

## Special Comment

# Moody's Global Credit Policy

February 2009

## Corporate Default and Recovery Rates, 1920-2008

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### Summary

This report comprises Moody's twenty-second annual default study in which we update statistics on the default, loss, and rating transition experience of corporate bond and loan issuers for 2008, as well as for the historical period since 1920. Briefly, we find that:

- 101 Moody's-rated corporate issuers defaulted on a total of \$238.6 billion of bonds and \$42.6 billion of loans in 2008. Including issuers who were not rated as of January 1, 2008, 104 corporate issuers defaulted on \$239.8 billion of bonds and \$42.8 billion of loans.
- The financial industry was the most troubled sector in 2008 as measured by default volume. In that sector, the bankruptcy of Lehman Brothers Holdings, Inc. in September was the largest default in history (\$120.2 billion debt).
- Across regions, 84 of the 101 defaulters in 2008 were North American issuers (74 in the U.S and 10 in Canada) with defaulted debt volumes totaling \$226.2 billion. In Europe, 12 Moody's-rated corporate issuers defaulted on \$53.4 billion of debt. The remaining defaulters were Latin-American and Asian issuers.
- Moody's global speculative-grade default rate ended 2008 at 4.1%, more than quadrupling 2007's year-end level of 0.9%. The default rate for all Moody's-rated corporate issuers rose to 1.9% at the end of 2008 from 0.3% at year-end 2007.
- Measured on a dollar volume basis, Moody's global speculative-grade bond default rate ended 2008 at 5.8%, up from 2007's year-end level of 0.6%. Among all Moody's-rated issuers, the volume-weighted default rate increased from 0.1% in 2007 to 2.2% in 2008.
- Moody's global speculative-grade default rate forecasting model predicts that the speculative-grade default rate will jump sharply to 16.4% in the fourth quarter of 2009, a level that, if it materializes, would exceed the peaks reached in 1991 and 2001.

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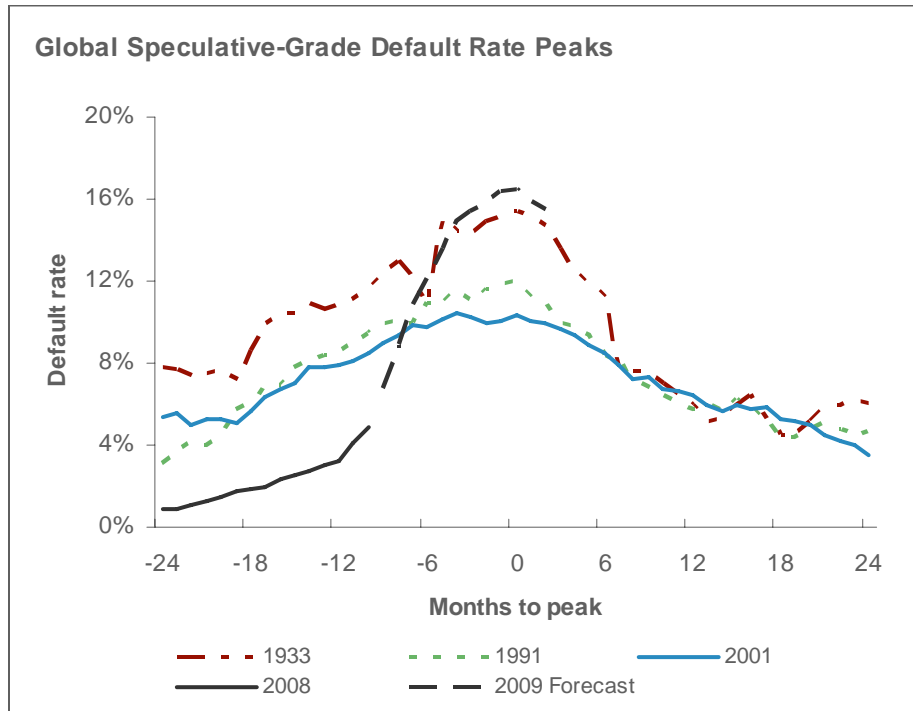
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## Corporate Default and Recovery Rates, 1920-2008

- Rating downgrades in 2008 surpassed rating upgrades for the first time since 2003. The upgrade-to-downgrade ratio fell significantly from 2.0 in 2007 to 0.3 in 2008.
- Measured using post-default trading prices, the average recovery rate for senior unsecured bonds dropped from 53.3% in 2007 to 33.8% in 2008.



## Corporate Default and Recovery Rates, 1920-2008

### Introduction

Moody's credit ratings facilitate the efficient functioning of capital markets by providing independent opinions on the creditworthiness of debt obligations issued by corporate issuers around the world. One of the primary purposes of Moody's corporate default study is to communicate the historical performance of Moody's ratings as predictors of default and loss severity for corporate issuers. In addition to providing useful data for investors and regulators, Moody's default studies also contribute to the transparency of the rating process and directly address the meaning of Moody's long-term debt ratings scale.

In the following three sections, we first summarize corporate default experience and credit trends in 2008 and discuss Moody's forecast for speculative-grade corporate defaults and recovery rates in 2009. This is followed by a review of rating accuracy metrics. We then present historical statistics on corporate defaults, ratings transitions, ratings performance metrics, and recovery rates. This year's default study contains several revisions to the historical data relative to previous years' reports, which are described in detail in a separate section at the end of the study. Finally, this report includes several detailed sections describing the methodologies used to generate the statistics as well as a guide to their reading and interpretation.

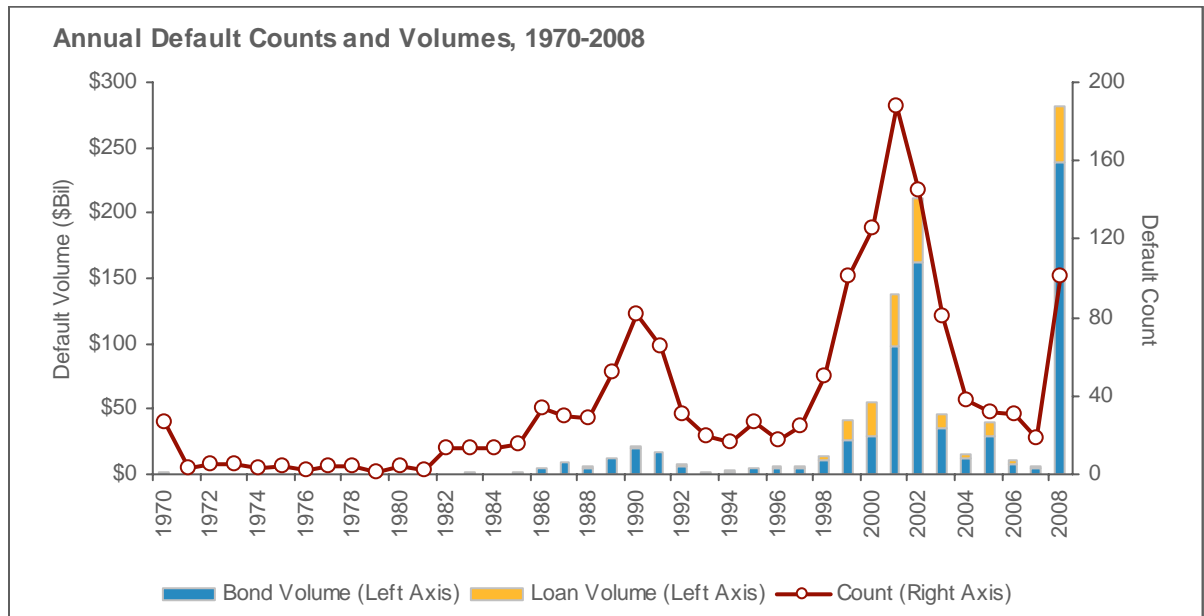
### 2008 – Financial Crisis Leads to Record Default Volumes

The global financial crisis reached a fevered pitch in 2008 with the failure of a number of large financial institutions, including the largest defaulter in history - the bankruptcy of Lehman Brothers Holdings Inc. Combined with defaults by other large financial institutions, including Washington Mutual and three large Icelandic banks, dollar default volumes easily set record highs. However, the damage was not limited to financial institutions as the financial crisis pushed the US and other developed economies into recession, and severely limited non-financial issuers' ability to access the debt markets. In fact, the high-yield debt markets were essentially closed for much of 2008 and high yield spreads reached record levels of roughly 2,000 basis points in the fourth quarter. As a result, defaults by non-financial issuers climbed sharply as the year proceeded with many distressed issuers unable to refinance maturing debt or obtain forbearance from covenant violations.

World-wide, 101 Moody's-rated corporate issuers defaulted on a total of \$281.2 billion of debt in 2008. Default counts and volumes both surged from 2007 when only 18 companies defaulted on \$6.7 billion of debt. From a geographic standpoint, 84 of the 101 defaulters were based in North America while 12 were based in Europe. On a volume basis, defaulted debt totaled \$226.2 billion in North America and \$53.4 billion in Europe. Exhibit 1 presents annual default counts and defaulted debt volumes for the period 1970 to 2008. The chart shows that default volume in 2008 easily reached a record high, while the number of defaulted issuers was the highest since 2002. Exhibit 21 on page 19 lists the top ten defaults among Moody's-rated issuers for the period 1920-2008, six of which were by 2008 defaulters.

## Corporate Default and Recovery Rates, 1920-2008

Exhibit 1



Among the 101 defaulters in 2008, more than half were by issuers in the broad Capital or Consumer Industries sectors<sup>1</sup>. Within these two sectors, defaults were highest in the Hotel, Gaming, & Leisure (15 defaulters) and Construction & Building (6 defaulters) industries. Measured by default volume, however, the FIRE<sup>2</sup> and Banking sectors easily topped the non-financial sectors as they accounted for almost 80% of the total default volume in 2008. The failures of Lehman Brothers, Washington Mutual, GMAC and three Icelandic banks were the largest defaulting financial institutions in terms of dollar volume. The largest non-financial defaulter was Tribune Company with almost \$13 billion in volume.

A unique characteristic of initial default events in 2008 was the high incidence of distressed exchanges. With debt markets essentially closed for high yield issuers, and the scarcity of DIP financing making bankruptcy a less attractive option, distressed issuers with unsustainable capital structures or liquidity problems had few options other than to offer debt exchanges, effectively implementing out-of-court restructurings that constitute events of default under Moody's definition of default. Of the 101 defaulters in 2008, 23%, or 23, were distressed exchanges, which is more than double the historical average of 10% of total initial default events. Exhibit 2 breaks down the 101 defaults in 2008 by initial default type and broad industry.

<sup>1</sup> Capital industries sector includes automotive, capital equipment, chemicals, plastics, & rubber, construction & building, containers, packaging, & glass, forest products & paper, metals & mining, and business service industries. Consumer industries sector includes beverage, food, & tobacco, durable and non-durable consumer goods, healthcare & pharmaceuticals, hotel, gaming, & leisure, and consumer service industries.

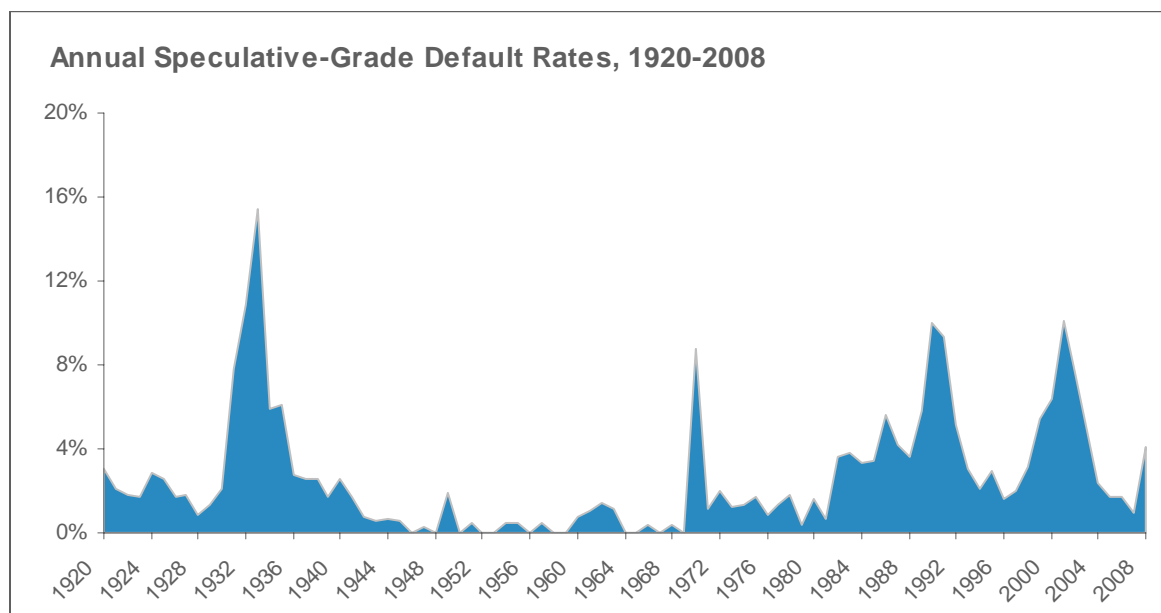
<sup>2</sup> FIRE sector refers to finance, insurance, and real estate finance.

## Corporate Default and Recovery Rates, 1920-2008

**Exhibit 2**

Industry and Initial Default Type for 2008 Defaults					
Broad Industry	Percent of Issuer Counts	Percent of Dollar Volume	Initial Default Type	Percent of Issuer Counts	Percent of Dollar Volume
Banking	8.9%	25.4%	Bankruptcy	45.5%	81.7%
Capital industries	29.7%	5.2%	Distressed Exchange	22.8%	13.2%
Consumer Industries	22.8%	5.1%	Payment Default	31.7%	5.2%
Energy & Environment	6.9%	2.0%	2008 Total	101	\$281.2 bil
FIRE	9.9%	53.8%			
Media & Publishing	8.9%	6.7%			
Retail & Distribution	4.0%	0.7%			
Technology	5.0%	0.8%			
Transportation	4.0%	0.4%			
Utilities	0.0%	0.0%			
2008 Total	101	\$281.2 bil			

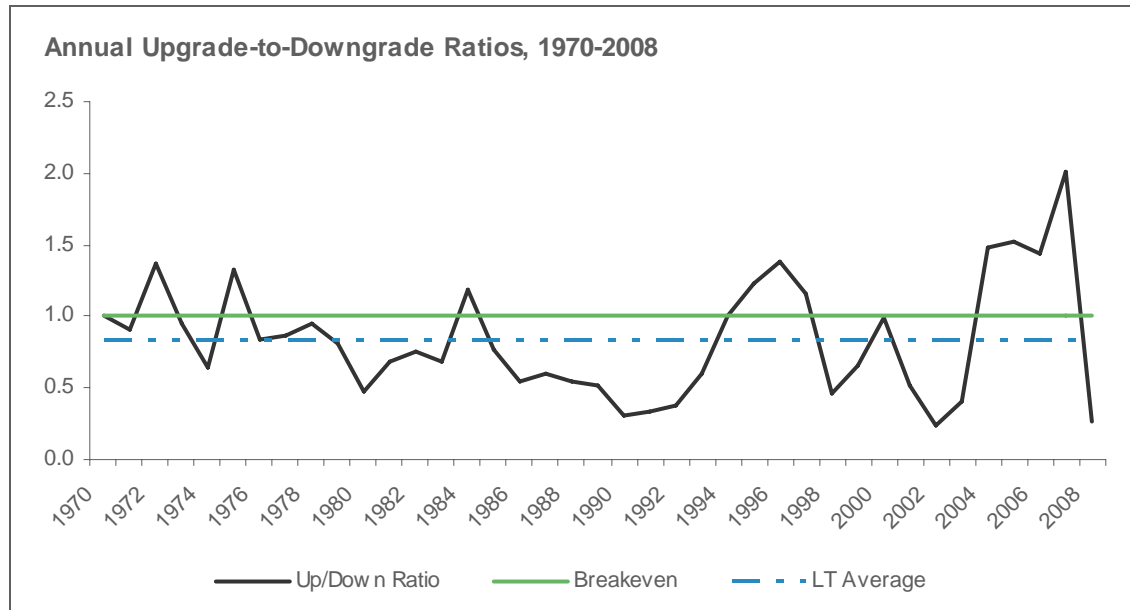
As a result of rapidly increasing defaults in 2008, the trailing twelve-month issuer-weighted default rate for all Moody's-rated issuers jumped from 0.3% in 2007 to 1.9% in 2008, marking its first up-tick since 2001. Among speculative-grade issuers, the default rate rose to 4.1% in 2008, more than a fourfold increase from its closing level of 0.9% at the end of 2007. To put this in historical perspective, since 1983, Moody's annual default rate for speculative-grade corporate issuers has averaged 4.4%, with the annual peak in 2001 at 10.1% and the trough in 2007 at 0.9%. Before 1983, the speculative-grade default rate reached a record peak of 15.4% during the Great Depression (see Exhibit 3). Measured on a dollar volume basis, Moody's speculative-grade corporate bond default rate jumped from 0.6% in 2007 to 5.8% in 2008. And the volume-weighted default rate for all Moody's-rated issuers increased to 2.2% in 2008 from 0.1% in 2007.

**Exhibit 3**

## Corporate Default and Recovery Rates, 1920-2008

Consistent with rapidly weakening credit quality and increasing numbers of defaults, the upgrade-to-downgrade ratio for corporate issuers fell sharply in 2008. Specifically, there were 992 downgrades and 268 upgrades in 2008, sending the upgrade-to-downgrade ratio to 0.3 compared with 2.0 in 2007<sup>3</sup>. Exhibit 4 shows the annual upgrade-to-downgrade ratio for Moody's-rated corporate issuers between 1970 and 2008, indicating that the 2008 decline in the ratio was the largest in the past 39 years. Since 1970, the upgrade-to-downgrade ratio has averaged at 0.8.

**Exhibit 4**



Historically, as shown by Moody's research, default rates and recovery rates are negatively correlated. In 2008, this negative correlation reared its head again as rising default rates coincided with declining recovery rates. As shown in Exhibit 5, and as measured by post-30 day trading prices, average recovery rates for bonds and loans in all lien positions dropped in 2008 from 2007. For example, in 2008, senior unsecured bonds recovered an average of 33.8% on an issuer-weighted basis, well below 2007's 53.3%. Measured on a value-weighted basis, the decline was even more pronounced as the average senior unsecured bond recovery rate fell to 26.2% in 2008, from a level of 56.9% a year earlier. And relative to historical averages, recovery rates of all debts, with the exception of senior secured bonds, were below average in 2008 when measured on an issuer-weighted basis.

<sup>3</sup> These are not adjusted for methodology changes (JDA, LGD etc.). As a result, these data are not directly comparable to the upgrade/downgrade ratios in Moody's Quarterly Rating Action reports.

## Corporate Default and Recovery Rates, 1920-2008

**Exhibit 5****Average Corporate Debt Recovery Rates Measured by Post-Default Trading Prices<sup>1</sup>**

Lien Position	Issuer-Weighted			Value-Weighted		
	2008	2007	1982-2008	2008	2007	1982-2008
<b>Bank Loans</b>						
Sr. Secured	63.4%	68.6%	69.9%	49.0%	78.3%	62.1%
Second Lien	40.4%	65.9%	50.4%	36.6%	65.8%	49.8%
Sr. Unsecured <sup>2</sup>	29.8%	--	52.5%	22.6%	--	41.0%
<b>Bonds</b>						
Sr. Secured	58.0%	80.5%	52.3%	45.9%	81.7%	53.0%
Sr. Unsecured	33.8%	53.3%	36.4%	26.2%	56.9%	32.4%
Sr. Subordinated	23.0%	54.5%	31.7%	10.4%	67.7%	26.4%
Subordinated	23.6%	--	31.0%	7.3%	--	23.5%
Jr. Subordinated	--	--	24.0%	--	--	16.8%
<b>Pref. Stock<sup>3</sup></b>						
Trust Pref.	--	--	11.7%	--	--	13.0%
Non-trust Pref.	8.6%	--	21.6%	1.7%	--	13.1%

1. Based on 30-day post-default market prices.

2. 2008's average senior unsecured loan recoveries are based on three observations.

3. Only includes defaults on preferred stock that are associated or followed by a broader debt default. Average recovery rates for preferred stock only covers the period of 1983-2008.

Value-weighted recovery rates were noticeably lower than issuer-weighted recovery rates in 2008 as larger defaulters experienced lower recovery rates relative to those of smaller defaulters. And, as shown in Exhibit 6, the recovery rates for large financial institutions in 2008 were especially low with Lehman Brothers recovering 9% on its senior unsecured bonds and the three Icelandic banks recovering less than 5% on their senior unsecured bonds. Washington Mutual Bank and Washington Mutual, however, recovered an average of 42% and the GMAC's distressed debt exchange led the pack with a relatively high recovery rate at about 70%.

## Corporate Default and Recovery Rates, 1920-2008

**Exhibit 6****Senior Unsecured Bond Recovery Rates for Financial Institution Defaults in 2008<sup>1</sup>**

Company	Domain	Default Volume (\$Mil)	Sr. Unsecured Bond Recovery
Lehman Brothers Holdings, Inc.	United States	120,164	9.3%
Kaupthing Bank hf	Iceland	20,063	4.0%
Glitnir banki hf	Iceland	18,773	3.0%
GMAC LLC	United States	17,190	69.9%
Washington Mutual Bank	United States	13,600	26.5%
Residential Capital, LLC	United States	12,315	51.7%
Landsbanki Islands hf	Iceland	12,161	3.0%
Washington Mutual, Inc.	United States	5,746	57.0%
GMAC of Canada Ltd	Canada	265	70.7%
Downey Financial Corp.	United States	200	0.5%
Fremont General Corporation	United States	166	46.0%
Luminent Mortgage Capital, Inc.	United States	131	27.3%
Triad Financial Corporation	United States	89	76.5%
Franklin Bank Corp.	United States	80	0.0%
GMAC International Finance B.V.	Netherlands	51	85.5%
<b>Average</b>	<b>35.4%</b>	<b>Median</b>	<b>27.3%</b>

1. Based on 30-day post-default market prices.

Recovery rates in 2008 would have been even lower had it not been for the record level of distressed exchanges, which typically yield relatively high recovery rates. As shown in Exhibit 7 for 2008 defaulters, debt holders at all lien positions experienced higher recoveries on distressed exchanges relative to other types of defaults. For example, senior unsecured bond holders experienced an average 50.8% recovery rate from distressed exchanges, more than double the average recovery rates of 20.8% and 24.4% for payment defaults and bankruptcies, respectively.

**Exhibit 7****2008 Recovery Rates by Initial Default Types<sup>1</sup>**

Lien Position	Initial Default Type		
	Payment Default	Bankruptcy	Distressed Exchange
<b>Bank Loans</b>			
Sr. Secured	55.0%	66.1%	82.7%
Second Lien	47.4%	31.6%	72.2%
Sr. Unsecured	--	29.8%	--
<b>Bonds</b>			
Sr. Secured	65.7%	42.7%	73.0%
Sr. Unsecured	20.8%	24.4%	50.8%
Sr. Subordinated	20.3%	16.7%	48.5%
Subordinated	10.0%	4.6%	77.8%
Jr. Subordinated	--	--	--

1. Issuer-weighted. Based on 30-day post-default market prices.



## Corporate Default and Recovery Rates, 1920-2008

The recovery data discussed above is based on debt trading prices 30 days after the default date. An alternative recovery measure is based on ultimate recoveries, or the value creditors realize at the resolution of a default event. For example, for issuers filing for bankruptcy, the ultimate recoveries are the present values of the cash and/or securities that creditors actually receive when these issuers exit bankruptcy, typically 1-2 years following their initial default dates.<sup>4</sup>

In Exhibit 8, we present data on ultimate recovery rates for North American companies in Moody's Ultimate Recovery Database.<sup>5</sup> Last year, Moody's added 20 firms that either emerged from bankruptcy or resolved their default events in 2008. The average "firm-wide" recovery rate for these 20 firms was 63.0%, below 2007's 68.7% level, but still well above the long-term average of 53.4% since 1987.<sup>6</sup> As shown in Exhibit 8, the individual debts at these 20 firms, in most cases, enjoyed higher recoveries in 2008 compared to historical averages. However, among the 10 of the 20 companies that defaulted in 2008 and also had their default events resolved in the same year, debt holders of all priorities, except senior unsecured bonds, experienced weaker recovery rates compared to their 1987-2008 historical averages. Since there is a substantial time lag between an issuer's default date and when its ultimate recovery is known, these data are consistent with there also being a lag in the observed cyclicity of ultimate recovery rates and default rates.

### Exhibit 8

#### Average Corporate Debt Recovery Rates Measured by Ultimate Recoveries, 1987-2008<sup>1</sup>

Lien Position	Emergence Year			Default Year		
	2008	2007	1987-2008	2008	2007	1987-2008
Loans	87.0%	96.6%	82.8%	61.2%	93.5%	82.8%
Bonds						
Sr. Secured	70.0%	85.5%	63.6%	51.1%	65.4%	63.6%
Sr. Unsecured	74.0%	60.0%	46.2%	76.8%	83.7%	46.2%
Sr. Subordinated	23.0%	62.9%	29.7%	9.3% <sup>2</sup>	55.4%	29.7%
Subordinated	--	0.0%	28.9%	--	0.0%	28.9%
Jr. Subordinated	0.0%	50.0%	16.0%	--	--	16.0%

1. Some of these numbers differ from last year's report due to new data being added to the Ultimate Recovery Database during 2008.

2. There were only two sr. sub bond defaults in 2008.

As highlighted above, Moody's and other academic researchers have found that annual corporate default rates are negatively correlated with annual average recovery rates as measured by post-default trading prices. There is also a similar negative relationship using ultimate data.<sup>7</sup> As shown in panel A in Exhibit 9, a linear regression of annual average senior unsecured bond recovery rates on annual speculative-grade default rates yields an R-square value of 0.5. In panel B using firm-wide ultimate recoveries, a similar negative correlation is also observed with an R-square of 0.4.

<sup>4</sup> For details, see Moody's Special Comment "Moody's Ultimate Recovery Database," April 2007.

<sup>5</sup> Data is from Moody's Ultimate Recovery Database which includes detailed recovery information for over 3500 loans and bonds from more than 700 U.S. corporate defaulters since 1987.

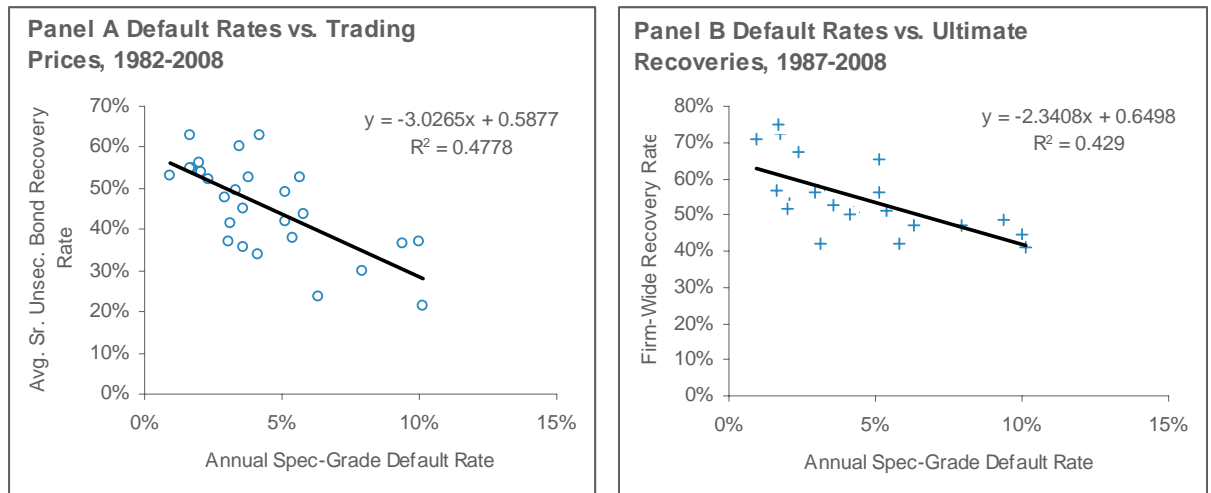
<sup>6</sup> For a given issuer, the firm-wide recovery rate is the weighted-average recovery rate across all of the issuer's debts where the weights are the size of the debts. Or in other words, it is the enterprise value of the issuer divided by the firm's total debts at the time of resolution.

