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Requiem for a Market Maker: The Case of Drexel Burnham Lambert and Below-Investment-Grade Bonds*

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***Requiem for a Market Maker*:** The Case of Drexel Burnham Lambert and Below-Investment-Grade Bonds

ABSTRACT

In this article we add to both the financial intermediation and market microstructure literature by examining the market reactions surrounding the withdrawal of a major financial intermediary and market maker from a specific securities market. More specifically, we examine the exit of Drexel Burnham Lambert (Drexel) from the junk bond market. At the time Drexel exited the market by declaring bankruptcy, it was the dominant market maker and underwriter of junk bonds. In this article we examine the impact of Drexel's failure on direct and indirect holders of junk bonds. That is, we investigate the effect of Drexel's collapse on junk bond returns, and on the stock returns of a group of firms that, on average, held significant amounts of junk bonds.

We find that the collapse of Drexel had a significant impact on junk bond prices in general, but a greater impact on the prices of lower quality junk bonds in particular. We interpret this result to imply that the value of the liquidity services supplied by Drexel was higher for lower-quality junk bonds. Additionally, we find that junk bonds underwritten by Drexel, as opposed to other investment banks, experienced a significant decline in prices over the months leading up to Drexel's failure announcement. We interpret this result to suggest that the monitoring services provided by Drexel (for the bonds it underwrote) would not be easily replaced by other financial intermediaries operating in the junk bond market.

Our results also indicate that the stock returns of life insurance companies with relatively high junk bond exposure tended to be more negatively affected by Drexel's financial distress than the stock returns of life insurance companies with relatively low junk bond exposure.

***Requiem for a Market Maker*:** The Case of Drexel Burnham Lambert and Below-Investment-Grade Bonds

On February 13, 1990, Drexel Burnham Lambert filed for Chapter 11 bankruptcy protection. This event led to Drexel's exit from the below-investment-grade (junk bond) market, adversely affecting junk bond prices. At the time of its bankruptcy filing, Drexel was the dominant force in both the primary and secondary markets for junk bonds. The firm underwrote 287 (or 46 percent) of the 618sub-investment-grade debt issues brought to market between 1978 and 1985 and in dollar terms accounted for 57 percent of the $46 billion of new issues brought to market (Altman and Nammacher, 1987). Drexel's domination of the market was such that even in the face of increasing uncertainty regarding the firm's survival during 1989, its last year of operations, it was able to maintain a 38.6 percent market share of new issue dollars--approximately four times the market share of the firm's closest competitors (*Wall Street Journal*, January 2, 1990). The key to Drexel's domination of the primary market was the extensive network of repeat investors that it assembled and maintained. To support this investor network, Drexel established the expertise and reputation necessary to perform credit analysis of its issues and monitored the post-issuance activities of issuing firms. Such interactions may foster private information flows over time, which could provide Drexel with a comparative advantage in monitoring junk bond issuers relative to other investment houses and dispersed debtholders. This view of Drexel's services to the junk bond market is consistent with theoretical models of the asset services view of intermediation, which implies that private information and associated relationship-specific activities are intrinsic to bank lending.

In models of banking relationships, commercial banks have access to private corporate information about their clients and monitor firms' activities over the course of the loan.[1] Banks are both well informed compared to investors who operate with only public information and have a comparative advantage in monitoring borrowers relative to dispersed debtholders. Thus, banks can offer some borrowers lower financing costs relative to the public securities markets. Along similar lines, in models of investment banking relationships, underwriters can reduce the costs of asymmetric information by establishing a network of well-informed investors in new issues. Beatty and Ritter (1986) and Booth and Smith (1986) show that reputational capital is an important mechanism in the underwriting process, certifying that market prices are consistent with insider information.

Market prices also carry an immediacy/liquidity discount (Grossman and Miller, 1988; and Shleifer and Vishny, 1992). In an examination of the transaction costs of liquidity, Amihud and Mendelson (1986) suggested that an instrument's liquidity can be inferred from the size of the bid-ask spread. Less liquid instruments will typically have wider bid-ask spreads. Amihud and Mendelson find a positive correlation between yields and liquidity. Junk bonds typically have wide bid-ask spreads, suggesting that their market prices will incorporate a significant liquidity discount (Amihud and Mendelson, 1989). Thus, the yields on junk bonds will carry an illiquidity premium to cover transaction costs. Amihud and Mendelson (1986, 1989) argue that liquidity considerations can have a major effect on market prices of securities. Drexel's collapse meant that the dominant market maker was no longer supplying liquidity to the junk bond market.

Drexel's domination of the secondary market for junk bonds, both of its own issues and

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[1] Monitoring by bank can be important in mitigating agency conflicts between shareholders and creditiors. For a discussion of the role of banks in corporation finance, see Diamond (1984), Hoshi, Kashyap, and Scharfstein (1990a and 1990b), and James (1987).

others, was widely recognized (see Table 1). The firm was generally considered the primary source of junk bond prices (*Wall Street Journal*, March 16, 1990), and its willingness to commit capital to carrying inventory made it an important source of liquidity in the market. At the time that Drexel sought bankruptcy protection, the firm's junk bond portfolio was estimated by analysts to be worth between $1.5 billion and $2 billion (or approximately 1 percent of the entire market). In addition, Drexel employed aggressive tactics such as the use of the firm's capital to buy out preferred customers at the issue price when Flight Transportation Corporation went bankrupt less than one month after issuance. These tactics served to strengthen investor confidence in Drexel's willingness to stand behind both its issuers and investors. Thus, Drexel's exit from the junk bond market was expected to affect investors as well as issuing firms.[2]

According to a Government Accounting Office (GAO) study, insurance companies accounted for over 30 percent of all junk bond investments in 1987. Drexel's financial difficulties may have contributed to solvency problems among those life insurance companies (LICs) holding junk bonds. For example, two life insurance subsidiaries of First Executive Corporation were seized by state regulators in April 1991 as a result of junk bond investment losses first disclosed in January 1990. Executive Life of California had 62.7 percent of its general account assets invested in junk bonds, while Executive Life of New York held 64 percent of its assets in junk bonds. Fidelity Bankers of Virginia and First Capital of California, subsidiaries of First Capital Corporation, were seized in May 1991 due to investment losses in their junk bond portfolios.

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[2] Slovin, Suuhka, and Polonchek (1993) examine share price effects of firms with lending relationship with Continental Illinois Bank during its de facto failure and subsequent FDIC rescue. They find that the bank's impending failure had negative impact on client firm share prices. They interpret this result as supporting the asset services models of intermediation that emphasize the relationship-specific nature of bank lending.

Fidelity Bankers had 36.9 percent of its assets in junk bonds, while First Capital had about 40 percent of its general account assets invested in junk bonds. Both life insurances companies were clients of Drexel.

If Drexel maintained a unique capacity for supporting its client investors, then its exit from the junk bond market is expected to produce negative wealth effects for these junk bondholders. The assumptions underlying this prediction are that: (1) the large informational production capacity of Drexel will be lost and not easily replicated in the short run by other underwriters and, (2) the post-failure junk bond market structure will be less liquid than the pre-failure one.

The remainder of this article is presented in five sections. The first section discusses the relationship between an investment bank and its client firms. The second section presents the data and methodology used to examine the impact of Drexel's collapse on junk bond prices. The third section provides empirical results on whether Drexel's collapse negatively affected junk bond prices. The fourth section investigates whether Drexel's financial distress affected the stock market valuation of life insurance companies. The fifth, and last, section offers a brief summary of our findings.

1. Private information, market makers, and the value of an investment bank

An investment bank that is market maker provides a specialized service of buying and selling securities in the secondary market. Such an investment bank will face transaction costs, because buy and sell orders do not arrive simultaneously. An investment bank holds an inventory of securities until it can arrange placements with investors. Transacting is costly because an investment bank must raise capital to carry the inventory of securities and faces uncertainty about the time required to place securities with investors (Demsetz, 1968).

The more difficult it is for investors to process and evaluate information about a security, the longer an investment bank will expect to hold that security in its inventory, and the greater will be the cost of transacting. Because of this investors may demand a large "liquidity premium" on securities that are difficult to analyze or evaluate. In an examination of the transactions costs aspect of liquidity, Amihud and Mendelson (1986) find a positive correlation between yields and liquidity. Thus, if Drexel's exit from the junk bond market resulted in a market structure that is not as liquid as the pre-failure one, then junk bond prices should fall, reducing holding period returns and creating losses to junk bond holders.

In addition to providing liquidity services to market participants, investment banks can provide monitoring services to reduce agency costs. Jensen and Meckling (1976) developed the theory of agency costs and suggested that independent auditing firms can reduce these types of costs. Fama and Jensen (1985) and Smith (1986) suggested that investment banks not only help find a market for securities, but they play a very key role as monitors. A hypothesis similar to the monitoring hypothesis is the certification hypothesis, as presented by Baron (1982), Booth and Smith (1986), Beatty and Ritter (1986), and others.[3] Booth and Smith (1986) found evidence that supports the certification hypothesis, which states that the certification of securities by an investment bank adds value to issuing firms. The value arises from the ability of issuing firms' management to communicate to investors through an investment bank that the security price is consistent with inside information. Consequently, management is willing to pay underwriter fees in order to communicate or certify the true value of the firm. An underlying assumption of the

[3] See Kroszner and Ragan (1994), for an excellent discussion of the certification role of investment banks before 1933.

certification hypothesis is that the investment bank has a good reputation. Furthermore, the certification is more valuable the greater the information asymmetries associated with the firm. The larger the information asymmetries, the greater is the potential for wealth transfers. Therefore, the use of an investment bank's services suggests that the costs of communicating and the associated potential wealth transfers outweigh the costs of underwriting fees. The relationship between the investment bank and the issuing firm involves the flow of private information between the issuer and investment bank and entails relationship-specific investments. Such setup costs may make it expensive for firms to immediately turn to alternative funds in response to the failure of their investment bank.

Amihud and Mendelson (1989) suggested that the process of certification can increase a bond's liquidity. The liquidity of a bond is reduced when outside investors suspect that insiders are trading on the basis of privileged information. Market makers will tend to widen the bid-ask spread in order to protect themselves against better informed traders and to be compensated for bearing greater liquidity risk. An investment bank's certification of the firm's current condition and future prospects to outside investors reduces the risk of trading against better informed traders. This is expected to bring about a narrower bid-ask spread and greater liquidity. Greater liquidity of a firm's securities may increase its value. Amihud and Mendelson (1989) have shown that investors require a higher expected return from bonds with lower liquidity to compensate for the bonds higher trading costs. By increasing the liquidity of the firm's bonds (as well as stocks), management can effectively reduce its cost of capital for any given level of corporate risk. Thus, the impact of Drexel's collapse could potentially affect firms' cost of capital if the surviving junk bond market structure is not as liquid as the pre-failure one. Drexel likely provided monitoring and certification, as well as liquidity, services to junk bond market participants.[4] However, Amihud and Mendelson (1989) suggest that eliminating either certification or monitoring services will have a negative impact on a market's liquidity. Therefore, the major focus of this article is on the liquidity services that Drexel provided.

