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THE PROFITABILITY OF MERGERS

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by

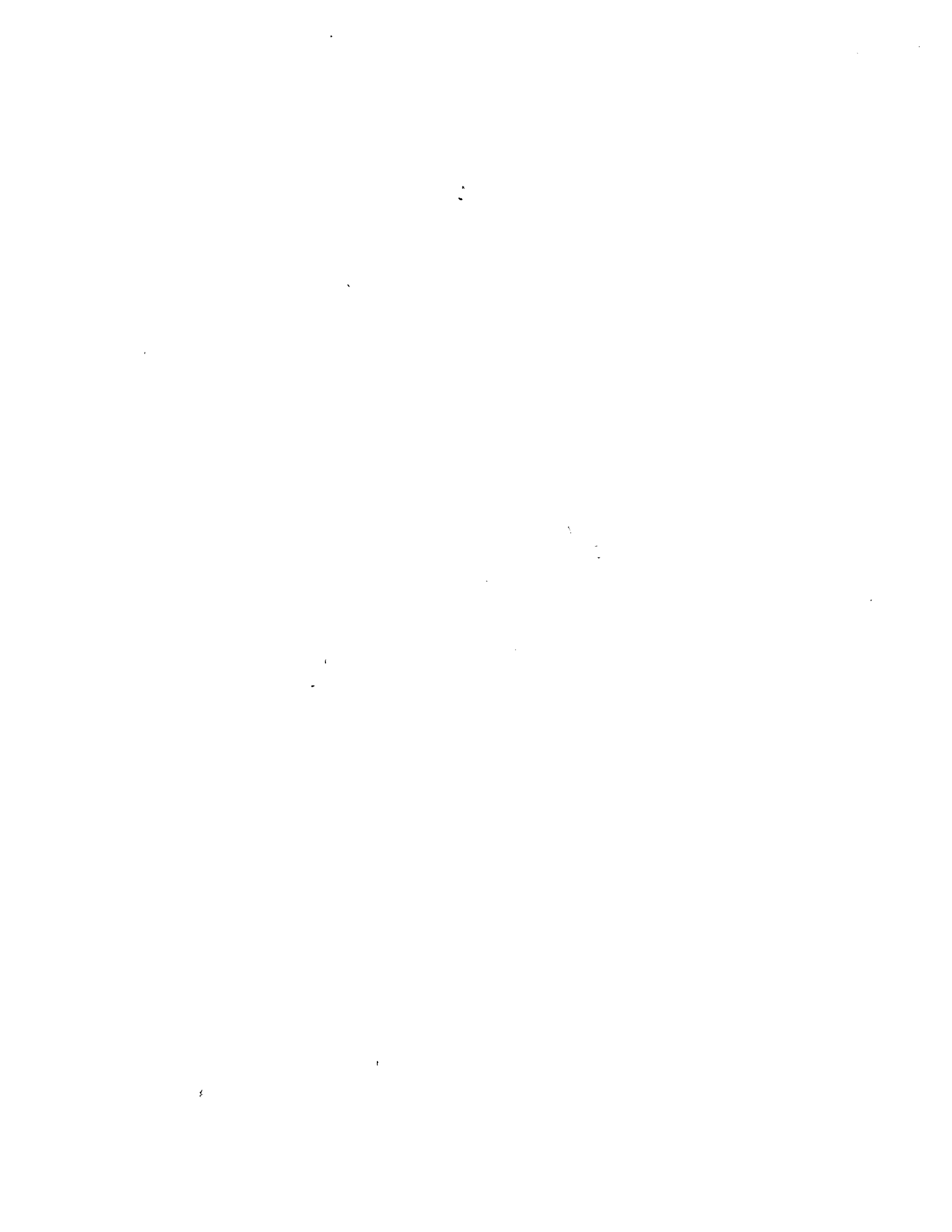
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THE PROFITABILITY OF MERGERS

David J. Ravenscraft and F. M. Scherer

Abstract

This paper uses Line of Business data for 1975-77 to estimate relationships between acquisition history and manufacturing corporations' profitability. A sample encompassing firms of widely varying size shows that on average, acquired companies' pre-merger profitability was substantially above manufacturing sector norms. Following merger, the ratio of operating income to assets declined by more than would have been expected had simple Galtonian regression occurred. The decrease is shown by both cross-sectional and pre- vs. post-merger analyses. Conglomerate acquirers fared least well; mergers of roughly equal-sized firms fared best. Acquisitions accounted for as purchases had significantly lower profitability than those treated as poolings of interest, partly because of selection biases and partly because acquisition premiums for poolings are recorded in equity accounts rather than asset account writeups. Numerous sell-offs of unprofitable acquisitions imparted a selection bias enhancing the measured profitability of surviving acquisitions.

THE PROFITABILITY OF MERGERS

David J. Ravenscraft and F. M. Scherer*

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Numerous studies using stock price data have shown that abnormal gains are realized by the shareholders of acquired firms (even if not acquiring firms).¹ However, this finding is consistent with diverse motivations for merger such as monopoly power, tax savings, undervalued assets, divergent expectations, asymmetric information, management empire-building, the displacement of inefficient managers, and "synergies" (e.g., economies of scope). The last two motives are most clearly consistent with the argument that mergers increase the efficiency of resource allocation and use. Additional stock price research has attempted to rule out the non-efficiency alternatives. The results, however, have been equivocal.

The inefficient management and synergy hypotheses imply that pre-merger financial performance of the acquired company was improvable, and that pre-tax profitability increases were expected on average to follow from merger. This paper examines whether such improvements actually

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Use is made of Line of Business data collected by the Federal Trade Commission. A review by FTC staff has determined that individual company data are not disclosed. The conclusions are the authors' and not necessarily those of the FTC.

occurred. Thus, our central research question is, do acquired entities exhibit superior post-merger profit performance relative to control groups and to their pre-merger achievements?

I. Measurement Problems

There have been many studies of the relationship between merger activity and profitability.² Most have foundered on various methodological reefs.

For one, the most active acquirers among U.S. industrial corporations in recent decades have been companies which, at least after merger if not before, were highly diversified. It is difficult therefore to establish an adequate no-merger control group of entities with similar industrial characteristics.

Second, the average acquired entity is quite small in comparison to its acquirer. When the profits of acquired units are mixed with those of the acquirer in an analysis of whole-company performance, the merged entities' profit experience, "noisy" under any circumstances, is likely to be overwhelmed or drowned out within the much larger consolidated whole.³ And when sufficiently many units are merged to make the acquired fraction relatively large, control group problems proliferate. The solution to this confluence of problems is to examine what happens at the individual line of business level.

Third, the very act of merger can introduce systematic biases that distort financial performance analyses.⁴ Most importantly, U. S. industrial corporations have used, with roughly equal historical frequency, two quite different means of accounting for the assets taken into their financial statements through merger.⁵ Under pooling of

interests accounting, the assets of the acquired firm are recorded at their book value when the acquisition is consummated. If the acquirer pays more (less) for the assets than their book value, the difference is debited (credited) to the acquirer's stockholders' equity account. In contrast, under purchase accounting, the acquired assets are entered at the effective price paid for them. If a premium is paid over the acquired entity's book value, the acquired assets are "stepped up" relative to their pre-merger book values, and/or an addition may be made to the acquirer's good will (asset) account. Plant and equipment value increases following from purchase accounting mergers are always depreciated in subsequent years. Depreciation of good will increments has been required on acquisitions made since 1970. When positive premiums are paid, as has been true on average, post-merger profitability of purchase-accounting acquisitions will be systematically lower than that of pooling acquisitions, all else equal. The numerator of the post-merger profit ratio for the average purchase accounting acquisition will be smaller owing to increased depreciation, and the denominator of any profit/assets ratio will be larger. Indeed, if markets for acquisitions are approximately competitive, the profit/assets ratio on purchase accounting acquisitions should not on average exceed a competitive return on assets.

