1986-2002 Credit Risk Loss

Experience Study:

Private Placement Bonds

by the

Private Placement Committee

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I. EXECUTIVE SUMMARY

The 1986-2002 Credit Risk Loss Experience Study represents a continuation of the 1986-98 study analyzing credit loss experience by institutional investors on private placement bonds. This continuing study is being conducted under the auspices of the Society of Actuaries and involves twenty institutional investors altogether, but between six and fifteen in any given year, which accounted for between 24% and 44% of outstanding life insurance company private placement bond holdings during the study period.[1] The study measures incidence rates, loss severities and economic loss rates associated with credit risk events for privately placed debt during the years 1986-2002. Private placement loss experience is broken down along a variety of dimensions, such as by year of funding, bond rating, etc., and is compared to loss experience for publicly issued bonds. In addition to the final report, institutions which contributed data to the study receive confidential reports comparing their experience against the aggregate experience. New contributors are welcome to join in the study.

The years 1986-2002 arguably include two complete credit loss cycles[2], which increases the relevance of results for this round of the study relative to previous round, the most recent of which had experience through 1998. However, future economic downturns may be different, so care must be used in interpreting and using the results. The study is not meant as a prediction of future loss experience on private placements.

The body of the report provides the complete background, results and analysis. This Executive Summary summarizes the main results, which include:
- Economic loss rates more than doubled between the periods 1986-90 and 1991-92, dropped to low levels during 1993-98, and then jumped again in 2001-2 to levels similar to 1991-2.
- During the period studied, private placements had materially better loss experience than publicly issued bonds, even after controlling for differences in aggregate portfolio quality.
- Privates with internal credit ratings that equate to AAA/Aaa through BB/Ba at the start of each year had loss experience over one-year horizons similar to that for publicly issued bonds. Incidence or default rates were worse, but loss severities were better.
- Private placements with a most recent quality rating of B or riskier offered superior experience relative to public bonds. Incidence or default rates, loss severities, and economic loss rates were all better.
- Contributors' internal credit ratings of placements and NAIC[3] ratings are complementary and credible in that each type of rating has incremental predictive power for loss rates.

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[1] The percentages consider only general account assets, and are based on data compiled and estimated by the American Council of Life Insurers ("ACLI").

[2] The first credit cycle covered by the study may have begun before 1986, the initial year studied.

[3] National Association of Insurance Commissioners.

- Loss severities for individual credit events are widely distributed and hard to predict but, on average, loss severities for senior debt are smaller than subordinated debt severities.
- Restructurings appear to carry lower loss severities than defaults on average.
- Variations in incidence rates by the number of years since asset funding (issuance) strongly imply a seasoning effect. Incidence rates are low during the first year or two after issuance, then rise, and then drop back after seven or eight years have elapsed since issuance. The seasoning effect is stronger for below investment grade placements (those rated riskier than BBB/Baa) and remains even after controls are implemented for the effect of the business cycle on loss rates.
- Bonds with higher coupon interest rates tend to have higher incidence rates, even controlling for ratings.
- There is little evidence that crisis-at-maturity is an important factor in explaining the timing of losses, but some indications from the 1986-2002 study suggest that the discipline of amortization may be important in reducing losses.
- Although the period analyzed in this study covers roughly two full credit cycles, implications for credit risk experience during a typical credit cycle depend on views about the relative proportions of recession and normal years in a typical cycle and about the severity of the downturn.
- Fears expressed in the 1990s that below-investment-grade private placements posed extraordinary portfolio risk appear to be overstated in that, in fact, the performance of such assets was better than the performance of similarly rated public bonds.
- Results examining the relative predictive power of internal and NAIC credit ratings suggest that where opinions differ about the credit quality of an asset, on average the more pessimistic opinion is more likely to be correct.

The remainder of this executive summary offers somewhat more detail. Readers are encouraged to see the full body of the report to learn additional results and insights and to understand the methods as well as the limiting factors of the analysis.