2. Impact of Drexel's collapse on junk bond prices

We investigate the impact of Drexel's failure announcement on junk bond prices by examining the daily abnormal returns associated with several junk bond portfolios. Merrill-Lynch maintains daily time series data on several high-yield bond indices--a "high quality" below-investment-grade index, an "intermediate quality" index, a "low quality" index, and an "average quality" index. The high quality index includes about 350 below-investment-grade bonds that have bond ratings between BB1 and BB3; the intermediate quality index includes about 390 instruments with bond ratings between B1 and B3; the low quality index includes about 40 below-investment-grade bonds with bond ratings between CCC1 and C3; and the average quality index is constructed from the bonds included in the high, intermediate, and low quality indices. We use Merrill-Lynch's indices to calculate daily returns on the high, low, and average quality junk bond portfolios. Daily abnormal returns to these portfolios are estimated. Calculation of abnormal returns for these three portfolios can provide a test of the impact of Drexel's financial distress on junk bond prices. The estimation of daily abnormal returns is based on the multivariate regression model that Cornett and Tehranian (1990) use to examine the

[4] See Kroszner (1996), for a discussion of junk bonds and the substitution of traded debt instruments for bank loans over the 1970s and 1980s. Kroszner also noted that junk bonds often had equity-like characteristics. This suggests that Drexel, as a major underwriter, was likely involved in the day-to-day management of the some of the junk bond issuing firms, and hence, monitoring their activities.

effect of newly introduced banking legislation on depository institutions' stock returns.[5] This model measures abnormal returns by the coefficients of dummy variables that are included in a system of market-model equations.

2.1. Methodology

The junk bond price impact of Drexel's collapse is estimated by employing a single-factor market model. This approach involves a system of portfolio return equations for each of three portfolios: (1) high quality junk bonds; (2) low quality junk bonds; and (3) average quality junk bonds. Thus,

$$R_{1,t} = \alpha_1 + \beta_{1,I} R_{I,t} + \sum_{s=-60}^{20} \tau_{1,s} D_{s,t} + e_{1,t}, \tag{1A}$$

$$R_{2,t} = \alpha_2 + \beta_{2,I} R_{I,t} + \sum_{s=-60}^{20} \tau_{2,s} D_{s,t} + e_{2,t}, \tag{1B}$$

$$R_{3,t} = \alpha_3 + \beta_{3,I} R_{I,t} + \sum_{s=-60}^{20} \tau_{3,s} D_{s,t} + e_{3,t}, \tag{1C}$$

where

$R_{j,t}$ = the return on a portfolio, j (=1, 2, and 3), of different quality of junk bonds on day t (T = 475 daily observations from August 5, 1988, through June 30, 1990);

α_j = an intercept coefficient for portfolio j (=1, 2, and 3);

[5] This approach also has been used by Binder (1985a and 1985b); Thompson (1985); Malatesta (1986); Karafiath (1988); Karafiath and Glascock (1989); and Karafiath, Mynatt, and Smith (1991).

$\beta_{j,I}$ = risk coefficient for portfolio j (=1, 2, and 3);

$R_{I,t}$ = the holding period return on a long-term U.S. Treasury security portfolio;

$\tau_{j,s}$ = coefficient on the binary variable $D_{s,t}$, for portfolio j (=1, 2, and 3) on day s;

$D_{s,t}$ = a binary variable that is set equal to one on day s in the forecast window and zero otherwise; and

$e_{j,t}$ = an error term for j (=1, 2, and 3).

With this specification, the estimated parameters $\tau_{j,s}$ (j=1, 2, and 3) measure the daily abnormal returns associated with Drexel's bankruptcy announcement. We are testing for daily intercept shifts in the interval day -60 to day 20. Since this interval is "dummied out," the observations in the day -60 to day 20 interval do not influence the estimate of the intercept. Only those observations without dummies (day -379 to day -61 and day +21 to +95) determine the value of the intercept.

The daily holding period returns on the U.S. Treasury portfolio were calculated as the percentage changes in the Shearson-Lehman's long-term Treasury security index, published in the *Wall Street Journal*.[6]

2.2. Testable hypotheses

If Drexel maintained a unique capacity for the production of underwriting, trading, and monitoring activities, its exit from the market would have implications for prices of below-investment-grade bonds. The above discussion suggests that Drexel's financial distress produced

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[6] Because of the potential shift in the relationship between junk bond returns and the Treasury return, we estimated the system of equations in (1A)-(1C) using a lower grade bond return index as a proxy for the market index. The results were qualitatively similar to those reported.

negative price reactions for seasoned junk bonds. Negative junk bond price reactions can be the result of reduced liquidity in the market for junk bonds. The alternative hypothesis suggests no-reaction from Drexel's announcement because investors may have already accounted for such an influence in junk bond prices. We examine this by evaluating the following null hypotheses:

H1. *The abnormal returns for each junk bond portfolio jointly equal zero on, or around, Drexel's failure announcement day s.*

H2. *The abnormal returns for each junk bond portfolio individually equals zero on, or around, Drexel's failure announcement day s.*

If H1 and H2 are not rejected, then this suggests that no new information concerning the condition of the junk bond market was conveyed to the market by Drexel's failure announcement. Under this scenario, the impact of Drexel's failure on the junk bond market had already been discounted by the time its announcement was made on February 13, 1990, and reflected in junk bond prices. If Drexel's earlier problems, such as Michael Milken's dismissal, had led investors to fully anticipate this deterioration in junk bond prices, then no significant market response to the failure announcement would occur.

An important related hypothesis is whether the negative price response is the same across junk bond portfolios. We predict that for any given negative impact of Drexel's financial distress, the impact will be larger for lower quality junk bonds than for higher quality junk bonds. The assumption underlying this prediction is that lower rated firms are more likely to face larger information asymmetries than other junk bond issuers. The potential for adverse selection is widely recognized as a source of friction facing firms attempting to raise new capital (see, for example Myers and Majluf, 1984). The relationships that Drexel maintained with its client firms mitigated this source of friction and thereby reduced the firms' cost of capital. Drexel's "vote of confidence" was likely to be more important for those firms with severe information asymmetries. Thus, we have the following prediction:

H3. *The abnormal returns (or, economic impacts) are the "same" for each junk bond portfolio on, or around, Drexel's failure announcement day s.*

In the next section, we examine these three hypotheses using daily data for three junk bond portfolios.

2.3. Empirical results

The daily abnormal returns are generated by estimating equations (1A)-(1C) using seemingly unrelated regression (SUR) techniques.[7] Results from applying the SUR model are presented in Table 2. Panel A of the table reports the results for high- and low-quality junk bond portfolios. Panel B of Table 2 shows the results for the average-quality junk bond portfolio.[8] Defining February 13th as day 0, we examine the impact of Drexel's financial distress using three windows: Day 0, the three-day window [0,+2], and the five-day window [-2,+2]. On the event

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[7] The SUR methodology, attributed originally to Zellner (1962), uses joint generalized least squares as an estimation procedure. When all explanatory variables are identical, as they are in our system of equations, the parameter estimates and their standard errors are no different under SUR than those that would result from ordinary least squares. However, tests of hypotheses across equations are more efficiently performed by using SUR. In addition, when the disturbances across equations are not independent (i.e., are contemporaneously correlated), SUR estimation is more efficient than ordinary least squares estimation applied equation-by-equation (see Johnston [1984]).

[8] On December 21, 1988, Drexel avoids criminal trial by pleading guilty to six felony counts and agreeing to dismiss Michael Milken and pay $650 million in fines and restitution. On March 16, 1989, the SEC increases pressure on Drexel to remove Milken from control of the firm's junk-bond operations. On April 13, 1989, Drexel agrees to a settlement of SEC civil charges that gives regulators unprecedented control over the firm. We tested whether these three separate announcements had any impact on junk bond prices. The empirical results suggest that these additional three announcements had little, if any, statistical impact on junk bond prices. These results are available from the authors upon request.

date, we find a decline of 1.57 to 4.24 percent in junk bond prices. From the event date to two days after, the cumulative average decline in junk bond prices ranged between 1.19 and 3.26 percent. From two days before to two days after the event date, the cumulative average decline in junk bond prices ranged between 1.16 and 3.41 percent. Next, we test whether these negative junk bond price reactions are statistically significant (*H1* and *H2*).

Test of H1: The abnormal returns for each junk bond portfolio jointly equal zero on, or around, Drexel's failure announcement day s.

The values of the test statistics (F-test) under restrictions implied by the null hypothesis are:

Day 0

$\tau_{1,0} = \tau_{2,0} = \tau_{3,0} = 0$ 132.48 (p=0.0001)

Days [0,+2]

$\sum_{s=0}^{2} \tau_{1,s} = \sum_{s=0}^{2} \tau_{2,s} = \sum_{s=0}^{2} \tau_{3,s} = 0$ 29.04 (p=0.0001)

Days [-2,+2]

$\sum_{s=-2}^{2} \tau_{1,s} = \sum_{s=-2}^{2} \tau_{2,s} = \sum_{s=-2}^{2} \tau_{3,s} = 0$ 18.00 (p=0.0001).

These numbers strongly suggest rejection of the null hypothesis for each of the three event windows. Thus, it appears that there are significant abnormal returns among the three junk bond portfolios.

Test of H2: The abnormal returns for each junk bond portfolio individually equals zero on, or around, Drexel's failure announcement day s.

Table 3 presents the test statistics for each of six event-period windows across the three junk bond portfolios. Column 1 lists the event windows. Columns 2 through 4 present results for the three portfolios. Overall, the results suggest that Drexel's failure had a significant impact on junk bond prices. The cumulative AR over the interval [-20, -3] is negative and significant. Thus, this suggests that information (on Drexel Burnham Lambert financial deterioration and "other" economic news) adversely affecting junk bond prices leaked out in "dribs and drabs" over days prior to the bankruptcy announcement of February 13.[9] Although information concerning Drexel's financial condition had leaked out over several weeks prior to February 13, the failure announcement still provided new information as indicated by the significant negative reactions over the four event period windows [0], [-2, 0], [-2, +2], and [0, +2].[10]

Test of H3: The abnormal returns (or, economic impacts) are the "same" for each junk bond portfolio on, or around, Drexel's failure announcement day s.

In addition to the identification of the significance of abnormal returns at each of the three event windows, of particular interest is a test of the hypothesis that the economic impact of Drexel's failure was the same for a portfolio of each quality type of junk bond at each of the three event windows. For day 0, for example, the results indicate an abnormal return of -4.24 percent, -2.65 percent, and -1.57 percent for the low-quality, average-quality, and high-quality junk bond

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[9] Cornell and Shapiro (1986) used the term "dribs and drabs" to describe the nature of negative information flows associated with the Mexican debt crisis of 1982. They postulated that negative information about Mexico's financial condition was slowly released throughout 1982 and 1983, and the announcement of Mexico's default on August 19, 1982, provided no new information. Thus, it is important to examine stock market reaction over several intervals preceding and following the event announcement.