Fourth, there is no reason to believe that the companies selected for acquisition are necessarily representative, even within their home industries. And merger candidate selection biases can interact with merger accounting choices. To present a better post-merger earnings face, acquirers have tended to favor pooling-of-interests accounting on acquisitions for which they paid a high premium over book value, shifting

to purchase accounting for lower-premium acquisitions.^{6/} To the extent that high takeover premiums reflect high pre-merger profitability, and assuming some persistence over time of profitability,⁷ purchase accounting acquisitions will exhibit lower post-merger profitability than pooling-of-interests mergers.

II. Pre-Merger Profitability

Several previous studies have examined the pre-merger profitability of acquired entities.⁸ All were confined to acquired companies whose securities were publicly traded -- an attribute correlated with size. Because the lines of business on which our subsequent analysis will focus originated preponderantly from relatively small private company acquisitions, a data source illuminating pre-merger performance across a broader array of acquired firm sizes and ownership types was required. From the "listing applications" filed when New York Stock Exchange companies make acquisitions entailing the issuance of new securities, several samples were drawn: one including all domestic manufacturing company acquisitions during the first nine months of 1968 (at the peak of the conglomerate merger boom), another covering 1971 acquisitions whose financial results for 1970 (a year of recession) were disclosed, and a third encompassing all 1974 manufacturing company acquisitions. The "listing application" acquisitions were much smaller on average than those populating traded company acquisition samples. Median acquired company assets in 1967 were \$2.4 million, and 78 percent of the sample members had assets of less than \$10 million.

Table 1

Average Supra-Normal Pre-Merger Profitability of Acquired Companies,
by Year of Acquisition and Merger Accounting Method*

	1968	1971	1974	All Years
All acquisitions	8.37% ₃₉₂	9.45% ₁₁₃	6.47% ₁₂₉	8.18% ₆₃₄
Poolings	9.09% ₃₃₇	13.81% ₈₁	8.84% ₈₆	9.80% ₅₀₄
Purchases	4.01% ₃₃	-1.58% ₃₂	1.72% ₄₃	1.88% ₁₃₀

*The subscripted values give the number of company observations in each cell.

Table 1 summarizes the results, with annualized profitability in the last reporting period (usually a year) before acquisition measured as the ratio of operating income (computed before interest charges, extraordinary charges or credits, and income taxes) to end-of-period assets. From each acquired firm's profit ratio, the corresponding ratio for the firm's home two-digit industry group (derived from the FTC Quarterly Financial Report) has been subtracted. Thus, the figures (converted to percentages) in Table 1 are in effect supra-normal returns.

On average, the acquired companies were 85 percent more profitable than their manufacturing universe peers. For the three-year all acquisition supra-normal profitability average, the t-ratio on a test of the zero null hypothesis is 10.62. A test of the null hypothesis of inter-year homogeneity among the averages for all acquisitions cannot be rejected; $F(3,631) = 0.53$. Purchases were significantly less profitable

than acquisitions treated as poolings, taking acquisition year into account; $F(3,628) = 7.79$, which exceeds the 1 percent point of 3.82. The supra-normal returns of purchase acquisitions were insignificantly different from zero; in a test of the zero restriction, $F(3,127) = 0.42$.

NYSE listing applications normally provide profit and loss data for only the last accounting year (plus or minus some fraction) prior to merger. To test whether merger selection biases favor acquisition candidates with unsustainably high peak profitability, manufacturing companies covered by the COMPUSTAT research files for at least five years before their acquisition by Line of Business sample members were identified. To approximate the NYSE results as closely as possible, entities with final-year assets exceeding \$50 million, and final year operating income less than 15 percent of assets, were excluded. The 33 companies that remained had final year operating income / asset ratios, adjusted for business cycle influences, of 25.2 percent -- a reasonable approximation to the comparably-adjusted 23.5 percent return (before deduction of industry means) of the 634 NYSE listing application sample. There was evidence that when one selects on a high final-year profitability criterion (and also, but more weakly, without such a bias¹⁰), profitability in earlier years was lower, but not significantly so [with $F(160,5) = 1.24$]. With T as the year of merger, the pre-merger profit pattern was 25.2% in T-1, 20.8% in T-2, 16.9% in T-3, 18.6% in T-4, and 21.1% in T-5.¹¹ Although the final pre-merger year was the peak, profits in earlier years were above all-manufacturing averages, and the acquired companies appear to have had the staying power to recover from a profit slump three to four years before merger.

Thus, on average, the entities acquired during the late 1960s and early 1970s brought into the union superior pre-merger profitability records. However, purchases were different from poolings in this respect, and care must be taken to control both for pre-merger profitability carry-overs and the accounting choices that affect post-merger earnings reports.

III. The Line of Business Sample

In our analysis of post-merger financial performance, the starting point was the Federal Trade Commission's Line of Business survey for the years 1974-77. We focus mainly on 1977, macroeconomically the most "normal" year of the series. In that year, reports were obtained from 456 U.S. manufacturing corporations. Each reporting company was required to disaggregate its financial information into a maximum possible 261 manufacturing categories, usually defined at the four- or three-digit S.I.C. level, and 14 more broadly defined nonmanufacturing categories. The average sample company broke its operations into 8.0 manufacturing "LBs" (excluding a catch-all category), with a range of from one to 53, and 1.4 nonmanufacturing LBs. Activity overseas and in domestic regulated sectors was excluded from the line of business reports.

To develop the necessary measures of merger extent and character, an attempt was made to identify and link to individual company manufacturing LBs all acquisitions made by sample companies between 1950 and 1977, along with the estimated value of assets acquired. For multi-line acquired companies, assets had to be divided among appropriate LBs (including those sold off or not engaged in manufacturing). For each acquisition,

the method of merger accounting used (mainly, purchase or pooling) also had to be determined, either from public sources or (for approximately 13 percent of acquired assets) by means of a logit model that successfully predicted 84 percent of known accounting choices.¹³ Sometimes it was difficult to pinpoint which corporation acquired whom. Sixty-nine pooling of interests mergers between corporations whose assets at the time differed from each others' by no more than a factor of two were treated as "mergers of equals," rather than as acquisitions by a clearly surviving parent.

The total number of manufacturing lines (excluding a catch-all category) operated by the 456 sample corporations in 1977 was 3,674. Before the statistical analysis was begun, the sample was reduced to 2,955 LBs on the basis of several criteria. First, because of a partial-year bias problem, 171 lines with substantial 1977 acquisitions or divestiture activity were deleted.¹⁴ Second, 303 manufacturing lines that had been reported by the company in a miscellaneous (99.99) category in 1975 were excluded because their historical merger records were incomplete. Third, 227 lines of 12 companies for which the merger histories were of poor quality were dropped. Finally, 18 lines were excluded because their (operating income / assets), or (operating income / sales), ratios exceeded ± 100 percent, since such "outlier" values could overwhelm the statistical patterns among more "normal" lines. Sensitivity of the results to the last two exclusion rules will be tested.

For the 2,955 LBs in our 1977 sample, a total of 5,552 non-divested acquisitions (excluding mergers of equals) between 1950 and 1977 were

recorded. This overstates the number of unitary mergers made and surviving through 1977, since some acquisitions were divided across multiple lines of business and are therefore counted more than once. Thirteen percent of all non-equals acquisitions affected more than one surviving manufacturing LB. For them, the average number of lines per acquisition was 2.42. The average (typically large) merger of equals affected 3.9 lines of business. No non-equals acquisitions were recorded in 717 LBs. Of these, 289 were lines in which the parent corporations did not operate in 1950, suggesting either that the line was entered by internal development or (less likely) that a seminal non-equals merger escaped our attention. Of the 1,151 lines in which the sample companies and their mergers-of-equals partners operated during 1950, 723 had one or more non-equals acquisitions. The number of lines not occupied in 1950, but making one or more subsequent non-equals acquisitions, was 1,515. Most were cases of diversification through acquisition. Within the 2,238 lines, new and old, with non-equals acquisitions between 1950 and 1977, 45 percent had only one acquisition and 24 percent only two acquisitions. Six or more acquisitions were recorded in 7.6 percent of the acquisition-making LBs.

