

Forced Selling of Fallen Angels

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What happens when investment-grade bonds are downgraded to junk status? The received wisdom is that these fallen angels are sold by fixed-income investors who, by regulation, are prohibited from investing substantial portions of their portfolios in speculative-grade paper. Some may not be allowed to invest in such low-grade debt at all.¹ This view was well articulated by the *New York Times* ("News Analysis: Crisis Looms in Mortgages" [2007]) in a discussion of turmoil in the subprime mortgage-backed securities (MBS) market. The NYT suggests that these MBS bonds would experience further downgrades as the fallout continues, and when this happens, the concern is that "many mortgage buyers cannot hold securities that are rated below investment grade—insurance companies are an example. So if the securities were downgraded, forced selling would ensue, further pressuring an already beleaguered [subprime] market."

Previous studies of the effects of fallen angel downgrades on the corporate bond market have largely focused on returns, asking the question "Are fallen angel corporate bonds a good investment?" The logic is that forced selling by regulated entities would allow other investors (such as high-yield mutual funds) to pick up the bonds at bargain basement prices, therefore allowing them to earn positive excess returns (see Fridson and Cherry [1992] and

Fridson [2005]). Fridson and Cherry [1992] and Fridson and Sterling [2006, 2007] compare returns on fallen angels and original issue high-yield bonds to determine if returns are higher for the former, as the conventional wisdom suggests. While they find evidence that returns are higher for fallen angels, they do not attribute the superior performance to forced selling by regulated entities.

The previous focus on returns reflects the difficulty researchers have faced in tabulating selling activity. Few databases are available that would identify bond transactions in a sufficiently detailed manner that one could determine which firms were buying or selling fallen angels. Our study overcomes this hurdle by investigating insurance company trading activity around the time of the downgrade. Insurance companies must report their corporate bond trading activity to regulators, which allows us to determine the extent to which forced selling occurs. Insurance companies are likely to be among the most regulated of corporate bond investors: If the received wisdom is correct we should observe its effect in these data.

Insurance company regulations vary by the jurisdiction in which the firm is domiciled, but generally speaking they constrain holdings of high-yield bonds along two dimensions. First, they may limit or outright prohibit investments in speculative-grade debt.² Second, risk-based capital (RBC) regulations

force insurers to hold more capital (surplus) when they invest in riskier assets. The National Association of Insurance Commissioners (NAIC) categorizes corporate bonds according to six risk classes, with NAIC-1 being the safest class and NAIC-6 being the riskiest. The NAIC categories line up well with the rating agencies, so that a bond rated AAA is nearly always classified as NAIC-1 and a bond rated BBB is nearly always considered NAIC-2. Insurers that restrict their assets to these two categories can operate with very little surplus, but firms that invest heavily in NAIC-5 and NAIC-6 bonds must have higher levels of surplus (RBC requirements are higher). Thus, even if an insurer does not face outright prohibitions on investments in speculative-grade bonds, fear of failure to meet RBC requirements may motivate the insurer to sell its fallen angels shortly after losing investment-grade status.

In addition, life insurers may feel forced to sell fallen angels because of the impact they have on the firm's reputation. For example, Fenn and Cole [1994] and DeAngelo, DeAngelo, and Gilson [1994] provide evidence that policyholder perceptions of portfolio risk are extremely important determinants of market share and profitability in the life insurance industry. Thus, if policyholders are skittish about insurers whose portfolios seem too risky, then insurers may choose to follow a strategy of selling fallen angels when they are downgraded.

Nonetheless, it is unlikely that any state regulations or internal investment policies would require that a fallen angel be sold immediately after being downgraded, as selling at a fire sale price may be even more damaging to the firm. Consequently, we wonder just how much pressure there is to sell fallen angels, let alone whether such pressure is sufficient to exacerbate the fallout, as the *New York Times* claims, or to generate the excess returns found on fallen angel bonds. Our goal in this article is to investigate insurance company sales of bonds that were downgraded to junk in order to document the extent of forced selling of fallen angels.

Examining insurance company buy and sell trades over the period from 1995 to 2006, we find evidence for the claim that insurance firms are forced to sell fallen angels. We find that insurance companies are indeed more likely to sell fallen angels following the ratings downgrade than comparable bonds that did not experience a corresponding downgrade. For example, our multivariate regression analysis indicates that fallen angels experience nearly one and a half more sales transactions in the month following a rating downgrade than comparable bonds.

However, we do not conclude that there is a stampede to sell off these bonds. As has been noted in much of the literature, we find that the overall transaction volume for seasoned bonds is limited. Hence, while one and a half bond sales a month is a huge increase in sales activity compared with bonds that were not downgraded to junk, less than two investors on average divesting their holdings of fallen angels hardly constitutes a rush to the exit.

DATA

We identify fallen angels using the Fixed Investment Securities Database (FISD), which includes detailed information on issuance and ratings for all fixed-income securities that are assigned a CUSIP, or are likely to receive one soon. FISD is sold by Mergent, Inc., and includes all bonds sold in the U.S. with a stated maturity date of 1990 or later. Mergent also provides data on bond transactions that insurance companies are required to report to the NAIC. This part of the Mergent data includes all corporate bond transactions reported to the NAIC by U.S. insurance companies over the 1995–2006 period.³ The database has daily data, to the extent that trades occur daily. Many corporate bonds trade infrequently, however, so it is entirely possible that a bond will not have any trades in a given month or quarter.

A potential concern with the NAIC database is whether insurers are representative participants in the U.S. corporate bond market. Campbell and Taksler [2003] note insurance firms hold approximately one third of all corporate bonds. Hong and Warga [2000] conclude that these firms account for a quarter of transactions in the high-yield market. The insurers' data are far more representative of transactions in the corporate bond market than transactions completed on the NYSE's Automated Bond System (ABS), which is the only other transaction database for the time period we investigate.⁴ Moreover, the ABS trades are more likely to be retail trades than trades by institutions and therefore are unlikely to show the effects of forced sales due to regulatory pressure. Another transaction database, TRACE, is only available since 2003 and does not include information on whether the transaction involves buying or selling the bond.

We investigate trading activity of fallen angels that are straight debentures or medium-term notes (therefore, we exclude convertible and zero coupon bonds, retail notes, asset-backed securities, and trust preferred capital securities). We also exclude Yankee bonds, Canadian

bonds, and bonds denominated in non-U.S. currencies as bankruptcy laws in other countries may affect insurance company investment decisions when these bonds approach distress. We delete all bonds with offering amounts less than \$5 million as these bonds are highly illiquid. Finally, we remove all observations with missing information on the bond offering amount, offer date, industry group, or bond type. Based on these screens, we identified 50,436 individual bond issues for inclusion in our study.

