

Efficiency Gains

Mergers allow firms to take advantage of economies of scale where existing firms in the industry are operating at levels below optimum capacity. Indivisibility of overhead, asset fixity, or labor specialization are factors which contribute to economies of scale. Further cost reductions may be achieved by lowering bureaucratic or transportation costs. Reductions in tax costs also may be achieved by taking advantage of unused tax credits or accumulated tax losses. Synergy, the concept by which two firms combine and increase their value, may be achieved by these cost reductions (Cooke).

Efficiency gains also may be achieved by reducing transactions costs through vertical merger. When an environment is complex or uncertain, the transactions costs of negotiating and enforcing contracts are high, there is an incentive to merge. By merging, firms can reduce transactions costs, avoid opportunistic behavior and achieve more efficient governance by internalizing exchanges (Williamson).

Managerial Motives

Managerial motives range from profit to personal. Managers may want to maximize revenue or pursue growth maximization. Growth maximization may be achieved by acquiring new firms which are experiencing rapid growth (Beckenstein). Managers also may find it cheaper to acquire growth rather than to develop new areas, especially when growth is desired in foreign markets. Mergers may also allow managers to reduce risk and increase returns through diversification.

Managerial self-interest is recognized as a potentially key factor determining mergers. Achampong and Zemedkun found managers achieve similar benefits through either merger or promotions. By gaining control of a larger corporation through merger, managers increase their sphere of influence as well as their salaries. Cooke concurs stating "managers may wish to expand their enterprises, since their salaries, perquisites and status often increase with size."

Monopolistic Motives

Profitability and size (dominance) are considered to be basic merger motives (Goldberg). Carlton and Perloff state "if a sufficient number of firms in one industry merge, the resulting firm would face less competition and acquire additional market power." The high degree of correlation between increased market share and increased profits is widely accepted. According to Mueller, this motive is prevalent across all three types of mergers — horizontal, vertical and con-

glomerate. Not only can firms gain market share but also they may be in a better position to deter entry. If a firm can increase market share through horizontal merger, they may find collusion, either tacit or explicit, more effective. Coupling collusion with cost reductions may allow firms to erect barriers to entry. Vertical mergers can increase market power by providing a captive outlet for the products of a firm one step forward or backward in the production chain. Vertical merger may also allow the firm to exercise third degree price discrimination, thereby raising profits (Perry). Vertical mergers may also help deter entry by requiring a potential entrant to enter all markets in which a firm operates to compete effectively. Conglomerate mergers can increase market power and deter entrants if they provide captive markets for each firms' products.

Speculative Motives

Gort's theory of economic disturbance argues that forces which generate discrepancies in valuation are decisive in determining variations in merger rates both among industries and over time. Golbe and White further contend that "periods in which there are greater divergences in opinion about companies' future prospects are also periods in which the level of merger and acquisition activity is likely to be greater." These periods of uncertainty stem from the introduction of new technology or unexpected exogenous shocks to an industry.

A second speculative incentive, referred to as the bargain theory, states that mergers occur when potential purchasers believe that asset's current prices constitute "bargains." Merger activity should be greater when prices of existing firms are low relative to new asset prices. Melicher et al. also find speculative motives to be an important factor affecting merger activity. They find merger activity increases with expectations of economic growth as measured by stock prices.

Additional Motives

In addition to these broad categories, antitrust activity seems to play a role in merger activity. Most studies do not consider antitrust activity as a primary factor motivating mergers, but acknowledge that low antitrust activity creates a favorable climate for their occurrence.

Growth rate of the economy and of an industry are also suggested as motives for merger activity. Growth of the economy may have a positive effect on mergers because there is typically more capital available. Industry growth is important to merger activity because firms want to maintain growing markets. Hence, existing firms in an industry may want to acquire firms experiencing faster growth. Firms outside an industry may want to acquire firms in a fast growing industry to maintain growth and diversify.

With all of the hypothesized determinants of mergers, there seems to be no general consensus as to which are the most important. Studies of aggregate merger activity have revealed little information regarding which motives are decisive in accounting for levels of merger activity. Consequently, a detailed review of previous empirical studies is not given. However, a detailed description of previous time-series studies on merger activity is provided in Golbe and White.

Specific to the food industry, Connor and Geithman provide a qualitative review of motives for mergers and acquisitions. They cite profit maximization, gains in efficiency, reduced risk, increased market power, ease of financing and managerial hubris as potential motives for mergers. While they provide a thorough review of previous studies which analyze general merger motives, they do not conduct independent analysis of determinants affecting merger activity.