[10] We thank Clifford Smith for suggesting the appropriate intervals for the event windows used in this analysis.

portfolios, respectively. We test whether these apparent differences across the three portfolios are statistically significant. Focusing attention on tests that measure abnormal returns around Drexel's failure announcement provides valuable information about the economic impact of the collapse on prices of junk bonds of different quality.

A joint test of the hypothesis that the economic impact of Drexel's collapse was the same for each of the three junk bond portfolios gives the following F-statistics:

Day 0

$\tau_{1,0} = \tau_{2,0} = \tau_{3,0}$ 61.13 (p=0.0001)

Day [0,+2]

$\sum_{s=0}^{2} \tau_{1,s} = \sum_{s=0}^{2} \tau_{2,s} = \sum_{s=0}^{2} \tau_{3,s}$ 15.20 (p=0.0001)

Day [-2,+2]

$\sum_{s=-2}^{2} \tau_{1,s} = \sum_{s=-2}^{2} \tau_{2,s} = \sum_{s=-2}^{2} \tau_{3,s}$ 10.59 (p=0.0001).

These results reject the null hypothesis, suggesting that the three junk bond portfolios did not react in the same way, or to the same magnitude, to Drexel's collapse. Table 4 provides additional independent tests of hypothesis 3 across junk bond portfolios. As the second and third columns of Table 4 indicate, the null hypothesis that the impact on junk bond prices of Drexel's failure is equal can be rejected for the average-quality and high-quality portfolios and the average-quality and low-quality-portfolios. The results in the fourth column show that the impact on prices of Drexel's failure is significantly greater for low-quality junk bonds. Thus, we conclude that the impact of Drexel's collapse significantly affected the junk bond prices of lower quality issues to a greater magnitude.[11] This is consistent with the notion that the liquidity services supplied by an investment banker is more valuable for firms who issues are of lower quality.

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[11] To check the robustness of our results, we employed several junk bond indices obtained from Salomon Brothers. These indices are based on monthly data. The following market model was utilized:

$$R_{k,t} = \alpha_k + \beta_{k,I} R_{I,t} + \tau_k D + e_{k,t},$$

where $R_{k,t}$ = the return on the kth portfolio in month t, $R_{I,t}$ = the return on Salomon's Treasury portfolio with an average maturity between 7 and 10 years, D is the event binary variable that is equal to one if month is January or February 1990, otherwise zero, and τ_k is the coefficient on the event binary variable. With this specification, the estimated parameter τ_k measures the monthly abnormal returns associated with Drexel's bankruptcy announcement. The results of estimating this equation over the January 1988-June 1990 period is provided below:

Portfolio	[-1,0]	P-value
Composite	-2.6181	0.0150
High-quality	-0.8119	0.1573
Intermediate-quality	-2.6913	0.0127
Low-quality	-5.5394	0.0451

Composite refers to Salomon's high yield composite index, High-quality refers to Salomon's high yield BB-rated index, Intermediate-quality refers to Salomon's high yield B-rated index, and Low-quality refers to Salomon's high yield CCC-rated index. These results also suggest that lower quality junk bonds responded more than higher quality junk bonds to Drexel's financial collapse.

3. Individual junk bond price reactions to Drexel's financial distress

In this section, we examine the effects of Drexel's financial distress on prices of individual junk bonds. We have already shown that Drexel's collapse had a more negative impact on the market valuation of lower quality junk bonds than other quality of junk bonds. Drexel employed its financial capital to signal to both issuers and investors the firm's commitment to support the junk bond market. Thus we ask the question: Is the identity of the underwriter important in determining the impact of Drexel's financial distress on junk bond prices? To examine this question, we estimate the following equation, using weekly data for a sample of junk bonds over the January 1988 to June 1990 period:

$$R_{i,t} = \alpha_0 + \alpha_1 DREXEL + \beta_I R_{I,t} + \sum_{s=-4}^{4} \tau_s D_s + e_{i,t}, \qquad \textbf{(2)}$$

where $R_{i,t}$ is the weekly holding period return on bond i; DREXEL is a binary variable equaling one for a bond underwritten by Drexel and zero otherwise; $R_{I,t}$ is the holding period return on a long-term U.S. Treasury security portfolio; D_s is a binary variable that is set equal to one on week s in the forecast window and zero otherwise; and $e_{i,t}$ is an error term.

To identify publicly traded below-investment-grade bonds over the 1988-1990 period, we utilize prospectuses of several junk bond mutual funds.[12] After we obtain the names of the issuing firms, Moodys' reports are examined to ascertain the existence of additional junk bonds

[12] We obtained data from Franklin's Age High Income Fund; Dean Witter High Yield Securities; First Investors High Yield Fund; Lutheran Brotherhood High Yield Fund; T. Rowe Price High Yield Fund; Value Line Aggressive Income Trust; Keystone B-4 (the discount bond fund); and Cigna High Yield Income Shares.

and obtain financial data on the issuing firms. Standard and Poor's reports are examined to identify the primary underwriter of each junk bond. Our sample consists of 50 bond issues of 36 firms. In 22 cases, Drexel was the lead underwriter, while in 28 cases other investment banks were the lead underwriters. Weekly closing bid prices for all 50 bonds over the 132 weeks beginning December 24, 1987, and ending June 29, 1990, are collected from Barron's, and used to calculate holding period returns.

Table 5 lists each junk bond, name of the issuer, rating, and whether the bond was underwritten by Drexel. Summary statistics on selected financial characteristics of the issuing firms are provided in Table 6. Before we test for market response differences, it is important to establish that the risk characteristics are not significantly different between Drexel and non-Drexel underwritten bonds. Recall that the main result from section 2 of this article is that lower quality junk bonds on average responded significantly more negatively relative to higher quality junk bonds to the announcement of Drexel's failure. The bond ratings from Table 5 and the accounting measures from Table 6, demonstrate that the riskiness of Drexel and non-Drexel underwritten bonds are not significantly different.

The coefficient estimates on the Drexel and $D_{s,t}$ variables are provided in panel A of Table 7. These results indicate that the prices of bonds underwritten by Drexel fell more over this period than the prices of bonds underwritten by other investment banking firms.[13] To get an idea of the

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[13] We also estimated the following equation for a portfolio of junk bonds which Drexel served as the underwriter and a portfolio of junk bonds which other investment companies served as underwriters:

$$R_{i,t} = \alpha_0 + \beta_I R_{I,t} + \sum_{s=-4}^{4} \tau_{0,s} D_s + \sum_{s=-4}^{4} \tau_{1,s} D_s DREXEL \quad e_{i,t}.$$

approximate magnitude of this difference over the year leading up to Drexel's failure we can simply multiple the coefficient on the *Drexel* intercept in panel A of Table 7, which represents a weekly holding period return, by the number of weeks in a year. That is, Drexel junk bonds declined by [0.2761 percent times 52, or] about 14.4 percent more than junk bonds underwritten by other investment banks over the year leading up to Drexel's failure. We believe this result provides limited support for the monitoring hypothesis.[14]

The coefficients on the event variables are consistent with the notion that negative information about Drexel's financial condition and ability to maintain its domination of the junk bond market was slowly released over several weeks prior to the week of the bankruptcy announcement. From D_{-4} (week ending January 19) to D_0 (week ending February 16), there appears to have been a substantial negative impact on junk bond prices from Drexel's financial distress. While information concerning Drexel's financial condition was released over several weeks prior to the week of February 16, the coefficient on D_0 suggests that the bankruptcy

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The results indicate no significant differences in the reaction (τ_s) to Drexel's failure announcement between junk bonds that were underwritten by Drexel and those that were underwritten by other investment companies.

[14] Anil Kashyap and Randall Kroszner suggested that we need to develop an empirical test to distinguish between the liquidity hypothesis and the certification hypothesis. Both Kashyap and Kroszner suggested that we should interact size of junk bond issue with the Drexel binary variable or size with quality of the junk bond issue. The thinking here is that for some firms certification would be more important than for other firms. For large firms or firms with large junk bond issues, certification is less important than for smaller firms. Large firms would be less dependent on Drexel than smaller firms. So, we need to control for size of the junk bond issue. Kroszner suggested that we also could use board of director composition as a control variable to capture the impact of the board on monitoring/controlling the activities of junk bond issuers, reducing the role of the investment bank. We are in the process of collecting this information to re-estimate our equation (2). Thus, our results are preliminary.

announcement still provided new information.

Panel B of Table 7 provides an additional test of whether Drexel's financial collapse had more of an impact on lower quality than higher quality junk bonds. Individual firms' junk bonds were ranked according to their bond rating. Junk bonds with a quality rating above CCC are classified as "high-quality" junk bonds, and those with a quality rating CCC or below are classified as "low-quality" junk bonds. HIGH is a binary variable equaling one for high-quality junk bonds and zero otherwise. Equation (2) is modified to allow the τ_ss to vary by quality of junk bonds. The results in panel B of Table 7 are consistent with the portfolio results in section 2. In particular, it appears that news of Drexel's bankruptcy negatively affected the prices of junk bonds, and that the impact varied with the quality of junk bonds. Lower quality junk bonds experienced a greater price reaction to Drexel's financial collapse than other junk bonds.

These results indicate that the Drexel Burnham Lambert financial distress had far reaching ramifications for the junk bond market. Because insurance companies held a substantial amount of junk bonds in their portfolios, Drexel's collapse may have led to solvency problems among those life insurance companies holding junk bonds. The next section of this article examines the effects of Drexel's failure on the stock market valuation of life insurance companies.

4. Impact of Drexel's collapse on the market valuation of life insurance companies (LICs)

4.1. Testable hypotheses

In this section, we investigate the performance of a portfolio of life insurance companies (LICs) stocks around events leading up to and including Drexel's failure. The possible LIC response to Drexel's failure announcement can be expressed in the form of two pairs of hypotheses. The first hypothesis is that LIC shareholders returns should reflect quickly and without bias events that provide new information (such as Drexel's failure announcement) about the value of an LIC's bond portfolio. Thus, no significant investor response should be found to Drexel's failure announcement, because investors had already acted on the deterioration of Drexel's financial condition and domination of the junk bond market in response to news and events in the preceding months. On January 25, 1988, Drexel was informed that the SEC was about to recommend civil charges of major securities-law violations against the firm and Michael Milken, the head of its junk-bond operation. On March 29, 1989, Michael Milken was indicted on charges of major securities-law violations. On April 13, 1989, Drexel agreed to a settlement of SEC civil charges that gave, among other things, regulators control of the firm. Thus, information about Drexel's financial condition and ability to maintain its domination of the junk bond market leaked out in "dribs and drabs" over several months. The information-leakage hypothesis holds that, in light of preceding events and signals, Drexel's failure announcement provided no new information. The alternative hypothesis is simply that Drexel's failure did indeed provide new information and this information impacted the stock prices of LICs.