Exhibit 1 shows summary statistics for the bonds in our sample. These bonds constitute the relevant portion of insurance companies' portfolios, but we do not necessarily observe trades on all of them in the NAIC transaction database, as corporate bonds are only sporadically traded. In Panel A, we report the average amount outstanding and average maturity based on the bond rating category. The exhibit highlights the low fraction (approximately 18 percent) of issues that are rated below investment grade (BB and lower). Panel B reports the breakdown of the issues according to whether they are medium-term notes or corporate debentures. Medium-term notes are

corporate debt obligations having characteristics similar to commercial paper but with longer maturities. Medium-term notes allow corporations to periodically place smaller debt denominations with varying coupon and maturity terms without having to file separate SEC registration for each security.⁵ Like commercial paper, they are issued by firms with relatively high average ratings (AA- in our sample, or six notches above the average rating of BBB- for corporate bonds). Panel C shows the distribution of issues by broad industry group and reveals that over 50 percent of the bonds were issued by firms in the financial sector.

During our sample period four rating agencies might have assigned a rating to the bonds in our sample: Moody's Investors Service (Moody's), Standard & Poor's (S&P), Fitch Investors Service (Fitch), and Duff & Phelps Credit Rating Agency (DCR). Moody's and S&P have much higher market shares than Fitch or DCR. One explanation is that ratings are paid for by issuers and the cost of a third or fourth rating exceeds its value to the company. Cantor and Packer [1997] find evidence that larger firms are more likely to get a third rating. Another possibility

EXHIBIT 1

Descriptive Statistics for All Bonds

	Number	Proportion	Average Amount	Average Maturity	Average Rating
Panel A: Ratings					
AAA	5,793	11.49%	\$ 142,364	9.4	—
AA	7,149	14.17%	\$ 210,777	9.7	—
A	19,353	38.37%	\$ 152,183	4.8	—
BBB	8,629	17.11%	\$ 212,351	9.3	—
BB	2,482	4.92%	\$ 255,059	10.7	—
B	5,672	11.25%	\$ 229,276	12.8	—
CCC and below	1,358	2.69%	\$ 203,456	10.6	—
Panel B: Bond Type					
Corporate Debenture	25,001	49.57%	\$ 267,852	13.9	BBB-
Medium-Term Note	25,435	50.43%	\$ 103,101	5.3	AA-
Panel C: Industry Group					
Industrial	18,300	36.28%	\$ 233,626	12.1	BBB-
Financial	25,705	50.97%	\$ 163,510	5.5	AA-
Utility	6,298	12.49%	\$ 128,562	18.8	A-
Government	61	0.12%	\$ 380,730	12.8	AA-
Miscellaneous	72	0.14%	\$ 106,290	3.0	AA
Grand Total	50,436	100.00%	\$ 184,768	9.6	A-

is that Fitch and DCR benefit from “ratings shopping,” the practice of paying for a rating from an agency that would provide an above-average rating and skipping the ratings that are less favorable.⁶ Given the importance of Moody’s and S&P relative to the other two agencies, one could argue that an analysis of fallen angels should depend on only those two agencies. That is, a fallen angel would be defined as a bond that once had an investment-grade rating from Moody’s or S&P (not necessarily both) and was downgraded such that it no longer had an investment-grade rating from either. The date that it became a fallen angel would be the date that it no longer had an investment-grade rating from either agency. Or, one could argue that insurance company regulations about speculative-grade bonds are often based on all the ratings that are available. Therefore, being rated junk by Moody’s and S&P is irrelevant if either Fitch or DCR still has an investment-grade rating on the bond.⁷ If so, we would want to define a fallen angel as a bond that once had an investment-grade rating from at least one of the four rating agencies and no longer has an investment-grade rating from any of the four. We use both definitions of a fallen angel in our analysis. In April 2000, Fitch acquired DCR. Consequently, we use only three ratings in the latter half of our sample, but four in the first half.

Exhibit 2 shows summary statistics for our sample of fallen angels. Panel A shows the distribution of fallen angels by the number of notches involved in the downgrade. For example, focusing on the “2 Rating Agencies sample,” we see that most bonds were downgraded one or two notches (e.g. BBB– to BB+ or BBB– to BB). We also see that almost 45 percent of the fallen angels were downgraded to BB+/Ba1, or the rating notch just below investment grade (Panel B). Exhibit 2 also shows that most fallen angels are senior bonds (Panel C) from industrial firms (Panel D) and are general corporate obligations (Panel E). Finally, Panel F shows that fallen angels often have smaller face values (less than \$50 million). Note this does not imply the firms that issue these bonds are smaller.

Our goal is to determine if regulatory pressure leads to abnormally high sales of fallen angels by insurance companies. But what is abnormally high? Corporate bonds do not trade much, and insurance companies probably trade somewhat less than other fixed-income investors, so even a small amount of selling may be abnormally high for these bonds. To place the bond trading activity in perspective, we note that between 1995 and 2006, the NAIC data record 619,344 sale transactions for the 50,436 bonds

in our sample, or approximately 12 sales per bond issue. Thus, a fair test of the extent of forced selling must take into account the fact that bonds do not trade often and that some issues trade more than others. For example, using a variety of databases, Alexander, Edwards and Ferri [2000]; Crabbe and Fabozzi [2006]; Goldstein, Hotchkiss, and Sirri [2007], and Cai, Helwege, and Warga [2007] note that trading is a function of a bond’s age. Trading occurs more often early in the life of a bond. Furthermore, Edwards, Harris, and Piwowar [2007] document that trading costs are lower for more recently issued bonds. Therefore, all else constant, fallen angels would be likely to trade less than some other bonds simply because bonds rarely get downgraded immediately after issuance (see Frydman, Hanson, and Schuerman [2005]). Bond trading is also related to the face value of the bond (see Crabbe and Turner [1995]). We control for these features when we consider the impact of fallen angel status on bond sales.

In order to provide a baseline for insurance firm sales activity, we first examine the characteristics of all bonds sold by insurance firms. We utilize four methods for measuring bond selling activity: 1) the average number of times a bond is sold in a month; 2) the relative dollar value of the amount sold—calculated as the amount sold divided by the bond’s offering amount; 3) the average number of monthly net sales transactions, where net sales refers to sell transactions less buy transactions; and 4) the average relative dollar value of the net sale amount—calculated as the net amount sold divided by the bond’s offering amount. To illustrate how the sale measures are calculated, consider a bond with an offering amount of \$100 that had two sales for \$10 and \$20, respectively, and one buy for \$45 in a particular month. First, the number of sales in the month is two. Second, the relative amount sold is 30 percent.⁸ Third, the net sales activity for the month equals one.⁹ Finally, the relative net amount sold is –15 percent.¹⁰ Examining these four measures should provide a comprehensive picture of bond trading by insurance firms.