Characteristics of the Food Industry

By understanding the special characteristics of the food industry, we can discover which determinants of merger activity are most likely to apply. By examining each of the four sectors, processing, wholesaling, retailing and food service, we can discover if each subsector is likely to respond to the same determinants. First, the food industry as a whole is discussed and then specifics of each sector are examined.

The food industry focuses on consumer products. Competition is based on both price and non-price aspects, depending on the sector. Price competition is simply offering the lowest possible price to consumers while non-price competition

includes product innovation and differentiation. Non-price competition leads to new product proliferation. For example, over 16,800 new grocery products were introduced in 1993 and over 20,000 were introduced in 1994.

The entire food industry is highly leveraged, labor intensive and highly profitable. According to the Food Marketing Review, the equity to debt ratio for food manufacturers averaged 0.91 in 1992 compared to 1.23 for all manufacturing corporations. Equity to debt for food manufacturers remained steady in 1993 and 1994. For food retailing, the equity to debt ratio averaged 0.36 in 1992 compared to 0.62 for all retailers. In 1993 and 1994 the equity to debt ratio for the food retailing sector increased to 0.42 and 0.53, respectively. Labor is the single salient cost of the food industry, capturing 34.5 cents of every dollar spent on food marketing. Even with these factors, the food industry is perennially one of the most profitable in the U.S. economy, making excess cash prevalent. The food processing sector, food retailing sector and food service sectors remained highly profitable even in 1991 and 1992 when the rest of the economy suffered a recession. In 1993 and 1994 profits for both food processors and food retailers were at record levels.

From a global perspective, the U.S. food industry is the leading international food system in terms of foreign trade, investment and sales of foreign subsidiaries. In 1992, the U.S. food industry showed its first trade surplus, $1.6 billion, in a decade. This surplus increased to $2.3 billion in 1993 and 2.5 billion in 1994. While large food processors exported on average 4% of sales, 27% of total sales came from plants located in foreign countries. Increased globalization, combined with high leverage and labor intensity make the food industry sensitive to movements in wages and prices, interest rates and the value of the U.S. dollar.

All four sectors are highly concentrated. The wholesale industry saw massive restructuring during the late eighties resulting in fewer but larger firms. For food distributors the five largest firms accounted for 82% of sales, and for wholesale clubs, the top five firms accounted for 95% of sales. Food retailing is less concentrated nationally, with the 20 largest grocery chains accounting for 40% of sales. Concentration in retailing increases significantly at the regional level. For food service, sales of the 25 largest franchised chains accounted for 64% of sales while the top 4 largest chains accounted for nearly 30% of sales. Food manufacturers ranked tenth among 20 manufacturing industries in shares of sales controlled by the top 50 firms.

Model Development

By comparing characteristics of the food industry with previous hypothesized determinants, it is clear that some of the same determinants may apply. It is also clear there are differences which need evaluation. Determinants which should be similar to other industries are discussed and then determinants which are specific to the food industry are hypothesized. Hypothesized determinants for each of the four sectors, processing, wholesaling, retailing and food service, are also put forth. These four sectors are modeled separately to allow for differences within the food industry. It is important to note that no attempt is made to differentiate among horizontal, vertical or conglomerate merger and acquisition activity.

Like other industrial sectors, the food industry as a whole is subject to general economic conditions and antitrust laws. Merger activity is expected to increase as the economy grows. Depending on the nature of the law and vigor with which it is enforced, antitrust laws may also effect merger activity. As antitrust activity increases, merger activity should decrease.

The food industry also is not isolated from speculative motives. Differences in opinion regarding valuation and future prospects of firms is prevalent in the food industry. If firms are viewed as bargains, merger activity should increase. In addition, the food industry is subject to efficiency, managerial and monopolistic concerns like other industrial sectors, but the underlying motives are different. Efficiency concerns are important across the food industry due to labor intensity and cost of equipment. As efficiency increases, the need to merge should be lessened. Profitability and high debt-to-equity are managerial concerns which effect all sectors of the food industry. Increased profitability and decreased debt-to-equity should increase merger activity as

financing becomes less difficult and firms become more attractive.

A further managerial motive is globalization. The food industry is experiencing rapid expansion into foreign markets which should affect merger activity, particularly in the processing and food service sectors. The processing and food service sectors also are affected by advertising expenditures. Firms may need to merge as advertising expenditures increase to take advantage of greater distributional expertise and resource availability. The practice of small firms introducing products at a local or regional level and then selling out to larger firms who then expand product distribution is prevalent in the food industry.