The period 1986-2002 witnessed both good and bad times economically. Credit losses on corporate debt of all kinds were relatively high during and immediately after the recessions in 1990-91 and in 2001. Although individual industrial sectors were distressed during many of the intervening years, credit losses were much smaller overall, especially
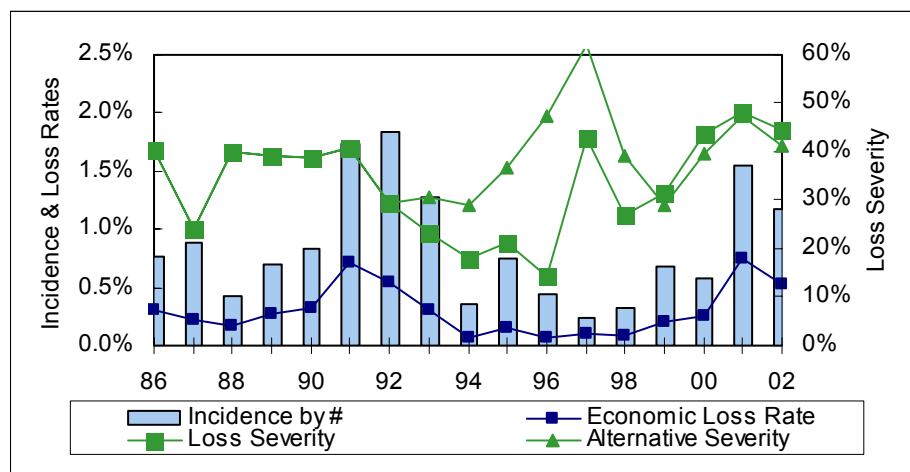
during the middle 1990s.

On the whole, private placement loss experience tracked economic conditions, perhaps with a small lag. As shown in the graph, incidence rates, the primary driver of economic loss rates, more than doubled from 1990 to 1991, fell back to very low levels later in the 1990s, and then rose to high levels again in 2001-2002. Reported loss severities averaged 35% over the whole period, falling after 1992 and rising again after 1999. However, sensitivity analysis indicates that severities may not have fallen as much after 1992 as the solid-square line on the chart on the preceding page indicates vis-à-vis the "alternative severity" line (see Section III.H for details). The proportional increase in severities during 2000-2002 was not as high as for publicly issued corporate bonds.
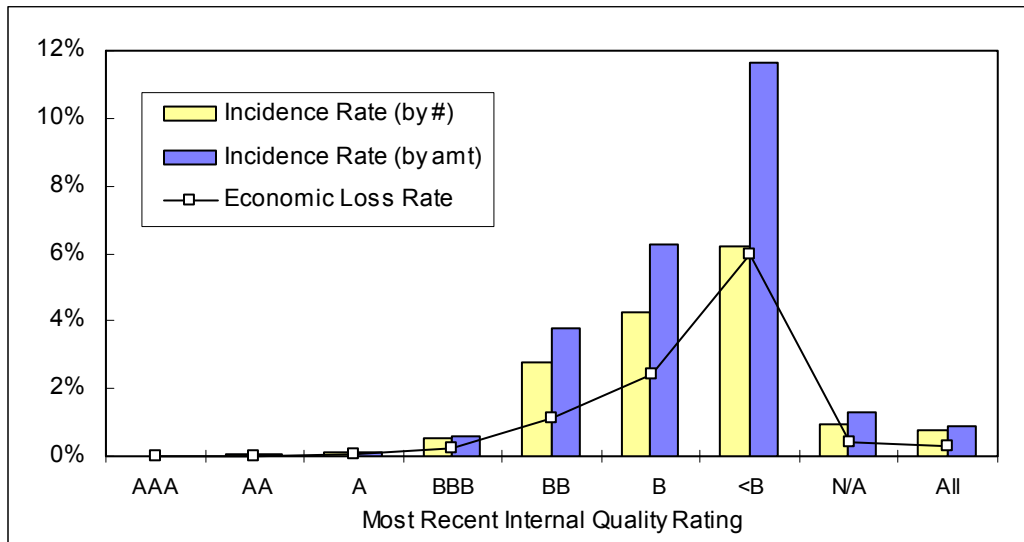
Other key results and observations from the body of the study include the following:

