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Bondholder Wealth Effects in Mergers and Acquisitions: New Evidence from the 1980s and 1990s

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ABSTRACT

We examine the wealth effects of mergers and acquisitions on target and acquiring firm bondholders in the 1980s and 1990s. Consistent with a coinsurance effect, below investment grade target bonds earn significantly positive announcement period returns. By contrast, acquiring firm bonds earn negative announcement period returns. Additionally, target bonds have significantly larger returns when the target's rating is below the acquirer's, when the combination is anticipated to decrease target risk or leverage, and when the target's maturity is shorter than the acquirer's. Finally, we find that target and acquirer announcement period bond returns are significantly larger in the 1990s.

U.S. COMPANIES ANNOUNCED 8,309 mergers and acquisitions (M&A) in 2001. The value of these deals exceeded \$700 billion. This actually represents a decline in M&A activity, which saw 10,833 deals worth \$1.28 trillion in 2000 and total deals worth \$1.4 trillion and \$1.2 trillion in 1999 and 1998.¹ Given the significance of M&A activity, an important question is: Do mergers create value, and if so, for whom? The existing literature thoroughly documents the wealth effects experienced by target and acquirer stockholders, but there is limited evidence on the wealth effects experienced by bondholders.² The purpose of this study is to fill this gap by examining the effects of 940 mergers and acquisitions on the value of 3,901 target and acquirer bonds during the period from 1979 to 1997.

The theoretical literature suggests that bondholders should experience significant wealth effects in mergers. Levy and Sarnat (1970), Lewellen (1971), and Higgins and Schall (1975) argue that mergers may increase bondholder wealth through coinsurance. In its simplest form, risky debt benefits from a reduction in the probability of default when merging firms have imperfectly

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¹ Source: Mergerstat available at www.mergerstat.com.

² See Jensen and Ruback (1983), Jarrell, Brickley, and Netter (1988), and Andrade, Mitchell, and Stafford (2001) for summaries of the evidence on stockholder returns in mergers and acquisitions.

correlated cash flows. Galai and Masulis (1976) extend this line of reasoning by arguing that in a non-synergistic merger the increase in bondholder wealth through coinsurance comes from (and is exactly offset by) a decrease in stockholder wealth. More recently, Shastri (1990) considers cases where merging firms may have different risk levels, leverage ratios, and debt maturities. He argues that merging firm bondholders may benefit from coinsurance effects or lose from expropriation effects depending on the characteristics of the target and acquirer.

A handful of studies examine the impact of mergers on bondholder returns (see Kim and McConnell (1977), Asquith and Kim (1982), Eger (1983), Dennis and McConnell (1986), and Maquieira, Megginson, and Nail (1998)). The evidence for acquirer bonds is mixed. Eger and Maquieira, Megginson, and Nail find that the excess returns to acquirer bonds at the announcement of a merger are significantly positive; Dennis and McConnell find that they are (marginally) significantly negative; and Kim and McConnell and Asquith and Kim find that they are insignificant. However, for target bonds the evidence is unanimous; all studies find insignificant excess returns to target bonds. This result is puzzling, since targets are generally much smaller than acquirers, we would expect the target firm's bonds to experience greater changes in value, on average, than the acquiring firm's bonds. The evidence on the wealth effects of target and acquirer equity is consistent with this intuition. Target equity wealth effects are much more pronounced than acquirer equity wealth effects.

So why do the existing studies fail to find significant wealth effects for target bonds? There are at least three potential reasons. First, most existing studies have very small samples due to the difficulty of obtaining bond price data.³ As a result, these studies are unlikely to have sufficient statistical power to reject the null hypothesis of zero excess returns. Another important limitation has been the poor quality of the available bond price data. Most bonds do not have published transaction prices, and many of the reported prices are matrix prices. Matrix prices are reported when a bond does not trade and dealer quotes are unavailable. The "matrix" consists of prices of similar bonds that did trade, where "similar" is based on characteristics like bond rating and maturity. Obviously, matrix price data cannot be used to gauge the wealth effects of bonds involved in a merger. Finally, the lack of significant target excess bond returns may simply be due to the fact that they did not exist during the time period examined in previous studies, the 1960s and 1970s.⁴ It is possible that

³ Kim and McConnell (1977) examine 2,286 mergers but are only able to find price data for 44 bonds of 39 firms. Similarly, in a sample of 2,870 mergers, Asquith and Kim (1982) find prices for only 62 bonds. The sample in Eger (1983) consists of 33 acquirer bonds but only six target bonds. Finally, the Dennis and McConnell (1986) bond sample consists of 67 bonds of 39 acquirers and 27 bonds of 21 targets.

⁴ Unlike earlier studies, Maquieira, Megginson, and Nail (1998) examine bondholder wealth effects in a large sample of 504 acquirer bonds and 124 target bonds of firms involved in 260 stock-for-stock mergers. However, even with a larger sample they still find that targets have insignificant excess bond returns. Interestingly, the majority of the mergers in their sample occurred prior to the 1980s. In particular, their sample consists of 106 mergers during the 1960s, 74 mergers during the 1970s, 54 mergers during the 1980s, and 26 mergers during the 1990s.

changes in takeover motives and methods, and changes in the use of debt financing seen in the 1980s and 1990s, have led to changes in bondholder wealth effects.⁵

We examine the impact of takeover announcements on bondholder wealth in a sample of 940 mergers and acquisitions during the period 1979 to 1997. Excluding bonds with matrix prices during the announcement period, our final sample includes 818 bonds of 265 target firms and 3,083 bonds of 831 acquiring firms. In sharp contrast with previous studies, we find strong evidence of a coinsurance effect for target bonds. Target bondholders earn a significantly positive mean excess return of 1.09 percent during the announcement period. Furthermore, we find that target bond wealth effects are highly dependent on the risk of the bond. In particular, while investment grade target bonds experience a mean excess return of -0.80 percent, below investment grade target bonds experience a mean excess return of 4.30 percent. Both the mean excess returns and their difference are highly statistically significant. By contrast, the mean excess bond return for acquirers is only -0.17 percent (statistically significant at the one percent level), and there is no significant difference between the excess returns of acquirer bonds rated investment grade and below investment grade.

We partition the sample into a number of additional groupings to investigate the determinants of bond returns. The results for target bonds generally support the risk, leverage, and maturity predictions of Shastri (1990). Shastri predicts that target bonds will benefit when the target is riskier than the acquiring firm. Consistent with this prediction, we find that target bonds with credit ratings below the acquirer's earn positive excess returns that are significantly larger than the negative excess returns earned by target bonds with credit ratings above or equal to the acquirer's. We find similar results using the variance of unlevered stock returns to measure pre- versus post-merger asset risk. Shastri also predicts that target bondholders will benefit when the merger decreases leverage (i.e., when the target firm's leverage ratio exceeds the acquiring firm's leverage ratio), and when target bonds have a shorter maturity than acquirer bonds. Consistent with the leverage prediction, we find that the mean excess return is significantly positive for the group of target bonds where the merged firm's leverage ratio is less than the target's pre-merger leverage ratio. And consistent with the maturity prediction, we find that target bonds with shorter maturity than acquiring firm bonds have significantly larger excess returns than target bonds with longer maturity than acquiring firm bonds. Finally, we find that target excess bond returns are significantly larger when the target is relatively small, when the offer is not characterized as hostile, and when the offer occurs in the 1990s. As discussed below, the significantly larger target bond returns in the 1990s coincide with an increase in the incidence of event risk covenants for target bonds (and

⁵ See Holmstrom and Kaplan (2001) for a comparison of U.S. merger activity in the 1980s and 1990s.

especially below investment grade target bonds) in the sample during this time period.⁶

Excess returns for acquiring firm bonds exhibit very different and far fewer significant patterns than the excess returns for target firm bonds. First, we generally find no significant differences between announcement period excess bond returns grouped by bond rating or maturity relative to the target firm, or by change in asset risk or leverage as a result of the merger. Second, inconsistent with Shastri's (1990) predictions, excess bond returns to acquirers are significantly negative when the acquirer's bond rating is below the target's, when the post-merger asset risk is less than the acquirer's pre-merger asset risk, when the merger results in a reduction in leverage for the acquiring firm, and when the acquirer's bond maturity is less than the target's. However, consistent with the results for target bonds we find that acquirer bonds fare worse when the relative size of the target is large (versus small), when the offer is classified as hostile (versus friendly), and when the offer is made in the 1980s (versus the 1990s). Nevertheless, analogous to the documented evidence on stockholder returns in mergers and acquisitions, the size and significance of bondholder effects are typically much larger for the target firm's bonds than for the acquiring firm's bonds.