The second pair of hypotheses is concerned with the size of the stock prices response for each LIC. Institutions with large holdings of junk bonds are expected to show more return sensitivity than LICs with smaller holdings of junk bonds. This rational-pricing hypothesis holds that the capital market correctly incorporated the junk bond market implications of Drexel's failure announcement for each LIC. The opposing hypothesis is that investors did indeed react, but were unable to discriminate among LICs on the basis of exposure. We call this alternative the investor-contagion hypothesis. This hypothesis holds that Drexel's failure announcement was a "common type of bad signal" initiating a downward revision of an LIC's market value, irrespective of the extent of its exposure to junk bonds. These two pairs of hypotheses can be summarized as:

H1. The event parameter, $\tau_{j,t}$, for each LIC (portfolio) jointly equals zero on Drexel's failure announcement:

$$\tau_{1,t} = \tau_{2,t} = \tau_{3,t} .... = \tau_{N,t} = 0, \text{ where N is the number of LICs (portfolios).}$$

H2. The event parameter is equal across all LICs (portfolios) on Drexel's failure announcement:

$$\tau_{1,t} = \tau_{2,t} = \tau_{3,t} .... = \tau_{N,t}.$$

4.2. Model

The stock price impact on LICs of Drexel's failure is estimated by employing a version of the multivariate model used earlier. This model is expanded to include both a stock market factor and an interest rate factor. An interest rate factor is appended to the traditional market model to capture a life insurance company's sensitivity to unanticipated changes in interest rates.[15] Life insurance companies, like commercial banks and savings and loan associations, are sensitive to unanticipated interest rate changes, because they typically engage in interest rate intermediation in which the interest rate sensitivity of their assets differs from that of their liabilities. Therefore, changes in interest rates will affect the market values of the two sides of their balance sheets differently and affect both their net worth and their stock value.

The impact of Drexel's bankruptcy announcement of life insurance companies' share prices is estimated by adding a vector of (0,1) binary variables to the right-hand side of the two-factor

[15] See Lynge and Zumwalt (1980), Flannery and James (1984), Scott and Peterson (1986), Kane and Unal (1988), and Kwan (1991) for a discussion of the interest rate sensitivity of financial intermediaries' stock returns.

market model. Defining the event date February 13, 1990 as day zero, the model is estimated over a 630 day interval. Each day s in the interval day -20 to day +20 is assigned a (0,1) dummy variable D_s that is equal to one on day s only and is zero otherwise. The estimated regression coefficient on each dummy variable D_s is a measure of the abnormal return on day s.

The model implies a system of portfolio return equations for each of two portfolios: (1) a high junk bond exposure portfolio of LICs and (2) a low junk bond exposure portfolio of LICs. Life insurance companies with a market value of capital to junk bond ratio less than or equal to 75 percent at the end of 1988 are classified as high junk bond institutions. Those with a market value of capital to junk bond ratio greater than 75 percent are classified as low junk bond institutions. Thus,

$$R_{H,t} = \alpha_H + \beta_{H,M} R_{M,t} + \beta_{H,J} R_{J,t} + \sum_{s=-20}^{s=20} \tau_{H,s} D_s + e_{H,t},$$

$$R_{L,t} = \alpha_L + \beta_{L,M} R_{M,t} + \beta_{L,J} R_{J,t} + \sum_{s=-20}^{s=20} \tau_{L,s} D_s + e_{L,t}, \tag{3}$$

where

$R_{j,t}$ = the return on a portfolio, j(=H and L), of high-exposure and low-exposure LICs on day t (T = 630 daily observations from January 4, 1988, through June 29, 1990);

$R_{M,t}$ = the return on a value-weighted portfolio;

$R_{J,t}$ = the return on a long-term U.S. Treasury security portfolio;

α_j = an intercept coefficient for portfolio j(=H and L);

$\beta_{j,M}$ = the stock market beta coefficient for portfolio j(=H and L);

$\beta_{j,J}$ = the interest rate beta coefficient for portfolio j(=H and L);

$\tau_{j,s}$ = coefficient on the binary variable $D_{s,t}$, or the prediction error for portfolio j(=H and L) on day s;

D_s = a binary variable that is set equal to one on day s in the forecast window and zero otherwise; and

$e_{j,t}$ = is an error term for j(=H and L).

The daily holding period returns on the U.S. Treasury portfolio were calculated as the percentage change in the Shearson-Lehman's long-term Treasury security index, published in the *Wall Street Journal.*

4.3. Empirical results

Table 8 provides financial data on the sample of 59 life insurance companies. Low junk bond holders are on average smaller and better capitalized than high junk bond holders. Table 9 provides seemingly unrelated regression estimates of daily abnormal returns for the high and low junk bond holding life insurance companies for several event intervals.[16] The evidence indicates that Drexel's failure announcement had a negative and statistically significant impact on the stock returns of high junk bond life insurance companies. Over the five-day interval [-2,+2] surrounding Drexel's failure announcement the high junk bond exposure portfolio shows a significant negative abnormal return of -13.26 percent (p-value=0.0001). If the analysis is

[16] The estimation was conducted in the SUR framework to facilitate hypothesis tests and pairwise comparisons of abnormal returns. Since, the explanatory variables are identical across equations, system estimation influences neither the parameter estimates nor their standard errors.

limited to the three-day interval [0,+2], the high junk bond exposure portfolio shows a negative abnormal return of -15.65 percent (p-value=0.0001). Drexel's failure announcement had little, if any, significant negative impact on the stock returns of the portfolio of low junk bond life insurance companies. Over the five-day interval [-2,+2] surrounding Drexel's failure announcement, the low exposure portfolio showed an abnormal return of -0.87 percent (p-value=0.3670). Over the three-day event window, the low-exposure portfolio had an abnormal return of -0.12 percent (p-value=0.8716). Tests of the hypothesis $\sum \tau_{t,H} = \sum \tau_{t,L}$ for the high and low junk bond portfolios for the two intervals [-2,+2] and [0,+2] yield:

$$\sum_{t=-2}^{2} \tau_{t,H} = \sum_{t=-2}^{2} \tau_{t,L}\,, \qquad F = 12.85 \quad (p = 0.0004)$$

$$\sum_{t=0}^{2} \tau_{t,H} = \sum_{t=0}^{2} \tau_{t,L}\,, \qquad F = 33.70 \quad (p = 0.0001)\,.$$

These tests suggest that the economic impact of Drexel's failure announcement on high junk bond LICs was significantly different from the impact on low junk bond LICs. Specifically, the Drexel's failure announcement resulted in significantly larger negative abnormal returns to stockholders of the high junk bond exposure LICs than low junk bond exposure LICs. These results are partially consistent with the rational-pricing hypothesis as the size of investor response to the failure announcement was related to the degree of junk bond exposure. We attempt to shed additional light on the degree to which valuation effects realized by LICs reflected junk bond exposure by examining individual LIC stock returns surrounding Drexel's failure announcement.

4.4. Individual LIC analysis

The portfolio results indicate that more exposed LICs experienced a significant decline in market value surrounding the failure announcement. Given these findings, we examine whether the observed decline was uniform across LICs. For each life insurance company, we estimate the following equation:

$$R_{i,t} = \alpha + \beta_M R_{M,t} + \beta_J R_{J,t} + \sum_{s=-20}^{20} \tau_{i,s} D_{s,t} + e_{i,t}. \qquad (4)$$

This approach yields abnormal returns errors for each LIC on each trading day in the event interval. For each LIC, cumulative abnormal returns (CAR) may be obtained by summing the τ coefficients:

$$CAR_j(t_1,t_2) = \sum_{s=t_1}^{t_2} \tau_{j,s}, \qquad (5)$$

where CAR_j (t_1,t_2) is the cumulative prediction over the interval t_1 to t_2 for the jth portfolio.

4.4.1 LIC-specific empirical results

Table 10 sheds light on the variation in wealth effects within the sample by reporting individual LIC abnormal returns associated with Drexel's bankruptcy filing. Panel A of Table 10 presents the results for the high exposure LICs and panel B of Table 10 shows the results for the low exposure firms. The results for the high exposure group show a significant negative reaction for four (Amvestors Financial Corporation, First Capital Holding Corporation, First Executive

Corporation, and Presidential Life Corporation) of the nine LICs over both the five-day window [-2,+2] and three-day [0,+2]. A fifth insurance company (ICH Corporation) shows a significant reaction over the three-day window. The results for the low-exposure insurance companies in panel B of the table show little evidence of a statistically significant reaction to Drexel's failure announcement. F tests of the hypothesis:

$$\sum_{t=-2}^{2} \tau_{t,1} = \sum_{t=-2}^{2} \tau_{t,2} = \ldots = \sum_{t=-2}^{2} \tau_{t,N} = 0$$

yield the following results:

High junk bond exposure: $F = 4.3564 \quad (p = 0.0001)$

Low junk bond exposure: $F = 0.7417 \quad (p = 0.9117)$.

The results from estimating the multivariate regression model for individual LICs are therefore consistent with those obtained for portfolio returns.[17] In particular, over the five-day

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[17] F tests of the hypothesis

$$\sum_{t=0}^{2} \tau_{t,1} = \sum_{t=0}^{2} \tau_{t,2} = \ldots = \sum_{t=0}^{2} \tau_{t,N} = 0$$

yield the following results:

High junk bond exposure: $F = 7.3465 \quad (p = 0.0001)$

Low junk bond exposure: $F = 0.6559 \quad (p = 0.9713)$.

event window, we can reject hypothesis *H1* that the cumulative abnormal returns for life insurance companies in the high junk bond exposure group jointly equal zero surrounding Drexel's failure announcement. The cross-sectional mean cumulative abnormal returns over the five-day window is -75.52, suggesting that an equally weighted portfolio of exposed life insurance companies stocks would have suffered a price decline of 75.52 percent over the five-day period. The test statistic for the low-junk bond exposure group does not allow rejection of hypothesis *H1*.

Similarly, tests of the hypothesis

$$\sum_{t=-2}^{2} \tau_{t,1} = \sum_{t=-2}^{2} \tau_{t,2} = \dots = \sum_{t=-2}^{2} \tau_{t,N}$$

yield the following results:

High junk bond exposure: $F = 3.8224 \quad (p = 0.0002)$

Low junk bond exposure: $F = 0.7360 \quad (p = 0.9152)$.

The F-statistic testing *H2* over the five-day event window allows rejection of the null hypothesis that the cumulative abnormal returns are equal across different high junk bond life

Thus, over the three-day event window [0,+2] the F-statistic allows rejection of *H1* for the high exposure group of life insurance companies. The insignificant F-statistic does not allow rejection of *H1* for the low exposure group.

insurance companies.[18] Thus, this result indicates that high exposed firms experienced a significant decline in market valuation over the five days and that the decline was not uniform across all life insurance companies. Less exposed life insurance companies did not show any differences in reactions to Drexel's failure announcement. Given the above findings, we examine whether the observed differences in response to Drexel's failure announcement are proportional to junk bond exposure.

