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PROFITABILITY OF MERGERS

IN FOOD MANUFACTURING

by

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ABSTRACT

A cross-section, time-series model of food processing firms examines how profitability is affected by acquiring either firms inside the food industry (i.e., firms within the parent's area of expertise), or outside of the food industry (i.e., conglomerate-type acquisitions). The study concludes that acquiring food firms increases the parent firm's actual profits; while acquiring firms outside of the industry increases only book profits, but negatively impacts shareholder wealth.

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In recent years mergers and acquisitions have been taking place at one of the most rapid paces in history. In 1986 food processing companies made their industry (SIC-20) one of the three most active in terms of merging of all of the major industry groups (Mergers and Acquisitions, 1986). This surge by food firms is just the most recent phase in a series of active acquisition periods that extend back through the sixties.

What effect will the conglomeration movement have on agriculture, the major supplying sector of the food processing industry. Will the continuing surge in mergers and acquisitions result in greater industry concentration? Will this situation cause changes in marketing channels or price structures in agriculture?

A fundamental understanding of the food-processing firm is an essential starting point in the analysis of questions above. In an effort to understand the nature of the food manufacturing industry's participation in this process of mergers, this paper will specifically address the following questions. Do synergistic effects of mergers enhance firm performance by increasing management or production efficiencies? Or, as argued in the financial literature, is the primary effect of mergers an increase in accounting profits?

This study attempts to answer these questions by first noting the inconclusive nature of previous studies, which are probably due to shortcomings in methodology. In response, this study adopts a cross-section, time-series model of firms in a single industry to analyze the

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profitability impacts of different types of mergers and acquisitions. This paper makes the following conclusions based on the results:

1.) All acquisitions, both within the food industry and outside of the food industry increase accounting earnings per share (EPS).

2.) Only acquisitions of firms in the same industry positively increase "real profits" (measured by the stockholder's rate of returns).

3.) Diversification by acquiring firms outside of a parent firm's primary industry group has either no effect on performance, or under certain specifications even has a negative impact.

4.) The results support the theories of management's maximization of growth of accounting earnings (Reid,1968; D. Mueller,1969).

I. Effects of Mergers

Pecuniary advantages of mergers are those that have no real effect on the firm's flow of income. These advantages can give the acquiring firm's EPS figure substantial current or short run gains. These gains arise from the interaction of the acquiring and acquired firms': 1.) relative price/earnings ratios; 2.) book value versus market value of assets; and 3.) depreciation of assets and goodwill.

Of the numerous studies made of the effect of mergers on accounting profits (Hogarty, 1970; Mandelker, 1974; and Reid, 1968, 1971), most conclude that merged firms were no more profitable than those which did not follow a merger strategy. These studies focused on firms that primarily carried out conglomerate-type mergers. However, no study appears to have adjusted the accounting data from the merged firms for the upward bias in earnings introduced by corporate accounting. If such

adjustments had been made, they would have likely strengthened their "no-effect" conclusion, or even found a negative impact.

Other studies have concentrated on finding the effects of mergers and acquisitions on a more "real" measure of profits--the stockholder's rate of return. The results of these studies are conflicting, however. Weston and Mansinghka (1971) and Lev and Mandelker (1972) found that stockholders of acquiring firms did receive higher stock market returns than did those of comparable non-acquiring firms. Melicher and Rush (1973), on the other hand, concluded that conglomerate diversification was not effective in obtaining superior performance. Other studies (e.g., Carter, 1977) hesitate to draw firm conclusions based on methodological problems in their analyses.

Mueller's (1977) comprehensive survey of the effects of mergers attributes many of the differences in empirical results to these methodological shortcomings. This study was designed to overcome the problems of these other researchers whose results differed across time periods, sample selection, classification of mergers, and profitability measures. The following sections describe more thoroughly the sample, data, and pooled cross-section, time-series model used to test the effects of different types of mergers on food company profitability.

