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Default & Recovery Rates of Corporate Bond Issuers

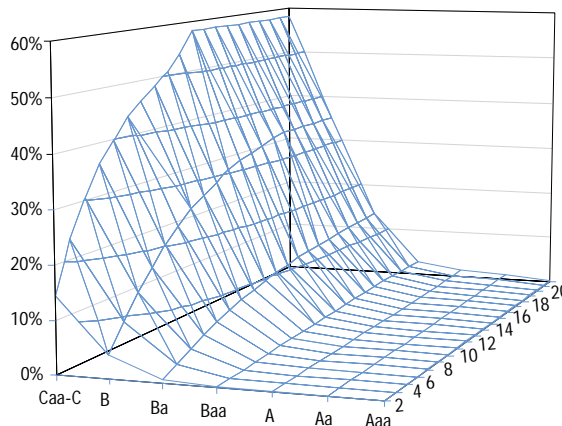
A Statistical Review of Moody's Ratings Performance 1970-2001

Summary

This report is Moody's 15th annual study of global corporate defaults and ratings performance. Moody's reviews the default, recovery and credit loss experience for 2001 and the historical period since 1970. Briefly, we find:

- World-wide 212 Moody's-rated issuers defaulted on a total of US \$135 billion. Corporate bond defaults constituted 186 of the 229 firms, with a dollar volume of US \$106 billion. The dollar volume of the ten largest defaults in 2001 (US \$46.5 billion) exceeds the value for all defaults in 2000 (US \$33.4 billion).
- Default rates reached decade highs in 2001. The default rate for all Moody's-rated corporate bond issuers ended 2001 at 3.7%. For speculative-grade rated issuers, the default rate reached 10.2%.
- Rating downgrades exceed rating upgrades 1.9 to 1 in 2001. Rating downgrades were most severe for B-rated speculative-grade issuers. Despite the default of some fallen angels, rating downgrades for investment-grade issuers were not abnormally higher than average in 2001.
- The average recovery rate of defaulted bonds fell for the third straight year to a record low of 21% of par, although there were notably high recovery rates for a handful of fallen angel issues.
- Moody's ratings at the default date effectively differentiate defaulted bond recovery rates. The difference in recovery rates between investment and speculative grade ratings also holds a year before default.
- This year's data reinforces the observation that recovery rates are inversely correlated with annual default rates, which implies that credit loss rates rise even more than default rates when default rates increase.
- Historical cumulative credit loss rates have been higher for lower rated issuers, at all possible investment horizons, demonstrating that Moody's rating system effectively differentiates credit risk.

Historical Cumulative Credit Loss Rates from 1 to 20 Years, 1970-2001
Time-Varying Recovery Rates



Default & Recovery Rates of Corporate Bond Issuers

Special Comment

Moody's Default Risk Service

The data underpinning the research in this default study are available in *Moody's Default Risk Service (DRS)*. The database includes the credit histories of nearly 10,000 corporate and sovereign entities and over 80,000 individual debt securities since 1970. The service provides the raw data to calculate rating transition, default, and recovery rates for the Moody's-rated corporate universe. For more information about our DRS database, call 212-553-1658.

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Introduction

This report is Moody's fifteenth annual study of corporate debt defaults. It comes a critical juncture for the capital markets worldwide. Record defaults — unmatched in number and dollar volume since the Great Depression — have culminated in the bankruptcies of well-known firms whose rapid collapse caught investors by surprise. In the wake of these failures, concern for credit quality has grown to a level not seen in seventy years.

This report is primarily concerned with the statistical documentation of the performance of Moody's ratings of corporate bond issuers, both for the year 2001 as well as the historical period since 1970. We employ time-tested metrics, such as default and rating transition rates, as well as some new ones. In this study we expand our investigation into the severity of default. Ultimately, we seek to gauge quantitatively the performance of Moody's ratings as statements about expected credit losses stemming from defaults. Hence Moody's has also expanded the section on historical credit loss rates.

Moody's bases the results of this study on a proprietary database of ratings and defaults for industrial and transportation companies, utilities, financial institutions that have issued long-term debt to the public. Sovereign, municipal, structured finance, financial strength, bank loan, bank deposit, and issuers with only short-term debt ratings are excluded. In total, the data cover the credit experiences of over 16,000 corporate issuers that sold long-term public debt at some time between 1919 and 2001. As of January 1, 2001 over 4,800 of those issuers held Moody's ratings. These issuers account for the bulk of the outstanding dollar amount of U.S. public long-term corporate debt and a substantial part of public issuance abroad.

Moody's default database covers over 3,500 long-term bond defaults by issuers both rated and non-rated by Moody's. We compiled these default histories from a variety of sources, including our own Industrial, Railroad, and Public Utilities Manuals; reports of the National Quotation Service; various issues of *The Commercial and Financial Chronicle*; our library of financial reports; press releases; press clippings; internal memoranda; and records of analyst contact with rated issuers. We also examined documents from the Securities and Exchange Commission, The Dun & Bradstreet Corp., the New York Stock Exchange, and the American Stock Exchange.

This report also introduces some minor changes in methodology. The default rate statistics we report in this study include only Moody's-rated corporate bond issuers. Where important, we highlight defaults by sovereign issuers, structured finance tranches, or other non-corporate entities. These defaults will not, however, be included in this report's nor in Moody's regular monthly default rate statistics.

Moody's has also modified the algorithm that assigns the estimated senior unsecured ratings for corporate bond issuers. This algorithm is used to isolate the probability of default component embedded in Moody's debt-level ratings and is described in detail in the Estimated Senior Ratings & Notching Practices section of Appendix I. Briefly, the adjustments introduced this year include changes in notching for subordinated instruments introduced in July 2000.

We begin with a summary of defaults in 2001.

2001 Corporate Debt Defaults

Defaults Reach Extreme in 2001

In 2001 a confluence of events resulted in one of the most intense years of credit pressure around the globe. The consequences of the bursting of the New Economy bubble were and continue to be acutely felt. The buildup of poor credit quality in the late 1990s bull market in the United States came home to roost amid an economic slowdown exacerbated by terrorist attacks in New York and Washington. The rapid expansion of the telecommunications industry was followed by an equally rapid collapse as many firms in that industry failed. The bankruptcy of firms whose risk of default was previously believed to be remote has awakened the spectre of accounting fraud and mismanagement, leading to heightened uncertainty in financial markets.

World-wide, 212 Moody's-rated corporate issuers defaulted on a total of US \$135.1 billion of debt. Bond defaults comprised 186 of the 212 firms, with a total dollar volume of US \$106 billion of bonds. The number and volume of defaults in 2001 trounces the previous record for a calendar year set in 2000. In that year, 110 Moody's-rated issuers defaulted on a total of US \$33.4 billion.

Corporate debt defaults were accompanied by the default of two sovereigns, the Republic of Argentina and the Republic of Moldova. Argentina's debt exchange offer constituted an event of default, affecting a total of nearly US \$90 billion of bonds. The late payment of interest due on its eurobonds (US \$145 million) qualified Moldova as a default. The figures reported in this study, however, exclude defaults by sovereign issuers.

Defaults in 2001 were notable for their individual size as well as their frequency. Twenty-nine issuers had defaults totaling over one billion dollars in debt apiece. The dollar volume of bonds for the ten largest corporate defaulters totaled US \$46.5 billion in 2001, exceeding the US \$33.4 value of all defaults in 2000. Exhibit 1 presents the top ten corporate defaulters (consolidated entities) in 2001. Enron Corporation's bankruptcy, the largest in US history, totaled US \$9.9 billion of bonds.¹ Finova Capital, which held the record for the largest corporate default earlier in the year, defaulted on a total of US \$6.3 billion of bonds.

Exhibit 1 — Ten Largest Corporate Bond Defaults in 2001

(Consolidated Entities)

Company	US\$ Billions
Enron Corp.	\$9.9
FINOVA Capital Corporation	\$6.3
Asia Pulp & Paper	\$5.2
Pacific Gas & Electric Company	\$5.0
XO Communications, Inc.	\$4.9
Southern California Edison Company	\$3.6
MYCAL Corporation	\$3.1
PSINet Inc.	\$2.9
Comdisco, Inc.	\$2.8
Exodus Communications, Inc.	\$2.8
Total	\$46.5

The decline in corporate credit quality in 2001 was most severe in the United States: 77% of all defaults in number and 85% in volume were in the US. Exhibit 2 presents the distribution of defaults by broad geographical region. Nine of the ten largest defaults occurred in the US. 142 corporate bond issuers defaulted on a total of US \$85 billion last year. Including Canada, North American defaults constituted 85.1% of defaults by dollar volume and 81.2% in number. Corporate issuers in Europe, the region with second highest default volume, constituted 4.2% of defaults by volume and 7% in number. Global Telesystems, Dolphin Telecom, and Netia Holdings led Europe's defaults. The remaining defaulters were distributed primarily in Asia and Southeast Asia. The Asia Pulp & Paper corporate family was the third largest default in 2001. Excluding Argentina's US \$90 billion default, South American firms constituted just 1.5% of defaults, despite the country's economic and political turmoil.

Exhibit 2 — Geographical Distribution of Bond Defaulters by Issuer Count and Volume

Region	Percent of Total	
	Volume	Issuers
North America & Caribbean	85.1%	81.2%
Europe	4.2%	7.0%
Asia	3.4%	5.4%
Southeast Asia	3.2%	2.2%
Africa	2.4%	2.2%
South America	1.5%	1.6%
Australia & New Zealand	0.2%	0.5%
	US \$106 B = 100%	186 = 100%

1. Moody's corporate bond default rate statistics exclude subsidiaries that issue only preferred stock or issue only debt that is backed by other corporate affiliates. Consequently, only Enron Corporation appears in Moody's default rate statistics. The entire Moody-rated Enron corporate family, which includes several trusts and special purpose vehicles that were supported by Enron Corp., totals over US \$22.3 billion of debt.

The two largest defaulting industry categories in 2001 by dollar volume were also the ones that had been deregulated in the recent past. Defaults by firms in the energy sector, including the California utilities and Enron, totaled nearly US \$18 billion, or about 17% of all defaults in 2001. Two of the top ten largest defaults in 2001 (XO Communications and PSINet) were in the telecommunications sector, and in the aggregate, telco defaults constituted 25% of defaults by dollar volume. Despite the concentrations of defaults in these two industry categories, the data indicates that defaults were actually fairly broadly distributed among industry categories. Defaults in pro-cyclical sectors, such as construction, chemicals and steel increased in 2001, as did defaults in retail and hotels and gaming.

Exhibit 3 — Distribution of Defaults by Industry Sector

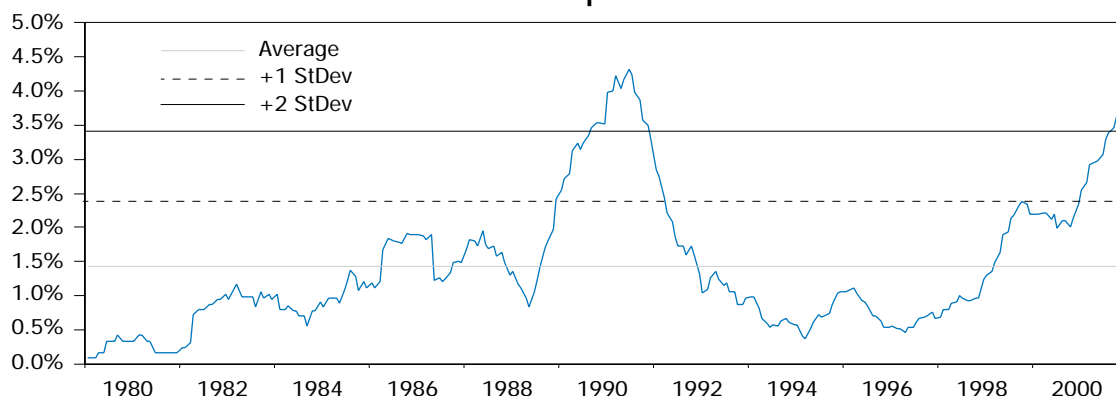
Industry	By Volume	By Count
Telecommunications	25.8%	16.1%
Diversified/Conglomerate	9.3%	0.5%
Financial (Non-Bank)	9.1%	3.8%
Electric Utilities	8.1%	1.1%
Construction, Building, & Real Estate	6.0%	5.9%
Electronics	4.7%	5.4%
Automobile	4.2%	2.7%
Forest Products & Paper	4.0%	6.5%
Retail	3.9%	4.8%
Hotels, Casinos, & Gaming	3.6%	5.4%
Printing, Publishing, & Broadcasting	3.2%	4.8%
Chemicals, Plastics, & Rubber	3.0%	6.5%
Metals & Mining	2.5%	7.5%
Miscellaneous Manufacturing	2.4%	1.6%
Nondurable Consumer Products	1.6%	4.8%
Machinery	1.4%	2.7%
Beverage, Food, & Tobacco	1.3%	2.7%
Leisure, Amusement, & Entertainment	1.0%	2.2%
Textiles, Leather, & Apparel	1.0%	1.6%
Cargo Transportation & Shipping	1.0%	3.2%
Containers, Packaging, & Glass	0.9%	1.6%
Aerospace & Defense	0.7%	3.2%
Miscellaneous	0.6%	2.7%
Healthcare, Education, & Childcare	0.4%	1.1%
Consumer Transportation	0.1%	0.5%
Banking	0.1%	0.5%
Oil & Gas	0.1%	0.5%
	US \$106 B = 100%	186 = 100%

Default rates tested levels not seen since 1991. The default rate for all rated corporate bond issuers reached 3.7% in 2001. That figure represents a statistical extreme. The average default rate since 1980 for all rated Moody's issuers is 1.4%. While the average may represent a reasonable estimate of the expected default rate in the absence of any other information, it does not fully characterize all the possible outcomes. Since 1980, the all corporate trailing twelve-month default rate has ranged from a low of 0.1% to a high of 4.3%. One measure of the uncertainty around the average is the standard deviation.

In Exhibit 4 we plot the time series of the trailing twelve-month all corporate default rate against its 1.4% average. We also include markers for one and two standard deviations from the average. The default rate exceeded two standard deviations from the mean over this period for the first time since 1991. A similar trend is evident for the speculative grade default rate as well. 10.3% of issuers rated speculative grade defaulted within a year of holding that rating, falling just short of the 10.5% post-Depression record set in 1991. The speculative grade default rate began 2001 at 5.8%, and rose in each successive month in 2001. For US-based issuers, the damage was worse. 11% of speculative grade issuers defaulted, tying the 1991 post-Depression record for a calendar year default rate. The default rate for all rated US corporate issuers, which includes fallen angel and investment grade defaults, hit 3.8%. Exhibit 26 in Appendix II presents the time series of default rates by rating notch and by rating aggregates.

Non-US bond issuers experienced an unfortunate reversal of fortune. The default rate for all rated corporate issuers outside the US declined in 2000 from 1.5% to 0.96%. The rate finished 2001 at 2.3% as economies around the globe began to slow down in tandem with the US. In speculative grade, the rate for non-US firms rose from 3.5% in January 2001 to 8.9% at December's end.

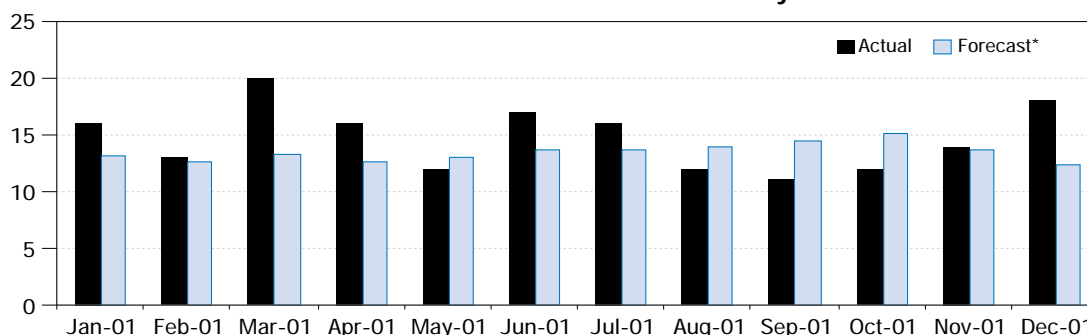
Exhibit 4 - Default Rate for All Corporate Issuers Was Extreme in 2001



Brighter Forecast for Defaults in 2002

Monthly defaulted issuer counts in 2001 generally exceeded expectations. Defaults were as low as 11 firms in September and as high as 20 firms in March. On average, 14.8 issuers defaulted per month in 2001. In January 2001 Moody's default forecasting model (described in Appendix I) predicted that defaults would average 13.5 per month over the year. Consequently, Moody's model predicted that the speculative-grade default rate would end the year at 9.5%. The model somewhat undershot the mark, then, as the actual 2001 rate was 10.2%. Exhibit 5 shows the actual monthly default counts against the model-generated default counts for 2001.

Exhibit 5 - 2001 Actual vs. Forecasted Monthly Default Counts



* As of January 2001.

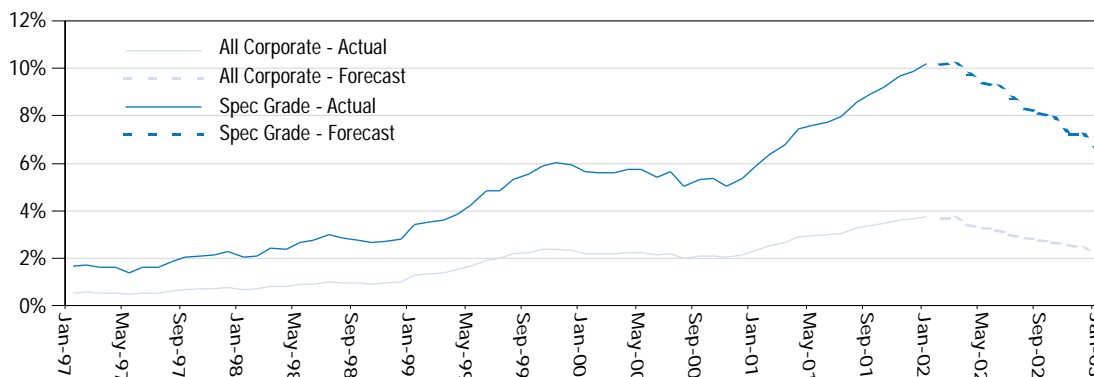
Despite the sharp rise in the default rate in 2001 and uncertainty for economic growth in 2002, Moody's is forecasting lower default rates in 2002. Moody's forecasting model indicates that default rates are at or near a peak and should decline over the course of 2002. The forecasts for all corporate bond issuers and the speculative grade sub-category are charted in Exhibit 6. The model indicates that the default rate for all rated corporate bond issuers will fall to 2.2% by the end of 2002. For speculative-grade rated issuers, the default rate is expected to decline to 6.8%.

Driving the decline in default rates is improvement in the aggregate credit profile of the Moody's-rated universe. Firstly, many of the lowest-rated defaulters that came to market since 1997 have defaulted, therefore exiting the pool of potential future defaulters and leaving a stronger credit quality cohort of issuers. Secondly, issuers entering the market in the past year have arrived with higher initial credit ratings. The average rating for new issuers has increased from Ba in 1997 to Baa in 2001. Higher initial ratings means that ex-ante default risk is lower for these credits. In short, higher credit quality issuers have replaced poor credit quality issuers that have left the pool of potential defaulters. Everything else equal, one would expect lower default rates.

There are also several macroeconomic trends helping set the stage for lower default rates in 2002. Default rates are responsive to changes in the slope of the Treasury yield curve (the ten-year yield minus the 90-day yield). Default rates historically begin to decline roughly 17 months after the yield curve begins to steepen. Since the yield curve began steepening in January 2001, this leading indicator places a peak in the default rate sometime in the first half of 2002. Low nominal interest rates are also helping, as is a stabilization in US industrial production.

However, Argentinean corporate issuers are a wild-card that could materially affect the global default rate outlook. The recently proposed capital controls, which would effectively forbid external payments without permission from the central bank, puts many Argentinean firms at risk of default in 2002. Indeed, many Argentinean firms have been downgraded to Ca, suggesting the risk of default is high in the near term. If most of these firms default at approximately the same time, the default rate could exceed 11% before beginning its decline. In this scenario we expect the global default rate and the US default rate to diverge, with the US rate declining in line with our forecast.

