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CORPORATE MERGERS AND THE CO-INSURANCE OF CORPORATE DEBT

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WHILE NUMEROUS STUDIES have been devoted to examining the returns to the stockholders of merging firms, the same detailed analysis has not been extended to another group of emminently interested security owners—namely the bondholders of these same firms. Indeed, there exists a fundamental unresolved controversy concerning the impact of corporate merger on the value of the merging firms' bonds, and, by implication, the value of their common stock. The controversy revolves around the notion of a "co-insurance" effect for corporate debt and the wealth-transfers thereby engendered.

The idea of a co-insurance effect for corporate debt was first advanced by Lewellen (11). He argued that the joining-together of two or more firms whose earnings streams were less-than-perfectly correlated would reduce the risk of default of the merged firms (i.e., the co-insurance effect) and thereby increase the "debt capacity" or "borrowing ability" of the combined enterprise. He concluded that the increased total borrowing capacity of the resulting firm, in combination with the well-known effect of tax-deductible interest payments, provided an economic incentive for shareholder-wealth-maximizing firms to engage in merger. However, Lewellen's thesis was incomplete because he failed to examine carefully the impact of the co-insurance effect on the value of the merging firm's already outstanding debt.

Higgins and Schall (6) and Galai and Masulis (5) extended the analysis to show that the co-insurance effect would lead to an increase in the market value of the merging firms' debt and a concomitant decline in the market value of their equity. Thus, the net financial result of non-synergistic mergers would be a wealth-transfer from stockholders to debtholders. They concluded that unless firms can neutralize this wealth-transfer they should not engage in merger. However, if firms are either controlled by stockholders or if managers at least seek to maintain shareholders' wealth—let us define these more generally as shareholder-wealth-*protecting* firms—we would expect to observe that merging firms do take steps to neutralize this wealth-transfer.

This paper is a theoretical and empirical examination of corporate merger and the co-insurance of corporate debt. The theoretical section uses a cash-flow analysis to re-examine the co-insurance effect. The comparative advantages of the theoretical framework used here is that the valuation consequences of the co-insurance effect are provided with no distributional assumptions and without

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assuming the validity of any specific capital market pricing mechanism. The empirical section provides a comprehensive examination of the returns to the bondholders of merging firms and the subsequent actions taken by merging firms to neutralize the potential wealth-transfer. The empirical results are important for at least three reasons: First, they represent the first effort to determine the impact of corporate merger on the market value of the merging firms' debt. Second, they provide some direct evidence toward resolving the controversy raised by the co-insurance effect. Third, they provide evidence on the effectiveness of stockholders in protecting their own interests through the media of appointed managers and delegated authority. In this regard, the results provide some indirect evidence on the theory of agency.[1]

I. The Co-Iinsurance Effect and Shareholder-Wealth-Protecting Firms

This section re-examines the co-insurance effect within a perfect capital market framework in which the values of all securities depend only upon the distribution of cash flows which they confer upon their owners and in which bankruptcy is assumed to be costless. Bankruptcy is defined as occurring whenever the face value of the firm's debt obligation exceeds the terminal market value of its assets. When bankruptcy occurs, ownership of the firm is transferred to debtholders, who may then decide either to liquidate it or to continue its operations. In this setting the end-of-period gross dollar return to the debtholders of firm i, $\tilde{Y}_i$, may be expressed as

$$\tilde{Y}_i = \begin{cases} \hat{Y}_i & \text{if} \quad \tilde{X}_i \geq \hat{Y}_i \\ \tilde{X}_i & \text{if} \quad \tilde{X}_i < \hat{Y}_i \end{cases} \tag{1}$$

where $\hat{Y}_i$ is the gross dollar amount *promised* to debtholders, and $\tilde{X}_i$ is the firm's end-of-period gross dollar return after paying all non-capital factors of production.

Suppose that firms A and B combine in a nonsynergistic merger (i.e., $\tilde{X}_C = \tilde{X}_A + \tilde{X}_B$) to form firm C. The total pre-merger cash flow distribution owned by the debtholders of firms A and B may be written as

$$\tilde{Y}_A + \tilde{Y}_B = \begin{cases} \hat{Y}_A + \hat{Y}_B & \text{if} \quad \tilde{X}_A \geq \hat{Y}_A, \tilde{X}_B \geq \hat{Y}_B \\ \hat{Y}_A + \tilde{X}_B & \text{if} \quad \tilde{X}_A \geq \hat{Y}_A, \tilde{X}_B < \hat{Y}_B \\ \tilde{X}_A + \hat{Y}_B & \text{if} \quad \tilde{X}_A < \hat{Y}_A, \tilde{X}_B \geq \hat{Y}_B \\ \tilde{X}_A + \tilde{X}_B & \text{if} \quad \tilde{X}_A < \hat{Y}_A, \tilde{X}_B < \hat{Y}_B. \end{cases} \tag{2}$$

If the merged firm leaves unchanged the debt obligations of the combined pre-merger firms, then $\hat{Y}_C = \hat{Y}_A + \hat{Y}_B$, and from (1), the cash flow distribution owned by the merged firm's creditors is

$$\tilde{Y}_C = \begin{cases} \hat{Y}_A + \hat{Y}_B & \text{if} \quad \tilde{X}_A + \tilde{X}_B \geq \hat{Y}_A + \hat{Y}_B \\ \tilde{X}_A + \tilde{X}_B & \text{if} \quad \tilde{X}_A + \tilde{X}_B < \hat{Y}_A + \hat{Y}_B. \end{cases} \tag{3}$$