II. Sample Characteristics

In the present study, the impact of mergers and acquisitions made by the 19 of the largest food manufacturers is analyzed over the time period 1955-1980. A compilation (Connors and Mathers, 1978), of the 50 largest (in terms of sales) U.S. food companies in 1975 formed the basis for the sample selection. After excluding cooperatives, foreign-based firms, privately held corporations, and firms primarily selling

ages, a sample size of 19 firms remained. The sample excluded these certain categories of firms mainly due to the lack of data. Each company was included in the 1980 Fortune 500 group. Together the firms accounted for 23 per cent of total domestic food sales in 1975.

III. Indices of Merger Activity

To determine the effect of mergers within the food industry relative to those outside of food, indices of merger activity were formulated, for each company, for each year, t, as described below:

The "inside food index" =

The number of acquisitions within the food industry in year t

x diversification factor

x the percentage change in total sales within the food industry, from year t-1 to year t,

where the food industry is, as discussed above, defined broadly to include all activity within the 2-digit, 1972 SIC-20 classification of food and kindred products, plus all other horizontal and vertical production and distribution activities related to food.

The diversification factor is the number of different 4-digit SIC lines acquired in year t within this broadly defined food industry. Diversification was included in the index because in addition to the number and size of acquisitions, the diversity of the acquisition activity would logically affect a firm's profitability (even if the acquisitions of a firm were all from the same, general industry-group). An identical index represents mergers outside of the food industry.

The data on acquisitions over the period 1955-80 were obtained from Moody's Industrial Manuals, from "Mergers and Acquisitions", andj from individual companies' Annual Reports and direct inquiry to the

acquiring firms. Domestic, as well as foreign acquisitions were included. Ideally the size of acquisitions would be represented in the index of merger activities by annual sales figures for the acquired companies, rather than using the change in total food (non-food) sales. Annual sales figures for all acquired companies, however, were simply not available. The changes in sales were used as a proxy for the additions to total sales from acquisitions, although it is recognized that part of any change arises from growth of the parent company.

IV. Performance Measures and Hypotheses

To measure performance using accounting data, average annual earnings per share (EPS), which express the relationship between after-tax income credited to common stockholders and the number of shares outstanding, were collected from Moody's Industrials for each company. Yearly earnings per share were corrected for stock splits (stock split correction factors also obtained from Moody's), and deflated by the gross national product implicit price deflator.

This study utilizes "market residuals" as a measure for the real profit variable. The first step in constructing this variable was to calculate monthly rates of return for each company as a function of closing stock prices and dividends issued. Then, the historic relationship between a company's stock price and the performance of the stock market as a whole was found for each month of the study period (using observations of the previous 60 months). Next, the calculated coefficients and the actual stock market rate of return in month t (that is the 61st month) were used to predict the individual company's return in month t. The final step subtracts the predicted return from the actual

return of the individual firm. Thus, any unanticipated effects of mergers are impounded in this market residual variable.

The hypotheses to be tested on these profit measures are:

1.) Because EPS will reflect the tax, accounting and other pecuniary advantages which accrue more or less equally, regardless of the industry of the acquisition, the effects of food, as well as of non-food mergers on EPS should be positive.

2.) Firms can gain distinct production, marketing and operational economies (as well as possible increases in market power) when expanding within the food industry. This should show up as a positive correlation between the merging index and market residuals. Conversely, although there certainly exist some theoretical economies (e.g., financial or advertising) from expanding outside a firm's primary area of business, potentially adverse management-related factors should result in a net negative impact on real performance.

V. Model Estimation

The pooled cross-section, time-series model to be estimated is set up as follows:

$$(1) \quad Y_{it} = \sum_{k} X_{itk} \gamma_{ik} + U_{it}$$

where $i = 1, 2, 3, \ldots, 19$ companies[3]

$t = 1, 2, 3, \ldots, 25$ years, 1955-80

$k = 1, \ldots, 4$ regressors, defined below

Y_{it} = profit measure of the ith company, i.e., either EPS or market residual, MR, in year t

X_{it1} = Inside food merger index for company i, in year t

X_{it2} = Outside food merger index for company i, in year t

X_{it3} = Number of food divestitures of company i, in year t[4]

X_{it4} = Number of non-food divestitures of company i, in year t

U_{it} = An autocorrelated, contemporaneously correlated residual.