4.4.2 LIC-specific differences in junk bond exposure

Selected cumulative abnormal returns will be used as the dependent variable in the following model:

$$CAR_j(t_1,t_2) = a_1 + a_2\left[\frac{HJUNK}{MV}\right]_j + a_3\left[\frac{LJUNK}{MV}\right]_j + \mu_j, \qquad \textbf{(6)}$$

where $CAR_j\ (t_1,t_2)$ = abnormal return for the jth LIC over the interval t_1 to t_2 ; $[HJUNK/MV]_j$ =

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[18] F tests of the hypothesis

$$\sum_{t=0}^{2}\tau_{t,1} = \sum_{t=0}^{2}\tau_{t,2} = \ldots = \sum_{t=0}^{2}\tau_{t,N}$$

yield the following results:

High junk bond exposure: $F = 6.4742 \quad (p = 0.0001)$

Low junk bond exposure: $F = 0.6668 \quad (p = 0.9647)$.

Thus, over the three-day event window [0,+2] the F-statistic allows rejection of *H2* for high exposed firms, while it does not allow rejection of *H2* for the low exposed group of life insurance companies.

"higher quality" non-investment grade bonds for the jth LIC as a fraction of market value of its equity; $[LJUNK/MV]_j$ = "lower quality" non-investment grade bonds for the jth LIC as a fraction of market value of its equity; and μ_j is an error term. Estimation of equation (6) allows us to test whether the market's ability to distinguish among LICs varies by degree of junk bond exposure and the quality of their junk bonds.

Ordinary least squares estimation of equation (6) will provide unbiased estimates of the parameter vector. However, the standard errors of the OLS coefficients will be biased because of cross-sectional correlation and heteroskedasticity in the abnormal returns. Following Karafaith, Mynatt, and Smith (1991), equation (6) is estimated using generalized least squares; details are provided in Appendix A.

Our earlier discussion suggests that the relationship between junk bond exposure and cumulative ARs will be negative, with LICs that have large exposure to lower quality junk bonds showing more return sensitivity than those that have smaller exposure to such bonds. This prediction is based on the notion that an LIC stock price should adjust rapidly to the news contained in Drexel's failure announcement and the adjustment should be proportion to its holdings of lower quality junk bonds. If there is, however, a contagion impact of Drexel's failure announcement, we would not expect the lower quality junk bond exposure variable (or the higher quality junk bond exposure variable) to be significantly related to cumulative ARs. A contagion effect is by definition universal.

Results of the cross-sectional estimation of equation (6) for selected intervals are presented in Table 11. These cross-sectional tests confirm our impression from the subgroup analysis and are consistent with the impact of Drexel's failure announcement on junk bond prices. In particular, our results indicate a significant direct relationship between junk bond exposure and the market penalty over the five-day window surrounding the bankruptcy filing. The market penalty is more severe for LICs holding a higher the proportion of lower quality junk bonds relative to market value of equity. In addition, the coefficient on the higher quality junk bond exposure variable suggests that Drexel's failure announcement inflicted less damage on LICs with higher proportion of higher quality junk bonds relative to equity. If the analysis is limited to the (0,+2) interval, the negative relationship between lower quality junk bond exposure and the market penalty is slightly stronger. Both of these findings support the rational-pricing hypothesis as the magnitude of an LIC stock market reaction varies with its exposure to various quality of junk bonds.

V. Conclusion

In this article, we examine the implications of Drexel's financial distress on junk bonds and their holders. Our results indicate that all types of junk bonds were negatively affected by Drexel's financial collapse. However, prices of lower quality junk bonds fell more than those of higher quality junk bonds. We interpret this result to mean that the liquidity services offered by investment banks are more valuable to lower quality firms than high quality firms. Additionally, we find that junk bonds underwritten by Drexel, relative to junk bonds underwritten by other investment banks, experienced a significant decline in price over the year leading up to Drexel's failure. We interpret this finding as weak support for the monitoring hypothesis.

Lastly, we find that the market valuation of life insurance companies was negatively affected by Drexel's financial collapse. However, it appears that stock market investors reacted rationally to Drexel's failure announcement and penalized life insurance companies based on the magnitude of their exposure to lower quality junk bonds.

Appendix A[19]

We estimate a first-stage regression

$$R_{j,t} = \alpha_j + \beta_{j,M}R_{M,t} + \beta_{j,I}R_{I,t} + \sum_{s \in \text{event window}} \tau_{j,s}D_s + \epsilon_{j,t}$$

where $R_{j,t}$ = return to firm j on date t; $R_{M,t}$ = return on the stock market portfolio; $R_{I,t}$ = return on the junk bond portfolio; $\tau_{j,s}$ = abnormal returns at date s; D_s is equal to 1 if t=s, zero otherwise; and $\epsilon_{j,t}$ is an error term with $E(\epsilon_{j,t}) = 0$, $E(\epsilon_{j,t}^2)=\sigma_j^2$, $E(\epsilon_{j,t}\,\epsilon_{i,t})=\sigma_{i,j}$ $\forall t$, and $E(\epsilon_{j,t}\,\epsilon_{i,\tau})=0$ $\forall i,j$ $\forall t \neq \tau$. For $\forall s$, $s \in$ event window,

$$R_{j,s} = \alpha_j + \beta_{j,M}R_{M,s} + \beta_{j,I}R_{I,s} + \tau_{j,s} + \epsilon_{j,s}$$

Suppose abnormal returns to firm j at date s is described by

$$\tau_{j,s} = \tilde{a} + \tilde{b}EXP_j$$

then

$$\hat{\tau}_{j,s} = \tilde{a} + \tilde{b}EXP_j + (\alpha_j - \hat{\alpha}_j) + (\beta_{j,M} - \hat{\beta}_{j,M})R_{M,s} + (\beta_{j,I} - \hat{\beta}_{j,I})R_{I,s} + \epsilon_{j,s}$$

$$\hat{\tau}_{j,s} = \tilde{a} + \tilde{b}EXP_j + \tilde{\mu}_{j,s}.$$

The cumulative abnormal returns between t_1 and t_2 (CAR_j (t_1,t_2)), can be written as:

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[19] The approach used in this appendix is a modified version of the techniques developed in Karafiath, Mynatt, and Smith (1991).

$$CAR_j(t_1,t_2) = \sum_{s=t_1}^{t_2} \hat{\tau}_{j,s}.$$

Then

$$CAR(t_1,t_2) = \sum_{s=t_1}^{t_2} \tilde{a} + \sum_{s=t_1}^{t_2} \tilde{b} EXP_j + \sum_{s=t_1}^{t_2} \tilde{\mu}_{j,s} \equiv a + bEXP_j + \mu_j,$$

here $a \equiv (t_2 - t_1 + 1)\hat{a}$, $b \equiv (t_2 - t_1 + 1)\hat{b}$, and

$$\mu_j = \sum_{s=t_1}^{t_2} (\alpha_j - \hat{\alpha}_j) + \sum_{s=t_1}^{t_2} (\beta_{j,M} - \hat{\beta}_{j,M}) R_{M,s} + \sum_{s=t_1}^{t_2} (\beta_{j,I} - \hat{\beta}_{j,I}) R_{I,s} + \sum_{s=t_1}^{t_2} \epsilon_{j,s}.$$

Manipulating the above equations yields

$$\mu_j = T_2(\alpha_j - \hat{\alpha}_j) + T_2 \bar{R}_{M,s} (\beta_{j,M} - \hat{\beta}_{j,M}) + T_2 \bar{R}_{J,s}(\beta_{j,J} - \hat{\beta}_{j,J}) + \sum_{s=t_1}^{t_2} \epsilon_{j,s},$$

where $T_2 = (t_2 - t_1 + 1)$; and averages are taken over the event window $[t_1, t_2]$. We can write $E\mu_j^2$ as:

$$E\mu_j^2 = T_2^2 var(\hat{\alpha}_j) + T_2^2 \bar{R}_{M,s}^2 \, var(\hat{\beta}_{j,M}) + T_2^2 \bar{R}_{J,s}^2 \, var(\hat{\beta}_{j,J}) + T_2 \sigma_j^2$$

$$+ 2T_2^2 \bar{R}_{M,s} cov(\hat{\alpha}_j, \hat{\beta}_{j,M}) + 2T_2^2 \bar{R}_{J,s} \, cov(\hat{\alpha}_j, \hat{\beta}_{j,J}) + 2T_2^2 \bar{R}_{M,s} \bar{R}_{J,s} cov(\hat{\beta}_{j,M}, \hat{\beta}_{j,J})$$

$$= T_2^2 [\sigma_j^2 (X'X)_{11}^{-1} + \bar{R}_{M,s}^2 \sigma_j^2 (X'X)_{22}^{-1} + \bar{R}_{J,s}^2 \sigma_j^2 (X'X)_{33}^{-1} + \frac{1}{T_2} \sigma_j^2$$

$$+ \ 2\bar{R}_{M,s}\sigma_j^2(X'X)^{-1}_{12} \ + \ 2\bar{R}_{J,s}\sigma_j^2(X'X)^{-1}_{13} \ + \ 2\bar{R}_{M,s}\bar{R}_{J,s}\sigma_j^2(X'X)^{-1}_{23}$$

where X_{tx3}=(1 $\bar{R}_M$ $\bar{R}_J$).

$$E\hat{\mu}_j^2 \ = \ \hat{\sigma}_j^2[T_2^2(\frac{1}{T_2} \ + \ (X'X)^{-1}_{11} \ + \ \bar{R}^2_{M,s}(X'X)^{-1}_{22} \ + \ \bar{R}^2_{J,s}(X'X)^{-1}_{33}$$

$$+ \ 2\bar{R}_{M,s}(X'X)^{-1}_{12} \ + \ 2\bar{R}_{J,s} \ (X'X)^{-1}_{13} + \ 2\bar{R}_{M,s}\bar{R}_{J,s})(X'X)^{-1}_{23}].$$

$$E\hat{\mu}_j^2 \ = \ \hat{\sigma}_j^2 \ x \ correction.$$

Likewise, $E\hat{\mu}_i\hat{\mu}_j \ = \ \hat{\sigma}_{ij} \ x \ correction.$ *Thus,*

$$\hat{\Omega}_{correction} \ = \ \hat{\Omega}_{GLS} \ x \ correction.$$

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Table 1
Top 10 junk bond underwriters

This table reports the top 10 junk bond underwriters, the dollar amount underwritten in million of dollars, and the percentages share of the total dollar amount underwritten during 1989. Information was obtained from Benveniste, Singh, and Wilhelm (1993).