<sup>7</sup> See Moody's Special Comment "Adjusting Moody's LGD Assessments to Meet Basel II Downturn Requirements", November 2007

## Corporate Default and Recovery Rates, 1920-2008

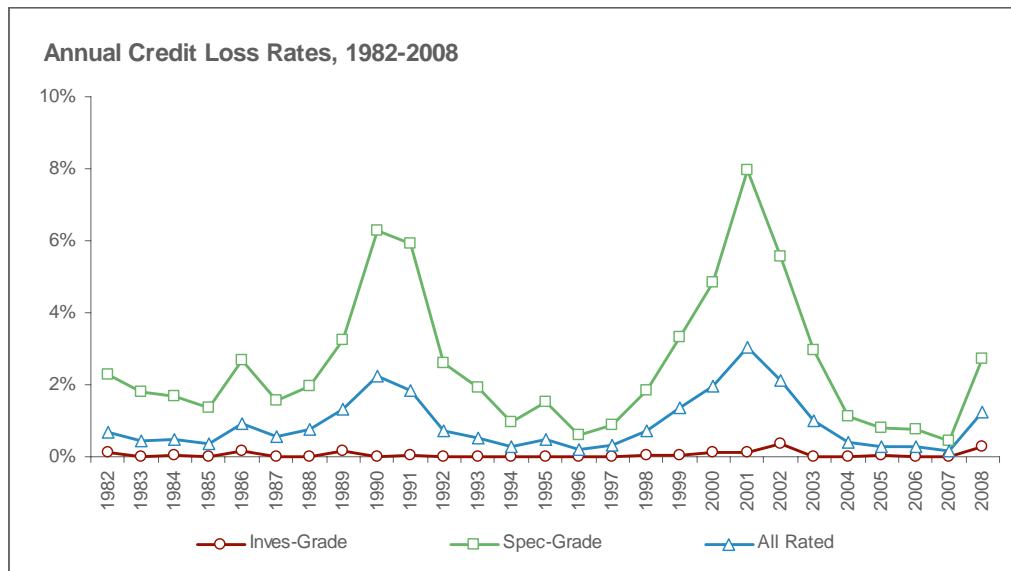
**Exhibit 9**

### Correlation between Default and Recovery Rates



Moody's credit ratings are opinions of relative expected credit losses upon default, which are functions of both the probability of default and severity of default (LGD). Exhibit 10 shows annual credit loss rates from 1982 to 2008 for Moody's-rated corporate issuers. In 2008, the rising default rate, coupled with a higher loss severity rate, led to an increase in the credit loss rate among Moody's-rated issuers to 1.2%, compared to 0.2% in 2007. The average annual credit loss rate since 1982 is 0.9% (see underlying data in Exhibit 29).

**Exhibit 10**



## Corporate Default and Recovery Rates, 1920-2008

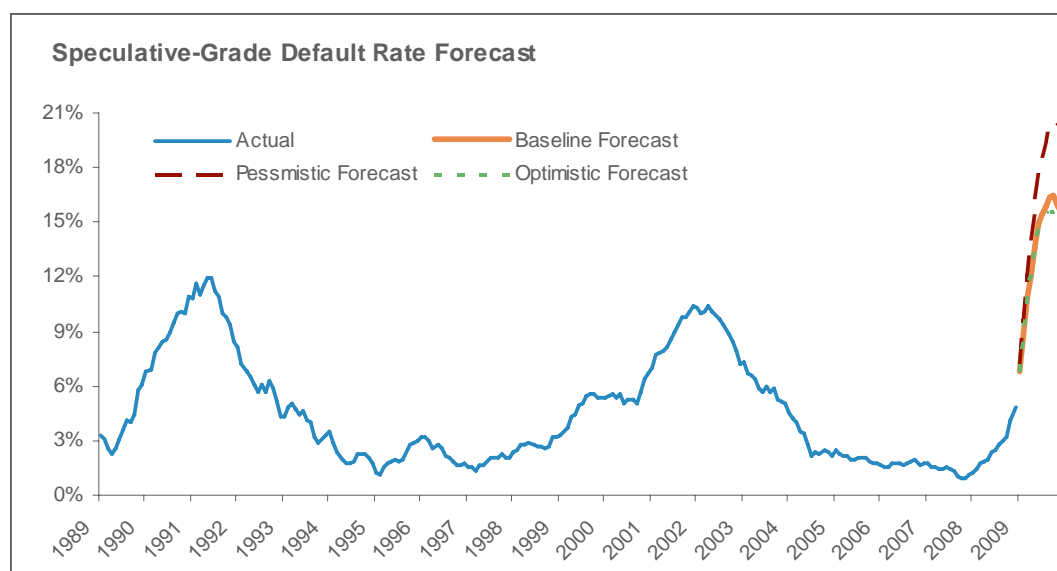
## Default and Recovery Outlook for 2009

## Default Rate Forecasts

The ongoing banking crisis and global economic downturn make it almost certain that default rates will continue to climb sharply during 2009. The only outstanding questions are to what levels they will rise and how quickly. Because the impact of the current economic downturn on corporate debt issuers is likely to be more severe than for the two most recent credit cycles of the early 1990s and 2000s, Moody's expects that the speculative-grade default rate will exceed the peaks of 11.9% and 10.4% reached in those cycles, respectively. Indeed, the speculative-grade default rate could exceed the 15.4% record level set in 1933, when the speculative-grade market was solely a fallen angel market comprised exclusively of downgraded investment-grade issuers.

Moody's formal forecasting model, the Credit Transition Model (CTM)<sup>8</sup>, indicates that the global issuer-weighted speculative-grade default rate will hit a peak of 16.4% in November. If this forecast materializes, the speculative-grade default rate will almost quadruple from a level of 4.1% at the end of 2008. In terms of the absolute numbers of the defaulters, the model forecast implies roughly 300 defaulters in 2009.

Exhibit 11 shows the model's baseline forecasts through 2009, as well as the optimistic and pessimistic forecast scenarios. The baseline forecast assumes that the unemployment rate will increase to 9.0% in the U.S. and 8.2% in Europe by year end. We note, however, that the high level of uncertainty surrounding the likely severity and length of the current global economic downturn imply similarly high uncertainty around the point estimates of model-based forecasts of default rates. Moreover, some of the model's main drivers, including the current record low ratings mix of Moody's issuers and record high levels of high yield bond spreads, are in ranges not seen in the historical data used to parameterize the model, implying heightened model risk.

**Exhibit 11**

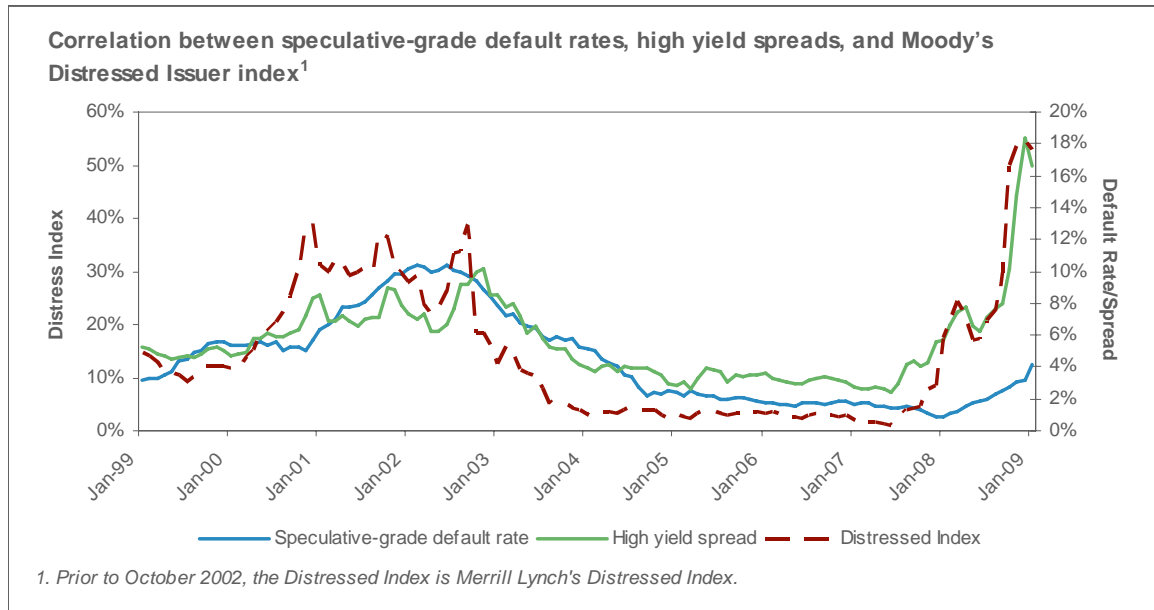
The high level of the high yield bond spread, which is a primary driver underlying the model's forecasts for rising default rates in 2009, began increasing in the second half of 2007 and reached a peak of approximately 2,000 basis points in the fourth quarter of 2008. Coincident with this increase in the high yield spread, Moody's Distressed Issuer index, which shows the percentage of speculative-grade issuers with debts trading at spreads to Treasuries greater than 1,000 basis points, also climbed sharply and now stands at 52.6% of speculative-grade issuers. Exhibit 12 shows the historical correlation between speculative-grade default rates,

<sup>8</sup> See Moody's Special Comment "Introducing Moody's Credit Transition Model" (August 2007) for more details about CTM.

## Corporate Default and Recovery Rates, 1920-2008

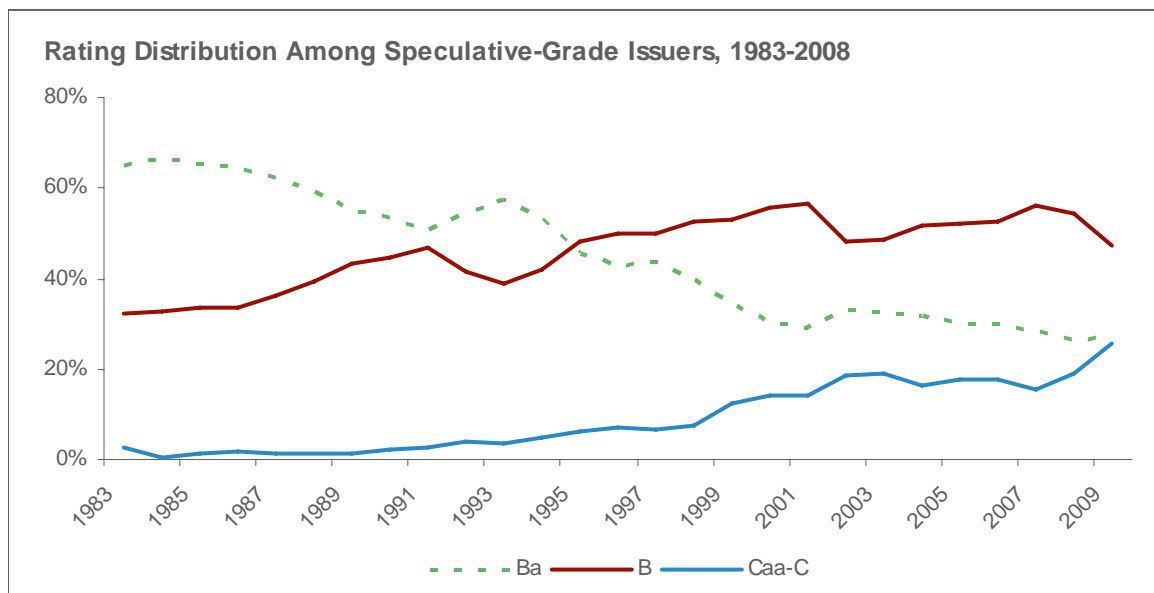
high yield spreads, and Moody's Distressed Issuer index. The historical data suggest that movements in the high-yield spread often coincide with changes in the level of the speculative-grade default rate. During the last two credit cycles of 1990-91 and 2001-02, high yield bond spreads peaked at roughly 1,000 basis points, and were associated with peak speculative-grade default rates of roughly 10-12%. If this historical relationship were to hold up in this cycle, the recent peak of 2,000 basis points in the high yield spread suggests that speculative-grade default rates could approach 20%.

**Exhibit 12**



The current high default rate forecast also stems from deteriorating credit quality and increasing refunding risk for corporate issuers. As shown in Exhibit 13, at the beginning of 2009, the share of Caa-C issuers accounted for almost 25% of Moody's speculative-grade issuers, the highest level recorded since 1983. Moreover, roughly 60% of issuers currently rated Caa1 or below either have negative outlooks or are on watch for possible downgrades. In the current environment, lowly rated issuers are particularly vulnerable to default if they need to refinance maturing debt or obtain forbearance from covenant violations.

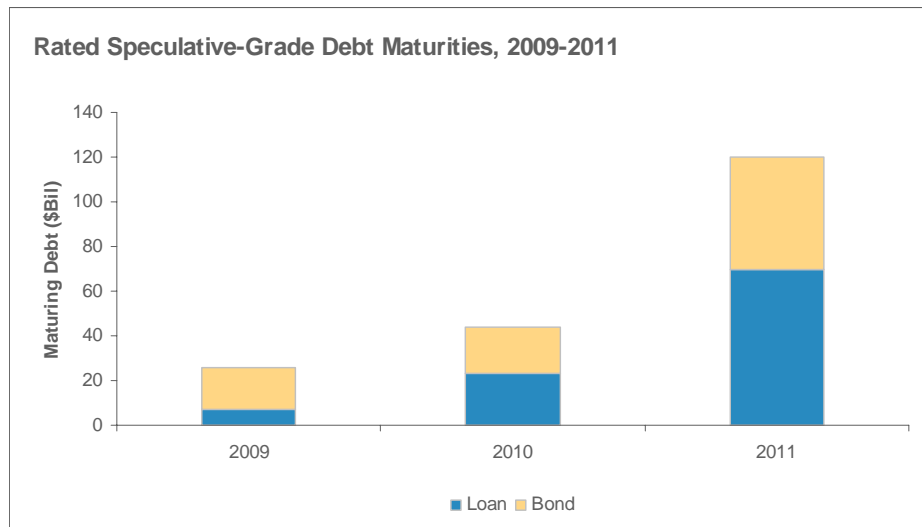
**Exhibit 13**



## Corporate Default and Recovery Rates, 1920-2008

In addition to deteriorating credit quality, refunding risks are projected to increase over the next several years as more than one-half of current U.S. speculative-grade issuers have debts maturing in the next three years. As shown in Exhibit 14, measured by dollar volume, a total of \$190 billion in debt is coming due over the next three years, which more than doubles the refunding needs of \$86 billion between 2008 and 2010<sup>9</sup>. This increase in issuers' refunding needs stems from maturing debt that was originated during the refinancing boom years of 2004-2007. Among Caa-C issuers, almost one-half have at least some debt maturing from 2009 to 2011.

### Exhibit 14



Across geographical regions, the speculative default rate is expected to climb to 15.8% in the U.S. by year-end 2009, while the European default rate is expected to rise more sharply to 19.6%. Driving this differential is the currently weaker ratings mix among European speculative-grade issuers relative to U.S. issuers.

Exhibit 15 shows the baseline one-year default rate forecasts across industries in both the U.S. and Europe. In the U.S., the consumer transportation industry, comprised mostly of airline companies, is expected to experience the highest default rate at over 30%. In Europe, the most troubled sector is expected to be durable consumer goods.

<sup>9</sup> For details, see Moody's Special Comment "Refunding Risk and Needs for U.S. Speculative-grade Corporate Issuers, 2009-2011", February 2009.

## Corporate Default and Recovery Rates, 1920-2008

## Exhibit 15

## One-Year Corporate Default Rate Forecasts by Industry

Industry	U.S.	Europe	Industry	U.S.	Europe
Transportation: Consumer	31.8%	2.5%	Services: Consumer <sup>1</sup>	7.6%	94.8%
Media: Broadcasting & Subscription	24.6%	11.4%	Healthcare & Pharmaceuticals	7.0%	2.8%
Automotive	22.6%	13.9%	FIRE: Finance	6.8%	3.3%
Media: Advertising, Printing & Publishing	22.3%	16.7%	Chemicals, Plastics, & Rubber	6.7%	12.9%
Hotel, Gaming, & Leisure	18.9%	14.2%	Beverage, Food, & Tobacco	6.7%	3.3%
Consumer goods: durable	16.3%	34.6%	Environmental Industries	6.2%	0.1%
Consumer goods: non-durable	14.7%	21.0%	Energy: Oil & Gas	5.7%	1.1%
Containers, Packaging, & Glass	14.6%	8.7%	FIRE: Real Estate	5.3%	0.0%
Retail	14.6%	3.8%	Telecommunications	5.2%	8.7%
Services: Business	14.2%	19.1%	Media: Diversified & Production	5.2%	2.4%
Transportation: Cargo	13.6%	8.9%	Energy: Electricity	4.9%	0.4%
Metals & Mining	13.0%	13.0%	FIRE: Insurance	1.5%	1.9%
Construction & Building	12.5%	9.3%	Utilities: Electric	0.9%	0.2%
Forest Products & Paper	10.4%	11.3%	Banking	0.4%	1.6%
Capital Equipment	9.9%	7.2%	Government Related Corp. Issuers	0.4%	1.4%
High Tech Industries	9.4%	11.7%	Utilities: Oil & Gas	0.4%	0.4%
Wholesale	9.1%	0.8%	Utilities: Water	0.1%	0.3%
Aerospace & Defense	7.8%	3.2%			

1. There is only one European issuer in the Consumer Service industry

Besides forecasting default rates, the CTM can also forecast probabilities of upgrade and downgrade rates for all or any sub-group of Moody's-rated issuers. The CTM is currently forecasting that rating downgrades will continue to outnumber rating upgrades in 2009. The upgrade-to-downgrade ratio is anticipated to decline further to 0.2 in 2009 from 0.3 in 2008. Among investment-grade companies, 5.8% of issuers are expected to have their ratings downgraded to Ba1 or below in the coming twelve months. On the other hand, only 1.6% of speculative-grade issuers are expected to become rising stars in 2009.

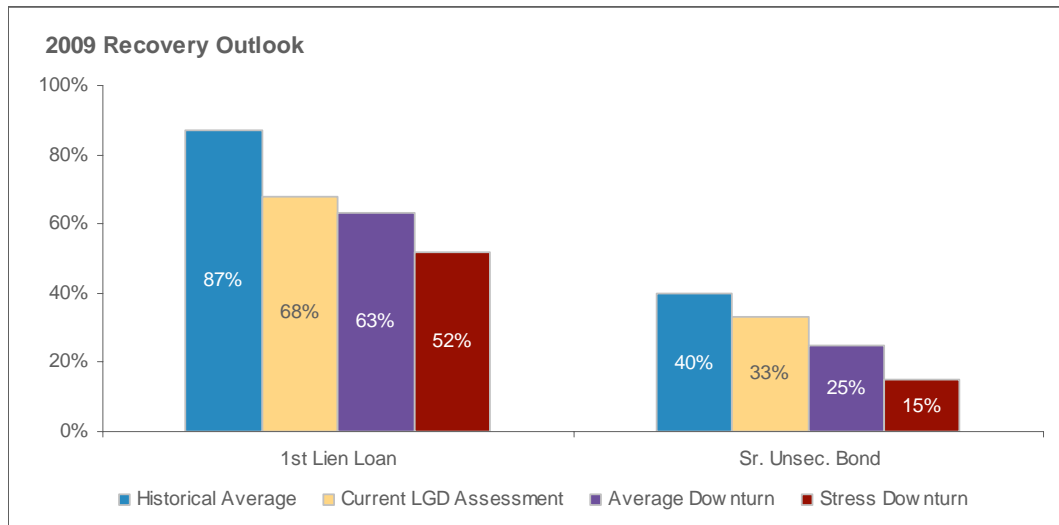
## Recovery Outlook

As recovery rates are negatively correlated with default rates, Moody's expects recovery rates to decline in 2009 as default rates continue to increase. Moreover, recoveries are likely to be below historical averages as a result of strong loan issuance in recent years<sup>10</sup>. The increasing share of loans in issuers' liability structures implies less protection for loan investors because it entails a corresponding reduction in the share of total debt junior to the loans—which serves as a first-loss cushion for the loans in the event of default. For unsecured bond holders, the increasing loan shares imply more debt senior to the bonds and, therefore, lower recovery rates on those bonds. Based on Moody's current LGD assessments, the average expected recovery rate across all U.S. first lien loans is 68%, which compares with a historical average of 87% from Moody's ultimate recovery database. For senior unsecured bonds, the average expected recovery rate is 33%, which is also lower than historical average of 40% (see Exhibit 16). In light of the current economic slowdown, we also present the LGD outlook under regular- and stress-downturn scenarios where firm-wide recovery rates average 45% and 35%, respectively. In the previous two credit cycles of 1991 and 2001, firm-wide recovery rates averaged roughly 45%. However, the current downturn, and its impact on firm-wide recovery rates, could certainly be more severe than those associated with the previous two credit cycles.

<sup>10</sup> See Moody's Special Comment "Strong Loan Issuance in Recent Years Signals Low Recovery Prospects for Loans and Bonds of Defaulted U.S. Corporate Issuers", June 2008.

## Corporate Default and Recovery Rates, 1920-2008

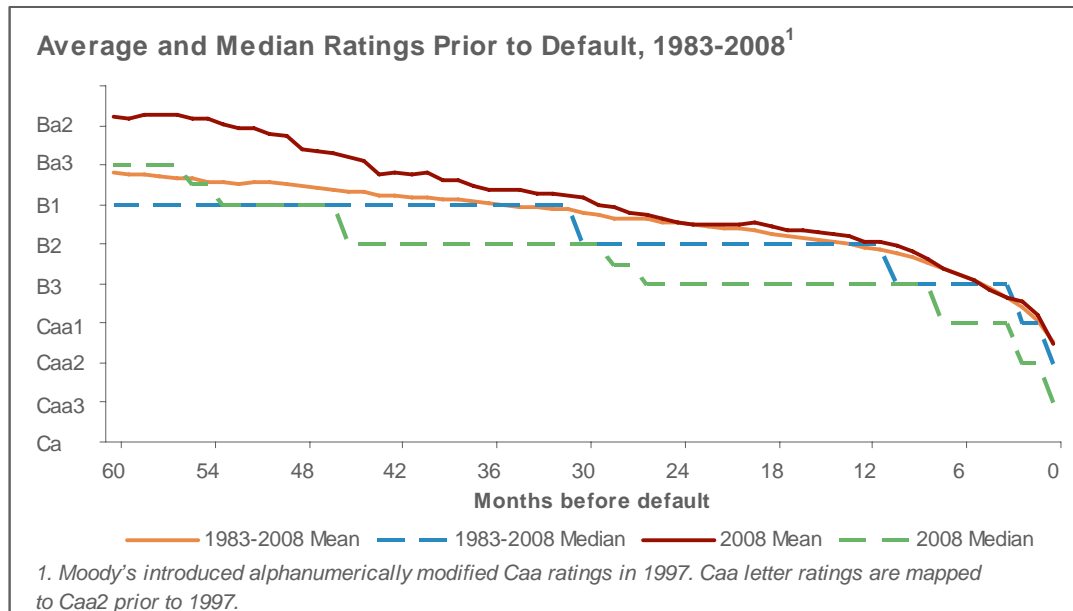
**Exhibit 16**



## Rating Accuracy Metrics

Moody's ratings have historically proven to be effective predictors of default. This is illustrated in Exhibit 17, which plots the average and median ratings of roughly 1,300 corporate issuers that defaulted from 1983 to 2008. The chart shows that Moody's-rated issuers have, on average, been downgraded to the Ba3 level as early as five years prior to default. Among issuers that defaulted in 2008, the average rating is Ba2 five years prior to default, which is slightly higher than its comparable historical average. In the year prior to default, 2008 defaulters' ratings were downgraded to B2 on average, which is comparable to historical average since 1983.

**Exhibit 17**

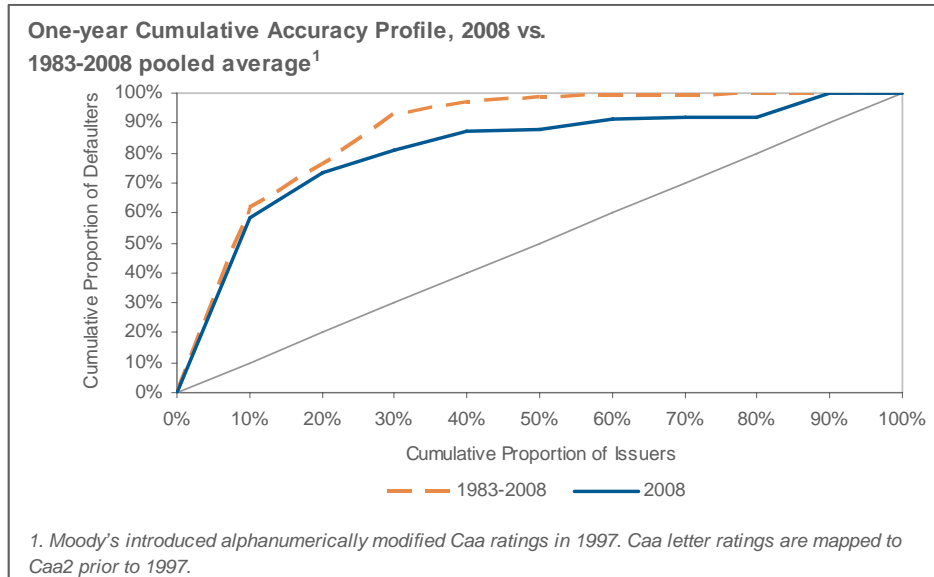


As a valuable tool to measure credit risk, ratings are expected to differentiate strong credits from weaker ones. In other words, an effective rating system should not only assign low ratings to issuers that ultimately default but also assign high ratings to those that are remote to default. A metric designed to measure this aspect of ratings performance is the cumulative accuracy profile (CAP) plot as shown in Exhibit 18. A rating system that possessed no predictive information about default risk would lie on the 45° line; the further the CAP curve

## Corporate Default and Recovery Rates, 1920-2008

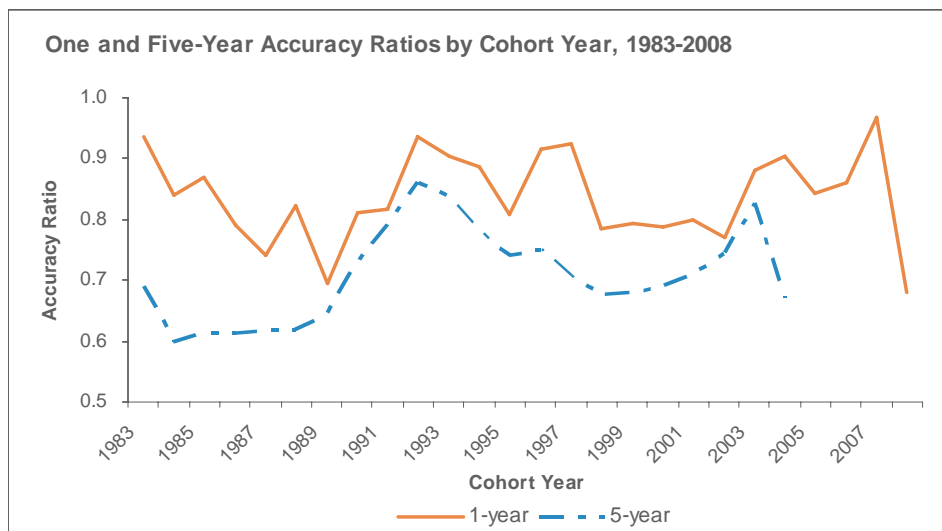
bows toward the northwest corner, the better it is at identifying defaults in the riskiest rating categories. Exhibit 18 shows that the CAP curve for 2008 lies below the one for the 1983-2008 period, which indicates a worse performance in 2008 relative to the historical average. The drop in rating performance in 2008 is largely the result of several investment-grade defaults in the banking and financial sectors, including Lehman Brothers, Washington Mutual and three Icelandic banks.