1. For an extensive discussion of the economic theory of agency, see Jensen and Meckling (9).

Subtracting (2) from (3) yields the difference between the post- and pre-merger cash flow distributions for all states of the world

$$\tilde{Y}_C-\left(\tilde{Y}_A+\tilde{Y}_B\right)=\begin{cases} 0 & \text{if} \quad \tilde{X}_A \geqslant \hat{Y}_A, \tilde{X}_B \geqslant \hat{Y}_B \\ \hat{Y}_B-\tilde{X}_B & \text{if} \quad \tilde{X}_A \geqslant \hat{Y}_A, \tilde{X}_B < \hat{Y}_B, \tilde{X}_A+\tilde{X}_B \geqslant \hat{Y}_A+\hat{Y}_B \\ \tilde{X}_A-\hat{Y}_A & \text{if} \quad \tilde{X}_A \geqslant \hat{Y}_A, \tilde{X}_B < \hat{Y}_B, \tilde{X}_A+\tilde{X}_B < \hat{Y}_A+\hat{Y}_B \\ \hat{Y}_A-\tilde{X}_A & \text{if} \quad \tilde{X}_A < \hat{Y}_A, \tilde{X}_B \geqslant \hat{Y}_B, \tilde{X}_A+\tilde{X}_B \geqslant \hat{Y}_A+\hat{Y}_B \\ \tilde{X}_B-\hat{Y}_B & \text{if} \quad \tilde{X}_A < \hat{Y}_A, \tilde{X}_B \geqslant \hat{Y}_B, \tilde{X}_A+\tilde{X}_B < \hat{Y}_A+\hat{Y}_B \\ 0 & \text{if} \quad \tilde{X}_A < \hat{Y}_A, \tilde{X}_B < \hat{Y}_B. \end{cases} \tag{4}$$

Because each element of (4) is either positive or zero, the end-of-period cashflow to the merged firms debtholders, $\tilde{Y}_C$, is not less than the combined pre-merger cashflows, $\tilde{Y}_A+\tilde{Y}_B$, in any state and in some states it is greater. Hence, $\tilde{Y}_C$ stochastically dominates $\tilde{Y}_A+\tilde{Y}_B$, and in equilibrium, the market value of the merged firm's debt must necessarily be greater than the combined market values of their debt had they not merged.

To examine the impact of merger on the value of common stock, the residual gross dollar return to the stockholders of firm i, $\tilde{R}_i$, may be expressed as

$$\tilde{R}_i=\begin{cases} \tilde{X}_i-\hat{Y}_i & \text{if} \quad \tilde{X}_i \geqslant \hat{Y}_i \\ 0 & \text{if} \quad \tilde{X}_i < \hat{Y}_i. \end{cases} \tag{5}$$

Combining (5) with (1) yields

$$\tilde{R}_i=\tilde{X}_i-\tilde{Y}_i. \tag{6}$$

Then the difference between the before- and after-merger cash flow is

$$\begin{aligned} \tilde{R}_C-\left(\tilde{R}_A+\tilde{R}_B\right) &= \tilde{X}_C-\tilde{Y}_C-\left[\tilde{X}_A-\tilde{Y}_A+\tilde{X}_B-\tilde{Y}_B\right] \\ &= -\left[\tilde{Y}_C-\left(\tilde{Y}_A+\tilde{Y}_B\right)\right], \end{aligned} \tag{7}$$

which is (4) with the sign reversed. From (4), we know that each element of (7) is either negative or zero. Therefore, $\tilde{R}_A+\tilde{R}_B$ stochastically dominates $\tilde{R}_C$ and in a perfect capital market, the total value of the merging firm's common stock must decline. Thus, unless counter-actions are taken, the net financial result of non-synergistic[2] mergers is a wealth-transfer from stockholders to bondholders.

Higgens and Schall pointed out one course of counter-action available to shareholder-wealth-protecting firms: Retire all existing debt at its pre-merger market price and reissue new debt following the merger. However, even then shareholders would be worse-off following the merger because the substantial costs

2. The problem is compounded when earnings synergies result from the merger. In that case, bondholders receive a wealth-transfer from the co-insurance effect and an additional "windfall" gain from the increase in earnings produced by the merger. Proof of this proposition is contained in a longer unpublished version of this paper.

of such transactions effectively reduce shareholder wealth. A less expensive and more realistic option open to these firms is to increase their use of financial leverage to the point where the post-merger default risk of the previously outstanding debt is increased sufficiently to negate the co-insurance effect and to cancel any wealth-transfers from equity-holders to debt-holders.

Therefore: if (1) corporate mergers produce a co-insurance effect and (2) merging firms are shareholder-wealth-protecting firms, then we would observe that (1) bondholders of merging firms do not earn any abnormal returns around the time of merger, and (2) merged firms increase their use of financial leverage relative to the participating firms' combined pre-merger financial leverage. The following sections provide empirical investigations of the returns to the bondholders of merging firms and the use of financial leverage by these firms.

II. Empirical tests of Bondholder Returns

This section describes two separate empirical methodologies and the data used to examine the returns to the bondholders of merging firms. The first test employs a paired-comparisons procedure, while the second uses a two index market model.

A. *Paired-Comparisons Procedure*

In the paired-comparisons test one bond issued by a non-merging company was selected to match each of the bonds issued by a sample of merging firms on four observable risk-return characteristics. These characteristics were: (1) bond rating as given by *Standard and Poor's Bond Guide*; (2) term to maturity; (3) coupon interest rate; and (4) industrial bonds were paired with industrial bonds and utility bonds were paired with utility bonds. The theoretical and empirical justification for matching the bonds on these characteristics is contained in Kim, McConnell, and Greenwood (10). If the underlying risk-return characteristics of the two sets of bonds are identical, except that the issuers of one set of bonds engaged in merger while the issuers of the other did not, then any difference in returns between the two groups may be attributable to the merger. The paired-comparisons tests examines the differences in rates of return between the two groups of bonds over the period from 24 months before to 23 months after the mergers in question.