Exhibits 3 through 8 provide an overview of bond trading activity at insurance companies. Overall, the exhibits show that this activity is very small. For example, Exhibit 3 is a graph of the average monthly sales transactions for the bonds in our sample over the entire time period that they are in the sample. The graph also shows the sales of fallen angel bonds in the month after they were downgraded. Neither set of bonds is sold often, reflecting the fact that corporate bonds are not actively

EXHIBIT 2

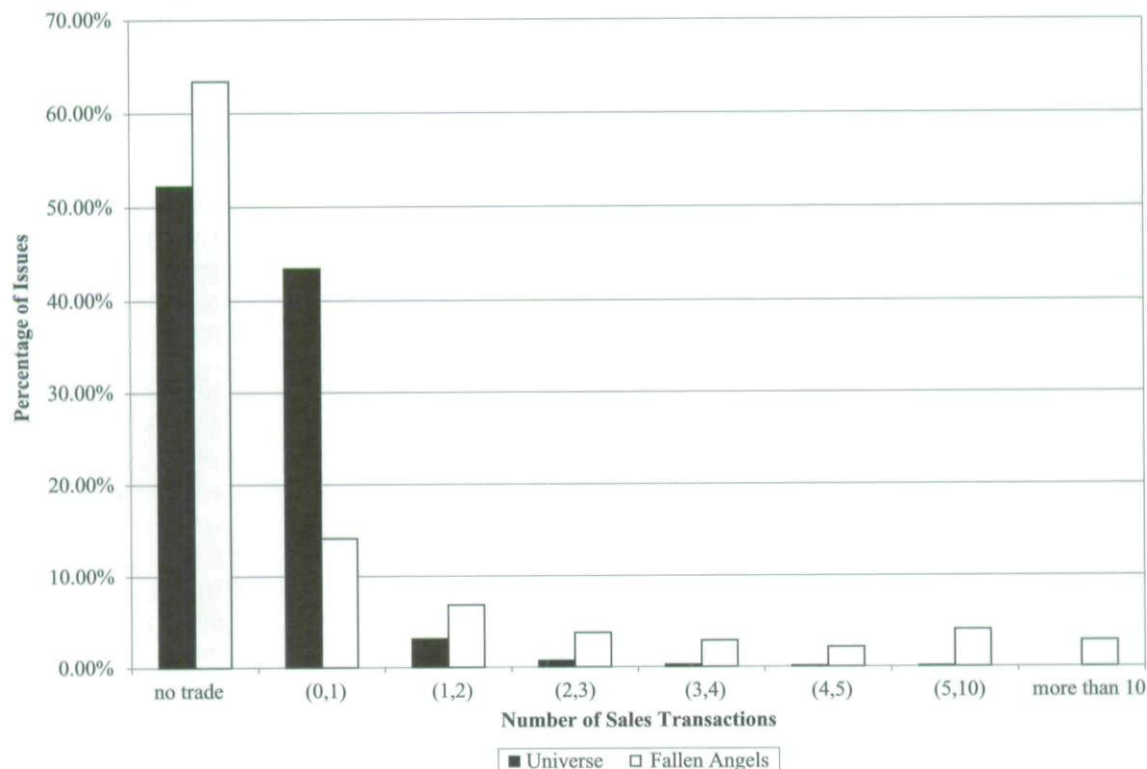
Descriptive Statistics for the Fallen Angel Sample

	Using 4 Rating Agencies			Using 2 Rating Agencies		
	Number	Proportion	Average Age at Downgrade	Number	Proportion	Average Age at Downgrade
Panel A: Rating Downgrade						
Downgraded 1 Notch	275	22.39%	5.72	624	33.17%	5.14
Downgraded 2 Notches	457	37.21%	5.24	700	37.21%	4.98
Downgraded 3 Notches	231	18.81%	5.60	226	12.01%	5.39
Downgraded 4 + Notches	265	21.58%	4.86	331	17.60%	5.22
Panel B: Rating After Downgrade						
B1, B+ and below	204	16.61%	4.71	248	13.18%	5.09
BB-, Ba3	113	9.20%	7.20	615	32.70%	5.01
BB, Ba2	506	41.21%	4.67	178	9.46%	5.54
BB+, Ba1	405	32.98%	5.95	840	44.66%	5.13
Panel C: Bond Security						
Junior subordinate	1	0.08%	1.98	2	0.11%	2.48
Senior	1,148	93.49%	5.26	1,713	91.07%	5.01
Senior subordinate	24	1.95%	5.14	32	1.70%	5.76
Senior Secured	55	4.48%	7.01	134	7.12%	6.56
Panel D: Industry Group						
Industrial	699	56.92%	5.82	1,115	59.28%	5.54
Financial	330	26.87%	4.21	426	22.65%	3.87
Utility	199	16.21%	5.46	340	18.08%	5.35
Panel E: Bond Type						
Corporate Debenture	864	70.36%	5.41	1,375	73.10%	5.28
Medium Term Note	364	29.64%	5.14	506	26.90%	4.72
Panel F: Offering Amount (millions)						
<=\$50	316	25.73%	6.32	460	24.46%	6.14
<=\$100	133	10.83%	6.72	245	13.02%	6.23
<=\$150	113	9.20%	6.25	242	12.87%	5.47
<=\$200	112	9.12%	5.88	204	10.85%	5.26
<=\$300	178	14.50%	5.12	269	14.30%	4.80
<=\$400	103	8.39%	3.93	137	7.28%	3.76
<=\$500	108	8.79%	4.19	123	6.54%	3.93
>=\$500	165	13.44%	3.17	201	10.69%	3.00
Grand Total	1,228	100.00%	5.33	1,881	100.00%	5.13

EXHIBIT 3

Sales Transactions per Month

Among the Universe of Bonds and Among Fallen Angels in the Month after Being Downgraded



traded instruments. In the sample overall the average number of sales transactions is 0.21 per month. The median is even lower (less than 0.02), reflecting the large fraction of the bonds that have no recorded sales transactions by insurance companies at any time during the sample period. Likewise, a large number of fallen angels are not sold by any insurance company in the month after they are downgraded. Among the bonds with a positive monthly average number of sales transactions, most are sold less than once a month. We can see, therefore, that any analysis of insurance firm transactions will necessarily be based on a limited set of activity.

Exhibits 4 through 8 show detailed breakdowns of trading activity for all the bonds in our sample based on bond rating, age, industry group, face value, and type of bond. Insurance firm selling activity is more heavily concentrated in the ratings categories near the investment grade/speculative grade cutoff (BBB-/BB+). Exhibit 5 provides a breakdown of selling activity by bond age. Consistent with Alexander, Edwards, and Ferri [2000]; Warga [1992], and Hotchkiss and Jostova [2007], we see

that selling activity falls off as bonds age. Exhibit 6 shows that bond sales are more common among industrial bonds. Exhibit 6 also shows that overall (across all ratings and bond ages), insurance firms are net buyers of bonds. Examining selling activity based on bond offering size, Exhibit 7 shows that transactions (both selling and buying) are concentrated in the largest bond size categories. For example, bonds in the largest offering amount size category average 1.3 sales transactions per month whereas bonds in the smallest size category average less than 0.02 transactions per month.