**Exhibit 18**



Another way to measure rating performance is the accuracy ratio, which is derived from the CAP curve. The accuracy ratio (AR) is the ratio of the area between the CAP curve and the 45° line, to the maximum possible area above the 45° line. AR values range from minus one to positive one and a higher AR indicates better rating accuracy. Exhibit 19 shows both one- and five-year horizon accuracy ratios for the period of 1983-2008. The graph suggests that the one-year accuracy ratio is positively correlated with the credit cycle: when defaults increase, the accuracy ratio falls. At the five-year horizon this correlation is much less evident. In the short run, the stability objective of Moody's rating system dampens rating changes; at longer time horizons, the stability objective is less of a constraint, and accuracy increases.

**Exhibit 19**





## Corporate Default and Recovery Rates, 1920-2008

## Data Tables and Charts

## Exhibit 20

## Moody's-Rated 2008 Corporate Bond and Loan Defaults

Company	Country	Initial Default Type	Bonds <sup>1</sup>	Loans <sup>1</sup>	In Jan 1 Cohort <sup>2</sup>
3217920 Nova Scotia Company	Canada	Distressed exchange		\$369	Yes
3D-GOLD Jewellery Holdings Limited	Hong Kong	Missed interest payment	\$170		Yes
Abitibi-Consolidated Company of Canada	Canada	Distressed exchange	\$138		Yes
Abitibi-Consolidated Inc.	Canada	Distressed exchange	\$317		Yes
ACIH, Inc.	United States	Missed interest payment	\$174		Yes
Ainsworth Lumber Company Limited	Canada	Distressed exchange	\$824		Yes
American Color Graphics, Inc.	United States	Suspension of payments		\$90	No <sup>3</sup>
American Media Operations, Inc.	United States	Missed interest payment	\$415		Yes
Ashton Woods USA, LLC	United States	Missed interest payment	\$125		Yes
Atlantis Plastics, Inc.	United States	Missed interest payment		\$216	Yes
Autocam Corporation	United States	Distressed exchange		\$30	Yes
Baseline Oil & Gas Corp	United States	Missed pri&int payments	\$115		Yes
Belvedere S.A.	France	Chapter 11	\$729		Yes
Big West Oil, LLC	United States	Chapter 11		\$600	Yes
BLB Management Services, Inc.	United States	Missed interest payment		\$565	Yes
Britannia Bulk Plc	United Kingdom	Placed under administration		\$170	Yes
Buffets, Inc.	United States	Chapter 11	\$300	\$640	Yes
Cap Cana, S.A.	Dominican Republic	Missed pri&int payments		\$100	Yes
Chesapeake Corporation	United States	Missed interest payment	\$295	\$250	Yes
Constar International, Inc.	United States	Prepackaged Chapter 11	\$395	\$75	Yes
Controladora Comercial Mexicana S.A.B. de C.V	Mexico	Bankruptcy	\$455		Yes
Downey Financial Corp.	United States	Chapter 7	\$200		Yes
Finlay Fine Jewelry Corporation	United States	Distressed exchange	\$140		Yes
Fremont General Corporation	United States	Missed interest payment	\$166		Yes
French Lick Resorts & Casino, LLC	United States	Distressed exchange	\$128		Yes
Gainey Corporation	United States	Missed interest payment		\$235	Yes
General Growth Properties	United States	Missed pri&int payments		\$900	Yes
General Motors Acceptance Corp. of Canada Ltd	Canada	Distressed exchange	\$265		Yes
Ginn-LA CS Borrower, LLC	United States	Missed pri&int payments		\$651	Yes
Glitnir banki hf	Iceland	Seized by regulators	\$13,365	\$5,408	Yes
GMAC International Finance B.V.	Netherlands	Distressed exchange	\$51		Yes
GMAC LLC	United States	Distressed exchange	\$17,190		Yes
Greatwide Logistics Services, Inc.	United States	Missed pri&int payments		\$487	Yes
Greektown Holdings, LLC	United States	Chapter 11	\$185	\$262	Yes
Harrah's Entertainment, Inc.	United States	Distressed exchange	\$1,142		No <sup>4</sup>
Harrah's Operating Company, Inc.	United States	Distressed exchange	\$1,082		Yes
Hawaiian Telcom Communications, Inc.	United States	Chapter 11	\$500	\$575	Yes
Herbst Gaming, Inc.	United States	Missed interest payment	\$330	\$847	Yes
Hines Nurseries	United States	Chapter 11	\$175	\$40	Yes
HRP Myrtle Beach Operations, LLC	United States	Chapter 11	\$255	\$15	Yes
IAP Worldwide Services, Inc.	United States	Distressed exchange		\$496	Yes
Interep National Radio Sales, Inc.	United States	Prepackaged Chapter 11	\$100	\$100	Yes
IT Holding S.p.A	Italy	Missed pri&int payments		\$12	Yes
JHT Holdings	United States	Prepackaged Chapter 11		\$130	Yes
Journal Register Co.	United States	Missed interest payment		\$673	Yes
Kaupthing Bank hf	Iceland	Seized by regulators	\$18,282	\$1,781	Yes
Kimball Hill, Inc.	United States	Chapter 11	\$203	\$150	Yes
Kremikovtzi AD	Bulgaria	Missed interest payment	\$504		Yes
Landsbanki Islands hf	Iceland	Seized by regulators	\$11,015	\$1,146	Yes
Lazy Days' R.V. Center, Inc.	United States	Missed interest payment	\$139		Yes
LBREP/L SunCal Master I, LLC	United States	Chapter 11		\$395	Yes
Legends Gaming, LLC	United States	Chapter 11		\$222	Yes
Lehman Brothers Bankhaus AG	Germany	Payment moratorium	\$80		Yes
Lehman Brothers Holdings, Inc.	United States	Chapter 11	\$118,164	\$2,000	Yes
Lehman Brothers Holdings, Plc	United Kingdom	Placed under administration	\$10		Yes

## Corporate Default and Recovery Rates, 1920-2008

## Moody's-Rated 2008 Corporate Bond and Loan Defaults

Company	Country	Initial Default Type	Bonds <sup>1</sup>	Loans <sup>1</sup>	In Jan 1 Cohort <sup>2</sup>
Lehman Brothers, Inc.	United States	Liquidated	\$228		Yes
Leiner Health Products Inc.	United States	Chapter 11	\$150	\$290	Yes
Level 3 Communications, Inc.	United States	Distressed exchange	\$328		Yes
Linens 'N Things, Inc.	United States	Chapter 11	\$650	\$444	Yes
MAAX Corporation	Canada	Bankruptcy	\$150	\$232	Yes
Majestic Star Casino, L.L.C. (The)	United States	Missed interest payment	\$500		Yes
Masonite Corporation	Canada	Missed interest payment	\$770		Yes
Mecachrome International Inc.	Canada	Bankruptcy	\$267	\$9	Yes
Metaldyne Corporation	United States	Distressed exchange	\$354		Yes
Mobile-8 Telecom Tbk	Indonesia	Missed pri&int payments	\$100		Yes
Motor Coach Industries International, Inc.	United States	Prepackaged Chapter 11	\$59	\$144	Yes
Mrs. Fields Famous Brands, LLC	United States	Prepackaged Chapter 11	\$196		Yes
Neff Corp.	United States	Distressed exchange	\$196		Yes
Petrozuata Finance Inc.	Venezuela	Distressed exchange	\$755		Yes
Pierre Foods	United States	Missed interest payment	\$125	\$267	Yes
Pilgrim's Pride Corporation	United States	Chapter 11	\$657	\$1,269	Yes
Plastech Engineered Products, Inc.	United States	Chapter 11		\$565	Yes
Portola Packaging, Inc.	United States	Prepackaged Chapter 11	\$180	\$60	Yes
PRC, LLC	United States	Chapter 11		\$227	No <sup>4</sup>
Primus Telecommunications Group, Inc.	United States	Distressed exchange	\$48		No <sup>3</sup>
Primus Telecommunications Holding, Inc.	United States	Distressed exchange	\$82		Yes
Propex Inc.	United States	Chapter 11	\$150	\$310	Yes
Quebecor World (USA) Inc.	United States	Bankruptcy			No <sup>4</sup>
Quebecor World, Inc.	United States	Bankruptcy	\$1,453	\$1,000	Yes
Recycled Paper Greetings, Inc.	United States	Missed interest payment		\$217	Yes
Residential Capital, LLC	United States	Distressed exchange	\$12,315		Yes
Roskilde Bank A/S	Denmark	Missed interest payment	\$592		Yes
SemCams Holding Company	Canada	Bankruptcy		\$175	Yes
SemCrude, L.P.	United States	Chapter 11		\$2,520	Yes
SemGroup LP	United States	Chapter 11	\$600	\$400	Yes
Sirius Satellite Radio, Inc.	United States	Distressed exchange	\$50		Yes
Six Flags, Inc	United States	Distressed exchange	\$531		Yes
Tekni-Plex, Inc.	United States	Missed interest payment	\$740		Yes
Tembec Industries, Inc.	Canada	Distressed exchange	\$1,200		Yes
Tousa Inc.	United States	Chapter 11	\$1,060	\$1,200	Yes
Triad Financial Corporation	United States	Distressed exchange	\$89		Yes
Tribune Company	United States	Chapter 11	\$2,519	\$10,155	Yes
Tronox Worldwide LLC	United States	Missed interest payment	\$350		Yes
Tropicana Entertainment, LLC	United States	Chapter 11	\$960	\$1,310	Yes
Tropicana Las Vegas Resort and Casino, LLC	United States	Chapter 11		\$440	Yes
Trump Entertainment Resorts Holdings, L.P.	United States	Missed interest payment	\$1,249		Yes
VeraSun Energy Corporation	United States	Chapter 11	\$660	\$6	Yes
Vertis, Inc.	United States	Missed interest payment	\$984	\$650	Yes
VICORP Restaurants, Inc	United States	Chapter 11	\$127	\$15	Yes
Viskase Companies, Inc.	United States	Distressed exchange	\$3		Yes
Washington Mutual Bank	United States	Receivership	\$13,600		Yes
Washington Mutual, Inc.	United States	Chapter 11	\$5,746		Yes
Waterford Wedgwood plc	Ireland	Missed interest payment	\$231		Yes
WCI Communities, Inc.	United States	Chapter 11	\$650	\$300	Yes
Wellman, Inc.	United States	Chapter 11		\$675	Yes
Workflow Management, Inc.	United States	Missed pri&int payments		\$275	Yes

1. In millions of USD. Guaranteed debts are only added to the issuers but not to the guarantors in order to avoid double counting.

2. Only issuers included in the January 1 cohort are included in Moody's default rates.

3. Primus Telecom Group and American Color Graphic initially defaulted in 2007. They are not counted as 2008 defaulters. However, some of their debts did not default until 2008 and these debts are included in 2008's default totals.

4. The ratings for PRC and Quebecor World (USA) were withdrawn before January 1st, 2008 while Harrah's Entertainment's initial rating was assigned in February 2008.

## Corporate Default and Recovery Rates, 1920-2008

## Exhibit 21

## Largest Moody's-Rated Defaults, 1920-2008

Corporate Family	Default Volume (US\$ Mil)	Default Year	Specific Industry	Domain
Lehman Brothers Holdings Inc.	\$120,483	2008	FIRE: Finance	United States
Worldcom, Inc.	\$33,608	2002	Telecommunications	United States
GMAC LLC	\$29,821	2008	FIRE: Finance	United States
Kaupthing Bank Hf	\$20,063	2008	Banking	Iceland
Washington Mutual, Inc.	\$19,346	2008	Banking	United States
Glitnir Banki Hf	\$18,773	2008	Banking	Iceland
NTL Communications Corp.	\$16,429	2002	Media: Broadcasting & Subscription	United Kingdom
Adelphia Communications Corp.	\$16,256	2002	Media: Broadcasting & Subscription	United States
Enron Corp.	\$13,852	2001	Energy: Electricity	United States
Tribune Company	\$12,674	2008	Media: Diversified & Production	United States

## Exhibit 22

Annual Moody's-Rated Global Corporate Issuer Default Counts, 1920-2008<sup>1</sup>

Year	Inv-Grade	Spec-Grade	All Rated	Year	Inv-Grade	Spec-Grade	All Rated	Year	Inv-Grade	Spec-Grade	All Rated
1920	8	25	33	1950	0	0	0	1980	0	4	4
1921	7	24	31	1951	0	1	1	1981	0	2	2
1922	10	23	33	1952	0	0	0	1982	2	11	13
1923	5	22	27	1953	0	0	0	1983	0	13	13
1924	3	37	40	1954	0	1	1	1984	1	12	13
1925	7	34	41	1955	0	1	1	1985	0	15	15
1926	4	18	22	1956	0	0	0	1986	4	30	34
1927	1	15	16	1957	0	1	1	1987	0	30	30
1928	0	8	8	1958	0	0	0	1988	0	29	29
1929	3	12	15	1959	0	0	0	1989	4	48	52
1930	2	21	23	1960	0	2	2	1990	0	82	82
1931	6	79	85	1961	0	3	3	1991	1	64	65
1932	10	108	118	1962	0	4	4	1992	0	31	31
1933	9	188	197	1963	0	3	3	1993	0	19	19
1934	5	60	65	1964	0	0	0	1994	0	16	16
1935	9	51	60	1965	0	0	0	1995	0	27	27
1936	3	19	22	1966	0	1	1	1996	0	17	17
1937	4	17	21	1967	0	0	0	1997	0	25	25
1938	9	17	26	1968	0	1	1	1998	1	49	50
1939	2	13	15	1969	0	0	0	1999	1	100	101
1940	2	22	24	1970	2	25	27	2000	4	122	126
1941	0	10	10	1971	0	3	3	2001	4	184	188
1942	0	4	4	1972	0	5	5	2002	16	129	145
1943	0	3	3	1973	2	3	5	2003	0	81	81
1944	0	3	3	1974	0	3	3	2004	0	38	38
1945	0	2	2	1975	0	4	4	2005	2	30	32
1946	0	0	0	1976	0	2	2	2006	0	31	31
1947	0	1	1	1977	1	3	4	2007	0	18	18
1948	0	0	0	1978	0	4	4	2008	13	88	101
1949	0	5	5	1979	0	1	1				

1. Includes bond and loan issuers rated as of January 1 of each year.

## Corporate Default and Recovery Rates, 1920-2008

## Exhibit 23

Annual Rated Global Corporate Bond and Loan Default Volumes, 1970-2008<sup>1</sup>

Cohort	Investment Grade			Speculative Grade			All Ratings		
	Bond	Loan	Total	Bond	Loan	Total	Bond	Loan	Total
1970	\$154	\$0	\$154	\$756	\$0	\$756	\$910	\$0	\$910
1971	\$0	\$0	\$0	\$132	\$0	\$132	\$132	\$0	\$132
1972	\$0	\$0	\$0	\$215	\$0	\$215	\$215	\$0	\$215
1973	\$17	\$0	\$17	\$94	\$0	\$94	\$112	\$0	\$112
1974	\$0	\$0	\$0	\$69	\$0	\$69	\$69	\$0	\$69
1975	\$0	\$0	\$0	\$176	\$0	\$176	\$176	\$0	\$176
1976	\$0	\$0	\$0	\$34	\$0	\$34	\$34	\$0	\$34
1977	\$68	\$0	\$68	\$179	\$0	\$179	\$247	\$0	\$247
1978	\$0	\$0	\$0	\$112	\$0	\$112	\$112	\$0	\$112
1979	\$0	\$0	\$0	\$18	\$0	\$18	\$18	\$0	\$18
1980	\$0	\$0	\$0	\$302	\$0	\$302	\$302	\$0	\$302
1981	\$0	\$0	\$0	\$47	\$0	\$47	\$47	\$0	\$47
1982	\$243	\$0	\$243	\$486	\$0	\$486	\$729	\$0	\$729
1983	\$0	\$0	\$0	\$1,190	\$0	\$1,190	\$1,190	\$0	\$1,190
1984	\$183	\$0	\$183	\$399	\$0	\$399	\$582	\$0	\$582
1985	\$0	\$0	\$0	\$1,595	\$0	\$1,595	\$1,595	\$0	\$1,595
1986	\$138	\$0	\$138	\$3,766	\$0	\$3,766	\$3,904	\$0	\$3,904
1987	\$40	\$0	\$40	\$9,363	\$242	\$9,605	\$9,403	\$242	\$9,645
1988	\$0	\$0	\$0	\$5,194	\$361	\$5,555	\$5,194	\$361	\$5,555
1989	\$1,506	\$0	\$1,506	\$10,196	0	\$10,196	\$11,702	\$0	\$11,702
1990	\$0	\$0	\$0	\$19,559	\$1,603	\$21,161	\$19,559	\$1,603	\$21,161
1991	\$1,348	\$0	\$1,348	\$14,924	\$350	\$15,274	\$16,272	\$350	\$16,622
1992	\$0	\$0	\$0	\$6,418	\$698	\$7,116	\$6,418	\$698	\$7,116
1993	\$0	\$0	\$0	\$1,827	\$424	\$2,251	\$1,827	\$424	\$2,251
1994	\$0	\$0	\$0	\$2,100	\$299	\$2,399	\$2,100	\$299	\$2,399
1995	\$0	\$0	\$0	\$4,788	\$27	\$4,816	\$4,788	\$27	\$4,816
1996	\$0	\$0	\$0	\$4,053	\$1,435	\$5,488	\$4,053	\$1,435	\$5,488
1997	\$0	\$0	\$0	\$5,104	\$948	\$6,052	\$5,104	\$948	\$6,052
1998	\$399	\$0	\$399	\$9,825	\$2,817	\$12,642	\$10,224	\$2,817	\$13,041
1999	\$461	\$1,225	\$1,686	\$26,222	\$13,044	\$39,266	\$26,683	\$14,269	\$40,952
2000	\$4,115	\$3,950	\$8,065	\$25,296	\$21,567	\$46,863	\$29,411	\$25,517	\$54,928
2001	\$22,351	\$5,363	\$27,714	\$75,981	\$33,850	\$109,830	\$98,331	\$39,213	\$137,544
2002	\$55,565	\$13,122	\$68,687	\$106,831	\$35,728	\$142,559	\$162,396	\$48,850	\$211,246
2003	\$0	\$870	\$870	\$35,024	\$9,428	\$44,451	\$35,024	\$10,297	\$45,321
2004	\$0	\$0	\$0	\$11,810	\$3,932	\$15,742	\$11,810	\$3,932	\$15,742
2005	\$2,155	\$2,825	\$4,980	\$26,598	\$8,745	\$35,343	\$28,753	\$11,570	\$40,323
2006	\$0	\$0	\$0	\$7,758	\$2,630	\$10,388	\$7,758	\$2,630	\$10,388
2007	\$0	\$0	\$0	\$4,755	\$1,983	\$6,738	\$4,755	\$1,983	\$6,738
2008	\$182,820	\$10,335	\$193,155	\$55,814	\$32,223	\$88,037	\$238,634	\$42,557	\$281,191

1. Millions USD; includes bond and loan issuers rated as of January 1 of each year.

## Corporate Default and Recovery Rates, 1920-2008

## Exhibit 24

Annual Issuer Default Counts and Volume Totals  
by Geographical Region, 1986-2008<sup>1</sup>

Year	Issuer Counts					Dollar Volumes <sup>2</sup>				
	Africa & Middle East	Asia-Pacific	Europe	Latin America	North America	Africa & Middle East	Asia-Pacific	Europe	Latin America	North America
1986	0	0	0	0	34	\$0	\$0	\$0	\$0	\$3,904
1987	0	0	0	0	30	\$0	\$0	\$0	\$0	\$9,645
1988	0	0	0	0	29	\$0	\$0	\$0	\$0	\$5,555
1989	0	4	0	0	48	\$0	\$1,144	\$0	\$0	\$10,558
1990	0	1	0	0	81	\$0	\$200	\$0	\$0	\$20,961
1991	0	0	1	0	64	\$0	\$0	\$999	\$0	\$15,623
1992	0	0	0	0	31	\$0	\$0	\$0	\$0	\$7,116
1993	0	0	0	0	19	\$0	\$0	\$0	\$0	\$2,251
1994	0	0	1	0	15	\$0	\$0	\$774	\$0	\$1,625
1995	0	0	0	1	26	\$0	\$0	\$0	\$0	\$4,816
1996	0	0	0	1	16	\$0	\$0	\$0	\$218	\$5,270
1997	0	2	0	2	21	\$0	\$614	\$0	\$310	\$5,129
1998	0	5	0	0	45	\$0	\$1,444	\$0	\$0	\$11,597
1999	0	8	9	6	78	\$0	\$3,445	\$4,012	\$1,608	\$31,887
2000	0	5	3	2	116	\$0	\$1,048	\$713	\$238	\$52,929
2001	4	15	16	7	146	\$2,758	\$7,832	\$10,635	\$2,034	\$114,284
2002	0	3	28	15	99	\$0	\$1,112	\$48,007	\$9,196	\$152,930
2003	0	2	8	9	62	\$0	\$374	\$3,623	\$3,038	\$38,286
2004	1	0	3	0	34	\$183	\$0	\$1,873	\$100	\$13,587
2005	0	0	1	1	30	\$0	\$0	\$207	\$100	\$40,015
2006	0	0	7	2	22	\$0	\$0	\$1,601	\$167	\$8,620
2007	0	0	3	0	15	\$0	\$0	\$771	\$0	\$5,967
2008	0	2	12	3	84	\$0	\$270	\$53,374	\$1,311	\$226,236

1. Includes bond and loan issuers rated as of January 1 of each year.

2. Millions of USD

## Corporate Default and Recovery Rates, 1920-2008

## Exhibit 25

2008 Defaulted Corporate Bond and Loan Recoveries<sup>1</sup>

Company	Initial Default Type	Bank Loan			Bond			
		1st Lien	2nd Lien	Sr. Unsec	Sr. Sec.	Sr. Unsec.	Sr. Sub.	Sub.
3D-GOLD Jewellery Holdings Limited	Payment default					7.00%		
Abitibi-Consolidated Company of Canada	Distressed exchange					70.00%		
Abitibi-Consolidated Inc.	Distressed exchange					60.75%		
ACIH, Inc.	Payment default					20.00%		
Ainsworth Lumber Company Limited	Distressed exchange					41.00%		
American Media Operations, Inc.	Payment default						20.00%	
Ashton Woods USA, LLC	Payment default						20.00%	
Atherogenics, Inc.	Payment default					11.50%		
Atlantis Plastics, Inc.	Payment default	54.63%	41.00%					
Baseline Oil & Gas Corp	Payment default				101.00%			
Big West Oil, LLC	Bankruptcy	47.50%						
Birch Mountain Resources Ltd.	Payment default							10.00%
Buffets, Inc.	Bankruptcy	55.63%				3.50%		
Constar International, Inc.	Bankruptcy				62.00%		3.00%	
Controladora Comercial Mexicana S.A.B. de C.V	Bankruptcy					32.23%		
Corporacion Durango S.A. de C.V.	Bankruptcy					26.00%		
Downey Financial Corp.	Bankruptcy					0.53%		
Finlay Fine Jewelry Corporation	Distressed exchange					7.00%		
Fleetwood Enterprises Inc.	Distressed exchange						72.25%	
Franklin Bank Corp.	Bankruptcy					0.01%		
Fremont General Corporation	Payment default					46.00%		
French Lick Resorts & Casino, LLC	Distressed exchange				75.00%			
Gainey Corporation	Payment default	51.65%						
General Motors Acceptance Corp. of Canada Ltd	Distressed exchange					70.71%		
Glitnir banki hf	Bankruptcy					3.00%		1.00%
GMAC International Finance B.V.	Distressed exchange					85.50%		
GMAC LLC	Distressed exchange					69.87%		
Greatwide Logistics Services, Inc.	Payment default	82.80%	61.10%					
Greektown Holdings, LLC	Bankruptcy	96.59%				74.00%		
Harrah's Entertainment, Inc.	Distressed exchange					29.38%	56.25%	
Harrah's Operating Company, Inc.	Distressed exchange					20.75%		
Hawaiian Telcom Communications, Inc.	Bankruptcy					6.25%	0.50%	
Herbst Gaming, Inc.	Payment default	27.22%					11.00%	
Hines Nurseries	Bankruptcy					56.25%		
HRP Myrtle Beach Holdings, LLC	Bankruptcy					0.50%		
HRP Myrtle Beach Operations, LLC	Bankruptcy				31.75%			
IAP Worldwide Services, Inc.	Distressed exchange	82.67%	72.17%					
Interep National Radio Sales, Inc.	Bankruptcy						76.00%	
Intermet Corporation	Bankruptcy	85.17%	65.00%					
JHT Holdings	Bankruptcy	48.10%						
Journal Register Co.	Payment default	35.00%						
Kaupthing Bank hf	Bankruptcy					4.00%		1.00%
Kimball Hill, Inc.	Bankruptcy						3.38%	
Kremikovtzi AD	Payment default				61.00%			
Landsbanki Islands hf	Bankruptcy					3.00%		
LandSource Communities	Bankruptcy	71.79%	17.50%					
Lazy Days' R.V. Center, Inc.	Payment default					11.00%		
Legends Gaming, LLC	Bankruptcy	64.63%	40.00%					