Using the month of merger as month 0, the kth month following the merger as month $+k$, and the kth month before the merger as $-k$, monthly rates of return, including both capital gains and accrued coupon interest payments, were computed for each bond over the period from month -24 to month $+23$.[3]

The monthly rate of return on each matching bond i, R_{ik}^{*}, was subtracted from the monthly return earned in the same calendar month on its corollary merger bond i, R_{ik}, and the average difference (AD) in rates of return across pairs of bonds was computed for each relative month k as:

$$\bar{b}_k = \left[\sum_{i=1}^{M} (R_{ik} - R_{ik}^{*}) \right] / M, \qquad k = -24, \ldots, +23, \tag{8}$$

where M is the number of merger bonds in the sample. The measure $\bar{b}_k$ may be

3. For a description of the way in which the monthly rates of return were calculated, see Bildersee (2, p. 509).

thought of as the average "abnormal" return to the bondholders of the merging firms. The average differences in rates of return between the two groups of bonds were then summed over the period from month -24 through month T to compute the cumulative average differences (CAD) in month T as

$$\bar{\bar{b}}_T = \sum_{k=-24}^{T} \bar{b}_k, \qquad T = -24, \ldots, +23. \tag{9}$$

If the holders of both sets of bonds earned equivalent returns we would expect the AD's to be randomly distributed around a mean of zero. If, however, the bondholders of merging firms earned windfall gains, we would expect the AD's to be positive more often than negative (especially around the time of merger); and we would expect to observe an upward or positive trend in the CAD.

B. *Data*

The sample of merging firms was selected from the *FTC's Statistical Report on Mergers and Acquisitions* (16). In order to be included in the sample, a firm had to satisfy five criteria:

1. The firm engaged in a *major* merger between January 1, 1960 and December 31, 1973.[4] A merger was classified as major if the book value of the assets of the smaller firm was greater than 10% of the book value of the assets of the larger firm.
2. The merger was complete (i.e., partial mergers were excluded).[5]
3. The merging company had long-term publicly-traded debenture bonds outstanding for at least twenty-four months before the merger and the same bonds were outstanding for at least twenty-four months after the merger.[6]
4. The firm did not engage in any other *non-minor*[7] merger during the forty-eight month interval surrounding the month of the merger in question.
5. The merger was classified as "conglomerate" by the FTC.[8]

Out of a total of 2,286 firms involved in a merger or acquistion, we found only 39 firms which had 44 bonds outstanding that satisfied these criteria. A comprehensive description of the companies and the characteristics of the sample and control bonds is contained in the Appendix.

4. The *major* merger requirement was imposed to exclude small mergers wherein any co-insurance effect might be overwhelmed by other phenomenon.

5. To be a complete merger the common stock of one company had to be purchased entirely by the other company and the debts of both companies had to be assumed by the merged firm. We might note in this regard that a substantial proportion of the mergers reported by the FTC were partial mergers, wherein the acquiring company controlled 80% to 90% of the common stock of the acquired company. One explanation for this phenomenon is that all earnings synergies could be achieved through partial merger, but because both firms continued as separate entities each was liable for its own debts only, thereby avoiding any possible co-insurance generated wealth-transfers.

6. We excluded convertible bonds which represent both a debt claim and an equity claim.

7. To distinguish from a *major merger*, a *non-minor* merger was defined as one wherein the book value of the assets of the smaller firm was greater than 5% of the book value of the assets of the larger firm.

8. This requirement was imposed to isolate the "co-insurance" effect from the possible synergistic effect of merger. Even in the absence of any "co-insurance", a favorable synergistic effect may increase operating profitability and consequently the market value of the merging companies' debt. See footnote 2.

Although the stringencies of these criteria limited the sample size, it was felt that a sample free of contaminating influences (such as partial mergers, multiple mergers by one firm, and merger-induced earnings synergies) would yield more meaningful results than a larger sample that had not disentangled these complications. Furthermore, examination of the characteristics of the sample indicates that it is more representative than its size would indicate. The sample includes a wide variety of merger, bond, and firm classifications, and is approximately evenly split on the following dimensions: (1) acquiring vs. acquired firms, (2) "pure" conglomerate vs. other conglomerate mergers, and (3) bonds rated A or better vs. bonds rated BBB or worse.[9] The diversity exhibited by the sample, in conjunction with the care exercised in its selection, should reveal insights into a very broad range of mergers.

The control bonds were selected from *Standard and Poor's Bond Guide* to match the merger bonds on the four characteristics listed above. In order to be included as a matching bond, the issuing company could not have engaged in any *major* merger during the 48-month interval which surrounded the merger of its corresponding sample bond. Because of the restrictiveness of the criteria used in the selection of the control bonds, it was not possible to match the bonds exactly on all four characteristics.[10] However, all bonds were matched exactly on bond rating[11] and as the Appendix shows, 5 out of 44 matched exactly on all four features. Cumulatively, 33 matched within $\pm\frac{1}{4}\%$ on coupon interest, while 43 were within $\pm\frac{1}{2}\%$. In terms of maturity, 16 matched exactly, 26 were within ± 1 year, and 41 were within ± 3 years.[12]

The monthly bond price data were collected from *Standard and Poor's Bond Guide*[13] while the final date of merger given in *Moody's Industrials* was used as the merger date.

9. Of the 44 bonds in the sample, 20 were issued by firms classified by the FTC as "acquired" while 24 were "acquiring". Within the conglomerate category, the FTC further subdivides mergers into "pure", "product extension", and "market extension" conglomerate mergers. The sample includes bonds of 21 pure and 23 product or market extension conglomerate mergers. In terms of the relative sizes of their assets, the "acquired" firms ranged from 11% to 179% of the size of the acquiring firm, with an average of 43%. Finally, in terms of bond quality, the bond ratings were distributed across all six bond rating classes with 26 rated A or better and the remainder rated BBB or worse.

10. In two cases an acceptable industrial bond match was not available and utility bonds were used. While it was not possible to match the bonds exactly with bonds in the same industry, a comparison of SIC codes shows a wide industry representation in both groups with no concentration of industries in either one.

11. Bond rating was matched 24 months before the merger. No subsequent adjustment was made for ratings changes for bonds in either group. The objective was to find bonds that matched 24 months *before* the merger, and trace their performance over the subsequent 48 months.

12. Examination of the Appendix shows that the deviation of the control bonds from the sample bonds on these characteristics are evenly distributed, with approximately equal numbers of matching bonds having coupon interest rates and maturities greater and less than their corresponding merger bonds.