Growth concerns also are important in the food sectors. In retailing there is a trend toward larger, all purpose stores. Increasing store size raises capital requirements for the retailing sector. As a result, mergers in the retailing sector may rise as store size increases. Processing is likely affected by increased product proliferation. As new products are introduced, the need to diversify through merger is reduced. The food service industry is experiencing rapid growth due to increasing consumption of food-away-from-home. As the food-away-from-home share of the total food dollar increases, merger activity in the food service sector should rise.

To summarize, the models for examining determinants of merger activity in the four food industry sectors are hypothesized as follows:

Processing mergers =

$$f_1 (A, EH, P, DE, E, SB, G, AD, PP) + \varepsilon_1$$

Wholesaling mergers =

$$f_2 (A, EH, P, DE, SB, E, PP) + \varepsilon_2$$

Retailing mergers =

$$f_3 (A, EH, P, DE, E, SB, AD, SS) + \varepsilon_3$$

Food service mergers =

$$f_4 (A, EH, P, DE, E, SB, AD, G, FSH) + \varepsilon_4$$

where: A = antitrust climate; EH = general economic health; P = profitability; DE = debt to equity; SB = speculative or bargain factor; G = globalization; PP = product proliferation; E = efficiency; SS = store size; FSH = food away from home share; AD = advertising; and ε_i, i = 1, 2,...4 are random errors.

Data

To analyze merger activity and acquisitions in the food industry, we employ annual data from 1972 to 1994. Intrayear data were not available for analysis. Descriptive statistics are provided in Tables 1 and 2. The number of mergers and acquisitions in each of the four sectors of the food industry, the dependent variables in this analysis, will be used as proxies for merger and acquisition activity. The number of mergers and acquisitions are available in various issues of the *Food Marketing Review* published by the Economic Research Service (ERS) and in the *Food Retailing Review* available from the Food Institute. The number of firms is available in the *Survey of Current Business*. Product proliferation, measured by the number of new products introduced, is available in the *Food Marketing Review*. The food-away-from-home share of the total food dollar is also available in the *Food Marketing Review*. Average new store size is from the *Food Retailing Review*. Efficiency, measured as an index of output per worker, is available through the Bureau of Labor Statistics.

Debt-to-equity is measured as the ratio of total debt to stockholders equity. Profitability is measured as a percentage of total sales. Debt-to-equity and profitability measures are available through *RMA Annual Statement Studies*. Profitability and debt-to-equity ratios for the processing sector are obtained by averaging the ratios for the following seven processing subsectors: bread and other baked goods; canned and dried fruits and vegetables; dairy; flour and other grain mills; red meat; poultry; and sausage. General economic health is measured by the gross domestic product, and globalization is proxied by U.S. direct foreign investment. The gross domestic product and U.S. direct foreign investment are expressed in billions and millions of dollars, respectively. These variables are in the *Survey of Current Business*. Advertising data are from the *Ad $ Summary*. Advertising is total media expenditures and is expressed in millions of dollars. As a proxy for

Table 1. Descriptive Statistics — Levels of Variables.

Variable	Mean	Standard Deviation
Gross Domestic Product (Billions)	3617.3	531.98
Processing Mergers	229.18	54.65
Retail Mergers	41.95	19.81
Food Service Mergers	52.13	20.64
Processing Establishments	21902	1852.6
Retail Establishments	174170	17332
Food Service Establishments	333160	71414
Processing Ratio of Mergers to Establishments	0.041	0.025
Retail Ratio of Mergers to Establishments	0.0006	0.0004
Food Service Ratio of Mergers to Establishments	0.017	0.043
Processing Profitability (% of sales)	2.61	0.41
Retail Profitability (% of sales)	1.40	0.42
Food Service Profitability (% of sales)	3.36	1.27
Processing Debt-to-Equity Ratio	1.63	0.17
Retail Debt-to-Equity Ratio	0.49	0.07
Food Service Debt-to-Equity Ratio	0.38	0.08
Processing Ratio of Stock Price to Book Value	3.03	1.71
Retail Ratio of Stock Price to Book Value	10.47	26.93
Food Service Ratio of Stock Price to Book Value	3.38	1.21
Processor U.S. Direct Foreign Investment (Millions)	10886	30.136
Food Service U.S. Direct Foreign Investment (Millions)	2016	7.07
Processor Advertising (Millions)	2344.22	391.49
Food Service Advertising (Millions)	813.19	385.31
Processing New Products Introduced	6679.8	3770.2
Retail Average New Store Size (Sq. Ft.)	36116	5155.9
Food Service Food-Away-From-Home Share (%)	41.236	3.54

Table 2. Descriptive Statistics - Percentage Growth Rate of Variables.