## Corporate Default and Recovery Rates, 1920-2008

2008 Defaulted Corporate Bond and Loan Recoveries<sup>1</sup>

Company	Initial Default Type	Bank Loan			Bond			
		1st Lien	2nd Lien	Sr. Unsec	Sr. Sec.	Sr. Unsec.	Sr. Sub.	Sub.
Lehman Brothers Holdings, Inc.	Bankruptcy			13.63%		9.32%	0.13%	
Lehman Brothers, Inc.	Bankruptcy						13.00%	
Leiner Health Products Inc.	Bankruptcy	44.04%					0.13%	
Level 3 Communications, Inc.	Distressed exchange					64.88%		78.75%
Linens 'N Things, Inc.	Bankruptcy				44.00%			
Luminent Mortgage Capital, Inc.	Payment default					27.25%		
MAAX Corporation	Bankruptcy						1.63%	
Majestic Star Casino, L.L.C. (The)	Payment default				26.00%	4.00%		
Masonite Corporation	Payment default						7.00%	
Metaldyne Corporation	Distressed exchange					27.01%	10.63%	
Mrs. Fields Famous Brands, LLC	Bankruptcy				58.00%			
Neff Corp.	Distressed exchange					12.50%		
Petrozuata Finance Inc.	Distressed exchange				101.12%			
Pierre Foods	Payment default	79.67%					7.75%	
Pilgrim's Pride Corporation	Bankruptcy	57.00%				25.00%	5.50%	
Plastech Engineered Products, Inc.	Bankruptcy	28.10%	14.00%					
Portola Packaging, Inc.	Bankruptcy					51.38%		
PRC, LLC	Bankruptcy	61.88%	25.00%					
Primus Telecommunications Group, Incorporated	Distressed exchange					68.50%		
Primus Telecommunications Holding, Inc.	Distressed exchange					30.00%		
Propex Inc.	Bankruptcy	69.96%					10.25%	
Quebecor World, Inc.	Bankruptcy			74.20%		50.85%		
Recycled Paper Greetings, Inc.	Payment default	49.94%	40.00%					
Residential Capital, LLC	Distressed exchange				43.00%	51.69%		76.75%
SemCrude, L.P.	Bankruptcy	82.40%						
SemGroup LP	Bankruptcy					19.50%		
Sirius Satellite Radio, Inc.	Distressed exchange					82.00%		
Six Flags, Inc	Distressed exchange					65.58%		
Tekni-Plex, Inc.	Payment default				95.50%		64.00%	
Tembec Industries, Inc.	Distressed exchange					32.33%		
Tousa Inc.	Bankruptcy					53.00%	8.50%	
Triad Financial Corporation	Distressed exchange					76.50%		
Tribune Company	Bankruptcy	28.59%		1.50%	3.04%			2.58%
Tronox Worldwide LLC	Payment default					14.00%		
Tropicana Entertainment, LLC	Bankruptcy	94.80%					56.00%	
Tropicana Las Vegas Resort and Casino, LLC	Bankruptcy	95.33%						
Trump Entertainment Resorts Holdings, L.P.	Payment default				14.75%			
VeraSun Energy Corporation	Bankruptcy				57.50%	11.50%		
Vertis, Inc.	Payment default				96.00%	46.00%	12.13%	
VICORP Restaurants, Inc	Bankruptcy					24.00%		
Viskase Companies, Inc.	Distressed exchange						55.00%	
Washington Mutual Bank	Bankruptcy					26.50%		0.44%
Washington Mutual, Inc.	Bankruptcy					57.00%		18.00%
WCI Communities, Inc.	Bankruptcy	88.25%					38.50%	
Wellman, Inc.	Bankruptcy	69.21%	28.33%					
Workflow Management, Inc.	Payment default	58.75%						

1. Based on 30-day post default

## Corporate Default and Recovery Rates, 1920-2008

## Exhibit 26

Average Annual Bond and Loan Recovery Rates <sup>1</sup>							
Year	Loan		Bond				All Bonds
	Sr. Sec. <sup>2</sup>	Sr. Sec.	Sr. Unsec.	Sr. Sub.	Sub.	Jr. Sub.	
1982	n.a.	72.50%	35.79%	48.09%	29.99%	n.a.	35.57%
1983	n.a.	40.00%	52.72%	43.50%	40.54%	n.a.	43.64%
1984	n.a.	n.a.	49.41%	67.88%	44.26%	n.a.	45.49%
1985	n.a.	83.63%	60.16%	30.88%	39.42%	48.50%	43.66%
1986	n.a.	59.22%	52.60%	50.16%	42.58%	n.a.	48.38%
1987	n.a.	71.00%	62.73%	44.81%	46.89%	n.a.	50.48%
1988	n.a.	55.40%	45.24%	33.41%	33.77%	36.50%	38.98%
1989	n.a.	46.54%	43.81%	34.57%	26.36%	16.85%	32.31%
1990	75.25%	33.81%	37.01%	25.64%	19.09%	10.70%	25.50%
1991	74.67%	48.39%	36.66%	41.82%	24.42%	7.79%	35.53%
1992	61.13%	62.05%	49.19%	49.40%	38.04%	13.50%	45.89%
1993	53.40%	n.a.	37.13%	51.91%	44.15%	n.a.	43.08%
1994	67.59%	69.25%	53.73%	29.61%	38.23%	n.a.	45.57%
1995	75.44%	62.02%	47.60%	34.30%	41.54%	n.a.	43.28%
1996	88.23%	47.58%	62.75%	43.75%	22.60%	n.a.	41.54%
1997	78.75%	75.50%	56.10%	44.73%	35.96%	30.58%	49.39%
1998	51.40%	46.82%	41.63%	44.99%	18.19%	62.00%	39.25%
1999	75.82%	43.00%	38.04%	28.01%	35.64%	n.a.	34.33%
2000	68.32%	39.23%	23.81%	20.75%	31.86%	15.50%	25.18%
2001	64.87%	37.98%	21.45%	19.82%	15.94%	47.00%	22.21%
2002	58.80%	48.37%	29.69%	21.36%	24.51%	n.a.	29.95%
2003	73.43%	63.46%	41.87%	37.18%	12.31%	n.a.	40.72%
2004	87.74%	73.25%	52.09%	42.33%	94.00%	n.a.	58.50%
2005	83.78%	71.93%	54.88%	26.06%	51.25%	n.a.	55.97%
2006	83.60%	74.63%	55.02%	41.41%	56.11%	n.a.	55.02%
2007	68.63%	80.54%	53.25%	54.47%	n.a.	n.a.	54.69%
2008	63.38%	57.98%	33.80%	23.02%	23.56%	n.a.	34.83%

1. Issuer-weighted, based on 30-day post-default market prices.

2. Second-lien loans excluded.



## Corporate Default and Recovery Rates, 1920-2008

**Exhibit 27****Average Sr. Unsecured Bond Recovery Rates by Year Prior to Default, 1982-2008<sup>1</sup>**

	Year 1	Year 2	Year 3	Year 4	Year 5
Aaa	n.a.	3.33% <sup>2</sup>	n.a.	97.00%	85.55%
Aa	43.60%	40.15%	43.45%	57.61%	43.40%
A	42.48%	45.45%	44.50%	38.28%	40.95%
Baa	41.85%	44.56%	44.09%	45.44%	42.68%
Ba	48.00%	42.68%	41.58%	41.15%	41.12%
B	36.98%	35.41%	35.88%	36.91%	40.68%
Caa-C	33.96%	33.25%	33.11%	39.59%	41.94%
Investment-Grade	42.05%	44.23%	44.24%	44.57%	43.37%
Speculative-Grade	36.26%	35.71%	36.30%	38.26%	40.90%
All Rated	36.56%	36.65%	37.50%	39.52%	41.51%

1. Issuer-weighted, based on 30-day post default market prices.

2. Based on three Icelandic bank defaults.

**Exhibit 28****Average Cumulative Credit Loss Rates by Letter Rating, 1982-2008<sup>1</sup>**

Rating	Year 1	Year 2	Year 3	Year 4	Year 5
Aaa	0.00%	0.02%	n.a.	0.00%	0.02%
Aa	0.01%	0.04%	0.05%	0.07%	0.14%
A	0.02%	0.07%	0.17%	0.30%	0.40%
Baa	0.11%	0.28%	0.52%	0.78%	1.10%
Ba	0.60%	1.83%	3.33%	4.93%	6.27%
B	2.73%	6.35%	9.79%	12.69%	14.53%
Caa-C	10.50%	17.25%	22.78%	24.51%	26.70%
Investment Grade	0.04%	0.13%	0.24%	0.37%	0.52%
Speculative Grade	2.77%	5.72%	8.50%	10.69%	12.24%
All Rated	0.99%	2.01%	2.93%	3.64%	4.15%

1. Based on average default rates and senior unsecured bond recoveries measured on issuer-weighted basis.

## Corporate Default and Recovery Rates, 1920-2008

## Exhibit 29

Average Annual Credit Loss Rates by Letter Rating, 1982-2008<sup>1</sup>

Year	Aaa	Aa	A	Baa	Ba	B	Caa-C	Inv-Grade	Spec-Grade	All Rated
1982	0.000	0.000	0.164	0.204	1.787	1.476	14.818	0.136	2.293	0.666
1983	0.000	0.000	0.000	0.000	0.431	2.981	19.907	0.000	1.808	0.456
1984	0.000	0.000	0.000	0.183	0.421	3.430	50.590	0.049	1.686	0.468
1985	0.000	0.000	0.000	0.000	0.563	2.981	0.000	0.000	1.374	0.377
1986	0.000	0.000	0.000	0.638	0.967	5.499	12.640	0.151	2.675	0.903
1987	0.000	0.000	0.000	0.000	1.015	2.294	7.454	0.000	1.574	0.561
1988	0.000	0.000	0.000	0.000	0.689	3.396	15.645	0.000	1.960	0.744
1989	0.000	0.339	0.000	0.334	1.706	4.900	14.048	0.162	3.256	1.319
1990	0.000	0.000	0.000	0.000	2.147	9.837	37.053	0.000	6.284	2.245
1991	0.000	0.000	0.000	0.172	3.099	7.980	24.632	0.041	5.935	1.856
1992	0.000	0.000	0.000	0.000	0.155	4.665	14.517	0.000	2.619	0.712
1993	0.000	0.000	0.000	0.000	0.356	2.840	16.766	0.000	1.931	0.514
1994	0.000	0.000	0.000	0.000	0.112	1.874	2.435	0.000	0.959	0.279
1995	0.000	0.000	0.000	0.000	0.374	2.215	4.764	0.000	1.530	0.481
1996	0.000	0.000	0.000	0.000	0.000	0.509	5.138	0.000	0.610	0.195
1997	0.000	0.000	0.000	0.000	0.083	0.849	6.424	0.000	0.890	0.300
1998	0.000	0.000	0.000	0.069	0.472	2.206	6.570	0.022	1.840	0.702
1999	0.000	0.000	0.000	0.064	0.781	3.078	11.266	0.022	3.336	1.351
2000	0.000	0.000	0.000	0.288	0.654	4.421	15.294	0.104	4.830	1.974
2001	0.000	0.000	0.130	0.150	1.027	7.463	24.723	0.104	7.952	3.045
2002	0.000	0.000	0.117	0.863	1.041	3.216	19.822	0.356	5.569	2.131
2003	0.000	0.000	0.000	0.000	0.555	1.205	12.217	0.000	2.978	1.013
2004	0.000	0.000	0.000	0.000	0.183	0.399	5.502	0.000	1.124	0.390
2005	0.000	0.000	0.000	0.079	0.000	0.552	2.788	0.029	0.781	0.299
2006	0.000	0.000	0.000	0.000	0.081	0.515	2.662	0.000	0.759	0.279
2007	0.000	0.000	0.000	0.000	0.000	0.000	2.746	0.000	0.429	0.163
2008	0.000	0.341	0.220	0.301	0.700	1.314	9.620	0.264	2.733	1.241
Average	0.000	0.025	0.023	0.124	0.719	3.041	13.335	0.053	2.582	0.913
Max	0.000	0.341	0.220	0.863	3.099	9.837	50.590	0.356	7.952	3.045
Min	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.429	0.163

1. Data in percent and based on issuer-weighted average default rates and issuer-weighted average senior unsecured bond recovery rates.

## Corporate Default and Recovery Rates, 1920-2008

## Exhibit 30

2008 One-Year Letter Rating Migration Rates <sup>1</sup>										
From/To	Aaa	Aa	A	Baa	Ba	B	Caa	Ca-C	Default	WR
Aaa	84.066	10.440	0.000	0.549	0.000	0.000	0.000	0.000	0.000	4.945
Aa	0.126	80.252	13.459	0.377	0.252	0.000	0.126	0.126	0.503	4.780
A	0.000	1.371	87.258	4.758	0.161	0.081	0.081	0.000	0.323	5.968
Baa	0.000	0.176	2.109	85.940	4.306	0.264	0.176	0.000	0.439	6.591
Ba	0.000	0.000	0.169	4.237	75.254	9.153	1.017	1.356	1.017	7.797
B	0.000	0.000	0.166	0.166	2.566	71.440	14.238	0.993	1.904	8.526
Caa	0.000	0.000	0.000	0.000	0.000	3.210	67.407	8.642	12.099	8.642
Ca-C	0.000	0.000	0.000	0.000	0.000	0.000	5.263	26.316	52.632	15.789

## Exhibit 31

Average One-Year Letter Rating Migration Rates, 1920-2008 <sup>1</sup>										
From/To	Aaa	Aa	A	Baa	Ba	B	Caa	Ca_C	Default	WR
Aaa	87.365	7.487	0.845	0.176	0.032	0.001	0.001	0.000	0.000	4.092
Aa	1.243	84.949	6.623	0.697	0.165	0.036	0.007	0.004	0.068	6.208
A	0.082	3.000	84.972	5.304	0.671	0.105	0.025	0.008	0.078	5.755
Baa	0.042	0.291	4.576	81.239	5.000	0.780	0.146	0.016	0.285	7.624
Ba	0.007	0.082	0.483	5.897	73.790	6.683	0.570	0.058	1.320	11.109
B	0.007	0.052	0.159	0.605	5.952	71.791	5.106	0.498	3.769	12.062
Caa	0.000	0.026	0.039	0.231	0.785	8.133	64.080	3.552	11.438	11.717
Ca-C	0.000	0.000	0.114	0.000	0.447	3.232	7.822	55.109	20.445	12.831

## Exhibit 32

Average One-Year Letter Rating Migration Rates, 1970-2008 <sup>1</sup>										
From/To	Aaa	Aa	A	Baa	Ba	B	Caa	Ca-C	Default	WR
Aaa	88.494	7.618	0.650	0.026	0.028	0.002	0.002	0.000	0.000	3.179
Aa	1.047	86.817	7.077	0.288	0.042	0.016	0.008	0.001	0.016	4.688
A	0.066	2.832	87.274	4.961	0.473	0.086	0.028	0.003	0.024	4.253
Baa	0.043	0.191	4.786	84.382	4.165	0.781	0.203	0.021	0.163	5.265
Ba	0.008	0.056	0.395	5.678	76.054	7.070	0.549	0.061	1.084	9.045
B	0.011	0.037	0.133	0.346	5.034	73.939	5.090	0.620	4.165	10.624
Caa	0.000	0.026	0.037	0.222	0.484	8.928	60.781	3.589	13.122	12.810
Ca-C	0.000	0.000	0.000	0.000	0.331	2.790	9.446	39.479	30.033	17.921

## Exhibit 33

Average Five-Year Letter Rating Migration Rates, 1970-2008 <sup>1</sup>										
From/To	Aaa	Aa	A	Baa	Ba	B	Caa	Ca-C	Default	WR
Aaa	54.006	23.725	5.327	0.470	0.265	0.040	0.038	0.000	0.085	16.044
Aa	3.322	50.875	21.090	3.219	0.540	0.165	0.031	0.000	0.174	20.585
A	0.224	8.378	53.060	14.324	2.781	0.877	0.169	0.013	0.448	19.725
Baa	0.262	1.204	13.616	46.491	9.082	3.039	0.535	0.070	1.729	23.971
Ba	0.046	0.199	2.375	11.885	27.468	10.865	1.386	0.151	8.024	37.602
B	0.044	0.065	0.312	1.712	6.857	22.207	4.536	0.663	20.932	42.672
Caa	0.000	0.000	0.072	1.235	2.222	6.110	7.354	1.010	39.627	42.370
Ca-C	0.000	0.000	0.000	0.308	0.540	1.747	1.850	2.158	47.867	45.529

1. Data in percent. Average migration rates in Exhibit 31-33 are calculated using monthly cohort frequency.

## Corporate Default and Recovery Rates, 1920-2008

## Exhibit 34

2008 One-Year Alphanumeric Rating Migration Rates<sup>1</sup>

From/To:	Aaa	Aa1	Aa2	Aa3	A1	A2	A3	Baa1	Baa2	Baa3	Ba1	Ba2	Ba3	B1	B2	B3	Caa1	Caa2	Caa3	Ca-C	Default	WR		
Aaa	84.066	2.198	8.242	0.000	0.000	0.000	0.000	0.549	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.945	
Aa1	0.000	79.026	10.487	5.993	0.375	0.375	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.745
Aa2	0.402	1.205	70.683	14.056	4.016	0.402	3.614	0.000	0.000	0.000	0.803	0.000	0.000	0.000	0.000	0.000	0.000	0.402	0.000	0.402	0.000	0.000	4.016	
Aa3	0.000	0.358	0.000	60.215	21.505	8.961	0.000	0.000	1.075	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.434	6.452	
A1	0.000	0.000	0.000	2.381	71.190	15.238	0.952	0.714	0.238	0.714	0.000	0.000	0.000	0.000	0.238	0.000	0.000	0.000	0.000	0.000	0.000	0.952	7.381	
A2	0.000	0.000	0.721	0.962	2.163	77.404	10.817	1.683	0.481	0.240	0.240	0.240	0.000	0.000	0.000	0.000	0.000	0.000	0.240	0.000	0.000	0.000	4.808	
A3	0.000	0.000	0.000	0.000	0.248	4.208	79.455	7.921	1.980	0.495	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.693	
Baa1	0.000	0.000	0.000	0.000	0.000	0.505	4.798	76.515	8.081	1.768	1.010	0.000	0.253	0.000	0.000	0.000	0.253	0.000	0.253	0.000	0.253	0.000	6.313	
Baa2	0.000	0.000	0.000	0.000	0.000	0.000	0.743	1.980	82.178	5.446	0.990	0.495	0.495	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.743	6.931	
Baa3	0.000	0.296	0.296	0.000	0.000	0.000	0.000	0.000	8.284	72.781	4.734	2.959	2.959	0.592	0.296	0.000	0.000	0.000	0.000	0.000	0.000	0.296	6.509	
Ba1	0.000	0.000	0.000	0.000	0.000	0.578	0.000	0.000	1.734	7.514	69.364	5.780	5.202	0.000	0.578	0.000	1.734	0.000	0.000	1.734	0.000	1.734	5.780	
Ba2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.546	3.279	4.372	67.213	9.836	3.825	1.639	0.546	0.000	0.000	0.000	0.000	0.000	0.000	8.743	
Ba3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.855	0.000	0.427	8.547	57.692	10.256	5.983	1.709	0.427	0.427	0.427	2.137	2.564	8.547		
B1	0.000	0.000	0.000	0.000	0.000	0.000	0.334	0.000	0.000	0.000	0.000	1.338	6.355	64.548	9.699	4.682	3.344	0.669	0.669	0.334	1.672	6.355		
B2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.487	0.000	0.730	0.730	4.380	57.421	11.436	6.326	3.163	2.190	1.460	0.730	10.949		
B3	0.000	0.000	0.000	0.000	0.000	0.000	0.201	0.000	0.000	0.000	0.201	0.000	0.201	0.803	4.819	59.839	13.253	7.430	1.406	1.004	3.012	7.831		
Caa1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.154	3.077	50.769	15.769	7.692	6.154	7.308	8.077		
Caa2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.923	0.000	4.808	50.000	9.615	10.577	17.308	5.769		
Caa3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.878	26.829	19.512	29.268	19.512			
Ca-C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.263	26.316	52.632	15.789		

## Exhibit 35

Average One-Year Alphanumeric Rating Migration Rates, 1983-2008<sup>1</sup>

From/To:	Aaa	Aa1	Aa2	Aa3	A1	A2	A3	Baa1	Baa2	Baa3	Ba1	Ba2	Ba3	B1	B2	B3	Caa1	Caa2	Caa3	Ca-C	Default	WR	
Aaa	87.592	5.350	2.249	0.428	0.352	0.137	0.013	0.003	0.030	0.000	0.018	0.018	0.000	0.003	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	3.807
Aa1	2.526	77.611	7.472	6.321	0.943	0.342	0.067	0.134	0.047	0.010	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.523
Aa2	1.193	5.139	76.061	7.962	3.043	1.124	0.395	0.073	0.095	0.004	0.022	0.000	0.000	0.018	0.009	0.007	0.000	0.024	0.000	0.002	0.000	0.000	4.828
Aa3	0.213	1.555	4.568	76.256	8.042	2.556	0.677	0.194	0.172	0.073	0.012	0.031	0.016	0.016	0.000	0.000	0.000	0.004	0.000	0.000	0.037	5.576	
A1	0.067	0.127	1.393	5.623	76.699	7.249	2.592	0.548	0.345	0.126	0.186	0.125	0.042	0.048	0.020	0.000	0.000	0.004	0.000	0.000	0.018	4.786	
A2	0.083	0.036	0.256	1.163	5.332	76.592	7.484	2.740	0.821	0.351	0.172	0.102	0.121	0.041	0.035	0.005	0.025	0.030	0.010	0.000	0.025	4.576	
A3	0.041	0.075	0.121	0.274	2.039	7.439	73.366	6.435	3.137	1.011	0.438	0.182	0.181	0.102	0.029	0.025	0.002	0.005	0.007	0.011	0.032	5.046	
Baa1	0.033	0.064	0.091	0.121	0.303	2.041	7.222	72.629	7.054	2.875	0.813	0.399	0.318	0.403	0.060	0.034	0.060	0.034	0.005	0.018	0.132	5.292	
Baa2	0.042	0.081	0.045	0.093	0.173	0.756	2.871	6.274	73.265	6.419	1.660	0.634	0.615	0.519	0.248	0.138	0.113	0.030	0.031	0.012	0.138	5.844	
Baa3	0.053	0.021	0.032	0.048	0.133	0.247	0.628	2.912	8.649	70.021	5.146	2.469	1.122	0.798	0.372	0.269	0.205	0.117	0.173	0.056	0.288	6.242	
Ba1	0.026	0.002	0.024	0.050	0.179	0.140	0.369	0.654	2.980	9.390	63.910	4.431	3.787	1.590	1.139	0.689	0.172	0.188	0.081	0.037	0.654	9.507	
Ba2	0.000	0.000	0.029	0.000	0.029	0.088	0.071	0.322	0.803	3.172	8.681	63.023	6.452	2.804	2.300	1.073	0.221	0.179	0.125	0.096	0.702	9.828	
Ba3	0.000	0.020	0.010	0.029	0.025	0.178	0.141	0.173	0.284	0.726	2.703	6.186	64.067	5.672	4.366	2.140	0.445	0.328	0.076	0.091	1.737	10.606	
B1	0.029	0.015	0.017	0.008	0.042	0.088	0.084	0.056	0.131	0.262	0.488	2.657	6.378	64.162	6.553	3.860	1.104	0.575	0.296	0.366	2.368	10.461	
B2	0.000	0.000	0.008	0.018	0.021	0.000	0.043	0.105	0.103	0.129	0.317	0.666	2.007	6.811	62.475	7.530	3.043	1.490	0.476	0.541	3.675	10.543	
B3	0.000	0.006	0.046	0.000	0.010	0.024	0.078	0.046	0.056	0.114	0.106	0.256	0.654	2.747	6.545	59.098	5.281	3.738	1.101	1.085	7.318	11.690	
Caa1	0.000	0.053	0.000	0.000	0.000	0.042	0.000	0.000	0.000	0.000	0.095	0.021	0.159	0.800	2.654	8.608	52.334	7.199	3.904	2.659	8.656	12.815	
Caa2	0.000	0.000	0.000	0.000	0.000	0.015	0.000	0.000	0.074	0.280	0.125	0.103	0.530	0.876	1.575	4.223	7.424	49.032	3.730	4.415	15.481	12.118	
Caa3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.521	0.174	0.130	0.000	0.195	1.302	1.888	2.323	6.360	42.197	5.513	22.900	16.497	
Ca-C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.085	0.000	0.255	0.212	0.870	1.528	1.570	3.756	4.371	38.892	30.066	18.396	

1. Data in percent. Average migration rates in Exhibit 35 are calculated using monthly cohort frequency.

## Corporate Default and Recovery Rates, 1920-2008

## Exhibit 36

Annual Issuer-Weighted Corporate Default Rates by Letter Rating, 1920-2008<sup>1</sup>