13. In each case the sales price was used if available; if not, then the bid price was used. In a small number of cases in which neither the sale nor bid price was available, the asked price was used. To check for reporting errors, the price series were examined for large jumps or drops in prices. These were then double-checked with the prices given in the *Bank and Quotation Record*. If the two sources differed, the *Bank and Quotation Record* price was used if it smoothed the price fluctuations.

C. *Two-Index Market Model*

The two-index market model was used to account for a bond's systematic risk more explicitly. We included a bond index as well as a stock index as the independent variables (1) to hedge against the possibility of a segmented capital market and (2) to alleviate the omitted asset problem.[14] The following version of the market model was used:

$$\begin{aligned} &\tilde{R}_{it} = \alpha_i + \beta_{1i}\tilde{S}_t + \beta_{2i}\tilde{B}_t + \tilde{U}_{it} \\ &E(\tilde{U}_{it}) = 0; E(\tilde{S}_t \cdot \tilde{U}_{it}) = 0; E(\tilde{B}_t \cdot \tilde{U}_{it}) = 0; \\ &E(U_{it} \cdot U_{ik}) = \begin{cases} 0 & \text{if} \quad t \neq k \\ \sigma_u^2 & \text{if} \quad t = k, \end{cases} \end{aligned} \tag{10}$$

where $\tilde{R}_{it}$ is the return on security i; $\tilde{S}_t$ is the return on a *stock* market index; $\tilde{B}_t$ is the return on a *corporate bond* index;[15] $\tilde{U}_{it}$ is the stochastic disturbance term for security i; and α_i, β_{1i}, and β_{2i}, are coefficients to be estimated; and the subscript t represents the time period.

The estimates of the coefficients in equation (10) were derived from a moving time series OLS regression. The coefficients were reestimated for each bond in each month using the previous 12 monthly returns (i.e., month $t-12$ to month $t-1$). This procedure yielded 36 market equations for each bond. The reestimation procedure was used to account for instabilities in the relationship between the security return and the market indexes. Each estimated equation was then used to generate an estimate of the conditional expected return on the security in month t.

The difference between the actual return, R_{it}, on each bond and its estimated conditional mean return was then computed as:

$$e_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_{i1}S_t - \hat{\beta}_{i2}B_t,$$

where $\hat{\alpha}_i$, $\hat{\beta}_{i1}$, and $\hat{\beta}_{i2}$ were estimated using data from periods $t-12$ to $t-1$. The difference, e_{it}, represents the residual or abnormal return to bond i in month t. These residuals were averaged across firms to compute the average residual (AR) in each relative month k as

$$\mathrm{AR}_k = \sum_{i=1}^{M} \frac{e_{ik}}{M},$$

and then summed to yield the cumulative average residual (CAR) from month -12 to month K as

$$\mathrm{CAR}_K = \sum_{k=-12}^{K} \mathrm{AR}_k.$$

The stock market rate of return used is a value-weighted index of NYSE stocks

14. See Mayers (13, pp. 230–232).

15. Since the stock and bond indices are correlated, the bond index was orthogonalized by regressing it against the stock market index. The residuals of the preliminary regression were then used as the second index in estimating the market equations for the individual securities.

compiled by Myron Scholes, while the bond market rate of return is an equally-weighted index of high-quality corporate bonds created by Ibbotson and Sinquefield (7).[16]

III. Results on Bond Returns

A. *Average Differences* (AD's) *and Cumulative Average Differences* (CAD's)

The AD's and CAD's for the paired-comparison test are presented in Table 1. The AD's (Column 2) were almost evenly split between positive and negative observations with 25 and 23, respectively. Comparison of the before and after merger period shows 13 positive AD's before the merger and 12 after. The largest positive AD (1.5%) did occur one month before the merger, but its t-statistic (Column 3) was only .35. Examination of the remainder of the t-values in Column 3 shows that there was no *single* relative month in which the bondholders of merging firms reaped statistically significant abnormal gains.

Looking at consecutive AD's we see that the longest run of positive observations was only 3 months in duration. However, it is interesting to note that in the 12-month interval around the month of merger, beginning in month -5, nine out of twelve AD's were positive. This suggests that the bondholders of merging firms may have achieved some positive abnormal returns around the time of merger.

Looking at the CAD (Column 4) we see that it was positive in month -24 and remained positive until month -6 when it first became negative. The run of positive AD's then shows up in the CAD which reached a level of $+2.0\%$ in month -1 and remained at about the same level until month $+6$ after which it began to decline until becoming negative in month $+16$. Column 5 shows that at no time was the CAD statistically significantly different from zero.[17,18]

B. *Average Residuals* (AR's) *and Cumulative Average Residuals* (CAR's)

Table 2 contains the AR's (Column 2) and the CAR's (Column 4) computed from the estimated two index market model.[19] There is a certain consistency between these and the paired-comparisons results. Here, as with the AD's, the one month before the merger exhibits a large positive abnormal return (in fact, it is the second largest observed). Further, the AR's just before and just after the merger are predominantly positive. As with the CAD, the CAR reaches its highest level right after the merger month, remains positive for several months, and then becomes

16. Both indexes are available from the Center for Research in Security Prices at the University of Chicago.

17. To compute this t-statistic, the CAD at each month was divided by the *cross*-sectional standard deviation of the individual bonds' cumulative differences at that month. That is for each month T, $\bar{b}_T$ in (9) was divided by the standard deviation of $\sum_{k=-24}^{T}(R_{ik} - R_{ik}^{*})$.

18. As a second test on the paired comparisons procedure, we computed the average price of the bonds in each group in each relative month. In no month was the difference between the average prices of the two groups statistically significant.

19. The average R-squared value for the 1584 estimated market equations (36 equations per bond for 44 bonds) was approximately .20.