Exhibit 6 - 2002 Default Rate Forecasts



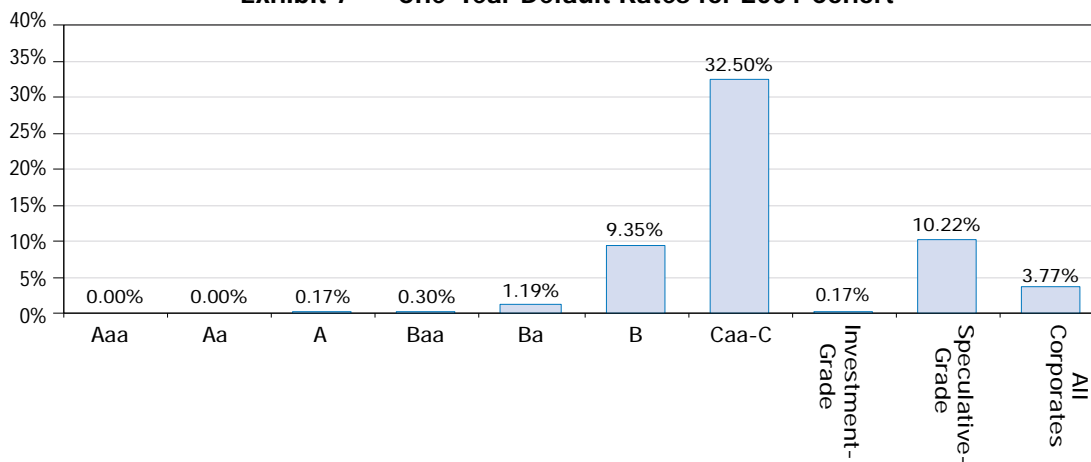
Historical Default & Rating Transition Rates

Moody's Ratings as Predictors of Default

Over 3,500 of the more than 16,000 corporate issuers that Moody's has rated since 1920 defaulted at some point in time. In the appendix, we present many tables that illustrate the strong historical correlation between Moody's ratings and subsequent default experience at different investment horizons.

In 2001, this same historical relationship is evident at every possible investment horizon, including the relatively simplistic measure, default frequency within one-year.

Exhibit 7 — One-Year Default Rates for 2001 Cohort



The chart (Exhibit 7) indicates that just 0.17% of all bond issuers rated by Moody's investment grade on January 1, 2001 defaulted before the end of the year, whereas 10.22% of all speculative-grade issuers defaulted.

At the same time, there were a number of very prominent investment-grade defaulters in 2001. Exhibit 8 puts this in perspective by presenting the full list of issuers that held investment-grade senior unsecured or issuer ratings within a year of default since 1970. In 2001, ten bond issuers had investment-grade ratings within a year of default, the highest annual count of investment grade defaulters since 1970. The default rate for investment grade issuers in 2001 was 0.17%, a rise from the 0.14% of 2000 and 0.04% of 1999. It is also the highest rate since 1989. While the investment grade default rate was higher than the 0.06% average since 1970, it is not the highest. Exhibit 26 in Appendix I shows the time series of default rates for investment grade issuers. We find that the investment grade default rate was higher in four other years: 1973, 1982, 1986, and 1989.

Although some very prominent investment-grade companies defaulted in 2001, the ratings on defaulting issuers prior to default were actually lower on average in 2001 than in previous years. To evaluate the extent of rating decay in advance of default, we calculated the median and average senior unsecured rating of issuers between zero and 60 months before default, shown in Exhibit 9. The average rating is constructed by translating Moody's rating symbols onto a linear scale, in descending order from 1 to 21, where Aaa=1, Aa1=2,...,and C=21. We took the average of the numbers to produce a smooth series. While the value of this average rating has no simple interpretation, it can be translated back onto the original symbolic scale, and its changes do reflect improvement and deterioration in the underlying pool of future defaulters, capturing finer gradations of change than does the median rating.

In Exhibit 9 we plot the median and average rating for the 1983-2001 period and for the cohort of 2001 defaulters. Both the graphs show that five years prior to default the median rating of defaulting companies is speculative-grade. For the 1983-2001 period, the median rating five years prior to default was upper speculative grade, Ba3. For 2001 defaulters, however, the rating five years before default was B1. As Moody's has observed in the past, the classes of debt that came to market in 1997 and 1998 exhibited initial ratings that were substantially below average, a large proportion of which were initially rated B and below. Notably, the average rating five years prior to default is two notches below the median (B3), indicating that there were a number of issuers with very low ratings well in advance of default.

The downward slope of the average rating and the down-step pattern of the lines in the charts show that these future defaulters are already seeing downward rating pressure five years in advance of default. At 38 months before default, the median rating has fallen to B1 and falls further to B2 fifteen months prior to default. At the time of default, the rating is Caa2. We also see that as the default date approaches, the pace of rating downgrade accelerates. The pattern of deterioration for the 2001 defaulters is similar, but a couple of notches lower.

Exhibit 9 also shows that precipitous rating drops shortly before default have been rare. Even for the 2001 defaulters we see that there was an orderly progression of rating downgrades leading up to the default date. Noteworthy cases, such as PG&E and Enron, notwithstanding, Moody's rating process has effectively signaled default through rating changes in the aggregate.

An alternative method for evaluating the effectiveness of ratings as a screen for subsequent defaulters is to measure the proportion of rated defaults are captured by ratings at different horizons prior to default. Cumulative Accuracy Profiles (CAP) plots are useful for making visual, qualitative assessments of rating performance. A CAP curve is constructed by sorting the Moody's-rated universe of corporate bond issuers from lowest (i.e. riskiest, Caa-C) rating to highest (default remote, Aaa) rating and calculating the percentage of defaulters whose credit rating is equal to or lower than that rating. An effective rating system would catch relatively more defaults from the rated population in its lowest (high default risk) categories. The further the curve bows toward the northwest corner, the greater the fraction of all defaults that carry low ratings.

Exhibit 8 — Companies with Investment Grade Ratings within One Year of Default

Company Name	Default Year	Rating 1 Year Prior to Default	Rated Bond Default
Allis-Chalmers Corp.	1982	Baa	No
Ames Department Stores, Inc.	1990	Baa3	Yes
AMF, Inc.	1986	Baa2	No
Arlan's Department Stores Inc.	1973	Baa	Yes
Armstrong World Industries, Inc.	2000	Baa1	Yes
Bank of New England Corporation	1990	A2	No
Burroughs Corp.	1991	Baa3	No
Chrysler Corporation	1979	Baa	No
Columbia Gas System, Inc.	1991	Baa1	Yes
Comdisco, Inc.	2001	Baa1	Yes
Continental Bank Corp.	1984	A2	No
C-U Funding Corporation	1990	A2	Yes
Daylin Inc.	1975	Baa	Yes
DFC Financial (Overseas) Ltd.	1989	Aa3	Yes
DFC Overseas Investment Ltd.	1989	A1	Yes
Documation Inc.	1984	Baa3	Yes
Dow Corning Corporation	1995	Baa1	Yes
Edison International	2001	A3	No
Enron Corporation	2001	Baa1	Yes
Equitable Lomas Leasing Corporation	1989	Baa2	Yes
Finova Capital Corporation	2001	Baa1	Yes
Finova Group, Inc.	2001	Baa3	Yes
First City Bancorporation of Texas, Inc.	1987	Baa3	Yes
First RepublicBank Corporation	1988	Baa1	Yes
General American Life Insurance Company	1999	A3	No
Guangdong Enterprises (Holdings) Ltd.	1999	Baa3	Yes
Guangdong International Trust & Investment Corporation	1998	Baa2	Yes
Gulf Canada Resources Limited	1993	Baa3	No
Gulf States Utilities Company	1987	Baa3	No
Harnischfeger Industries, Inc.	1999	Baa2	Yes
Interco, Inc.	1989	A1	No
Intel Corporation	1980	Baa	Yes
Intel Financial International N.V.	1980	Baa	Yes
Johns Manville Corp.	1982	A	Yes
Joy Technologies	1999	Baa2	Yes
Laidlaw One, Inc.	2000	Baa3	Yes
Laidlaw, Inc.	2000	Baa3	Yes
Lomas Financial Corporation	1989	Baa3	Yes
Long Island Lighting Company	1984	Baa3	No
MNC Financial, Inc.	1990	A2	No
Moran Bros., Inc.	1986	Baa3	Yes
Moran Energy International N.V.	1986	Baa3	Yes
Moran Energy, Inc.	1986	Baa3	Yes
One Bancorp, The	1990	Baa3	Yes
Owens Corning	2000	Baa3	Yes
Pacific Gas & Electric Company	2001	A2	Yes
Parkview-Gem Inc.	1973	Baa	Yes
PG&E Corporation	2001	Baa3	No
Philadelphia, Baltimore & Washington Railroad Co.	1970	Baa	Yes
Revere Copper & Brass Co.	1982	Baa	Yes
Smith International, Inc.	1986	A3	Yes
Southern California Edison Company	2001	A2	Yes
Storage Technology Corporation	1984	Baa2	Yes
Swissair Group	2001	A3	No
Tidewater Inc.	1986	Baa3	No
United Merchants & Manufacturers, Inc.	1977	Baa	No
USG Corporation	2001	Baa1	Yes
Western Union Telegraph Company	1985	Baa2	No
Zhu Hai Highway Company Limited	2000	Baa3	Yes

Exhibit 10 shows CAP curves for one-year and five-year horizons for the 1983-2001 time period. The first thing we observe from the charts is that Moody's ratings generally do a good job of discriminating defaults from non-defaults. Over 90% of all defaulters generally carry ratings that are B1 or below one year before default, and 40%-70% are rated B1 or lower five years before default.

The curves for both the one-year (left) and five-year (right) horizons bow significantly toward the northwest corner. We further observe that Moody's ratings have become more effective at sorting defaults by rating notch over time. This is seen by observing that each CAP curve for successive periods lies above the one for the previous period. Over time, relatively more defaults have been captured by low speculative grade ratings, both at the one and five year horizon. The ability of B1 ratings and below to capture default improved from about 40% for the 1983-1987 period to nearly 70% for the 1993-1996 period.

At the one-year horizon nearly 90% of defaults in 2001 were captured by ratings at or below B2. For the five-year horizon, nearly 90% of defaults we captured by ratings at or below Ba2, which is consistent with the results we saw in Exhibit 9. Indeed, the CAP curve for 2001 represents the best performance by Moody's ratings for the entire period 1983-2001. Speculative grade ratings proved to be very effective at detecting and signaling latent default risk not only for the firms that defaulted in 2001, but over the five year horizon as well. The results over time for low investment grade ratings, however, are somewhat mixed. The CAP curves in the Baa range for different time periods and horizons are crowded and sometimes cross. Nevertheless, even in the worst case (1983-1987) 90% of defaults are captured by ratings below Baa3, the lowest investment grade rating.

That Moody's ratings properly rank order default risk is seen in Exhibit 11, where we plot annual default rates by rating notch from 1993 to 2001. The horizontal axis of the chart shows the average one-year default rate. Moving from left to right, the default rate by rating increases as rating declines. The average one-year default rate for B1 rated issuers, for example, is 3.5%. For Ba2 the default rate more than doubles to 7.2%. For defaulters in the Caa-C rating notches, the average one-year default rate jumps to 21.6%. Annual default rates for investment grade corporate bond issuers are clustered at or near zero.

Default rates can vary significantly from year to year. One is therefore concerned not just with the average or expected default rate, but how much the default rate can vary around that average. One way to measure the volatility of default rates is to use the standard deviation of the annual default rate. This value is plotted on the vertical axis of Exhibit 11. The data shows that the volatility of default rates also increases as ratings decrease. So, the one year default rate for B1 issuers has averaged 3.5% but, based on the historical data, one might expect that default rate to range between 1% and 6% about 68% of the time. The line-fit plot shows that the relationship between the average default rate and its standard deviation is nearly proportional (the slope coefficient is 0.987).

Exhibits 31 and 32 in Appendix II shows that the rank ordering of default rates generally holds for horizons longer than one year. The tables show average cumulative default rates by rating notch for the 1970-2001 period and by alpha-numeric rating notch for the 1983-2001 period.

Exhibit 9 Median & Average Rating Decay Before Default

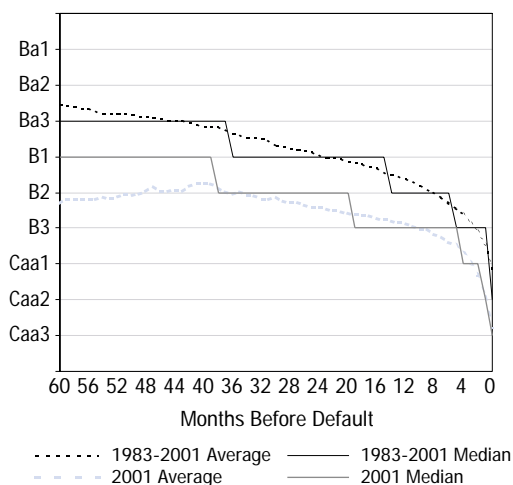
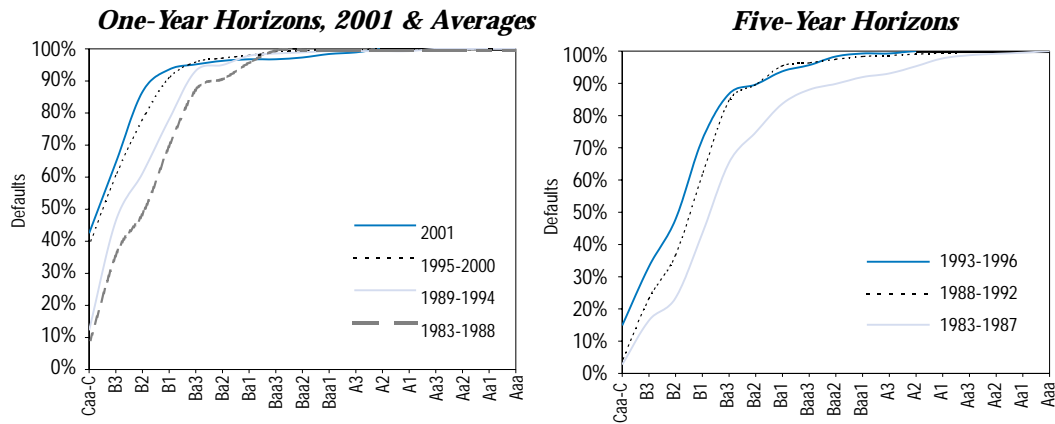


Exhibit 10 - CAP Curves by Rating Notch, 1983-2001



Credit Quality and Rating Transition Rates

Default is just one state to which a debt issuer's rating can transition. However, ratings can be upgraded, downgraded, or remain unchanged. Changes in the distribution of ratings add a much richer picture of changes in aggregate credit quality. A correlation between default rates and rating changes is apparent with even a casual look at Exhibit 12, which plots the ratio of rating upgrades to rating downgrades against the annual default rate for all corporate bond issuers. The upgrade-downgrade ratio in this chart is notch-weighted. A rating change from Baa1 to Baa2 counts as a one notch downgrade; a rating change from Baa1 to Baa3 counts as a two notch downgrade, etc. A ratio of one indicates that rating upgrades were equally matched by rating downgrades. A ratio less than one indicates that rating downgrades exceeded rating upgrades.

Over time, the annual upgrade-downgrade ratio is inversely correlated with the annual default rate. Moreover, declines in the upgrade-downgrade ratio precede increases in the annual default rate. In the period following the last surge in defaults, 1992-1997, credit quality improved dramatically, with rating upgrades outstripping rating downgrades for several years and peaking at 1.8 upgrades for every downgrade in 1996. In that year, the default rate for all rated corporate bond issuers touched bottom at 0.5%. The time period since 1997 experienced a rapid and turbulent decrease in credit quality. The default rate escalated sharply as rating downgrades outpaced rating upgrades. In 2000, though, things seemed to pause. The upgrade-downgrade ratio actually increased to the point where rating upgrades offset rating downgrades. The rate of increase in the default rate also slowed.

The experience of 2000 highlights some important theoretical concerns about using the upgrade-downgrade ratio as a singular measure of aggregate credit quality. Moody's ratings are a finite scale, with a ceiling (Aaa) and a floor (C). Rating are constrained to move among the ratings in this finite scale (or they are withdrawn). The upgrade-downgrade ratio is a "flow" variable: it measures the movements of ratings in the ratings scale. Equally important however — particularly for the 1998-2001 experience — is the rating level. In 1997-1998 many issuers were assigned low initial ratings (many single-B or below). The fact that many of these issuers had low initial ratings means that default risk was 'baked in' from the outset, and that these issuers were transition constrained.

Exhibit 11 - One-Year Default Rates by Rating Notch, 1983-2001

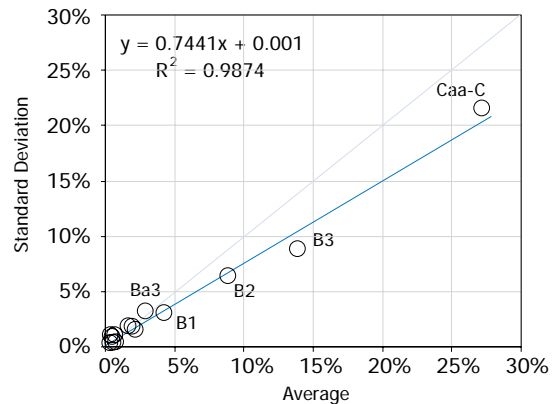
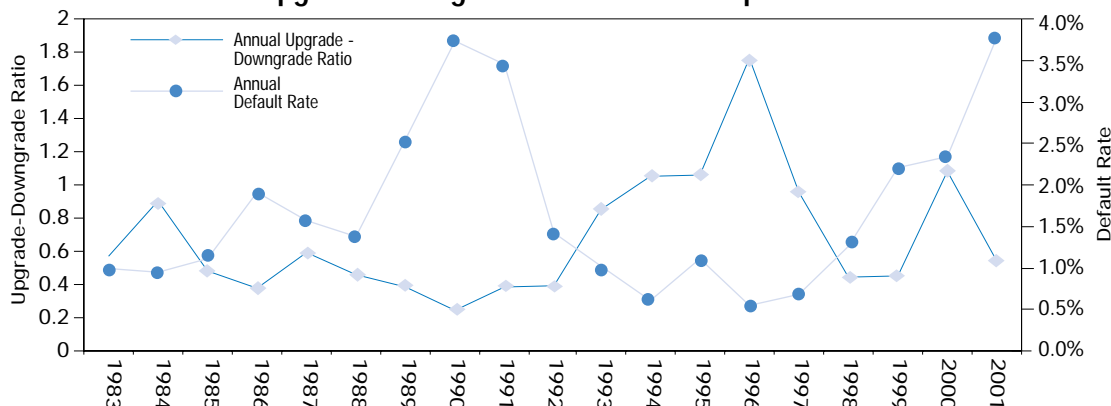


Exhibit 12 - Upgrade-Downgrade Ratio and All Corporate Default Rate



Rating transition matrices show the complete possible states a rating can take over a given time horizon, and therefore provides much more detail on rating migrations than the upgrade-downgrade ratio. The rows of a transition matrix show the beginning of period rating. The columns of a transition matrix show the end of period rating, including default and WR, which means that the rating was withdrawn. The prime diagonal of a transition matrix shows the percentage of issuers whose ratings did not change over the given time horizon (called the inertial frequency). Note that the rows of a transition matrix sum to 100%.

Exhibit 13 shows average one-year estimated senior rating transition rates for corporate bond issuers. The table shows the average one-year transition rates for annual cohorts from 1983 to 2001, where each annual cohort is weighted by the size of the cohort (number of issuers). The inertial frequency for Aaa-rated issuers, for example, is 85%: the ratings of 85% of Aaa-rated issuers did not change over one year, on average, between 1983 and 2001. (Exhibit 26 in Appendix II is a similar transition matrix for broad rating notches over the longer period 1970 to 2001.)

Exhibit 13 reveals some important features of the behavior of ratings and Moody's rating process over one year. Higher ratings have generally been less likely than lower ratings to be revised over one year. Since 1983, an issuer that started any given year with a rating of Aaa ended the year with an Aaa 85% of the time. By contrast, an issuer that began the year with a rating of B1 ended the year with that same rating 66.9% of the time. We also see that for ratings in the middle of the ratings scale the likelihood of a rating upgrade and a rating downgrade is roughly symmetrical. Of course, Aaa-rated issuers can only migrate down the rating scale (or exit the pool via WR), while Caa-rated issuers can only migrate up the rating scale (or default, or exit the pool via WR).