Year	Aaa	Aa	A	Baa	Ba	B	Caa-C	Inv Grade	Spec Grade	All rated	Year	Aaa	Aa	A	Baa	Ba	B	Caa-C	Inv Grade	Spec Grade	All rated
1920	0.000	0.000	0.334	0.962	2.157	4.368		0.439	3.010	1.244	1965	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1921	0.000	0.185	0.340	0.639	0.447	2.693	12.270	0.380	2.066	1.031	1966	0.000	0.000	0.000	0.000	0.000	2.273	0.000	0.000	0.415	0.119
1922	0.000	0.189	0.170	1.108	1.077	1.733	7.692	0.515	1.776	1.019	1967	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1923	0.000	0.000	0.000	0.614	0.910	2.320	5.952	0.242	1.713	0.805	1968	0.000	0.000	0.000	0.000	0.000	0.000	5.405	0.000	0.387	0.107
1924	0.000	0.371	0.000	0.118	2.041	2.788	12.414	0.138	2.846	1.152	1969	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1925	0.000	0.000	0.147	0.709	1.714	2.545	14.634	0.325	2.557	1.177	1970	0.000	0.000	0.000	0.541	4.264	19.718	53.333	0.271	8.772	2.641
1926	0.000	0.464	0.177	0.142	1.395	2.050	5.195	0.225	1.756	0.784	1971	0.000	0.000	0.000	0.000	0.881	0.000	14.286	0.000	1.152	0.285
1927	0.000	0.000	0.222	0.000	1.269	1.869	13.043	0.073	1.781	0.726	1972	0.000	0.000	0.000	0.000	0.000	7.273	37.500	0.000	1.957	0.455
1928	0.000	0.000	0.000	0.000	0.183	1.252	11.111	0.000	0.897	0.373	1973	0.000	0.000	0.000	0.460	0.000	3.922	36.364	0.231	1.271	0.454
1929	0.000	0.303	0.000	0.434	0.752	0.877	9.434	0.240	1.294	0.688	1974	0.000	0.000	0.000	0.000	0.512	7.143	0.000	0.000	1.330	0.275
1930	0.000	0.000	0.000	0.421	0.922	2.902	7.813	0.159	2.131	1.024	1975	0.000	0.000	0.000	0.000	1.020	6.154	0.000	0.000	1.735	0.361
1931	0.000	0.000	0.281	1.039	2.959	9.220	32.468	0.490	7.845	3.811	1976	0.000	0.000	0.000	0.000	0.985	0.000	0.000	0.000	0.864	0.175
1932	0.000	0.677	0.873	0.898	5.973	13.785	23.392	0.780	10.811	5.434	1977	0.000	0.000	0.000	0.291	0.525	3.175	50.000	0.109	1.339	0.351
1933	0.000	0.000	0.266	1.808	11.111	15.916	25.668	0.806	15.391	8.424	1978	0.000	0.000	0.000	0.000	1.090	5.556	0.000	0.000	1.798	0.352
1934	0.000	0.610	0.348	0.817	2.632	4.309	16.040	0.578	5.929	3.462	1979	0.000	0.000	0.000	0.000	0.494	0.000	0.000	0.000	0.420	0.087
1935	0.000	0.000	1.345	1.899	4.826	4.173	13.072	1.253	6.090	3.857	1980	0.000	0.000	0.000	0.000	0.000	4.938	33.333	0.000	1.613	0.343
1936	0.000	0.803	0.510	0.344	1.225	2.358	7.930	0.465	2.736	1.643	1981	0.000	0.000	0.000	0.000	0.000	4.494	0.000	0.000	0.701	0.164
1937	0.000	0.000	0.545	1.101	0.651	2.697	9.040	0.661	2.595	1.666	1982	0.000	0.000	0.256	0.318	2.783	2.299	23.077	0.212	3.571	1.038
1938	0.000	0.870	1.719	1.988	0.985	1.468	12.739	1.579	2.593	2.122	1983	0.000	0.000	0.000	0.000	0.911	6.306	42.105	0.000	3.824	0.965
1939	0.000	0.000	0.000	0.950	0.597	1.875	5.714	0.402	1.751	1.210	1984	0.000	0.000	0.000	0.362	0.833	6.780	100.000	0.096	3.333	0.925
1940	0.000	0.000	0.000	1.325	0.418	1.097	11.823	0.572	2.606	1.868	1985	0.000	0.000	0.000	0.000	1.413	7.483	0.000	0.000	3.448	0.947
1941	0.000	0.000	0.000	0.000	0.955	0.766	5.063	0.000	1.698	1.087	1986	0.000	0.000	0.000	1.347	2.041	11.602	26.667	0.319	5.644	1.906
1942	0.000	0.000	0.000	0.000	0.000	0.818	1.980	0.000	0.750	0.468	1987	0.000	0.000	0.000	0.000	2.724	6.154	20.000	0.000	4.222	1.504
1943	0.000	0.000	0.000	0.000	0.000	1.345	0.000	0.000	0.615	0.374	1988	0.000	0.000	0.000	0.000	1.258	6.202	28.571	0.000	3.580	1.359
1944	0.000	0.000	0.000	0.000	0.000	0.512	2.532	0.000	0.679	0.401	1989	0.000	0.604	0.000	0.594	3.037	8.720	25.000	0.288	5.794	2.348
1945	0.000	0.000	0.000	0.000	0.000	0.000	3.226	0.000	0.525	0.294	1990	0.000	0.000	0.000	0.000	3.409	15.616	58.824	0.000	9.976	3.564
1946	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1991	0.000	0.000	0.000	0.272	4.892	12.598	38.889	0.065	9.370	2.931
1947	0.000	0.000	0.000	0.000	0.000	0.000	2.439	0.000	0.314	0.156	1992	0.000	0.000	0.000	0.000	0.306	9.182	28.571	0.000	5.154	1.402
1948	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1993	0.000	0.000	0.000	0.000	0.567	4.517	26.667	0.000	3.072	0.817
1949	0.000	0.000	0.000	0.000	1.370	1.111	7.407	0.000	1.901	0.835	1994	0.000	0.000	0.000	0.000	0.242	4.050	5.263	0.000	2.073	0.602
1950	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1995	0.000	0.000	0.000	0.000	0.714	4.227	9.091	0.000	2.920	0.918
1951	0.000	0.000	0.000	0.000	0.000	0.000	4.651	0.000	0.450	0.180	1996	0.000	0.000	0.000	0.000	0.000	1.366	13.793	0.000	1.637	0.523
1952	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1997	0.000	0.000	0.000	0.000	0.188	1.935	14.634	0.000	2.028	0.684
1953	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1998	0.000	0.000	0.000	0.118	0.808	3.780	11.255	0.038	3.152	1.202
1954	0.000	0.000	0.000	0.000	0.000	0.000	7.143	0.000	0.471	0.165	1999	0.000	0.000	0.000	0.103	1.261	4.967	18.182	0.036	5.384	2.180
1955	0.000	0.000	0.000	0.000	0.000	1.504	0.000	0.000	0.505	0.163	2000	0.000	0.000	0.000	0.378	0.859	5.803	20.073	0.136	6.339	2.591
1956	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2001	0.000	0.000	0.165	0.191	1.308	9.501	31.474	0.132	10.124	3.877
1957	0.000	0.000	0.000	0.000	0.000	1.274	0.000	0.000	0.452	0.144	2002	0.000	0.000	0.166	1.228	1.481	4.574	28.192	0.507	7.921	3.031
1958	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2003	0.000	0.000	0.000	0.000	0.955	2.073	21.016	0.000	5.123	1.742
1959	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2004	0.000	0.000	0.000	0.000	0.381	0.832	11.485	0.000	2.346	0.815
1960	0.000	0.000	0.000	0.000	1.231	0.000	0.000	0.000	0.737	0.243	2005	0.000	0.000	0.000	0.175	0.000	1.224	6.179	0.065	1.732	0.662
1961	0.000	0.000	0.000	0.000	0.581	0.000	8.696	0.000	1.070	0.353	2006	0.000	0.000	0.000	0.000	0.181	1.144	5.919	0.000	1.688	0.620
1962	0.000	0.000	0.000	0.000	1.700	1.361	0.000	0.000	1.463	0.463	2007	0.000	0.000	0.000	0.000	0.000	0.000	5.873	0.000	0.918	0.348
1963	0.000	0.000	0.000	0.000	1.153	1.563	0.000	0.000	1.156	0.351	2008	0.000	0.515	0.333	0.454	1.058	1.985	14.532	0.399	4.129	1.874
1964	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000											

1. Data in percent. Includes bond and loan issuers rated as of January 1 of each year.

Mean	0.000	0.063	0.092	0.271	1.063	3.395	13.252	0.149	2.643	1.087
Median	0.000	0.000	0.000	0.000	0.651	1.985	7.872	0.000	1.751	0.684
Stdev	0.000	0.185	0.265	0.473	1.620	4.062	16.568	0.279	2.910	1.352
Min	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Max	0.000	0.870	1.719	1.988	11.111	19.718	100.000	1.579	15.391	8.424

## Corporate Default and Recovery Rates, 1920-2008

## Exhibit 37

Annual Issuer-Weighted Corporate Default Rates by Alphanumeric Rating, 1983-2008<sup>1</sup>

Year	Aaa	Aa1	Aa2	Aa3	A1	A2	A3	Baa1	Baa2	Baa3	Ba1	Ba2	Ba3	B1	B2	B3	Caa1	Caa2	Caa3	Ca-C	Inv Grade	Spec Grade	All rated	
1983	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.614	0.000	9.091	17.910		53.333		0.000	0.000	3.824	0.965	
1984	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.064	1.170	1.613	0.000	5.926	17.647	2.985				100.000	0.096	3.333	0.925	
1985	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.626	2.857	4.444	7.143	11.650		0.000		0.000	0.000	3.448	0.947	
1986	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.651	0.893	1.183	3.413	7.821	15.152	15.385		33.333		0.000	0.319	5.644	1.906	
1987	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.788	0.943	2.963	4.270	5.882	10.219		22.222		0.000	0.000	4.222	1.504	
1988	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.564	4.178	6.897	10.959		23.529		50.000	0.000	3.580	1.359	
1989	0.000	0.000	0.000	1.356	0.000	0.000	0.000	0.000	0.826	1.000	0.806	1.852	4.803	5.621	9.150	18.321		27.273		0.000	0.288	5.794	2.348	
1990	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.738	2.844	3.516	7.805	21.687	29.870		58.333	0.000	75.000	0.000	9.976	3.564	
1991	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.743	0.000	0.000	1.136	0.000	9.143	3.497	11.043	27.957		40.000	0.000	44.444	0.065	9.370	2.931	
1992	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.735	0.966	1.471	26.582		31.579	0.000	22.222	0.000	5.154	1.402	
1993	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.877	0.000	0.778	2.439	3.279	10.084		22.222	0.000	57.143	0.000	3.072	0.817	
1994	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.608	1.893	3.614	8.805		7.018	0.000	0.000	0.000	2.073	0.602	
1995	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.835	4.415	5.882	1.923		2.667	0.000	24.242	0.000	2.920	0.918	
1996	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.167	0.000	3.306	0.000	14.679	0.000	12.500	0.000	1.637	0.523	
1997	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.467	0.000	1.163	7.018	0.000	13.333	0.000	18.868	0.000	2.028	0.684	
1998	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.312	0.000	0.000	1.208	1.220	2.125	5.357	4.893	5.825	11.628	26.667	16.667	0.038	3.152	1.202	
1999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.329	0.489	0.563	2.376	2.553	5.372	8.018	11.245	21.488	20.000	46.512	0.036	5.384	2.180	
2000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.289	0.000	0.949	0.930	0.606	0.990	3.030	4.900	11.306	11.847	30.000	21.875	37.838	0.136	6.339	2.591	
2001	0.000	0.000	0.000	0.000	0.000	0.434	0.000	0.281	0.270	0.000	0.000	1.320	2.825	3.097	10.406	18.000	26.316	32.813	44.776	39.024	0.132	10.124	3.877	
2002	0.000	0.000	0.000	0.000	0.000	0.000	0.445	1.263	0.721	1.829	2.105	1.208	1.084	2.151	4.680	8.000	15.638	26.667	32.099	48.611	0.507	7.921	3.031	
2003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.576	0.692	1.460	0.349	2.345	4.278	9.259	22.695	29.474	33.613	0.000	5.123	1.742	
2004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.913	0.000	0.601	2.336	7.605	8.547	13.115	31.250	0.000	2.346	0.815	
2005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.244	0.307	0.000	0.000	0.000	0.000	0.872	2.744	3.012	5.128	19.048	21.739	0.065	1.732	0.662	
2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.477	0.749	0.541	2.157	2.210	6.667	18.182	17.778	0.000	1.688	0.620	
2007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.133	8.333	15.385	33.333	0.000	0.918	0.348	
2008	0.000	0.000	0.000	1.481	0.989	0.000	0.000	0.261	0.769	0.306	0.000	0.000	2.679	1.721	0.772	3.128	7.585	17.822	32.432	57.143	0.399	4.129	1.874	
Mean	0.000	0.000	0.000	0.109	0.038	0.017	0.017	0.109	0.121	0.401	0.635	0.602	1.935	2.701	5.960	10.301	7.898	21.652	14.371	30.305	0.080	4.420	1.551	
Median	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.340	2.295	5.129	8.412	7.585	22.222	15.385	27.746	0.000	3.702	1.281	
StDev	0.000	0.000	0.000	0.386	0.194	0.085	0.087	0.288	0.256	0.982	1.069	0.786	1.963	2.334	5.624	8.430	7.340	14.861	14.383	25.386	0.140	2.595	0.990	
Min	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.918	0.348
Max	0.000	0.000	0.000	1.481	0.989	0.434	0.445	1.263	0.826	4.651	3.788	2.844	9.143	7.821	21.687	29.870	26.316	58.333	44.776	100.000	0.507	10.124	3.877	

1. Data in percent. Includes bond and loan issuers rated as of January 1 of each year.

2. Moody's introduced alphanumerically modified Caa ratings in 1997. Caa letter ratings are mapped to Caa2 prior to 1997.

## Corporate Default and Recovery Rates, 1920-2008

Exhibit 38

Average Cumulative Issuer-Weighted Global Default Rates, 1920-2008<sup>1</sup>

Rating	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Aaa	0.000	0.009	0.027	0.082	0.164	0.252	0.359	0.514	0.676	0.863
Aa	0.066	0.201	0.310	0.471	0.728	1.027	1.339	1.643	1.935	2.265
A	0.075	0.250	0.529	0.854	1.193	1.555	1.935	2.309	2.715	3.134
Baa	0.280	0.836	1.539	2.306	3.101	3.883	4.643	5.410	6.215	7.021
Ba	1.332	3.183	5.277	7.448	9.533	11.502	13.309	15.084	16.730	18.436
B	3.885	8.595	13.327	17.578	21.290	24.581	27.621	30.136	32.358	34.292
Caa-C	13.153	21.903	28.591	33.568	37.419	40.435	42.759	44.868	46.975	48.972
Inv-Grade	0.143	0.436	0.814	1.243	1.705	2.179	2.654	3.129	3.625	4.133
Spec-Grade	3.561	7.258	10.828	14.043	16.866	19.371	21.616	23.629	25.462	27.225
All Rated	1.398	2.894	4.349	5.673	6.855	7.915	8.875	9.752	10.584	11.396

Rating	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Aaa	1.030	1.162	1.304	1.350	1.388	1.464	1.543	1.605	1.686	1.738
Aa	2.635	3.040	3.446	3.856	4.169	4.412	4.614	4.830	5.104	5.338
A	3.595	4.048	4.449	4.829	5.266	5.651	5.964	6.266	6.558	6.841
Baa	7.786	8.558	9.318	10.008	10.606	11.228	11.784	12.277	12.733	13.228
Ba	19.986	21.505	22.994	24.304	25.499	26.625	27.808	28.951	29.963	30.959
B	36.138	37.905	39.473	40.951	42.355	43.707	44.832	45.710	46.320	46.675
Caa-C	51.044	53.102	55.044	57.080	59.142	61.097	62.822	64.377	65.840	67.278
Inv-Grade	4.651	5.171	5.669	6.127	6.556	6.961	7.309	7.633	7.955	8.276
Spec-Grade	28.870	30.471	31.987	33.377	34.680	35.920	37.118	38.215	39.156	40.025
All Rated	12.176	12.938	13.658	14.315	14.926	15.503	16.024	16.504	16.950	17.378

1. Data in percent. Average cumulative default rates are calculated using monthly cohort frequency.

Exhibit 39

Average Cumulative Issuer-Weighted Global Default Rates, 1970-2008<sup>1</sup>

Rating	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Aaa	0.000	0.013	0.013	0.037	0.107	0.176	0.250	0.330	0.416	0.508
Aa	0.017	0.054	0.087	0.157	0.234	0.312	0.388	0.455	0.498	0.551
A	0.025	0.118	0.272	0.432	0.612	0.814	1.025	1.266	1.516	1.752
Baa	0.164	0.472	0.877	1.356	1.824	2.299	2.770	3.241	3.776	4.397
Ba	1.113	2.971	5.194	7.523	9.639	11.580	13.263	14.921	16.570	18.276
B	4.333	9.752	15.106	19.864	24.175	28.261	32.164	35.432	38.437	41.088
Caa-C	16.015	25.981	34.154	40.515	45.800	49.687	52.702	56.097	59.736	63.275
Inv-Grade	0.068	0.215	0.416	0.651	0.894	1.146	1.399	1.661	1.939	2.237
Spec-Grade	4.113	8.372	12.467	16.093	19.245	22.047	24.520	26.696	28.726	30.637
All Rated	1.401	2.844	4.193	5.360	6.344	7.197	7.938	8.594	9.211	9.802

Rating	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Aaa	0.608	0.714	0.824	0.887	0.955	1.029	1.110	1.139	1.139	1.139
Aa	0.612	0.712	0.850	0.979	1.074	1.208	1.381	1.565	1.866	2.194
A	2.012	2.266	2.529	2.786	3.111	3.462	3.873	4.300	4.702	5.102
Baa	5.047	5.749	6.502	7.281	8.009	8.778	9.492	10.166	10.740	11.303
Ba	20.042	21.900	23.676	25.443	27.220	28.951	30.585	32.024	33.512	34.845
B	43.531	45.968	48.093	50.226	52.190	53.770	54.640	55.336	55.690	56.101
Caa-C	65.727	65.840	66.809	67.953	68.873	70.486	70.922	70.922	70.922	70.922
Inv-Grade	2.552	2.886	3.245	3.602	3.966	4.359	4.771	5.175	5.563	5.952
Spec-Grade	32.477	34.314	36.017	37.704	39.343	40.884	42.205	43.348	44.473	45.498
All Rated	10.377	10.952	11.514	12.065	12.608	13.156	13.684	14.179	14.658	15.125

1. Data in percent. Average cumulative default rates are calculated using monthly cohort frequency.

## Corporate Default and Recovery Rates, 1920-2008

## Exhibit 40

Average Cumulative Issuer-Weighted Global Default Rates, 1983-2008<sup>1</sup>

Rating	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Aaa	0.000	0.016	0.016	0.049	0.088	0.136	0.188	0.193	0.193	0.193
Aa	0.019	0.061	0.099	0.172	0.247	0.290	0.321	0.346	0.367	0.413
A	0.026	0.131	0.306	0.482	0.679	0.892	1.105	1.337	1.550	1.711
Baa	0.182	0.516	0.928	1.412	1.893	2.362	2.815	3.237	3.647	4.139
Ba	1.145	3.169	5.690	8.293	10.484	12.472	14.222	15.845	17.320	18.736
B	4.330	9.828	15.268	20.087	24.469	28.667	32.665	36.002	38.925	41.451
Caa	13.730	23.507	31.696	38.405	43.747	47.617	50.360	53.520	58.374	64.778
Ca-C	32.949	44.297	53.255	58.406	63.932	66.489	70.337	74.990	74.990	74.990
Inv-Grade	0.072	0.229	0.436	0.673	0.917	1.154	1.381	1.599	1.803	2.008
Spec-Grade	4.351	8.917	13.373	17.316	20.686	23.696	26.388	28.687	30.708	32.516
All Rated	1.565	3.192	4.726	6.037	7.118	8.037	8.824	9.482	10.045	10.544

Rating	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Aaa	0.193	0.193	0.193	0.193	0.193	0.193	0.193	0.193	0.193	0.193
Aa	0.468	0.573	0.692	0.778	0.870	1.008	1.191	1.433	1.795	2.128
A	1.889	2.060	2.266	2.513	2.848	3.247	3.759	4.341	4.760	5.104
Baa	4.684	5.280	6.058	6.890	7.621	8.451	9.278	10.072	10.739	11.147
Ba	20.121	21.620	23.065	24.718	26.397	27.876	29.386	30.871	32.810	34.457
B	43.791	46.245	48.474	50.759	52.781	54.137	55.074	56.189	56.769	57.462
Caa	69.880	70.146	72.358	74.846	76.781	80.138	81.054	81.054	81.054	81.054
Ca-C	74.990	74.990	74.990	74.990	74.990	74.990	74.990	74.990	74.990	74.990
Inv-Grade	2.230	2.470	2.766	3.080	3.408	3.793	4.232	4.707	5.116	5.433
Spec-Grade	34.180	35.865	37.452	39.176	40.810	42.171	43.389	44.609	45.983	47.195
All Rated	11.012	11.478	11.960	12.467	12.963	13.461	13.981	14.530	15.046	15.467

1. Data in percent. Average cumulative default rates are calculated using monthly cohort frequency.



## Corporate Default and Recovery Rates, 1920-2008

## Exhibit 41

Average Cumulative Issuer-Weighted Global Default Rates by Alphanumeric Rating, 1983-2008<sup>1</sup>

Rating	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Aaa	0.000	0.016	0.016	0.049	0.088	0.136	0.188	0.193	0.193	0.193
Aa1	0.000	0.000	0.000	0.094	0.141	0.159	0.159	0.159	0.159	0.159
Aa2	0.000	0.010	0.042	0.104	0.201	0.245	0.294	0.350	0.412	0.483
Aa3	0.038	0.118	0.174	0.246	0.319	0.370	0.402	0.417	0.420	0.468
A1	0.018	0.154	0.366	0.544	0.692	0.793	0.868	0.935	0.997	1.076
A2	0.026	0.092	0.244	0.445	0.639	0.891	1.230	1.615	1.955	2.209
A3	0.032	0.151	0.318	0.463	0.714	0.997	1.203	1.432	1.660	1.799
Baa1	0.135	0.357	0.622	0.867	1.091	1.289	1.547	1.730	1.859	2.088
Baa2	0.139	0.426	0.796	1.367	1.850	2.317	2.756	3.178	3.666	4.292
Baa3	0.291	0.816	1.459	2.129	2.926	3.741	4.463	5.189	5.859	6.520
Ba1	0.682	1.862	3.363	4.857	6.280	7.789	8.889	9.649	10.346	11.120
Ba2	0.728	2.066	3.760	5.608	7.230	8.425	9.661	11.006	12.330	13.365
Ba3	1.791	4.954	8.873	12.932	16.209	19.227	22.017	24.755	27.188	29.601
B1	2.450	6.800	11.358	15.361	19.513	23.576	27.853	31.305	34.187	36.717
B2	3.827	9.116	14.386	19.204	23.232	27.013	30.514	33.495	36.607	39.110
B3	7.666	15.138	22.336	28.744	34.261	39.643	44.081	48.016	50.948	53.684
Caa1	9.150	18.763	28.028	35.629	42.389	46.914	49.140	51.686	57.028	62.344
Caa2 <sup>2</sup>	16.388	25.807	32.990	38.799	41.983	45.823	48.900	51.959	55.997	61.737
Caa3	24.806	36.604	43.417	49.310	55.959	57.672	60.527	64.744	70.661	82.018
Ca-C	32.949	44.297	53.255	58.406	63.932	66.489	70.337	74.990	74.990	74.990
Investment-Grade	0.072	0.229	0.436	0.673	0.917	1.154	1.381	1.599	1.803	2.008
Speculative-Grade	4.351	8.917	13.373	17.316	20.686	23.696	26.388	28.687	30.708	32.516
All Rated	1.565	3.192	4.726	6.037	7.118	8.037	8.824	9.482	10.045	10.544

Rating	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Aaa	0.193	0.193	0.193	0.193	0.193	0.193	0.193	0.193	0.193	0.193
Aa1	0.159	0.159	0.323	0.526	0.759	0.849	0.849	0.849	0.849	0.849
Aa2	0.565	0.658	0.702	0.702	0.702	0.810	0.998	1.217	1.470	1.495
Aa3	0.527	0.684	0.835	0.933	1.030	1.210	1.466	1.826	2.417	3.139
A1	1.202	1.322	1.470	1.673	1.910	2.188	2.333	2.568	2.568	2.568
A2	2.401	2.532	2.684	2.880	3.091	3.372	4.061	4.639	5.192	5.609
A3	2.020	2.309	2.661	3.035	3.665	4.379	5.077	6.074	6.785	7.420
Baa1	2.382	2.827	3.469	4.281	5.209	6.332	6.940	7.192	7.192	7.192
Baa2	5.140	6.002	6.686	7.339	7.980	8.667	9.527	10.568	11.574	11.940
Baa3	6.998	7.452	8.517	9.589	10.181	10.820	11.865	12.986	13.985	14.855
Ba1	11.938	13.222	14.161	15.087	16.669	17.886	19.306	21.066	23.830	25.925
Ba2	14.746	16.342	17.864	19.321	21.354	23.013	24.599	25.112	25.499	25.499
Ba3	31.635	33.344	35.421	38.298	39.905	41.745	43.470	45.411	47.196	49.403
B1	38.998	41.585	44.132	46.736	48.110	48.850	49.644	50.649	51.792	53.186
B2	41.376	43.339	45.820	48.886	53.355	56.778	58.350	59.986	59.986	59.986
B3	56.398	59.278	60.552	61.298	61.546	61.546	61.999	62.735	62.735	62.735
Caa1	74.557	83.038								
Caa2 <sup>2</sup>	65.577	65.577	68.127	70.995	73.226	77.097	78.154	78.154	78.154	78.154
Caa3	82.018									
Ca-C	74.990	74.990	74.990	74.990	74.990	74.990	74.990	74.990		
Investment-Grade	2.230	2.470	2.766	3.080	3.408	3.793	4.232	4.707	5.116	5.433
Speculative-Grade	34.180	35.865	37.452	39.176	40.810	42.171	43.389	44.609	45.983	47.195
All Rated	11.012	11.478	11.960	12.467	12.963	13.461	13.981	14.530	15.046	15.467

1. Data in percent. Average cumulative default rates are calculated using monthly cohort frequency.

2. Moody's introduced alphanumerically modified Caa ratings in 1997. Caa letter ratings are mapped to Caa2 prior to 1997.

## Corporate Default and Recovery Rates, 1920-2008

Exhibit 42

Average Cumulative Issuer-Weighted Global Default Rates by Alphanumeric Rating, 1998-2008<sup>1</sup>

Rating	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Aaa	0.000	0.039	0.039	0.039	0.039	0.039	0.039	0.039	0.039	0.039
Aa1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aa2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aa3	0.033	0.114	0.153	0.199	0.249	0.300	0.385	0.385	0.385	0.385
A1	0.036	0.187	0.370	0.586	0.823	0.936	1.016	1.103	1.103	1.103
A2	0.047	0.134	0.318	0.459	0.643	0.942	1.427	2.119	2.904	3.850
A3	0.044	0.182	0.343	0.519	0.844	1.120	1.286	1.522	1.975	2.458
Baa1	0.181	0.435	0.679	0.851	0.904	0.984	1.150	1.418	1.473	1.972
Baa2	0.178	0.465	0.815	1.284	1.593	1.861	2.083	2.233	2.399	2.399
Baa3	0.355	0.905	1.556	2.174	2.861	3.307	3.926	4.694	5.589	7.294
Ba1	0.410	1.392	2.425	2.992	3.865	4.585	5.023	5.339	5.945	6.655
Ba2	0.657	1.405	2.400	3.654	4.510	5.115	5.697	7.337	8.989	11.366
Ba3	1.043	2.809	5.184	7.763	9.383	10.981	12.291	14.343	16.717	18.771
B1	1.563	5.371	9.485	12.881	15.510	17.816	20.200	22.225	24.150	26.197
B2	3.359	8.209	13.290	18.117	21.259	24.313	27.338	29.927	32.801	34.994
B3	5.433	12.328	19.852	26.296	31.409	36.620	41.557	46.575	53.771	61.912
Caa1	9.198	18.781	28.002	35.400	42.125	46.847	49.165	51.700	55.169	61.282
Caa2	15.670	26.005	33.512	38.344	40.763	43.915	45.134	45.134	45.134	45.134
Caa3	25.224	36.861	43.641	49.290	55.747	56.044	57.121	59.063	59.063	59.063
Ca-C	37.289	49.844	59.601	62.498	64.885	65.356	65.356	65.356	65.356	
Investment-Grade	0.103	0.287	0.503	0.721	0.939	1.126	1.344	1.610	1.896	2.306
Speculative-	4.439	9.045	13.525	17.221	19.892	22.133	24.049	25.930	28.012	30.058
All Rated	1.711	3.459	5.085	6.371	7.283	8.003	8.627	9.255	9.926	10.671

1. Data in percent. Average cumulative default rates are calculated using monthly cohort frequency.

Exhibit 43

Average Cumulative Issuer-Weighted Default Rates by Broad Industry Group, 1970-2008<sup>1</sup>

Industry Group	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Banking	0.332	0.714	1.112	1.493	1.823	2.093	2.292	2.501	2.677	2.859
Capital Industries	1.838	3.823	5.759	7.533	9.095	10.499	11.769	12.947	14.058	15.118
Consumer Industries	2.333	4.795	7.106	9.103	10.760	12.214	13.500	14.574	15.580	16.456
Energy & Environment	1.346	2.679	3.816	4.788	5.635	6.435	7.117	7.694	8.276	8.862
FIRE	0.445	0.964	1.508	2.067	2.555	3.031	3.505	3.968	4.445	4.948
Media & Publishing	2.326	4.737	7.066	9.031	10.782	12.259	13.433	14.356	15.333	16.429
Retail & Distribution	2.733	5.535	8.147	10.343	12.277	13.921	15.286	16.632	18.039	19.372
Govt-Related Corp. Issuers	0.445	0.912	1.188	1.384	1.606	1.648	1.648	1.648	1.648	1.648
Technology	1.701	3.475	5.065	6.266	7.102	7.733	8.313	8.761	9.104	9.431
Transportation	2.114	3.883	5.430	6.707	7.743	8.632	9.391	10.127	10.803	11.526
Utilities	0.170	0.335	0.492	0.637	0.780	0.917	1.040	1.148	1.257	1.373