Finally, we estimate cross-sectional regressions of stock and bond excess returns and examine the relations between the excess returns of target and acquiring firms' stock and bonds. The regression results are generally consistent with the grouping analysis, but are sensitive to the set of controls included in the equations. An analysis of correlations between stockholder and bondholder excess returns provides little direct evidence of merger-induced wealth transfers between security holder classes. In particular, stockholder and bondholder excess returns tend to be positively correlated.

The remainder of the paper is organized as follows. Section I describes the data and provides descriptive statistics. Section II presents the results, and Section III concludes.

I. Data and Descriptive Statistics

A. Sample

We use the Securities Data Corporation's (SDC) Mergers and Acquisitions Database to collect a sample of takeover announcements during the period from 1979 to 1997. We exclude leveraged buyouts and simple acquisitions of assets, and require that both the target and acquiring firms be publicly traded companies with non-missing announcement period stock returns on CRSP. We then require that the target and/or the acquirer have publicly traded non-convertible bonds outstanding with announcement period bond prices available

⁶ Event risk covenants are designed to protect bondholders from the risks of takeovers and leveraged recapitalizations (e.g., see McDaniel (1986), Lehn and Poulsen (1992), Cook and Easterwood (1994), and Nash, Netter, and Poulsen (2003)).

in the Lehman Brothers Fixed Income Database.⁷ The latest version of the Fixed Income Database covers the period from January 1973 to March 1998, and contains all bonds in the Lehman Brothers corporate and government bond indices. The database reports a time-series of month-end bid quotes from Lehman Brothers' dealers, and provides a variety of information about the issuer and the features of the bond. These criteria result in a sample of 940 deals (i.e., target and acquiring firm pairs).

Since roughly one-third of the month-end bond prices in the database are matrix prices, we focus only on those deals where the target and/or the acquirer have at least one bond without matrix prices in the three-month window -2 through 0 , where 0 is the announcement month. This allows for the computation of bondholder returns in months -1 and 0 which are not based on matrix prices. Of the 940 deals in the sample during the period 1979 to 1997, 831 acquirers have 3,083 bonds and 265 targets have 818 bonds that meet this criterion. There are 141 target and acquiring firm pairs where both firms have bonds with valid (i.e., not based on matrix prices) announcement period returns.

A methodological issue is how to treat multiple bond issues of the same firm. We choose to combine all of a firm's bond characteristics into a single observation by computing weighted averages of individual bond characteristics, where the weights are based on the market value of each bond two months prior to the announcement month. Thus, a given firm's announcement period excess bond return and other characteristics (e.g., bond rating and maturity) are weighted-averages of the excess returns and characteristics of the firm's bonds in the sample.⁸

B. Descriptive Statistics

The distribution of target (acquirer) firms with bonds consists of 31 (67) firms in 1979 to 84, 82 (244) in 1985 to 89, 44 (203) in 1990 to 94, and 108 (317) in 1995 to 97. The concentration of the sample in the 1985 to 89 and 1995 to 97 time periods mirrors the sharp increase in aggregate U.S. merger and acquisition activity during these periods, as documented in Andrade, Mitchell, and Stafford (2001). A key difference between our larger bond sample and the smaller bond samples examined in earlier merger studies is that the earlier work examined bondholder merger effects in the late 1960s and early 1970s. Similar to the mid-1980s and late 1990s, this earlier period witnessed intense merger and acquisition activity. To the extent that merger motives and characteristics have changed over time, and given the well-documented increase in the use of control

⁷ Studies using the Fixed Income Database include Warga and Welch (1993), Billett (1996), Blume, Lim, and MacKinlay (1998), Hong and Warga (2000), King and Mauer (2000), Maxwell and Stephens (2003), and Eberhart and Siddique (2002).

⁸ As discussed by Eberhart and Siddique (2002), treating the excess returns of individual bonds as independent observations will bias the standard error of the mean excess bond return downward because of the likely high correlation of the excess returns of bonds of the same firm. Of course, this will induce an upward bias in the t -statistic of the mean excess bond return.

related covenants in the late 1980s, we might expect bondholder wealth effects in mergers to be different in our sample.

Table I provides descriptive statistics of the firms and their bonds in the sample. The book value of total assets is from COMPUSTAT and is measured at the fiscal year-end immediately prior to the merger announcement. We compute the market value of equity two months prior to the announcement month using data from CRSP.⁹ The book value of total assets and the market value of equity are expressed in 1996 dollars using the Consumer Price Index. The leverage ratio is defined as the ratio of the book value of total debt to the sum of the book value of total debt and market value of equity. The book value of total debt is from COMPUSTAT or *Moody's Manuals* and is measured at the fiscal year-end immediately prior to the merger announcement. We use the standard deviation of unlevered stock returns to measure asset risk. An unlevered stock return is computed by multiplying a firm's monthly stock return by one minus the firm's leverage ratio at the end of the corresponding fiscal year. We compute the standard deviation of these unlevered stock returns using two years of monthly returns starting 25 months prior to the announcement month and ending two months prior to the announcement month (i.e., months -25 to -2). We require that firms have at least 12 non-missing returns in this window.

Panels A and B report descriptive statistics for target and acquiring firms, respectively. Note that targets, on average, are smaller, have a slightly larger leverage ratio and are riskier (as measured by the standard deviation of unlevered returns) than acquiring firms. The 265 targets in Panel A have an average of slightly more than three bonds per firm, an average remaining maturity of about 11 years, and an average Standard and Poor's bond rating between BBB and BBB+. In addition, 37 percent of targets have a below investment grade bond rating. In comparison, the 831 acquirers in Panel B have an average of 3.71 bonds per firm, an average remaining maturity of 11.38 years, an average bond rating between A- and A, and 18 percent are rated below investment grade.

We also compute relative size, correlation of unlevered stock returns, and combined standard deviation of unlevered stock returns for the 141 target and acquiring firm pairs where both firms have bonds (not reported in Table I). Relative size is the ratio of the target to acquirer market value of equity two months before the announcement month. The median relative size is 0.45. In comparison, the median relative size for the initial sample of 940 deals is much smaller at 0.11. Not surprisingly, targets with publicly traded bonds in the Lehman Brothers Indices are relatively large and are closer in size to their acquiring firms. The average correlation between target and acquirer unlevered returns (over months -25 to -2) is 0.42 and ranges from -0.16 to 0.84. The

⁹ Variables such as the market value of equity and standard deviation of unlevered stock returns (to be discussed) are either computed at month -2 or using data up through month -2. We do not use month -1 data because of a potential leakage of information about the offer as early as one month prior to the announcement month (e.g., see Asquith, Bruner, and Mullins (1983) and Jarrell and Poulsen (1989a)).

Table I
Descriptive Statistics of Target and Acquiring Firms

Deals include all mergers and acquisitions announced during the period 1979 to 1997 that are listed on Securities Data Corporation's Mergers and Acquisitions Database where both target and acquirer are listed on CRSP and have non-missing announcement period stock returns, and the target and/or the acquirer have valid announcement period bond returns. A firm has valid bond returns if the returns of its bonds in the announcement month and the month before are not based on matrix prices. Assets is the book value of total assets at the fiscal year-end immediately prior to the merger announcement. The market value of equity is computed two months prior to the announcement month using data from CRSP. The book value of total assets and the market value of equity are expressed in 1996 dollars using the consumer price index. We define leverage as the ratio of the book value of total debt to the sum of the book value of total debt and market value of equity. The book value of total debt is measured at the fiscal year-end immediately prior to the merger announcement. The standard deviation of unlevered stock returns is computed using two years of monthly returns starting 25 months prior to the announcement month and ending two months prior to the announcement month. We require that the firm have at least 12 non-missing monthly returns during this period. Unlevered returns are computed by multiplying a firm's stock returns by one minus the firm's leverage ratio at the end of the corresponding fiscal year. When a firm has multiple bonds, bond maturity and rating are weighted averages of the bonds' maturities and ratings, where the weights are based on bond market values two months prior to the announcement month.