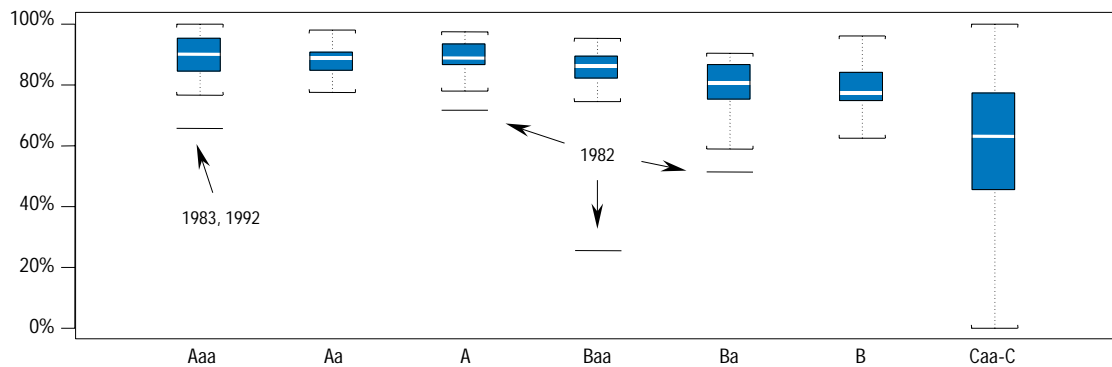
Exhibit 14 demonstrates some of these features succinctly. The chart shows the distribution of annual inertial rating frequencies. The box-plots show the median inertial rating frequency (the white lines), the second and third quartiles (the blue boxes), and the 95% extremum (the brackets). The dashed lines represent inertial rating frequencies exceeding the 95th percentile. The median inertial rating frequencies decline with ratings. Additionally, the 95th percentile brackets for nearly all rating categories show the same amount of dispersion, indicating that rating upgrades and a rating downgrades are roughly symmetrical.

Close examination of rating transitions between 1983 and 2001 shows further that large and sudden rating changes occur infrequently. Over this time period, just 8.6% involved rating changes of more than one rating category (excluding defaults and withdrawn ratings). As one moves down the rating scale, the likelihood of a multi-notch change (up or down) increases. The frequency for Aa2-rated issuers, for example, is 5.9%. The frequency doubles to 12.5% for Ba3-rated issuers.

Exhibit 13 — Average One-Year Rating Transition Rates, 1983-2001

Rating to:		Aaa	Aa1	Aa2	Aa3	A1	A2	A3	Baa1	Baa2	Baa3	Ba1	Ba2	Ba3	B1	B2	B3	Caa-C	Default	WR
Rating	Aaa	85.00	5.88	2.90	0.47	0.71	0.28	0.16	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.56
From:	Aa1	2.54	76.02	7.87	6.58	2.31	0.32	0.05	0.18	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.04
	Aa2	0.70	2.90	77.00	8.39	3.93	1.35	0.58	0.16	0.00	0.00	0.00	0.05	0.08	0.00	0.00	0.00	0.00	0.00	4.85
	Aa3	0.08	0.61	3.36	77.88	8.89	3.14	0.85	0.24	0.21	0.16	0.00	0.04	0.09	0.00	0.00	0.00	0.00	0.08	4.38
	A1	0.03	0.11	0.60	5.53	77.68	7.20	2.88	0.78	0.27	0.13	0.36	0.25	0.05	0.12	0.01	0.00	0.00	0.00	3.99
	A2	0.05	0.06	0.29	0.77	5.34	77.47	7.18	2.87	0.80	0.39	0.28	0.10	0.11	0.03	0.07	0.00	0.03	0.02	4.13
	A3	0.05	0.10	0.05	0.23	1.48	8.26	71.77	6.69	3.65	1.43	0.54	0.19	0.22	0.33	0.05	0.04	0.01	0.00	4.91
	Baa1	0.08	0.02	0.13	0.18	0.20	2.71	7.67	71.19	7.37	3.14	1.04	0.46	0.35	0.55	0.09	0.00	0.02	0.08	4.73
	Baa2	0.07	0.10	0.12	0.17	0.17	0.87	3.67	6.90	71.50	7.02	1.68	0.52	0.65	0.48	0.45	0.23	0.03	0.07	5.30
	Baa3	0.03	0.00	0.03	0.07	0.18	0.57	0.65	3.22	9.33	67.03	6.38	2.59	1.90	0.80	0.31	0.18	0.16	0.43	6.15
	Ba1	0.08	0.00	0.00	0.03	0.22	0.12	0.67	0.75	2.94	7.68	66.47	4.60	3.88	1.12	1.27	0.81	0.33	0.62	8.39
	Ba2	0.00	0.00	0.00	0.03	0.04	0.15	0.13	0.35	0.70	2.30	8.35	63.96	6.20	1.67	3.70	1.35	0.53	0.65	9.88
	Ba3	0.00	0.02	0.00	0.00	0.04	0.16	0.17	0.17	0.26	0.69	2.71	5.04	66.66	4.83	5.16	2.22	0.85	2.27	8.74
	B1	0.02	0.00	0.00	0.00	0.06	0.09	0.15	0.07	0.24	0.30	0.42	2.52	5.70	66.89	5.22	4.58	1.78	3.71	8.23
	B2	0.00	0.00	0.06	0.01	0.11	0.00	0.07	0.17	0.12	0.18	0.29	1.63	2.95	5.75	61.22	7.61	3.69	8.04	8.10
	B3	0.00	0.00	0.06	0.00	0.02	0.04	0.06	0.11	0.12	0.20	0.18	0.35	1.17	4.02	3.36	62.05	6.84	12.50	8.91
	Caa-C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	0.48	0.48	0.64	0.00	1.36	1.85	1.23	2.87	54.21	26.54	10.36

Exhibit 14 - Distributions of Annual Inertial Rating Frequencies, 1970-2001



Rating transitions in 2001 exhibited a higher degree of volatility. In the aggregate, 8.9% of issuers experienced multi-notch rating changes, virtually indistinguishable from the long run average or 8.6%. But volatility in specific rating notches is evident. The incidence of multi-notch changes for B-rated issuers was nearly triple the 1983-2001 average, which is not surprising given the high level of defaults. Here, we see again that speculative grade ratings were highly effective at identifying defaults. The default rate for Caa-rated issuers was 30%, compared with an average of 25% since 1983. Exhibit 15 summarizes the 2001 transition frequencies.

Fallen angels — issuers that began the year investment grade and ended the year speculative grade — constituted just 0.16% of all issuers (excluding defaults and withdrawn ratings). There was a noticeable increase in fallen angels in specific rating categories, however. A2-rated issuers downgraded to Caa-C occurred with a 0.24% frequency in 2001, compared with a long-run probability of 0.03%. The total fallen angel percentage for A2 was 0.42% in 2001. Similarly high incidences of fallen angels occurred in the A3, Baa2 and Baa3 rating categories.

Exhibit 15 — 2001 Cohort Rating Transition Rates

Rating to:		Aaa	Aa1	Aa2	Aa3	A1	A2	A3	Baa1	Baa2	Baa3	Ba1	Ba2	Ba3	B1	B2	B3	Caa-C	Default	WR	
Rating from:	Aaa	89.91	0.00	0.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.17
	Aa1	0.00	75.65	17.39	1.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.22
	Aa2	1.10	6.59	74.18	7.69	1.10	6.04	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.00	0.00	0.00	0.00	0.00	2.20
	Aa3	0.00	4.27	5.07	81.60	4.00	0.27	1.07	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.47
	A1	0.00	0.00	0.89	6.55	73.81	8.33	5.36	1.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.57
	A2	0.43	0.00	0.21	0.21	3.21	76.87	8.99	3.21	1.71	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.21	0.43	0.43	4.28
	A3	0.24	0.00	0.00	0.24	1.21	5.07	77.05	6.76	4.11	1.69	0.24	0.00	0.48	0.00	0.24	0.24	0.24	0.00	0.24	2.17
	Baa1	0.00	0.00	0.00	0.28	0.28	0.56	4.46	77.44	8.36	3.06	0.28	1.11	0.00	0.28	0.00	0.00	0.00	0.56	0.56	3.34
	Baa2	0.54	0.27	0.00	0.00	1.09	0.54	1.91	3.54	73.84	9.81	2.18	0.54	0.27	0.54	0.00	0.27	0.27	0.27	0.27	4.09
	Baa3	0.00	0.00	0.00	0.33	0.00	0.65	0.98	0.33	10.42	73.29	3.26	3.26	2.28	0.65	0.00	0.65	0.33	0.00	0.33	3.58
	Ba1	0.00	0.00	0.00	0.00	1.00	0.00	2.00	0.50	1.50	11.00	66.50	2.00	4.50	1.50	2.50	0.50	0.00	0.50	0.50	6.00
	Ba2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.69	2.08	15.97	53.47	9.72	5.56	2.08	2.08	1.39	1.39	1.39	4.86
	Ba3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	1.14	2.29	8.57	64.57	7.43	4.57	1.14	2.29	1.71	1.71	5.71
	B1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.29	0.29	1.16	7.56	4.94	52.62	9.59	3.49	10.47	3.49	3.49	5.81
	B2	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.81	0.54	0.27	0.27	0.00	1.36	4.61	56.91	4.34	14.09	10.57	10.57	5.96
	B3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.85	2.97	52.54	21.19	15.25	15.25	7.20	
	Caa-C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.39	1.56	54.69	30.47	30.47	12.50	

Default Severity & Recovery Rates

As statements about expected credit loss, Moody's ratings incorporate assessments of both the likelihood of default and the severity of loss given default (LGD). While the likelihood of default is roughly the same for various debt obligations of the same obligor, these obligations are readily differentiated by the severity of the loss that may be expected in the event of default. For this reason, when rating debt obligations Moody's pays close attention to the effective security and seniority of the instrument — two of the most important determinants of the post-default recovery that investors may realize.

Where Moody's believes that the protections afforded by an instrument's seniority and security are enough to support significantly greater recovery, the reduced credit risk of the obligation is reflected in a higher rating. Dispersion in the ratings of different obligations of the same issuer around the senior unsecured rating reflects, in part, Moody's opinion about the incremental protections that the various obligations provide against credit loss. The proximity of debt to a firm's assets (seniority) and the extent to which it is secured by specific assets (security or collateral) can lead to ratings for specific debt obligations that can be several notches above or below an obligor's senior unsecured rating.

In the event of default, Moody's ratings are statements about the expected relative recovery rate (RR) that investors can expect upon the conclusion of the bankruptcy or workout process. Just as Moody's ratings should properly rank order default risk by rating prior to default, Moody's obligation-specific ratings should also have informational value to predict relative recovery rates. We examine the degree to which ratings perform as accurate predictors of recovery in the event of default later in this section.

Beyond its importance in the ratings process, estimating recovery rates is vital in other contexts. Many value-at-risk, credit risk models, and fixed income portfolio strategies use estimates of the recovery rate as inputs, and their results can sometimes be quite sensitive to the assumed recovery rate. Regulatory bodies rely on estimates of the recovery rate to establish, among other things, capital adequacy guidelines. The Basel Committee on Banking Supervision has explicitly stated that banks must estimate LGD (1-RR), and that their estimates must be based in history and supported empirically.² Lastly, investors that specialize in distressed situations (so-called "vulture" investors) require recovery estimates for issue selection and to benchmark portfolios.

Estimating the residual value of bonds in the event of default is difficult. What may seem the most straightforward method for calculating recovery rates is both theoretically and practically problematical. Ideally, one would know the value of the original claim (par in the case of straight bonds, or accreted value for discounts), track all the payments made on the defaulted debt instrument, discount them back to the default date, and present them as a percentage of the original claim. This method clearly relies on many assumptions. In a bankruptcy or workout, the payments made to holders of defaulted debt usually take the

2. Basel, § 336 & 337

form of a combination of equity and derivative securities, new debt or modifications to the terms of surviving debt, cash, or even a physical asset. As there is frequently no market for such payments there is no precise way to measure their value. One would also require separate estimates for the discount rate to apply to each payment on the defaulted instrument over the duration of the default or bankruptcy.

Consequently, in this report we proxy the recovery rate with the secondary market price of the defaulted instrument approximately one month after the time of default. These market quotes are from several dealers and represent an actual bid on the specific instrument, although no trade may have occurred at that price. This definition of recovery is closely aligned with investors who might wish to trade out of a defaulted instrument soon after the time of default. (A separate investor clientele might well pursue the alternative strategy of acquiring defaulted paper.) The recovery rate proxy that we use here can be interpreted as a transfer price between these two investor groups.

Determinants of Recovery in Default

In the event of default bondholders usually receive some fraction of the value of their original claim. The determinants of recovery rates are several, and include the structural characteristics of the firm, the position of the debt instrument in the firm's capital structure, and macro-economic conditions. The time trend of defaulted bond recovery rates and their correlation with default rates are also factors affecting bond recoveries in default.

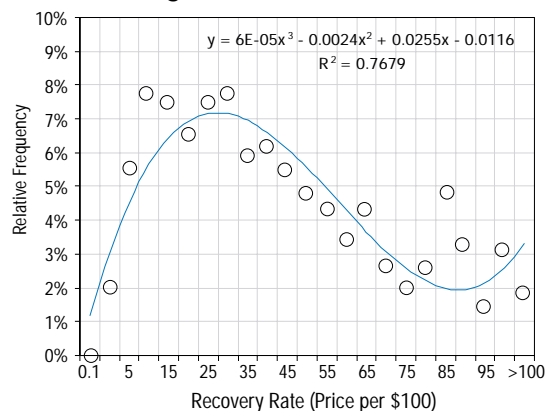
When one examines the data on defaulted bond recoveries, one sees that although recoveries can range from zero to 100% of par or even higher, there is a distinct pattern to the distribution of recovery rates. Exhibit 16 illustrates the statistical characteristics of the empirical distribution of recovery rates for straight bond issues between 1982 and 2001. The graph shows the percentage of recovery rates that are equal to or less than the value on the horizontal axis and the one immediately below it. For example, 6% of defaulted bond recoveries between 1982 and 2001 were between \$35 and \$31.

On average straight bonds recover \$41 per \$100 par. However, given the asymmetric and skewed shape of the distribution, the median recovery rate of \$35 may be a more representative value of the expected or most common recovery rate. The data also exhibits a considerable degree of dispersion around the average, with a standard deviation of \$28. The difference between the first quartile (\$17) and third quartile (\$61) — an alternative measure of dispersion — is also quite large.

Exhibit 16 also shows that there are some non-trivial occurrences of very high recovery rates, in excess of \$85 per \$100 par. Many of these high-recovery observations originate from some large defaults within the last three years, such as Owens Corning, Southern California Edison Company, Finova Capital Corporation, Pacific Gas & Electric Company, and Daewoo Corporation. Additionally, many of these high recovery rates are associated with industries with physical assets such as transportation, utilities, metals and mining, and oil and gas.

The shape of the empirical distribution roughly corresponds to what we would expect: a single-peaked, skewed distribution with a long right tail. But the frequency of the high-recovery outliers in the right tail is a nuisance. The theoretical distribution of recovery rates would resemble the empirical distribution but would be unimodal.³ In the chart we fit a simple third order polynomial to the data to better illustrate the shape of the distribution while accounting for the outliers.

Exhibit 16 - Distribution of Recovery Rates for Straight Bond Issues, 1982-2001

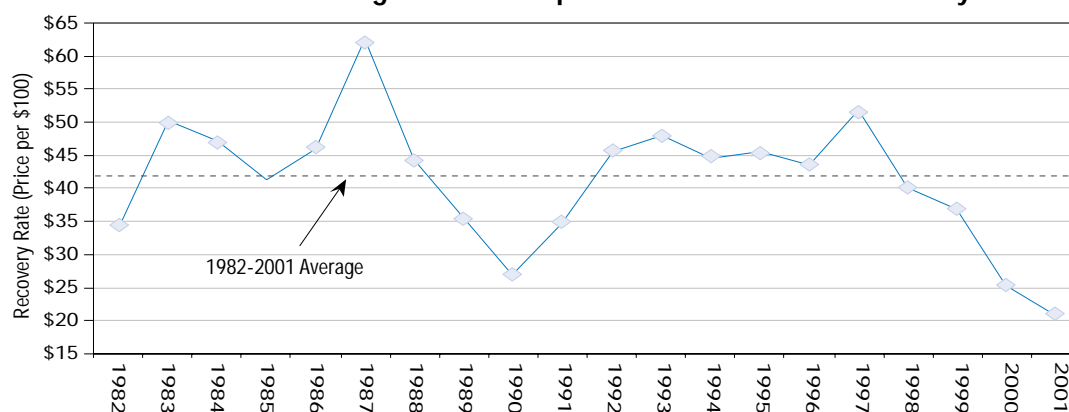


Having knowledge of the shape and moments of the distribution of recovery rates is helpful, but it does not demonstrate whether or how recovery rates vary over time. As default rates are serially correlated, one might expect a time trend in defaulted bond recovery rates as well. It becomes apparent that a time trend in recovery rates exists when one looks at annual average recovery rates as a function of time, as in Exhibit 17.

The chart shows average annual recovery rates for original issue speculative grade bonds. Recovery rates have varied significantly from their average over this time interval. Annual average default rates range from a high of \$62 in 1987 to a low of \$21 in 2001. The standard deviation of annual average recovery rates is \$9.

The sample period in Exhibit 17 above includes two economic expansions and two recessions. During periods when the economy was growing, recovery rates were either near or above the average recovery rate for the entire sample period. Conversely, during recessions (1990-19991 and 2001) the average recovery rate fell to levels substantially below average. In 1990 the average recovery rate was \$15 below average, while in 2001 the average recovery rate was \$21 below average, more than two standard deviations away from the average.

Exhibit 17 -Average Defaulted Speculative-Grade Bond Recovery Rates



The proximity of debt to a firm's assets and the extent to which it is secured by specific assets is the strongest determinant of recovery in the event of default.⁴ Exhibit 18 below presents average recovery rates by security and level of subordination for non-investment grade issuers from 1982 to 2001. The chart shows that our expectations about the relationship between seniority and security are borne out in the data. The more senior and secured the debt instrument, the higher is the recovery rate vis-a-vis debt ranked lower in the capital structure. The deterioration in the value of bond in default in 2001 also manifests itself when recovery rates are broken out by priority in the capital structure. With the single exception of senior secured bonds, every level of security and level of subordination showed below average recovery rates in 2001.

Exhibit 18

Average Speculative-Grade Recovery Rates by Priority in Capital Structure 1982-2001

Seniority/Security	Average Recovery	
	1982-2000	2001
Sr.Sec. Bank Loan	\$67.06	\$54.68
Equipment Trust	\$64.65	NA
Sr. Secured	\$52.09	\$58.00
Sr. Unsecured	\$43.82	\$36.20
Sr. Sub.	\$34.59	\$19.90
Sub.	\$31.88	\$16.45
Jr. Sub.	\$22.48	NA

3. Some recovery rate models use the Beta distribution, whose parameters generate a unimodal distribution that also allows for high-recovery outliers.

4. Moody's research indicates that seniority/security is the single best predictor of recovery in default when other factors are held constant. See *LossCalc: Moody's Model for Predicting Loss Given Default* (February 2002.)

Ratings Near Default Predict Recovery

Moody's ratings explicitly account for expected recoveries in default in its notching process (see Appendix I). Moody's ratings effectively rank order defaulted bond recoveries even after controlling for seniority and security. Exhibit 19 plots average recovery rates for speculative grade issuers by rating and priority of claim in the capital structure for the 1982-2001 period. The surface shows a positive correlation between recovery rates and seniority/security, and a positive correlation between recovery rates and Moody's rating.

The distribution of recovery rates for all defaulted bonds in Exhibit 16 showed that there were a number of high recovery rates. We noted that these were attributable to several large defaults in terms of the number of bonds and total dollar volume. Moreover, these high-recovery issuers tended to be rated investment grade one year prior to default. Since average recovery rates decline with rating for speculative grade-rated issuers, the question arises as to whether there is a meaningful difference in recovery rates between investment-grade issuers and speculative-grade issuers as a group.

Exhibit 20 presents evidence to suggest that there is a difference. Here, we tabulate the average recovery rates for bonds and bank loans by priority in the capital structure based on their rating one year before the default date, not as the bond-level average for a given priority, but rather as the issuer-level average. These issuer-level averages were constructed by first taking the average of the bonds for a given security/seniority class of each issuer, then averaging across issuers. The table supports the bond-level average results in Exhibit 18, in which average recovery rates strictly decrease with lower priority.

The data suggests that issuers rated investment grade one year ahead of the default date show significantly higher recovery rates. The difference is greatest for senior secured bonds, where issuers rated investment grade one year before default show recovery rates \$20 higher than issuers rated speculative grade one year before default. The results holds for senior unsecured and subordinated bonds as well.

Exhibit 20 also presents a result that, on its face, seems counter-intuitive: investment-grade issuers recovery less on average than speculative-grade rated issuers on bank loans. There are at least two possible explanations for this result. Subordinated debt is more common for speculative-grade rated issuers, and hence provide a greater structural cushion below bank debt. Secondly, since the credit strains of speculative-grade-rated issuers are generally evident prior to their defaults, banks generally require stray protective covenants in their lending agreements with those issuers, time to renegotiate the terms of existing debt or structure in protective covenants. Investment-grade (or fallen angel) defaults are rare events that often unfold with unexpected rapidity. In these cases banks may not be able to move quickly enough to preserve the value of their claims.