1. Percent of all rated issuers in each industry group.

## Corporate Default and Recovery Rates, 1920-2008

## Exhibit 44

Annual Default Rates by Broad Industry Groups, 1970-2008<sup>1</sup>

Year	Banking	Capital Industries	Consumer Industries	Energy & Environment	FIRE	Media & Publishing	Retail & Distribution	Govt-Related Corp. Issuers	Technology	Transportation	Utilities
1970		0.000	0.957	0.000	20.000	0.000	0.000	0.000	0.833	16.107	0.000
1971		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.400	0.000
1972		0.361	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.226	0.000
1973		0.358	0.000	0.000	0.000	0.000	2.899	0.000	0.000	1.667	0.000
1974		0.360	0.000	0.000	0.000	0.000	2.985	0.000	0.000	0.000	0.000
1975	0.000	0.361	0.781	0.000	0.000	4.651	1.504	0.000	0.000	0.000	0.000
1976	0.000	0.357	0.741	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1977	0.000	0.000	0.755	0.000	0.000	4.348	0.000	0.000	0.000	1.818	0.000
1978	0.000	0.000	0.755	1.198	0.000	0.000	1.538	0.000	0.730	0.000	0.000
1979	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.717	0.000	0.000
1980	0.000	0.377	0.000	1.124	0.000	0.000	1.538	0.000	0.000	0.957	0.000
1981	0.000	0.367	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.966	0.000
1982	0.000	1.097	0.000	0.926	0.000	4.255	4.615	0.000	1.881	2.062	0.000
1983	0.000	1.066	0.580	2.469	0.000	0.000	0.000	0.000	0.619	4.040	0.412
1984	0.000	0.694	1.096	3.187	0.000	0.000	0.000	0.000	1.824	1.058	0.000
1985	0.000	1.502	1.395	2.740	1.111	0.000	0.000	0.000	0.563	0.000	0.000
1986	0.000	3.324	1.597	7.914	0.000	2.151	0.971	0.000	0.518	2.778	0.000
1987	0.398	2.375	2.452	4.895	0.000	1.493	0.837	0.000	0.474	0.000	0.412
1988	2.027	0.782	2.593	1.439	0.590	3.974	1.550	0.000	1.220	0.000	0.418
1989	2.121	3.158	3.890	0.000	3.243	8.054	0.709	11.765	1.200	1.843	0.000
1990	2.670	4.841	7.767	0.651	0.000	7.692	7.213	0.000	1.202	5.479	0.409
1991	2.067	3.490	3.774	1.290	0.489	5.217	9.319	0.000	1.610	8.911	0.828
1992	0.503	1.872	2.851	0.641	0.463	7.619	2.344	0.000	1.165	0.000	0.821
1993	0.469	1.474	1.172	1.166	0.000	3.670	2.273	0.000	0.375	0.000	0.000
1994	0.000	0.198	0.945	0.000	0.000	0.000	2.516	0.000	1.070	1.717	0.000
1995	0.000	1.203	2.736	0.488	1.081	0.000	1.734	0.000	0.658	0.833	0.000
1996	0.000	0.479	1.271	0.866	0.000	3.279	0.560	0.000	0.605	0.000	0.363
1997	0.000	0.432	2.255	0.000	0.274	0.000	3.061	0.000	0.552	0.766	0.000
1998	0.129	1.119	2.424	0.930	0.896	1.550	5.811	0.000	0.712	0.676	0.000
1999	0.245	2.179	4.565	4.451	0.602	1.342	2.661	3.226	1.889	4.984	0.633
2000	0.000	3.948	6.299	1.362	0.779	1.802	6.074	0.000	2.421	4.444	0.000
2001	0.119	6.911	5.565	1.611	1.167	3.561	7.852	0.000	7.040	3.797	0.562
2002	0.601	2.878	2.092	4.261	0.184	5.438	3.069	0.000	8.729	5.263	0.531
2003	0.000	2.520	1.984	1.519	0.352	3.268	4.188	0.000	3.905	2.614	0.523
2004	0.000	1.462	2.122	0.250	0.173	0.000	1.163	0.000	0.726	1.307	0.257
2005	0.113	1.391	0.503	0.734	0.164	0.000	1.818	0.000	0.241	3.145	0.249
2006	0.000	1.483	0.964	0.000	0.315	0.608	0.573	0.000	0.726	1.216	0.000
2007	0.000	0.714	0.643	0.000	0.000	1.176	1.724	0.000	0.474	0.000	0.000
2008	0.852	2.937	3.533	1.549	1.419	4.142	2.174	0.000	1.148	2.216	0.000

1. Percent of all rated issuers in each industry group.

## Corporate Default and Recovery Rates, 1920-2008

## Exhibit 45

Annual Volume-Weighted Corporate Default Rates by Letter Rating, 1994-2008<sup>1</sup>

Cohort	Aaa	Aa	A	Baa	Ba	B	Caa-C	Inv. Grade	Spec. Grade	All Rated
1994	0.000	0.000	0.000	0.000	0.141	1.971	13.136	0.000	1.631	0.333
1995	0.000	0.000	0.000	0.000	0.567	4.637	6.876	0.000	3.081	0.714
1996	0.000	0.000	0.000	0.000	0.000	1.624	22.529	0.000	2.309	0.659
1997	0.000	0.000	0.000	0.000	0.051	3.064	7.111	0.000	1.950	0.504
1998	0.000	0.000	0.000	0.000	0.747	3.151	13.225	0.000	2.977	0.884
1999	0.000	0.000	0.000	0.140	1.143	5.800	21.315	0.031	6.051	1.164
2000	0.000	0.000	0.000	0.623	1.039	5.767	20.723	0.137	5.681	1.313
2001	0.000	0.000	0.728	0.957	1.178	14.061	55.132	0.548	15.706	3.029
2002	0.000	0.000	2.718	2.529	5.250	15.699	79.453	1.931	22.610	5.091
2003	0.000	0.000	0.000	0.000	3.622	2.560	17.426	0.000	5.736	1.003
2004	0.000	0.000	0.000	0.000	0.000	0.258	9.395	0.000	1.919	0.335
2005	0.000	0.000	0.000	0.201	0.000	1.639	16.337	0.073	3.762	0.749
2006	0.000	0.000	0.000	0.000	0.033	1.062	4.008	0.000	1.050	0.212
2007	0.000	0.000	0.000	0.000	0.000	0.000	3.655	0.000	0.602	0.117
2008	0.000	0.816	2.370	1.108	8.097	1.287	10.756	1.466	5.754	2.212
Mean	0.000	0.054	0.388	0.371	1.458	4.172	20.072	0.279	5.388	1.221
Median	0.000	0.000	0.000	0.000	0.567	2.560	13.225	0.000	3.081	0.749
StDev	NA	0.211	0.898	0.703	2.376	4.701	20.615	0.600	6.017	1.323
Min	0.000	0.000	0.000	0.000	0.000	0.000	3.655	0.000	0.602	0.117
Max	0.000	0.816	2.718	2.529	8.097	15.699	79.453	1.931	22.610	5.091

1. Data in percent. Includes bond and loan issuers rated as of January 1 of each year.

## Exhibit 46

Average Volume-Weighted Corporate Default Rates by Letter Rating, 1994-2008<sup>1</sup>

Rating	Year 1	Year 2	Year 3	Year 4	Year 5
Aaa	0.000	0.000	0.000	0.000	0.000
Aa	0.037	0.037	0.037	0.037	0.037
A	0.332	0.680	0.950	1.121	1.328
Baa	0.348	0.811	1.186	1.655	2.067
Ba	1.295	2.867	4.443	6.045	7.333
B	4.106	9.904	14.912	18.881	21.835
Caa-C	18.088	27.994	34.545	37.910	39.561
Investment-Grade	0.255	0.546	0.780	0.999	1.210
Speculative-Grade	5.100	9.824	13.695	16.654	18.776
All Rated	1.175	2.307	3.223	3.945	4.501

1. Data in percent. Cumulative default rates are calculated using monthly cohort frequency.

## Corporate Default and Recovery Rates, 1920-2008

## Exhibit 47

Cumulative Issuer-Weighted Default Rates by Annual Cohort, 1970-2008<sup>1</sup>

## Cohort formed 1/1/1970

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Aaa	39	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.703	2.703	2.703
Aa	78	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.439	1.439	1.439	2.921	2.921	2.921	2.921
A	253	0.000	0.000	0.000	0.413	0.413	0.835	0.835	0.835	0.835	1.292	1.292	1.292	1.292	1.292	1.292	1.292	1.793	1.793	2.878	2.878
Baa	372	0.541	0.541	0.541	1.118	1.412	1.412	1.722	2.363	3.030	3.030	3.392	3.392	4.573	4.983	5.405	5.845	7.243	8.260	9.378	9.981
Ba	239	4.264	5.143	5.600	6.077	7.058	8.079	8.618	9.195	10.426	10.426	10.426	11.990	14.505	15.400	15.400	17.451	20.775	23.290	23.290	24.780
B	36	19.718	19.718	22.586	22.586	22.586	22.586	22.586	22.586	22.586	22.586	22.586	22.586	30.955	30.955	30.955	30.955	36.266	36.266	36.266	36.266
Caa-C	15	53.333	60.000	80.000	88.000	88.000	88.000	88.000	100.000												
Inves-Grade	742	0.271	0.271	0.271	0.696	0.840	0.987	1.136	1.440	1.752	1.752	2.083	2.083	2.606	2.963	3.145	3.332	4.293	4.901	5.761	5.985
Spec-Grade	290	8.772	9.854	11.720	12.498	13.302	14.142	14.585	15.526	16.526	16.526	16.526	17.776	21.105	21.816	21.816	23.428	26.928	28.903	28.903	30.108
All rated	1032	2.641	2.938	3.445	3.964	4.281	4.606	4.829	5.287	5.760	5.760	6.016	6.281	7.374	7.798	7.943	8.391	9.789	10.614	11.319	11.688

## Cohort formed 1/1/1971

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Aaa	40	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.703	2.703	2.703	2.703
Aa	75	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.786
A	282	0.000	0.000	0.364	0.364	0.736	0.736	0.736	0.736	0.736	1.135	1.135	1.547	1.963	1.963	1.963	2.398	2.398	3.336	3.336	3.336
Baa	398	0.000	0.000	0.531	0.801	1.079	1.369	1.970	2.595	2.595	2.935	2.935	4.055	4.443	4.844	5.261	6.583	7.539	8.584	9.141	10.314
Ba	229	0.881	1.339	1.817	2.801	3.827	4.369	4.948	6.187	6.187	6.187	7.744	10.248	11.141	11.141	13.173	17.569	20.086	20.086	21.580	21.580
B	27	0.000	3.846	3.846	3.846	3.846	3.846	3.846	3.846	3.846	3.846	3.846	15.865	15.865	15.865	15.865	23.181	23.181	23.181	23.181	23.181
Caa-C	7	14.286	57.143	74.286	74.286	74.286	74.286	100.000													
Inves-Grade	795	0.000	0.000	0.391	0.524	0.795	0.933	1.216	1.506	1.506	1.813	1.813	2.462	2.795	2.965	3.139	3.856	4.421	5.218	5.427	6.075
Spec-Grade	263	1.152	3.141	3.970	4.829	5.727	6.201	7.210	8.282	8.282	8.282	9.621	13.194	13.955	13.955	15.676	20.335	22.445	22.445	23.738	23.738
All rated	1058	0.285	0.770	1.266	1.570	1.986	2.200	2.641	3.097	3.097	3.343	3.598	4.785	5.193	5.332	5.764	7.109	7.902	8.577	8.932	9.487

## Cohort formed 1/1/1972

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Aaa	41	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.632	2.632	2.632	2.632	2.632
Aa	79	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.667	1.667
A	303	0.000	0.337	0.337	0.337	0.337	0.337	0.337	0.337	0.337	0.337	0.718	1.102	1.102	1.102	1.503	1.503	2.373	2.373	2.850	3.344
Baa	431	0.000	0.487	0.735	1.246	1.510	2.061	2.638	2.638	3.270	3.270	3.966	4.327	5.070	5.456	6.673	7.553	8.516	9.541	11.162	13.418
Ba	225	0.000	0.471	1.439	2.450	2.983	3.549	4.751	4.751	4.751	6.233	9.412	10.258	10.258	13.107	17.196	19.513	19.513	20.865	22.291	29.763
B	28	7.273	7.273	7.273	7.273	7.273	7.273	7.273	7.273	7.273	7.273	18.864	18.864	18.864	18.864	26.591	26.591	26.591	26.591	26.591	26.591
Caa-C	8	37.500	51.389	51.389	51.389	51.389	67.593	67.593	67.593	67.593	67.593	67.593	67.593	67.593	67.593	67.593	67.593	67.593			
Inves-Grade	854	0.000	0.363	0.486	0.736	0.864	1.125	1.394	1.394	1.680	1.680	2.133	2.442	2.757	2.919	3.584	4.109	4.850	5.238	6.248	7.290
Spec-Grade	261	1.957	2.769	3.609	4.487	4.950	5.927	6.961	6.961	6.961	8.227	12.276	12.995	12.995	15.434	19.816	21.783	21.783	22.968	24.231	30.878
All rated	1115	0.455	0.921	1.206	1.595	1.795	2.208	2.634	2.634	2.864	3.103	4.212	4.592	4.853	5.389	6.641	7.379	8.007	8.504	9.539	11.324

## Corporate Default and Recovery Rates, 1920-2008

## Cumulative Issuer-Weighted Default Rates by Annual Cohort, 1970-2008 (continued)

## Cohort formed 1/1/1973

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Aaa	41	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.632	2.632	2.632	2.632	2.632	2.632
Aa	82	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.587	1.587	1.587
A	309	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.368	0.739	0.739	0.739	1.130	1.130	1.977	1.977	2.438	2.918	3.433
Baa	440	0.460	0.694	1.176	1.426	1.945	2.489	2.489	3.085	3.085	3.744	4.429	5.135	5.867	7.022	7.856	8.768	9.744	11.813	13.446	13.446
Ba	207	0.000	1.003	2.050	2.603	3.188	4.422	4.422	4.422	5.915	9.868	10.703	10.703	12.554	16.551	19.957	19.957	21.259	22.628	31.146	32.676
B	26	3.922	3.922	3.922	3.922	3.922	3.922	3.922	3.922	3.922	15.931	15.931	15.931	15.931	23.938	23.938	23.938	23.938	23.938	23.938	23.938
Caa-C	6	36.364	36.364	36.364	36.364	57.576	57.576	57.576	57.576	57.576	57.576	57.576	57.576	57.576	57.576	57.576	57.576				
Inves-Grade	872	0.231	0.348	0.588	0.710	0.959	1.217	1.217	1.490	1.490	1.925	2.370	2.672	2.983	3.624	4.129	4.842	5.216	6.384	7.190	7.405
Spec-Grade	239	1.271	2.147	3.063	3.547	4.565	5.634	5.634	6.923	11.678	12.396	12.396	14.004	18.347	21.281	21.281	22.438	23.669	31.367	32.739	
All rated	1111	0.454	0.732	1.111	1.306	1.707	2.121	2.121	2.344	2.575	3.768	4.259	4.511	5.030	6.244	7.101	7.709	8.189	9.358	11.087	11.457

## Cohort formed 1/1/1974

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Aaa	44	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.439	2.439	2.439	2.439	2.439	2.439	2.439
Aa	90	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.242	1.242	1.242	1.242	1.242	1.242	1.242	1.242	2.739	2.739	2.739	2.739
A	307	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.366	0.737	0.737	0.737	1.124	1.124	1.956	1.956	2.407	2.875	3.382	3.382
Baa	430	0.000	0.481	0.730	1.248	1.789	1.789	2.384	2.384	3.044	3.728	4.433	5.168	5.555	6.397	7.317	8.297	9.856	11.495	11.495	11.495
Ba	199	0.512	1.584	2.153	2.755	4.026	4.026	4.026	4.791	8.808	9.657	9.657	11.510	17.475	20.844	20.844	22.174	24.954	33.530	35.076	36.831
B	29	7.143	7.143	7.143	7.143	7.143	7.143	7.143	11.905	21.973	21.973	21.973	21.973	29.404	29.404	29.404	29.404	29.404	29.404	29.404	29.404
Caa-C	2	0.000	0.000	0.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000										
Inves-Grade	871	0.000	0.236	0.356	0.601	0.854	0.854	1.123	1.123	1.695	2.133	2.432	2.737	3.053	3.551	4.252	4.619	5.573	6.362	6.573	6.573
Spec-Grade	230	1.330	2.261	2.754	3.791	4.881	4.881	4.881	6.184	10.978	11.704	11.704	13.324	19.422	22.352	22.352	23.529	26.036	33.891	35.297	36.875
All rated	1101	0.275	0.651	0.844	1.242	1.652	1.652	1.872	2.101	3.401	3.887	4.137	4.650	5.849	6.696	7.296	7.769	8.920	10.623	10.987	11.186

## Cohort formed 1/1/1975

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Aaa	52	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
Aa	104	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.036	1.036	1.036	1.036	1.036	1.036	2.229	2.229	3.466	3.466	3.466	3.466	3.466
A	321	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.355	0.355	0.355	0.726	0.726	1.526	1.526	1.961	2.871	3.365	3.899	3.899
Baa	411	0.000	0.000	0.266	0.822	0.822	1.433	1.433	2.439	3.133	3.845	4.585	4.974	5.815	6.275	7.259	9.326	10.940	10.940	10.940	10.940
Ba	201	1.020	2.096	3.231	3.829	3.829	3.829	4.546	8.349	9.150	9.150	10.914	16.600	19.808	20.987	22.251	23.569	30.333	31.784	33.389	33.389
B	33	6.154	6.154	6.154	9.566	9.566	9.566	13.586	22.016	22.016	22.016	22.016	28.255	28.255	28.255	28.255	37.223	47.686	47.686	47.686	47.686
Caa-C	2	0.000	0.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000											
Inves-Grade	888	0.000	0.000	0.119	0.362	0.362	0.620	0.620	1.166	1.585	1.869	2.160	2.460	2.932	3.597	3.943	5.023	5.952	6.151	6.367	6.367
Spec-Grade	236	1.735	2.647	4.086	5.093	5.093	5.093	6.298	10.760	11.436	11.436	12.957	18.678	21.419	22.420	23.498	25.781	32.906	34.172	35.558	35.558
All rated	1124	0.361	0.546	0.926	1.318	1.318	1.528	1.745	2.981	3.443	3.680	4.167	5.304	6.105	6.813	7.258	8.493	10.248	10.589	10.960	10.960

## Corporate Default and Recovery Rates, 1920-2008

## Cumulative Issuer-Weighted Default Rates by Annual Cohort, 1970-2008 (continued)

## Cohort formed 1/1/1976

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Aaa	66	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.667	1.667	1.667	1.667	1.667	1.667	1.667	1.667	1.667
Aa	112	0.000	0.000	0.000	0.000	0.000	0.000	0.957	0.957	0.957	0.957	0.957	0.957	2.070	2.070	3.222	3.222	3.222	3.222	3.222	3.222
A	368	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.615	0.615	0.615	1.276	1.276	2.357	2.357	3.135	4.358	4.358	4.843	4.843	5.364
Baa	370	0.000	0.285	0.584	0.584	0.912	0.912	2.346	3.088	3.852	4.645	5.061	5.957	5.957	7.007	9.221	10.371	10.972	10.972	10.972	10.972
Ba	208	0.985	2.022	3.108	3.108	3.711	4.360	7.112	7.838	7.838	9.427	14.506	17.355	18.408	19.526	20.692	27.957	29.255	30.670	30.670	30.670
B	27	0.000	0.000	4.082	4.082	4.082	9.001	19.400	19.400	19.400	19.400	27.885	27.885	27.885	27.885	40.997	57.855	57.855	57.855	57.855	57.855
Caa-C	2	0.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000
Inves-Grade	916	0.000	0.112	0.228	0.228	0.349	0.349	0.992	1.518	1.786	2.062	2.490	2.940	3.572	3.902	5.096	5.978	6.166	6.372	6.372	6.599
Spec-Grade	237	0.864	2.225	3.649	3.649	4.180	5.314	8.921	9.560	9.560	10.990	16.338	18.899	19.842	20.851	22.975	30.789	31.993	33.301	33.301	33.301
All rated	1153	0.175	0.536	0.907	0.907	1.105	1.310	2.473	3.018	3.242	3.703	4.904	5.666	6.340	6.762	8.079	9.894	10.218	10.572	10.572	10.767

## Cohort formed 1/1/1977

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Aaa	67	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.667	1.667	1.667	1.667	1.667	1.667	1.667	1.667	1.667	1.667
Aa	119	0.000	0.000	0.000	0.000	0.000	0.897	0.897	0.897	0.897	0.897	0.897	1.946	1.946	3.023	3.023	3.023	3.023	3.023	3.023	3.023
A	389	0.000	0.000	0.000	0.000	0.000	0.000	0.578	0.578	0.578	1.198	1.198	2.896	2.896	3.997	5.154	5.154	5.613	5.613	6.110	6.110
Baa	354	0.291	0.596	0.596	0.596	0.596	2.049	2.803	3.577	4.384	4.808	5.717	5.717	6.785	8.470	9.629	10.235	10.235	10.235	10.235	10.235
Ba	196	0.525	1.627	1.627	2.242	2.903	5.697	6.433	6.433	8.040	13.172	16.051	17.107	18.219	19.379	26.653	27.963	29.404	29.404	29.404	29.404
B	32	3.175	6.513	6.513	10.409	14.576	23.811	23.811	23.811	23.811	31.067	31.067	31.067	31.067	41.672	54.634	54.634	54.634	54.634	54.634	54.634
Caa-C	2	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000
Inves-Grade	929	0.109	0.221	0.221	0.221	0.221	0.844	1.353	1.614	1.882	2.298	2.735	3.654	3.973	5.131	5.985	6.168	6.369	6.369	6.590	6.590
Spec-Grade	230	1.339	2.745	2.745	3.797	4.925	8.524	9.162	9.162	10.581	15.886	18.422	19.349	20.332	22.402	30.052	31.238	32.535	32.535	32.535	32.535
All rated	1159	0.351	0.713	0.713	0.905	1.105	2.238	2.769	2.987	3.437	4.607	5.350	6.266	6.677	7.954	9.717	10.033	10.378	10.378	10.568	10.568

## Cohort formed 1/1/1978

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Aaa	71	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.538	1.538	1.538	3.101	3.101	3.101	3.101	3.101	3.101	3.101	3.101
Aa	131	0.000	0.000	0.000	0.000	0.816	0.816	0.816	0.816	0.816	0.816	1.743	1.743	1.743	1.743	1.743	1.743	1.743	1.743	1.743	1.743
A	381	0.000	0.000	0.000	0.000	0.000	0.584	0.584	0.584	1.212	1.212	2.601	2.601	4.108	4.901	4.901	5.372	5.372	5.880	5.880	5.880
Baa	340	0.000	0.000	0.000	0.000	1.411	1.777	2.531	2.924	3.336	4.657	5.134	6.157	7.770	9.437	10.019	10.019	10.019	10.019	10.019	10.019
Ba	188	1.090	1.090	1.090	1.752	4.559	6.038	6.038	9.251	15.188	17.083	18.132	19.246	21.570	28.866	30.183	33.092	33.092	33.092	33.092	33.092
B	37	5.556	5.556	11.852	15.178	22.397	22.397	26.708	26.708	32.346	38.497	38.497	38.497	47.283	60.462	60.462	60.462	60.462	60.462	60.462	60.462
Caa-C	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000
Inves-Grade	923	0.000	0.000	0.000	0.000	0.607	0.980	1.233	1.364	1.770	2.337	3.232	3.542	4.831	5.663	5.841	6.035	6.035	6.250	6.250	6.250
Spec-Grade	228	1.798	1.798	2.810	3.896	7.359	8.582	9.233	11.942	18.438	20.849	21.733	22.676	25.670	33.156	34.329	36.904	36.904	36.904	36.904	36.904
All rated	1151	0.352	0.352	0.540	0.735	1.837	2.353	2.671	3.218	4.583	5.423	6.313	6.711	8.228	9.945	10.252	10.755	10.755	10.940	10.940	10.940

## Corporate Default and Recovery Rates, 1920-2008

## Cumulative Issuer-Weighted Default Rates by Annual Cohort, 1970-2008 (continued)

## Cohort formed 1/1/1979

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Aaa	75	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.449	1.449	1.449	2.920	2.920	2.920	2.920	2.920	2.920	2.920	2.920	2.920
Aa	132	0.000	0.000	0.000	0.803	0.803	0.803	0.803	0.803	0.803	1.713	1.713	1.713	1.713	1.713	1.713	1.713	1.713	1.713	1.713	1.713
A	377	0.000	0.000	0.000	0.000	0.576	0.576	0.576	1.194	1.194	2.571	2.571	3.685	4.464	4.464	4.929	4.929	5.427	5.427	5.427	5.427
Baa	334	0.000	0.319	0.319	1.701	2.060	2.430	2.814	2.814	4.107	4.574	5.584	8.258	9.916	10.494	10.494	10.494	10.494	10.494	10.494	10.494
Ba	209	0.494	0.494	1.061	3.445	5.945	9.245	11.985	18.478	20.061	20.934	21.870	24.818	32.128	33.249	35.677	35.677	35.677	35.677	35.677	35.677
B	34	0.000	6.452	9.853	17.212	17.212	21.570	26.471	38.236	45.099	45.099	45.099	56.079	56.079	56.079						
Caa-C	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000
Inves-Grade	918	0.000	0.113	0.113	0.709	1.074	1.198	1.326	1.591	2.146	3.024	3.329	4.753	5.570	5.745	5.936	5.936	6.147	6.147	6.147	6.147
Spec-Grade	246	0.420	1.317	2.275	5.306	7.434	10.830	13.793	21.372	23.459	24.224	25.048	28.555	35.223	36.268	38.544	38.544	38.544	38.544	38.544	38.544
All rated	1164	0.087	0.359	0.546	1.605	2.299	3.012	3.642	5.171	5.979	6.835	7.219	8.951	10.612	10.908	11.395	11.395	11.574	11.574	11.574	11.574

## Cohort formed 1/1/1980

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Aaa	88	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.258	1.258	1.258	2.540	2.540	2.540	2.540	2.540	2.540	2.540	2.540	2.540	2.540
Aa	129	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.901	1.810	1.810	1.810	1.810	1.810	1.810	1.810	1.810	1.810	1.810	1.810	1.810
A	382	0.000	0.000	0.274	0.832	0.832	0.832	1.731	2.045	3.045	3.045	4.128	4.884	4.884	5.334	5.334	5.817	5.817	5.817	5.817	6.909
Baa	334	0.000	0.000	1.008	1.358	1.718	2.465	2.465	3.302	4.200	5.629	8.153	10.228	11.310	11.310	11.310	11.310	11.310	11.310	11.310	11.310
Ba	209	0.000	0.531	3.855	5.014	8.679	11.850	17.883	20.082	20.902	23.599	26.428	33.581	35.852	38.296	38.296	38.296	38.296	39.714	39.714	39.714
B	41	4.938	7.543	15.822	21.628	27.898	31.415	43.885	48.561	48.561	48.561	59.992	67.994	67.994	67.994	67.994	67.994	67.994	67.994	67.994	67.994
Caa-C	6	33.333	33.333	33.333	33.333	33.333	33.333	55.556	55.556	55.556	55.556	55.556	55.556	55.556	55.556	55.556	55.556	55.556	55.556	55.556	55.556
Inves-Grade	933	0.000	0.000	0.460	0.812	0.932	1.179	1.562	2.231	3.073	3.512	4.877	5.815	6.149	6.332	6.332	6.535	6.535	6.535	6.535	6.995
Spec-Grade	256	1.613	2.472	6.517	8.401	12.394	15.532	22.804	25.255	25.935	28.157	32.082	39.048	41.015	43.140	43.140	43.140	43.140	44.363	44.363	44.363
All rated	1189	0.343	0.521	1.710	2.369	3.239	4.036	5.695	6.680	7.491	8.219	9.984	11.819	12.384	12.846	12.846	13.017	13.017	13.198	13.198	13.585