The model was estimated under the following assumptions (see Parks, 1967 for the original formulation):

(2) $U_{it} = \rho_{it}U_{it-1} + V_{it}$ (autocorrelation)

(3) $E(U_{it}U_{jt}) = \sigma_{ij}$ $i \neq j$ (contemporaneous correlation)

(4) $E(U^2_{it}) = \sigma_{ii}$

(5) $E(U_{it}U_{js}) = 0$ $i \neq j$, $s \neq t$

(6) $E(UU) = \sum \otimes I$

and under the following restrictions:

(7) $\gamma_{ik} = \gamma_{2k} = \gamma_{3k} = \cdots = \gamma_{mk} = \gamma_k$, for each k=1...4

Zellner (1962) shows that if the restrictions are valid, there will be no aggregation bias resulting from using data aggregated over each company. The validity of the restrictions was tested with an F statistic (Judge, et al., 1980, pp. 249-250) calculated from a comparison of the restricted and unrestricted models.[5] The unrestricted model incorporated separate coefficients for each company. The null hypothesis of equal coefficients was accepted, thus justifying the estimation of equation (1) under a standard GLS model, rather than as a seemingly unrelated regression, as Parks had originally formulated.

VI. Results and Conclusions

Table 1 reports two sets of results from equation (1) estimated under the restrictions of the model. The first set reports results from regressing deflated EPS on current and (one year) lagged merger and divestiture indices. The second set reports results from the regression of market residuals on current and (one year) lagged indices.

Table 1. The Effects of Inside and Outside Food Mergers and Divestitures

	Inside Food Mergers	Outside Food Mergers	Inside Food Divestitures	Outside Food Divestitures
			On Deflated EPS[a]	
Current Time Period, t	.0146 (4.12)[b]	.0044 (5.11)	.0700 (13.20)	.0077 (1.43)
Lagged Time Period, t-1	.0026 (.66)	.0044 (5.31)	.0666 (12.45)	.0134 (2.58)
			On Market Residuals	
Current Time Period, t	.0041 (1.55)	.0005 (.96)	.0318 (4.87)	-.0152 (3.36)
Lagged Time Period, t-1	.0129 (3.81)	-.0028 (4.44)	.0028 (3.03)	.0001 (.02)

[a]Intercept coefficients are not reported. Market residual model was estimated with a single intercept. EPS model was estimated with individual firm dummy variables.

[b]t-ratios in parentheses.

The EPS equations in Table 1 support the hypothesis of a positive impact of all merger activity on the accounting measure of profits. The magnitude and level of significance of the estimated coefficient on the lagged, within food index are lower, compared to those on the current index, as is perhaps expected if the accounting gains from merger are designed to show up most strongly in the year during which the merger was completed. (The magnitude and level of significance of the outside merger coefficients for current and lagged time periods are very similar). Because the effect of stock mergers on accounting profits are particularly favorable, it is not surprising to see the strong positive effect of all mergers on EPS.

To evaluate the effect on true profitability, the coefficients of interest are those of the market residual model. The coefficients for both merger indices are relatively insignificant in the current time period, the non-food index more so than that for food. However, for the market residual model, the lagged indices likely will give a truer estimate of the effect of merger activity. While this interpretation may not be intuitively appealing (the "efficient market theory" would predict that most of the adjustment happens immediately), it is consistent with the numeric techniques used to generate the market performance measure. The individual company's market residuals were originally calculated on a monthly basis. These monthly figures were then summed over twelve months to yield a yearly variable. The yearly averaging process automatically dampens any contemporary effect. Also, since a large proportion of the mergers by the 19 companies were concluded in the last few months before the end of the year, a further weakening of the contemporaneous effect is experienced. Given an accurate, initial market

response by stockholders to a new acquisition, continued superior (inferior) performance by the merged firm would still "show-up" through the months following the original "jump" in market price. This situation occurs since the regression coefficients used to forecast successive "predicted returns" only gradually adjust to the "new relationship" of the stock to the market (that is, there is a lag before the forecast equation begins to make "precise" estimates). Hence, the impact of a merger will be most accurately embodied in the lagged index.