Investment Bank	Amount	Share
Drexel	9748.6	38.6
Shearson	2361.0	9.3
Morgan Stanley	2349.7	9.3
Merrill Lynch	2252.5	8.9
Goldman Sachs	2195.4	8.9
First Boston	2014.9	8.0
Salomon Brothers	1508.3	6.0
Donaldson Lufkin	1308.9	5.2
Bear Stearns	547.0	2.2
Kidder Peabody	375.0	1.5

Table 2
Estimates of daily abnormal returns (AR) for junk bond portfolios

Market model abnormal returns and t-statistics are shown for each day in the interval (day -20 to day +20) for each portfolio of junk bonds. Panel A reports the results for the high- and low-quality junk bond portfolios; panel B shows those for the average-quality junk bond portfolio.

Panel A Daily ARs for high- and low- quality junk bond portfolios

Day	Date(1990)	AR High Quality Junk	t-Statistic	AR Low Quality Junk	t-Statistic
-20	Jan. 16	0.0509	0.442	0.0344	0.082
-19	Jan. 17	0.0101	0.088	-0.1424	-0.340
-18	Jan. 18	0.0145	0.125	0.6027	1.432
-17	Jan. 19	-0.0470	-0.409	0.2503	0.596
-16	Jan. 22	-0.1249	-1.087	0.2627	0.626
-15	Jan. 23	0.0113	0.098	0.0231	0.055
-14	Jan. 24	-0.0529	-0.460	-0.2372	-0.565
-13	Jan. 25	-0.0478	-0.416	-0.0886	-0.211
-12	Jan. 26	0.0132	0.115	0.1052	0.250
-11	Jan. 29	-1.3035	-11.341[c]	-2.8633	-6.821[c]
-10	Jan. 30	-0.0491	-0.428	0.0543	0.130
- 9	Jan. 31	0.0627	0.543	-0.6235	-1.480
- 8	Feb. 1	-0.2450	-2.134[b]	0.2612	0.623
- 7	Feb. 2	0.0144	0.125	0.1245	0.296
- 6	Feb. 5	0.0681	0.593	0.0292	0.070
- 5	Feb. 6	0.0126	0.109	0.2169	0.516
- 4	Feb. 7	-0.0751	-0.654	-0.3636	-0.867
- 3	Feb. 8	-0.2088	-1.816[a]	0.1786	0.425
- 2	Feb. 9	-0.0142	-0.123	-0.3828	-0.908
- 1	Feb. 12	0.0492	0.427	0.2209	0.524

Table 2 (continued)

Panel A Daily ARs for high- and low- quality junk bond portfolios

Day	Date(1990)	AR High Quality Junk	t-Statistic	AR Low Quality Junk	t-Statistic
0	Feb. 13	-1.5725	-13.680[c]	-4.2400	-10.124[c]
+ 1	Feb. 14	0.0665	0.579	0.7545	1.798
+ 2	Feb. 15	0.3070	2.670[c]	0.2169	0.517
+ 3	Feb. 16	0.1139	0.992	0.3301	0.787
+ 4	Feb. 20	0.1851	1.586	0.4661	1.093
+ 5	Feb. 21	-0.0487	-0.424	0.0192	0.046
+6	Feb. 22	-0.0403	-0.350	-0.4291	-1.021
+ 7	Feb. 23	0.0081	0.071	0.0628	0.150
+ 8	Feb. 26	0.1503	1.306	-0.2778	-0.661
+ 9	Feb. 27	0.0716	0.623	0.0753	0.179
+10	Feb. 28	-0.2100	-1.822[a]	-0.1450	-0.344
+11	Mar. 1	-0.0541	-0.470	-0.8496	-2.022[b]
+12	Mar. 2	-0.0541	-0.470	-0.3011	-0.717
+13	Mar. 5	0.1607	1.394	-0.1983	-0.471
+14	Mar. 6	-0.0329	-0.286	0.0568	0.135
+15	Mar. 7	0.0104	0.090	0.2734	0.652
+16	Mar. 8	-0.0458	-0.399	0.0289	0.069
+17	Mar. 9	0.0768	0.667	0.0779	0.185
+18	Mar. 12	0.0865	0.753	0.2154	0.514
+19	Mar. 13	0.0124	0.108	0.1957	0.465
+20	Mar. 14	-0.0147	-0.128	-0.0369	-0.088

Table 2 (continued)

Panel B Daily ARs for Average-Quality Junk Bond Portfolio

Day	Date(1990)	AR	t-Statistic
-20	Jan. 16	-0.0033	-0.024
-19	Jan. 17	-0.0572	-0.420
-18	Jan. 18	0.0153	0.112
-17	Jan. 19	-0.1232	-0.903
-16	Jan. 22	-0.0904	-0.664
-15	Jan. 23	-0.0749	-0.549
-14	Jan. 24	-0.1602	-1.175
-13	Jan. 25	-0.1849	-1.356
-12	Jan. 26	0.0264	0.193
-11	Jan. 29	-1.9131	-14.033[c]
-10	Jan. 30	-0.0069	-0.051
- 9	Jan. 31	-0.1014	-0.741
- 8	Feb. 1	-0.0852	-0.626
- 7	Feb. 2	0.0294	0.215
- 6	Feb. 5	0.0484	0.355
- 5	Feb. 6	0.0276	0.202
- 4	Feb. 7	-0.0073	-0.054
- 3	Feb. 8	-0.1465	-1.074
- 2	Feb. 9	-0.1417	-1.035
- 1	Feb. 12	0.0971	0.710
0	Feb. 13	-2.6547	-19.471[c]

Table 2 (continued)

Panel B Daily ARs for Average-Quality Junk Bond Portfolio

Day	Date(1990)	AR	t-Statistic
+1	Feb. 14	0.2591	1.901[a]
+2	Feb. 15	0.2501	1.834[a]
+3	Feb. 16	0.1127	0.828
+4	Feb. 20	0.3019	2.180[b]
+5	Feb. 21	0.0277	0.203
+6	Feb. 22	-0.0462	-0.339
+7	Feb. 23	0.0148	0.108
+8	Feb. 26	0.1019	0.746
+9	Feb. 27	0.0473	0.347
+10	Feb. 28	-0.1944	-1.421
+11	Mar. 1	-0.2778	-2.036[b]
+12	Mar. 2	-0.0443	-0.325
+13	Mar. 5	0.0821	0.601
+14	Mar. 6	0.0038	0.028
+15	Mar. 7	0.0475	0.349
+16	Mar. 8	-0.0324	-0.238
+17	Mar. 9	0.1495	1.096
+18	Mar. 12	0.1384	1.016
+19	Mar. 13	0.0425	0.311
+20	Mar. 14	0.0071	0.052

“a” means significant at the ten percent level. “b” means significant at the five percent level. “c” means significant at the one percent level.

Table 3
Cumulative ARs for each of the three junk bond portfolios surrounding Drexel Burnham Lambert's failure announement

This table reports the cumulative ARs and p-values for six event-perod windows ([-60, -21], [-20, -3], [0], [-2, 0], [-2, +2], and [0, +2]) for the three junk bond portfolios. The p-values are for the null hypothesis that the cumulative ARs for each junk bond portfolio are equal to zero.

Interval	High-quality (H)	Average-quality (A)	Low-quality (L)
(-60, -21)	-0.0923 (0.9037)	-0.7377 (0.4150)	-1.8845 (0.4988)
(-20, -3)	-1.8965 (0.0002)	-2.8074 (0.0001)	-2.1757 (0.2327)
(0, 0)	-1.5725 (0.0001)	-2.6547 (0.0001)	-4.2500 (0.0001)
(-2, 0)	-1.5375 (0.0001)	-2.6992 (0.0001)	-4.4119 (0.0001)
(-2, +2)	-1.1640 (0.0001)	-2.1900 (0.0001)	-3.4404 (0.0003)
(0, +2)	-1.1990 (0.0001)	-2.1455 (0.0001)	-3.2785 (0.0001)

Table 4
Test statistics for the daily abnormal and cumulative abnormal returns for the three junk bond portfolios

This table provides a test of the hypothesis that the economic impact of Drexel's failure is the same for each junk bond portfolio during four event-period windows ([0], [0, +2], [-2, 0], and [-2, +2]). The tests of these pairwise comparisons utilized an F-statistic.

Interval	A vs. H	A vs. L	H vs. L
0 0	118.781 (p=0.0001)	20.649 (p=0.0001)	47.255 (p=0.0001)
0 +2	30.186 (p=0.0001)	3.460 (p=0.0631)	9.470 (p=0.0021)
-2 0	45.446 (p=0.0001)	7.902 (p=0.0050)	18.082 (p=0.0001)
-2 +2	21.181 (p=0.0001)	2.516 (p=0.1129)	6.776 (p=0.0094)

Table 5
Sampled junk bonds

This table provides a list of junk bonds, the name of the issuer, rating at the time of issuance, and whether Drexel Burnham Lambert was the lead underwriter. Names of the junk bonds were obtained from the pospectuses of the following high-yield mutual funds: Franklin's Age High Income Fund, Dean Witter High Yield Securities, First Investors High Yield Fund, Lutheran Brotherhood High Yield Fund, T. Rowe Price High Yield Fund, Value Line Aggressive Income Trust, Keystone B-4 (the discount bond fund), and Cigna High Yield Income Shares. To be included in the sample, each bond held by each High-Yield mutual fund must be rated less than Baa by Moody's or BBB by Standard and Poor's and have weekly prices listed in Barrons.