Exhibit 19 - Average Recovery Rates by Rating at Default & Priority in Capital Structure

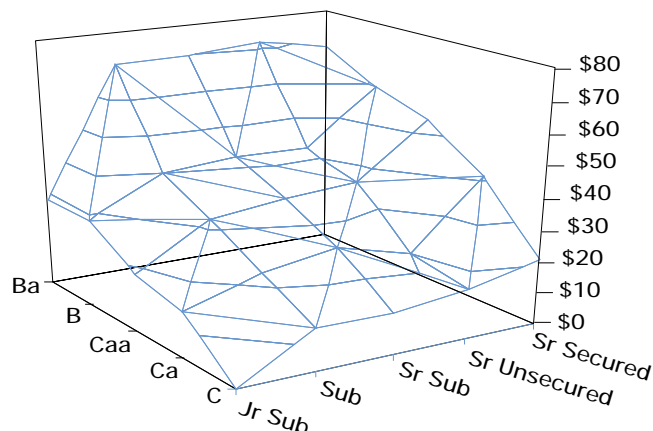


Exhibit 20

Issuer-level Recovery Rates for Bonds & Bank Loans, 1982-2001

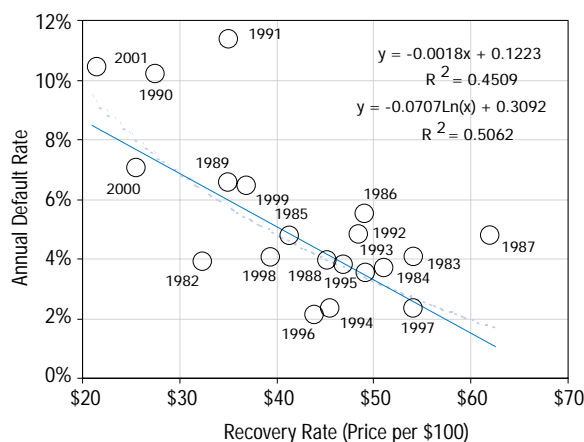
	Rating One Year Prior to Default		All Rated
	Investment Grade	Speculative Grade	
Sr.Sec. Bank Loan	\$68.33	\$71.42	\$71.28
Secured Bonds	\$73.44	\$52.76	\$53.32
Sr. Unsecured Bonds	\$52.48	\$35.29	\$36.57
Subordinated Bonds	\$35.75	\$31.74	\$31.84

The results in Exhibit 20 may strike some readers as curious. Presumably, the recovery investors can ultimately expect to receive at the conclusion of a workout or bankruptcy is a function of the assets available to cover debt holders' claims. That value would seem to be independent of the initial rating. What we show here is that Moody's rating a year in advance of the date of default provides a good indication of recovery in default.

Default rates and recovery rates are the component parts for the calculation of credit loss rates, which we take up in the next section. However, there remains one more empirical fact

that is crucial to the accurate determination of credit loss rates. Exhibit 17 showed that there was substantial variation in average recovery rates over time. It further showed that in periods when the default rate was high that average recovery rates were low. The implied inverse correlation is supported by a more rigorous analysis of the data. In Exhibit 21 we plot the annual average speculative-grade default rate against the annual average speculative-grade recovery rate. The correlation between the two is -0.67 . The important implication is that default severity will be at its highest when defaults are at their worst.

Exhibit 21 - Annual Average Spec-Grade Recovery Rates Inversely Correlated with Default Rates

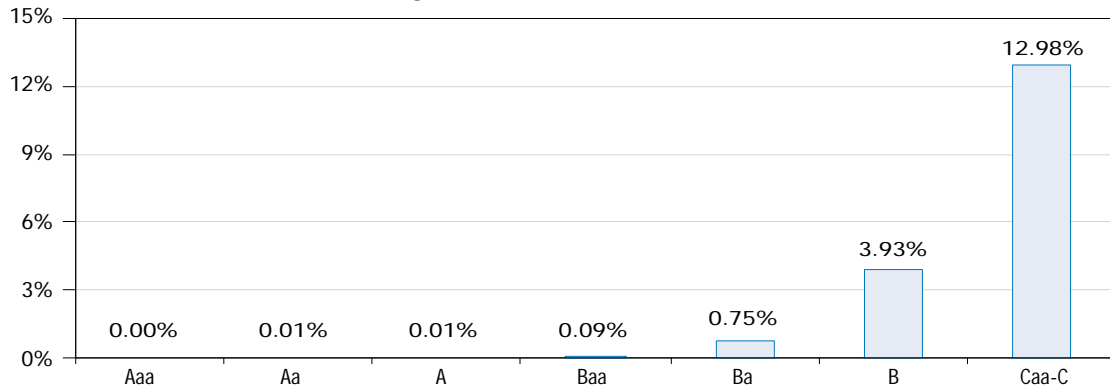


Historical Credit Loss Rates

The previous sections dealt with the two underlying determinants of credit loss, the likelihood of default and the severity (or recovery) in the event of default. We have seen that Moody's ratings have properly rank ordered default risk and default severity over time. Not only does the probability of default rise with lower ratings, but the severity of loss also rises. In this section we bring together the results of the preceding sections to arrive at estimates of credit loss rates, and demonstrate that Moody's ratings effectively differentiate credit loss rates.

Credit losses are the loss in total return of a fixed income portfolio due to defaults. For a portfolio with large exposure to default-risky debt (such as for high yield portfolios), credit losses can materially affect total returns. Exhibit 22 below shows average one-year credit loss rates for the 1982-2001 period. Credit loss rates increase with lower rating categories, and increases more than proportionally for speculative grade ratings. The graph gives an indication of the average loss to a portfolio with a similar credit risk profile. A portfolio of bonds with an average rating of B, for example, would deduct 393 basis points from its total return.

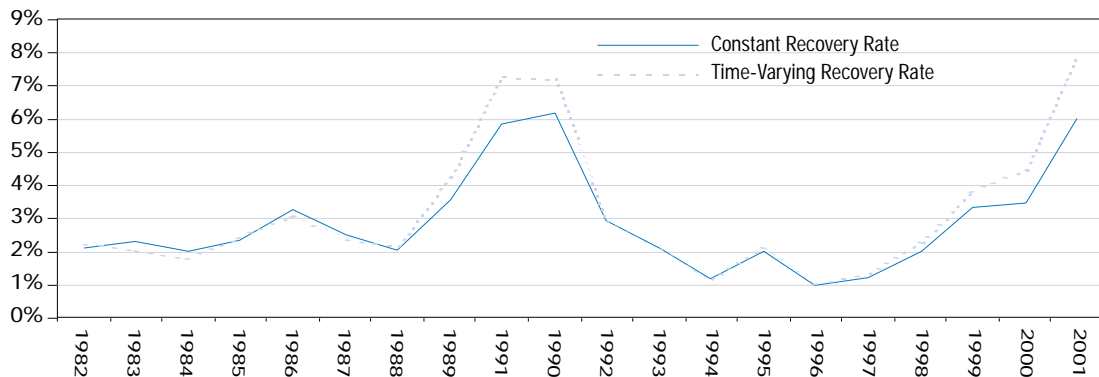
Exhibit 22 - Average One-Year Credit Loss Rates, 1982-2001



The method for calculating expected credit loss rates above holds generally, but the resulting estimates of credit loss depend critically on the assumed default and recovery rates. Credit loss rate calculations typically assume a constant recovery rate over the estimation horizon. The constant recovery rate is usually assumed to be the long-run average recovery rate of about \$41 per \$100 par. Two of the results of the section on recovery rates seriously call into question the validity of this method, however. Firstly, we saw that recovery rates fluctuate substantially over time. At any point in time, the prevailing recovery rate may be considerably above or, more importantly for loss estimates, below the long-run average. Secondly, we saw that default rates and recovery rate are inversely related: when defaults are high recoveries are likely to be low, which means that expected credit losses will be high.

Exhibit 23 shows the magnitude of the difference between a constant assumed recovery rate and a time varying recovery rate. The chart shows historical credit loss rates from 1982 to 2001 for speculative grade defaults. During periods when the default rate is near its average, historical credit loss rates calculated using a constant recovery rates and a time varying recovery rate are almost indistinguishable. However, when the default rate is high credit loss rates using a constant recovery rate understate the severity of credit losses by as much as 190 basis points.

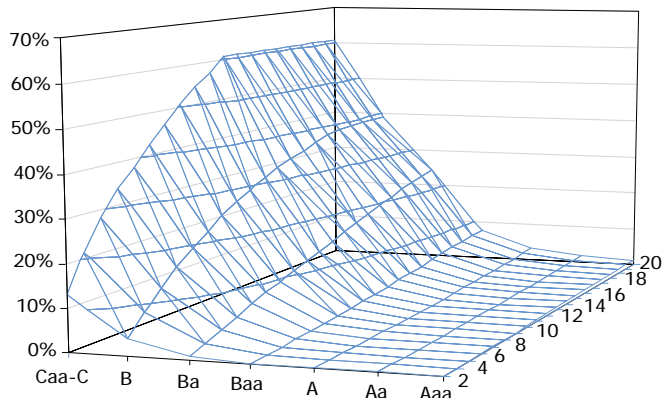
Exhibit 23 - Annual Historical Credit Loss Rates for Speculative Grade Issuers, 1982-2001



The difference between credit loss rates calculated using a constant recovery rate and a time varying recovery rate becomes more acute with time and when segmented by Moody's rating. Exhibit 24 below shows historical cumulative credit loss rates by rating notch from one to twenty years assuming a constant recovery rate equal to US \$41 per US \$100. The slice of the chart for year one is equivalent to Exhibit 22 above. We find that credit loss rates are readily differentiated by rating notch at every time horizon. Historical credit losses increase monotonically, both cross sectionally and holding rating constant. Additionally, we find that credit losses saturate at some time horizon. For the Caa-C bucket, saturation arrives at year 10; for the Baa bucket saturation occurs in year 14. Credit losses plateau at various time horizons because after a certain point all issuers in that rating category default and leave the pool (the default rate saturates at 100%).

The chart on the cover of this report shows historical cumulative credit loss rates, but this time using time-varying recovery rates. We calculated time varying cumulative credit loss rates by weighting the numerators of the marginal survival rates by the average recovery rate for that year. So, for example, the 2001 cohort was weighted using a US \$23 recovery rate instead of US \$41. Several differences between the results calculated this way and those in Exhibit 24 stand out. Historical credit loss rates become more front-loaded under time-varying recovery rates. Historical credit loss rates in year one are higher under time-varying recovery rates, particularly for B- and Caa-C-rated issuers. Credit loss rates in the first year increase from 12.98% to 14.52% for Caa-C-rated issuers, for example. This is because years in which there are more numerous defaults (such as 1991 and 2001) receive heavier severity weights (lower recovery rates). Over time the credit loss rates under time-varying recovery rates saturate at slightly lower levels.

Exhibit 24 - Cumulative Historical Credit Loss Rates by Rating Notch, 1982-2001
Constant Recovery Rate



Appendix I: Methodology

ESTIMATED SENIOR RATINGS & NOTCHING PRACTICES

Moody's rating process is designed to produce a consistent measure of relative credit risk, the primary consideration of which is Moody's evaluation of expected credit loss. Moody's evaluation of expected credit loss includes both the probability of default and the severity of loss in the event of default expressed through a simple rating symbol on a uniform rating scale. Moody's ratings are designed to provide investors with a consistent indicator of credit quality with the full consideration of geographic, sectoral, structural, and contractual standing of the obligation.

The expected loss associated with a particular bond is, mathematically, the likelihood of default multiplied by the severity of default:

$$\text{Credit Loss Rate} = (\text{Default Frequency}) \cdot (1 - \text{Recovery Rate})$$

Moody's ratings are judgments that are intended to support investment decisions. To evaluate our ratings' performance as indicators of the probability of default, we should then use the judgment itself as the unit of study. Because the number of credit judgments that Moody's must make does not vary with either the par amount or number of bonds of the issuer, we consider the bond issuer itself as the unit of study. Separately tabulating additional issues by number or total par amount of a single issuer would bias the results toward the default characteristics of issuers with multiple or large debt issues.

In order to calculate historical default rates, which are estimates of the expected default probability component of ratings, we must, therefore, hold severity considerations constant. We do this by considering the rating on each company's senior unsecured debt or, if there is none, by statistically implying such a rating on the basis of rated subordinated or secured debt. In most cases, this will yield an assessment of risk that is relatively unaffected by special considerations of collateral or of position within the capital structure. The process that assigns these issuer-level ratings is called the senior ratings algorithm (SRA), and the resulting ratings are called estimated senior unsecured ratings or, more concisely, estimated senior ratings.

The process of isolating the default risk component of ratings is essentially Moody's practice of rating notching in reverse. Notching refers to the practice of making rating distinctions among the different liabilities of a firm or entity when it has a number of different classes of debt outstanding. The analytical process is taken in two steps. First, a rating is assigned to an issuer's most important class of liabilities (often the rating for senior unsecured liabilities or senior implied rating), then the issuer's other debt obligations are rated — "notched" — in relation to this initial rating.

Modifications to the senior ratings algorithm are occasionally necessary. Moody's has, from time to time, refined its rating scale and introduced new types of ratings to help investors better gauge the credit risks of debt issuers. Moody's also adjusts its notching practices when necessary. This year we have incorporated some improvements to the algorithm used to estimate senior unsecured ratings. In the process, some of the estimated senior rating histories have been revised, thereby generating some changes in previously reported default rates. The resulting figures represent a more accurate estimate of the risk of default associated with each Moody's rating.

Specifically, the senior ratings algorithm now includes in its notching matrix the adjustments to subordinated debt issues introduced in the November 2000 special comment *Notching for Differences in Priority of Claims and Integration of the Preferred Stock Rating Scale*. Although the practice of notching is a general methodology, specific notching practices vary from investment grade to speculative grade, from banks and financial institutions to corporates, and from public finance to corporates. The discussion of these practices is too detailed to include here. Interested readers should read the special comment carefully. The practical effect of the change is that the new notching matrix will be used for ratings assigned after July 2001.

MOODY'S DEFINITION OF DEFAULT

Moody's definition of default was designed to rigorously assess the performance of its ratings as predictors of default. Consequently, Moody's definition is strict, and includes three types of default events:

- a) There is a missed or delayed disbursement of interest and/or principal, including delayed payments made within a grace period;
- b) An issuer files for bankruptcy (Chapter 11, or less frequently Chapter 7, in the US) or legal receivership occurs; or
- c) A distressed exchange occurs where: (i) the issuer offers bondholders a new security or package of securities that amount to a diminished financial obligation (such as preferred or common stock, or debt with a lower coupon or par amount), or (ii) the exchange had the apparent purpose of helping the borrower avoid default.⁵

The central purpose of this definition is to capture events that change the relationship between the bondholder and bond issuer from the relationship which was contained in the original agreement, and which subjects the bondholder to an economic loss. We seek to identify economic loss that is the result of a credit event. Importantly, economic losses suffered by bondholders due to changes in market conditions only are not considered defaults. Nor are losses due to price changes associated with a deterioration in the credit quality of the issuer, as long as the terms of the obligation are being met.

Category a) is objectively observable and easily related to the purpose of the definition, as stated above. When an obligor fails to make a payment on the scheduled payment date, bondholders suffer a monetary loss which is not due to a price change, but rather to a credit event. Although bondholders may be made whole at a later date, this is not known with certainty at the time of the missed payment, so that investors bear meaningful opportunity cost. Even if the indenture provides for a grace period, this merely allows the issuer to avoid legal proceedings if the payment is made up in time. It does not negate the loss suffered by investors. Moreover, because the obligor has failed to perform according to the original agreement, the fundamental relationship between bondholder and bond issuer has changed. Strict technical defaults, such as violations of covenants, while important, are not considered defaults by Moody's.

Category b) is similarly clear-cut. In countries in which there is a significant amount of public debt issuance, some type of legal bankruptcy code or process exists. In the US, we recognize both "straight" Chapter 11 filings and "pre-packaged" Chapter 11 filings, and Chapter 7 filings as bankruptcies. Outside the US, receivership, administration, or seizure by regulators are considered defaults under this category.

Category c) is the most subjective of the three classes of default and may apply in a wide variety of circumstances. A default which falls under the category of distressed exchange may be very subtly related to the particular details of the situation. By including distressed exchange as category of default, Moody's is not seeking to broaden the central idea of what constitutes a default. Rather, we are seeking both to include credit events that carry the same basic negative credit characteristics associated with non-payment and bankruptcy, but which have avoided these more extreme outcomes. One of the goals of including distressed exchanges in our default definition is simply to get the timing right. Many situations that ultimately result in non-payment or bankruptcy begin with distressed exchanges. In these cases, the distressed exchange can be thought of as the initial default event.

CALCULATING RATING TRANSITION & DEFAULT RATES

Weighted-Average Cumulative Default Rates

In this appendix we outline the methodology used to calculate default rates. Let $m_t^Y(R)$ be the number of issuers from the cohort composed of all outstanding issuers with rating R at the start of year Y ($Y=1970, 1971, \dots$) that defaulted in the t^{th} year after cohort Y was formed and let $n_t^Y(R)$ be the number of issuers from the same cohort that have not defaulted by year t . The weighted average marginal default rate $d_t(R)$ is the average issuer-weighted probability of default for R -rated issuers in their t^{th} year given no previous default.⁶ Formally, can be expressed as

$$d_t(R) = \frac{\sum_{Y=1970}^T m_t^Y(R)}{\sum_{Y=1970}^T n_t^Y(R)}, \text{ where } T = 1995 - t.$$

5. For an elaboration on distressed exchange defaults see the June 2000 special comment *Moody's Approach to Evaluating Distressed Exchanges*.

6. Since these and all default rates derived from these ones will be, in some sense, averages we will simply denote them by "average" rather than the more cumbersome "weighted average".

Here, T restricts the summations to only those cohorts for which t years of history are available. The weighted-average marginal survival rate, $(1 - d_t(R))$, is the probability of survival past the t^{th} year given survival past year $t-1$.

The t^{th} year average cumulative survival rate for rating R , denoted here by $S_t(R)$, is the probability that an issuer does not default by year t . It is found by taking the product of the intervening average marginal survival rates

$$S_t(R) = \prod_{i=1}^t (1 - d_i(R))$$

We denote the weighted-average cumulative default rate for a given rating category R and a given number of years t , by $D_t(R)$. It estimates the fraction of an initial population of issuers that has historically defaulted within t years after having the specified rating R . As the average cumulative survival rate is the probability that an issuer has not defaulted in each year leading up to t , the average cumulative default rate is its complement

$$D_t(R) = 1 - S_t(R)$$

Specifically $D_t(R)$, summarizes historical default experience through the t^{th} year as a function of marginal default rates. In particular, the one-year average cumulative default rate equals the one-year average marginal default rate: $D_1(R) = d_1(R)$

The above specification provides a simple means to convert a T -year cumulative default rate into an average one-year default rate. That is, in the special case where the marginal default rate is assumed to be the same year over year, (i.e., $d_j(R) = d_k(R)$ for all values of j and k), we have

$$d(R) = 1 - [1 - D_t(R)]^{1/t}$$

Cumulative Default Rates

The cumulative default rates, shown in Exhibit X of Appendix II, are not weighted by cohort size. For the cohort formed in year Y , the t^{th} year cumulative default rate for rating category R , denoted by $C_t^Y(R)$, is the fraction of all issuers rated R when cohort Y was formed that defaulted by year t . Using the notation introduced above,

$$C_t^Y(R) = \frac{\sum_{i=1}^t m_i^Y(R)}{n_0^Y(R)}$$

Where $n_0^Y(R)$ is the total number of issuers with rating R at the start of year Y .

Average Cumulative Loss Rates

The methods used to calculate average marginal and average cumulative default rates generalize to loss rates. Loss rates factor in the severity of default in addition to the likelihood of default. We denote the recovery rate in the event of default by the symbol μ and note that the severity rate is simply $(1-\mu)$. Algebraically, the expected loss is the product of the probability of default and the severity of default. In particular, the average marginal loss rate $l_t(R)$ for any period t is the product

$$l_t(R) = d_t(R)(1 - \mu)$$

Extending our definition of the average cumulative default rate, we define the average cumulative loss rate $L_t(R)$

$$L_t(R) = 1 - \prod_{i=1}^t (1 - l_i(R))$$

Note that $L_t(R)$ represents the expected loss of principal and coupon (as a fraction of par) by period t . It is not a statement as to the present value of future losses. Exhibit X above depicts the behavior of average cumulative loss rates, by rating category, for investment horizons spanning 1 to 20 years where a fixed recovery rate of 42¢ on the dollar is assumed.