Variable	Mean	Standard Deviation
Gross Domestic Product	1.86	4.08
Processing Profitability	1.43	20.59
Retail Profitability	2.09	24.41
Food Service Profitability	-3.40	12.44
Processing Debt to Equity	1.07	8.08
Retail Debt to Equity	-1.30	7.87
Food Service Debt to Equity	-2.54	9.95
Processing Ratio of Stock Price to Book Value	2.24	22.78
Retail Ratio of Stock Price to Book Value	-22.77	131.82
Food Service Ratio of Stock Price to Book Value	-5.59	22.89
Processor U.S. Direct Foreign Investment	4.18	9.38
Food Service U.S. Direct Foreign Investment	4.30	1.09
Processor Advertising	5.43	15.50
Food service Advertising	9.05	9.05
Processing New Products Introduced	8.93	6.53
Retail Average New Store Size	0.34	8.23
Food Service Food-Away-From-Home Share	1.16	1.69

speculative motives or the bargain theory, the ratio of the industry's stock price index to its book value is used. Both measures are available in the *Standard and Poor's Analysts Handbook.*

Estimation Technique

Due to the discrete nature of the dependent variable, the logit form of regression analysis will be employed (Intriligator). This form is given by $\ln(p/(1-p)) = X\beta + v$ where p = the proportion of mergers which occur, X = the set of predetermined variables, and β = the coefficients associated with the predetermined variables. v is a stochastic disturbance term with variance $Var(v_i) = 1/(r_i p_i(1-p_i))$ where r_i is the number of establishments in period i and p_i is the relative frequency of mergers in period i. Because the disturbance term is heteroskedastic, generalized or weighted least squares is employed. Since the form of the heteroskedasticity is known, weights for each observation are computed as the inverse of the square root of the variance.

Greene defines the marginal effects associated with the logit model as $\gamma=\Lambda(\beta'X)(1-\Lambda(\beta'X)\beta$ where $\Lambda(\beta'X)=e^{\beta'X}/(1+e^{\beta'X})$. The values of the marginal effects will vary with the regressors in X. In this analysis X is evaluated at the means of the regressors. The standard errors associated with the marginal effects can be computed using the Delta method and are given by,

$$\text{Asy. Var}[\gamma] = (\Lambda(\beta'X)(1-\Lambda(\beta'X))^2[I+(1-2\Lambda(\beta'X))\beta X'] V[I+(1-2\Lambda(\beta'X))\,\beta\, X']'$$

where V = Asy. Var[β].

Although the individual sectors of the food industry are modeled separately, it is assumed that their disturbances are linked. To capture this correlation, we employ a seemingly unrelated regression (SUR) approach together with the logit form of regression analysis. In estimation, the wholesaling sector equation is omitted since data are not available. All right-hand-side regressors except antitrust activity, stock price to book value ratios and trend variables are expressed as the lag of the growth rate of the respective variable. This lag representation reflects the timing and basis of merger decisions. It is assumed that a merger in time period t is based on information from the previous time period. Further, decisions are influenced more by changes in the associated variables rather than actual levels. Antitrust activity and the stock price to book value are modeled contemporaneously due to the idea that antitrust activity and value of the merging firms at the actual time of the merger or acquisition are most important. The new products variable in the processing equation, average new store size in the retailing equation and the food-away-from-home share in the food service equation are lagged but left in levels to capture the trends occurring in each sector. Output per worker, the proxy for efficiency, is omitted due to collinearity problems between it and profitability. Antitrust climate is measured using a dummy variable, which is one for years 1981 through 1989. This demarcation corresponds to relaxed enforcement of antitrust laws during the eighties under the Reagan Administration (Marion and Kim).

Alternative measures of antitrust activity were attempted, but they were beset with problems. To illustrate, in following Preston and Connor, the use of the number of professional hours charged to antitrust matters by the Federal Trade Commission was examined. However, data for the majority of the years covered in this analysis were unavailable making this option infeasible. The number of merger investigations initiated was also tried as a proxy for antitrust activity. This specification introduced right-hand-side endogeneity concerns and thus also was deemed inappropriate. The use of the dummy variable is further justified by a study done by Preston and Connor which found "a severe attenuation of antitrust under the Reagan Administration" corresponding to the years 1981 through 1989.