IV. Post-Merger Performance Variables

Our principal index of individual LB profitability PROF77:A is the ratio of 1977 operating income (after depreciation, but before deduction of capital charges, extraordinary items, and income taxes) to end-of-period assets. It is expressed in percentage terms. We also examine more briefly the ratio of 1977 operating income to sales PROF77:S. Comparison of these ratios is informative because the choice of a merger accounting

method can affect both the numerator and denominator of the assets-deflated measure but only the numerator of the sales measure.

The extent of merger activity is measured by a variable MERGSHR, relating the value of assets acquired at the time of acquisition (in other than mergers of equals) to an LB's end-of-1977 assets.¹⁵ A potential problem with MERGSHR is that when, for some reason, the subject LB's assets have shrunk over time, MERGSHR can exceed 1.0, possibly greatly. Such shrinkage usually reflects some kind of failure -- e.g., unprofitable operations that have led to writeoffs, plant closures, and/or sell-offs. Twelve percent of the LBs with one or more acquisitions had MERGSHR values in excess of 1.0, and one percent had values of 2.5 or more. To avoid letting outlier values dominate the statistical analysis and also to reflect the fact that a line cannot have been more than 100 percent merger-originated, the outlying values were truncated to 1.0. The sensitivity of results to this and other key data assumptions will be tested. Results will also be presented for an alternative categorical dummy variable method of measuring merger activity.

For the non-equals acquisitions covered by MERGSHR, the variable POOL measures MERGSHR times the fraction of all acquired assets in an LB accounted for as poolings. The corresponding variable PURCH measures MERGSHR times the fraction of acquired assets accounted for as purchases.¹⁶ These accounting treatment multipliers are bimodally distributed, since nearly half of all LBs with acquisitions had only one acquisition and because, for multiple acquisition lines, companies often made consistent accounting choices. Thus, of all LBs with acquisitions,

31 percent treated at least 97.5 percent of their acquired assets as poolings, while 40 percent treated all or virtually all of their acquired assets as purchases.

Our objective is to assess the impact of mergers and their accounting treatment on profitability while controlling for other relevant influences. We approach the merger effects estimation problem using covariance analysis. Industry effects are controlled by letting each of 257 four-digit industry categories with reporting LBs have its own profits regression intercept value (in effect, imposing 256 intercept dummy variables). See Schmalensee (1985). Thus, in the narrowest sense, the control group is the set of lines, each normalized to its home industry's average profitability and other relevant independent variables, with zero acquisition activity. That set contains nearly one-fourth of all 1977 sample LBs. However, since the acquisition activity variables POOL and PURCH are continuous, the control group also includes lines with acquisition activity arbitrarily close to zero. Of the 1977 sample lines, 38 percent had MERGSHR values of .05 or less and 52 percent had values of 0.15 or less. An alternate control approach was to introduce variables measuring industry average capital intensity, R&D outlays as a percentage of industry sales, industry advertising outlays as a percentage of sales, imports as a percent of apparent domestic consumption, exports as a percent of industry sales, an estimate of minimum efficient plant scales as a percentage of industry sales, and 1972-77 real (i.e., price-deflated) industry sales growth ratios. Except in yielding lower R^2 values, indicating less complete control for inter-industry differences, the

results were quite similar to those obtained using 256 industry dummies and will not be reported here.

Three additional variables are defined at the individual line of business level. EQUALS is a dummy variable with a value of 1 if the LB had a merger of equals, i.e., with the merging firms' assets differing by no more than a factor of two and with pooling of interests accounting adopted. NEW is a dummy variable with a value of 1 for LBs in which the parent corporation did not operate in 1950 and for which no acquisitions were recorded. SHR77 measures (in ratio form) the 1977 market share of an LB in its four-digit FTC industry category (defined nationally).¹⁷ Its average value is 0.037 (i.e., 3.7 percent), with a standard deviation of 0.065. In prior studies using line of business data, profitability has been found to increase consistently, the larger a line's market share was.

V. Results

Table 2 presents the basic ordinary least squares regression results. T-ratios for the regression coefficients are given in subscripted parentheses. For all merger effect variables, two-tailed hypothesis tests were applied, since it was unclear a priori whether lines with a merger history would be more or less profitable than the (low merger) control group, all else equal.

Regressions (2.1) and (2.2) correspond most closely to the estimates made in previous merger profitability analyses, i.e., with no control for merger accounting methods. They suggest that more intense merger activity is associated with significantly lower profitability.

Table 2

BASIC MERGER EFFECT REGRESSIONS

Dependent Variable	(2.1)	(2.2)	(2.3)	(2.4)	(2.5)	(2.6)	(2.7)	(2.8)
	PROF77:K	PROF77:K	PROF77:K	PROF77:K	PROF75:K	PROF76:K	PROF77:S	FLOW77:S
Mean	13.9%	13.9%	13.9%	13.9%	11.7%	13.4%	7.8%	10.3%
Intercept values	+14.4### (35.2)	[257 values] ###	[257 values] ###	[257 values] ###	[257 values] ###	[257 values] ###	[257 values] ###	[257 values] ###
MERGSHR	- 1.60# (1.77)	-2.35## (2.50)						
POOL		+ 1.99 (1.56)	+ 3.36### (2.63)	+ 1.29 (1.04)	- 1.60 (1.31)	+ 1.09 (1.50)	+ 0.96 (1.30)	
PURCH		- 5.27### (4.35)	- 3.74### (3.05)	- 3.31### (2.64)	- 3.48### (2.88)	- 1.46## (2.10)	- 1.64## (2.33)	
NEW		+ 1.82 (1.59)	+ 3.11### (2.70)	+ 0.76 (0.67)	- 0.39 (0.35)	+ 1.19# (1.82)	+ 1.24# (1.89)	
EQUALS		+ 1.61 (1.46)	+ 2.00# (1.82)	+ 1.55 (1.43)	+ 2.29## (2.13)	+ 0.97 (1.56)	+ 0.75 (1.20)	
SHR		+39.25*** (6.34)	+30.11*** (4.73)	+28.07*** (4.91)	+25.37*** (7.20)	+24.81*** (6.99)		
R ²	.0011	.1338	.1421	.1547	.1862	.1474	.1791	.1930
N	2,955	2,955	2,955	2,955	3,223	3,101	2,955	2,955

*Significant in one-tail test at .10 level, ** at .05 level, *** at .01 level.
 #Significant in two-tail test at .10 level, ## at .05 level, ### at .01 level.

The remaining regressions distinguish between mergers made under pooling-of-interests and purchase accounting. The effects are quite different. With only one exception, pooling mergers are found to be more profitable than the control group, though not always significantly so. Purchase mergers, on the other hand, are significantly less profitable.

Because the POOL mergers, unlike the PURCH mergers, experienced no merger-related asset revaluations, their profitability is more directly comparable to that of control group (no or low-merger) lines. Considering first the results for 1977, we see that a statistically significant positive merger effect emerges only when operating income is related to assets, not sales [compare regressions (2.4) and (2.7)], and only when a market share variable is included [equation (2.3) vs. (2.4)]. The SHR77 effect (discernible also for NEW and PURCH lines) occurs because the market shares of lines with mergers, and especially of lines in which the parent companies did not operate in 1950, were much smaller on average, as the following market share averages testify:

	Mean Market Share	Number of LBs
1950 operations, no acquisitions or mergers of equals	0.076	381
1950 operations, with acquisitions	0.056	723
No 1950 operations, no acquisitions or mergers of equals (NEW)	0.020	274
No 1950 operations, with acquisitions	0.021	1,515
Mergers of equals	0.035	267

Given the strong positive association between market share and profitability (attributable inter alia to scale economies and first-mover advantages), including SHR77 controls for an influence that otherwise depresses the profits of small-share, acquisition-prone post-1950 lines. Whether the market share effect is truly exogenous, or whether lower market shares followed causally from merger, is a question to which we must return in Section VI. For the moment, we err on the conservative side of assuming that it should be controlled, and we do so in the remaining regressions of Table 2.