Cumulative loss rates with time varying recovery rates can be calculated by weighting the numerators of the marginal default rate in each period t with the appropriate annual average loss severity rate $(1 - \mu_t)$. Constructed in the terms defined above:

$$l_t(R) = d_t(R)(1 - \mu_t)$$

MOODY'S APPROACH TO FORECASTING DEFAULT RATES

In this section we briefly outline the model and its explanatory variables with the hope that transparency will help investors understand how the model works and what the forecast means. We also hope that it will dispel some misunderstandings and misperceptions about the model. The full detail and specification of Moody's default rate forecasting model was presented in the August 1999 special comment *Predicting Default Rates: a Forecasting Model for Moody's Issuer-Based Default Rates*. Investors wanting a deeper understanding of the model are recommended to read that report.

Most of the total variation and nearly all of the short term variation in default rates comes from changes in the number of defaulters over the past year, which is represented in the numerator in equation (1). The denominator, consisting of the gross number of issuers minus the average number of withdrawals over the past 12 month, is a less volatile time series. In fact, the gross number of issuers in the denominator is known with complete certainty twelve months in advance in our framework.

Fortunately, there is a fairly stable historical relationship between the gross issuer count — the known quantity — and the adjustments. The adjustments have averaged about 4% and 2% for the speculative-grade and all-corporate categories, respectively. We therefore simply extrapolate this percentage using a simple autoregressive model to forecast the withdrawal adjustments over the known component of the denominators.

With the denominator of the default rate forecast to a high degree of reliability, we can turn our attention to forecasting separately the terms of the summand in the numerator (the number of defaults we expect to occur in forward months). These are the specific unknown quantities with which we can project the issuer-based default rate 12 months into the future.

To predict default counts, we need a statistical technique that will efficiently model non-negative integer values as a function of a set of explanatory variables. Because the number of potential defaulters is known, and because we can assume that the correlation of default events is small, the multinomial distribution would be a natural basis for such a model. In this case however, the number of defaults represents only a small fraction of the number of issuers, and so the multinomial distribution will be asymptotic to the Poisson distribution, which is easily represented in a regression model.

Our model assumes that each month's count of bond defaulters is drawn from a Poisson distribution with parameter lambda:

$$\Pr(Y_i = y_i) = \frac{e^{-\lambda_i} \lambda_i^{y_i}}{y_i!}, y_i = 0, 1, 2, \dots \quad (1)$$

Thus, the probability that the number of speculative-grade defaulters in May is n , for example, is given by

$$\Pr(Y_{Spec,May} = n) = \frac{e^{-\lambda_{Spec,May}} \lambda_{Spec,May}^n}{n!}. \quad (2)$$

The mean of the Poisson distribution is λ and its standard deviation is $\lambda^{1/2}$. Thus, (dropping the “spec” subscript for convenience) we want to find a formula for estimating λ_i — the Poisson parameter in each month i .

A good estimator for λ_i is one that makes the expected number of defaults in each month, using equation (1), as close as possible to the number of defaults that actually occurred. In order for the model to be a forecasting model, we can only use lagged observable variables in constructing our estimator for λ_i .

We use the log-linear version of the model, in which the log of λ_i is a linear function of other variables, i.e.:

$$\ln \lambda_i = \beta' x_i \quad (3)$$

where x_i is a vector of explanatory variables, and β is a set of coefficients which is estimated using maximum-likelihood.

The log-linear formulation induces additivity on the right hand side of equation (4), which allows us to obtain separate coefficients for each variable we include. For example, if the model includes two variables — the percentage of issuers with speculative-grade ratings and industrial production — we would have

$$\ln \lambda_i = \beta_1 * \%speculative - grade + \beta_2 * industrial \ production \quad (4)$$

The current specification of Moody’s default forecasting model includes six variables plus an intercept and interaction terms. The model includes:

1. Percent of the corporate bond universe rated speculative grade
2. Percent of the speculative grade universe rated Ba or below
3. Real Industrial Production (i.e. IP deflated by the Producer Price Index) trend
4. New speculative-grade issuers lagged count
5. Ten year Treasury (nominal) yield
6. Treasury bond-bill spread (10 year — 90 day)

Moody’s default forecasting model also accounts for the well-known aging effect. This theory posits that the hazard rate of default is a function of time in the market for new issuers. For each issuer, the theory goes, a critical period will be reached when the success of the enterprise is most uncertain and, consequently, the risk of default is at a maximum. If the issuer’s plans are successfully implemented and begin to generate sufficient revenues to pay down the debt, the critical period has been survived and the probability of default falls.

Using our historical default database of defaulters, we found that the hazard rate of default did indeed start low, rising rapidly to a peak at about four years, then decreasing almost as rapidly out to about 10 years. We therefore account for the effect of lagged new issuance by including in the regression a weighted sum of lagged new issuer counts (variable 4 in the list above), where the weights are given by a smoothed historical hazard rate curve. We incorporate the same weighted sum of total new speculative-grade issuer counts into the forecasting equations for both the all-corporate and speculative-grade default rate series.

Appendix II: Statistical Tables of Default & Recovery

Exhibit 25 - Chronological List of Moody's-Rated Bond Defaults in 2001

Company	Volume	Default Event	Domain	Industry
January				
Renco Metals, Inc.	\$150.00	Missed interest payment	United States	Metals & Mining
Vlasic Foods International Inc.	\$200.00	Missed interest payment	United States	Beverage, Food, & Tobacco
Waste Systems International, Inc.	\$87.70	Missed interest payment	United States	Miscellaneous
G-I Holdings Inc.	\$0.13	Chapter 11	United States	Chemicals, Plastics, & Rubber
HighwayMaster Communications, Inc.	\$125.00	Distressed exchange	United States	Telecommunications
WEC Company	\$130.00	Missed interest payment	United States	Machinery
Ainsworth Lumber Co. Ltd.	\$225.00	Grace period default	Canada	Forest Products & Paper
Bayan Telecommunications, Inc.	\$200.00	Missed interest payment	Philippines	Telecommunications
Holt Group, Inc.(The)	\$140.00	Missed interest payment	United States	Cargo Transportation & Shipping
CFP Holdings, Inc.	\$115.00	Missed interest payment	United States	Beverage, Food, & Tobacco
Chiquita Brands International, Inc.	\$887.00	Suspension of payments	United States	Beverage, Food, & Tobacco
FRD Acquisition Co.	\$156.90	Missed interest payment	United States	Hotels, Casinos, & Gaming
Globalstar, L.P.	\$1,450.00	Suspension of payments	United States	Telecommunications
NorthPoint Communications Group, Inc.	\$400.00	Chapter 11	United States	Telecommunications
Southern California Edison Company	\$3,578.77	Missed principal and interest payments	United States	Electric Utilities
Pacific Gas & Electric Company	\$4,972.29	Missed principal and interest payments	United States	Electric Utilities
Fujian International Trust & Investment Corp.	\$120.47	Missed interest payment	China	Banking
Pacific Aerospace & Electronics, Inc.	\$75.00	Missed interest payment	United States	Aerospace & Defense
Prandium, Inc.	\$409.36	Missed interest payment	United States	Hotels, Casinos, & Gaming
Volume (US\$ Millions)	\$13,422.61			
Count	19			
February				
Consumers International Inc.	\$170.00	Missed interest payment	Canada	Containers, Packaging, & Glass
Consumers Packaging Inc.	\$122.28	Missed interest payment	Canada	Containers, Packaging, & Glass
First Wave Marine, Inc.	\$90.00	Missed interest payment	United States	Oil & Gas
Loews Cineplex Entertainment Corporation	\$300.00	Missed interest payment	United States	Leisure, Amusement, & Entertainment
Tjiwi Kimia Finance Mauritius Limited	\$600.00	Missed interest payment	Indonesia	Forest Products & Paper
Tjiwi Kimia International Finance Company BV	\$200.00	Grace period default	Indonesia	Forest Products & Paper
REV Holdings Inc.	\$770.00	Distressed exchange	United States	Nondurable Consumer Products
Sunbeam Corporation	\$2,029.28	Chapter 11	United States	Miscellaneous Manufacturing
GS Technologies Operating Co., Inc.	\$250.00	Chapter 11	United States	Metals & Mining
Russell-Stanley Holdings, Inc.	\$150.00	Missed interest payment	United States	Chemicals, Plastics, & Rubber
James Cable Partners L.P.	\$100.00	Grace period default	United States	Printing, Publishing, &
Broadcasting				
Frank's Nursery & Crafts, Inc.	\$115.00	Chapter 11	United States	Retail
FINOVA Capital Corporation	\$6,304.69	Payment moratorium	United States	Financial (Non-Bank)
Volume (US\$ Millions)	\$11,201.25			
Count	13			
March				
RSL Communications PLC	\$1,636.77	Missed interest payment	Bermuda	Telecommunications
U.S. Office Products Company	\$406.83	Chapter 11	United States	Miscellaneous Manufacturing
APP China Group Limited	\$403.00	Suspension of payments	China	Forest Products & Paper
APP Finance (IX) Limited	\$506.20	Suspension of payments	Mauritius	Financial (Non-Bank)
APP Finance (VI) Mauritius Limited	\$1,437.50	Suspension of payments	Mauritius	Financial (Non-Bank)
APP Finance (VII) Mauritius Limited	\$499.98	Suspension of payments	Mauritius	Financial (Non-Bank)
APP Global Finance (III) Cayman Limited	\$638.00	Suspension of payments	Cayman Islands	Forest Products & Paper
APP Global Finance Ltd.	\$51.45	Suspension of payments	Singapore	Financial (Non-Bank)
APP International Finance (Mauritius) Limited	\$122.40	Suspension of payments	Mauritius	Forest Products & Paper
APP International Finance Company B.V.	\$464.11	Suspension of payments	Indonesia	Financial (Non-Bank)
Indah Kiat Finance Mauritius Limited	\$600.00	Suspension of payments	Indonesia	Forest Products & Paper
Indah Kiat International Finance Company B.V.	\$350.00	Suspension of payments	Indonesia	Forest Products & Paper
Indah Kiat Pulp & Paper Corporation (P.T.)	\$82.14	Suspension of payments	Indonesia	Forest Products & Paper
Pindo Deli Finance Mauritius Limited	\$750.00	Suspension of payments	Indonesia	Forest Products & Paper
Doskocil Manufacturing Company, Inc.	\$85.00	Missed interest payment	United States	Chemicals, Plastics, & Rubber
Centaur Mining & Exploration Limited	\$225.00	Placed under administration	Australia	Metals & Mining
Telex Communications, Inc.	\$225.00	Missed interest payment	United States	Electronics
Friede Goldman Halter, Inc.	\$185.00	Missed interest payment	United States	Construction, Building, & Real Estate
Metrocall, Inc.	\$533.66	Missed interest payment	United States	Telecommunications
Trans-Resources, Inc.	\$235.00	Missed interest payment	United States	Chemicals, Plastics, & Rubber
Silverleaf Resorts, Inc.	\$75.00	Missed interest payment	United States	Miscellaneous
Drug Emporium, Inc.	\$47.92	Chapter 11	United States	Retail
Advanced Radio Telecom Corp.	\$135.00	Chapter 11	United States	Telecommunications
Thermadyne Holdings Corporation	\$1,049.50	Missed interest payment	United States	Machinery
Volume (US\$ Millions)	\$10,744.47			

Exhibit 25 - Chronological List of Moody's-Rated Bond Defaults in 2001

Company	Volume	Default Event	Domain	Industry
Count	24			
April				
Paragon Corporate Holdings Inc.	\$115.00	Missed interest payment	United States	Automobile
CMI Industries Inc.	\$75.16	Missed interest payment	United States	Textiles, Leather, & Apparel
Grace, W.R. & Co.- Conn.	\$5.72	Chapter 11	United States	Chemicals, Plastics, & Rubber
Borden Chemicals & Plastics Operating L.P.	\$200.00	Chapter 11	United States	Chemicals, Plastics, & Rubber
Washington Group International Inc. Estate	\$300.00	Missed principal payment	United States	Construction, Building, & Real
Viatel, Inc.	\$1,950.27	Missed interest payment	United States	Telecommunications
Fountain View, Inc. Childcare	\$120.00	Missed interest payment	United States	Healthcare, Education, &
Cammell Laird Holdings plc	\$111.68	Missed interest payment	United Kingdom	Cargo Transportation & Shipping
Diamond Brands Incorporated	\$84.00	Missed interest payment	United States	Nondurable Consumer Products
Diamond Brands Operating Corp.	\$100.00	Missed interest payment	United States	Nondurable Consumer Products
SIMCALA, Inc.	\$75.00	Grace period default	United States	Metals & Mining
WinStar Communications, Inc.	\$2,188.40	Missed interest payment	United States	Telecommunications
WinStar Equipment Corp.	\$0.32	Chapter 11	United States	Telecommunications
Algoma Steel Inc.	\$368.75	Bankruptcy	Canada	Metals & Mining
Enterprises Shipholding Corporation	\$175.00	Missed interest payment	Greece	Cargo Transportation & Shipping
Volume (US\$ Millions)	\$5,869.31			
Count	15			
May				
Dade Behring Childcare	\$350.00	Missed interest payment	United States	Healthcare, Education, &
Merrill Corporation	\$140.00	Missed interest payment	United States	Nondurable Consumer Products
Motor Coach Industries International, Inc.	\$152.25	Grace period default	United States	Cargo Transportation & Shipping
PSINet Inc.	\$2,897.38	Missed interest payment	United States	Telecommunications
Grove Holdings LLC Estate	\$88.00	Chapter 11	United States	Construction, Building, & Real
Grove Worldwide LLC Estate	\$225.00	Prepackaged Chapter 11	United States	Construction, Building, & Real
Derby Cycle Corporation (The)	\$149.15	Missed interest payment	United States	Leisure, Amusement, & Entertainment
International Knife & Saw, Inc.	\$90.00	Missed interest payment	United States	Machinery
Casual Male Corp.	\$70.00	Chapter 11	United States	Retail
Teligent, Inc.	\$740.00	Chapter 11	United States	Telecommunications
PageMart Wireless, Inc.	\$523.41	Chapter 11	United States	Telecommunications
Marketing Specialists Corp.	\$100.00	Chapter 11	United States	Beverage, Food, & Tobacco
Volume (US\$ Millions)	\$5,525.19			
Count	12			
June				
AmeriKing, Inc.	\$100.00	Missed interest payment	United States	Hotels, Casinos, & Gaming
Avado Brands, Inc.	\$225.00	Missed interest payment	United States	Hotels, Casinos, & Gaming
Global Telesystems Europe B.V.	\$960.17	Missed interest payment	Belgium	Telecommunications
Sheffield Steel Corporation	\$110.00	Missed interest payment	United States	Metals & Mining
Thermadyne Mfg. LLC	\$207.00	Missed interest payment	United States	Machinery
Viskase Companies, Inc.	\$678.66	Missed interest payment	United States	Containers, Packaging, & Glass
EnviroSource Inc.	\$325.45	Missed interest payment	United States	Miscellaneous
360networks, Inc.	\$1,446.76	Missed interest payment	Canada	Telecommunications
Color Spot Nurseries, Inc.	\$100.00	Missed interest payment	United States	Nondurable Consumer Products
Epic Resorts LLC	\$130.00	Missed interest payment	United States	Hotels, Casinos, & Gaming
Pycsa Panama, S.A.	\$125.17	Missed interest payment	Panama	Consumer Transportation
Advance Agro Public Company Limited	\$60.00	Missed principal and interest payments	Thailand	Forest Products & Paper
Burke Industries, Inc.	\$140.00	Chapter 11	United States	Aerospace & Defense
USG Corporation Estate	\$1,810.10	Chapter 11	United States	Construction, Building, & Real
Imperial Credit Industries, Inc. Estate	\$176.87	Distressed exchange	United States	Construction, Building, & Real
Leiner Health Products Group Inc.	\$85.00	Missed interest payment	United States	Nondurable Consumer Products
Volume (US\$ Millions)	\$6,680.18			
Count	16			

Exhibit 25 - Chronological List of Moody's-Rated Bond Defaults in 2001

Company	Volume	Default Event	Domain	Industry
July				
Global TeleSystems Group, Inc.	\$571.90	Missed interest payment	United Kingdom	Telecommunications
AMRESKO, INC. Estate	\$362.33	Chapter 11	United States	Construction, Building, & Real
Arch Communications, Inc.	\$502.00	Missed interest payment	United States	Telecommunications
Metricom, Inc.	\$300.00	Chapter 11	United States	Telecommunications
Classic Cable, Inc. Broadcasting	\$466.50	Missed interest payment	United States	Printing, Publishing, &
Polaroid Corporation	\$575.00	Missed interest payment	United States	Leisure, Amusement, & Entertainment
HMT Technology Corporation	\$230.00	Missed interest payment	United States	Electronics
Brunner Mond Group plc	\$195.04	Missed interest payment	United Kingdom	Chemicals, Plastics, & Rubber
Comdisco, Inc. Estate	\$2,821.50	Chapter 11	United States	Construction, Building, & Real
Sterling Chemicals Holdings, Inc.	\$191.75	Chapter 11	United States	Chemicals, Plastics, & Rubber
Sterling Chemicals, Inc.	\$720.00	Chapter 11	United States	Chemicals, Plastics, & Rubber
Woods Equipment Company	\$51.93	Missed interest payment	United States	Machinery
Keystone Consolidated Industries, Inc.	\$100.00	Missed interest payment	United States	Metals & Mining
Dolphin Telecom plc	\$766.67	Bankruptcy	United Kingdom	Telecommunications
Coeur D'Alene Mines Corporation	\$123.41	Distressed exchange	United States	Metals & Mining
Pioneer Companies, Inc.	\$200.00	Chapter 11	United States	Chemicals, Plastics, & Rubber
Volume (US\$ Millions)	\$6,680.18			
Count	16			
August				
Delta Financial Corporation Estate	\$148.02	Missed interest payment	United States	Construction, Building, & Real
HCI Direct Inc.	\$70.00	Missed interest payment	United States	Nondurable Consumer Products
LLS Corp.	\$100.00	Missed interest payment	United States	Miscellaneous Manufacturing
Arch Wireless, Inc.	\$164.16	Missed interest payment	United States	Telecommunications
Rhythms NetConnections Inc.	\$915.00	Chapter 11	United States	Electronics
Mosler Inc.	\$115.00	Chapter 11	United States	Electronics
American Tissue Inc.	\$165.00	Cross default	United States	Forest Products & Paper
Aviation Sales Company	\$165.00	Missed interest payment	United States	Aerospace & Defense
Covad Communications Group, Inc.	\$1,400.00	Prepackaged Chapter 11	United States	Telecommunications
Multicanal S.A. Broadcasting	\$739.00	Missed principal payment	Argentina	Printing, Publishing, &
Ames Department Stores, Inc.	\$564.35	Chapter 11	United States	Retail
Enitel ASA	\$227.33	Bankruptcy	Norway	Telecommunications
Newcor, Inc.	\$125.00	Missed interest payment	United States	Automobile
Volume (US\$ Millions)	\$4,897.86			
Count	13			
September				
MCMS, Inc.	\$175.00	Missed interest payment	United States	Electronics
Zilog, Inc.	\$280.00	Missed interest payment	United States	Electronics
Telesystem International Wireless Inc.	\$547.00	Distressed exchange	Canada	Telecommunications
MYCAL Corporation	\$3,060.35	Bankruptcy	Japan	Retail
Ampex Corporation	\$44.00	Missed interest payment	United States	Electronics
Executone Information Systems, Inc.	\$16.30	Missed interest payment	United States	Telecommunications
Big City Radio, Inc. Broadcasting	\$174.00	Missed interest payment	United States	Printing, Publishing, &
Dairy Mart Convenience Stores, Inc.	\$90.00	Missed interest payment	United States	Retail
Railworks Corporation	\$175.00	Chapter 11	United States	Cargo Transportation & Shipping
Phar-Mor, Inc.	\$92.70	Chapter 11	United States	Retail
Exodus Communications, Inc.	\$2,817.19	Chapter 11	United States	Electronics
Aladdin Gaming Holdings, LLC	\$221.50	Chapter 11	United States	Hotels, Casinos, & Gaming
At Home Corporation Broadcasting	\$937.00	Chapter 11	United States	Printing, Publishing, &
Volume (US\$ Millions)	\$8,630.03			
Count	13			