Name of Bond	Company Name	Rating	Drexel
Amax 14- ½ 1994	Amax Inc.	BB+	no
Carter Hawley Hale Stores Inc. 12-½ 2002	Carter Hawley Hale Stores Inc.	B2	no
Carter Hawley Hale Stores Inc. 12-¼ 1996	Carter Hawley Hale Stores Inc.	B2	no
Charter Medical Corp. 15.85 2008	Charter Medical Corporation	B3	yes
Coastal Corp. 11-⅛ 1998	Coastal Corporation	Ba1	yes
Coastal Corp. 11- ¾ 2006	Coastal Corporation	BB+	yes
Coastal Corp. 8.48 1991	Coastal Corporation	Ba2	yes
Conseco Inc. 12-¾ 1997	Conseco Inc.	B1	no
Jack Eckerd Corp. 11-⅛ 2001	Jack Eckerd Corporation	B2	no
Fairfield Communities Inc. 13-¼ 1992	Fairfield Communites Inc.	B3	yes
Golden Nugget Inc. 13-¼ 1995	Golden Nugget Inc.	Ba3	yes
General Homes Corporation 15-½ 1995	General Homes Corporation	Caa	no
Griffin Resorts International, Inc. 13-⅞ 1998	Resorts International Inc.	Caa	yes
Home Shopping Network Inc. 11-¾ 1996	Home Shopping Network Inc.	Ba3	no
ICN Pharmaceuticals Inc. 12-⅞ 1998	ICN Pharmaceuticals Inc.	B3	no
Integrated Resources 10-¾ 1996	Integrated Resources	C	yes
Koor Industries, Ltd. 12 1996	Koor Industries, Ltd.	CCC	yes
Leisure Technology Inc. 13-⅝ 1996	Leisure Technology Inc.	B3	no
MGM/UA Communications Co. 12-⅝ 1993	MGM/UA Communications Co.	B2	yes
MGM/UA Communications Co. 13 1996	MGM/UA Communications Co.	B2	yes
Mark IV Industries Inc. 7 2011	Mark IV Industries Inc.	B2	no
Maxxam Inc. 13-⅝ 1992	Maxxam Inc.	B3	yes
Mesa Limited Partnership 12 1996	Mesa Limited Parnership	B2	yes
NVR, L.P. 10 2002	NVR, L.P.	B3	no
Occidental Petroleum Corp. 8.95 1994	Occidental Petroleum Corp.	Ba1	yes
Public Serv. Co. of N. Hampshire 17-½ 2004	Public Serv. Co. of N. Hampshire	C	no
Public Serv. Co. of N. Hampshire 14-⅜ 1991	Public Serv. Co. of N. Hampshire	C	no
Public Serv. Co. of N. Hampshire 15 2003	Public Serv. Co. of N. Hampshire	C	no
Public Serv. Co. of N. Hampshire 14-½ 2000	Public Serv. Co. of N. Hampshire	Caa	no
Pacific Lumber 12 1996	Maxxam Inc.	B+	yes
Phillips Petroleum Co. 14-¾ 2000	Phillips Petroleum Co.	Ba2	no

Table 5 (continued)

Name of Bond	Company Name	Rating	Drexel
Resorts International Inc. 11-3/8 2013	Resorts International Inc.	Ca	no
Resorts International Inc. 10 1999	Resorts International Inc.	Ca	no
Resorts International Inc. 16-5/8 2004	Resorts International Inc.	Ca	no
Santa Fe Pacific Corporation 16 2003	Santa Fe Pacific Corporation	Ba3	no
Stone Container Corporation 13-5/8 1995	Stone Container Corporation	Ba3	yes
Storage Technology Corporation 13-½ 1996	Storage Technology Corporation	Ba2	no
Service Merchandise Co. Inc. 11-¾ 1996	Service Merchandise Co. Inc.	Ba3	no
Twentieth Century Fox Film Corp. 10-¼ 1998	Twentieth Century Fox Film Corp.	B2	no
Twentieth Century Fox Film Corp. 13- ¼ 2000	Twentieth Century Fox Film Corp.	B2	no
Tesoro Petroleum Corporation 12-¾ 2001	Tesoro Petroleum Corporation	B3	yes
Trump Taj Mahal Funding, Inc. 14 1998	Trump Taj Mahal Funding, Inc.	B3	no
Texas Air Corporation 15-¾ 1992	Continental Airlines Holdings Inc.	Caa	no
Texas Air Corporation 14-¼ 1993	Continental Airlines Holdings Inc.	Caa	yes
Texas Air Corporation 14-3/8 1990	Continental Airlines Holdings Inc.	Caa	yes
Texas Air Corporation 14.90 1995	Continental Airlines Holdings Inc.	Caa	yes
UNC Inc. 7-½ 2006	UNC Inc.	B3	no
Viacom Inc. 15-½ 2006	Viacom Inc.	B2	no
Wickes Companies Inc. 11-7/8 2001	Wickes Companies Inc.	Caa	yes
Wickes Companies Inc. 15 1995	Wickes Companies Inc.	Caa	yes

Table 6

Firm characteristics for the 22 bonds that were underwritten by Drexel Burnham Lambert and 28 bonds that were underwritten by other investment bankers

Thirteen companies issued the 22 bonds that were underwritten by Drexel Burnham Lambert and nineteen companies issued the 28 bonds that were underwritten by other investment bankers. The TIE Ratio is earnings before interest and taxes divided by interest charges; Cash Flow is net income plus depreciation and other amortization divided by total assets; Equity Ratio is book value of capital divided by total assets; Sales is net income divided by sales; Volatility is the standard deviation of ROE over a five year period ending in 1989; and Return is the weekly bond returns over the January 8, 1988-June 22, 1990 sample period. The fifty junk bonds were divided into two quality categories. Junk bonds with a quality rating above CCC are classified as "high-quality" junk bonds, and those with a quality rating CCC or below are classified as "low-quality" junk bonds. Bond returns are reported for both categories of junk bonds by underwriter. The standard deviations are in parentheses below the mean values. Difference provides the p-value for the null hypothesis that the mean of a variable for Drexel issues minus the mean of the same variable for non-Drexel issues is zero assuming unequal variances for the two subsamples.

	Drexel		Non-Drexel		Difference
	Mean	Median	Mean	Median	
Total Assets	$4.53	$2.63	$2.50	$1.66	0.24
($ Billion)	(5.57)		(2.76)		
Current Ratio	1.45[1]	1.51	1.62[2]	1.43	0.45
	(0.31)		(0.79)		
TIE Ratio	0.53	0.72	0.98[3]	1.27	0.44
	(1.4)		(1.83)		
Equity Ratio	6.35	20.44	10.59	12.15	0.69
	(30.6)		(26.53)		
ROA	-7.77	-2.40	-2.76	0.91	0.52
	(24.44)		(15.94)		
ROE	17.92	5.03	-8.00	14.16	0.32
	(51.12)		(91.84)		
Volatility	38.46	25.03	99.22	23.72	0.22
	(43.46)		(205.11)		
Return	-0.31	-----	-0.04	-----	0.01
	(3.98)		(3.84)		
High-Quality	-0.20	----	-0.04	-----	0.04
	(2.42)		(2.37)		
Low-Quality	-0.56	----	-0.02	-----	0.06
	(6.14)		(5.64)		

[1] The number of observations used in computing this variable is 11.
[2] The number of observations used in computing this variable is 15.
[3] The number of observations used in computing this variable is 17.

Table 7
Average abnormal firm-specific junk bond returns around Drexel Burnham Lambert's failure announcement

Panel A. Abnormal bond returns

This panel shows the abnormal bond returns around Drexel Burnham Lambert's failure announcement using the 22 bonds that were underwritten by Drexel Burnham Lambert and the 28 bonds that were underwritten by other investment bankers. Using weekly data over the January 8, 1988-June 22, 1990 period, the average abnormal junk bond returns around Drexel's failure announcement are computed from the following market model:

$$R_{i,t} = \alpha_0 + \alpha_1 DREXEL + \beta_I R_{I,t} + \sum_{s=-4}^{4} \tau_{i,s} D_s + e_{i,t},$$

where $R_{i,t}$ is the weekly holding period return on bond i; DREXEL is a binary variable equalling one for a bond underwritten by Drexel and zero otherwise; $R_{I,t}$ is the holding period return on a long-term U.S. Treasury security portfolio; D_s is a binary variable that is set equal to one on week s in the forecast window and zero otherwise; and $e_{i,t}$ is an error term. The figures in parentheses beneath the regression coefficients are the t-statistics.

DREXEL	D_{-4}	D_{-3}	D_{-2}	D_{-1}	D_0	D_{+1}	D_{+2}	D_{+3}	D_{+4}
-0.2752 (-2.62)[c]	-1.1280 (-2.04)[b]	-1.8294 (-3.30)[c]	-1.9595 (-3.53)[c]	-1.1294 (-2.03)[b]	-1.0160 (-1.84)[a]	0.7107 (1.28)	0.3490 (0.63)	-0.9338 (-1.68)[a]	-0.5583 (-1.01)

"a" means significant at the ten percent level. "b" means significant at the five percent level. "c" means significant at the one percent level.

Table 7 (continued)

Panel B. Abnormal bond returns for different quality of junk bonds
This panel shows the abnormal bond returns around Drexel Burnham Lambert's failure announcement for two quality categories of junk bonds. Junk bonds with a quality rating above CCC are classified as "high-quality" junk bonds, and those with a quality rating CCC or below are classified as "low-quality" junk bonds. Using weekly data over the January 8, 1988-June 22, 1990 period, the average abnormal junk bond returns for high- and low-quality junk bonds around Drexel's failure announcement are computed from the following market model:

$$R_{i,t} = \alpha_0 + \alpha_1 DREXEL + \alpha_2 HIGH + \beta_{I,1} R_{I,t} + \beta_{I,2} R_{I,t} HIGH + \sum_{s=-4}^{4} \tau_{1,i,s} D_s + \sum_{s=-4}^{4} \tau_{2,i,s} D_s HIGH + e_{i,t},$$

where HIGH is a binary variable equalling one for a high-quality junk bonds and zero otherwise; and other variables were defined earlier. The figures in parentheses beneath the regression coefficients are the t-statistics.

Variable	-4	-3	-2	-1	0	+1	+2	+3	+4
$D_{s,t}$	-0.8196 (-0.86)	-3.5313 (-3.72)[c]	-3.5939 (-3.78)[c]	-1.7284 (-1.82)[a]	-2.4221 (-2.42)[c]	1.9514 (2.06)[b]	0.2410 (0.25)	-2.4784 (-2.61)[c]	0.3633 (0.38)
$D_{s,t}$ x HIGH	-0.4674 (-0.40)	2.5757 (2.20)[b]	2.4734 (2.11)[b]	0.9083 (0.78)	2.1291 (1.83)[a]	-1.8811 (-1.61)	0.1634 (0.14)	2.3373 (2.00)[b]	-1.3962 (-1.20)

"a" means significant at the ten percent level. "b" means significant at the five percent level. "c" means significant at the one percent level.

Table 8
Selected financial charateristics of sampled life insurance companies

This table provides some characteristics, at year-end 1989, of nine life insurance companies that have market value of capital to junk bond ratio less than or equal to 75 percent at the end of 1988 and the 50 life insurance companies that have market value of capital to junk bond ratio more than 75 percent at the end of 1988. Financial data are from the National Association of Insurance Commissioners. Difference is the mean of a variable for high junk bond life insurance companies minus the mean of the same variable for low junk bond life insurance companies; the p-value is for the null hypothesis that the difference is zero assuming unequal variances for the two subsamples. MVA is the ratio of market value of equity to general account assets (TA). BVA is the ratio of book value of equity to TA. Tobin's Q is the ratio of firm market value (market value of equity plus TA minus book value of equity) to TA. Equity volatility is obtained by using stock return daily data for the twelve month period ending with the last month in 1989. JUNK is the ratio of junk bond investments to TA. GIC is the ratio of guaranteed investment contracts to TA. BMIX, defined as the ratio of income from annunities to total premium income, captures the business mix of a life insurance company. NOCST is the proportion of life insurance companies' premium income from states without premium tax offset policy. In 41 states, life insurance companies are allowed to *credit* some or all of their *ex post* assessments in state-administered guaranty funds against their state premium taxes. In the other states, companies are permitted to add a premium surcharge but may not credit assessment costs against taxes. In these cases, profits of surviving LICs would decline if they are unable to pass all of the assessment costs onto existing policyholders. ROA is net income divided by TA.