- The typical asset in contributors' portfolios continues to be a traditional private placement, that is, a dollar denominated, non-Rule 144A, investment grade senior debt instrument from a U.S. issuer. However, there is a trend toward more asset-backed securities.
- As would be expected, losses on speculative-grade bonds are more likely than on highly rated bonds. Average incidence and economic loss rates for placements with an investment grade rating are low, but rise steeply for below-investment-grade assets. Loss severities are somewhat higher on credit risk events (CREs) involving assets rated <B.
- This study compares results for private placements to results of studies of default and loss experience for publicly issued bonds. The motivations behind the comparison are:
  - ➢ public bond studies have been the foundation, to date, of most investors' intuition about corporate credit risk;
  - ➢ the sense that private placements offer additional protection to investors;
  - ➢ regulatory and rating agency treatments of private placements have been modeled on public bond experience; to the extent that private placement experience differs, information about it would be a useful input into regulatory

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and rating agency processes.
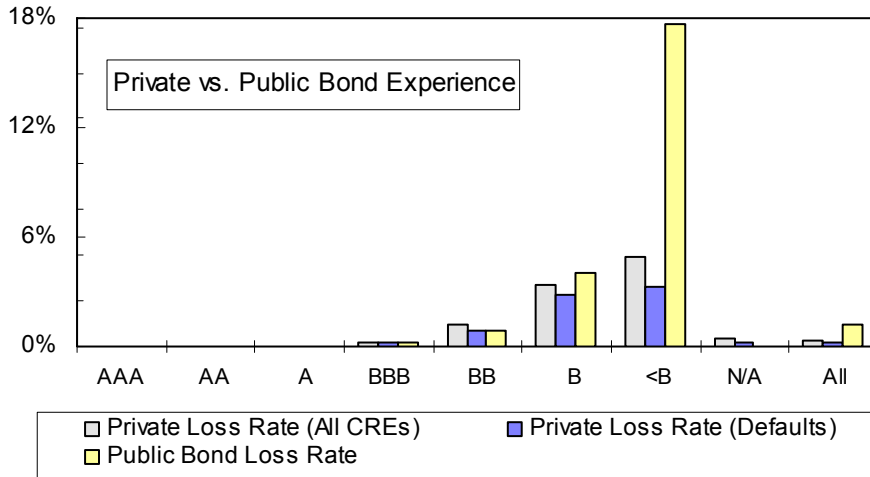
Highlights from the comparison between private and public bond experience include:

  ➢ Public bonds lost an average of 116 basis points annually during 1986-2002 through defaults while private placements lost 31 basis points annually on defaults, restructurings, and distress sales taken together. Even adjusting for differences in portfolio quality distribution between the public and private bond universes, private placements' economic loss rates were better by about 40 basis points depending on the measure used.

  ➢ The better overall loss experience is partly due to better average loss severities, which are near 35% for privates and are more than 60% for publicly issued bonds. However, better severities are not the whole story. For assets with start-of-year internal ratings the equivalent of investment grade, incidence rates are higher on privates but severities are lower, making overall private and public loss experience similar. For assets with internal ratings the equivalent of below investment grade, especially for those rated B and below, both incidence rates and severities are better for privates, leading to substantially better average loss rates.

Private and Public Economic Loss Rate Estimates (basis pts)

Basis	Economic Loss		
	Public	Private	Difference
Aggregate unadjusted	116 bps	31 bps	85 bps
Public estimated based on private sample quality distribution	67	31	36
Private estimated based on public sample quality distribution	116	70	46

➢ Variations in loss rates across ratings are driven largely by variations in incidence rates for both privates and publics. Patterns of incidence rates are similar to the loss rate patterns in the chart below.

➢ Loss severities are sensitive to priority (or seniority) in bankruptcy. Higher-priority bonds had lower loss severities on average than lower-priority bonds.