	Mean	Median	Std. Dev.	Min.	Max.	Sample Size
Panel A: Target Firms with Valid Bond Returns						
Assets (millions of 1996 dollars)	16,499	5,441	29,907	9	191,623	239
Market value of equity (millions of 1996 dollars)	3,766	1,748	6,194	23	56,277	265
Leverage	0.44	0.41	0.25	0.00	0.98	239
Std. dev. of unlevered stock returns	0.32	0.30	0.12	0.11	0.76	238
Number of bonds per firm	3.09	2.00	3.70	1.00	25.00	265
Bond maturity (years remaining)	10.94	10.40	6.75	1.17	29.18	265
Bond rating (NR = 1, D = 2, ..., AAA = #23)	14.47	15.00	3.09	1.00	23.00	265
Proportion of bonds below investment grade	0.37					265
Panel B: Acquiring Firms with Valid Bond Returns						
Assets (millions of 1996 dollars)	28,588	11,025	47,632	9	276,321	820
Market value of equity (millions of 1996 dollars)	8,833	3,135	17,746	16	182,568	831
Leverage	0.41	0.38	0.24	0.00	0.99	820
Std. dev. of unlevered stock returns	0.28	0.25	0.11	0.10	0.94	820
Number of bonds per firm	3.71	2.00	4.64	1.00	49.00	831
Bond maturity (years remaining)	11.38	9.47	6.52	0.50	32.17	831
Bond rating (NR = 1, D = 2, ..., AAA = #23)	16.53	17.00	2.86	1.00	23.00	831
Proportion of bonds below investment grade	0.18					831

combined standard deviation of unlevered returns is the portfolio standard deviation of unlevered target and acquirer returns where the weights are based on the market value of assets.¹⁰ The mean (median) combined standard deviation of unlevered returns is 0.24 (0.22).

II. Results

A. *Excess Returns*

We compute monthly bond and stock excess returns for each firm in the sample around the merger announcement month. Following Warga and Welch (1993), monthly excess bond returns are computed as the difference between a bond's monthly total return (change in price plus accrued interest) and the monthly total return on an index of bonds with similar rating and remaining maturity. These bond indices are constructed by Lehman Brothers and are available in the Fixed Income Database. There are nine Standard and Poor's bond rating categories (AAA, AA, A, BBB, BB, B, CCC, CC, and D, and not rated) in each of two maturity categories (long-term and intermediate), resulting in 18 different bond indices. As previously discussed, when a firm has multiple bonds in the sample we compute the firm's excess bond return as the weighted average of the bonds' excess returns, where the weights are based on the market values of the bonds in month -2 . Monthly excess stock returns are computed as the difference between the stock's monthly return and the monthly return on the CRSP value-weighted market portfolio.

The first row of Table II reports target and acquirer monthly excess bond and stock returns over the two-month period -1 and 0 , where month 0 is the announcement month. As noted earlier, we choose a two-month announcement period window due to potential leakage of information about the deal. The reported mean excess return represents the return on an equally weighted portfolio, while the median excess return shows the wealth effect for the typical company in the sample. The following discussion focuses on the mean excess return to facilitate comparisons with the results of previous studies.

Target bondholders earn a mean excess return of 1.09 percent, significant at the five percent level, while target stockholders earn a mean excess return of 22.15 percent, significant at the one percent level.¹¹ While the average announcement effect for target stock is similar to that found in previous studies, the average announcement effect for target bonds is quite different. Kim and McConnell (1977), Asquith and Kim (1982), Eger (1983), Dennis and McConnell (1986), and Maquieira, Megginson and Nail (1998) all find average target bondholder returns that are not significantly different from zero. The

¹⁰ The market value of assets is computed as the sum of the book value of total debt at the fiscal year-end immediately prior to the announcement month plus the market value of equity two months prior to the announcement month.

¹¹ The results for target stock reported in Table II are based on the sample of 265 targets with bonds. The mean excess return for target stock in the initial sample of 940 deals is 27.35 percent. Similarly, the results for acquirer stock are based on the 831 acquirers with bonds. The mean excess return for acquirer stock in the initial sample of 940 deals is identical to that reported in Table II.

Table II
Target and Acquirer Excess Bond and Stock Returns for the Full Sample and by Bond Rating

Deals include all mergers and acquisitions announced during the period 1979 to 1997 that are listed on Securities Data Corporation's Mergers and Acquisitions Database where both target and acquirer are listed on CRSP and have non-missing announcement period stock returns, and the target and/or the acquirer have valid announcement period bond returns. Excess returns are the sum of the excess returns for the two-month period -1 and 0, where month 0 is the announcement month. Excess stock returns are computed as the stock's monthly return minus the CRSP value-weighted market return. Excess bond returns are computed as the bond's total return minus the return on a similar risk and maturity bond index. When a firm has multiple bonds, its excess bond return is computed as the market value weighted average of each bond's excess return, where the weights are based on bond market values two months prior to the announcement month (i.e., month -2). The significance level of the median is based on a Wilcoxon signed-rank test. The significance level of the difference in medians is based on a Wilcoxon rank-sum test. The difference in means *t*-test assumes unequal variances across groups when a test of equal variances is rejected at the 10 percent level. The symbols ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively. Excess returns are in %.

	Target Bonds			Target Stock			Acquirer Bonds			Acquirer Stock		
	Mean	Median	N	Mean	Median	N	Mean	Median	N	Mean	Median	N
Full sample	1.09**	0.01	265	22.15***	18.32***	265	-0.17***	-0.03	831	0.15	0.40	831
Sample grouped by bond rating												
Investment grade	-0.80***	-0.22***	167	21.38***	18.13***	167	-0.09*	-0.03	680	0.27	0.52	680
Below investment grade	4.30***	1.10***	98	23.47***	19.01***	98	-0.55*	-0.05	151	-0.37	-0.54	151
Difference	-5.11***	-1.32***		-2.09	-0.88		0.46	0.02		0.64	1.06	

results for acquirer bonds also contrast with previous findings. Acquirer bonds experience an average announcement effect of -0.17 percent. While this mean excess return is significantly different from zero at the one percent level, it is arguable whether it is economically significant. Regardless, the negative announcement effect for acquirer bonds in our sample differs from the effects documented in the literature. In particular, Eger, Asquith and Kim, and Maquieira, Megginson and Nail find positive average excess returns to acquirer bonds that range from 1.0 percent to 1.9 percent, and are generally statistically significant.¹² The mean excess return for acquirer stockholders is positive, but not significantly different from zero. This result is consistent with the literature that generally finds slightly negative or zero announcement period returns for acquirer stock.

A number of papers argue that bondholders may benefit from a merger through a coinsurance effect resulting from a reduction in asset risk and/or an increase in the collateral value backing the debt. Kim and McConnell (1977) and Dennis and McConnell (1986) argue that coinsurance effects should be largest for riskier debt, with the associated prediction that bondholder gains from mergers should be larger for lower rated bonds. However, both papers fail to find evidence that lower rated target and/or acquiring bonds benefit from mergers.¹³

The remaining rows of Table II present bond and stock announcement period returns grouped by whether the firm's bonds are investment grade (Standard and Poor's bond rating of BBB– and above) or below investment grade. In sharp contrast with the existing evidence, we find that below investment grade target bonds exhibit a strong coinsurance effect. These bonds also experience dramatically different wealth effects in mergers than their investment grade counterparts. As shown in Table II, the mean excess return for investment grade target bonds is -0.80 percent, while the mean excess return for below investment grade target bonds is 4.30 percent. Both mean excess returns (and their medians) are significantly different from zero at the one percent level, and are significantly different from each other at the one percent level. By comparison, target stockholder announcement period returns are not statistically or economically different between these two groups. Excess returns for acquiring firm bondholders and stockholders also are not significantly different across the two rating classes.

B. Analysis of Bondholder Excess Returns

We now examine target and acquirer excess bond returns grouped by bond, firm, and deal characteristics. The contingent claims analysis of mergers in Shastri (1990) suggests several important grouping categories. Shastri

¹² Dennis and McConnell (1986) find a small negative announcement effect for acquirer bonds, but it is not significantly different from zero.

¹³ Kim and McConnell (1977) argue that anticipated post-merger leverage increases may offset any benefits from coinsurance that would be reflected in bond prices at announcement. Consistent with this increased leverage argument, Kim and McConnell (1977), Cook and Martin (1991), and Ghosh and Jain (2000) find that the leverage of combined firms increases following mergers.

illustrates how differences in target and acquiring firms' asset risks, leverage ratios, and debt maturities influence their respective debt claims in mergers. We quickly review these effects below and summarize them in the Appendix. The discussion assumes a non-synergistic merger where the merged firm's value equals the sum of the merging firms' values. In the case of a synergistic merger, the bondholder effects discussed below are unaffected, but they may be masked by the synergy gain that will generally benefit both stockholders and bondholders.

Risk Effect: The asset risk of the merged firm can differ from the merging firms' asset risks because of imperfectly correlated unlevered returns and/or differences between the asset risks of the merging firms. As a result, the bonds of the firm experiencing a decrease in risk should increase in value and the bonds of the firm experiencing an increase in risk should decrease in value. Of course, the change in bond value will depend on both the pre-merger risk of the debt and the magnitude of the change in risk. Relatively risky debt stands to benefit the most from a decrease in risk, while relatively safe debt stands to lose the most from an increase in risk. The Appendix shows how the various orderings of target, acquirer, and merged firm asset risk are expected to impact the values of target and acquirer bonds.