Exhibit 25 - Chronological List of Moody's-Rated Bond Defaults in 2001

Company	Volume	Default Event	Domain	Industry
October				
Federal-Mogul Corporation	\$2,784.00	Chapter 11	United States	Automobile
Pentacon, Inc.	\$100.00	Grace period default	United States	Aerospace & Defense
Quality Stores, Inc.	\$105.00	Missed interest payment	United States	Beverage, Food, & Tobacco
Spalding Holdings Corporation	\$200.00	Missed interest payment	United States	Nondurable Consumer Products
Atlantic Telecom Group plc	\$294.82	Placed under administration	United Kingdom	Telecommunications
Bethlehem Steel Corporation	\$404.00	Chapter 11	United States	Metals & Mining
Kellstrom Industries, Inc.	\$140.25	Missed interest payment	United States	Aerospace & Defense
Spinnaker Industries, Inc.	\$51.10	Missed interest payment	United States	Miscellaneous
Polestar Corporation plc	\$201.35	Distressed exchange	United Kingdom	Printing, Publishing, &
Broadcasting				
Focal Communications Corp.	\$545.00	Distressed exchange	United States	Telecommunications
Trump Atlantic City Associates	\$1,300.00	Grace period default	United States	Hotels, Casinos, & Gaming
Trump's Castle Funding, Inc.	\$714.92	Grace period default	United States	Hotels, Casinos, & Gaming
Volume (US\$ Millions)	\$6,840.43			
Count	12			
November				
HomeBase Inc.	\$90.20	Missed interest payment	United States	Retail
Benedek Communications Corp.	\$170.00	Missed interest payment	United States	Printing, Publishing, &
Broadcasting				
Condor Systems, Inc.	\$100.00	Chapter 11	United States	Aerospace & Defense
Netia Holdings II B.V.	\$368.04	Missed interest payment	Poland	Telecommunications
Lodgian Financing Corp.	\$200.00	Missed interest payment	United States	Hotels, Casinos, & Gaming
Metals USA, Inc.	\$200.00	Chapter 11	United States	Metals & Mining
NationsRent	\$175.00	Missed principal and interest payments	United States	Construction, Building, & Real
Estate				
Burlington Industries, Inc.	\$431.03	Chapter 11	United States	Textiles, Leather, & Apparel
Sleepmaster L.L.C.	\$115.00	Missed interest payment	United States	Nondurable Consumer Products
United Australia/Pacific, Inc.	\$492.87	Missed interest payment	United States	Printing, Publishing, &
Broadcasting				
Brokat Technologies AG	\$109.58	Bankruptcy	Germany	Electronics
XO Communications, Inc.	\$4,858.40	Suspension of payments	United States	Telecommunications
Huntsman Corporation	\$600.00	Missed interest payment	United States	Chemicals, Plastics, & Rubber
Huntsman Polymers Corporation	\$578.00	Missed interest payment	United States	Chemicals, Plastics, & Rubber
Industrias Metalurgicas Pescarmona	\$150.00	Missed interest payment	Argentina	Metals & Mining
Volume (US\$ Millions)	\$8,638.11			
Count	15			
December				
Clubhaus PLC	\$85.57	Missed interest payment	United Kingdom	Leisure, Amusement, & Entertainment
Weirton Steel Corporation	\$244.00	Missed interest payment	United States	Metals & Mining
Enron Corp.	\$9,859.89	Chapter 11	United States	Diversified/Conglomerate
Hayes Lemmerz International, Inc.	\$1,200.00	Chapter 11	United States	Automobile
Oxford Automotive, Inc.	\$200.00	Missed interest payment	United States	Automobile
Desa International, Inc.	\$130.00	Missed interest payment	United States	Miscellaneous
Jacobson Stores, Inc.	\$25.20	Missed interest payment	United States	Retail
Brill Media Company, LLC	\$105.00	Missed interest payment	United States	Printing, Publishing, &
Broadcasting				
Elektrim Finance B.V.	\$361.06	Missed principal and interest payments	United Kingdom	Financial (Non-Bank)
IMPSAT Fiber Networks, Inc.	\$650.00	Missed interest payment	Argentina	Telecommunications
Pen Holdings, Inc.	\$100.00	Missed interest payment	United States	Metals & Mining
ACINDAR Industria Argentina de Aceros S.A.	\$100.00	Suspension of payments	Argentina	Metals & Mining
Lodgian, Inc.	\$375.00	Chapter 11	United States	Hotels, Casinos, & Gaming
Loral Cyberstar, Inc.	\$929.00	Distressed exchange	United States	Telecommunications
ACT Manufacturing, Inc.	\$100.00	Chapter 11	United States	Electronics
Fortress Group, Inc. (The)	\$42.60	Distressed exchange	United States	Construction, Building, & Real
Estate				
Polymer Group, Inc.	\$591.50	Missed interest payment	United States	Textiles, Leather, & Apparel
American Commercial Lines LLC	\$300.00	Missed interest payment	United States	Cargo Transportation & Shipping
Volume (US\$ Millions)	\$15,398.81			
Count	18			

Exhibit 26 - Rating Transition Rates, 1970-2001; 2001 & 1-Year to 20-Year Horizon Averages

2001

Rating to:		Aaa	Aa	A	Baa	Ba	B	Caa-C	Default	WR
Rating from:	Aaa	89.91	0.92	0.00	0.00	0.00	0.00	0.00	0.00	9.17
	Aa	0.30	90.92	5.06	0.15	0.00	0.15	0.00	0.00	3.42
	A	0.25	2.30	86.69	6.57	0.33	0.16	0.16	0.16	3.37
	Baa	0.19	0.29	3.58	86.83	4.16	0.77	0.19	0.29	3.68
	Ba	0.00	0.00	1.16	6.55	75.53	8.86	1.16	1.16	5.59
	B	0.00	0.00	0.11	0.95	5.58	63.44	14.54	9.17	6.22
	Caa-C	0.00	0.00	0.00	0.00	0.00	2.34	54.69	30.47	12.50

1-Year Average

Rating to:		Aaa	Aa	A	Baa	Ba	B	Caa-C	Default	WR
Rating from:	Aaa	89.09	7.15	0.79	0.00	0.02	0.00	0.00	0.00	2.94
	Aa	1.17	88.00	7.44	0.27	0.08	0.01	0.00	0.02	3.01
	A	0.05	2.41	89.01	4.68	0.49	0.12	0.01	0.01	3.21
	Baa	0.05	0.25	5.20	84.55	4.51	0.69	0.09	0.15	4.51
	Ba	0.02	0.04	0.47	5.17	79.35	6.23	0.42	1.19	7.11
	B	0.01	0.02	0.13	0.38	6.24	77.82	2.40	6.34	6.67
	Caa-C	0.00	0.00	0.00	0.57	1.47	3.81	62.90	23.69	7.56

2-Year Average

Rating to:		Aaa	Aa	A	Baa	Ba	B	Caa-C	Default	WR
Rating from:	Aaa	79.12	13.20	1.80	0.04	0.17	0.02	0.00	0.00	5.66
	Aa	2.35	77.00	13.28	0.98	0.25	0.03	0.01	0.03	6.05
	A	0.10	4.64	79.33	8.03	1.18	0.29	0.04	0.06	6.33
	Baa	0.10	0.52	9.50	71.74	7.09	1.43	0.22	0.43	8.96
	Ba	0.04	0.06	0.89	8.93	62.90	9.45	0.72	2.98	14.02
	B	0.01	0.04	0.18	0.92	9.91	62.08	2.81	10.91	13.13
	Caa-C	0.00	0.00	0.03	1.14	2.47	6.18	44.41	31.61	14.16

3-Year Average

Rating to:		Aaa	Aa	A	Baa	Ba	B	Caa-C	Default	WR
Rating from:	Aaa	70.28	18.12	2.63	0.12	0.39	0.06	0.00	0.00	8.40
	Aa	3.36	67.31	17.91	1.66	0.49	0.08	0.01	0.07	9.11
	A	0.16	6.20	71.10	10.52	1.83	0.41	0.09	0.18	9.51
	Baa	0.14	0.88	12.47	61.76	8.40	1.96	0.33	0.78	13.28
	Ba	0.06	0.09	1.57	11.00	50.20	10.92	0.86	4.85	20.46
	B	0.02	0.06	0.18	1.55	12.30	48.99	2.52	14.65	19.74
	Caa-C	0.00	0.00	0.06	0.79	4.21	7.36	31.95	36.41	19.21

4-Year Average

Rating to:		Aaa	Aa	A	Baa	Ba	B	Caa-C	Default	WR
Rating from:	Aaa	62.51	21.61	3.69	0.18	0.52	0.14	0.00	0.05	11.32
	Aa	4.07	58.91	21.08	2.66	0.72	0.16	0.03	0.17	12.20
	A	0.21	7.39	64.16	12.38	2.37	0.56	0.13	0.30	12.50
	Baa	0.18	1.21	14.48	53.74	9.18	2.30	0.31	1.24	17.35
	Ba	0.08	0.18	2.24	12.09	40.64	11.13	0.77	6.56	26.32
	B	0.04	0.07	0.25	2.40	13.34	38.48	2.07	17.34	26.00
	Caa-C	0.00	0.00	0.00	1.54	5.00	8.04	22.76	40.01	22.65

Exhibit 26 - Rating Transition Rates, 1970-2001; 2001 & 1-Year to 20-Year Horizon Averages

5-Year Average

Rating to:		Aaa	Aa	A	Baa	Ba	B	Caa-C	Default	WR
Rating from:	Aaa	55.98	23.28	4.95	0.49	0.49	0.16	0.09	0.13	14.43
	Aa	4.51	51.98	23.30	3.58	0.94	0.28	0.01	0.28	15.12
	A	0.26	8.15	58.34	13.65	2.95	0.75	0.14	0.44	15.33
	Baa	0.23	1.61	15.81	47.09	9.56	2.42	0.30	1.63	21.35
	Ba	0.09	0.25	2.90	12.61	33.03	10.60	0.67	8.18	31.66
	B	0.05	0.07	0.53	2.92	13.25	30.40	1.58	19.55	31.64
	Caa-C	0.00	0.00	0.00	2.23	6.14	7.66	16.18	41.90	25.90

10-Year Average

Rating to:		Aaa	Aa	A	Baa	Ba	B	Caa-C	Default	WR
Rating from:	Aaa	31.28	28.22	9.63	2.61	0.85	0.11	0.05	0.71	26.55
	Aa	5.23	28.56	28.55	7.86	2.46	0.52	0.10	0.97	25.75
	A	0.39	10.49	38.87	15.24	4.32	1.59	0.20	1.37	27.52
	Baa	0.17	2.62	17.43	26.23	8.10	2.91	0.23	3.77	38.53
	Ba	0.23	0.76	5.62	11.54	11.32	6.90	0.54	14.34	48.74
	B	0.05	0.01	1.79	4.23	9.22	9.65	0.48	27.83	46.74
	Caa-C	0.00	0.00	0.00	4.49	1.60	1.70	2.36	53.16	36.70

20-Year Average

Rating to:		Aaa	Aa	A	Baa	Ba	B	Caa-C	Default	WR
Rating from:	Aaa	20.33	37.99	13.30	1.69	0.00	0.37	0.58	2.33	23.41
	Aa	2.12	9.32	27.88	15.96	4.33	0.83	0.12	2.27	37.17
	A	0.08	9.18	23.09	15.77	3.49	1.80	0.24	3.78	42.57
	Baa	0.17	2.30	15.45	11.53	2.29	1.34	0.47	7.48	58.95
	Ba	0.00	0.59	6.44	8.71	2.14	1.69	0.07	18.77	61.60
	B	0.00	0.00	4.85	2.78	2.41	0.68	0.00	26.50	62.79
	Caa-C	0.00	0.00	8.65	0.00	0.00	0.00	0.00	55.40	35.95

Exhibit 27 - Annual Default Rates by Rating, 1970-2001

(Percent)	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.00
Baa	0.28	0.00	0.00	0.47	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.31	0.00	0.37	0.00
Ba	4.19	0.43	0.00	0.00	0.00	1.04	1.03	0.53	1.10	0.49	0.00	0.00	2.78	0.94	0.87	1.80
B	22.78	3.85	7.14	3.77	6.90	5.97	0.00	3.28	5.41	0.00	5.06	4.49	2.41	6.31	6.72	8.22
Caa-C	53.33	13.33	40.00	44.44	0.00	0.00	0.00	50.00	0.00	0.00	33.33	0.00	27.27	44.44	100.00	0.00
Investment-Grade	0.14	0.00	0.00	0.24	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.22	0.00	0.10	0.00
Speculative-Grade	9.22	1.12	1.90	1.26	0.89	1.76	0.88	1.36	1.80	0.42	1.63	0.71	3.61	3.91	3.41	3.96
All Corporate	2.81	0.29	0.47	0.47	0.19	0.37	0.18	0.36	0.37	0.09	0.36	0.17	1.07	0.99	0.95	1.10

(Percent)	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aa	0.00	0.00	0.00	0.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17
Baa	1.36	0.00	0.00	0.61	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.11	0.39	0.30
Ba	1.78	2.76	1.26	3.00	3.37	5.43	0.31	0.57	0.24	0.70	0.00	0.19	0.64	1.03	0.91	1.19
B	11.80	6.27	6.10	9.29	16.18	14.56	9.05	5.86	3.96	4.99	1.49	2.16	4.15	5.88	5.42	9.35
Caa-C	23.53	20.00	28.57	33.33	53.33	36.84	27.91	30.00	5.26	12.07	13.99	14.67	15.09	20.05	18.15	32.50
Investment-Grade	0.33	0.00	0.00	0.31	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0.14	0.17
Speculative-Grade	5.54	4.28	3.50	6.07	9.90	10.47	4.98	3.61	1.99	3.41	1.70	2.09	3.43	5.65	5.88	10.22
All Corporate	1.92	1.57	1.37	2.55	3.73	3.45	1.42	1.02	0.61	1.10	0.54	0.68	1.26	2.20	2.34	3.77

Exhibit 28 - Annual Default Rates by Alpha-Numeric Rating, 1983-2001

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aa1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aa2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aa3	0.00	0.00	0.00	0.00	0.00	0.00	1.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44
A3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Baa1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57
Baa2	0.00	0.00	0.00	0.00	0.00	0.00	0.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28
Baa3	0.00	1.14	0.00	5.00	0.00	0.00	1.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	1.02	0.00
Ba1	0.00	1.20	0.00	0.00	3.82	0.00	0.79	2.68	1.10	0.00	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.52
Ba2	0.00	1.72	1.69	1.23	0.97	0.00	1.83	2.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.00	1.42
Ba3	2.65	0.00	3.81	3.48	2.98	2.59	4.77	4.00	10.20	0.75	0.77	0.61	1.77	0.00	0.48	1.14	2.02	1.06	1.76
B1	0.00	5.84	4.38	7.61	4.96	4.36	5.81	8.54	5.86	1.01	3.35	1.99	4.57	1.21	0.00	1.88	3.35	3.31	3.29
B2	10.00	18.75	7.41	16.67	4.30	7.14	9.79	22.36	12.90	1.59	5.22	3.85	6.67	0.00	1.59	7.67	6.61	4.14	10.89
B3	17.91	2.90	13.86	16.07	10.37	9.72	19.55	29.11	28.42	24.84	11.29	8.05	4.15	3.39	7.43	5.59	9.68	10.68	15.82
Caa-C	44.44	100.00	0.00	23.53	20.00	28.57	33.33	53.33	36.84	27.91	30.00	5.26	12.07	13.99	14.67	15.09	20.05	18.15	32.50
Investment-Grade	0.00	0.10	0.00	0.33	0.00	0.00	0.31	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0.14	0.17
Speculative-Grade	3.91	3.41	3.96	5.54	4.28	3.50	6.07	9.90	10.47	4.98	3.61	1.99	3.41	1.70	2.09	3.43	5.65	5.88	10.22
All Corporates	0.99	0.95	1.10	1.92	1.57	1.37	2.55	3.73	3.45	1.42	1.02	0.61	1.10	0.54	0.68	1.26	2.20	2.34	3.77

Exhibit 29 - Annual Default Rate Descriptive Statistics, 1970-2001

(Percent)	Minimum	1st Quartile	Median	Mean	StDev	3rd Quartile	Maximum
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aa	0.00	0.00	0.00	0.02	0.12	0.00	0.69
A	0.00	0.00	0.00	0.01	0.06	0.00	0.27
Baa	0.00	0.00	0.00	0.15	0.28	0.28	1.36
Ba	0.00	0.30	0.89	1.21	1.33	1.39	5.43
B	0.00	3.93	5.87	6.53	4.66	7.41	22.78
Caa-C	0.00	10.37	21.79	24.73	21.79	34.21	100.00
Investment-Grade	0.00	0.00	0.00	0.06	0.10	0.10	0.33
Speculative-Grade	0.42	1.68	3.42	3.77	2.87	5.12	10.47
All Corporate	0.09	0.37	1.01	1.24	1.07	1.65	3.77

Exhibit 30 - Annual Credit Loss Rate Descriptive Statistics, 1982-2001*

(Percent)	Minimum	1st Quartile	Median	Mean	StDev	3rd Quartile	Maximum
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aa	0.00	0.00	0.00	0.02	0.09	0.00	0.42
A	0.00	0.00	0.00	0.01	0.04	0.00	0.17
Baa	0.00	0.00	0.00	0.12	0.20	0.18	0.81
Ba	0.00	0.37	0.58	0.88	0.80	1.21	3.17
B	0.87	2.85	3.68	4.15	2.25	5.29	9.34
Caa-C	0.00	8.71	14.25	16.43	12.99	19.29	61.86
Investment-Grade	0.00	0.00	0.00	0.04	0.07	0.07	0.20
Speculative-Grade	1.01	2.05	2.35	2.89	1.52	3.41	6.10
All Corporate	0.33	0.60	0.79	1.01	0.61	1.35	2.28

* Does not adjust for differential recovery rates between investment-grade and non-investment-grade shown in Exhibit 20.

Exhibit 31 - Average Cumulative Default Rates by Alpha-Numeric Rating, 1983-2001

	1	2	3	4	5	6	7	8	9	10
Aaa	0.00	0.00	0.00	0.07	0.22	0.31	0.41	0.53	0.53	0.53
Aa1	0.00	0.00	0.00	0.23	0.23	0.38	0.38	0.38	0.38	0.38
Aa2	0.00	0.00	0.06	0.19	0.42	0.51	0.61	0.73	0.88	1.05
Aa3	0.05	0.09	0.16	0.24	0.34	0.46	0.46	0.46	0.46	0.58
A1	0.00	0.02	0.27	0.43	0.54	0.67	0.73	0.86	0.93	1.02
A2	0.04	0.10	0.28	0.57	0.77	0.98	1.12	1.51	1.83	1.98
A3	0.00	0.11	0.21	0.29	0.42	0.64	0.96	1.03	1.22	1.34
Baa1	0.12	0.40	0.69	1.10	1.52	1.81	2.16	2.37	2.50	2.50
Baa2	0.09	0.39	0.76	1.46	2.18	2.98	3.68	4.20	4.96	5.87
Baa3	0.37	0.88	1.51	2.47	3.26	4.40	5.57	6.72	7.45	8.33
Ba1	0.62	2.03	3.68	5.83	7.67	9.51	10.76	11.99	12.73	13.85
Ba2	0.62	2.43	4.75	7.33	9.55	11.27	13.29	14.81	15.96	16.33
Ba3	2.43	6.81	11.95	16.64	21.04	25.46	29.23	33.25	37.12	39.80
B1	3.47	9.81	15.99	21.64	27.26	32.49	38.27	42.19	45.98	49.66
B2	7.18	15.65	22.96	28.87	33.57	36.80	39.43	41.18	42.33	43.76
B3	12.45	21.81	29.63	35.80	41.13	45.05	47.94	52.04	55.72	57.35
Caa-C	21.61	34.23	44.04	52.18	57.44	62.52	66.37	71.17	75.61	80.49
Investment-Grade	0.06	0.20	0.40	0.69	0.96	1.25	1.51	1.77	2.00	2.21
Speculative-Grade	3.99	9.07	13.96	18.33	22.23	25.64	28.72	31.39	33.70	35.50
All Corporate	1.34	3.02	4.62	6.04	7.24	8.27	9.17	9.92	10.56	11.07

Exhibit 32 - Average Cumulative Default Rates by Letter Rating, 1970-2001

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Aaa	0.00	0.00	0.00	0.04	0.14	0.25	0.37	0.49	0.64	0.79	0.96	1.15	1.36	1.48	1.60	1.74	1.88	2.03	2.03	2.03
Aa	0.02	0.04	0.08	0.20	0.31	0.44	0.56	0.69	0.79	0.89	1.01	1.18	1.37	1.64	1.76	1.90	2.13	2.31	2.62	2.87
A	0.02	0.07	0.21	0.35	0.51	0.68	0.87	1.07	1.32	1.57	1.84	2.09	2.38	2.62	2.97	3.35	3.78	4.30	4.88	5.44
Baa	0.15	0.46	0.87	1.44	1.95	2.54	3.16	3.75	4.40	5.09	5.85	6.64	7.42	8.23	9.10	9.94	10.76	11.48	12.05	12.47
Ba	1.27	3.57	6.20	8.83	11.42	13.75	15.63	17.58	19.46	21.27	23.23	25.36	27.38	29.14	30.75	32.62	34.24	35.68	36.88	37.97
B	6.66	13.99	20.51	26.01	31.00	35.15	39.11	42.14	44.80	47.60	49.65	51.23	52.91	54.70	55.95	56.73	57.20	57.20	57.20	57.20
Caa-C	21.99	34.69	44.34	51.85	56.82	62.07	66.61	71.18	74.64	77.31	80.55	80.55	80.55	80.55	80.55	80.55	80.55	80.55	80.55	80.55
Investment-Grade	0.06	0.19	0.38	0.65	0.90	1.19	1.50	1.81	2.15	2.51	2.89	3.30	3.72	4.15	4.60	5.08	5.58	6.07	6.55	6.96
Speculative-Grade	4.73	9.55	13.88	17.62	20.98	23.84	26.25	28.42	30.40	32.31	34.19	36.05	37.83	39.44	40.84	42.37	43.67	44.78	45.71	46.58
All Corporates	1.54	3.08	4.46	5.65	6.67	7.57	8.34	9.04	9.71	10.37	11.03	11.70	12.36	12.98	13.58	14.22	14.84	15.42	15.96	16.43