➢ Overall, private economic loss rates are lower than public bond loss rates in each year of the study. Additionally, overall private placement incidence rates are lower than public default rates in the majority of years, as reported by both Moody's and Standard & Poor's. The superior economic loss results are partly due to relatively higher average quality of contributors' private placement portfolios compared to the public bond universe, but even compensating for this difference the performance of private placements is substantially better overall.
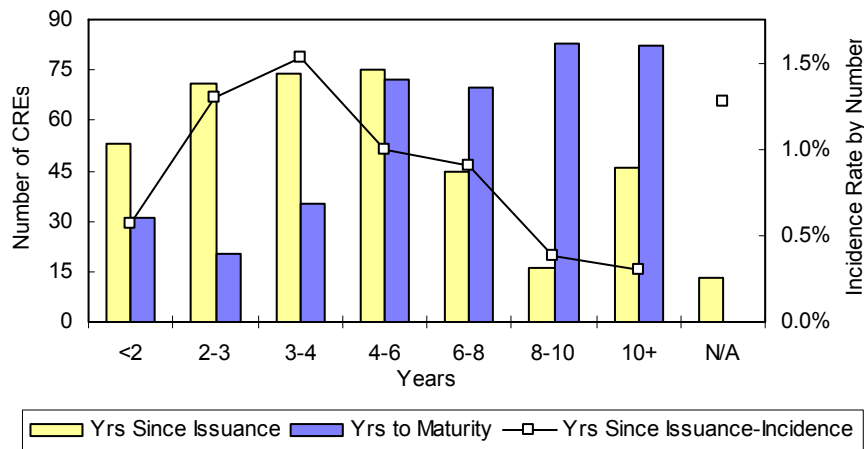
- More than half of CREs occur for assets which were originated during the last half of the 1980's or the last half of the 1990s and over 80% of CREs occur within seven years of the funding date. There is strong evidence of seasoning effects even after accounting for effects of the economic cycle.
- Of the 1001 CREs in the study, defaults were the most frequent CRE type (688 CREs), followed by restructurings (237 CREs), distress sales (46 CREs) and unreported (30 CREs). Average loss severities for defaults and distress sales were 41% and 23%, respectively, and the average severity for restructurings was 26%. Some restructurings may have later ended in defaults not captured in the study's data (which would cause severities for restructurings to be understated). However, on average, the effort involved in restructurings appears to be worth the cost.
- During the period 1995-2002, for which information about asset types is available, asset-backed and traditional private placements had similar economic loss rates. Asset-backed securities had better incidence rates but worse loss severities than traditional notes, bonds and debentures. Among asset-backed securities, CBOs, CLOs and credit-linked notes experienced the highest loss rates. Among other

asset types, airline equipment trust certificates experienced relatively high loss rates.

In summary, the 1986-2002 Credit Risk Loss Experience Study presents data for private placements which the investment community can use to better understand the risks of investing in this asset class relative to other asset classes. This study presents a quantitative and statistical framework which both actuaries and investment professionals can understand and utilize. The Society of Actuaries welcomes input and participation from the investment community.

II. INTRODUCTION

A. Background

This is a report on the study of credit risk experience of private placement bonds from 1986 through 2002. It covers new data gathered for 1999 through 2002 and incorporates updates of the previously reported 1986-98 experience. As such, it is self-contained, with no need on the part of the reader to refer to prior reports. Each report also differs from previous ones in the inclusion of new analyses as warranted.

The report consists of five main parts: this Introduction; the Analysis and Commentary, which deals with the significant findings of the study including a comparison of the Private Placement credit risk experience developed by the study to the experience under Public Bonds; the Cross Tabulation section, which presents results relative to certain combinations of parameters or characteristics; the Data Summaries, which present the detailed results of the study in aggregate and in relation to various selected parameters or characteristics; and finally a set of Appendices setting out the technical aspects of the study methodology and of the validation of the data, the limitations the user should bear in mind in using the results of the study, a more in-depth commentary than is given in this introduction about the economic landscape before and during the study's observation period, and extensive additional detail about the study results and underlying data.

The original 1986-89 study of the credit risk event (CRE) loss experience of insurance company commercial mortgage loans and private placement bonds represented the first phase of an ongoing study of the economic loss resulting from credit risk events (see Appendix I for the definition of CREs). This study was initiated by the Society of Actuaries (SOA) in cooperation with the American Council of Life Insurance (ACLI), representing a joint effort of actuaries and investment professionals. Since the 1986-89 study, there have been three additional reports, on private placements only, extending the experience through 1998. The current report is a fifth report of experience, extending it through 2002.

Private placement bonds represent a significant portion of fixed-income securities owned by life insurance companies. According to the ACLI's 2003 Life Insurance Fact Book, such assets represented 17% of life insurance companies' general account invested assets as of December 31, 2002, the last year of the current study. In spite of substantial holdings, there is no published, industry-wide, direct data from which default loss experience or, more importantly, the economic loss from credit risk events related to these securities can be assessed. Consequently, a disciplined study of insurance company private placement bonds is important. An ongoing study is essential to:

- provide information of value in the portfolio management process,

- provide the basis for making informed choices about the setting of assumptions as to future credit risk losses for liability valuations and for asset acquisition strategies,

- build a credible longitudinal data base that allows the study of the behavior of these asset classes and the correlation of credit risk to environmental and asset specific variables,

- provide reasonable assumptions for the setting or revision of asset valuation reserves and risk-based capital standards.