Regressions (2.5) and (2.6) reveal that even when market shares are taken into account, pooling merger-prone lines were not significantly more profitable than the control group in 1975 (a year of sharp recession) and 1976. This has several possible interpretations. One might be that the acquired companies were unusually vulnerable to business downturns. However, this selection bias hypothesis is inconsistent with the Table 1 evidence showing that the companies acquired in 1971 actually fared relatively better in recession year 1970 than other acquirees did in boom years 1967 and 1973. Second, the managements of acquired entities may have had more trouble coping with the recession of 1975 than their non-acquired peers, but through sell-offs and other changes, got their acts in order again by 1977. For this hypothesis there is some support. Fifty-seven lines included in the 1976 regression were sold off in, or at least beginning in, 1977. If those LBs are deleted from the 1976 regression, the coefficient on POOL changes from - 1.60 [the value reported in regression (2.6)] to - 0.47. Finally, an agnostic interpretation would be that the profitability effects of acquisition jump around a fair amount

and, averaged over three years of the business cycle, were mildly and insignificantly positive.

The 1977 POOL coefficient of regression (2.4), controlling also for SHR77, implies that moving from having no acquisition history to 100 percent pooling merger origination of 1977 asset values was accompanied by profitability premiums of 3.36 percentage points, all else equal. However, Table 1 reveals that before merger, companies subjected to pooling-of-interests acquisition had operating income / asset ratios surpassing those of two-digit industry peers (but not controlling for market share differences or business cycle changes) by 8.18 percentage points on average. Thus, post-merger profitability appears to have fallen. More light will be shed on this interpretation shortly.

The PURCH coefficients are consistently negative and statistically significant for all years and regression specifications. Given the evidence that pre-merger profits of companies acquired under purchase accounting were insignificantly different from those of manufacturing universe peers, this too suggests a post-merger decline. One possible reason is the payment of premiums over the acquired entity's book value, raising post-merger asset values and depreciation charges. Both numerator and denominator of assets-deflated regression (2.4) are affected by this phenomenon, but only the numerator of an operating income / sales regression (2.7) is affected. The stronger absolute and relative impact of PURCH in regression (2.4) as compared to regression (2.7) is consistent with this difference. If higher depreciation charges were an important reason for the reduced profitability of purchase accounting acquisitions, that effect should vanish when the dependent variable is measured in terms

of cash flow (operating income plus depreciation) as the dependent variable. In fact, as cash flow regression (2.8) shows, the negative PURCH effect is slightly greater, not smaller, with a cash flow definition, and the absolute difference between pooling and purchase mergers is 2.62 percentage points -- a trivial change from the 2.55 point difference with operating income regression (2.7).¹⁹ A systematic depreciation effect may not be observable because asset stepups went preponderantly into good will, which did not have to be amortized before 1970 and were subjected to long (e.g., 40 year) amortization periods thereafter.

That asset stepups occurred is suggested by the relative differences between the POOL and PURCH coefficients in asset-deflated regression (2.4) as compared to sales-deflated regression (2.7). That is, we compute the absolute difference between the POOL and PURCH coefficients and relate it to average all-sample profitability, augmented by the merger-related premium implied by POOL. For asset-deflated regression (2.4), the relative POOL - PURCH differential is $100 [7.10 + (13.9 + 3.36)] = 41$ percent, compared to $100 [2.55 + (7.8 + 1.09)] = 29$ percent for sales-deflated regression (2.7). The implication is that asset denominators rose [in equation (2.4) only] while operating income fell relatively (in both regressions).

The consistently positive, although not always significant, coefficients for the EQUALS variable suggest that mergers of equals may have been more successful in avoiding profitability declines. This inference is strengthened by an analysis of 45 cases (out of 69) on which

pre-merger profitability data for both partners were available. After adjustment for business cycle and trend influences, operating income averaged 12.1 percent of assets for the larger of the partners, 14.5 percent for the smaller, and 12.6 percent for the asset-weighted average of the two.²⁰ The weighted average is slightly but statistically insignificantly below the 1974-77 all-sample average return of 13.3 percent. By this comparison, a modest increase in post-merger profitability is indicated. However, the average 1974-77 return of EQUALS lines for those 45 cases was 12.0 percent. Here, with no control for industry effects and market share, an insignificant decline is implied. The most that can be concluded is that the changes were small and equivocal.

Except in 1976, positive coefficients also emerge for the categorical variable NEW, although statistical significance is achieved only for 1977 after controlling for market share (which for NEW lines was well below the all-sample average). The NEW lines were those not operated by the parent in 1950 and without evidence of merger activity. Although a few may have originated in mergers too small to be recorded, most undoubtedly came from internal development. Among other things, NEW lines had significantly higher R&D/sales ratios than other sample lines. Their depressed profitability in 1975 and 1976 may reflect the characteristically low returns on research and development that seemed to prevail more generally in the U.S. economy during those years (but not for 1977 and 1978), as measured in a distributed lag analysis of a quite different sample.²¹

Sensitivity Analyses

Numerous tests were conducted to determine whether the results were sensitive to sample and variable redefinitions.²² Several entailed substitutions for MERGSHR, a key component of POOL and PURCH, whose measurement had to overcome numerous conceptual and data gap problems. Truncating MERGSHR at 3.0 rather than 1.0 imparted no significant change. Neither did substituting an alternative to MERGSHR in which acquired asset values were inflated at the nominal asset growth rates experienced by their home industry between the year of acquisition and 1977, with the resulting index truncated at a maximum value of 1.0. Letting that growth-adjusted index have values as high as 5.0 did reduce regression coefficient values appreciably, but did not alter signs or significance patterns. In a quite different alternate approach, two zero - one categorical variables were substituted for the continuously-scaled MERGSHR, as follows:

ORIGMERG Unit value if parent operated in that line in 1950 and
 at least one non-equals acquisition was consummated.

NEWMERG Unit value if parent not in that line in 1950 and at
 least one non-equals acquisition was consummated.

Each was then multiplied by the fraction of acquired assets handled as poolings and purchases. With these substitutions, the analogue to regression (2.4) is as follows:

$$\begin{aligned} (1) \text{ PROF77:A} &= [257 \text{ values}] + 1.87\# \text{ NEWMERG(POOL)} - 3.02\#\#\# \text{ NEWMERG(PURCH)} \\ &\quad (1.73) \qquad\qquad\qquad (2.76) \\ &- 0.61 \text{ ORIGMERG(POOL)} - 0.90 \text{ ORIGMERG(PURCH)} + 2.68\# \text{ NEW} \\ &\quad (0.43) \qquad\qquad\qquad (0.76) \qquad\qquad\qquad (1.98) \\ &+ 2.02\# \text{ EQUALS} + 39.45\#\#\# \text{ SHR77}; \quad R^2 = .1562. \\ &\quad (1.82) \qquad\qquad\qquad (6.25) \end{aligned}$$

The NEWMERG(POOL) regression coefficient estimates the pooling merger profitability of an average post-1950 line -- i.e., one with acquired assets amounting to 48 percent of total 1977 assets. To be comparable with the POOL = 1 interpretation of regression (2.4), it must be inflated by $1 / 0.48$. The average PROF77:A impact estimated in this way is 3.90 percentage points, which is reasonably close to the 3.36 point value of regression (2.4). For the 723 ORIGMERG lines, in which the parent companies already had a meaningful presence by 1950, the merger effect coefficients are more equivocal. In those lines, acquired assets amounted on average to only 20 percent of 1977 assets. It seems plausible that the merger effects were submerged in the noise associated with non-acquired activity. Taken as a whole, these sensitivity tests suggest that the observed merger effects are robust and do not simply stem from specific measurement assumptions.