Finally, we examine selling activity based on whether bonds are corporate debentures or medium-term notes. Exhibit 8 shows that the majority of selling activity occurs among the former.

EVIDENCE OF FORCED SELLING OF FALLEN ANGELS

As trading in the NAIC database is fairly light, a fair comparison of fallen angel sales should involve a set of

EXHIBIT 4

Selling Activity by Bond Rating

Bond Rating	Average Monthly Bond Sales	Average Monthly Relative Sale Amount	Average Monthly Net Sales	Average Monthly Relative Net Sale Amount
Aaa/AAA	0.08	0.001	-0.03	0.000
Aa1/AA+	0.14	0.002	-0.03	0.000
Aa2/AA	0.17	0.002	-0.03	0.000
Aa3/AA-	0.16	0.003	-0.06	0.000
A1/A+	0.16	0.003	-0.07	-0.001
A2/A	0.16	0.003	-0.08	-0.001
A3/A-	0.20	0.004	-0.09	-0.001
Baa1/BBB+	0.24	0.005	-0.11	-0.002
Baa2/BBB	0.29	0.005	-0.09	-0.002
Baa3/BBB-	0.36	0.005	-0.06	-0.002
Ba1/BB+	0.38	0.005	0.00	0.001
Ba2/BB	0.40	0.004	0.00	0.001
Ba3/BB-	0.41	0.003	-0.01	0.001
B1/B+	0.31	0.002	0.03	0.001
B2/B	0.26	0.002	0.00	0.000
B3/B-	0.20	0.001	0.01	0.000
Caa1/CCC+	0.24	0.002	0.09	0.001
Caa2/CCC	0.13	0.001	0.07	0.001
Caa3/CCC-	0.16	0.001	0.11	0.001
Ca/CC	0.13	0.001	0.10	0.001
C/C	0.07	0.000	0.06	0.000

bonds with similar characteristics. We compare the trading activity over the month and quarter after the downgrade for the two sets of bonds. We also consider the trading activity over the time period between the downgrade date and the end of the calendar year of the downgrade, as it is likely that forced selling, if it exists, would put pressure on the firm to sell the fallen angel in advance of the insurer's annual report.¹¹

To compare the trading activity of fallen angels with similar bonds, we create a matched sample using the following criteria: For each fallen angel, we find bonds that 1) are in the same industry group, 2) have the same rating, 3) have an offer amount that is between 75 percent and 125 percent of the fallen angel's offer amount, and 4) were issued within one year of the fallen angel's issue date.

EXHIBIT 5

Selling Activity by Bond Age

Bond Age (in years)	Average Monthly Bond Sales	Average Monthly Relative Sale Amount	Average Monthly Net Sales	Average Monthly Relative Net Sale Amount
0	0.36	0.003	-1.07	-0.021
1	0.30	0.004	-0.01	0.000
2	0.27	0.004	0.02	0.001
3	0.27	0.004	0.05	0.002
4	0.25	0.004	0.07	0.002
5	0.23	0.004	0.08	0.002
6	0.19	0.004	0.07	0.002
7	0.16	0.003	0.06	0.001
8	0.13	0.003	0.05	0.002
9	0.12	0.003	0.05	0.002
10	0.18	0.005	0.12	0.004
11	0.15	0.004	0.09	0.003
12	0.11	0.002	0.06	0.002
13	0.07	0.002	0.03	0.001
14	0.05	0.001	0.02	0.001
15	0.05	0.001	0.02	0.001
16	0.03	0.000	0.02	0.000
17	0.02	0.000	0.01	0.000
18	0.03	0.000	0.02	0.000
19	0.03	0.000	0.02	0.000
20	0.03	0.000	0.02	0.000
21	0.03	0.000	0.03	0.000
22	0.02	0.000	0.02	0.000
23	0.03	0.000	0.02	0.000
24	0.05	0.001	0.04	0.001
25 and above	0.06	0.001	0.05	0.001

Based on these criteria, we identify matching bonds for 1,545 out of the 1,881 fallen angels identified using two rating agencies. In order to increase the number of bonds included in the analysis, we relax the matching criteria for the remaining 336 fallen angels in the following sequence: First, we expand the rating requirement to the broad rating group (e.g., BB+, BB, and BB- are one rating group) and match 107 additional fallen angels. Second, for the remaining 229 fallen angels we replace the offering amount match criteria with three broad categories: 1) offering amounts less than \$50 million, 2) offering amounts between \$50 million and \$150 million, and 3) offering amounts greater than \$150 million.¹² This rule nets an additional 197 fallen angels. For the remaining 32 fallen angels, we drop the requirement that the bonds come from the same industry group, resulting in a pickup of 25

EXHIBIT 6

Selling Activity by Industry Group

Industry	Average Monthly Bond Sales	Average Monthly Relative Sale Amount	Average Monthly Net Sales	Average Monthly Relative Net Sale Amount
Industrial	0.29	0.004	-0.05	-0.001
Financial	0.15	0.003	-0.07	-0.001
Utility	0.14	0.003	-0.02	0.000
Government	0.19	0.003	-0.01	-0.002
Miscellaneous	0.15	0.003	-0.31	-0.004

EXHIBIT 7

Selling Activity by Offering Amount

Offer Amount Group (millions)	Average Monthly Bond Sales	Average Monthly Relative Sale Amount	Average Monthly Net Sales	Average Monthly Relative Net Sale Amount
<=\$50	0.02	0.003	0.00	-0.001
<=\$100	0.09	0.003	0.00	0.000
<=\$150	0.17	0.003	0.00	0.000
<=\$200	0.26	0.003	-0.03	-0.001
<=\$300	0.36	0.004	-0.09	-0.001
<=\$400	0.54	0.004	-0.14	-0.002
<=\$500	0.70	0.004	-0.23	-0.002
> \$500	1.30	0.004	-0.52	-0.002

EXHIBIT 8

Selling Activity by Bond Type

Bond Type	Average Monthly Bond Sales	Average Monthly Relative Sale Amount	Average Monthly Net Sales	Average Monthly Relative Net Sale Amount
Corporate Debenture	0.31	0.009	-0.06	0.001
Medium-Term Notes	0.05	0.002	-0.03	-0.001

with corresponding control bonds, or a dataset containing 42,981 total observations.

In Exhibits 9 and 10 we compare the sales activity of fallen angels to that of the matched bond sample. Exhibit 9 reports the results for the fallen angels identified using Moody's and S&P ratings, and Exhibit 10 shows the results for fallen angels identified using the four rating agencies. The results show that by all measures and in all time periods, sales are significantly larger for the fallen angel sample. Thus, despite the large number of fallen angels that remain in insurers' portfolios after the downgrade (as the "no trades" bar in Exhibit 3 indicates) the ones that are sold after the downgrade involve far more transactions than is typical for a corporate bond, even controlling for characteristics of bonds that affect their trading activity.