TABLE 1

AVERAGE DIFFERENCES AND CUMULATIVE AVERAGE DIFFERENCES FROM MONTH −24 TO MONTH +23

Relative Month	Average Difference	*T*-statistics Average Difference	Cumulative Average Difference	*T*-Statistics CAD
−24	0.00329	0.12574	0.00329	0.12474
−23	−0.00118	−0.07374	0.00211	0.07422
−22	0.00711	0.19430	0.00922	0.19366
−21	−0.00272	−0.07912	0.00650	0.14535
−20	−0.00034	−0.01392	0.00616	0.16902
−19	−0.00064	−0.02959	0.00552	0.16262
−18	0.00101	0.03633	0.00653	0.17935
−17	0.00167	0.05293	0.00820	0.20584
−16	0.00640	0.20829	0.01460	0.28082
−15	−0.00650	−0.18549	0.00811	0.17098
−14	−0.00270	−0.08138	0.00541	0.11342
−13	0.00129	0.03974	0.00670	0.12441
−12	0.00045	0.01602	0.00716	0.14403
−11	−0.00489	−0.12245	0.00227	0.03551
−10	0.00751	0.25988	0.00978	0.15117
−9	−0.00483	−0.13383	0.00495	0.06806
−8	0.00959	0.22889	0.01453	0.22138
−7	−0.00667	−0.19587	0.00786	0.13218
−6	−0.01154	−0.30397	−0.00368	−0.05088
−5	0.00866	0.22433	0.00498	0.07434
−4	0.00447	0.15643	0.00945	0.14895
−3	0.00174	0.04138	0.01119	0.16031
−2	−0.00627	−0.15537	0.00493	0.07023
−1	0.01488	0.34660	0.01981	0.25437
0	−0.00507	−0.12857	0.01475	0.21240
1	0.00562	0.14475	0.02037	0.24801
2	0.00096	0.02743	0.02133	0.25381
3	−0.00995	−0.29111	0.01138	0.13664
4	0.00091	0.02375	0.01230	0.14212
5	0.00743	0.20745	0.01972	0.21734
6	0.00075	0.02275	0.02048	0.20361
7	−0.00482	−0.09594	0.01566	0.17041
8	0.00202	0.04784	0.01768	0.18206
9	−0.00315	−0.08600	0.01454	0.15501
10	−0.00285	−0.08374	0.01168	0.12244
11	−0.00326	−0.04575	0.00842	0.09807
12	−0.00433	−0.08371	0.00409	0.04586
13	0.00354	0.09332	0.00763	0.08373
14	0.00921	0.16988	0.01684	0.16819
15	−0.00603	−0.09609	0.01081	0.10559
16	−0.01363	−0.24957	−0.00282	−0.02829
17	−0.00042	−0.00755	−0.00323	−0.03187
18	0.00931	0.20304	0.00608	0.07328
19	0.00480	0.10500	0.01088	0.11465
20	−0.02154	−0.43479	−0.01066	−0.10709
21	0.01173	0.28639	0.00107	0.01114
22	−0.00044	−0.00793	0.00063	0.00727
23	0.00939	0.20309	0.01002	0.10603

TABLE 2

AVERAGE RESIDUALS AND CUMULATIVE AVERAGE RESIDUALS COMPUTED USING 12-MONTH MOVING MARKET EQUATIONS

Relative Month	Average Residuals	*T*-Values Average Residuals	Cumulative Average Residuals	*T*-Values Cumulative Average Residuals
−12	−0.0007	−0.0253	−0.0007	−0.0253
−11	−0.0072	−0.1828	−0.0079	−0.1910
−10	0.0047	0.1815	−0.0032	−0.0771
−9	−0.0012	−0.0434	−0.0044	−0.0889
−8	0.0042	0.1128	−0.0002	−0.0030
−7	−0.0078	−0.2193	−0.0079	−0.1315
−6	−0.0038	−0.1112	−0.0118	−0.2101
−5	0.0110	0.2927	−0.0008	−0.0140
−4	−0.0035	−0.1593	−0.0043	−0.0746
−3	0.0017	0.0357	−0.0026	−0.0440
−2	0.0024	0.0745	−0.0002	−0.0031
−1	0.0141	0.2522	0.0138	0.2280
0	−0.0045	−0.1080	0.0094	0.1605
1	0.0030	0.0731	0.0123	0.1650
2	0.0049	0.1279	0.0172	0.2539
3	−0.0095	−0.2802	0.0077	0.1093
4	−0.0015	−0.0618	0.0062	0.0832
5	−0.0048	−0.1663	0.0014	0.0187
6	0.0047	0.1507	0.0061	0.0907
7	−0.0128	−0.3193	−0.0067	−0.0941
8	0.0080	0.1700	0.0013	0.0173
9	−0.0027	−0.0888	−0.0014	−0.0156
10	−0.0055	−0.1560	−0.0069	−0.0787
11	−0.0075	−0.1869	−0.0144	−0.1770
12	−0.0050	−0.1794	−0.0194	−0.2287
13	−0.0006	−0.0165	−0.0200	−0.2087
14	−0.0016	−0.0313	−0.0216	−0.1811
15	−0.0051	−0.1117	−0.0267	−0.2296
16	−0.0042	−0.0990	−0.0310	−0.2597
17	0.0036	0.0900	−0.0274	−0.2590
18	−0.0018	−0.0651	−0.0292	−0.2641
19	0.0007	0.0154	−0.0285	−0.2520
20	−0.0111	−0.2290	−0.0397	−0.3001
21	0.0172	0.3847	−0.0225	−0.1781
22	0.0016	0.0287	−0.0209	−0.1791
23	0.0056	0.1146	−0.0153	−0.1263

negative again. In no case. however, are the AR's or the CAR's statistically significantly different from zero.[20]

There is, however, one troubling aspect to these results. Over the 36-month interval the AR's were predominantly negative, exhibiting 21 negative observations out of a total of 36. In fact, 7 out of a total of 15 positive AR's occurred in the

20. The t-statistics for CAR_K were obtained by dividing CAR_K by the standard deviation of $\sum_{k=-12}^{K} e_{ik}$. Thus, although the t-values in Columns 3 and 5 may contain an upward bias [Black, Jensen, and Scholes (3, p. 84)], they still indicate that the AR's and the CAR's were not statistically significant.