To control for the effect of additional accounting convention differences,²³ dummy variables signifying the use of last-in, first-out inventory accounting and straight-line (as contrasted to accelerated) depreciation were introduced. The LIFO variable coefficient was of minute size and statistically insignificant. The straight-line depreciation coefficient was negative and significant, presumably because sample assets were on average at an age (5 to 10 years) where accelerated, but not straight-line, depreciation allowances had been largely accrued. Compared to regression (2.4), key structural estimates²⁴ were little affected:

POOL	3.57### / (2.78)
PURCH	-3.29## / (2.67)
NEW	2.92## / (2.54)
EQUALS	2.08# / (1.89)
SHR77	36.91*** / (5.91)
LIFO	-0.22 / (0.29)
STLINE	-3.38### / (3.62); $R^2 = .1588$.

Further sensitivity tests deleted LBs in which the accounting method for 25 percent or more of acquired assets was predicted with a logit model rather than being ascertained directly, added LBs for companies with low-quality merger histories, and added LBs with (operating income / assets) percentages exceeding ± 100 percent. Sign patterns were invariant and regression coefficient estimates were seldom much affected, although for the regression with outlying profit values included, the PURCH coefficient dropped to -9.04 percentage points.

The Time Structure of Profit Effects

In emphasizing the 1977 profitability estimates, we adopt the most positive perspective consistent with our data. Finding that at least in relatively prosperous 1977, pooling merger lines had profits significantly above control group norms, we probe further into the nature of those increments. In particular, the 3.36 point POOL coefficient estimate of regression (2.4) assumes an effect of that magnitude no matter when acquisitions were made. That is, a rectangular time structure is implied. We now test that restriction. The wedge permitting such a test is a variable YEAR, measuring the average year of merger activity. For LBs

with only one non-equals acquisition, it is the year in which the acquisition was consummated. For LBs with multiple acquisitions, it is the acquired asset-weighted average of acquisition years. Its median value occurs at 1967.

Since a complete profit time series was not available, alternate time lag structures were pre-specified and imposed upon the merger effect coefficients. The best-fitting specification was then sought. The simplest formulation is a triangular lag structure under which POOL (or PURCH) is weighted by:

$$(2) \quad YLAG = YEAR - 1950,$$

where YEAR is the average acquisition year. This specification assumes profit effects that diminish linearly to zero in 1950. Alternatively, POOL (or PURCH) is weighted by $27 - YLAG$ for a structure with increasing effects.

For both the pooling and purchase effects, the best-fitting triangular lag structure of this type was the diminishing effect version, reported as regression (3.2) in Table 3. For comparison, the rectangular lag regression (equation (2.4) of Table 2) is repeated as regression (3.1). Adding the triangular POOL lag coefficient to a regression with rectangular effects leads to a reduction of unexplained variance significant at the 15 percent level: $F(1,2692) = 2.53$. The declining triangular PURCH lag was not significantly different from its rectangular counterpart; $F(1,2692) = 0.43$. The decreasing triangular structure did prove significantly superior to lags that increased triangularly over time for both POOL and PURCH: $F(1,2692) = 7.33$ and 6.55 respectively.

Table 3

BEST-FITTING TIME LAG STRUCTURE REGRESSIONS

	(3.1)	(3.2)	(3.3)	(3.4)
	Rectangular	Constrained Triangular	Unconstrained Triangular	Pooling Quadratic, Purchase Triangular
	[257 constants]	[257 constants]	[257 constants]	[257 constants]
Intercept				
POOL	3.36### (2.63)			
POOL x YLAG		0.198### (3.00)	0.357 ### (3.05)	0.059 (0.18)
POOL x (YLAG) ²				0.007 (0.43)
PURCH	-3.74### (3.05)			
PURCH x YLAG		-0.178### (3.11)	-0.130### (3.23)	-0.181### (3.14)
NEW	3.11### (2.70)	3.17### (2.78)	3.06### (2.69)	3.13### (2.73)
EQUALS	2.00# (1.82)	1.97# (1.80)	1.97# (1.79)	1.97# (1.79)
SHR77	39.25*** (6.34)	39.66*** (6.43)	39.30*** (6.38)	39.53*** (6.40)
R ²	.1547	.1553	.1555	.1554

The pooling acquisition above-control profitability profile implied by regression (3.2) is illustrated by the dashed line in Figure 1. For comparison, the rectangular lag structure of equation (3.1) is shown by a dot-dash line. With the regression (3.2) structure, acquisitions consummated in 1976 brought 1977 profitability averaging 5.4 percentage points above no-merger levels. The "older" an acquisition was, the more its above-control profitability deteriorated. A similar interpretation of the PURCH effect (not graphed) implies returns 4.4 percentage points below the control group (or $4.4 + 5.1 = 9.5$ points below pooling merger returns) for the most recent (1976) acquisitions. They depreciate linearly to zero for 1950 acquisitions.

Regression (3.2) constrains the lag effects to equal zero in 1950. When this restriction is removed [in effect, by adding a variable intercept year constant to equation (3.2)], the best-fitting specification was regression (3.3). The fit is slightly, but not significantly, superior to that when both merger effects are constrained to have a 1950 intercept. For the unconstrained POOL effect, graphed by the solid line in Figure 1, profitability for 1977 (the first year whose mergers are excluded, and hence the last pre-merger year) is estimated at 9.7 percent. This closely approximates the pre-merger supra-normal profitability of pooling mergers in Table 1. For POOL lines acquired before 1959, returns are negative relative to the control group. For PURCH acquisitions (not graphed), recent-year effects are negative, and a crossover occurs only at 1941. This slow rate of depreciation explains why one cannot distinguish statistically between triangular and rectangular lag structures.