Exhibits 11 and 12 show the estimated coefficients for the regressions of trading activity among fallen angels and the set of matched bonds. Exhibit 11 reports the results using Moody's and S&P ratings, and Exhibit 12 shows the results for fallen angels identified using the four rating agencies. As the results are qualitatively the same, we will confine our discussion to Exhibit 11. The exhibits show the estimated coefficients for the regressions where the dependent variable is the number of sales transactions (columns 1 and 2) and the number of net sales (columns 3 and 4). In each regression, we include as control variables the natural log of the bond offering amount, the natural log of the bond age at downgrade, a dummy variable denoting whether the bond is a debenture (as opposed to a medium-term note), the natural log of the bond's numerical rating (larger numbers are associated with lower credit quality), the natural log of the bond's maturity, and dummy variables for firms in the industrial or financial industries. Our regression specification also includes the natural log of the number of the downgrades in each month to capture overall credit market conditions and thus the possibility that insurance firms have greater bond sales activity during months with large numbers of bond downgrades.

Our main variable of interest is a dummy variable denoting whether the bond is a fallen angel. If the estimated coefficient on this fallen angel indicator is significantly positive then we have evidence that forced selling of fallen angels occurs in the insurance industry. In the second model specification (columns 2 and 4), we add three dummy variables to denote fallen angels that were downgraded by 2 notches, 3 notches, and 4 or more

EXHIBIT 9

Univariate Test of Selling Activity

		Mean	Std. Dev.	Max.	Min.	Median	t-Statistic
Monthly Number of Bond Sales	Fallen Angels	1.469	4.193	98.000	0.000	0.000	14.77
	Comparable non-FA bonds	0.038	0.189	3.000	0.000	0.000	
Monthly Relative Dollar Sales Amount	Fallen Angels	0.017	0.078	1.000	-0.192	0.000	9.05
	Comparable non-FA bonds	0.000	0.006	0.150	0.000	0.000	
Monthly Number of Net Bond Sales	Fallen Angels	0.899	3.956	98.000	-20.000	0.000	9.81
	Comparable non-FA bonds	0.001	0.279	3.000	-9.000	0.000	
Monthly Relative Dollar Net Sales Amount	Fallen Angels	0.015	0.079	1.000	-0.192	0.000	7.89
	Comparable non-FA bonds	0.000	0.008	0.150	-0.137	0.000	
Quarterly Number of Bond Sales	Fallen Angels	3.920	8.688	144.000	0.000	1.000	18.42
	Comparable non-FA bonds	0.180	1.377	46.000	0.000	0.000	
Quarterly Relative Dollar Sales Amount	Fallen Angels	0.044	0.121	1.138	-0.522	0.002	14.84
	Comparable non-FA bonds	0.002	0.016	0.475	0.000	0.000	
Quarterly Number of Net Bond Sales	Fallen Angels	2.329	7.258	99.000	-35.000	0.000	13.28
	Comparable non-FA bonds	0.067	1.335	45.000	-14.000	0.000	
Quarterly Relative Dollar Net Sales Amount	Fallen Angels	0.036	0.123	1.138	-0.990	0.000	12.26
	Comparable non-FA bonds	0.001	0.017	0.475	-0.137	0.000	
Calendar Year Number of Bond Sales	Fallen Angels	5.228	10.883	175.000	0.000	1.000	19.55
	Comparable non-FA bonds	0.255	1.730	40.000	0.000	0.000	
Calendar Year Relative Dollar Sales Amount	Fallen Angels	0.063	0.150	1.619	-0.708	0.007	17.34
	Comparable non-FA bonds	0.003	0.018	0.475	0.000	0.000	
Calendar Year Number of Net Bond Sales	Fallen Angels	3.376	8.942	114.000	-19.000	0.000	15.73
	Comparable non-FA bonds	0.086	1.453	38.000	-17.000	0.000	
Calendar Year Relative Dollar Net Sales Amount	Fallen Angels	0.053	0.152	1.619	-0.987	0.001	14.69
	Comparable non-FA bonds	0.001	0.019	0.475	-0.137	0.000	

Note: 1,877 fallen angels identified based on two rating agencies (Moody's and S&P) with corresponding control bonds.

EXHIBIT 10

Univariate Test of Selling Activity

		Mean	Std. Dev.	Max.	Min.	Median	t-Statistic
Monthly Number of Bond Sales	Fallen Angels	1.545	4.595	98.000	0.000	0.000	11.25
	Comparable non-FA bonds	0.064	0.332	8.000	0.000	0.000	
Monthly Relative Dollar Sales Amount	Fallen Angels	0.011	0.051	0.983	-0.192	0.000	7.40
	Comparable non-FA bonds	0.000	0.002	0.033	0.000	0.000	
Monthly Number of Net Bond Sales	Fallen Angels	0.974	4.451	98.000	-15.000	0.000	7.50
	Comparable non-FA bonds	0.019	0.313	8.000	-3.000	0.000	
Monthly Relative Dollar Net Sales Amount	Fallen Angels	0.009	0.054	0.983	-0.236	0.000	5.92
	Comparable non-FA bonds	0.000	0.002	0.033	-0.036	0.000	
Quarterly Number of Bond Sales	Fallen Angels	4.230	9.529	144.000	0.000	1.000	14.48
	Comparable non-FA bonds	0.236	1.575	46.000	0.000	0.000	
Quarterly Relative Dollar Sales Amount	Fallen Angels	0.037	0.106	1.619	-0.522	0.003	11.11
	Comparable non-FA bonds	0.002	0.018	0.475	0.000	0.000	
Quarterly Number of Net Bond Sales	Fallen Angels	2.600	8.109	99.000	-35.000	0.000	10.69
	Comparable non-FA bonds	0.086	1.442	45.000	-9.000	0.000	
Quarterly Relative Dollar Net Sales Amount	Fallen Angels	0.030	0.106	1.619	-0.625	0.000	9.16
	Comparable non-FA bonds	0.001	0.018	0.475	-0.058	0.000	
Calendar Year Number of Bond Sales	Fallen Angels	5.815	11.803	175.000	0.000	1.000	15.94
	Comparable non-FA bonds	0.370	1.914	46.000	0.000	0.000	
Calendar Year Relative Dollar Sales Amount	Fallen Angels	0.054	0.130	1.619	-0.708	0.006	12.48
	Comparable non-FA bonds	0.005	0.040	1.111	-0.001	0.000	
Calendar Year Number of Net Bond Sales	Fallen Angels	3.782	9.865	114.000	-19.000	0.000	12.67
	Comparable non-FA bonds	0.157	1.728	45.000	-6.000	0.000	
Calendar Year Relative Dollar Net Sales Amount	Fallen Angels	0.045	0.126	1.619	-0.374	0.001	9.71
	Comparable non-FA bonds	0.003	0.040	1.111	-0.110	0.000	

Note: 1,226 fallen angels identified based on four rating agencies (Moody's, S&P, Fitch, and DCR) with corresponding control bonds.