The suggestion has been made that private placements are sufficiently similar to publicly traded bonds that the value added by studying the former is limited. The evidence suggests otherwise (please see "comparison with public bond experience" in the Analysis section of this report) .

The insurance business has changed and continues to do so, both with respect to the types of products sold and the types of investments made. The economic environment also has been transformed and provides substantial investment challenges. In the 1980's, real interest rates were much higher and more volatile than they were previously as inflation and later the fear of inflation plagued the economy. This interest rate environment made debt service more difficult for borrowers and the economic value of missed payments more costly to lenders. It is important to keep in mind that a significant number of loans that form the basis of this study were made in this economic environment.

Economic conditions during the observation period
To understand better the credit risk events of 1986 through 2002, the reader may find it helpful to review the economic conditions and their impact on asset defaults. Not only was the structure of the economy changing at a rapid pace, but inflation or fear of infla-tion, high interest rates, the rolling recession, changes in the tax law and demographics all combined during the 1980's to impact default rates. These trends culminated in the recession and debt shake-out of the beginning of the 1990's, followed by a long period of sustained growth and then another period off relatively high debt losses in 2001-2002. Appendix II, to which the interested reader is referred, describes the economic landscape shortly before and during the observation period covered by the study.

Assessment of credit risk
Credit risk is one of the risks now facing life insurance companies with respect to the vast liabilities created by investment-oriented products. Moreover, insurance companies are not the only entities subject to credit risk events. Banks, pension funds, and commercial credit companies encounter many of the same problems. With corporate treasurers ever more sophisticated in searching out the lowest possible cost of funds, the margins of all lending institutions are under pressure. In this environment the enhanced understanding and accurate assessment of credit risk become prized skills for investment professionals and actuaries alike. The Society of Actuaries believes that the maintenance of a unique data base of the kind that the present study represents allows both those groups to enhance their understanding of credit risk behavior in ways simply unavailable otherwise.

While economic cycles are not easily identifiable and repetitive, the Private Placement

Committee believes that we now have covered roughly two economic cycles in this study. Although some relationships have become evident as more experience has been added, the Committee still anticipates that the ongoing study, providing results over an even longer period of time, will be better able to identify or clarify such implications and provide information of significant value.

B. Goals of the 1986-2002 Study

Having met the goals of the 1986-89 study[4], the Society of Actuaries concluded that it is desirable to transform the study into an ongoing experience study. Investment professionals and contributors concurred. The goals of the ongoing study on Private Placements are to:

a) compile a reliable, accurate data base of credit risk events and associated exposures, on a "cash to cash" basis;

b) continue to develop and refine the design of the study and the definition of the data to be collected;

c) provide information about the incidence and severity of credit risk events and the economic loss resulting from them;

d) perform analyses and develop insights into the behavior of private placement credit risk in relation to various parameters and environmental variables;

e) stimulate further thinking and research into credit risk behavior.[5]

C. Data Contributors

In all, 20 companies have contributed some data to the five phases of the study so far. Eleven companies contributed to the 1986-89 experience; ten companies contributed to the 1990-92 experience (one did so retroactively); fifteen companies contributed to the 1993-94 experience; seven companies contributed to the 1995-98 experience; and six companies contributed to the 1999-2002 experience. The Society of Actuaries thanks all of these companies for their admirable efforts in supporting the private placement bond

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[4]   The goals of that study were (1) to assess the feasibility of a major experience study of this kind and the readiness of companies to support it, (2) to generate interest and support for the ongoing study, and (3) to provide information about the credit risk experience of private placements (and commercial mortgages) over the study period.

[5]   In this regard, the Society of Actuaries notes that the company-specific data are the property of the contributing companies while the aggregate data are the property of the Society and cannot be disclosed. However, the Society is prepared to consider research proposals based on the data, so long as the processing is handled by the Society. Any such proposal must be submitted to the Asset Risk Committee, and must be approved by the Society and by the data contributors.

study.