## Cohort formed 1/1/1981

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Aaa	92	0.000	0.000	0.000	0.000	0.000	0.000	1.242	1.242	1.242	2.525	2.525	2.525	2.525	2.525	2.525	2.525	2.525	2.525	2.525	2.525
Aa	135	0.000	0.000	0.000	0.000	0.000	0.000	0.823	2.483	2.483	2.483	2.483	2.483	2.483	2.483	2.483	2.483	2.483	2.483	2.483	3.810
A	386	0.000	0.268	0.268	0.268	0.268	1.164	1.479	2.150	2.150	3.237	4.000	4.000	4.455	4.455	4.944	4.944	4.944	4.944	6.040	6.601
Baa	335	0.000	0.638	1.981	2.677	3.399	3.399	3.803	4.664	6.032	8.441	9.922	10.940	10.940	10.940	10.940	10.940	10.940	10.940	10.940	11.732
Ba	242	0.000	3.620	5.044	8.051	11.708	18.392	20.847	21.535	24.553	28.609	35.885	37.970	40.225	40.225	40.225	40.225	41.569	42.960	42.960	42.960
B	46	4.494	11.569	16.482	24.312	27.168	40.116	40.116	40.116	50.096	56.334	56.334	56.334	56.334	56.334	56.334	56.334	56.334	56.334	56.334	56.334
Caa-C	8	0.000	0.000	0.000	0.000	0.000	14.286	28.571	28.571	28.571	28.571	28.571	28.571	28.571	28.571	28.571	28.571	28.571	28.571	28.571	28.571
Inves-Grade	948	0.000	0.330	0.782	1.015	1.254	1.625	2.147	2.969	3.396	4.723	5.484	5.809	5.986	5.986	6.183	6.183	6.183	6.183	6.631	7.324
Spec-Grade	296	0.701	4.754	6.686	10.361	13.784	21.580	24.094	24.654	27.124	31.826	38.681	40.433	42.339	42.339	42.339	42.339	43.459	44.613	44.613	44.613
All rated	1244	0.164	1.349	2.136	3.130	4.063	6.012	6.941	7.708	8.512	10.429	12.180	12.719	13.161	13.161	13.324	13.324	13.498	13.677	14.049	14.623



## Corporate Default and Recovery Rates, 1920-2008

## Cumulative Issuer-Weighted Default Rates by Annual Cohort, 1970-2008 (continued)

## Cohort formed 1/1/1982

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Aaa	95	0.000	0.000	0.000	0.000	0.000	1.212	1.212	1.212	2.479	2.479	2.479	2.479	2.479	2.479	2.479	2.479	2.479	2.479	2.479	2.479	
Aa	147	0.000	0.000	0.000	0.000	0.000	0.746	2.267	2.267	2.267	2.267	2.267	2.267	2.267	3.378	3.378	3.378	3.378	3.378	3.378	4.625	4.625
A	395	0.256	0.256	0.256	0.256	1.125	1.125	1.777	1.777	3.190	3.932	3.932	4.366	4.366	4.366	4.366	4.366	4.366	4.366	4.893	5.434	8.791
Baa	325	0.318	0.318	1.373	2.104	2.486	3.303	4.180	5.572	8.025	9.545	10.600	10.600	10.600	10.600	10.600	10.600	10.600	11.381	12.190	12.190	
Ba	255	2.783	5.303	7.977	11.676	18.565	20.729	21.332	23.999	28.384	33.351	35.255	37.311	37.311	37.311	37.311	38.645	40.071	40.071	40.071	43.185	
B	44	2.299	9.448	14.478	17.193	29.238	29.238	29.238	29.238	34.681	54.277	54.277	54.277	54.277	54.277	54.277	54.277	54.277	54.277	54.277	54.277	54.277
Caa-C	13	23.077	47.368	47.368	47.368	56.140	64.912	64.912	64.912	64.912	64.912	64.912	64.912	64.912	64.912	64.912	64.912	64.912	64.912	64.912	64.912	64.912
Inves-Grade	962	0.212	0.212	0.548	0.780	1.262	1.770	2.573	2.991	4.441	5.191	5.512	5.687	5.687	5.881	5.881	5.881	5.881	6.320	6.999	8.399	
Spec-Grade	312	3.571	7.675	10.577	13.980	21.653	23.866	24.361	26.569	30.835	37.091	38.694	40.433	40.433	40.433	40.433	41.536	42.705	42.705	42.705	45.280	
All rated	1274	1.038	2.031	2.973	3.947	6.079	6.964	7.698	8.471	10.442	12.144	12.669	13.098	13.098	13.257	13.257	13.427	13.603	13.966	14.527	16.071	

## Cohort formed 1/1/1983

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Aaa	98	0.000	0.000	0.000	0.000	2.410	2.410	2.410	3.728	3.728	3.728	3.728	3.728	3.728	3.728	3.728	3.728	3.728	3.728	3.728	3.728	3.728
Aa	223	0.000	0.000	0.000	0.000	0.484	1.985	1.985	1.985	1.985	1.985	1.985	1.985	2.697	2.697	2.697	2.697	2.697	2.697	3.529	4.398	
A	426	0.000	0.000	0.000	0.262	0.262	0.844	0.844	2.107	3.096	3.799	4.180	4.180	4.180	4.180	4.180	4.180	4.180	4.675	6.213	6.760	
Baa	272	0.000	1.167	1.575	3.302	3.776	4.299	5.395	6.546	7.748	7.748	7.748	7.748	7.748	7.748	7.748	7.748	8.694	10.657	12.700	14.816	
Ba	230	0.911	2.394	4.516	12.154	14.205	17.368	21.000	26.130	31.769	31.769	33.236	33.236	33.236	33.236	35.066	36.948	38.918	40.954	45.098	49.321	
B	114	6.306	11.015	17.860	25.138	28.416	29.600	32.307	40.088	49.910	54.919	57.736	57.736	57.736	57.736	57.736	57.736	57.736	57.736	57.736	57.736	57.736
Caa-C	10	42.105	65.263	65.263	65.263	76.842	76.842	76.842	76.842	76.842	76.842	76.842	76.842	76.842	76.842	76.842	76.842	76.842	76.842	76.842	76.842	76.842
Inves-Grade	1019	0.000	0.305	0.410	0.957	1.422	2.159	2.414	3.345	4.034	4.329	4.490	4.490	4.669	4.669	4.669	4.669	4.873	5.502	6.798	7.702	
Spec-Grade	354	3.824	6.977	10.658	17.966	20.837	23.152	26.332	32.345	39.249	40.880	42.713	42.713	42.713	42.713	43.894	45.155	46.461	47.816	50.599	53.463	
All rated	1373	0.965	1.965	2.923	5.025	6.017	7.079	7.895	9.723	11.418	11.906	12.308	12.308	12.457	12.457	12.617	12.782	13.124	13.828	15.279	16.418	

## Cohort formed 1/1/1984

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Aaa	81	0.000	0.000	0.000	1.439	1.439	1.439	3.068	3.068	3.068	3.068	3.068	3.068	3.068	3.068	3.068	3.068	3.068	3.068	3.068	3.068	3.068
Aa	241	0.000	0.000	0.000	0.887	1.807	1.807	1.807	1.807	1.807	1.807	1.807	2.449	2.449	2.449	2.449	2.449	2.449	3.196	3.977	3.977	
A	454	0.000	0.228	0.467	0.718	1.505	1.777	2.918	3.810	4.443	4.443	4.443	4.443	4.443	4.443	4.443	4.443	4.889	6.271	6.762	7.299	
Baa	281	0.362	0.362	0.770	1.225	1.729	2.789	3.909	5.085	5.085	5.770	5.770	5.770	5.770	5.770	5.770	6.703	8.667	11.729	13.856	13.856	
Ba	246	0.833	3.490	12.154	14.336	18.088	21.634	27.203	32.434	33.420	34.530	34.530	34.530	34.530	36.071	36.071	37.775	39.528	41.333	45.000	45.000	
B	119	6.780	12.878	20.293	24.205	27.385	32.350	42.426	49.512	51.756	56.834	56.834	56.834	56.834	56.834	60.945	60.945	60.945	60.945	60.945	60.945	60.945
Caa-C	2	100.000																				
Inves-Grade	1057	0.096	0.194	0.400	0.948	1.644	2.007	2.891	3.548	3.830	3.984	3.984	4.155	4.155	4.155	4.155	4.351	4.955	6.406	7.277	7.510	
Spec-Grade	367	3.333	7.130	15.329	18.122	21.657	25.709	32.857	38.645	39.994	42.272	42.272	42.272	42.272	43.322	44.479	45.673	46.907	48.187	50.810	50.810	
All rated	1424	0.925	1.957	4.131	5.212	6.551	7.687	9.792	11.375	11.831	12.333	12.333	12.473	12.473	12.625	12.782	13.107	13.777	15.156	16.241	16.434	

## Corporate Default and Recovery Rates, 1920-2008

## Cumulative Issuer-Weighted Default Rates by Annual Cohort, 1970-2008 (continued)

Cohort formed 1/1/1985

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Aaa	80	0.000	0.000	0.000	0.000	0.000	1.681	1.681	1.681	1.681	1.681	1.681	1.681	1.681	1.681	1.681	1.681	1.681	1.681	1.681	1.681
Aa	302	0.000	0.000	0.000	0.771	0.771	0.771	0.771	0.771	0.771	0.771	1.365	1.365	1.365	1.365	1.365	1.365	2.055	2.777	2.777	2.777
A	517	0.000	0.210	1.340	2.303	2.555	3.885	4.718	5.011	5.011	5.011	5.011	5.011	5.011	5.011	5.011	5.434	6.304	7.224	7.721	7.721
Baa	276	0.000	1.215	1.215	1.728	2.811	3.379	4.568	5.209	5.913	5.913	5.913	5.913	5.913	5.913	7.970	10.135	13.526	14.711	14.711	14.711
Ba	292	1.413	6.753	9.361	12.866	18.452	24.098	29.643	31.181	32.041	32.041	33.071	33.071	34.266	34.266	35.650	37.112	40.218	43.364	43.364	43.364
B	149	7.483	16.843	22.974	26.360	30.538	42.009	48.452	50.646	55.841	55.841	55.841	55.841	55.841	59.855	59.855	59.855	59.855	59.855	59.855	59.855
Caa-C	5	0.000	0.000	0.000	33.333	33.333	33.333	33.333	33.333	33.333	33.333	100.000									
Inves-Grade	1175	0.000	0.368	0.865	1.615	1.953	2.780	3.395	3.660	3.806	3.806	3.970	3.970	3.970	4.349	4.934	6.140	6.984	7.209	7.209	7.209
Spec-Grade	446	3.448	10.116	13.976	17.729	22.770	30.224	35.920	37.577	39.450	39.450	40.927	40.927	41.783	42.737	43.751	44.822	47.097	49.423	49.423	49.423
All rated	1621	0.947	3.023	4.410	5.924	7.377	9.655	11.294	11.818	12.281	12.281	12.675	12.675	12.818	12.966	13.429	14.068	15.386	16.421	16.605	16.605

Cohort formed 1/1/1986

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Aaa	108	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aa	298	0.000	0.000	0.771	0.771	1.200	1.200	1.200	1.200	1.200	1.788	1.788	1.788	1.788	1.788	1.788	2.492	3.215	3.215	3.215	3.215
A	574	0.000	0.191	0.792	1.212	1.874	2.333	2.333	2.333	2.333	2.333	2.333	2.333	2.333	2.333	3.040	3.773	4.560	4.984	4.984	5.432
Baa	308	1.347	1.347	3.037	3.920	5.764	7.213	8.256	8.840	8.840	8.840	8.840	8.840	8.840	10.536	11.426	13.262	15.148	15.148	15.148	15.148
Ba	358	2.041	5.946	8.543	13.601	20.284	26.769	28.639	30.758	32.297	33.128	33.128	35.139	35.139	35.139	37.733	43.268	44.704	44.704	44.704	46.331
B	187	11.602	17.495	21.440	25.388	34.773	41.579	47.279	50.680	50.680	50.680	50.680	50.680	53.763	60.876	60.876	60.876	60.876	60.876	60.876	60.876
Caa-C	9	26.667	26.667	45.000	45.000	45.000	45.000	45.000	45.000	45.000	100.000										
Inves-Grade	1288	0.319	0.405	1.229	1.614	2.418	2.942	3.167	3.291	3.291	3.431	3.431	3.431	3.431	3.758	4.265	5.132	6.040	6.232	6.232	6.440
Spec-Grade	554	5.644	10.207	13.489	18.092	25.552	32.010	34.976	37.411	38.495	39.689	39.689	41.108	41.921	43.694	45.555	49.515	50.545	50.545	50.545	51.695
All rated	1842	1.906	3.300	4.812	6.296	8.710	10.554	11.342	11.923	12.132	12.463	12.463	12.707	12.835	13.367	14.053	15.327	16.216	16.373	16.373	16.712

Cohort formed 1/1/1987

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Aaa	132	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aa	318	0.000	0.000	0.000	0.382	0.382	0.382	0.382	0.382	0.918	0.918	0.918	0.918	0.918	0.918	1.566	2.228	2.228	2.228	2.228	2.228
A	543	0.000	0.000	0.410	1.267	1.711	1.711	1.711	1.711	1.711	1.711	1.711	1.711	1.711	2.057	2.774	3.540	4.359	4.359	4.791	4.791
Baa	338	0.000	1.049	1.419	3.363	4.991	6.289	7.243	7.243	7.243	7.243	7.901	7.901	9.318	10.058	11.576	12.352	12.352	12.352	12.352	12.352
Ba	463	2.724	4.242	9.051	15.800	22.832	25.433	28.487	30.204	31.467	32.177	33.802	34.747	34.747	36.978	40.545	44.300	44.300	44.300	45.786	45.786
B	268	6.154	13.729	20.458	31.700	40.535	46.398	48.421	48.421	48.421	48.421	48.421	50.367	54.683	59.104	61.441	66.759	66.759	66.759	66.759	66.759
Caa-C	10	20.000	30.667	30.667	30.667	30.667	30.667	30.667	30.667	65.333	65.333	65.333	65.333	65.333	65.333	65.333	65.333	65.333	65.333	65.333	65.333
Inves-Grade	1331	0.000	0.248	0.508	1.415	1.981	2.283	2.503	2.503	2.628	2.628	2.766	2.766	3.062	3.368	4.155	4.811	5.155	5.155	5.341	5.341
Spec-Grade	741	4.222	8.116	13.557	21.818	29.365	33.009	35.662	36.794	38.058	38.529	39.594	40.833	42.209	45.098	48.170	52.283	52.283	52.283	53.299	53.299
All rated	2072	1.504	3.016	4.986	8.160	10.696	11.861	12.671	12.935	13.310	13.410	13.725	13.946	14.409	15.128	16.243	17.407	17.680	17.680	17.976	17.976

## Corporate Default and Recovery Rates, 1920-2008

## Cumulative Issuer-Weighted Default Rates by Annual Cohort, 1970-2008 (continued)

## Cohort formed 1/1/1988

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Aaa	138	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aa	344	0.000	0.634	0.965	0.965	0.965	0.965	0.965	1.431	1.431	1.431	1.431	1.431	1.982	2.545	3.118	3.118	3.118	3.118	3.118	3.118
A	543	0.000	0.196	0.806	1.227	1.227	1.227	1.227	1.227	1.227	1.227	1.227	1.227	1.227	1.917	2.283	3.067	3.067	3.484	3.484	3.484
Baa	329	0.000	0.332	1.380	2.827	3.977	5.243	5.243	5.243	5.243	5.814	5.814	6.442	7.099	9.126	10.529	10.529	10.529	10.529	10.529	10.529
Ba	503	1.258	6.602	12.552	20.208	22.641	25.537	26.486	27.540	28.718	30.056	30.817	31.660	33.483	38.410	42.658	42.658	42.658	43.976	43.976	47.224
B	337	6.202	13.073	25.267	34.141	39.819	43.338	45.017	46.981	46.981	48.199	54.036	57.441	61.142	63.242	67.985	67.985	67.985	67.985	67.985	67.985
Caa-C	11	28.571	28.571	28.571	28.571	28.571	28.571	28.571	64.286	64.286	64.286	64.286	64.286	64.286	64.286	64.286	64.286	64.286	64.286	64.286	64.286
Inves-Grade	1354	0.000	0.316	0.895	1.411	1.685	1.986	1.986	2.100	2.100	2.225	2.225	2.360	2.640	3.509	4.113	4.430	4.430	4.601	4.601	4.601
Spec-Grade	851	3.580	9.470	17.805	25.837	29.455	32.533	33.724	35.402	36.156	37.424	39.859	41.499	43.863	47.734	51.944	51.944	51.944	52.834	52.834	54.953
All rated	2205	1.359	3.715	6.992	9.931	11.195	12.255	12.565	13.062	13.238	13.610	14.099	14.512	15.156	16.496	17.667	17.914	17.914	18.182	18.182	18.476

## Cohort formed 1/1/1989

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Aaa	156	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aa	339	0.604	0.604	0.604	0.604	0.604	0.604	1.045	1.045	1.045	1.045	1.045	1.562	2.091	2.627	2.627	2.627	2.627	2.627	2.627	4.049
A	575	0.000	0.184	0.565	0.565	0.565	0.565	0.565	0.565	0.565	0.565	0.565	0.565	1.506	1.836	2.189	2.189	2.568	2.568	2.568	3.873
Baa	347	0.594	1.221	1.870	2.902	3.278	3.278	3.278	3.278	3.760	3.760	4.292	4.850	7.143	8.940	9.577	9.577	9.577	9.577	9.577	10.370
Ba	480	3.037	9.740	17.554	20.034	22.975	23.408	24.386	26.036	27.285	29.434	30.236	32.836	37.532	43.627	43.627	43.627	43.627	43.627	46.803	50.291
B	374	8.720	22.788	31.367	37.566	41.366	43.972	47.042	47.042	50.098	53.749	56.510	59.562	61.320	65.287	65.287	65.287	67.767	67.767	67.767	70.246
Caa-C	12	25.000	43.750	57.813	57.813	57.813	57.813	57.813	57.813	57.813	57.813	57.813	57.813	57.813	57.813	57.813	57.813	57.813	57.813	57.813	57.813
Inves-Grade	1417	0.288	0.514	0.827	1.077	1.168	1.168	1.272	1.272	1.385	1.385	1.506	1.758	2.799	3.476	3.762	3.762	3.918	3.918	3.918	4.979
Spec-Grade	866	5.794	15.774	23.950	27.905	31.143	32.423	34.182	35.179	37.069	39.700	41.177	43.851	47.378	52.512	52.512	52.512	53.310	53.310	55.197	58.217
All rated	2283	2.348	6.061	9.005	10.415	11.427	11.775	12.298	12.536	13.038	13.566	13.936	14.611	16.017	17.382	17.605	17.605	17.848	17.848	18.115	19.370

## Cohort formed 1/1/1990

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Aaa	179	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aa	384	0.000	0.000	0.000	0.000	0.000	0.362	0.362	0.362	0.362	0.362	0.362	0.810	1.270	1.270	1.270	1.270	1.270	1.270	2.485
A	603	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.279	0.567	0.869	1.190	1.190	1.533	1.533	1.533	2.725
Baa	341	0.000	0.627	0.627	0.627	0.627	0.627	0.627	0.627	0.627	1.156	1.711	4.568	6.961	7.603	7.603	7.603	7.603	7.603	8.447
Ba	465	3.409	11.554	14.164	17.229	18.025	19.362	20.333	21.406	23.248	23.927	26.111	31.614	35.888	35.888	35.888	35.888	35.888	38.427	42.487
B	390	15.616	25.169	32.709	36.346	38.522	41.153	41.953	45.791	49.326	52.103	56.814	58.692	65.047	65.047	65.047	67.843	67.843	67.843	70.767
Caa-C	18	58.824	67.059	67.059	67.059	67.059	67.059	67.059	67.059	67.059	100.000									
Inves-Grade	1507	0.000	0.141	0.141	0.141	0.141	0.234	0.234	0.234	0.234	0.344	0.573	1.399	2.136	2.395	2.395	2.536	2.536	2.536	3.510
Spec-Grade	873	9.976	18.708	23.362	26.599	27.948	29.759	30.635	32.617	34.927	36.657	39.472	43.611	48.145	48.145	48.145	48.880	48.880	50.543	54.044
All rated	2380	3.564	6.592	8.064	9.026	9.401	9.938	10.153	10.607	11.087	11.508	12.211	13.584	14.924	15.127	15.127	15.350	15.350	15.596	16.881

## Corporate Default and Recovery Rates, 1920-2008

## Cumulative Issuer-Weighted Default Rates by Annual Cohort, 1970-2008 (continued)

## Cohort formed 1/1/1991

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Aaa	166	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aa	432	0.000	0.000	0.000	0.000	0.310	0.310	0.310	0.310	0.310	0.310	0.707	1.120	1.120	1.120	1.120	1.120	1.120	1.120
A	595	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.271	0.550	0.841	1.148	1.148	1.477	1.477	1.477	2.618
Baa	373	0.272	0.272	0.272	0.272	0.272	0.272	0.272	0.272	0.704	1.152	3.457	5.392	5.911	5.911	5.911	6.526	7.186	7.887
Ba	367	4.892	6.199	8.091	8.529	9.521	10.604	11.204	13.277	14.059	16.611	22.140	26.159	26.159	27.369	27.369	27.369	27.369	32.005
B	338	12.598	22.187	27.507	30.163	33.955	34.723	39.352	42.753	45.385	49.874	51.664	59.556	59.556	59.556	62.445	62.445	65.574	68.853
Caa-C	19	38.889	38.889	38.889	38.889	38.889	38.889	38.889	38.889	59.259	59.259	79.630	79.630	79.630	79.630	79.630	79.630	79.630	79.630
Inves-Grade	1566	0.065	0.065	0.065	0.065	0.151	0.151	0.151	0.151	0.252	0.460	1.213	1.886	2.123	2.123	2.253	2.390	2.534	3.438
Spec-Grade	724	9.370	14.429	17.800	19.201	21.356	22.270	24.348	26.788	28.647	31.716	36.250	41.201	41.201	41.960	42.789	42.789	43.712	47.561
All rated	2290	2.931	4.399	5.325	5.685	6.264	6.470	6.905	7.365	7.768	8.439	9.753	11.038	11.232	11.335	11.552	11.665	11.904	13.152

## Cohort formed 1/1/1992

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Aaa	154	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aa	440	0.000	0.000	0.000	0.281	0.281	0.281	0.281	0.281	0.281	0.644	0.644	0.644	0.644	0.644	0.644	0.644	0.644
A	689	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.228	0.465	0.962	1.223	1.223	1.223	1.223	1.223	2.837
Baa	386	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.398	0.810	2.962	4.345	4.844	4.844	5.391	5.968	6.579	7.212
Ba	351	0.306	1.025	1.025	1.954	2.463	3.027	4.935	6.375	7.949	12.970	18.326	18.326	19.422	20.652	20.652	20.652	25.560
B	267	9.182	16.079	19.906	24.559	26.954	30.824	34.402	37.135	43.422	45.308	51.499	51.499	51.499	51.499	51.499	51.499	54.844
Caa-C	27	28.571	33.862	33.862	33.862	33.862	42.130	42.130	56.597	56.597	71.065	71.065	71.065	71.065	71.065	71.065	85.532	85.532
Inves-Grade	1669	0.000	0.000	0.000	0.076	0.076	0.076	0.076	0.166	0.351	1.030	1.541	1.757	1.757	1.875	2.000	2.132	2.949
Spec-Grade	645	5.154	8.649	10.245	12.607	13.792	15.809	18.147	20.372	23.321	27.611	32.781	32.781	33.493	34.284	34.284	35.210	39.259
All rated	2314	1.402	2.302	2.685	3.272	3.522	3.920	4.342	4.784	5.399	6.611	7.806	7.987	8.083	8.284	8.391	8.615	9.783

## Cohort formed 1/1/1993

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Aaa	129	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Aa	454	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
A	736	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.196	0.605	1.034	1.261	1.261	1.261	1.261	2.409	
Baa	459	0.000	0.000	0.256	0.256	0.534	0.825	1.440	2.077	3.734	4.792	5.169	5.169	5.582	6.017	6.477	8.386
Ba	377	0.567	0.567	2.713	3.492	4.363	5.846	8.042	9.260	13.149	17.284	17.284	17.284	18.209	19.182	19.182	22.722
B	257	4.517	9.209	14.102	16.011	19.108	21.929	26.149	33.183	37.232	41.663	43.306	45.135	45.135	47.470	50.096	53.121
Caa-C	25	26.667	26.667	33.651	41.457	41.457	41.457	60.971	60.971	80.486	80.486	80.486	80.486	80.486	80.486	80.486	
Inves-Grade	1778	0.000	0.000	0.066	0.066	0.138	0.212	0.368	0.609	1.197	1.639	1.826	1.826	1.929	2.038	2.151	3.095
Spec-Grade	659	3.072	4.920	8.260	9.659	11.267	13.138	16.284	19.385	23.595	27.651	28.152	28.711	29.318	30.621	31.336	34.530
All rated	2437	0.817	1.285	2.133	2.451	2.846	3.267	3.961	4.687	5.866	6.890	7.124	7.206	7.380	7.653	7.846	9.054

## Corporate Default and Recovery Rates, 1920-2008

## Cumulative Issuer-Weighted Default Rates by Annual Cohort, 1970-2008 (continued)

## Cohort formed 1/1/1994

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Aaa	124	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aa	416	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
A	870	0.000	0.000	0.000	0.000	0.000	0.000	0.156	0.481	0.820	1.000	1.000	1.000	1.000	1.000	1.919
Baa	523	0.000	0.205	0.205	0.428	0.662	1.883	2.392	3.725	4.572	4.876	4.876	5.215	5.575	5.957	8.006
Ba	431	0.242	1.832	2.120	3.084	4.913	7.769	10.509	13.467	16.653	17.259	17.259	18.032	18.890	18.890	22.071
B	343	4.050	8.252	11.395	13.246	16.648	21.411	26.778	31.828	37.282	40.317	43.760	43.760	46.644	48.286	51.980
Caa-C	40	5.263	11.184	21.633	21.633	21.633	33.243	33.243	57.518	57.518	57.518	57.518	57.518	57.518	57.518	57.518
Inves-Grade	1933	0.000	0.055	0.055	0.116	0.180	0.508	0.712	1.209	1.582	1.740	1.740	1.828	1.921	2.018	2.936
Spec-Grade	814	2.073	4.942	6.843	8.108	10.435	14.318	17.871	22.068	25.964	27.438	28.707	29.178	30.746	31.332	34.587
All rated	2747	0.602	1.440	1.949	2.312	2.896	3.975	4.840	6.035	7.057	7.442	7.649	7.795	8.103	8.267	9.471