Exhibit 33-Cumulative Default Rates from 1 to 20 Years by Annual Cohort, 1970-2001

1970	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.70	2.70
Aa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.55	1.55	1.55	3.13	3.13	3.13	3.13	3.13	3.13
A	0.00	0.00	0.00	0.00	0.00	0.45	0.45	0.45	0.45	0.45	0.95	0.95	0.95	0.95	0.95	0.95	1.48	1.48	1.48	2.65	2.65	2.65
Baa	0.28	0.28	0.28	1.18	1.18	1.18	1.50	2.17	2.86	2.86	3.24	3.24	4.45	4.87	5.31	6.21	7.64	8.68	9.81	10.42	10.42	10.42
Ba	4.19	4.62	5.07	5.54	6.50	7.50	8.03	8.59	9.77	9.77	9.77	11.26	13.63	14.48	14.48	17.37	20.47	21.63	21.63	23.05	23.05	23.05
B	22.78	25.36	27.93	27.93	27.93	27.93	27.93	27.93	27.93	27.93	27.93	27.93	35.32	35.32	35.32	35.32	35.32	35.32	35.32	35.32	35.32	35.32
Caa-C	53.33	60.00	80.00	88.00	88.00	88.00	88.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Investment-Grade	0.14	0.14	0.14	0.59	0.59	0.74	0.90	1.22	1.55	1.55	1.90	1.90	2.45	2.82	3.01	3.40	4.40	5.04	5.93	6.17	6.17	6.17
Speculative-Grade	9.22	10.27	12.08	12.83	13.61	14.43	14.85	15.76	16.71	16.71	17.89	21.01	21.67	21.67	23.93	26.37	27.29	27.29	28.41	28.41	28.41	28.41
All Corporates	2.81	3.12	3.64	4.17	4.39	4.73	4.96	5.43	5.91	5.91	6.18	6.45	7.57	8.00	8.15	8.91	10.18	10.85	11.57	11.95	11.95	11.95

1971	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.78	2.78
Aa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.89	1.89
A	0.00	0.00	0.00	0.00	0.40	0.40	0.40	0.40	0.40	0.84	0.84	1.29	1.74	1.74	1.74	2.20	2.20	3.22	3.22	3.22	3.22	3.22
Baa	0.00	0.00	0.82	0.82	0.82	1.12	1.74	2.39	2.74	2.74	3.89	4.28	4.69	5.55	6.89	7.86	8.91	9.47	10.66	10.66	10.66	10.66
Ba	0.43	0.87	1.33	2.28	3.77	4.29	4.84	6.01	6.01	6.01	7.46	9.79	10.61	10.61	13.42	17.45	18.59	19.98	19.98	19.98	19.98	19.98
B	3.85	7.69	7.69	7.69	7.69	7.69	7.69	7.69	7.69	7.69	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Caa-C	13.33	56.67	74.00	74.00	74.00	74.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Investment-Grade	0.00	0.00	0.41	0.41	0.56	0.70	1.00	1.31	1.31	1.63	1.63	2.31	2.66	2.84	3.21	3.95	4.55	5.38	5.60	6.27	6.27	6.27
Speculative-Grade	1.12	3.06	3.86	4.70	6.00	6.46	7.43	8.45	8.45	9.71	13.07	13.78	13.78	16.20	19.67	20.65	21.87	21.87	21.87	21.87	21.87	21.87
All Corporates	0.29	0.79	1.31	1.52	1.95	2.17	2.62	3.09	3.09	3.35	3.61	4.83	5.25	5.40	6.13	7.36	8.01	8.70	9.07	9.64	9.64	9.64

Exhibit 33 - Cumulative Default Rates from 1 to 20 Years by Annual Cohort, 1970-2001

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1972																				
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.82	0.82	0.82	1.25	1.25	2.19	2.19	2.69	3.22
Baa	0.00	0.75	0.75	1.02	1.29	1.86	2.45	2.45	3.10	3.10	3.81	4.18	4.56	5.35	6.58	7.48	8.45	9.49	11.15	13.47
Ba	0.00	0.46	1.39	2.86	3.37	3.91	5.05	5.05	6.44	6.44	9.41	10.20	11.04	14.58	18.38	19.44	19.44	20.71	22.04	29.01
B	7.14	7.14	7.14	7.14	7.14	7.14	7.14	7.14	7.14	7.14	18.07	18.07	18.07	18.07	18.07	18.07	18.07	18.07	18.07	18.07
Caa-C	40.00	57.14	57.14	57.14	57.14	78.57	78.57	78.57	78.57	78.57	78.57	78.57	78.57	78.57	78.57	78.57	78.57	78.57	78.57	78.57
Investment-Grade	0.00	0.38	0.38	0.51	0.65	0.92	1.21	1.21	1.51	1.51	1.98	2.31	2.47	2.81	3.50	4.05	4.83	5.23	6.29	7.38
Speculative-Grade	1.90	2.69	3.51	4.79	5.24	6.18	7.16	7.16	7.16	8.36	12.18	12.86	13.58	16.64	19.92	20.84	20.84	21.95	23.13	29.33
All Corporates	0.47	0.95	1.15	1.55	1.76	2.18	2.62	2.62	2.86	3.10	4.24	4.64	4.90	5.73	6.87	7.47	8.12	8.63	9.69	11.53
1973																				
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.80	0.80	0.80	1.23	1.23	2.15	2.15	2.64	3.16	3.71
Baa	0.47	0.47	0.96	1.21	1.74	2.29	2.29	2.89	2.89	3.55	4.24	4.95	6.05	7.19	8.02	8.91	9.88	11.93	14.10	14.10
Ba	0.00	0.99	2.03	2.58	3.15	4.35	4.35	4.35	5.80	9.63	10.43	10.43	13.11	16.95	19.12	19.12	20.39	21.73	30.04	31.53
B	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	15.09	15.09	15.09	15.09	15.09	15.09	15.09	15.09	15.09	15.09	15.09
Caa-C	44.44	44.44	44.44	44.44	44.44	72.22	72.22	72.22	72.22	72.22	72.22	72.22	72.22	72.22	72.22	72.22	72.22	72.22	72.22	72.22
Investment-Grade	0.24	0.24	0.49	0.62	0.88	1.15	1.15	1.44	1.44	1.89	2.35	2.67	3.15	3.82	4.34	5.08	5.47	6.68	7.72	7.94
Speculative-Grade	1.26	2.13	3.04	3.51	4.52	5.56	5.56	5.56	6.82	11.44	12.14	12.14	14.50	17.88	19.78	19.78	20.92	22.13	29.73	31.08
All Corporates	0.47	0.66	1.05	1.25	1.67	2.10	2.10	2.33	2.56	3.79	4.30	4.56	5.36	6.47	7.20	7.82	8.32	9.52	11.47	11.85

Exhibit 33 - Cumulative Default Rates from 1 to 20 Years by Annual Cohort, 1970-2001

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1974																				
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32
A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.80	0.80	0.80	1.22	1.22	2.13	2.13	2.62	3.12	3.66	3.66
Baa	0.00	0.49	0.74	1.26	1.80	1.80	2.39	2.39	3.05	3.73	4.42	5.51	5.89	6.71	7.60	8.56	10.09	12.23	12.23	12.23
Ba	0.00	1.08	1.66	2.26	3.53	3.53	3.53	4.29	8.30	9.14	9.14	11.91	17.85	20.08	20.08	21.40	24.16	32.67	34.20	35.93
B	6.90	6.90	6.90	6.90	6.90	6.90	6.90	11.44	21.01	21.01	21.01	21.01	21.01	21.01	21.01	21.01	21.01	21.01	21.01	21.01
Caa-C	0.00	0.00	0.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Investment-Grade	0.00	0.25	0.37	0.63	0.89	0.89	1.17	1.17	1.76	2.22	2.53	3.00	3.33	3.84	4.56	4.94	5.93	6.94	7.16	7.16
Speculative-Grade	0.89	1.83	2.32	3.36	4.44	4.44	4.44	5.73	10.48	11.20	13.62	18.83	20.77	20.77	21.95	24.46	32.35	33.75	35.33	35.33
All Corporates	0.19	0.58	0.78	1.19	1.61	1.61	1.84	2.08	3.41	3.91	4.17	4.96	6.06	6.78	7.40	7.88	9.07	10.99	11.36	11.57
1975																				
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.08	1.08	1.08	1.08	1.08	1.08	1.08	2.32	2.32	3.60	3.60	3.60	3.60
A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.39	0.39	0.80	0.80	1.68	1.68	2.15	3.14	3.67	4.25	4.25
Baa	0.00	0.00	0.26	0.81	0.81	1.41	1.41	2.39	3.07	3.77	4.85	5.23	6.05	6.49	7.44	9.44	11.54	11.54	11.54	11.54
Ba	1.04	2.14	3.29	3.90	3.90	3.90	4.63	8.47	9.27	9.27	11.92	17.60	19.74	20.92	22.19	23.50	30.27	31.73	33.33	33.33
B	5.97	5.97	5.97	9.27	9.27	13.13	13.13	21.21	21.21	21.21	21.21	21.21	21.21	21.21	21.21	31.06	42.55	42.55	42.55	42.55
Caa-C	0.00	0.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Investment-Grade	0.00	0.00	0.12	0.38	0.38	0.64	0.64	1.21	1.64	1.94	2.39	2.70	3.19	3.87	4.23	5.34	6.49	6.70	6.92	6.92
Speculative-Grade	1.76	2.68	4.13	5.15	5.15	5.15	6.36	10.83	11.51	11.51	13.79	18.69	20.52	21.52	22.60	24.91	32.12	33.40	34.80	34.80
All Corporates	0.37	0.56	0.96	1.36	1.36	1.58	1.80	3.07	3.55	3.79	4.55	5.58	6.27	6.99	7.45	8.72	10.69	11.04	11.42	11.42

Exhibit 33 - Cumulative Default Rates from 1 to 20 Years by Annual Cohort, 1970-2001

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1976																				
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67
Aa	0.00	0.00	0.00	0.00	0.00	0.00	1.04	1.04	1.04	1.04	1.04	1.04	2.24	2.24	3.50	3.50	3.50	3.50	3.50	3.50
A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.67	0.67	1.37	1.37	2.54	2.54	2.95	4.26	4.26	4.78	4.78	5.88
Baa	0.00	0.28	0.57	0.57	0.89	0.89	2.28	3.00	3.74	4.90	5.30	6.16	6.16	7.17	9.31	10.99	11.57	11.57	11.57	11.57
Ba	1.03	2.11	3.24	3.24	3.87	4.54	7.40	8.15	8.15	10.61	15.87	17.85	18.95	20.12	21.33	28.88	30.24	31.72	31.72	31.72
B	0.00	0.00	3.64	3.64	3.64	8.12	17.54	17.54	17.54	17.54	17.54	17.54	17.54	17.54	30.23	45.73	45.73	45.73	45.73	45.73
Caa-C	0.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Investment-Grade	0.00	0.12	0.24	0.24	0.36	0.36	1.03	1.57	1.85	2.27	2.71	3.17	3.82	4.16	5.22	6.31	6.51	6.72	6.72	7.18
Speculative-Grade	0.88	2.28	3.73	3.73	4.27	5.44	9.12	9.77	9.77	11.96	16.66	18.41	19.38	20.42	22.62	30.70	31.95	33.31	33.31	33.31
All Corporates	0.18	0.55	0.94	0.94	1.14	1.35	2.55	3.11	3.34	4.06	5.17	5.82	6.51	6.95	8.15	10.18	10.52	10.88	10.88	11.28
1977																				
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69
Aa	0.00	0.00	0.00	0.00	0.00	0.98	0.98	0.98	0.98	0.98	0.98	2.12	2.12	3.30	3.30	3.30	3.30	3.30	3.30	3.30
A	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.63	0.63	1.30	1.30	3.14	3.14	3.93	5.17	5.17	5.66	6.71	6.71	6.71
Baa	0.28	0.58	0.58	0.58	0.58	1.98	2.71	3.46	4.63	5.04	5.91	5.91	6.92	8.54	10.22	10.81	10.81	10.81	10.81	10.81
Ba	0.53	1.64	1.64	2.26	2.92	5.70	6.43	6.43	8.82	13.91	15.81	16.86	17.96	19.13	26.42	27.74	29.18	29.18	29.18	29.18
B	3.28	6.73	6.73	10.97	15.54	25.78	25.78	25.78	25.78	25.78	25.78	25.78	25.78	39.27	56.62	56.62	56.62	56.62	56.62	56.62
Caa-C	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Investment-Grade	0.11	0.23	0.23	0.23	0.23	0.88	1.41	1.68	2.09	2.52	2.97	3.92	4.25	5.28	6.34	6.53	6.74	7.19	7.19	7.19
Speculative-Grade	1.36	2.78	2.78	3.84	4.98	8.62	9.26	9.26	11.40	15.98	17.69	18.62	19.62	21.74	29.56	30.78	32.11	32.11	32.11	32.11
All Corporates	0.36	0.74	0.74	0.94	1.14	2.31	2.86	3.09	3.78	4.87	5.50	6.45	6.87	8.04	10.02	10.34	10.70	10.70	10.70	11.09

Exhibit 33 - Cumulative Default Rates from 1 to 20 Years by Annual Cohort, 1970-2001

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1978																				
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.54	1.54	1.54	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10
Aa	0.00	0.00	0.00	0.00	0.88	0.88	0.88	0.88	0.88	0.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88
A	0.00	0.00	0.00	0.00	0.00	0.64	0.64	0.64	1.33	1.33	2.85	2.85	4.09	4.95	4.95	5.46	5.46	6.56	6.56	6.56
Baa	0.00	0.00	0.00	0.00	1.37	1.72	2.45	3.60	4.00	4.84	5.30	6.28	7.84	10.01	10.57	10.57	10.57	10.57	10.57	10.57
Ba	1.10	1.10	1.10	1.76	4.56	6.02	6.02	9.21	14.25	16.12	17.16	18.26	20.58	27.86	29.17	32.06	32.06	32.06	32.06	32.06
B	5.41	5.41	11.71	15.04	22.27	22.27	26.72	26.72	32.35	38.50	38.50	38.50	47.29	60.47	60.47	60.47	60.47	60.47	60.47	60.47
Caa-C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Investment-Grade	0.00	0.00	0.00	0.00	0.63	1.02	1.28	1.69	2.11	2.55	3.48	3.80	4.98	6.02	6.20	6.40	6.40	6.84	6.84	6.84
Speculative-Grade	1.80	1.80	2.81	3.90	7.35	8.57	9.21	11.90	17.63	20.02	20.90	21.83	24.82	32.28	33.45	36.01	36.01	36.01	36.01	36.01
All Corporates	0.37	0.37	0.56	0.76	1.90	2.43	2.76	3.55	4.84	5.58	6.50	6.91	8.33	10.26	10.57	11.09	11.09	11.47	11.47	11.47
1979																				
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.47	1.47	1.47	2.96	2.96	2.96	2.96	2.96	2.96	2.96	2.96	2.96
Aa	0.00	0.00	0.00	0.87	0.87	0.87	0.87	0.87	0.87	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86
A	0.00	0.00	0.00	0.00	0.62	0.62	0.62	1.29	1.29	2.78	2.78	3.58	4.41	4.41	4.91	4.91	5.97	5.97	5.97	5.97
Baa	0.00	0.31	0.31	1.66	2.01	2.37	3.50	3.50	4.34	4.79	5.77	8.39	10.57	11.13	11.13	11.13	11.13	11.13	11.13	11.13
Ba	0.49	0.49	1.06	3.42	5.89	9.16	11.88	17.61	19.18	20.04	20.96	23.87	31.07	32.17	34.55	34.55	34.55	34.55	34.55	34.55
B	0.00	6.45	9.85	17.21	17.21	21.69	26.58	38.33	45.18	45.18	45.18	56.14	56.14	56.14	56.14	56.14	56.14	56.14	56.14	56.14
Caa-C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Investment-Grade	0.00	0.12	0.12	0.74	1.12	1.25	1.65	1.92	2.35	3.26	3.58	4.90	5.92	6.10	6.30	6.30	6.73	6.73	6.73	6.73
Speculative-Grade	0.42	1.31	2.27	5.27	7.38	10.76	13.71	20.61	22.68	23.44	24.25	27.71	34.28	35.31	37.54	37.54	37.54	37.54	37.54	37.54
All Corporates	0.09	0.37	0.56	1.66	2.37	3.11	3.97	5.43	6.14	7.02	7.42	9.07	10.93	11.24	11.74	11.74	12.10	12.10	12.10	12.10

Exhibit 33 - Cumulative Default Rates from 1 to 20 Years by Annual Cohort, 1970-2001

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1980																				
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.29	1.29	1.29	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61
Aa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99
A	0.00	0.00	0.29	0.89	0.89	0.89	1.85	2.18	3.26	3.26	4.03	4.84	4.84	5.32	5.32	6.34	6.34	6.34	6.34	6.90
Baa	0.00	0.00	0.99	1.33	1.69	3.15	3.15	3.56	4.43	5.82	8.29	10.34	11.41	11.41	11.41	11.41	11.41	11.41	11.41	11.41
Ba	0.00	0.53	3.87	5.03	8.70	11.89	17.30	19.51	20.33	23.03	25.88	34.06	36.32	38.74	38.74	38.74	38.74	40.15	40.15	40.15
B	5.06	7.74	16.25	22.34	28.95	32.60	45.64	50.58	50.58	50.58	62.94	72.20	72.20	72.20	72.20	72.20	72.20	72.20	72.20	72.20
Caa-C	33.33	33.33	33.33	33.33	33.33	33.33	55.56	55.56	55.56	55.56	55.56	55.56	55.56	55.56	55.56	55.56	55.56	55.56	55.56	55.56
Investment-Grade	0.00	0.00	0.48	0.84	0.97	1.48	1.88	2.43	3.31	3.76	5.03	6.00	6.35	6.54	6.54	6.96	6.96	6.96	6.96	7.19
Speculative-Grade	1.63	2.49	6.56	8.46	12.50	15.67	22.46	24.94	25.63	27.87	31.86	39.77	41.74	43.88	43.88	43.88	43.88	45.11	45.11	45.11
All Corporates	0.36	0.54	1.77	2.45	3.34	4.37	5.97	6.88	7.71	8.47	10.17	12.21	12.79	13.27	13.27	13.62	13.62	13.81	13.81	14.00
1981																				
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	1.31	1.31	1.31	2.66	2.66	2.66	2.66	2.66	2.66	2.66	2.66	2.66	2.66	2.66
Aa	0.00	0.00	0.00	0.00	0.00	0.00	0.90	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.73	4.19
A	0.00	0.29	0.29	0.29	0.29	1.24	1.58	2.30	2.30	3.08	3.89	3.89	4.38	4.38	5.42	5.42	5.42	5.42	5.99	6.56
Baa	0.00	0.62	1.93	2.61	3.66	3.66	4.05	4.88	6.21	8.56	10.01	11.02	11.02	11.02	11.02	11.02	11.02	11.02	11.02	11.78
Ba	0.00	3.64	5.08	8.11	12.32	18.50	20.37	21.07	24.12	28.20	36.38	38.45	40.68	40.68	40.68	42.02	43.40	43.40	43.40	43.40
B	4.49	11.57	16.55	24.50	27.35	40.26	40.26	40.26	40.26	50.22	56.44	56.44	56.44	56.44	56.44	56.44	56.44	56.44	56.44	56.44
Caa-C	0.00	0.00	0.00	0.00	0.00	25.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Investment-Grade	0.00	0.34	0.81	1.05	1.42	1.81	2.35	3.20	3.65	4.88	5.67	6.01	6.20	6.20	6.61	6.61	6.61	6.61	6.84	7.54
Speculative-Grade	0.71	4.83	6.80	10.55	14.48	21.98	24.04	24.62	27.13	31.92	39.66	41.43	43.37	43.37	43.37	44.51	45.69	45.69	45.69	45.69
All Corporates	0.17	1.39	2.21	3.23	4.39	6.30	7.15	7.95	8.78	10.65	12.60	13.16	13.62	13.62	13.95	14.13	14.32	14.51	15.09	15.09