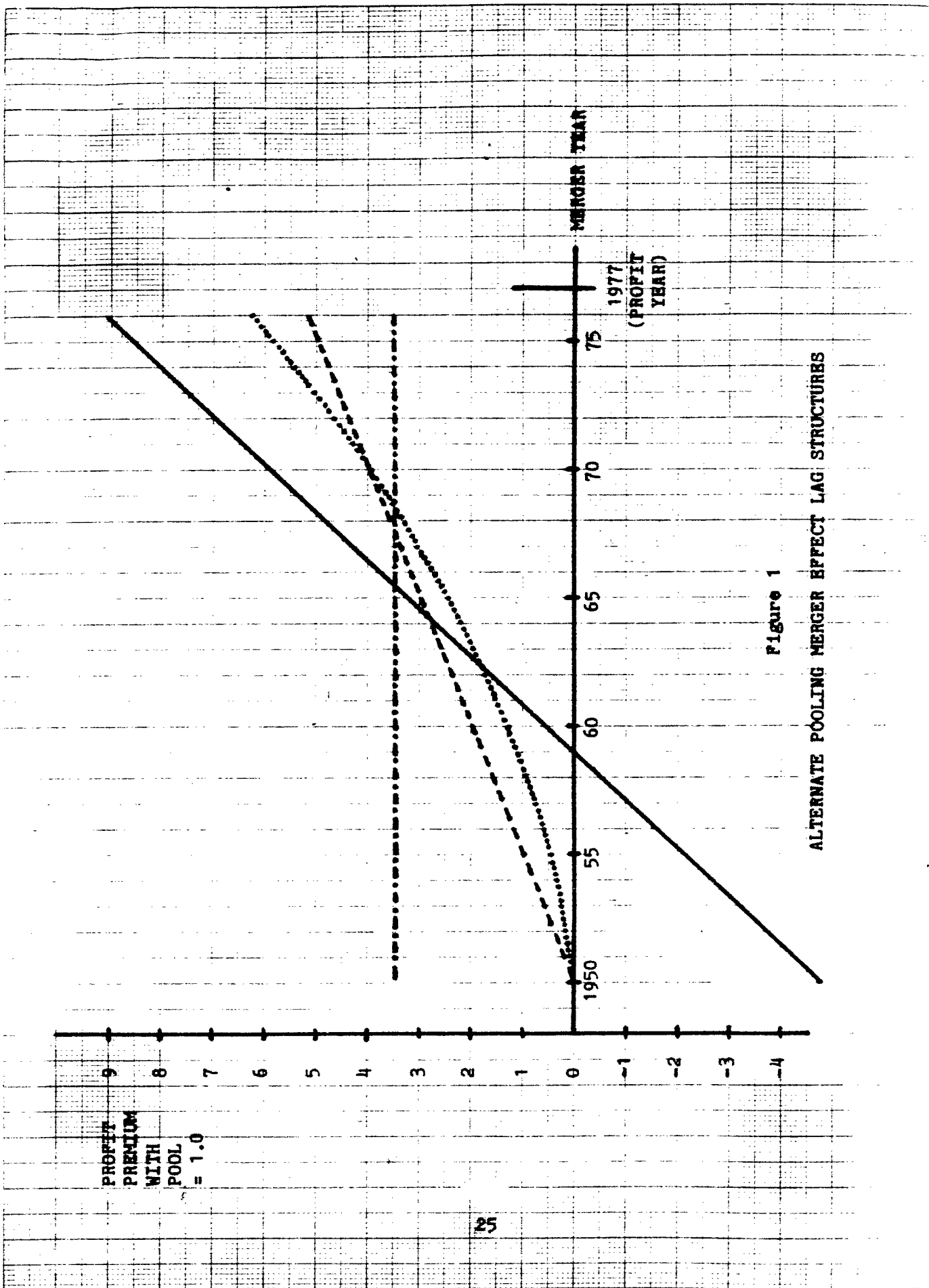


Figure 1

ALTERNATE POOLING MERGER EFFECT LAG STRUCTURES

It seems clear that pooling merger profitability effects were decreasing over time, not increasing or constant. However, the linear models tested thus far might not characterize the relevant time patterns fully. In particular, acquisitions might need a few "shakedown" years before reaching maximum profitability, after which decline commences. To test this hypothesis, three nonlinear models were estimated. First, YLAG was introduced quadratically in the 1950 intercept-constrained version. If the "shakedown" hypothesis were correct, an inverted U shape, with a negative squared term coefficient, should emerge. Actually, as regression (3.4) shows for a model with quadratic POOL effects only, both the linear and squared terms were positive but (because of extreme collinearity) insignificant. The F-ratio for the additional squared term is only 0.18. The resulting POOL lag structure, shown by a dotted line in Figure 1, differs little from the triangular structure of regression (3.2). Results for a quadratic PURCH effect were similarly weak. Second, the years 1974, 1975, and 1976 were allowed to have their own intercept shift dummy variables interacting with the merger effect variables. The "shakedown" hypothesis received no support. All dummy coefficient values were insignificantly different from zero, with t-ratios of less than 0.32 for the three POOL shift dummies. Third, an inverted U shape was forced upon the data by estimating nonlinearly a binomial POOL lag structure. The best-fitting variant, with a peak profit effect in 1973, was inferior in fit to all of the simpler declining lags graphed in Figure 1. Thus, the nonlinear tests warrant no revision of previous conclusions.

The declining profits of pooling mergers with increasing age could have several alternative explanations. Acquiring firms might have become

more selective over time, picking acquisitions of enhanced earning power as their skill at merger-making grew. This conjecture is inconsistent with the pre-merger profitability evidence of Table 1. Second, the observed decline may reflect the tendency (first identified by Francis Galton and explored with respect to profits by Mueller, 1986) for abnormal returns, positive or negative, to regress over time toward "normal" levels. Third, and more squarely at odds with any efficiency hypothesis, acquired corporations may have suffered from control loss problems in managing their acquisitions. Or they may have treated many acquisitions as "cash cows," charging high prices and inducing profit-eroding entry, or electing not to reinvest earnings in plant modernization, new product development, and advertising.²⁵ Fourth, and consistent with an increase in efficiency despite declining profitability, the supra-normal pre-merger profitability of acquired entities may have been caused by the firms' inability to finance all attractive investments. By breaking capital market constraints, mergers may have permitted expansion along a declining marginal efficiency of capital schedule until marginal capital costs and returns were equalized.

Matched Pre- vs. Post-Merger Analysis

To help discriminate among these alternatives, a further pre- vs. post-merger analysis was undertaken. It was limited to lines of business satisfying several criteria:

- (1) The line was new to the parent company, originating from a single acquisition not augmented by further acquisitions.
- (2) Pre-merger financial data were available (usually from

NYSE listing applications) on the acquired company.

(3) Post-merger data were available for all the years 1974-77; and

(4) The acquisition was accounted for as a pooling, so that no asset revaluation ensued.

These stringent criteria were satisfied in 67 cases. The sample is probably biased on the side of more successful acquisitions, since the resulting lines survived several years of high sell-off activity and since parent corporations were not required to disaggregate their financial reports for lines with sales below a \$10 million minimum threshold. The reporting threshold together with the single acquisition criterion imply not only survival fitness, but also a bias toward larger pre-merger size. In fact, median pre-merger assets were \$12.0 million, compared to \$2.4 million for the less constrained sample of Table 1.

Like the much larger sample of Table 1, the matched sample firms enjoyed returns well above all-manufacturing averages in the year before their acquisition. Their simple average operating income was 21.0 percent of assets unadjusted, or 25.2 percent when the profitability ratios were adjusted to reflect cyclical and trend changes in the contemporary Quarterly Financial Report manufacturing figures relative to a 1974-77 benchmark value of 12.50 percent. The matched lines' average 1974-77 operating income was 12.24 percent of assets: a decline of more than half over the average of seven years from the time of their last pre-merger earnings report to the midpoint of the 1974-77 period. Despite the passage of time and an average general price level rise of 52 percent,

only 57 percent of the matched lines experienced an absolute (i.e., not asset-deflated) current-dollar operating income increase between the pre- and post-merger periods.

Although there was little increase in profits and a sharp decline in profit rates, considerable asset growth occurred. Two-thirds of the lines experienced nominal asset growth rates greater than those of the four-digit industry category to which they belonged. The mean asset growth rate was 8.93 percent per annum, compared to a mean of 7.68 percent over matched time periods for the counterpart four-digit industries. Thus, there is no evidence that the acquired and surviving (i.e., not sold off) lines were on average treated as cash cows or otherwise deprived of investible funds. Some lines grew extraordinarily rapidly. Ten of the 67 had asset growth rates of 20 percent or more per year. Their average pre-merger operating income / assets ratio was an unusually high 27.1 percent; their average post merger rate was 14.3 percent. However, among the ten there was no obvious relationship between growth and 1974-77 profitability. Some remained supra-normally (though less) profitable while some overshot and had sub-normal 1974-77 returns.

To probe further, the normalized 1974-77 operating income / assets percentage POSTPI was regressed on two variables: the comparable ratio PREPI for the last pre-merger year, and the average percentage growth rate of acquired entity assets GROW. To capture the spirit of the Galtonian regression-toward-normal hypothesis, we subtracted from each profit figure 12.5 percent, the average operating income / assets value for all manufacturing corporations over 1974-77. Pre-merger profits were also

adjusted to macroeconomic comparability with the 1974-77 experience.

The resulting regression equation was:

$$(3) \quad \text{POSTPI} = -2.84 + 0.10 \text{ PREPI} + 0.15 \text{ GROW}; \quad R^2 = 0.034.$$

$$\quad \quad (1.31) \quad (0.81) \quad (0.81) \text{ [sic]}$$

The coefficient on PREPI would have a value of 1.0 if there were no regression toward "normal" and zero if there were complete regression. 27

It is not significantly different from zero, but differs from 1.0 with high significance ($t = 7.18$).

There remains the counter-factual question of whether profits would have declined as much had merger not occurred. Like all counter-factuals, it can have no certain answer. However, to test it as fully as possible, a special control sample was drawn. It consisted of all primarily-manufacturing corporations on the COMPUSTAT tape from 1965 through 1980, whose 1965 assets were \$50 million or less and whose 1965 operating income was 15 percent or more of assets. The median 1965 assets of the 261 "independent survivors" meeting these criteria was \$13.8 million, closely approximating the 67 matched merger company last-year value of \$12.7 million. The survivors' 1965 average operating income / assets ratio, adjusted for macroeconomic changes, was 24.1 percent, again approximating the matched merger company value of 25.2 percent. Thus, the two samples were as alike as possible in key respects, except that one group remained independent and the other did not.