	High-Junk		Low-Junk		Difference
	Mean	Median	Mean	Median	
Total Assets (TA) ($ Billion)	$5.8	$5.6	$5.3	$1.4	$0.5
MVA	0.061	0.051	0.275	0.207	-0.214[b]
BVA	0.077	0.052	0.132	0.121	-0.055[a]
Book-to-market equity ratio	2.113	0.806	0.775	0.598	1.338
Tobin's Q	0.982	1.009	1.126	1.061	-0.144[b]
Equity volatility	0.029	0.028	0.022	0.017	0.007[a]
JUNK	0.150	0.108	0.030	0.018	0.120[a]
GIC	0.043	0.000	0.046	0.000	-0.003
BMIX	0.603	0.801	0.196	0.068	0.407[a]
NOCST	0.120	0.101	0.219	0.180	-0.099[b]
ROA	0.020	0.009	0.020	0.017	0.000

"a" means significant at the five percent level. "b" means significant at the one percent level.

Table 9
Estimates of cumulative abnormal returns for high- and low-junk bond holding life insurance companies (portfolios are value-weighted by total assets)

This table reports the market model cumulative abnormal returns and p-values for four event-period windows ([0], [-2, 0], [-2, +2], and [0, +2]) for high- and low-junk bond exposure life insurance companies. These cumulative abnormal returns are based on daily ARs obtained from seemingly unrelated regression (SUR) estimates of a two-factor market model using two and one-half years of data (January 4, 1988, through June 29, 1990). The high exposure portfolio includes the nine life insuance companies that have market value of capital to junk bond ratio less than or equal to 75 percent at the end of 1988; and the low exposure junk bond portfolio includes the 50 life insurance companies that have market value of capital to junk bond ratio more than 75 percent at the end of 1988. Portfolio returns are value-weighted averages of individual stock returns. The p-values are for the null hypothesis that the cumulative ARs for each junk bond portfolio are equal to zero.

Interval	High-junk	Low-junk
(0, 0)	-3.7124 (0.0144)	-0.2078 (0.6310)
(-2, 0)	-1.3262 (0.6135)	-0.9616 (0.2003)
(-2, +2)	-13.2649 (0.0001)	-0.8751 (0.3670)
(0, +2)	-15.6511 (0.0001)	-0.1213 (0.8716)

Table 10.

Individual life insurance company cumulative abnormal returns

This table provides estimates of cumulative abnormal returns for four event perod windows ([-2, 0], [-2, +2], and [0, +2]) for each of the life insurance companies in the sample. Panel A reports the results for each of the nine life insurance companies in the high junk bond exposure group and panel B reports those for each of the 50 life insurance companies in the low junk bond exposure sample. The abnormal returns are based on seemingly unrelated regression (SUR) estimates of a two-factor market model using daily return data over the January 4, 1988-June 29, 1990 period. The F-statistic provides the p-value for the null hypothesis that the cumulative abnormal returns are equal to zero.

Panel A. High junk bond life insurance companies

	CAR (-2, +2)	F-statistic (-2, +2)	CAR (0, +2)	F-statistic (0, +2)	CAR (-2, 0)	F-statistic (-2, 0)
First Capital Holding Corporation	-13.17	0.08	-9.37	0.10	-11.68	0.04
First Executive Corporation	-29.78	0.00	-34.32	0.00	-2.98	0.57
Amvestors Financial Corporation	-10.68	0.06	-6.25	0.15	-15.26	0.00
Conseco Group	10.27	0.08	5.79	0.21	6.46	0.16
ICH Corporation	-8.13	0.36	-12.67	0.06	4.50	0.51
Intercontinental Life	5.90	0.36	4.38	0.38	6.24	0.21
National Western Life Corporation	-5.60	0.34	-3.18	0.48	-6.48	0.15
Presidential Life Corporation	-21.04	0.00	-21.33	0.00	-10.21	0.04
Reliance Group Holdings	-0.29	0.97	1.67	0.75	0.82	0.88

Panel B. Low junk bond life insurance companies

	CAR (-2, +2)	F-statistic (-2, +2)	CAR (0, +2)	F-statistic (0, +2)	CAR (-2, 0)	F-statistic (-2, 0)
Academy Insurance Group	10.04	0.26	3.05	0.66	6.96	0.31
Acceleration International Corporation	3.48	0.53	-0.56	0.89	5.69	0.18
Aetna Life & Casualty Corporation	-0.93	0.66	0.18	0.91	-1.79	0.27
Alfa Corporation	-3.70	0.57	0.40	0.94	-1.61	0.74
American Bankers Insurance Group	-1.18	0.77	-3.67	0.24	-1.07	0.73
American Family Corporation	-2.37	0.62	-3.79	0.31	-0.27	0.94
American General Corporation	-2.72	0.47	-0.80	0.78	-1.29	0.66
American Heritage	-0.72	0.74	-1.03	0.55	-0.54	0.75
American National	-1.08	0.69	1.09	0.60	-0.75	0.72

Table 10 (continued)

	CAR	F-statistic	CAR	F-statistic	CAR	F-statistic
	(-2, +2)		(0, +2)		(-2, 0)	
AON Corporation	1.73	0.56	1.20	0.60	1.96	0.39
Atlantic American Corporation	-0.03	1.00	-0.07	0.99	-0.01	1.00
Broad Incorporated	-0.75	0.89	-1.44	0.72	1.59	0.70
Capital Holding Corporation	-2.86	0.23	-3.77	0.04	-1.85	0.31
Central Reserve Life Corporation	1.79	0.83	1.91	0.77	-0.29	0.96
CIGNA Corporation	-0.35	0.87	2.44	0.15	-0.50	0.77
Citizens Incorporated	-1.68	0.93	-6.58	0.66	4.56	0.76
Colonial Companies Incorporated	0.68	0.89	0.58	0.88	2.46	0.51
Cotton States Life & Health	0.07	0.99	-0.79	0.92	0.76	0.92
Durham Corporation	2.27	0.72	-2.43	0.62	6.84	0.17
Equitable of Iowa Corporation	-2.50	0.53	-0.47	0.88	-2.14	0.48
Financial Benefit Group	0.46	0.95	7.41	0.18	-6.97	0.21
First Centennial Corporation	0.03	1.00	0.23	0.96	-0.20	0.97
Home Benefical Corporation	3.37	0.46	2.09	0.55	0.52	0.88
Independent Insurance Group	1.30	0.68	1.36	0.58	0.46	0.85
Jefferson Pilot Corporation	2.62	0.37	3.49	0.12	-0.83	0.71
Kansas City Life	-0.35	0.90	0.42	0.84	0.55	0.79
Kemper Corporation	-4.25	0.19	-3.55	0.15	-2.76	0.27
Kentucky Central Life	-4.24	0.32	2.10	0.52	-8.26	0.01
Laurentian Capital Corporation	-3.96	0.67	0.33	0.96	0.77	0.91
Liberty Corporation	0.31	0.90	0.31	0.87	-0.08	0.96
Lincoln National	-0.46	0.85	0.82	0.67	1.77	0.36
Manhattan National Corporation	-2.34	0.69	-0.49	0.91	-3.85	0.40
MCM Corporation	-2.97	0.67	-2.95	0.58	-0.06	0.99
Monarch Capital Corporation	8.64	0.02	3.05	0.30	2.98	0.31
NWNL Companies Incorporated	-2.69	0.39	-2.06	0.40	-7.51	0.00
Penn Treaty American Corporation	-1.46	0.86	-1.21	0.85	3.83	0.56
Protective Life Corporation	0.20	0.95	0.63	0.80	-2.56	0.31
Provident Life & Accident Insurance	7.05	0.07	2.18	0.47	7.41	0.01
Reliable Life Corporation	-1.25	0.50	-1.19	0.41	-0.05	0.97

Table 10 (continued)

	CAR	F-statistic	CAR	F-statistic	CAR	F-statistic
	(-2, +2)		(0, +2)		(-2, 0)	
Statesman Group	0.20	0.98	-3.35	0.61	1.15	0.86
Torchmark Corporation	-4.89	0.05	-2.13	0.27	-4.78	0.01
Transamerica Corporation	-2.44	0.30	0.32	0.86	-3.68	0.05
Travelers Corporation	-0.04	0.98	-0.24	0.89	-0.52	0.76
United Companies Financial Corporation	-1.31	0.83	-1.29	0.78	-5.69	0.22
United Insurance Cos. Inc.	2.10	0.80	0.80	0.90	1.25	0.84
Universal Holding Corporation	-9.40	0.61	11.53	0.42	-21.18	0.14
Unum Corporation	-4.62	0.10	-4.21	0.05	-3.04	0.16
USLICO Corporation	1.00	0.70	0.33	0.87	0.63	0.75
USLIFE Corporation	-5.16	0.05	-2.34	0.24	-3.31	0.10
Washington National Corporation	-0.50	0.83	1.31	0.46	-1.38	0.44

Table 11

Generalized least squares regression results explaining cumulative abnormal returns of 59 life insurance companies surrounding Drexel Burnham Lambert's failure announcement (cumulative intervals)

This table provides generalized least squares estimates of the association between junk bond exposure and cumulative abnormal returns using the following equation:

$$CAR_j(t_1,t_2) = a_1 + a_2\left[\frac{HJUNK}{MV}\right]_j + a_3\left[\frac{LJUNK}{MV}\right]_j + \mu_j .$$

The dependent variable for each interval is the cumulative abnormal return (CAR_j (t_1,t_2)) computed from daily abnormal returns. The daily abnormal returns are estimated from a two-factor market model using two and one-half years of daily return data (Janaury 4, 1988, through June 29, 1990). The variable [HJUNK/MV] is the ratio of "higher quality" non-investment-grade bonds to market value of equity. The variable [LJUNK/MV] is the ratio of "lower quality" non-investment-grade bonds to market value of equity. μ_j is an error term. The market value of equity is computed at the end of 1988. HJUNK and LJUNK are from the 1989 Statutory Reports of Condition of sampled insurance companies. The t-statistics are in parentheses and p-values are below the t-statistics.

Interval	Intercept	HJUNK/MV	LJUNK/MV	Adjusted R^2
(-2, 2)	-1.0051 (-0.6547) 0.5152	5.7757 (1.8890) 0.0639	-7.5419 (-3.8239) 0.0003	0.6481
(-2, 0)	-0.5148 (-0.4591) 0.6479	-1.0287 (-0.4605) 0.6469	-0.1244 (-0.0864) 0.9314	0.0203
(0, 0)	-0.1426 (-0.3433) 0.7327	0.0266 (0.0322) 0.9745	-1.3763 (-2.5777) 0.0126	0.2748
(0, 2)	-0.6329 (-0.6236) 0.5353	6.8310 (3.3791) 0.0013	-8.7937 (-6.7434) 0.0000	0.7736

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