The effect of lagged mergers within the food industry on a company's market measure of profitability thus is found to be strongly positive, and the effect of lagged non-food, or conglomerate mergers, to be strongly negative. This suggests that management and operational synergies develop from mergers into areas where parent company managers have experience and expertise (i.e., food), but that no synergies and improvements in long-run profitability result from conglomerate or non-food mergers. Conglomerate mergers appear to be pursued primarily for accounting benefits.

An implicit specification assumption in this paper's model that have derived the above results is the fact that the merger indices are uncorrelated with other regressors that also could effect the dependent variable. To test the validity of this assumption, an expanded version of the model included as regressors other firm-level variables frequently found in the industrial organization literature to be associated with merger activity (e.g., Imel and Helmberger, 1971). These additional variables included advertising, research and development, and a capital proxy (total investment). Their inclusion, in fact, did not materially impact the sign nor magnitudes of the results. The estimated

coefficients of the merger indices were quite robust to changes in the model specification. The estimates were also stable when the period of the study was varied.

The results, consequently, do offer evidence which support the study's hypotheses. Diversification outside of a parent company's traditional area of expertise, does not contribute positively to shareholder's wealth. At least for food manufacturing firms, any operational efficiencies resulting from mergers have been gained through mergers within the food industry. Accounting measures of profit, however, are increased through both types of merger activity. The possibility of realizing short-term accounting gains may indeed be the main motivation for conglomerate acquisitions.

Why would firms pursue mergers which impact favorably on accounting "earnings' but which add nothing to stockholders wealth". At least two explanations have been offered. First, managers are committed to growth rather than profitability. Ceteris paribus, they prefer to manage a larger enterprise, division or department rather than a small one. Their power and social prestige increase with the size of the unit managed. Secondly, the amount of a manager's pay, bonuses, and stock options increases with size of unit managed and prerequisites become more lavish. Total remuneration of chief executives is highly correlated with company size. Furthermore, bonuses of chief executives are usually determined by the accounting earnings of the corporation. (See Mueller, 1969; Baumol, 1959; Marris, 1964; and Williamson, 1966). Thus, the results reported in the present paper do seem to be consistent with previously observed managerial behavior.

[1]The 19 companies are:

Beatrice Foods Co.	Kellogg Company
Borden, Inc.	Dart & Kraft, Inc.
CPC International, Inc.	Nabisco, Inc.
Campbell Soup Co.*	Norton Simon, Inc.*
Carnation Company	Pillsbury Company
Central Soya Company, Inc.	Quaker Oats Company
Consolidated Food Corporation	Ralston Purina Company
General Foods Corporation	Standard Brands, Inc.
General Mills, Inc.	United Brands, Inc.
H. J. Heinz Company	

* not included in the market residual based regressions.

[2]The equation used for deriving the market rate of return for an individual company is as follows:

$$r(t) = [p'(t) + d(t)/p(t-1)]-1,$$

where

$r(t)$ = the market rate of return in month t;
$p(t)$ = the closing price of the stock at month end;
$s(t)$ = the stock-split or stock-dividend adjustment factor;
$p'(t) = p(t) \times s(t)$;
$p(t-1)$ = the closing price of the stock at the previous month's end;
$d(t)$ = dividends issued during the month.

Furthermore, the algorithm subtracts "1" from the calculation to give the figure as a monthly percentage return.

(Most of the data used in the calculation came from the CRSP tapes. Stock price data for companies that did not appear on the major stock exchanges for the entire 30-year study period, however, were taken from the Wall Street Journal.)

[3]For the market residuals based model, the sample size was reduced to 17 because of lack of stock price data for two companies. Further, because of the procedure used to calculate market residuals, the time period over which the model was estimated had to be limited to the years 1956-1979.

[4]The number of yearly divestitures was included in the model to explain further company performance. Ideally, like the merger activity indices, the divestiture measures should account for the size and diversity of the transactions in any one year. Lack of data on the sizes and types of the operations divested by the parent company, other than simply whether or not they were food or non-food divestitures, however, precluded developing complete divestiture indices. Divestiture enters the analysis only through simple, yearly counts.