When the matched merger and independent survivors groups were pooled, and letting DM be a dummy variable identifying the 67 matched merger lines, ²⁸ the regression analogous to equation (3) was:

$$(4) \text{ POSTPI} = - 4.55 + 0.32 \text{ PREPI} - 0.19 \text{ DM} \times \text{PREPI} + 0.24 \text{ GROW};$$

(4.68)
(5.76)
(2.78)
(3.48)

$$R^2 = .157, N = 328.$$

The 0.32 coefficient on PREPI again suggests considerable regression toward the "norm." However, the negative and significant coefficient on DM x PREPI reveals that the profits of matched merger lines regressed (mostly, fell) more rapidly than those of the control, even though, with an average pre-merger profit reporting date of 1968, they had less time to do so than the control group (with data uniformly for 1965).²⁹

By selecting our control group with a 15 percent floor on the 1965 operating income / assets variable, which is subject to random fluctuations over time, we have virtually guaranteed a Galtonian regression effect on the coefficient of PREPI in equation (4). However, case study interviews (see Scherer, 1986) revealed that acquiring companies at least tried to find candidates with sustainable profitability, not one-year flashes in the pan. The multi-year pre-merger analysis of Section III also suggests some sustainability. Therefore, the independent survivor group was culled to eliminate companies whose 1966 or 1967 operating income / assets ratio was less than 70 percent of the 1965 value. For the 179 companies that survived this screen, the counterpart to regression (4) was:

$$(5) \text{ POSTPI} = - 3.59 + 0.40 \text{ PREPI} - 0.29 \text{ DM} \times \text{PREPI} + 0.19 \text{ GROW};$$

(3.13)
(5.06)
(3.54)
(2.36)

$$R^2 = .160, N = 246.$$

Here the control group regression effect is smaller, as expected, while the matched merger offset coefficient increases commensurately. In each

of equations (3) through (5), the matched merger group lines retained only 10 to 13 percent of their pre-merger supra-normal profits, while the control group retained 32 to 40 percent.

The positive and significant coefficients on GROW in equations (4) and (5) suggest that rapid asset growth is associated with higher end-of-period profitability. It is of interest too that the average (N = 261) independent survivors' asset growth rate was 13.1 percent per year, compared to 8.9 percent for the matched merger group -- a difference that is highly significant. Clearly, the small, profitable companies that chose to remain independent were not deprived of growth capital relative to the acquired lines. This suggests that had the mostly-private, highly profitable acquired firms chosen to remain independent but "go public," their growth in the counter-factual might not have been stunted.

The Role of Acquisition Type

For our final thrust at disentangling how merger activity affected profitability, we return to the full 1977 sample and augment regression (2.4) of Table 2. New variables estimating the fraction of an LB's acquired assets in horizontal, vertical, "related business," and pure conglomerate merger categories are introduced, as follows:

- | | |
|-------|---|
| HORIZ | Acquiring company had at least five years experience in the same FTC four-digit industry category before acquisition. |
| VERT | Acquired unit made at least 5 percent of its sales to, or purchases from, another unit operated by the parent company for at least five years before acquisition. |
| RELAT | Acquiring company had at least five years experience in the |

same two-digit industry group before acquisition, but no horizontal or vertical connection.

CONGLOM None of the above criteria satisfied.

The definitions emphasize the accumulation of experience facilitating effective management, and hence the avoidance of control loss problems, rather than possible monopoly power relationships. Since the antitrust laws were fairly strictly enforced with respect to mergers during most of the period covered, and since some of the four-digit FTC categories are broader than meaningful antitrust markets, our hypothesis is that positive HORIZ values should mainly reflect relative managerial effectiveness. "Pure" conglomerate merger activity peaked at 51 percent of all assets acquired in the 1966-70 time period, averaging 33 percent of acquired assets in the other years.

The regression equation analogous to equation (2.4) is as follows:

$$\begin{aligned}
 (5) \text{ PROF77:A} &= [257 \text{ constants}] + 4.18\# \text{ HORIZ} \times \text{POOL} \\
 &\quad (1.73) \\
 &+ 1.77 \text{ VERT} \times \text{POOL} \quad + 5.61\#\#\# \text{ RELAT} \times \text{POOL} \\
 &\quad (0.42) \quad (2.74) \\
 &+ 1.18 \text{ CONGLOM} \times \text{POOL} \quad - 3.74\#\#\# \text{ PURCH} + 3.10\#\#\# \text{ NEW} \\
 &\quad (0.66) \quad (3.06) \quad (2.69) \\
 &+ 1.96\# \text{ EQUALS} + 39.12\#\#\# \text{ SHR77}; \quad R^2 = .1557. \\
 &\quad (1.78) \quad (6.31)
 \end{aligned}$$

Only the horizontal and related business mergers exhibit significantly positive pooling profit premiums relative to the (no merger) control group. The related business coefficient is actually larger, suggesting

that relevant industry group experience, rather than monopoly power (much less likely with related than horizontal mergers), underlies them. The premium return expected for vertical mergers failed to materialize, perhaps because of their relative infrequency (11 percent of total acquired assets) and high collinearity with horizontal activity, or because internal transfer pricing choices shifted profits to other lines. See Ravenscraft (1985).

VI. Interpretation

Our cross-sectional and pre - post analyses strongly support a conclusion that the business entities acquired during the 1960s and early 1970s were highly profitable before acquisition and, after acquisition, experienced profit declines. Indeed, were it not for the pruning that occurred through a sell-off wave that peaked in 1971, no above-control profits might have been detected even for 1977. This experience is difficult to reconcile with the conjecture that mergers turned out on average to be profit-increasing and efficiency-enhancing. The most sanguine reconciliation is that mergers broke capital rationing constraints, allowing firms to invest and move down marginal (and average) efficiency of capital functions. It is supported at best only weakly. Another explanation is that merger-makers selected firms whose profits were at unsustainably high levels, and that after merger, Galtonian regression occurred. Again, there is supporting evidence, but the drop in acquired firm profits appears to have been much greater than what was observed for a no-merger control group of similar size and pre-merger profitability.

Additional evidence goes beyond these relatively benign explanations. Profits following many acquisitions did not merely regress, they fell well below "normal" levels. Large numbers of lines with negative operating income on average were sold off.³¹ In a parallel project (Scherer, 1986), we conducted case studies of 15 acquisitions that ended in sell-off. They revealed substantial control loss problems, partly because conglomerate managers proved incapable of coping with exogenous business setbacks and partly because of incentive failures stemming from the parent - subsidiary relationship. Moreover, analyzing detailed line of business sales data from a survey independent of ours, Mueller (1985) found significant 1950-72 market share declines among lines that were acquired, as compared to those of a minimal-acquisition control group. The declines were steeper for lines involved in conglomerate mergers than those merged horizontally -- a finding that parallels our discovery that conglomerate acquisitions had the least favorable pooling profit record in 1977. To the extent that market share declines followed causally from merger, including SHR77 in the profitability regressions, as we have done, over-compensates for exogenous market share differences and hence overstates the profitability of merger. The combined evidence showing market share declines and profitability erosion in the average surviving case and sell-off in numerous extreme cases compels a skeptical answer to the question of whether the average 1960s or early 1970s merger improved the quality of management or yielded "synergies." Mergers of equals, it should be noted, may have been an exception. For them, at least, there is weak evidence of improved pooling basis profitability.

The PURCH variable results show consistently lower average returns on purchase accounting acquisitions than in existing no-merger lines or in lines entered de novo without merger. This result cannot be rationalized in terms of the lower pre-merger returns observed for purchase acquisitions, since they were insignificantly different from all-manufacturing averages. Rather, the depression must have come from some combination of control loss problems and acquisition premiums above the acquired firm's book value.