EXHIBIT 11

OLS Regression of Selling Activity

	(1)		(2)		(3)		(4)	
	Number of Bond Sales		Number of Bond Sales		Number of Net Bond Sales		Number of Net Bond Sales	
	Coefficient	t-Stat.	Coefficient	t-Stat.	Coefficient	t-Stat.	Coefficient	t-Stat.
Panel A: Monthly								
<i>Intercept</i>	-1.382	-12.50	-1.251	-11.29	-0.707	-5.70	-0.568	-4.56
<i>Fallen Angel Indicator</i>	1.449	62.71	1.055	27.07	0.909	35.08	0.551	12.59
<i>ln(Offering Amount)</i>	0.109	16.56	0.107	16.29	0.042	5.70	0.040	5.38
<i>ln(Bond Age at Downgrade)</i>	-0.071	-10.40	-0.071	-10.45	0.031	4.02	0.030	3.89
<i>Medium-Term-Note Indicator</i>	-0.046	-1.98	-0.044	-1.91	0.005	0.19	0.008	0.32
<i>ln(Bond Numerical Rating)</i>	0.130	4.42	0.083	2.80	0.148	4.48	0.100	3.01
<i>ln(Bond Maturity)</i>	-0.022	-2.19	-0.024	-2.42	-0.056	-4.97	-0.059	-5.19
<i>Industrial Industry Indicator</i>	-0.081	-3.80	-0.060	-2.81	-0.055	-2.29	-0.036	-1.50
<i>Financial Industry Indicator</i>	-0.029	-1.16	-0.009	-0.34	0.008	0.27	0.022	0.76
<i>ln(Number of downgrades)</i>	0.009	1.84	0.009	1.72	-0.009	-1.59	-0.010	-1.73
<i>Fallen Angel Downgraded 2 Notches</i>			0.337	6.38			0.410	6.91
<i>Fallen Angel Downgraded 3 Notches</i>			1.110	14.91			0.500	5.98
<i>Fallen Angel Downgraded 4 or More Notches</i>			0.769	11.68			0.831	11.23
<i>R²</i>	8.05%		8.53%		2.49%		2.74%	
<i>Adj. R²</i>	8.04%		8.51%		2.48%		2.72%	
Panel B: Quarterly								
<i>Intercept</i>	-3.779	-15.89	-3.533	-14.87	-1.981	-8.57	-1.694	-7.33
<i>Fallen Angel Indicator</i>	3.809	76.64	2.804	33.57	2.313	47.91	1.315	16.17
<i>ln(Offering Amount)</i>	0.317	22.44	0.313	22.24	0.126	9.17	0.121	8.80
<i>ln(Bond Age at Downgrade)</i>	-0.227	-15.42	-0.227	-15.46	0.074	5.20	0.074	5.16
<i>Medium-Term-Note Indicator</i>	-0.199	-3.99	-0.191	-3.83	-0.057	-1.17	-0.046	-0.96
<i>ln(Bond Numerical Rating)</i>	0.215	3.40	0.127	2.01	0.295	4.80	0.196	3.19
<i>ln(Bond Maturity)</i>	0.029	1.32	0.025	1.17	-0.067	-3.17	-0.071	-3.38
<i>Industrial Industry Indicator</i>	-0.250	-5.43	-0.209	-4.56	-0.174	-3.90	-0.133	-2.98
<i>Financial Industry Indicator</i>	-0.175	-3.21	-0.124	-2.28	-0.040	-0.75	0.003	0.06
<i>ln(Number of downgrades)</i>	0.044	4.03	0.042	3.88	-0.004	-0.34	-0.006	-0.54
<i>Fallen Angel Downgraded 2 Notches</i>			0.786	6.94			0.953	8.64
<i>Fallen Angel Downgraded 3 Notches</i>			4.028	25.25			3.057	19.68
<i>Fallen Angel Downgraded 4 or More Notches</i>			1.291	9.14			1.570	11.42
<i>R²</i>	12.00%		13.05%		4.61%		5.35%	
<i>Adj. R²</i>	11.99%		13.03%		4.60%		5.33%	

notches, respectively. These dummy variables isolate sales activity that might occur due to regulatory pressure on insurance companies to limit their holdings of deeply downgraded bonds.

The regression exhibits are divided into three panels corresponding to three periods: Panel A reports the results for the bond sales activity within one month of the bond downgrade date; Panel B reports the results for activity within one quarter of the downgrade date; and Panel C reports results for the remainder of the calendar year after the downgrade. As the overall results in each panel are similar, we concentrate our discussion on the month following the downgrade (Panel A).

Looking first at the simple count of sales transactions (columns 1 and 2), we see that bond characteristics that we mentioned earlier have a significant impact on sales activity. Larger bonds and lower-rated bonds are sold more frequently while older bonds and longer maturity bonds are sold less often. In addition, we find a significant and positive coefficient for the number of bond downgrades, implying that insurance companies do sell more bonds in periods when credit quality is declining.

Do insurance companies actively sell fallen angels? The indicator variable for fallen angels is positive and significant with a value of nearly 1.5 (column 1). This implies

EXHIBIT 11 (continued)

	(1) Number of Bond Sales		(2) Number of Bond Sales		(3) Number of Net Bond Sales		(4) Number of Net Bond Sales	
	Coefficient	t-Stat.	Coefficient	t-Stat.	Coefficient	t-Stat.	Coefficient	t-Stat.
Panel C: Calendar Year								
<i>Intercept</i>	-5.290	-16.93	-4.968	-15.92	-2.437	-8.53	-2.011	-7.05
<i>Fallen Angel Indicator</i>	5.104	78.19	3.634	33.13	3.392	56.86	1.834	18.27
<i>ln(Offering Amount)</i>	0.465	25.01	0.457	24.72	0.170	10.03	0.161	9.53
<i>ln(Bond Age at Downgrade)</i>	-0.285	-14.70	-0.285	-14.83	0.107	6.02	0.104	5.92
<i>Medium-Term-Note Indicator</i>	-0.256	-3.90	-0.232	-3.55	-0.031	-0.51	-0.007	-0.12
<i>ln(Bond Numerical Rating)</i>	0.220	2.65	0.118	1.41	0.325	4.28	0.187	2.46
<i>ln(Bond Maturity)</i>	0.004	0.15	0.001	0.04	-0.154	-5.91	-0.159	-6.14
<i>Industrial Industry Indicator</i>	-0.038	-0.63	0.002	0.03	-0.050	-0.91	0.002	0.05
<i>Financial Industry Indicator</i>	0.157	2.19	0.208	2.93	0.092	1.42	0.146	2.23
<i>ln(Number of downgrades)</i>	0.005	0.33	0.001	0.06	-0.028	-2.12	-0.032	-2.45
<i>Fallen Angel Downgraded 2 Notches</i>			1.460	9.80			1.683	12.36
<i>Fallen Angel Downgraded 3 Notches</i>			5.518	26.34			4.530	23.64
<i>Fallen Angel Downgraded 4 or More Notches</i>			1.499	8.08			2.213	13.04
<i>R</i> ²	12.35%		13.47%		6.20%		7.23%	
<i>Adj. R</i> ²	12.33%		13.45%		6.18%		7.21%	