Leverage Effect: Unless the target and acquirer have identical leverage ratios, one firm will experience an increase in leverage and the other a decrease in leverage when they merge. The bonds of the more highly leveraged firm should experience a reduction in bankruptcy (default) risk after the merger and are therefore expected to experience a positive wealth effect at merger announcement. Similarly, all else being equal, the bonds of the less leveraged firm should experience a negative wealth effect. Of course, this presumes that there are no anticipated changes in leverage post-merger or as a result of the merger offer itself.

Maturity Effect: If one firm's debt has a longer maturity than the other, then the shorter maturity debt effectively becomes senior to the longer maturity debt when they merge. This seniority effect, which is valuable because of the larger merged firm's asset base, is expected to lead to a positive wealth effect at merger announcement for the shorter maturity debt. As discussed in Shastri (1990), the impact on the value of the longer maturity debt is ambiguous.

Tables III and IV, respectively, present target and acquirer excess bond returns grouped by bond, firm, and deal characteristics. Panel A of Table III stratifies the sample of target bonds by whether the target bond rating is below or above the acquirer bond rating. Consistent with the risk effect, when the target bond rating is below the acquirer bond rating, the mean and median target excess bond returns are positive, although only the median is significantly different from zero. In sharp contrast, when the target bond rating is above the acquirer bond rating, the mean and median target excess bond returns are significantly negative. Both the mean and median differences between these two groups are statistically significant at the one percent level, and the mean difference of 2.83 percent appears to be highly economically significant. As one would expect given a strong risk effect, within the group of target bonds having a rating below the acquirer rating, the sub-sample of below investment grade

Table III
Differences in Target Excess Bond Returns Across Various Groupings

Deals include all mergers and acquisitions announced during the period 1979 to 1997 that are listed on Securities Data Corporation's Mergers and Acquisitions Database where both target and acquirer are listed on CRSP and have non-missing announcement period stock returns, and the target and/or the acquirer have valid announcement period bond returns. Excess bond returns are the sum of the excess returns in the announcement month (0) and the month prior to the announcement month (-1). When a firm has multiple bonds, bond excess returns, rating and maturity are weighted averages using the market values of the firm's bonds two months prior to the announcement month (i.e., month -2) to compute weights. The standard deviation of unlevered stock returns (std. dev.) is computed using two years of monthly returns over the months -25 to -2. We require that the firm have at least 12 valid monthly returns during this period. Unlevered returns are computed by multiplying the stock returns by (1 - Leverage), where Leverage is the ratio of the book value of total debt to the sum of the book value of total debt and market value of equity at the end of the corresponding fiscal year. The combined standard deviation of unlevered returns is the portfolio standard deviation of unlevered target and acquirer returns where the weights of the portfolio are based on the market value of assets (book value of total debt plus market value of equity) two months prior to the merger announcement month, and the standard deviations and correlation are based on the unlevered stock returns. The combined target and acquirer leverage is computed using target and acquirer weights based on the market value of assets two months prior to the announcement month. Relative size is the ratio of the target to acquirer market value of equity. The significance level of the median is based on a Wilcoxon signed-rank test. The significance level of the difference in medians is based on a Wilcoxon rank-sum test. The differences in means *t*-test assumes unequal variances across groups when a test of equal variances is rejected at the 10 percent level. The symbols ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively. Excess returns are in %.

Grouping Criteria	All Bonds			Investment Grade Bonds			Below Investment Grade Bonds		
	Mean	Median	N	Mean	Median	N	Mean	Median	N
Panel A: Target bond rating is									
Below acquirer bond rating	1.64	0.29**	96	-0.14	0.01	63	5.05*	1.06***	33
Above or equal to acquirer bond rating	-1.19***	-0.34***	65	-1.16***	-0.36***	53	-1.31	-0.10	12
Difference	2.83***	0.64***		1.02**	0.37***		6.37**	1.16**	
Panel B: The ratio $std.dev_{combined} / std.dev_{target}$ is									
Less than or equal to one	1.53**	0.07	202	-0.65***	-0.18*	130	5.47***	1.24***	72
Greater than one	-1.56**	-0.64**	25	-1.61***	-0.64***	19	-1.41	-0.01	6
Difference	3.09***	0.71***		0.96	0.46**		6.88*	1.25	
Panel C: The ratio $leverage_{combined} / leverage_{target}$ is									
Less than or equal to one	2.00**	-0.04	136	-1.06***	-0.27***	76	5.87***	1.36***	60
Greater than one	0.04	0.01	94	-0.49*	-0.17	75	2.14**	0.65**	19
Difference	1.96*	-0.05		-0.56	-0.10		3.73	0.71	
Panel D: Target bond maturity is									
Shorter than acquirer bond maturity	1.29	0.22**	97	0.08	0.16	63	3.53	0.51	34
Longer than or equal to acquirer bond maturity	-0.69**	-0.47*	64	-1.42***	-0.85***	53	2.82**	2.68**	11
Difference	1.98*	0.69***		1.50***	1.01***		0.71	-2.17	

Panel E: Relative size of target to acquirer is							
Below sample median	2.79***	0.23**	132	-0.54**	-0.19	71	6.68***
Above sample median	-0.61**	-0.20	133	-1.00***	-0.25***	96	0.39
Difference	3.40***	0.43***		0.46	0.06		6.29***
Panel F: Method of payment is							
Cash	0.04	-0.01	48	-1.56**	-0.50*	28	2.27*
Stock or mixture	1.32**	0.01	217	-0.65***	-0.21**	139	4.83***
Difference	-1.28	-0.02		-0.90	-0.29		-2.56
Panel G: Deal attitude classified as							
Hostile	-0.41	-0.28	44	-1.47***	-0.70***	34	3.22**
Friendly	1.38**	0.05	221	-0.63***	-0.19	133	4.43***
Difference	-1.79*	-0.33		-0.84*	-0.51		-1.21
Panel H: Deal announced in							
1979-1989	-0.33	-0.61**	104	-1.40***	-0.70***	68	1.68
1990-1997	2.00**	0.32***	161	-0.39*	0.05	99	5.83***
Difference	-2.34**	-0.93***		-1.01**	-0.76***		-4.14*
Panel I: Conglomerate-Target and acquirer belong to							
Same two-digit SIC code	1.89*	-0.23	91	-0.91**	-0.29**	50	5.30**
Different two-digit SIC code	0.67	0.16	174	-0.76**	-0.07*	117	3.59**
Difference	1.22	-0.39		-0.15	-0.22		1.71
Panel J: The deal type is							
Merger	0.79	0.01	204	-0.65***	-0.07	133	3.47**
Tender offer	2.08	-0.22	61	-1.42***	-0.92***	34	6.50*
Difference	-1.29	0.23		0.78	0.85**		-3.03
Panel K: The deal is							
Completed	1.72**	0.31**	138	-0.20	0.01	76	4.07**
Not completed	0.40	-0.26*	127	-1.31***	-0.44***	91	4.71*
Difference	1.32	0.57***		1.11***	0.45***		0.64

Table IV
Differences in Acquirer Excess Bond Returns Across Various Groupings

Deals include all mergers and acquisitions announced during the period 1979 to 1997 that are listed on Securities Data Corporation's Mergers and Acquisitions Database where both target and acquirer are listed on CRSP and have non-missing announcement period stock returns, and the target and/or the acquirer have valid announcement period bond returns. Excess bond returns are the sum of the excess returns in the announcement month (0) and the month prior to the announcement month (-1). When a firm has multiple bonds, bond excess returns, rating, and maturity are weighted averages using the market values of the firm's bonds two months prior to the announcement month (i.e., month -2) to compute weights. The standard deviation of unlevered stock returns (std. dev.) is computed using two years of monthly returns over the months -25 to -2. We require that the firm have at least 12 valid monthly returns during this period. Unlevered returns are computed by multiplying the stock returns by (1 - Leverage), where Leverage is the ratio of the book value of total debt to the sum of the book value of total debt and market value of equity at the end of the corresponding fiscal year. The combined standard deviation of unlevered returns is the portfolio standard deviation of unlevered target and acquirer returns where the weights of the portfolio are based on the market value of assets (book value of total debt plus market value of equity) two months prior to the merger announcement month, and the standard deviations and correlation are based on the unlevered stock returns. The combined target and acquirer leverage is computed using target and acquirer weights based on the market value of assets two months prior to the announcement month. Relative size is the ratio of the target to acquirer market value of equity. The significance level of the median is based on a Wilcoxon signed-rank test. The significance level of the difference in medians is based on a Wilcoxon rank-sum test. The differences in means *t*-test assumes unequal variances across groups when a test of equal variances is rejected at the 10 percent level. The symbols ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively. Excess returns are in %.