Exhibit 33-Cumulative Default Rates from 1 to 20 Years by Annual Cohort, 1970-2001

1982	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Aaa	0.00	0.00	0.00	0.00	0.00	1.36	1.36	1.36	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.81
Aa	0.00	0.00	0.00	0.00	0.00	0.80	2.43	2.43	2.43	2.43	2.43	2.43	2.43	3.64	3.64	3.64	3.64	3.64	4.97	4.97
A	0.27	0.27	0.27	0.27	1.19	1.19	1.89	1.89	3.02	3.82	3.82	4.28	4.28	4.28	4.28	4.28	4.28	4.83	5.38	9.30
Baa	0.31	0.31	1.35	2.43	2.80	3.60	4.46	5.82	8.21	9.70	10.73	10.73	10.73	11.36	11.36	11.36	11.36	11.36	12.14	12.14
Ba	2.78	5.29	7.97	12.15	18.56	20.20	20.80	23.49	27.90	32.90	34.82	36.89	36.89	36.89	36.89	38.23	39.67	39.67	39.67	42.76
B	2.41	9.92	15.14	17.92	30.31	30.31	30.31	30.31	35.67	60.18	60.18	60.18	60.18	60.18	60.18	60.18	60.18	60.18	60.18	60.18
Caa-C	27.27	56.36	56.36	67.27	78.18	78.18	78.18	78.18	78.18	78.18	78.18	78.18	78.18	78.18	78.18	78.18	78.18	78.18	78.18	78.18
Investment-Grade	0.22	0.22	0.57	0.93	1.43	1.96	2.80	3.24	4.61	5.40	5.74	5.92	5.92	6.32	6.32	6.32	6.32	6.55	7.24	8.88
Speculative-Grade	3.61	7.77	10.71	14.54	21.92	23.73	24.23	26.47	30.82	37.88	39.50	41.27	41.27	41.27	41.27	42.40	43.60	43.60	43.60	46.22
All Corporates	1.07	2.10	3.08	4.27	6.38	7.19	7.96	8.76	10.70	12.60	13.15	13.59	13.59	13.92	13.92	14.10	14.28	14.46	15.03	16.78

1983	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
Aaa	0.00	0.00	0.00	0.00	0.00	2.50	2.50	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90
Aa	0.00	0.00	0.00	0.00	0.52	2.13	2.13	2.13	2.13	2.13	2.13	2.13	2.91	2.91	2.91	2.91	2.91	2.91	2.91	3.77
A	0.00	0.00	0.00	0.27	0.27	0.86	0.86	1.83	2.83	3.55	3.94	3.94	3.94	3.94	3.94	3.94	3.94	4.42	4.42	6.91
Baa	0.00	1.20	1.61	3.37	3.85	4.39	5.53	6.73	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	8.95	10.89	11.89
Ba	0.94	2.48	5.77	13.07	14.48	17.72	21.42	26.66	32.44	32.44	33.92	33.92	35.57	35.57	37.47	39.39	39.39	41.45	45.78	
B	6.31	11.01	17.86	25.14	28.42	29.60	32.33	40.29	50.25	55.22	58.02	58.02	58.02	58.02	58.02	58.02	58.02	58.02	58.02	58.02
Caa-C	44.44	72.22	72.22	72.22	86.11	86.11	86.11	86.11	86.11	86.11	86.11	86.11	86.11	86.11	86.11	86.11	86.11	86.11	86.11	86.11
Investment-Grade	0.00	0.31	0.42	0.99	1.47	2.23	2.50	3.33	4.05	4.36	4.53	4.53	4.71	4.71	4.71	4.71	4.92	5.56	7.08	
Speculative-Grade	3.91	7.15	11.61	18.72	21.24	23.60	26.84	33.02	40.10	41.77	43.63	43.63	44.67	44.67	45.89	47.16	47.16	48.52	51.38	
All Corporates	0.99	2.02	3.17	5.25	6.18	7.28	8.12	9.91	11.67	12.18	12.60	12.60	12.91	12.91	13.08	13.25	13.42	14.14	15.78	

Exhibit 33 - Cumulative Default Rates from 1 to 20 Years by Annual Cohort, 1970-2001

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1984																			
Aaa	0.00	0.00	0.00	1.63	1.63	1.63	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
Aa	0.00	0.00	0.00	0.94	1.93	1.93	1.93	1.93	1.93	1.93	1.93	2.63	2.63	2.63	2.63	2.63	2.63	2.63	3.40
A	0.00	0.23	0.47	0.73	1.52	1.80	2.67	3.57	4.21	4.21	4.21	4.21	4.21	4.21	4.21	4.21	4.21	4.65	6.90
Baa	0.37	0.37	0.79	1.26	1.78	2.88	4.05	5.89	6.61	6.61	6.61	6.61	6.61	6.61	6.61	6.61	7.53	9.44	10.43
Ba	0.87	4.55	13.04	14.75	18.65	23.07	28.03	35.27	36.30	37.46	37.46	38.76	38.76	40.33	40.33	40.33	42.09	45.71	
B	6.72	12.77	20.11	23.99	27.13	32.07	42.30	49.51	51.76	56.83	56.83	56.83	56.83	56.83	60.94	60.94	60.94	60.94	60.94
Caa-C	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Investment-Grade	0.10	0.20	0.41	0.98	1.71	2.09	2.88	3.70	4.00	4.16	4.16	4.34	4.34	4.34	4.34	4.54	5.16	6.63	
Speculative-Grade	3.41	7.89	15.94	18.44	22.05	26.64	33.48	40.64	42.03	44.38	44.38	45.26	45.26	46.32	47.49	47.49	48.73	51.29	
All Corporates	0.95	2.17	4.33	5.36	6.75	8.03	10.01	11.99	12.47	13.00	13.00	13.29	13.29	13.45	13.61	13.78	14.46	16.02	
1985																			
Aaa	0.00	0.00	0.00	0.00	0.00	2.06	2.06	2.06	2.06	2.06	2.06	2.06	2.06	2.06	2.06	2.06	2.06	2.06	2.06
Aa	0.00	0.00	0.00	0.83	0.83	0.83	0.83	0.83	0.83	0.83	1.48	1.48	1.48	1.48	1.48	1.48	1.48	2.21	
A	0.00	0.21	1.37	2.35	2.61	3.70	4.55	4.85	4.85	4.85	4.85	4.85	4.85	4.85	4.85	4.85	5.27	6.96	
Baa	0.00	1.24	1.24	1.76	2.88	3.46	5.31	5.97	6.70	6.70	6.70	6.70	6.70	6.70	6.70	8.73	10.86	11.96	
Ba	1.80	6.82	9.47	12.54	18.85	24.02	31.16	32.74	33.62	33.62	35.63	35.63	36.79	36.79	36.79	38.18	42.59		
B	8.22	17.65	23.84	27.26	31.51	43.36	50.12	52.39	57.68	57.68	57.68	57.68	57.68	61.91	61.91	61.91	61.91	61.91	
Caa-C	0.00	0.00	0.00	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33
Investment-Grade	0.00	0.38	0.90	1.69	2.04	2.79	3.56	3.84	4.00	4.00	4.17	4.17	4.17	4.17	4.57	5.17	6.40		
Speculative-Grade	3.96	10.45	14.36	17.87	23.39	30.65	37.51	39.21	41.12	41.12	43.30	43.30	44.14	45.07	45.07	46.10	49.40		
All Corporates	1.10	3.17	4.61	6.10	7.70	9.90	11.92	12.47	12.96	12.96	13.51	13.51	13.66	13.81	14.13	14.78	16.28		

Exhibit 33 - Cumulative Default Rates from 1 to 20 Years by Annual Cohort, 1970-2001

1986	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aa	0.00	0.00	0.84	0.84	1.30	1.30	1.30	1.30	1.30	1.95	1.95	1.95	1.95	1.95	1.95	2.69
A	0.00	0.20	0.82	1.25	1.93	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	3.12	4.21
Baa	1.36	1.36	3.09	4.00	5.42	6.93	8.01	8.62	8.62	8.62	8.62	8.62	8.62	10.34	11.23	13.07
Ba	1.78	6.10	8.37	13.98	20.31	28.03	29.95	32.82	33.60	34.43	34.43	36.41	36.41	36.41	38.84	43.99
B	11.80	17.20	21.22	25.28	35.11	44.73	49.21	52.71	52.71	55.14	55.14	55.14	58.34	62.13	62.13	62.13
Caa-C	23.53	23.53	40.52	40.52	40.52	40.52	40.52	40.52	40.52	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Investment-Grade	0.33	0.42	1.30	1.70	2.45	3.01	3.25	3.39	3.39	3.54	3.54	3.54	3.54	3.89	4.43	5.52
Speculative-Grade	5.54	10.18	13.29	18.29	25.64	33.78	36.40	39.38	39.93	41.72	41.72	43.13	43.93	44.78	46.56	50.35
All Corporates	1.92	3.37	4.88	6.52	8.90	11.20	11.94	12.67	12.78	13.26	13.26	13.52	13.65	14.07	14.79	16.25

1987	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aa	0.00	0.00	0.00	0.42	0.42	0.42	0.42	0.42	1.00	1.00	1.00	1.00	1.00	1.00	1.69
A	0.00	0.00	0.42	1.29	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	2.09	2.79
Baa	0.00	1.09	1.47	3.10	4.81	6.18	7.20	7.20	7.20	7.20	7.87	7.87	9.31	10.06	13.15
Ba	2.76	4.54	9.97	16.46	23.93	27.43	31.01	32.16	33.42	34.14	35.78	36.70	36.70	38.83	41.05
B	6.27	13.17	20.10	31.76	43.13	46.61	48.66	48.66	50.03	50.03	50.03	51.99	54.17	58.64	61.01
Caa-C	20.00	30.67	30.67	30.67	30.67	30.67	30.67	30.67	65.33	65.33	65.33	65.33	65.33	65.33	65.33
Investment-Grade	0.00	0.26	0.54	1.41	2.02	2.35	2.59	2.59	2.72	2.72	2.87	2.87	3.19	3.51	4.67
Speculative-Grade	4.28	8.08	13.96	22.17	30.85	34.27	37.28	38.04	39.73	40.21	41.28	42.50	43.18	45.98	48.19
All Corporates	1.57	3.09	5.28	8.49	11.45	12.61	13.56	13.75	14.25	14.36	14.69	14.92	15.29	16.04	17.31

Exhibit 33-Cumulative Default Rates from 1 to 20 Years by Annual Cohort, 1970-2001

1988	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aa	0.00	0.35	0.73	0.73	0.73	0.73	0.73	1.26	1.26	1.26	1.26	1.26	1.88	2.51
A	0.00	0.40	1.02	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	2.12
Baa	0.00	0.34	1.07	2.58	3.78	4.67	4.67	4.67	4.67	5.25	5.25	5.89	6.54	9.25
Ba	1.26	7.03	12.93	20.50	23.59	26.87	27.81	28.85	30.01	31.30	32.03	32.83	34.54	39.12
B	6.10	13.24	26.02	37.40	41.61	46.75	47.63	50.71	50.71	52.00	58.10	59.85	63.58	65.66
Caa-C	28.57	28.57	28.57	28.57	28.57	28.57	28.57	64.29	64.29	64.29	64.29	64.29	64.29	64.29
Investment-Grade	0.00	0.34	0.87	1.42	1.72	1.94	1.94	2.06	2.06	2.20	2.20	2.34	2.64	3.71
Speculative-Grade	3.50	9.73	18.18	27.05	30.49	34.38	35.28	37.31	38.06	39.33	41.72	42.78	45.04	48.71
All Corporates	1.37	3.94	7.33	10.67	11.94	13.22	13.47	14.09	14.28	14.67	15.19	15.51	16.18	17.68

1989	1	2	3	4	5	6	7	8	9	10	11	12	13
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aa	0.69	0.69	0.69	0.69	0.69	0.69	1.23	1.23	1.23	1.23	1.23	1.84	2.46
A	0.00	0.19	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	1.50
Baa	0.61	1.26	1.93	3.00	3.00	3.00	3.00	3.00	3.50	3.50	4.03	4.59	7.48
Ba	3.00	10.07	18.04	20.79	24.05	24.47	25.42	27.00	28.78	30.77	31.51	33.86	38.02
B	9.29	23.24	33.79	38.90	44.59	46.65	50.69	50.69	52.88	56.92	58.43	61.69	63.48
Caa-C	33.33	42.86	57.14	57.14	57.14	57.14	57.14	57.14	57.14	57.14	57.14	57.14	57.14
Investment-Grade	0.31	0.55	0.89	1.16	1.16	1.16	1.27	1.27	1.40	1.40	1.53	1.80	3.04
Speculative-Grade	6.07	15.99	25.03	28.66	32.80	33.83	35.88	36.86	38.72	41.29	42.24	44.78	48.03
All Corporates	2.55	6.40	9.77	11.15	12.43	12.72	13.36	13.62	14.15	14.71	15.01	15.71	17.27

Exhibit 33-Cumulative Default Rates from 1 to 20 Years by Annual Cohort, 1970-2001

1990	1	2	3	4	5	6	7	8	9	10	11	12
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aa	0.00	0.00	0.00	0.00	0.00	0.45	0.45	0.45	0.45	0.45	0.45	0.99
A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.58
Baa	0.00	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	1.17	1.72	5.08
Ba	3.37	11.72	14.33	17.38	18.17	19.48	20.42	22.50	24.23	24.87	27.59	31.93
B	16.18	27.90	34.84	39.94	41.62	44.32	45.13	47.09	50.82	53.85	57.21	59.11
Caa-C	53.33	62.67	62.67	62.67	62.67	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Investment-Grade	0.00	0.15	0.15	0.15	0.15	0.26	0.26	0.26	0.26	0.38	0.63	1.66
Speculative-Grade	9.90	19.69	24.07	27.91	29.04	31.10	31.97	33.92	36.16	37.42	40.14	43.56
All Corporates	3.73	7.31	8.78	10.00	10.34	11.00	11.23	11.73	12.25	12.61	13.36	14.82

1991	1	2	3	4	5	6	7	8	9	10	11
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aa	0.00	0.00	0.00	0.00	0.38	0.38	0.38	0.38	0.38	0.38	0.86
A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.56
Baa	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.73	1.18	3.98
Ba	5.43	6.73	8.61	9.05	10.03	11.09	12.84	14.82	16.30	19.48	23.74
B	14.56	23.70	30.57	32.78	36.72	37.49	40.27	43.69	46.37	49.39	51.13
Caa-C	36.84	36.84	36.84	36.84	47.37	47.37	47.37	47.37	47.37	47.37	73.68
Investment-Grade	0.07	0.07	0.07	0.07	0.17	0.17	0.17	0.17	0.28	0.51	1.44
Speculative-Grade	10.47	15.24	19.25	20.43	22.86	23.77	25.81	28.18	29.98	32.93	36.67
All Corporates	3.45	4.92	6.09	6.42	7.12	7.34	7.81	8.31	8.74	9.46	10.86

Exhibit 33 - Cumulative Default Rates from 1 to 20 Years by Annual Cohort, 1970-2001

1992	1	2	3	4	5	6	7	8	9	10
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aa	0.00	0.00	0.00	0.34	0.34	0.34	0.34	0.34	0.34	0.77
A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.49
Baa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.82	3.37
Ba	0.31	1.05	1.05	2.00	2.52	3.68	5.62	7.08	9.47	13.70
B	9.05	17.60	20.99	25.76	28.13	30.89	34.26	36.86	42.74	44.42
Caa-C	27.91	33.67	33.67	41.97	41.97	53.57	53.57	53.57	53.57	76.79
Investment-Grade	0.00	0.00	0.00	0.08	0.08	0.08	0.08	0.18	0.39	1.23
Speculative-Grade	4.98	9.19	10.60	13.29	14.49	16.53	18.88	20.66	24.10	27.82
All Corporates	1.42	2.56	2.92	3.63	3.90	4.34	4.80	5.20	5.94	7.23

1993	1	2	3	4	5	6	7	8	9
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.66
Baa	0.00	0.00	0.27	0.27	0.27	0.58	1.21	1.54	3.19
Ba	0.57	0.57	2.73	3.51	4.84	6.35	7.47	9.32	13.87
B	5.86	10.17	15.71	17.63	20.65	23.39	28.60	35.51	38.17
Caa-C	30.00	30.00	44.00	52.00	52.00	52.00	52.00	52.00	76.00
Investment-Grade	0.00	0.00	0.07	0.07	0.07	0.16	0.33	0.51	1.15
Speculative-Grade	3.61	5.30	9.10	10.51	12.40	14.28	16.75	20.25	24.45
All Corporates	1.02	1.48	2.51	2.86	3.29	3.75	4.37	5.15	6.42

Exhibit 33 - Cumulative Default Rates from 1 to 20 Years by Annual Cohort, 1970-2001

1994	1	2	3	4	5	6	7	8
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.51
Baa	0.00	0.22	0.22	0.46	0.71	1.74	2.28	3.93
Ba	0.24	1.84	2.13	3.09	4.92	7.37	10.08	12.94
B	3.96	9.53	12.86	14.81	19.12	24.39	31.07	35.70
Caa-C	5.26	14.01	24.54	24.54	24.54	31.10	31.10	56.15
Investment-Grade	0.00	0.06	0.06	0.13	0.20	0.48	0.71	1.32
Speculative-Grade	1.99	5.52	7.47	8.77	11.38	14.91	18.83	22.75
All Corporates	0.61	1.69	2.23	2.63	3.31	4.31	5.29	6.56

1995	1	2	3	4	5	6	7
Aaa	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aa	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A	0.00	0.00	0.00	0.00	0.00	0.14	0.43
Baa	0.00	0.00	0.00	0.46	1.40	1.89	3.65
Ba	0.70	0.95	2.06	3.64	6.45	9.16	11.63
B	4.99	7.63	10.63	14.55	18.82	24.58	32.41
Caa-C	12.07	20.34	20.34	25.75	32.35	32.35	55.88
Investment-Grade	0.00	0.00	0.00	0.12	0.37	0.56	1.15
Speculative-Grade	3.41	5.22	7.13	9.96	13.58	17.43	22.91
All Corporates	1.10	1.67	2.23	3.09	4.19	5.26	6.97

Exhibit 33-Cumulative Default Rates from 1 to 20 Years by Annual Cohort, 1970-2001

1996	1	2	3	4	5	6
Aaa	0.00	0.00	0.00	0.00	0.00	0.00
Aa	0.00	0.00	0.00	0.00	0.00	0.00
A	0.00	0.00	0.00	0.00	0.12	0.36
Baa	0.00	0.00	0.18	0.75	1.34	2.97
Ba	0.00	0.73	2.37	5.40	7.70	10.85
B	1.49	4.60	9.61	13.24	19.22	26.12
Caa-C	13.99	20.24	27.41	40.61	43.58	63.73
Investment-Grade	0.00	0.00	0.05	0.21	0.43	0.99
Speculative-Grade	1.70	3.94	7.52	11.49	15.42	20.93
All Corporates	0.54	1.22	2.27	3.43	4.57	6.32

1997	1	2	3	4	5
Aaa	0.00	0.00	0.00	0.00	0.00
Aa	0.00	0.00	0.00	0.00	0.00
A	0.00	0.00	0.00	0.11	0.32
Baa	0.00	0.15	0.77	1.42	2.60
Ba	0.19	1.50	5.14	8.30	10.84
B	2.16	7.62	12.27	18.24	27.79
Caa-C	14.67	27.31	37.55	40.20	62.83
Investment-Grade	0.00	0.04	0.23	0.46	0.90
Speculative-Grade	2.09	6.12	10.59	15.06	21.75
All Corporates	0.68	1.96	3.38	4.78	6.89

Exhibit 33 - Cumulative Default Rates from 1 to 20 Years by Annual Cohort, 1970-2001

1998	1	2	3	4
Aaa	0.00	0.00	0.00	0.00
Aa	0.00	0.00	0.00	0.00
A	0.00	0.00	0.10	0.31
Baa	0.12	0.50	1.02	2.09
Ba	0.64	2.94	6.20	9.85
B	4.15	11.59	18.82	29.14
Caa-C	15.09	30.24	36.30	58.22
Investment-Grade	0.04	0.16	0.37	0.81
Speculative-Grade	3.43	9.17	14.56	22.66
All Corporates	1.26	3.31	5.24	8.17

1999	1	2	3
Aaa	0.00	0.00	0.00
Aa	0.00	0.00	0.00
A	0.00	0.00	0.20
Baa	0.11	0.66	1.46
Ba	1.03	3.25	6.44
B	5.88	14.68	25.15
Caa-C	20.05	29.61	49.72
Investment-Grade	0.04	0.23	0.59
Speculative-Grade	5.65	11.92	20.54
All Corporates	2.20	4.68	8.08