Note: Fallen angels identified based on two rating agencies (Moody's and S&P). Number of observations is 53,804.

that fallen angels have nearly 1.5 more sales transactions in the month following a downgrade than similar bonds that were not downgraded from the investment-grade category. To put this into perspective, the control bonds averaged only 0.04 sales transactions per month, or about one sale for every 25 bonds in the group. Thus, the fallen

angel bonds clearly experienced substantially greater sales activity than the sample of comparable bonds.

In the second specification (column 2), we added the dummy variables denoting the number of rating notches the fallen angels fell. The coefficients on these variables suggest that sales activity increases for fallen angel bonds

EXHIBIT 12

OLS Regression of Selling Activity

	(1) Number of Bond Sales		(2) Number of Bond Sales		(3) Number of Net Bond Sales		(4) Number of Net Bond Sales	
	Coefficient	t-Stat.	Coefficient	t-Stat.	Coefficient	t-Stat.	Coefficient	t-Stat.
Panel A: Monthly								
<i>Intercept</i>	-1.299	-9.54	-1.070	-7.87	-1.055	-7.15	-0.789	-5.35
<i>Fallen Angel Indicator</i>	1.512	50.40	0.874	17.02	0.985	30.33	0.256	4.61
<i>ln(Offering Amount)</i>	0.105	13.77	0.101	13.32	0.057	6.89	0.051	6.24
<i>ln(Bond Age at Downgrade)</i>	-0.086	-9.86	-0.092	-10.57	0.050	5.25	0.043	4.54
<i>Medium-Term-Note Indicator</i>	-0.039	-1.42	-0.033	-1.23	-0.005	-0.17	0.005	0.18
<i>ln(Bond Numerical Rating)</i>	0.087	2.57	0.016	0.47	0.154	4.20	0.071	1.94
<i>ln(Bond Maturity)</i>	-0.018	-1.69	-0.020	-1.93	-0.050	-4.30	-0.050	-4.36
<i>Industrial Industry Indicator</i>	-0.030	-1.26	-0.011	-0.44	-0.013	-0.51	0.016	0.63
<i>Financial Industry Indicator</i>	-0.006	-0.20	0.018	0.62	0.044	1.41	0.070	2.24
<i>ln(Number of downgrades)</i>	0.018	2.55	0.016	2.30	0.004	0.51	0.002	0.22
<i>Fallen Angel Downgraded 2 Notches</i>			0.460	6.51			0.736	9.61
<i>Fallen Angel Downgraded 3 Notches</i>			1.224	12.70			0.780	7.47
<i>Fallen Angel Downgraded 4 or More Notches</i>			1.590	19.30			1.846	20.70
<i>R</i> ²	6.76%		7.70%		2.36%		3.33%	
<i>Adj. R</i> ²	6.74%		7.67%		2.34%		3.30%	

EXHIBIT 12 (continued)

	(1)		(2)		(3)		(4)	
	Number of Bond Sales		Number of Bond Sales		Number of Net Bond Sales		Number of Net Bond Sales	
	Coefficient	t-Stat.	Coefficient	t-Stat.	Coefficient	t-Stat.	Coefficient	t-Stat.
Panel B: Quarterly								
<i>Intercept</i>	-3.132	-10.92	-2.824	-9.87	-2.395	-8.57	-1.993	-7.14
<i>Fallen Angel Indicator</i>	4.089	64.75	2.938	27.23	2.600	42.23	1.265	12.02
<i>ln(Offering Amount)</i>	0.288	17.95	0.284	17.83	0.132	8.47	0.126	8.12
<i>ln(Bond Age at Downgrade)</i>	-0.290	-15.78	-0.301	-16.46	0.126	7.04	0.113	6.37
<i>Medium-Term-Note Indicator</i>	-0.121	-2.12	-0.117	-2.07	-0.034	-0.61	-0.025	-0.45
<i>ln(Bond Numerical Rating)</i>	-0.027	-0.37	-0.100	-1.41	0.219	3.16	0.110	1.59
<i>ln(Bond Maturity)</i>	0.032	1.42	0.017	0.74	-0.055	-2.51	-0.067	-3.08
<i>Industrial Industry Indicator</i>	-0.087	-1.73	-0.094	-1.88	-0.041	-0.83	-0.028	-0.57
<i>Financial Industry Indicator</i>	-0.068	-1.10	-0.045	-0.74	0.050	0.84	0.084	1.41
<i>ln(Number of downgrades)</i>	0.084	5.75	0.080	5.49	0.041	2.89	0.037	2.58
<i>Fallen Angel Downgraded 2 Notches</i>			0.547	3.68			0.860	5.93
<i>Fallen Angel Downgraded 3 Notches</i>			4.618	22.80			4.045	20.47
<i>Fallen Angel Downgraded 4 or More Notches</i>			1.854	10.71			2.586	15.31
<i>R²</i>	11.05%		12.24%		4.40%		5.58%	
<i>Adj. R²</i>	11.03%		12.22%		4.38%		5.55%	
Panel C: Calendar Year								
<i>Intercept</i>	-4.544	-11.78	-4.103	-10.65	-3.060	-9.07	-2.471	-7.35
<i>Fallen Angel Indicator</i>	5.594	65.86	3.972	27.33	3.765	50.71	1.875	14.78
<i>ln(Offering Amount)</i>	0.431	19.98	0.424	19.75	0.206	10.93	0.196	10.47
<i>ln(Bond Age at Downgrade)</i>	-0.459	-18.58	-0.475	-19.29	0.136	6.29	0.118	5.49
<i>Medium-Term-Note Indicator</i>	-0.136	-1.77	-0.124	-1.62	0.017	0.25	0.033	0.49
<i>ln(Bond Numerical Rating)</i>	0.124	1.30	0.017	0.18	0.218	2.60	0.055	0.65
<i>ln(Bond Maturity)</i>	0.013	0.44	-0.004	-0.15	-0.132	-5.01	-0.146	-5.58
<i>Industrial Industry Indicator</i>	-0.191	-2.82	-0.190	-2.81	-0.152	-2.56	-0.123	-2.08
<i>Financial Industry Indicator</i>	-0.026	-0.31	0.004	0.05	0.050	0.70	0.100	1.40
<i>ln(Number of downgrades)</i>	0.049	2.51	0.043	2.20	0.042	2.47	0.036	2.10
<i>Fallen Angel Downgraded 2 Notches</i>			1.100	5.50			1.392	7.97
<i>Fallen Angel Downgraded 3 Notches</i>			5.534	20.28			4.984	20.94
<i>Fallen Angel Downgraded 4 or More Notches</i>			2.662	11.42			3.826	18.81
<i>R²</i>	11.78%		12.71%		6.27%		7.61%	
<i>Adj. R²</i>	11.76%		12.68%		6.25%		7.58%	