Grouping Criteria	All Bonds			Investment Grade Bonds			Below Investment Grade Bonds		
	Mean	Median	N	Mean	Median	N	Mean	Median	N
Panel A: Target bond rating is									
Below target bond rating	-0.74**	-0.41***	48	-0.63**	-0.26***	29	-0.91	-0.80	19
Above or equal to target bond rating	-0.22	-0.03	112	-0.17	-0.03	101	-0.63	-0.10	11
Difference	-0.52	-0.38**		-0.45	-0.23*		-0.28	-0.90	
Panel B: The ratio $std.dev_{combined} / std.dev_{acquirer}$ is									
Less than or equal to one	-0.20**	-0.04	583	-0.11**	-0.05*	476	-0.60	0.09	107
Greater than one	-0.16	0.07	89	-0.11	0.11	83	-0.87	-1.45	6
Difference	-0.04	-0.11		0.00	-0.16***		0.27	1.54	
Panel C: The ratio $leverage_{combined} / leverage_{acquirer}$ is									
Less than or equal to one	-0.25**	-0.07*	420	-0.13**	-0.06*	328	-0.69*	-0.16	92
Greater than one	-0.08	0.04	310	-0.06	0.04	275	-0.22	0.07	35
Difference	-0.17	-0.11		-0.06	-0.10		-0.48	-0.23	
Panel D: Acquirer bond maturity is									
Shorter than target bond maturity	-0.45**	-0.30***	63	-0.50***	-0.26***	51	-0.25	-0.66	12
Longer than or equal to target bond maturity	-0.33	-0.03	97	-0.13	-0.03	79	-1.18	-0.41	18
Difference	-0.12	-0.27*		-0.37	-0.23*		0.93	-0.25	

Panel E: Relative size of target to acquirer is									
Below sample median	-0.03	0.02	415	-0.23***	-0.08***	304	-0.55	0.03	112
Above sample median	-0.32***	-0.07**	416	0.02	0.03	376	-0.53	-0.14	39
Difference	0.29**	0.09*		-0.25***	-0.11***		-0.02	0.17	
Panel F: Method of payment is									
Cash	-0.19*	-0.10**	233	-0.14*	-0.07**	188	-0.37	-0.59	45
Stock or mixture	-0.17**	0.00	598	-0.07	0.00	492	-0.62	0.08	106
Difference	-0.02	-0.10		-0.07	-0.07		0.25	-0.67	
Panel G: Deal attitude classified as									
Hostile	-0.61**	-0.36**	66	-0.34**	-0.30**	43	-1.10	-0.61	23
Friendly	-0.14**	0.00	765	-0.07	0.00	637	-0.45	-0.01	128
Difference	-0.47*	-0.36**		-0.27	-0.30**		-0.65	-0.60	
Panel H: Deal announced in									
1979-1989	-0.51***	-0.15**	272	-0.24**	-0.15**	210	-1.41**	-0.07	62
1990-1997	-0.01	0.03	559	-0.02	0.03	470	0.05	-0.05	89
Difference	-0.50***	-0.17**		-0.22*	-0.18***		-1.46**	-0.02	
Panel I: Conglomerate-Target and acquirer belong to									
Same two-digit SIC code	-0.19*	-0.08	297	-0.09	-0.08	242	-0.65	-0.10	55
Different two-digit SIC code	-0.14*	0.01	530	-0.09	0.01	436	-0.37	-0.01	94
Difference	-0.05	-0.09		0.00	-0.09		-0.28	-0.09	
Panel J: The deal type is									
Merger	-0.10	0.01	644	-0.06	0.01	533	-0.31	0.09	111
Tender offer	-0.41**	-0.14***	187	-0.19**	-0.12***	147	-1.22	-0.60	40
Difference	0.31*	0.15**		0.13	0.13**		0.91	0.69	
Panel K: The deal is									
Completed	-0.15*	-0.02	582	-0.07	-0.03	490	-0.55	0.07	92
Not completed	-0.24*	-0.05	249	-0.14	-0.02	190	-0.55	-0.35	59
Difference	0.09	0.03		0.07	-0.01		0.00	0.42	

target bonds drives the positive announcement effect. As seen in the table, the mean and median excess bond returns for this sub-sample are a significant 5.05 percent and 1.06 percent, respectively. Similarly, within the group of target bonds having a rating above the acquirer rating, the sub-sample of investment grade target bonds is expected to face a large negative risk effect. Indeed, for this sub-sample, the mean and median excess bond returns are a significant -1.16 percent and -0.36 percent, respectively. Excess returns for acquirer bonds by relative rating groups are reported in Panel A of Table IV. As seen in the table, there is no support for a risk effect in acquiring firm bonds. Acquirer excess bond returns are negative regardless of whether the acquirer bond rating is below or above the rating of the target.

Panel B in Table III stratifies the target bond sample by the change in asset risk (measured using the standard deviation of unlevered stock returns) that is likely to occur as a result of the merger. We group the target bond sample by whether the ratio of the combined firm to target firm standard deviation of unlevered returns is less than one (indicating the portfolio of target and acquirer assets has smaller asset volatility than that of the target) or greater than one (indicating the portfolio has larger asset volatility than that of the target). As seen in the panel, there is a strong portfolio risk effect for target bonds. In particular, the mean excess return for the group of target bonds with a ratio less than one is significantly positive at 1.53 percent, and the mean excess return for the group of target bonds with a ratio greater than one is significantly negative at -1.56 percent. As expected, the positive gains experienced by the asset risk reduction group (ratio less than one) are totally driven by the below investment grade sub-sample. For this sub-sample, the mean (median) target excess bond return is a significant 5.47 percent (1.24 percent). In contrast, the investment grade sub-sample actually has a small negative but significant mean (median) excess return of -0.65 percent (-0.18 percent). Similar to the case of relative bond ratings, the excess returns of acquiring firm bonds reported in Panel B of Table IV do not support the risk effect. Although acquirer excess bond returns are generally negative when risk increases (ratio of combined to acquirer standard deviation of unlevered returns greater than one), they are also negative when risk decreases (ratio less than one).

Panel C examines the impact of leverage on bondholder wealth. We group target and acquirer bonds by whether the ratio of the combined to individual firm leverage ratios is less than one (implying a decrease in leverage) or greater than one (implying an increase in leverage). The target and acquiring firm leverage ratios are computed as the ratio of the book value of total debt to the sum of the book value of total debt and market value of equity. The combined target and acquirer leverage ratio is computed as the market-value weighted average of the merging firms' leverage ratios, where the weights are based on the sum of the book value of total debt and market value of equity.¹⁴ All else

¹⁴ In the computation of the leverage ratios and the weights, the book value of total debt is from the fiscal year-end immediately prior to the merger announcement month and the market value of equity is from month -2 relative to the merger announcement month.

being the same, the leverage effect predicts that the bonds of the firm with a ratio of combined to individual firm leverage ratios less (greater) than one will experience a positive (negative) wealth effect in the merger.

The results for target bonds in Panel C of Table III are weakly consistent with the leverage effect. As predicted, target bonds experience a significantly positive mean excess return of 2.00 percent when the ratio of combined to target firm leverage ratios is less than one. By comparison, target bonds in the leverage increase group (i.e., ratio of combined to target leverage ratios greater than one) experience zero abnormal performance at the merger announcement. However, the breakdowns of the groups into investment grade and below investment grade target bonds offer little confirmatory evidence of a leverage effect. For example, although below investment grade target bonds experiencing a decrease in leverage have a significantly positive excess return at announcement, below investment grade target bonds experiencing an increase in leverage also have a significantly positive excess return at announcement. The results for acquirer bonds in Panel C of Table IV offer no support for a leverage effect. On the contrary, acquirer bonds experiencing a decrease in leverage actually have a significantly negative excess return at merger announcement. The overall lack of support for the leverage effect could be attributable to the market's perception that the merged firm's leverage ratio will be different from the simple weighted-average of the target and acquiring firms' pre-merger leverage ratios. Consistent with this interpretation, Kim and McConnell (1977), Cook and Martin (1991), and Ghosh and Jain (2000) find that, on average, leverage significantly increases following a merger.