The asset-increasing effect from takeover premiums is measured explicitly only for acquisitions subjected to purchase accounting. For pooling-of-interests acquisitions, above-book premiums are buried in stockholders' equity accounts. For a subsample of 1,409 manufacturing acquisitions on which comparable data were available (Ravenscraft and Scherer, 1984), the consideration paid averaged 1.75 times the book value of assets for acquisitions treated as poolings, but only 1.05 times assets on purchase acquisitions. ³² Assuming this experience to be representative, consider an LB whose 1977 assets of \$10 million were 100 percent pooling merger-originated. Let the line's operating income be \$1.725 million, i.e., the 1977 all-sample average of 13.89 percent plus the 3.36 percent differential associated with 100 percent pooling merger origin. If a 75 percent acquisition premium above book value had been paid, the line's return under purchase accounting (ignoring added depreciation charges) would have been $100 (1.725 / 17.5) = 9.86$ percent. This is well below all-sample averages and the "hurdle rates" used by large corporations in the early 1970s to screen capital investment proposals. ³³

Thus, it would appear that, especially on pooling-of-interests acquisitions of highly profitable firms, the acquiring companies carried the zero-sum acquisition price bidding game to such lengths that average post-merger returns were sub-normal. And although one cannot be sure what would have ensued in the no-merger counter-factual case, the subsequent deterioration of the average acquisition's profitability suggests that in the longer run, the game turned out to be negative-sum.

The data on which this analysis was based are historical, clustered around the conglomerate merger wave that peaked during the late 1960s. That merger wave, like the one that has appeared in the early 1980s, was accompanied by widespread claims that "synergies" would result and was initially supported by an enthusiastic stock market. If our analysis is at all near the mark, the optimism was unwarranted. The wave of the 1980s is different in many respects. Yet our results caution that current efficiency increase predictions -- claims that can be verified or rejected only after a considerable amount of history has unfolded -- should be accorded appropriate skepticism.

FOOTNOTES

1. For surveys of the literature, see Jensen and Ruback (1983) and Halpern (1983).

2. For a survey, see Mueller (1977).

3. See Jarrell (1983).

4. On some additional biases less important for our sample, see Meeks and Meeks (1981).

5. See Sapienza (1962) and Steiner (1975, Chapter 5).

6. See Ravenscraft and Scherer (1984).

7. See Mueller (1986).

8. For surveys, see Steiner (1975, pp. 185-188), Mueller (1977), and Harris et al. (1982). A survey and comparative analysis spanning seven nations is found in Mueller (1980).

9. Simple averages are more appropriate here than weighted averages, since we will compare the results to unweighted results for a large sample of individual lines of business.

A multiple covariance analysis was carried out to test whether supra-normal returns varied with three other variables. In 1968 ($t = 2.79$) and less clearly in 1971 ($t = 1.34$), supra-normal returns declined with increases in the logarithm of acquired company assets. The declines were 3.28 and 3.45 percentage points respectively for each tenfold increase in acquired company assets. For 1974 the size relationship was positive but insignificant ($t = 0.91$). Dummy variables introduced when operating income for less than a full year had to be annualized (in 10 percent of all cases) and when interest charges could not be excluded in computing operating income (in 6.5 percent of all cases) had erratic signs and were insignificant.

Thirteen observations have been excluded from the sample: seven because they used unconventional merger accounting methods and (consistent with the subsequent post-merger analysis) six because (operating income / assets) percentages exceeded +100 % (four cases) or -100 % (two cases).

10. For 61 companies chosen subject to no minimum profitability constraint but with assets less than or equal to \$50 million, operating income in the last pre-merger year was 16.5 percent of assets, with earlier but insignificant ($F = 0.42$) declines to a trough three years before merger.

11. These results are sensitive to the impact of one severely divergent observation and two other "outliers." When those three firms are deleted from the sample, the profitability pattern is 24.6% in T-1, 22.9% in T-2, 17.1% in T-3, 19.3% in T-4, and 20.4% in T-5. The F-ratio in a test of homogeneity across years is 2.29, which is significant at the 10 percent point.

12. A detailed discussion of methodology will appear in Ravenscraft and Scherer, forthcoming.

13. See Ravenscraft and Scherer (1984).

14. Suppose a merger occurs in the middle of the acquiring corporation's fiscal year and there is no change in acquired entity baseline profitability. Under pooling, the acquirer normally "reaches back" and reports the acquired entity's profits for the acquirer's entire fiscal year. Under purchase accounting, profits are recorded only for the post-acquisition period (e.g., one-half year). When profits are related to assets under the standard end-of-year convention, the profits/assets ratio under purchase accounting will be biased toward zero relative to the ratio under pooling and probably also relative to a competitive rate of return. If a sell-off occurs in midyear, the opposite bias results with either purchase or pooling accounting.

15. For earlier years, the appropriate end-of-year assets denominator is used.

16. Thus, if A is the fraction of acquired assets treated as poolings and $(1-A)$ is the purchase fraction, $POOL = A \times MERGSHR$ and $PURCH = (1-A) \times MERGSHR$. The vectors are not singular because of the MERGSHR multiplier, which does not vary systematically with A and has 721 zero values.

17. For years other than 1977, SHR (without a year value) pertains to the relevant year.

18. Similarly, the zero-order correlation between MERGSHR and SHR77 is -0.21 , which is highly significant. For the subset of LBs originating after 1950 with acquisitions, the correlation is -0.06 , significant at the 1 percent level.

The count of LBs for the first four table entries does not sum to 2,955, the sample size, because mergers of equals for lines in existence by 1950 and without subsequent acquisitions were excluded from the first line count and lines originating after 1950 for a merger of equals partner, and without other acquisitions, were excluded from the NEW count.

19. The insensitivity of results when cash flow is substituted for operating income also suggests that the depreciation accounting problems emphasized by Fisher and McGowan (1983) are inapplicable here. See also Long and Ravenscraft (1984).

20. For 81 of the 138 merger-of-equals partners, three years of pre-merger profitability data could be obtained. On average, the operating income / assets ratio was 8.7 percent (not percentage points) higher in the last pre-merger year than in the previous two years. However, the difference was not statistically significant ($t = 1.28$).

21. See Ravenscraft and Scherer (1982).

22. See McAleer et al. (1985) and Leamer (1985).

23. See e.g. Fisher and McGowan (1983), Long and Ravenscraft (1984), Salamon (1985), Benston (1985), and Scherer et al. (1985).

24. In still another accounting impact test, it was found that the ratio of total non-traceable costs (i.e., those that were allocated from a common corporate pool to individual LBs) to LB sales was negatively correlated with MERGSHR, with or without industry effect controls. Thus, profits of merger-prone lines were apparently not depressed disproportionately by cost allocations from their parents.

25. See Henderson (1979), pp. 163-166.

26. I.e., each positive pre-merger ratio was divided by the variable $MACRO = \frac{\text{Quarterly Financial Report all-manufacturing average for the merger year}}{12.50}$. Negative ratios were multiplied by $MACRO$.

27. If 12.50 is not the correct norm toward which Galtonian regression occurs, the intercept term will be biased away from what should otherwise be a zero value -- negatively if the "norm" is set too high, as appears to be the case in our regressions. Thus, from regression (3), it would appear that the norm should have been approximately 9.5 percent.

28. The methodology here follows Mueller (1985).

29. An alternate formulation of regressions (3) and (4) with PREPI multiplied by a variable measuring the interval between the last pre-merger (or 1965) profit report and 1975.5 had slightly, but insignificantly, more explanatory power. It revealed an even greater difference between the independent survivor and matched merger groups.

30. A further test showed merger type to have no significant relation to the purchase accounting effect.

31. See Ravenscraft and Scherer (1985), and W. T. Grimm (1983), p 34.

32. These estimates err on the low side, since liabilities assumed could not be included in the value of consideration paid.

33. See Hayes (1977), p. 15, and Gitman and Forrester (1977).

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