Empirical Results

The estimated coefficients and marginal effects for the model are exhibited in Tables 3 and 4, respectively. About 96, 69 and 93 percent of the variability in the relative frequency of mergers were accounted for by the predetermined variables in the models for the processing, retailing and food service sectors, respectively. The coefficient for real gross domestic product was posi-

Table 3. Estimated Coefficients.

Variable	Processing Sector		Retailing Sector		Food Service Sector	
	Coefficient	t-ratio	Coefficient	t-ratio	Coefficient	t-ratio
Antitrust Climate	0.69*[a]	6.91	0.37*	2.02	.89*	10.60
Real Gross Domestic Product	2.62*	2.79	3.41*	2.19	1.84*	3.11
Debt to Equity	-1.21*	-1.49	-0.37	-0.31	-0.95*	-4.55
Ratio of Stock Price to Book Value	0.02	0.26	-0.002	-0.12	.42*	11.31
Profitability	0.33*	1.53	-0.45*	-1.83	1.33*	5.00
New Products	0.0002*	6.01	----	----	----	----
Globalization	0.44	0.64	----	----	0.09	0.14
Advertising	0.21	0.46	----	----	1.24*	3.22
Food-Away-From-Home Share	----	----	----	----	0.18*	11.53
Average New Store Size	----	----	0.00003*	1.61	----	----
Constant	-4.83*	-55.68	-9.18*	-14.17	-15.96*	-27.40
R-Square Statistic[b]	0.96		0.69		0.93	

[a] Asterisk denotes statistical significance at the .10 level.
[b] From non-weighted regression.

Table 4. Estimated Marginal Effects and Associated Standard Errors.

Variable	Processing Sector		Retailing Sector		Food Service Sector	
	Marginal Effect	Standard Error	Marginal Effect	Standard Error	Marginal Effect	Standard Error
Antitrust Climate	0.17	0.02	0.07	0.03	0.21	0.02
Real Gross Domestic Product	0.65	0.23	0.69	0.31	0.43	0.14
Debt to Equity	-0.30	0.20	-0.07	0.24	-0.22	0.03
Ratio of Stock Price to Book Value	0.004	0.01	-0.0003	0.003	0.09	0.01
Profitability	0.08	0.05	-0.09	0.05	0.31	0.06
New Products	4.9E-06	8.22E-06	----	----	----	----
Globalization	0.11	0.17	----	----	0.03	0.17
Advertising	0.05	0.11	----	----	0.29	0.09
Food-Away-From-Home Share	----	----	----	----	0.04	0.004
Average New Store Size	----	----	6.24E-06	3.88E-06	----	----

tive and significant for all three sectors, supporting the idea that as the economy grows more capital is available for financing merger activity. Merger activity across all sectors was more responsive to changes in the growth of the real gross domestic product than all other variables. A one percent change in the growth of GDP leads to an increase in the proportion of firms engaged in merger activity in the following year by 0.65, 0.69 and 0.43 in the processing, retailing and food service sectors, respectively. This result indicates merger activity will increase with continued economic growth.

Profitability was positive and significant for the processing and food service sectors but was negative and significant for the food retailing sector. The food service sector was the most responsive with a one percent change in the growth of profitability leading to a 0.31 increase in the proportion of firms involved in merger activity as compared to 0.08 for the processing sector. A one percent change in the growth of profitability in the food retailing sector led to a 0.09 decrease in the proportion of firms merged. It is not surprising that the food retailing sector responds differently to changes in profitability than the food service and food processing sectors. Food retail-

ers perennially have operated with smaller profit margins than the food service and food processing sectors, leading to increased consolidation in the food retailing industry to capture economies of scale. As profit margins increase in the food retailing sector the need to consolidate through merger is reduced. The food processing and food service sectors, on the other hand, have enjoyed greater profitability, making them more attractive to investors both inside and outside the industry. The positive effect of increasing profitability on merger activity on the food processing and food service sectors supports the hypothesis that managers seek growth in profitability. Increased profitability in these two sectors may make them more attractive to outside firms trying to diversify and reduce risk. If these two sectors remain profitable, merger activity should be expected to continue.