12-month period beginning in month −5 and ending in month +6. Furthermore, the CAR was negative in all periods except the 10-month interval right around the merger, beginning in month −1, and ending in month +9.

One possible explanation for this phenomenon is that the estimated market equations tend to provide upward biased estimates of the conditional mean return. Since the residuals were obtained by subtracting the conditional mean return from the actual return, an overestimate of the conditional mean will result in an underestimate of the "true" value of the residual. Such an overestimate of the conditional mean may occur if the relationship between the bond return and the market indices (i.e., the slope of the market equation) is shifting systematically over time as the bond approaches maturity. For example, while the maturity of the bond index remains relatively constant over time as bonds are added and deleted and the stock index has a constant infinite maturity, the maturities of the sample bonds decrease systematically. For an index with a constant maturity, the effect of a given shift in term structure of interest rate may be constant over time. However, for a bond with a decreasing maturity, a given shift in term structure of interest rate will cause a systematically declining reaction in the bond price as the term to maturity

TABLE 3

AVERAGE RESIDUALS AND CUMULATIVE AVERAGE RESIDUALS COMPUTED USING MARKET EQUATION ESTIMATED WITH MONTHS −24 TO −13 AND +12 TO +23

Relative Month	Average Residual	Cumulative Average Residual
−12	−0.00120	−0.00120
−11	−0.00761	−0.00881
−10	0.00557	−0.00324
−9	−0.00340	−0.00664
−8	0.00521	−0.00142
−7	−0.00532	−0.00674
−6	−0.00673	−0.01347
−5	0.01063	−0.00284
−4	0.00426	0.00142
−3	−0.00299	−0.00157
−2	−0.00358	−0.00516
−1	0.01470	0.00954
0	−0.00616	0.00338
1	0.00218	0.00556
2	0.00796	0.01352
3	−0.00747	0.00605
4	0.00390	0.00995
5	−0.00512	0.00483
6	0.00283	0.00766
7	−0.00843	−0.00076
8	0.00297	0.00220
9	0.00066	0.00286
10	−0.00360	−0.00074
11	0.00051	−0.00022

declines.[21] This will cause a decrease in the slope of the market equation as time passes. Using data from earlier time periods to estimate the relationship between the bond return and the market indices will systematically overstate the true market equation coefficients, which will in turn overestimate the conditional mean return.

One possible means of adjusting for this problem is to use data from before and after the merger to estimate the market equations used in computing the AR's and the CAR's. By using "earlier" and "later" data the maturity effect should be alleviated. To accomplish this, the market equations for each bond were reestimated using the 24 rates of return for months -24 to -13 and months $+12$ to $+23$. This procedure yielded one market equation for each bond. These 44 market equations were then used to compute the AR's and CAR's over the period -12 to $+11$. These results are contained in Table 3.

Table 3 shows that the AR's (Column 2) were evenly distributed between positives and negatives. As with earlier tests, the highest single abnormal return was achieved in month -1. Again, the CAR (Column 3) reached its highest positive level shortly after the merger, continued at about the same level for several months and then become negative in month $+7$. These results also suggest that the bondholders of merging firms may have achieved some slight abnormal positive return around the time of merger. However, in no case were the AR's or CAR's statistically significant.[22]

IV. Bond Sub-Samples

The results presented above provide evidence on the entire sample of bonds. As we discussed, this sample represents a broad collection of different types of merger and bond characteristics. While the total sample gave no evidence of abnormal returns to bondholders, it may be that certain categories do in general earn abnormal returns. To examine this possibility we split the sample on several dimensions: (1) *Acquiring vs. acquired companies*. The reaction of the bonds may depend upon whether they were issued by the firm that initiated the merger and continued in operation or the firm that was absorbed.[23] (2) *"Pure" conglomerate mergers vs. other conglomerate mergers*. The co-insurance effect may be greater for pure conglomerate mergers because the correlation between their underlying earnings distributions may be lower. (3) *Bonds rated A or better vs. bonds rated BBB or worse*. There may be reason to believe that bonds that are always rated highly will receive little benefit in the way of co-insurance from a merger whereas a low rated bond may gain substantially. (4) *Firms that were large relative to their merger partner vs. firms that were small relative to their merger partner*. It might be argued that the bondholders of large firms reap little benefit when they merge with smaller

21. It is well-known that a bond price will exhibit smaller fluctuations, for a given interest rate change the shorter the term to maturity.

22. The t-values for the AR's and CAR's were approximately of the same magnitude as those reported in Table 2.

23. Mandelker (12) found that the returns to the stockholders of acquiring and acquired firms differed significantly.

companies, whereas the creditors of smaller firms reap substantial benefits when they join with larger companies.

As it turns out, splitting the sample on these characteristics showed no statistically significant results in either the AD's, the CAD's, the AR's, or the CAR's. In short, we found no evidence of systematic abnormal returns to the bondholders of any category of merger.

V. The Use of Leverage by Merging Firms

To examine the issue of whether or not merging firms tend to increase their financial leverage following the merger we computed three leverage ratios for the jth merged firm at time t:

$$L_{jt}^{LM} = BLD_{jt}/S_{jt}; \qquad L_{jt}^{TM} = BTD_{jt}/S_{jt}; \qquad L_{jt}^{B} = BTD_{jt}/BTA_{jt},$$

where BLD_{jt} is the book value of long-term debt; S_{jt} is the average market value of common plus preferred stock; BTD_{jt} is the book value of total debt (long-term plus short-term); and BTA_{jt} is the book value of total assets. The combined data of both the acquiring and the acquired firms (collected from *Moody's Industrials*) were used to calculate each ratio for each of the two years before the merger ($t = -1, -2$) and each of the two years after the merger ($t = 1, 2$). The year of merger was omitted from the calculation.