## Cohort formed 1/1/1995

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Aaa	119	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aa	454	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
A	939	0.000	0.000	0.000	0.000	0.000	0.136	0.420	0.863	1.020	1.020	1.020	1.020	1.020	1.842
Baa	545	0.000	0.000	0.000	0.432	1.556	2.026	3.506	4.028	4.028	4.028	4.344	4.685	5.052	7.026
Ba	439	0.714	0.973	2.124	3.761	7.042	9.472	12.533	15.393	17.052	17.052	17.761	18.544	18.544	20.495
B	466	4.227	6.683	9.472	12.706	16.485	22.052	30.974	38.054	41.978	44.542	45.267	46.913	47.870	51.061
Caa-C	61	9.091	17.853	17.853	26.207	36.504	41.207	61.958	71.468	71.468	71.468	71.468	71.468	100.000	
Inves-Grade	2057	0.000	0.000	0.000	0.113	0.406	0.589	1.098	1.433	1.503	1.503	1.583	1.668	1.758	2.603
Spec-Grade	966	2.920	4.705	6.579	9.342	13.204	17.167	23.464	28.424	31.120	32.367	33.062	34.227	35.104	37.552
All rated	3023	0.918	1.459	2.000	2.825	4.007	5.071	6.879	8.221	8.831	9.070	9.261	9.533	9.750	10.823

## Cohort formed 1/1/1996

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12	13
Aaa	128	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aa	486	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
A	1019	0.000	0.000	0.000	0.000	0.119	0.368	0.628	0.766	0.766	0.766	0.766	0.766	1.674
Baa	630	0.000	0.000	0.177	0.727	1.301	2.704	3.338	3.565	3.807	4.067	4.635	4.635	6.270
Ba	468	0.000	0.730	2.380	6.364	8.400	12.438	14.854	16.720	16.720	17.328	18.008	18.768	20.469
B	542	1.366	4.222	9.011	11.644	17.679	25.591	33.267	37.358	40.369	41.059	42.696	44.672	49.098
Caa-C	76	13.793	19.843	26.738	43.726	49.650	62.237	67.272	67.272	67.272	67.272	67.272	67.272	67.272
Inves-Grade	2263	0.000	0.000	0.049	0.203	0.416	0.916	1.207	1.331	1.397	1.467	1.616	1.616	2.441
Spec-Grade	1086	1.637	3.782	7.326	11.513	15.632	21.784	26.678	29.458	30.820	31.437	32.494	33.707	36.422
All rated	3349	0.523	1.180	2.234	3.467	4.656	6.502	7.840	8.514	8.827	8.994	9.293	9.485	10.567

## Corporate Default and Recovery Rates, 1920-2008

## Cumulative Issuer-Weighted Default Rates by Annual Cohort, 1970-2008 (continued)

Cohort formed 1/1/1997

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11	12
Aaa	129	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aa	528	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
A	1088	0.000	0.000	0.000	0.106	0.327	0.560	0.931	0.931	0.931	0.931	0.931	1.922
Baa	729	0.000	0.146	0.756	1.395	2.576	3.291	3.483	3.691	4.138	4.628	4.628	5.786
Ba	566	0.188	1.686	6.008	9.185	12.045	14.872	16.687	16.687	17.161	17.690	18.282	19.606
B	648	1.935	6.434	10.148	15.808	25.853	32.538	36.235	39.324	39.831	42.300	44.623	49.897
Caa-C	86	14.634	24.762	39.624	49.687	65.917	69.927	69.927	69.927	69.927	69.927	69.927	69.927
Inves-Grade	2474	0.000	0.043	0.222	0.455	0.895	1.204	1.423	1.481	1.605	1.737	1.737	2.480
Spec-Grade	1300	2.028	5.598	10.195	14.922	21.843	26.540	29.157	30.601	31.069	32.420	33.681	36.510
All rated	3774	0.684	1.855	3.358	4.857	7.051	8.487	9.268	9.626	9.818	10.180	10.403	11.471

Cohort formed 1/1/1998

Rating	Issuers	1	2	3	4	5	6	7	8	9	10	11
Aaa	118	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aa	572	0.000	0.000	0.000	0.000	0.000	0.000	0.244	0.244	0.244	0.244	0.244
A	1103	0.000	0.000	0.100	0.308	0.527	0.880	0.880	0.880	0.880	0.880	1.821
Baa	871	0.118	0.609	1.119	2.189	3.328	3.481	3.813	4.172	4.563	4.563	5.759
Ba	651	0.808	3.678	6.641	10.491	13.574	15.786	16.425	17.146	17.557	18.030	19.084
B	860	3.780	9.853	17.347	28.113	34.717	39.842	43.723	44.338	46.610	49.395	53.164
Caa-C	124	11.255	29.004	40.097	56.321	61.957	65.761	68.739	68.739	73.548	73.548	86.774
Inves-Grade	2664	0.038	0.198	0.405	0.838	1.297	1.493	1.650	1.762	1.881	1.881	2.625
Spec-Grade	1635	3.152	8.794	14.727	23.051	28.119	31.911	34.326	34.946	36.412	37.934	40.402
All rated	4299	1.202	3.325	5.494	8.548	10.468	11.723	12.501	12.742	13.177	13.508	14.575

Cohort formed 1/1/1999

Rating	Issuers	1	2	3	4	5	6	7	8	9	10
Aaa	107	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aa	611	0.000	0.000	0.000	0.000	0.000	0.218	0.218	0.218	0.218	0.218
A	1118	0.000	0.000	0.197	0.403	0.731	0.731	0.731	0.731	0.731	1.609
Baa	987	0.103	0.639	1.539	2.739	3.131	3.414	3.719	4.215	4.215	5.427
Ba	669	1.261	3.343	5.785	8.707	10.636	11.191	11.818	12.521	12.916	14.662
B	1027	4.967	13.622	24.051	32.551	37.169	40.665	41.815	43.807	46.679	50.119
Caa-C	244	18.182	28.754	47.651	54.425	60.279	65.168	65.168	67.345	67.345	72.369
Inves-Grade	2823	0.036	0.223	0.615	1.112	1.377	1.519	1.619	1.779	1.779	2.510
Spec-Grade	1940	5.384	12.051	20.794	27.093	30.816	33.265	34.097	35.495	36.989	39.471
All rated	4763	2.180	4.881	8.415	10.992	12.408	13.263	13.572	14.057	14.423	15.525

## Corporate Default and Recovery Rates, 1920-2008

## Cumulative Issuer-Weighted Default Rates by Annual Cohort, 1970-2008 (continued)

## Cohort formed 1/1/2000

Rating	Issuers	1	2	3	4	5	6	7	8	9
Aaa	123	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aa	610	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
A	1186	0.000	0.180	0.368	0.668	0.774	0.774	0.774	0.774	1.851
Baa	1081	0.378	0.874	2.146	2.723	2.971	3.372	3.804	3.804	4.485
Ba	607	0.859	2.547	4.639	6.305	6.305	7.222	7.565	7.955	10.585
B	1113	5.803	16.331	25.475	30.515	34.005	35.754	38.658	41.105	44.014
Caa-C	284	20.073	41.982	51.942	58.663	65.240	66.603	68.408	68.408	72.357
Inves-Grade	3000	0.136	0.385	0.912	1.233	1.362	1.499	1.644	1.644	2.303
Spec-Grade	2004	6.339	15.779	22.827	26.932	29.494	30.859	32.603	33.951	36.558
All rated	5004	2.591	6.376	9.305	10.938	11.849	12.346	12.922	13.254	14.333

## Cohort formed 1/1/2001

Rating	Issuers	1	2	3	4	5	6	7	8
Aaa	121	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aa	678	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
A	1234	0.165	0.426	0.702	0.702	0.702	0.702	0.702	2.053
Baa	1070	0.191	1.720	2.163	2.402	2.788	3.204	3.204	3.696
Ba	554	1.308	3.165	4.800	5.067	5.987	6.339	6.743	9.017
B	1076	9.501	19.442	24.976	28.327	30.199	33.209	35.547	39.031
Caa-C	267	31.474	43.180	54.419	61.810	64.160	65.753	65.753	68.731
Inves-Grade	3103	0.132	0.759	1.020	1.099	1.226	1.361	1.361	2.075
Spec-Grade	1897	10.124	17.837	22.784	25.514	27.056	28.907	30.248	33.028
All rated	5000	3.877	7.057	8.910	9.823	10.354	10.933	11.249	12.389

## Cohort formed 1/1/2002

Rating	Issuers	1	2	3	4	5	6	7
Aaa	135	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aa	694	0.000	0.000	0.000	0.000	0.000	0.000	0.000
A	1238	0.166	0.340	0.340	0.340	0.340	0.340	1.608
Baa	1180	1.228	1.605	1.707	1.926	2.046	2.046	2.613
Ba	573	1.481	3.348	4.283	5.347	6.258	6.611	8.225
B	831	4.574	9.961	12.558	14.642	17.664	19.521	24.642
Caa-C	323	28.192	40.753	49.912	52.317	56.701	59.637	61.559
Inves-Grade	3247	0.507	0.710	0.746	0.822	0.863	0.863	1.561
Spec-Grade	1727	7.921	13.296	16.223	17.914	20.161	21.442	24.601
All rated	4974	3.031	4.902	5.804	6.326	6.929	7.225	8.436

## Corporate Default and Recovery Rates, 1920-2008

## Cumulative Issuer-Weighted Default Rates by Annual Cohort, 1970-2008 (continued)

## Cohort formed 1/1/2003

Rating	Issuers	1	2	3	4	5	6
Aaa	132	0.000	0.000	0.000	0.000	0.000	0.000
Aa	646	0.000	0.000	0.000	0.000	0.000	0.000
A	1229	0.000	0.000	0.000	0.000	0.000	1.226
Baa	1160	0.000	0.000	0.203	0.313	0.313	0.443
Ba	550	0.955	1.384	2.112	2.664	2.980	5.432
B	822	2.073	3.728	5.878	8.430	9.980	14.573
Caa-C	319	21.016	33.414	35.793	40.406	43.462	46.003
Inves-Grade	3167	0.000	0.000	0.074	0.113	0.113	0.652
Spec-Grade	1691	5.123	8.078	9.732	11.782	13.006	16.398
All rated	4858	1.742	2.685	3.229	3.824	4.136	5.350

## Cohort formed 1/1/2004

Rating	Issuers	1	2	3	4	5
Aaa	143	0.000	0.000	0.000	0.000	0.000
Aa	611	0.000	0.000	0.000	0.000	0.219
A	1204	0.000	0.000	0.000	0.000	1.290
Baa	1175	0.000	0.187	0.187	0.187	0.304
Ba	555	0.381	0.596	1.338	1.623	3.543
B	901	0.832	2.071	4.178	5.171	8.710
Caa-C	281	11.485	18.005	22.386	25.522	30.266
Inves-Grade	3133	0.000	0.070	0.070	0.070	0.662
Spec-Grade	1737	2.346	3.998	5.941	6.954	10.024
All rated	4870	0.815	1.403	1.997	2.281	3.522

## Cohort formed 1/1/2005

Rating	Issuers	1	2	3	4
Aaa	144	0.000	0.000	0.000	0.000
Aa	632	0.000	0.000	0.000	0.199
A	1242	0.000	0.000	0.000	0.892
Baa	1175	0.175	0.175	0.175	0.611
Ba	559	0.000	0.656	0.909	3.151
B	967	1.224	3.067	4.033	7.83
Caa-C	330	6.179	10.417	13.753	21.354
Inves-Grade	3193	0.065	0.065	0.065	0.613
Spec-Grade	1856	1.732	3.627	4.768	8.648
All rated	5049	0.662	1.3	1.654	3.175



## Corporate Default and Recovery Rates, 1920-2008

## Cumulative Issuer-Weighted Default Rates by Annual Cohort, 1970-2008 (continued)

## Cohort formed 1/1/2006

Rating	Issuers	1	2	3
Aaa	139	0.000	0.000	0.000
Aa	670	0.000	0.000	0.178
A	1279	0.000	0.000	0.807
Baa	1176	0.000	0.000	0.307
Ba	598	0.181	0.181	2.489
B	1041	1.144	2.021	6.857
Caa-C	348	5.919	10.100	19.250
Inves-Grade	3264	0.000	0.000	0.468
Spec-Grade	1987	1.688	2.857	7.574
All rated	5251	0.620	1.020	2.867

## Cohort formed 1/1/2007

Rating	Issuers	1	2
Aaa	150	0.000	0.000
Aa	702	0.000	0.158
A	1298	0.000	0.664
Baa	1164	0.000	0.286
Ba	598	0.000	1.618
B	1197	0.000	4.505
Caa-C	334	5.873	17.710
Inves-Grade	3314	0.000	0.397
Spec-Grade	2129	0.918	5.710
All rated	5443	0.348	2.332

## Cohort formed 1/1/2008

Rating	Issuers	1
Aaa	182	0.000
Aa	795	0.515
A	1240	0.333
Baa	1138	0.454
Ba	590	1.058
B	1210	1.985
Caa-C	425	14.532
Inves-Grade	3355	0.399
Spec-Grade	2225	4.129
All rated	5580	1.874

1. Data in percent.

## Corporate Default and Recovery Rates, 1920-2008

### Guide to Data Tables and Charts

In this section we briefly describe the interpretation of some of the Exhibits contained in this report. Methodological details are discussed in separate sections below.

Exhibit 11 presents Moody's speculative-grade default rate forecast for 2009. The model generated point forecasts for each month are shown, as well as forecasted optimistic and pessimistic bounds. The pessimistic and optimistic bounds represent positive and negative economic scenarios for the U.S. unemployment rate and high yield spread.

Exhibit 17 was derived by mapping Moody's ratings to a linear scale, then taking the average and median values of the numerically mapped ratings.

Exhibit 27 shows average senior unsecured recovery rates by letter rating and year prior to default. Each cell in the table indicates the average recovery rate on senior unsecured bonds with a specific rating within  $T$  years of default. For example, the 35.4% two-year B recovery rate reported in Exhibit 27 indicates that the average recovery rate on B rated issues that default at some time within a two-year period, not mean recovery rate for issuers rated B *exactly* two years before default.<sup>11</sup> Together with issuer-weighted average cumulative default rates, these multi-period recovery estimates are used to calculate cumulative expected credit loss rates, as presented in Exhibit 28.

Exhibits 38 through 42 show issuer-weighted historical average default rates by rating category over various investment horizons. These data were generated by averaging the multi-year default rates of cohorts formed at monthly intervals. In addition to being statements of historical fact, these data are also useful proxies for *expected* default rates. For example, over a five-year period a portfolio of B-rated issuers defaulted at a 24.5% average rate between 1983 and 2008 (see Exhibit 40). For an investor with a five-year exposure to a B-rated debt obligation or counterparty, this estimate also happens to be the best estimate of the expected risk of default for a B-rated exposure based on the available historical data, particularly over long investment horizons.

Exhibit 46 shows average cumulative volume-weighted default rates by rating category. Whereas issuer-based default rates weight each issuer equally, these data weight each issuer by the total volume of defaulted debt; larger defaults receive relatively more weight. Average default rates based on debt volume affected are less suitable estimates of expected default risk. One reason is that issuer default volumes vary considerably over time. On average, a leveraged corporate issuer defaults on approximately \$300 million of bonds. However, that total can be very high (e.g. \$30 billion for WorldCom). Issuer-based default rates receive particular emphasis in the rating process because the expected likelihood of default of a debt issuer holding a given rating is expected to be the same regardless of differences in the nominal sizes of the exposures.

Exhibit 47 shows the cumulative issuer-weighted historical default rates of cohorts formed at annual intervals between the years 1970 and 2008 (January 1 of each year). These data are a subset of the data used to calculate the issuer-weighted averages shown in Exhibits 38 through 40 (which, again, are based on cohorts formed at monthly time intervals). The default rates in Exhibit 47 may be useful for scenario analysis. For example, if one believed that future default rates for a given pool of issuers will behave as they did in, say, 1997, then one can use the January 1, 1997 cohort cumulative default rates as proxies for expected default rates.

<sup>11</sup> The details of the calculation may be found in Moody's Special Comment, "Recovery Rates on Defaulted Bonds and Preferred Stocks", December 2003.

## Corporate Default and Recovery Rates, 1920-2008

### Methodology and Data Sources

#### Methodology Changes in this Year's Report

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The historical data contained in Moody's 2009 global default study includes a number of revisions relative to previous years' publications. Moody's occasionally discovers historical defaults, leading to minor revisions of the historical data. As always, the data contained in the most recently published Moody's default study supersedes the data published in previous reports.

##### *Change in Senior Rating Algorithm*

In January 2009, we applied a smoothing procedure in the senior rating algorithm to estimate every issuer's senior unsecured ratings. This enhancement aims to eliminate artificial rating changes that are not the result of a change in an issuer's credit quality, but due to a switch of reference debt on which the estimated senior unsecured rating is derived. The implementation of the smoothing procedure is particularly important when Moody's introduced new debt ratings, refined its rating scale, or adjusted its notching practices. For example, the introduction of issuer ratings on October 25 1999 results in numerous artificial rating changes if the smoothing procedure is not in place. At other times, the impact of the smoothing is modest. For instance, only 3% of Moody's-rated issuers have a different estimated senior unsecured rating (mostly by one notch) as of January 1, 2009 due to the introduction of the smoothing procedure.

##### *Removal of Special Purpose Vehicles*

In January 2009, we removed a substantial number of special purpose vehicles from Hartford Financial Services Group, Inc., Principal Financial Group, Inc., and Protective Life Corporation. These SPVs are non-insurance conduits and mostly Aa3 or A1 credits. None of them had defaulted.

#### Moody's Definition of Default

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Moody's definition of default includes three types of credit events:

1. A missed or delayed disbursement of interest and/or principal;
2. Bankruptcy, administration, legal receivership, or other legal blocks (perhaps by regulators) to the timely payment of interest and/or principal; or
3. A distressed exchange occurs where: (i) the issuer offers debt holders 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, lower seniority, or longer maturity); and (ii) the exchange has the effect of allowing the issuer to avoid a bankruptcy or payment default.

The definition of a default is intended to capture events that change the relationship between debt holders and the debt issuer from the relationship which was originally contracted, and which subjects the bondholder to an economic loss. Technical defaults (covenant violations, etc.) are not included in Moody's definition of default. Secondary and tertiary defaults are reported only after the initial default event is believed to have been cured. This is to ensure that multiple defaults related to a single episode of credit distress are not over-counted.

#### Rating Migration Calculations

---

A rating migration matrix completely summarizes changes in credit ratings over a given time horizon. The cells of the matrix are discrete-time estimates of rating migration probabilities. They show rate of rating change measured at two points in time; e.g. the start and end of one year. When calculating credit rating migration rates, Moody's treats rating changes, rating withdrawals, and defaults as mutually exclusive states. For example, an issuer that is downgraded on the day of default is counted only as a default, not a downgrade or a downgrade and default. Similarly, an issuer whose rating is withdrawn on the day of default is counted as a default, not a withdrawal.

## Corporate Default and Recovery Rates, 1920-2008

The probability that an issuer's rating  $i$  held on cohort date  $y$  will transition to rating  $j$  (which includes default and withdrawal) over a time horizon  $T$  is calculated as:

$$p_{ij}^y(T) = \frac{n_{ij}^y(T)}{n_i^y(0)}$$

The weighted average rating migration rate for all cohorts  $y$  in the historical data set  $Y$  is calculated as:

$$\bar{p}_{ij}(T) = \frac{\sum_{y \in Y} n_{ij}^y(T)}{\sum_{y \in Y} n_i^y(0)}$$

### Default Rate Calculations

Moody's method for calculating cumulative default rates is a discrete-time approximation of the nonparametric continuous-time hazard rate approach.<sup>12</sup> Cumulative default rates are calculated from marginal default rates, which represent the probability that an issuer that has survived in the sample through a particular date will default over the next time interval (typically, one year) following that date.

The marginal default rate for issuers holding rating  $i$  on cohort date  $y$  is the ratio of the number of defaulting issuers in period  $t$  divided by the number of issuers exposed to the risk of default in period  $t$ :

$$d_i^y(t) = \frac{x_i^y(t)}{n_i^y(t) - x_i^y(t-1) - \frac{1}{2}[w_i^y(t) + w_i^y(t-1)]}$$

The denominator of the marginal default rate adjusts for defaults that occur prior to time interval  $t$ , as well as rating withdrawals,  $w(t)$ , that occur in periods prior to interval  $t$  and a small adjustment for withdrawals that occur in time interval  $t$ . Cumulative default rates for investment horizons of length  $T$ ,  $D(T)$ , are built up from the marginal default rates:

$$D_i^y(T) = 1 - \prod_{t=1}^T [1 - d_i^y(t)]$$

Or, expanding the above equation (and dropping indices for brevity):

$$D(T) = d(1) + d(2)[1 - d(1)] + d(3)[(1 - d(1))(1 - d(2))] + \dots + d(T)\left(\prod_{t=1}^{T-1} [1 - d(t)]\right)$$

In the first time period, a fraction of the credit exposures in the cohort either defaults or survives. The credit exposures that survive period one may then go on to default or survive in period two; those that survive period two may go on to default or survive in period three, etc. Because the time periods are non-overlapping and the probability of default in each period is assumed to be independent, the  $T$ -period cumulative default rate is defined as one minus the product of the  $T$  marginal survival rates.

The calculation of the average cumulative default rate for rating class  $i$ ,  $\bar{D}_i(T)$ , is derived from the weighted average marginal default rates,  $\bar{d}_i(t)$ , calculated from all the available cohort marginal default rates in the historical data set  $Y$ :

$$\bar{D}_i(T) = 1 - \prod_{t=1}^T [1 - \bar{d}_i(t)]$$

<sup>12</sup> See Moody's Global Credit Research "Measuring Corporate Default Rates", November 2006.

## Corporate Default and Recovery Rates, 1920-2008

where

$$\bar{d}_i(t) = \frac{\sum_{y \in Y} x_i^y(t)}{\sum_{y \in Y} n_i^y(t)}$$

The default rates calculated in multi-year rating migration matrices are not comparable to those calculated using Moody's discrete-time hazard rate method described above. Rating migration matrices account for rating withdrawals separately (in the column labeled WR) while the hazard rate method incrementally adjusts the denominator of the marginal default rate to remove rating withdrawals. Occasionally, withdrawal-adjusted rating migration matrices are calculated as follows:

$$p_{ij}^y(T)^* = \frac{p_{ij}^y(T)}{(1 - p_{iw}^y(T))}$$

Using this method, *all* issuers whose ratings are withdrawn are removed. In effect, data for issuers whose ratings are withdrawn is completely discarded. This method generally yields higher default rate estimates than the hazard rate method. Hence, Moody's hazard rate-derived default rate estimates lay between unadjusted migration matrix-derived default rates and withdrawal-adjusted migration matrix-derived default rates.

### Recovery Rate Calculations

Moody's estimates defaulted debt recovery rates using market bid prices observed roughly 30 days after the date of default. Recovery rates are measured as the ratio of price to par value. Using post-default prices to measure recovery (or its complement, loss severity) parallels common practice in the credit default swaps market. Moreover, recovery rates measured in this way are most relevant for cash bond investors who liquidate their holdings shortly after default as often required by their portfolio governance rules or their own investment objectives. For investors holding defaulted securities until ultimate resolution, prices observed shortly after default are generally accepted as the market's estimate of discounted expected ultimate recovery rates.

The alternative approach of directly measuring *ultimate* realized recoveries presents a number of estimation challenges, including the appropriate discount rate to apply to cash-flows and valuing the assets used to pay creditor claims, which may include illiquid new securities (e.g., equity and derivative instruments) as well as physical assets. The table below defines the various ways Moody's calculates recovery rates.<sup>13</sup> For the purposes of measuring expected credit loss rates, we rely on issuer-weighted mean recovery rates.

Statistic	Definition
Issuer-Weighted Mean Recovery Rates	They are derived by estimating mean recovery rates for each issuer, then averaging them across issuers. They are useful for predicting recovery rates for portfolios that are well diversified across issuers.
Value-Weighted Mean Recovery Rates	They represent the average of recovery rates on all defaulted issuers, weighted by the face value of those issues. These estimates are useful for predicting recovery rates on the market portfolio.
Issuer-Weighted Median Recovery Rates	They are estimated as median of issuer-weighted recovery rates and are used for predicting the most likely recovery rate for a randomly selected issuer.
Issue-Weighted Mean Recovery Rates	They are estimated using recovery rates for each issue and taking the average of all issues. While this measure is widely reported, it is useful only for predicting the average recovery rate on a portfolio of default bonds diversified across issues but without reference to issuer or issue size.

<sup>13</sup> This table is derived from Moody's Special Comment "Recovery Rates on Defaulted Bonds and Preferred Stocks", December 2003.

## Corporate Default and Recovery Rates, 1920-2008

### Credit Loss Rate Calculations

Moody's credit ratings are opinions of relative expected credit losses. Credit losses are therefore a function of both probability of default (PD) as well as the severity of default (LGD). The expected credit loss rate for rating category  $i$  is calculated as the product of the  $T$ -horizon average issuer-weighted default rate and the  $T$ -horizon average issuer-weighted senior unsecured loss severity rate (where  $r(T)$  is the average senior unsecured recovery rate at horizon  $T$ ):

$$l_i(T) = \bar{D}_i(T) \times (1 - \bar{r}_i(T))$$

### CAP Curve and Accuracy Ratio

In addition to assigning low ratings to issuers that ultimately default, the effectiveness of a rating system depends on its ability to assign high credit ratings to issuers that do not default. In other words, an efficient rating system is able to separate the low credit risks from the high credit risks. A metric designed to measure this aspect of ratings performance is the cumulative accuracy profile (CAP) plot.<sup>14</sup> The CAP plot graphs the cumulative proportion of defaults from a portfolio (the y-axis) against the proportion of issuers exposed to the risk of default (the x-axis), sorted by riskiness. A rating system that randomly identified defaults from non-defaults would plot a line directly on the 45-degree line. The more powerful the discriminatory power of the rating system, the further the CAP curve bows toward the top left corner.

CAP curves are powerful tools for visualizing rating performance, but can be unwieldy from making comparisons over many time periods. A summary measure of rating accuracy that can be derived from the CAP curve is the accuracy ratio (AR). The accuracy ratio is the ratio of the area between the CAP curve and the 45-degree line to the total area above the 45-degree line. A rating system that perfectly differentiates defaults from non-defaults would score an AR of 100%, while a rating system that had zero predictive ability would score 50%.<sup>15</sup>

### Data Sources

Moody's bases the results of this study on its proprietary database of ratings and defaults for corporate bond and loan issuers. Municipal and sub-sovereign debt issuers, structured finance securities, private placements, and issuers with only short-term debt ratings are excluded unless otherwise noted. In total, Moody's data covers the credit experiences of over 18,000 corporate issuers that sold long-term public debt at some time between 1920 and 2008. As of January 1, 2008 approximately 6,000 corporate issuers held a Moody's long-term bond, loan, or corporate family rating.

Moody's database of corporate defaults covers over 3,600 long-term bond defaults by issuers both rated and non-rated by Moody's. Additional data sources, such as Lehman Brothers index data, supplemented Moody's proprietary data in the construction of the aggregate dollar volume-weighted default rates. Defaulted bond pricing data was derived from Bloomberg, Reuters, and TRACE. The majority of these market quotes represent an actual bid on the debt instrument, although no trade may have occurred at that price. Over the 1982-2008 period, the dataset consists includes post-default prices for approximately 3,000 defaulted instruments issued by over 1,400 defaulting corporations. Moody's makes the 1970-2008 credit rating, default, and recovery rate data used in this study available through its Default Risk Service (DRS) database.

<sup>14</sup> For a more detailed discussion of rating accuracy metrics see Moody's Global Credit Research "Measuring the Performance of Corporate Bond Ratings", November 2006.

<sup>15</sup> The accuracy ratio possesses the same information about discriminatory power as the area under the receiver-operator characteristics curve (AROC) and the Gini coefficient. Each measure quantifies rank rather than scale.

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