[5]F statistics for the EPS and market residual models were, respectively, .432 and .498.

References

Baumol, W. J. *Business Behavior, Value and Growth*. New York: Macmillan, 1959.

Carter, J. R. "In Search of Synergy: A Structure-Performance Test". *The Review of Economics and Statistics* 54 (1977):279-89.

Conners, J. and L. L. Mather. *Directory of the 200 Largest U.S. Food and Tobacco Processing Firms*. Washington, D.C.: United States Department of Agriculture, Economics, Statistics and Cooperative Service, 1978.

Cotterill, R. and W. F. Mueller. "The Impact of Firm Conglomeration on Market Structure: Evidence for the U.S. Food Retailing Industry". *The Antitrust Bulletin* 25(1980):557.

CRSP Master Files, Monthly and Daily Data. Chicago, Ill.: University of Chicago, Center for Research in Security Prices (various years).

Gort, M. and T. F. Hogarty. "New Evidence on Mergers". *Journal of Law and Economics* 13(1970):167-84.

Hogarty, T. F. "The Profitability of Corporate Mergers". *Journal of Business* 43(1970):317-27.

Imel, B. and P. Helmberger. "Estimation of Structure-Profit Relationships with Application to the Food Processing Sector". *American Economic Review* 61(1971):612-27.

Judge, G., et al. *The Theory and Practice of Econometrics*. New York: John Wiley and Sons, 1980.

Lev, B. and G. Mandelker. "The Microeconomic Consequences of Corporate Mergers". *Journal of Business* 45(1972):85-104.

Mandelker, G. "Rise and Return: The Case of Merging Farms". *Journal of Financial Economics* 1(1974):303-35.

Marris, R. *The Economic Theory of Management Capitalism*. Glencoe, Ill.: Free Press, 1964.

Melicher, R. W. and O. F. Rush. "The Performance of Conglomerate Firms: Recent Risk and Return Experience". *Journal of Finance* 28(1973):381-88.

"Mergers and Acquisitions". *The Journal of Corporate Venture* 6-15. (McClean, Virginia: Mergers and Acquisitions, Inc., 1970-1981,1986).

Moody's Industrial Manual. New York: Moody's Investor's Service, Inc., 1955-1980.

Mueller, D. C. "A Theory of Conglomerate Mergers". *Quarterly Journal of Economics* 83(1969):643-59.

_____. "The Effects of Conglomerate Mergers: A Survey of the Empirical Evidence". *Journal of Banking and Finance* 1(1977):315-47.

Mueller, W. F. "Food Conglomerates". *Proceedings of the Academy of Political Sciences* 34(1982):54-67.

Parker, R. C. and J. M. Connor. "Estimates of Consumer Loss Due to Monopoly in the U.S. Food Manufacturing Industries". *American Journal of Agricultural Economics* 61(1977):627-39.

Parks, R. W. "Efficient Estimation of a System of Regression Equations When Disturbances are Both Serially and Contemporaneously Correlated". *Journal of the American Statistical Association* 62(1967)500-9.

Reid, S. R. "A Reply to the Weston/Mansinghka Criticisms Dealing with Conglomerate Mergers". *Journal of Finance* 26(1971):937-46.

_____. *Mergers, Managers and the Economy*. New York: McGraw-Hill, 1968.

Rhoades, S. A. "The Effect of Diversification on Industry, Profit Performance in 241 Manufacturing Industries in 1963". *The Review of Economics and Statistics* 55(1973):146-155.

The Wall Street Journal, Eastern Edition. Princeton, New Jersey: Dow Jones Co. (various issues).

Weston, J. R. and S. K. Mansinghka. "Tests of the Efficiency Performances in Conglomerate Firms" *Journal of Finance* 726(1971):919-36.

Williamson, J. "Profit, Growth and Sales Maximization". *Economica* 33(1966):1-16.

Zellner, A. "An Efficient Method of Estimating Seemingly Unrelated Regressions and Tests for Aggregation Bias". *Journal of the American Statistical Association* 42(1962):348-68.