The coefficient associated with debt-to-equity was negative as expected for all three sectors but not significant for the retailing sector. A one percent change in the growth of debt to equity resulted in a 0.30 and 0.22 decrease in the proportion of merged firms in the food processing and food service sectors, respectively. Debt-to-equity is also related to managerial motives. As food processing and food service firms become more leveraged they become less attractive merger or acquisition targets. Further, financing becomes more difficult as debt-to-equity increases. As food processing and food service firms become more leveraged, fewer mergers should take place.

Antitrust climate was positive and significant across all three sectors. The proportion of firms merged in the processing, retailing and food service sectors increased by 0.17, 0.07 and 0.21, respectively, as a result of the change in antitrust enforcement during the Reagan Administration. This result indicates antitrust enforcement does play a significant role in merger activity across all sectors of the food industry. Future merger activity in the food industry could be reduced if antitrust enforcement is increased.

Advertising expenditures have a positive and significant effect on the food service sector but is insignificant for the food processing sector. A one percent increase in advertising expenditures results in the proportion of mergers in the food processing and food service sectors to increase by 0.05 and 0.29, respectively. This finding indicates it is more important for food service firms than food processing firms to spread the cost of advertising expenses through merger. Food processing firms can spread the cost of advertising over several products, while food service firms typically only advertise for one product.

The effect of globalization was insignificant for both the food service and food processing sectors. This result indicates firms are not merging as a result of expansion into foreign markets. For the food service industry this result is probably due to the fact that there is no comparable industry in foreign markets. Food service firms have few opportunities to merge with foreign firms to enter new markets because few exist. The opposite is true for food processing firms. The food processing industry in Europe is extensive and many multinational food processing firms are in operation. Globalization may not be a factor in food processing mergers because the industry has long been doing business internationally.

The ratio of stock price index to book value was insignificant for the food processing and food retailing sectors but was positive and significant for the food service sector. A one unit change in the ratio of the stock price index to book value results in a 0.09 increase in the proportion of firms merged in the food service sectors. A one unit change in the ratio of the stock price index to book value results in a 0.003 decrease in the proportion of firms merged in the food retailing industry, albeit not statistically significant. This result indicates the "Bargain" theory does not play a significant role in determining merger activity in the food industry, all other things held constant. In fact, the result from the food service sector supports Melicher's et al. idea that merger activity increases with expectations of economic growth as indicated by increasing stock prices.

The trend variables for all sectors were positive and significant. A one unit change in the food-away-from-home share of the total food dollar causes the proportion of mergers in the food service sectors to increase by 0.04. Increases in the number of new products and average new store size cause minimal impacts on the proportion of firms merged in the food processing and food retailing sectors, respectively. All three

trends reflect growth in the industry which increases attractiveness to firms looking to maximize growth. As more new products are introduced, stores become larger and the food-away-from-home share of the total food dollar increases merger activity in the food industry will increase. As consumer demands are likely to cause these trends to continue, merger activity in the food industry should also be expected to continue.

Conclusion

Analysis of the determinants of merger activity in the food industry has become important due to the impact mergers have on the structure of the manufacturing, wholesaling, retailing and food service sectors. Previous studies which measure the determinants of merger activity for the aggregate U.S. economy are inadequate because they fail to account for characteristics specific to the food industry.

Through logit analysis, determinants of merger activity for the processing, retailing and food service sectors were analyzed. All three sectors were significantly affected by changes in antitrust activity, real GDP and profitability. A commonality across all three sectors is the relative importance of changes in the real gross domestic product. In each case the response of merger activity was highly sensitive to changes in real GDP. An implication of this result is we should see more merger and acquisition activity as the economy grows. The effect of profitability on merger activity in the food processing and food retailing sectors was roughly one eighth that of changes in real gross domestic product. This finding implies merger activity is more sensitive to changes in demand growth, as proxied by the gross domestic product, than to changes in firm growth, as proxied by profitability.

The results indicate that the most important factors behind merger activity in the food industry are economic growth, managerial motives and antitrust activity. In the future, increased merger activity should be expected during times of increased economic growth, high profitability and low debt-to-equity levels in the food industry. Increased merger activity in the food industry can, however, be avoided through appropriate enforcement of antitrust laws.

The results do provide insight into future trends in merger activity. Improved results may be obtained through refining the measurement of antitrust activity and inclusion of the wholesaling sector. Further refinements also can be made by disaggregating by type of merger activity. With the high degree of impact merger activity has on the food industry, further research in this area clearly is warranted.

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