The maturity effect predicts that target (acquirer) bonds will experience an increase in wealth when their maturity is shorter than that of the acquirer's (target's) bonds. Panel D of Tables III and IV examines this prediction. Target bonds experience a significantly negative excess return when they have a longer average remaining maturity than the average remaining maturity of the acquiring firm's bonds. The mean (median) excess bond return is -0.69 percent (-0.47 percent), which is significantly negative at the five percent (10 percent) level. In sharp contrast, target bonds with shorter average maturity earn a positive mean excess return of 1.29 percent, which is insignificant at conventional levels, and a median excess return of 0.22 percent, which is significant at the five percent level. The mean and median excess returns of these two groups are significantly different at the 10 percent level and one percent level, respectively. Partitioning the target bond sample by credit risk reveals that this maturity effect is highly pronounced for investment grade target bonds. For this sub-sample, both the mean and median excess returns for the longer maturity target bonds are significantly negative at the one percent level and are significantly smaller than the excess returns of the shorter maturity group, again at the one percent level. For the below investment grade sub-sample of target bonds, we see little evidence of a maturity effect. Similar to the risk and leverage effects, the results for acquirer bonds in Table IV provide little evidence of a maturity effect. Overall, there is support for a maturity effect in target bonds but no support in acquirer bonds.

The relative size of the target and acquirer has been found to be a significant determinant of target excess stock returns.¹⁵ One would expect that a relatively large acquirer (target) should have a bigger coinsurance effect and therefore a more favorable impact on target (acquirer) security holders. Consistent with this idea, we see in Panel E of Table III that relatively small deals, characterized as deals with below median values of the ratio of target to acquirer market value of equity, result in significantly positive target excess bond returns, while relatively large deals result in negative excess bond returns. Moreover, the mean and median differences between these two groups (3.40 percent and 0.43 percent, respectively) are significant at the one percent level. This size effect is most pronounced for below investment grade target bonds, where the relatively small deals show a significantly positive mean (median) excess bond return of 6.68 percent (1.68 percent). Contrary to the implication of the coinsurance effect, we find in Panel E of Table IV that acquirer bonds earn significantly larger excess returns when the target is relatively small. Acquirer bonds experience significantly negative mean (median) excess returns of -0.32 percent (-0.07 percent) in large deals and insignificant excess returns in small deals. The difference in means (medians) of 0.29 percent (0.09 percent) is significant at the five percent (10 percent) level.

Panel F focuses on the method of payment. If the acquirer offers cash, then bondholders may experience a decrease in collateral and possibly greater asset risk after the merger. Alternatively, if the acquirer offers stock no assets leave the firm. We find only slight evidence that the method of payment impacts bondholder excess returns. Target bonds earn a significantly positive mean excess return when the method of payment is stock or a mixture, but the median excess return is insignificant and there is no statistical difference from the cash payment group. Furthermore, the reactions of investment grade and below investment grade target bonds are similar across method of payment groups. Acquirer bonds do not show any differential reaction to the method of payment.

Panel G in Table III shows that target bondholders earn a significantly positive mean excess return in deals classified as friendly.¹⁶ This positive mean excess return is significantly larger (at the 10 percent level) than the mean excess return experienced by target bondholders in hostile deals.¹⁷ The acquirer evidence in Panel G of Table IV is similar. Acquirer bonds earn mean (median) excess returns that are significantly larger at the 10 percent level (five percent level) in friendly deals.

Panel H stratifies the sample by whether the offer is announced during the period 1979 to 1989 or during the period 1990 to 1997. Many takeovers in the 1980s, in particular LBOs and MBOs, were harmful to bondholders.

¹⁵ Jarrell and Poulsen (1989b) and Billett and Ryngaert (1997) find that equity premiums decrease in the relative size of the target to the acquirer.

¹⁶ We rely on Securities Data Corporation's (SDC) definition of whether a deal is friendly or hostile, as flagged in their Mergers and Acquisitions Database. Schwert (2000) shows that hostile deals may not be easily distinguishable from friendly deals.

¹⁷ However, target bondholder median excess returns in friendly and hostile deals are insignificantly different from zero, as is the difference in medians.

Following that experience, bondholders in the 1990s often protected themselves with event risk covenants (ERC) (see, e.g., McDaniel (1986), Lehn and Poulsen (1992), Cook and Easterwood (1994), and Nash, Netter and Poulsen (2003)). Of the 265 target firms with bonds in our sample, we are able to verify whether 212 of these firms have at least one bond with an event risk covenant.¹⁸ Of these 212 targets, only four out of 102 targets in deals during 1979 to 1989 have bonds with ERC protection, while 35 out of 110 targets in deals during 1990 to 1997 have bonds with ERC protection. More telling, none of the 30 targets with bonds rated below investment grade during 1979 to 1989 have ERC protection, while 22 out of 39 targets with bonds rated below investment grade during 1990 to 1997 have ERC protection. This trend toward the increased use of ERC protection suggests that negative bondholder wealth effects from mergers and acquisitions should be less frequent and severe in the 1990s.

The evidence on the returns to target and acquiring firm bonds in Panel H of Tables III and IV is consistent with this implication. In the 1979 to 1989 period, target bonds earned an insignificantly negative mean excess return of -0.33 percent and a significantly negative median excess return of -0.61 percent. In sharp contrast, in the 1990 to 1997 period, target bonds earned a significantly positive mean excess return of 2.00 percent and a significantly positive median excess return of 0.32 percent; both are significantly larger than the corresponding returns in the 1980s. In a very similar pattern, acquirer bonds experienced significantly negative mean and median excess returns in the 1980s and virtually zero mean and median excess returns in the 1990s. Both the mean and median excess returns are significantly different across these two time periods.¹⁹

Finally, Panels I, J, and K report bondholder excess returns by whether the deal is classified as conglomerate or non-conglomerate, merger or tender offer, and completed or not completed, respectively. Defining conglomerate deals by whether the target and acquirer have different two-digit SIC codes, we find no evidence of a conglomerate effect in either the target or acquirer excess bond returns. We also find little evidence that target excess bond returns are significantly different in mergers and tender offers. However, both mean and median excess returns to investment grade target bonds are highly significantly negative in tender offers. This pattern of negative excess returns in tender offers is much stronger for acquirer bonds. As seen in Panel J of Table IV, mean and median acquirer excess bond returns are significantly negative in tender

¹⁸ We gather information on event risk covenants from *Standard and Poor's CreditWeek*, *Moody's Manuals*, and SEC filings in the EDGAR database. Foodbrands America Inc. 9.75 percent and 10.75 percent senior subordinated notes provide typical examples of event risk covenants. These notes' prospectuses state that in the event of a change in control, holders have the right to require that the company repurchase all or a portion of the notes at 101 percent of the principal amount plus accrued interest. Specified change in control events include mergers, leveraged acquisitions, LBOs, and MBOs.

¹⁹ We also examined target and acquirer excess bond returns for the 212 deals where it could be verified that the target bonds have ERC protection. Consistent with the sample period groupings, both target and acquiring firm bonds earned larger excess returns when target bonds have ERC protection than when they do not.

offers, and are significantly different from the corresponding mean and median acquirer excess bond returns in mergers. Lastly, there is no difference in the announcement effects of acquiring bonds to whether the deal is completed or not. In contrast, as seen in Panel K of Table III, investment grade target bonds in not completed deals experience significantly negative mean and median announcement effects that are significantly different from those in completed deals. However, whether the deal is completed or not completed has no effect on below investment grade target bonds.

C. Regressions Explaining Excess Returns

Table V reports regressions of target and acquirer excess bond and stock returns on explanatory variables constructed to mirror the grouping analysis in Tables III and IV. The dependent variables are the respective two-month (–1 and 0) excess security returns in percent. The first set of independent variables jointly tests the risk, leverage, and maturity effects. Specifically, we enter dummy variables equal to one if the acquirer bond rating is greater than the target bond rating, the standard deviation of unlevered returns (leverage ratio) of the combined firms is greater than the respective standard deviation of unlevered returns (leverage ratio) of the target or acquiring firm, and if the acquirer maturity is greater than the target maturity. The remaining independent variables consist of deal characteristics, including relative size (logarithm of the ratio of target to acquirer market value of equity in month –2) and dummy variables for whether the deal is for cash, classified as hostile, occurred in the 1990s, conglomerate, a tender offer, and completed. The table reports regressions for each of the four security holder classes with and without this set of deal characteristics. Note that the number of observations in the regressions is the 141 deals where both the target and acquiring firms have bonds in the sample. The *t*-statistics of the coefficient estimates are based on White's (1980) heteroskedasticity-consistent standard errors and are reported in parentheses below the coefficients.

The first two columns contain the results for target excess bond returns. As expected, the coefficient estimate on the relative rating dummy variable is positive, but it is only significantly positive when relative size and the other deal characteristics are not in the regression (column two). We find a similar result when risk is measured by the standard deviation of unlevered returns; target excess bond returns are smaller when the standard deviation of the combined firms' unlevered returns exceeds that of the target, but they are significantly smaller (at the 10 percent level) only when the deal characteristics are not in the regression (column two). These results should not be surprising, since the risk effect variables are generally highly correlated with the deal characteristics, especially the relative size of the target and acquirer.²⁰ Although the leverage

²⁰ For example, there is a strong negative correlation between the relative bond rating dummy variable and relative size (–0.42), and a strong positive correlation between the combined to target standard deviation dummy variable and relative size (0.46). Both correlations are statistically significant at well beyond the one percent level.