For each merger we computed the average of the before and the after merger leverage ratios, and the changes in financial leverage as follows:

$$\Delta L_j^i = (L_{j,1}^i + L_{j,2}^i)/(L_{j,-1}^i + L_{j,-2}^i), \qquad \text{for} \quad i = LM, TM, B,$$

which measures the relative use of leverage after merger vs. the relative use of leverage before merger. A ΔL_j^i greater than 1.0 shows an increase in the combined leverage ratio after the merger. Table 4 shows the average of ΔL_j^i's along with the number of mergers that showed an increase vs. a decrease on each measure.

TABLE 4

Measures of Change in the Use of Financial Leverage

Measure	Mean	Number Increase	Number Decrease
ΔL_j^{LM}	1.52	20	11
ΔL_j^{TM}	1.36	18	13
ΔL_j^{B}	1.16	26	5

The mean of each of the ratios across mergers is greater than 1.0. The number of firms showing an increase in ΔL^{LM} is 20 out of the 31 mergers for which complete data were available;[24] for ΔL^{TM} it is 18 out of 31, and for ΔL^{B} it is 26 out of 31.

24. The sample size drops from 39 to 31 companies for several reasons. Two companies were lost because we have two cases in which both the acquiring and acquired companies are in the sample. Since we used aggregate data, these were counted as one leverage observation. The remaining six firms were lost because of inadequate data for one or both firms.

Assuming an equal probability of increases and decreases, and using a binomial test [Conover (1971), p. 97], the number of increases in the first and the third measures are significant at the 5% and .5% level, respectively. The overall results support our hypothesis that merging firms tend to make greater use of leverage after merger than the combination of individual firms did before the merger.[25]

VI. Comments and Conclusions

As was discussed earlier, we are concerned with two issues. The first is whether or not the bondholders of merging firms earn abnormal positive returns. The second is the use of financial leverage by merging companies. Using two separate statistical procedures we could not reject the null hypothesis that the bondholders of merging firms do not earn abnormal positive returns around the time of merger. Thus, for this group of corporate mergers there was no statistically significant transfer of wealth from stockholders to bondholders. Using three different measures of financial leverage, we found that merged firms do make greater use of financial leverage after the merger than the combination of independent firms did before the merger. In the absence of any co-insurance effect we would expect this increase in financial leverage to generate windfall losses for the bondholders of the merging firms.[26] Since these bondholders did not suffer abnormal negative returns, we have evidence that a co-insurance effect did take place. While it is not possible to prove empirically a cause and effect relationship, these results are consistent with the argument that (1) a co-insurance effect did exist, and (2) the wealth-transfers to bondholders that would have been generated were negated by the increased use of debt financing. The evidence also is consistent with the notion that managers act in the best interests of stockholders when a conflict arises between stockholders and bondholders.

There may, of course, be other reasons for our failure to discover any statistically significant abnormal returns to the bondholders of merging companies. It may be that a significant wealth-transfer existed, but our tests were not powerful enough to detect it. However, given the assortment of tests employed that seems unlikely. It may be that we are observing the wrong set of firms, in the sense that managers (or stockholders) only engage in mergers with firms that will generate little co-insurance or that they take other steps to circumvent the wealth-transfer. For example, they may engage in partial mergers (see footnote 5) or they may call the bonds.[27] Having stated these caveats, however, we continue to feel confident in concluding that stockholders need not be overly concerned with the potential wealth-transfers that may be generated by corporate mergers. The evidence indicates that whatever gains mergers generate, they are not reaped by bondholders.

25. Melicher and Rush (14) provide further evidence on this report. They showed that firms engaged in conglomerate type mergers (i.e., mergers which are likely to generate a large co-insurance effect) make greater use of debt financing than firms involved in other types of mergers.

26. See Kim, McConnell, and Greenwood (10) for further explication of this point.

27. As an aside, two firms which qualified for the sample on all other measures were excluded because they called their bonds right around the time of merger.

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APPENDIX

TABLE A-1

MERGING COMPANIES, SAMPLE BONDS, AND CONTROL BONDS

	Acquiring Company[a]	Acquired Company	Merger Date	Means of Acquisition	Type[b]	Asset[c] Ratio	Coupon	Maturity	Rating	Matching Company	Coupon	Maturity
1.	The Coca Cola Co.	Minute Maid Corp.	12/60	Comm. Stk.	3	.26	4.000	1974	AA	Brown Shoe	3.500	1971
2.	National Distillers & Chemical Corp.	Bridgeport Brass Co.	6/61	Pfd. & Comm. Stk.	5	.16	4.750	1983	BBB	Deere & Co.	4.500	1983
3.	Kimerly-Clark Corp.	Cuosa River Newsprint Co.	4/62	Comm. Stk.	4	.19	3.750	1983	AA	National Steel Corp.	3.125	1982
4.	Brown Co.	American Writing Paper Corp.	12/62	Cash (?)	3	.17	4.500	1975	BBB	Lockheed Aircraft	4.500	1976
5.	Ralston Purina Co.	Van Camp Sea Food Co.	6/63	Comm. Stk.	3	.11	3.125	1977	AA	(A.E.) Staley Mfg.	3.250	1977
6.	Proctor & Gamble Co.	(J.A.) Folger	9/63	Comm. Stk.	3	.63	3.875	1981	AAA	Texas Co.	3.625	1983
7.	Pennsalt Chemicals Corp.	(F.J.) Stokes Corp.	7/63	Comm. Stk.	5	.12	3.450	1981	A	Superior Oil Co.	3.750	1981
8.	(J.E.) Seagrams & Sons, Inc.	Texas Pacific Coal & Oil Co.	11/63	Cash	5	.18	2.500	1966	A	American Airlines	3.000	1966
							4.250	1983	A	Aluminum Co. of Canada	4.500	1980
9.	Union Oil Co. of California	Pure Oil Co.	7/65	Conv. Pfd. Stk.	4	.84	2.750	1970	AA	Firestone Tire & Rubber	2.625	1972
							4.875	1986	AA	National Biscuit	4.750	1987
10.	Tennessee Gas Transmission Co.	Packaging Corp. of America	6/65		5	.57	4.375	1987	BBB	Riegel Paper	5.250	1985
11.	Foremost Dairies, Inc.	Strong-Cobb-Arner, Inc.	7/65	Cash & Debentures	5	.11	4.500	1980	BB	General Tire & Rubber	4.750	1981
12.	American Home Products Corp.	Ekco Products Co.	9/65	Conv. Pfd. Stk.	3	.28	4.600	1987	A	(W.T.) Grant	4.750	1987
13.	Atlantic Refining Co.	Richfield Oil Corp.	1/66	Conv. Pfd. Stk.	4	.52	3.250	1979	AAA	General Motors	3.250	1979
14.	Pet Milk Co.	Hussman Refrigerator Co.	2/66	Conv. Pfd. Stk.	5	.20	4.250	1982	A	Flintkote	4.625	1981
15.	Sterling Drug, Inc.	Lehn & Fink Products Corp.	6/66	Conv. Pfd. Stk.	3	.13	3.250	1980	AA	May Dept. Store	3.250	1980
16.	Getty Oil Co.	Tidewater Oil Co.	7/66	Comm. Stk.	4	.45	3.500	1986	A	Sierra Pacific Power	3.375	1984
17.	Kewanee Oil Co.	Harshaw Chemical Co.	12/66	Conv. Pfd. Stk.	5	.59	5.000	1978	BBB	Boeing Airplaine	5.000	1978
18.	United States Plywood Corp.	Champion Papers, Inc.	3/67	Conv. Pfd. & Comm. Stk.	3	.88	3.750	1981	A	W. Va. Pulp & Paper	4.000	1978
19.	Victor Comptometer Corp.	Daisy Manufacturing Co.	5/67	Pfd. & Comm. Stk.	3	.20	4.875	1988	BBB	International Harvestor	4.625	1988