Note: Fallen angels identified based on four rating agencies. Number of observations is 42,981.

that experience large rating downgrades. For example, the coefficient for fallen angels downgraded 3 notches implies that these bonds had 1.110 more sales than bonds that were downgraded only 1 notch and 2.165 more sales than the control bonds.¹³ The finding of greater sales activity for deeper downgraded bonds is consistent with insurance companies experiencing greater regulatory pressure to sell riskier bonds. However, the regressions reported here are affected by the large presence of bonds that do not trade at all. Correcting for this problem with a Tobit (unreported results) shows equally strong support for our results on fallen angels as a group, but much weaker evidence vis-à-vis the effects of being downgraded many notches.

Our other regression specifications also have fallen angel indicator variables that are positive and significant at the one percent level. The fallen angel coefficient in column 3 indicates that fallen angels experience almost one whole net sale (sales minus buys) more in the month after downgrade than the control set. As noted previously, relatively few bonds trade in any given period, and thus the finding of one additional net sale over the control group actually represents a substantial increase in sales activity.

Do abnormally high fallen angel sales imply that insurance companies are dumping fallen angels, as predicted by the *New York Times*? The answer to this question depends upon one's viewpoint of the relative magnitude of bond

trading activity. The univariate and regression analyses clearly show that fallen angels have greater selling activity than comparable corporate bonds, and this sales activity appears to be the result of regulatory pressure on insurance firms to limit their holdings of non-investment-grade debt. However, as previously discussed, overall trading activity by insurance companies is very low. Thus, it is not clear that insurance companies face regulatory pressure to liquidate their holdings of fallen angels. As noted from the graph in Exhibit 3, only about 35% of fallen angel bonds are sold by insurance companies to any extent in the month after the downgrade. In addition, the dollar amount of these sales only totals 1.2% of the face value of the fallen angels. As insurance companies own a large fraction of the outstanding face value of the corporate bond market, their sales activities appear trivial. To put the 1.2% figure into sharper perspective, consider that net purchases of fallen angels (before they were downgraded) reported in the NAIC transaction database amounts to 12% of the fallen angels' aggregate face value. As the database does not include purchases in the primary offering but would include subsequent sales of bonds purchased in the offering, this implies that insurance companies sell no more than 10% ($1.2\%/12\%$) of their holdings of fallen angels as a result of the downgrades. If we consider that insurance companies did purchase issues at origination, then the dollar amount sales activity suggests that insurance companies sell a much smaller percentage of their fallen angel holdings than 10%. As a result, we cannot conclude that insurance companies are dumping fallen angels after downgrading due to regulatory pressure.

CONCLUSION

We have investigated the often-made assertion that when a company is downgraded to the speculative-grade category, large groups of investors sell the firm's debt without considering whether it is priced appropriately and therefore potentially at a loss. The logic behind this story is that regulations and conservative investment policies put pressure on these investors to sell bonds just because they are no longer investment grade.

Our study does not support the hypothesis that institutional investors are required to liquidate their holdings of fallen angels. First, we find that overall sales transaction volume for seasoned bonds is very limited. For example, we find that the average number of sales transactions per month for BBB- rated bonds is 0.29 (less than one-third

of a bond) and the average number of transactions per month for bonds that are more than five years old is less than 0.25 bonds. As a result, any selling activity, however small, could lead to significant statistical findings of greater sales transactions for fallen angels. However, given the limited trading activity in seasoned bonds, insurance companies are far more active in selling fallen angels following the ratings downgrades than comparable bonds. Nonetheless, this increased sales activity for fallen angels represents a small portion of the overall holdings of fallen angels by insurance companies. As a result, our findings are not consistent with the popular perception that regulations force insurance companies to sell off fallen angels, causing further disruptions in the credit markets.

ENDNOTES

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¹Cantor and Packer [1997] highlight the widespread use of bond ratings in the regulation of banks, savings and loans, insurance companies and pension funds, noting that regulations constraining investments in speculative-grade bonds have been in effect since the 1930s.

²While the NAIC adopted a model law in 1996 restricting insurers to no more than 20 percent of their assets in non-investment-grade bonds, not all states adopted the model law word for word. Moreover, subsequent model laws were deemed too harsh, and some states adopted prudent man laws instead of stated limits on particular investments. Born [2001] indicates that just 10% of her sample firms faced state restrictions on their holdings of below-investment-grade debt.

³These data are the same as those used by Cai, Helwege, and Wurga [2007]; Campbell and Taksler [2003], and Krishnan, Ritchken, and Thomson [2005].

⁴See Cai, Helwege, and Wurga [2007].

⁵See riskglossary.com (http://www.riskglossary.com/link/medium_term_note.htm) for a complete description and definition of medium-term notes.

⁶See Cantor and Packer [1995]; Cantor and Packer [1996a], and Cantor and Packer [1997] for tests of the existence of ratings shopping. While the authors find that Fitch and DCR assign higher ratings on average, which is consistent with ratings shopping, on the whole the authors do not believe the practice of shopping for ratings drives these agencies' businesses.

⁷Cantor and Packer [1996b] provide evidence that the NAIC used Fitch or DCR ratings as a tiebreaker when S&P and Moody's disagreed on a rating, suggesting that the first definition of a fallen angel is more appropriate. However, the NAIC is not explicit in how it assigned its ratings during much

of the sample period and may have considered Fitch and DCR in the case of fallen angels.

$$^8(10 + 20)/100 = 0.3.$$

$$^92 \text{ sales} - 1 \text{ buy} = 1 \text{ net sale.}$$

$$^{10}(10 + 20 - 45)/100 = -0.15.$$

¹¹We expect the annual report to create an important deadline for two reasons. First, capital requirements are enforced on an annual basis. Second, policyholders who are concerned about the financial health of the insurer are likely to pay particular attention to what is reported in the annual report.

¹²These cutoff points roughly correspond to the 33rd and 67th percentile for the universe of bond offering amounts.

¹³The sales effect relative to the non-fallen angel bonds is found by adding the fallen angel and downgraded three notches coefficients ($1.110 + 1.055 = 2.165$).

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