Table V
Regressions Explaining Excess Security Returns

Deals include all mergers and acquisitions announced during the period 1979 to 1997 that are listed on Securities Data Corporation's Mergers and Acquisitions Database where both target and acquirer are listed on CRSP and have valid announcement period stock and bond returns. The dependent variable is the sum of the excess bond or stock returns (in percent) in the announcement month (0) and the month prior to the announcement month (-1). Excess bond returns are computed as the bond's total return minus the return on a similar risk and maturity bond index. Excess stock returns are computed as the stock's return minus the CRSP value-weighted market return. When a firm has multiple bonds, bond excess returns, rating and maturity are weighted averages using market values of the firm's bonds two months prior to the announcement month (i.e., month -2) to compute weights. Rating is a cardinalized variable based on the Standard and Poor's bond rating, where NR = 1, D = 2, CC = 3, ..., AAA = 23. The standard deviation of unlevered stock returns ($StdDev$) is computed using two years of monthly returns over months -25 to -2. We require that the firm have at least 12 monthly returns during this period. Unlevered returns are computed by multiplying the stock returns by (1 - Leverage), where Leverage is the ratio of the book value of total debt to the sum of the book value of total debt and market value of equity at the end of the corresponding fiscal year. The combined standard deviation of unlevered returns is the portfolio standard deviation of unlevered target and acquirer returns where the weights of the portfolio are based on the market value of assets (book value of total debt plus market value of equity) two months prior to the merger announcement month, and the standard deviations and correlation are based on the unlevered stock returns. The combined target and acquirer leverage is computed using target and acquirer weights based on the market value of assets two months prior to the announcement month. Bond maturity is the remaining maturity of the bond in the merger announcement month. Relative size is the logarithm of the ratio of the target to acquirer market value of equity two months prior to the merger announcement month. Cash, Hostile, 1990s, Conglomerate, Tender offer, and Completed deal are dummy variables equal to one if the offer is for cash, is hostile, is made during the period 1990 to 1997, involves firms in different two-digit SIC codes, is a tender offer, and is completed. T -statistics (in parentheses) are computed using White's correction for heteroskedasticity. The symbols **, *, and * denote significance at the 1, 5, and 10 percent levels based on a two-tailed test, respectively.

	Target Bonds	Target Stock	Acquirer Bonds	Acquirer Stock
Intercept	-3.819 (-3.20)**	14.404 (3.13)**	-0.836 (-2.07)**	-0.751 (-0.69)
Dummy = 1 if acquirer rating > target rating	1.320 (1.51)	6.469 (1.56)	-0.071 (-0.21)	3.266 (1.67)*
Dummy = 1 if $StdDev_{combined} > StdDev_{target}$	-1.251 (-1.23)	-9.742 (-1.60)	-0.760 (-0.11)	
Dummy = 1 if $StdDev_{combined} > StdDev_{acquirer}$			-0.040 (-0.13)	2.376 (1.40)
Dummy = 1 if $Leverage_{combined} > Leverage_{target}$	-0.483 (-0.60)	3.652 (1.04)	5.265 (1.37)	3.198 (2.00)**

(continued)

Table V—Continued

	Target Bonds	Target Stock	Acquirer Bonds	Acquirer Stock
Dummy = 1 if $Leverage_{combined} > Leverage_{acquirer}$				
Dummy = 1 if acquirer maturity > target maturity	1.177 (1.09)	1.380 (1.31)	-0.019 (-0.08)	0.187 (0.68)
Relative size (target/acquirer)	-0.759 (-1.47)	-3.060 (-0.85)	-0.077 (-0.24)	-3.188 (-1.95)*
Cash	-1.430 (-1.31)	-2.152 (-1.74)*	-0.054 (-0.18)	1.663 (1.00)
Hostile	-0.302 (-0.40)	-3.453 (-0.79)	0.610 (0.83)	
1990s	3.400 (2.47)**	15.315 (2.73)***	0.224 (-0.36)	0.555 (0.19)
Conglomerate	3.389 (1.36)	-8.002 (-2.07)**	0.929 (0.36)	0.127 (-0.56)
Tender offer	2.059 (2.28)**	5.884 (1.39)	-0.279 (-0.15)	2.335 (1.00)
Completed deal	-1.475 (-0.90)	6.365 (1.72)*	2.095 (0.69)	-2.095 (-1.27)
Adjusted R^2	0.05	0.22	0.04	0.01
No. of observations	141	141	141	141

and maturity effect variables have the correct signs, they are not significantly different from zero in either regression.

Two deal characteristics stand out as being significant determinants of target excess bond returns. First, consistent with the grouping results, the coefficient on the 1990s dummy variable is significantly positive. The estimate indicates that after controlling for characteristics of the merging firms and the deal, the difference between (mean) target bondholder excess returns in the 1990s and 1980s is a highly economically significant 3.40 percent. Second, the coefficient on the tender offer dummy variable is significantly positive. All else being the same, the estimate indicates that target excess bondholder returns are an economically significant 2.06 percent larger in tender offers than in mergers.

The next two columns report the results for target excess stock returns. Similar to the results for target bonds, the coefficient on the acquirer bond rating greater than the target bond rating dummy variable is significantly positive when the deal characteristics are not in the regression (column four). However, no other risk, leverage or maturity variable is significant in the target stock regressions. The coefficient on relative size is significantly negative, suggesting that relatively large targets garner smaller merger premia. This result also appears to be economically significant; a one standard deviation increase in relative size decreases the (mean) target excess stock return in this sample of 141 targets from 23.44 percent to 20.12 percent. Finally, the regressions show that target stockholders earn significantly smaller excess returns in the 1990s, and significantly larger excess returns in hostile and tender offers, and when the deal is completed. The negative coefficient on the 1990s dummy variable is interesting, since it sharply contrasts with the significantly larger excess returns earned by target bonds in the 1990s. In particular, the coefficient on the 1990s dummy variable in the target stock regression reveals that all else being the same, target excess stock returns are smaller by eight percent in the 1990s than in the 1980s. By almost any standard, this difference is economically significant.

The remaining columns of Table V report regression results for acquirer bonds and stock. The only significant coefficient in the acquirer bond regressions (columns five and six) is the negative coefficient on relative size. The coefficient estimate on relative size in column five indicates that a one standard deviation increase in relative size decreases the mean acquirer excess bond return from -0.39 percent to -0.78 percent. This economically significant effect suggests that acquirer bondholders fare much worse in deals where the target is relatively large.

The results for acquirer stockholder returns in columns seven and eight reveal two interesting but generally expected results. First, acquirer excess stock returns are significantly larger when the target is lower rated than the acquirer, and when the standard deviation of the combined firms' unlevered returns is larger than the standard deviation of the unlevered returns of the acquirer. Impressively, note in column eight that the coefficient on the standard deviation of combined greater than acquirer dummy variable indicates that (mean)

acquirer excess stock returns are larger by 3.2 percent when the merger is expected to increase asset risk than when it is expected to decrease asset risk. Of course, this positive risk effect is expected given the option view of levered equity. The second noteworthy result is that acquirer excess stock returns are significantly smaller (also by on average 3.2 percent) when the leverage ratio of the combined firms is expected to exceed the leverage ratio of the acquiring firm. This leverage effect is also consistent with the option view of levered equity (see, e.g., Shastri (1990)).

The regression results in Table V are robust to alternative specifications of the risk, leverage, and maturity variables. For example, the results are qualitatively similar if we replace the dummy variable specifications with logs of the ratios of (cardinalized) acquirer rating to target rating, standard deviation combined to standard deviation target or acquirer, leverage ratio combined to leverage ratio target or acquirer, and acquirer maturity to target maturity.

D. Combined Security Returns

An interesting question is how do security holder classes fare in mergers and acquisitions? To examine this question, we compute excess returns during the announcement period (months -1 and 0) for combinations of target and acquirer debt and equity. Combined bond/stock and target/acquirer total excess returns are computed as weighted-averages of the excess returns of the securities in the combination. Bond weights are based on the book value of long-term debt at the fiscal year end closest to the announcement month and stock weights are based on the market value of equity two months prior to the announcement month.²¹ Note that our formulation assumes that all of a firm's long-term debt has the same (value-weighted average) excess return as the firm's bonds in the Lehman Brother's Fixed Income Database. Additionally, the formulation implicitly assumes that the excess returns of a firm's short-term debt and debt-like instruments (e.g., leases) are zero.