20.	Signal Oil & Gas Co.	Mack Trucks, Inc.	9/67	Conv. Pfd. & Wts.	5	.45	5.125	1981	BB	Sperry Rand	5.500	1982
21.	Diamond Alkali Co.	Shamrock Oil & Gas Corp.	12/67	Conv. Pfd. & Comm. Stk.	3	.63	4.625	1987	A	Bethelem Steel	4.500	1990
22.	Reliance Electric & Engineering Co.	Toledo Scale Corp.	12/67	Conv. Pfd. Stk.	3	.87	3.375	1974	A	Anheuser Busch	3.375	1977
23.	Chris Craft Industries, Inc.	Baldwin Montrose Chem. Co., Inc.	6/68	Conv. Pfd. Stk.	5	.37	7.000	1972	B	Uris Bldg. Corp.	6.500	1975
24.	American Standard, Inc.	Westinghouse Air Brake Co.	6/68	Pfd. Stk.	3	.56	3.875	1978	BBB	Portland Gas & Coke	3.125	1976
25.	Hunt Foods & Industries, Inc.	Canada Dry Corp.	7/68	Conv. Pfd. & Comm. Stk.	3	.23	4.875	1990	BBB	Allis Chaimers	4.850	1990
26.	Gulf & Western Industries, Inc.	Consolidated Cigar Corp.	1/68	Conv. Pfd. & Wts.	5	.17	4.250	1975	BBB	Glenmore Distillers	4.000	1972
27.	Sun Oil Co.	Sunray Dx Oil Co.	10/68	Conv. Pfd. Stk.	4	.47	4.625	1990	AA	Dow Chemical	4.350	1988
28.	Owens-Illinois, Inc.	Lily Tulip Cup Corp.	11/68	Pfd. & Comm. Stk.	3	.11	3.750	1988	A	American Con	3.750	1988
29.	Montgomery Ward & Co., Inc.	Container Corp. of America	11/68	Debenture	5	.23	4.875	1990	A	American Con	4.750	1990
30.	Montgomery Ward & Co., Inc.	Container Corp. of America	11/68	Debenture	5	.23	3.300	1980	A	Whirlpool	3.500	1980
							4.400	1987	A	Burroughs Corp.	4.500	1988
31.	City Investing Co.	Rheem Manufacturing Co.	11/68	Cash	5	1.69	3.875	1975	BB	National Tea Co.	3.500	1980
32.	Loew's Theatres, Inc.	(P) Lorillard Co.	11/68	Debenture & Wts.	5	1.79	4.875	1986	A	Am. Smelting & Refining Co.	4.625	1988
							3.750	1978	A	Winn-Dixie Stores	3.750	1976
33.	North-American Rockwell Corp.	Miehle-Goss-Dexter, Inc.	9/69	Pfd. Stk.	3	.12	5.875	1987	BBB	MSL Industries	5.875	1987
34.	Saxon Industries, Inc.	Standard Packaging Inc.	10/70	Comm. Stk.	3	.82	6.000	1990	B	Frontier Airlines	5.500	1987
35.	V.S. Smelting, Refining & Mining Co.	Federal Pacific Electric Co.	8/71	Conv. Pfd. & Comm. Stk.	5	.60	5.375	1995	B	Indian Head Mills	5.500	1990
36.	Costal States Gas Corp.	Colorado Interstate Corp.	1/73	Cash	4	.47	5.000	1983	BBB	Mich.-Wisc. Pipeline	4.875	1983
							6.000	1980	BB	Texas Eastern Trans.	6.000	1977
37.	Norton Simon, Inc.	Max Factor & Co.	2/73	Comm. Stk.	5	.18	6.000	1998	BB	Jersey Central Power	6.000	1992
38.	North American Rockwell Corp.	Rockwell Manufacturing Co.	2/73	Comm. Stk.	5	.14	8.500	1995	A	Goodyear Tire	8.600	1995
39.	North American Rockwell Corp.	Rockwell Manufacturing Co.	2/73	Comm. Stk.	5	.14	5.25	1991	A	Sherwin-Williams	5.450	1992

a. The underlined company is the company whose bond is included in the sample.
b. According to the FTC classification type 3 is a product extension merger, type 4 is a market extension merger, and type 5 is a conglomerate merger of two essentially unrelated firms.
c. Asset ratio = (Book value of assets of acquired company) ÷ (Book value of assets of acquiring company).