Table VI reports combined excess security returns. Note that sample sizes vary because announcement period returns must exist for each security type in the combination. The mean (median) excess return to target stockholders and bondholders is a highly significant 13.88 percent (10.88 percent), while the mean (median) excess return to acquirer stockholders and bondholders is an insignificant 0.13 percent (0.28 percent). Combining target and acquirer bonds, we see that bondholders as a group earn virtually zero excess returns over the announcement period, with an insignificant mean (median) of 0.08 percent (-0.06 percent). By contrast, combined target and acquirer stock experiences a significant 4.34 percent (3.50 percent) mean (median) wealth effect. Finally, the

²¹ We would prefer to base the bond weight on the market value of all of a firm's long-term debt, but we only have market values for a firm's bond issues in the Fixed Income Database. Nevertheless, the results discussed below are qualitatively similar when the bond weight is based on the sum of the market values of a firm's bond issues in the Fixed Income Database.

Table VI
Combined Excess Security Returns

Deals include all mergers and acquisitions announced during the period 1979 to 1997 that are listed on Securities Data Corporation's Mergers and Acquisitions Database where both target and acquirer are listed on CRSP and have non-missing announcement period stock returns, and the target and/or the acquirer have valid announcement period bond returns. Excess bond returns and excess stock returns are the sum of the excess returns for the two-month period -1 and 0 , where month 0 is the announcement month. Excess stock returns are computed as the stock's return minus the CRSP value-weighted market return. Excess bond returns are computed as the bond's total return minus the return on a similar risk and maturity bond index. When a firm has multiple bonds, its excess bond return is computed as the market value weighted average of each bond's excess return, where the weights are based on the market values of the firm's bonds two months prior to the announcement month (i.e., month -2). Combined bond/stock and target/acquirer total excess returns are computed as weighted averages, where the bond weights are based on the book value of long-term debt at the most recent fiscal year end and the equity weights are based on the market value of equity two months prior to the announcement month (i.e., month -2). The median significance level is based on a Wilcoxon signed-rank test. The symbols ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively. Excess returns are in %.

Excess Return Category	Mean	Median	<i>N</i>
Target total excess bond and stock return	13.88***	10.88***	239
Acquirer total excess bond and stock return	0.13	0.28	820
Target and acquirer excess bond return	0.08	-0.06	141
Target and acquirer excess stock return	4.34***	3.50***	939
Target and acquirer total excess bond and stock return	4.43***	3.54***	141

mean (median) excess return to all target and acquirer securities combined is a significant 4.43 percent (3.54 percent). Looking at the median excess returns, the overall conclusion is that the typical deal in the sample creates wealth, but the wealth gains are almost entirely captured by target security holders.

Although not reported in a table, we also estimate regressions of combined security excess returns on the various deal characteristics that we use in Table V. Excess returns to combined target stock and bonds are significantly smaller in cash offers and significantly larger in tender offers and hostile deals. The combined target returns are also significantly decreasing in the relative size of the target and acquirer. For combined acquirer stock and bonds the only significant coefficient is on the 1990s dummy variable, which indicates that the average excess return of acquiring firm securities is larger by 1.36 percent in the 1990s (versus the 1980s). Similarly, in the combined target and acquirer bond regression only the 1990s dummy variable is significant. The coefficient estimate indicates that relative to the 1980s, combined target and acquirer excess bond returns in the 1990s are larger by on average 2.28 percent. For the combined target and acquirer stock, announcement period excess returns are significantly smaller in cash deals, significantly larger in tender offers and hostile deals, and are significantly increasing in the relative size of the target to the acquirer. Finally, the excess returns to all target and acquirer securities combined are marginally significantly larger in hostile deals.

E. Detecting Wealth Transfers between Stockholders and Bondholders

If mergers result in wealth transfers between stockholders and bondholders, then we might expect to observe a negative relation between their announcement period excess returns. However, if the interests of stockholders and bondholders are aligned or if there are substantial synergy benefits anticipated from the combination, then we would expect to observe a positive relationship. Indeed, the combined target and acquirer stock and bond median excess return of 3.54 percent reported in Table VI suggests that there are synergy gains for the typical combination in our sample. Since observed security holder wealth effects will reflect both synergy gains and any wealth transfers, it will be difficult to detect wealth transfers without controlling for synergy. Unfortunately, we know little about what factors produce synergy gains in mergers and therefore have little guidance about how to control for synergy. Nevertheless, it is a useful exercise to examine the correlations between excess returns of target stock and bonds, acquirer stock and bonds, and the combination of target and acquirer stock and bonds in the sample.

The Pearson correlation coefficient between the target stock and bond excess returns is significantly positive at 0.19. Interestingly, the group of below investment grade target bonds drives this positive correlation. In particular, the correlation between target excess stock returns and the excess returns of target investment grade bonds is insignificantly negative at -0.02 , while the correlation between target excess stock returns and the excess returns of target below investment grade bonds is highly significantly positive at 0.28. The correlations between the excess returns of the stock and bonds of acquiring firms have exactly the same pattern. Excess stock returns are significantly positively correlated with excess bond returns, but the positive correlation is driven by the sub-sample of below investment grade acquirer bonds. Finally, the combined excess returns of target and acquirer stocks are negative correlated with the combined excess returns of target and acquirer bonds. However, this negative correlation is small at -0.04 and is not significantly different from zero. Overall, the correlation analysis offers no evidence of wealth transfers between the stock and bonds of target or acquiring firms, and only a faint trace of a wealth transfer between the combined stock and the combined bonds.²²

III. Conclusions

The finance literature suggests that bondholders may experience significant wealth effects in mergers and acquisitions. However, empirical studies examining the reactions of straight bonds to merger announcements generally fail to detect any wealth effects. These studies typically have small samples

²² The results are similar if we compute nonparametric Spearman rank correlation coefficients and if we compute correlation coefficients between excess dollar returns. However, when we stratify the sample by time period the correlations in the 1980s tend to be much smaller than the correlations in the 1990s. Nevertheless, we find no reliable negative correlations between the excess returns of security holder classes in the 1980s.

concentrated in the 1960s and 1970s. This paper examines the effects of merger and acquisition announcements on the prices of 3,901 bonds of target and acquiring firms involved in 940 deals during the period 1979 to 1997. In contrast with the previous empirical work, we document significantly positive excess returns to target bonds and significantly negative excess returns to acquirer bonds. Furthermore, we find a strong coinsurance effect for risky target debt. This result is perhaps most sharply illustrated by the dramatic difference between the announcement period excess returns of investment grade and below investment grade target bonds. In particular, we find that investment grade target bonds have a significantly negative mean excess return of -0.80 percent, while below investment grade target bonds have a significantly positive mean excess return of 4.30 percent.

We find a rich set of differences in target and acquirer excess bond returns when we stratify the sample by firm and deal characteristics. Target bonds have significantly larger mean excess returns when the target bond rating is below the acquirer's, when the combination is anticipated to decrease risk or leverage for the target, and when the target's average bond maturity is shorter than the acquirer's average bond maturity. Target and acquirer excess bond returns are also significantly larger when the target is relatively small, the offer is not characterized as hostile, and when the offer occurs in the 1990s. The latter result coincides with an increase in the use of event risk covenants for the target bonds in our sample during the 1990s in comparison to the 1980s. Cross-sectional regression analysis generally confirms these results, although the risk, leverage, and maturity effects for target bonds are much weaker when we control for deal characteristics. Finally, we examine correlations between excess returns to test for wealth transfers between the stock and bonds of target and acquiring firms, and between the combined stock and bonds of the merged firm. The correlations tend to be positive, suggesting that there are no wealth transfers or that synergy benefits expected from the combination overshadow any wealth transfers that do exist.

Appendix

Bondholder Wealth Effects in Mergers and Acquisitions

Predicted bondholder wealth effects when firm A acquires firm T , resulting in merged firm M . The term $\sigma(\cdot)$ is the volatility (risk) of the firm's assets, $D(\cdot)$ is the market value of the firm's debt, and $V(\cdot)$ is total firm value. A $+$ ($-$) sign indicates that the market value of debt is expected to increase (decrease), all else held constant.

Effect	Criteria	Bond A	Bond T
Risk Effect	$\sigma(A), \sigma(T) > \sigma(M)$	+	+
	$\sigma(A) > \sigma(M) > \sigma(T)$	+	-
	$\sigma(A) < \sigma(M) < \sigma(T)$	-	+
Leverage Effect	$D(A)/V(A) > D(T)/V(T)$	+	-
	$D(A)/V(A) < D(T)/V(T)$	-	+
Maturity Effect	Avg. Maturity A < Avg. Maturity T	+	-/+
	Avg. Maturity A > Avg. Maturity T	-/+	+

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