Eight of the eleven companies that contributed data for the 1986-89 period did so for the entire period while the other three did so only for the last two years (1988 and 1989). All ten contributors to the 1990-92 experience provided data for the entire period, and eight of them were also contributors to the 1986-89 period. All but one of the fifteen contributors to the 1993-94 experience provided data for both years, and nine of them were also contributors to the experience of some of the prior years. All seven of the contributors to the 1995-98 experience provided data for the entire period, and they all were also contributors to the experience of some of the prior years. Only four companies had a continuous contribution of data for all years of the study to date. Nevertheless, while data continuity by contributor is not perfect, it is on the whole reasonable. The companies that have contributed data to the four phases of the study to date are:

Contributing Companies Private Placement Bonds					
Company	1986-89	1990-92	1993-94	1995-98	1999-02
Aetna	√	√			
AFLAC			√		
Aid Association for Lutherans			√	√	
Great-West Life		√	√	√	√
John Hancock	√	√	√		
Lincoln National			√		
Lutheran Brotherhood		√	√		
Metropolitan	√	√			
Nationwide	√	√	√	√	√
New England Life	√				
New York Life			√		
Pacific Life					√
Principal Financial	√	√	√	√	√
Providian			√		
Prudential	√	√	√	√	√
ReliaStar	√		√		
SAFECO	√	√	√		
Sun Life	√				
TIAA	√	√	√	√	√
Woodmen Accident & Life			√	√	

In contributing data to the 1990-92 period, one company retroactively contributed data for part of the earlier period. Some contributors to the 1993-94 period also contributed retroactively to various degrees. In addition, the earlier period data of the study were also revised to reflect updated information submitted by contributors to the prior studies.

The total outstanding principal at each year end in the 1986-2002 study is summarized in the following table. By way of comparison, the table also shows the aggregate amount of Private Placements in life insurers' general accounts. Finally, the table shows by year the number of Credit Risk Events in the study along with the exposure associated with them.

Year	TOTAL OUTSTANDING PRIVATE PLACEMENT PRINCIPAL AT YEAR END (BILLIONS)			PRIVATE PLACEMENT CRE DURING YEAR	
	Private Placements Study	Life Insurance Industry General Accounts[*]	%	Number	Outstanding Principal at time of CRE (Millions)
1985	$49.40	$147.50	34%		
1986	$51.80	$153.40	34%	52	$384.30
1987	$58.80	$155.10	38%	57	$469.30
1988	$66.70	$172.90	39%	35	$263.20
1989	$70.90	$195.00	36%	43	$475.50
1990	$88.60	$201.80	44%	50	$683.90
1991	$90.70	$215.10	42%	140	$1,700.20
1992	$90.40	$223.80	40%	106	$1,831.80
1993	$93.70	$235.80	40%	82	$1,134.50
1994	$99.00	$244.80	40%	29	$366.30
1995	$73.80	$256.40	29%	35	$502.10
1996	$76.00	$280.90	27%	24	$334.60
1997	$76.80	$304.30	25%	19	$174.60
1998	$84.00	$336.00	25%	20	$258.8
1999	$93.9	$353.50	27%	42	$620.2
2000	$93.2	$363.40	26%	47	$537.4
2001	$95.7	$392.30	24%	90	$1,444.5
2002	$96.3	$392.80	25%	130	$1,117.0
1986 - 2002				1,001	$12,298.4

[*] Source: ACLI Life Insurers Fact Book, General Account Bond Distribution

The reader may notice that the outstanding principals shown in the table do not agree with the aggregate exposures for the corresponding years in the data summaries section. The explanation is that the exposures in the data summaries section are computed in accordance with the formulae in Appendix I and represent average amounts exposed to credit risk during the calendar year while the figures in the table above are yearend

statistics.

D. Basic Model

The model used for the study was the so called incidence-and-severity model. The study is therefore more like a morbidity study than a mortality study. The underlying concepts are defined in Appendix I. In general, incidence[6] refers to the number of times that an event occurs over a given time period out of all possible occurrences (that is, the probability of occurrence of the event - in the present case a CRE) while severity describes the loss sustained given that the CRE has occurred. Multiplying incidence by severity gives the economic loss per unit exposed. Economic loss is conveniently thought of as the loss in basis points of contractually promised investment return, as a consequence of CREs.

The definition of CRE is broad, capturing all losses from credit risk, with the sole exception of loss from sale after rating deterioration (a "downgrade") that is not so severe as to put the bond on the brink of default. It thus encompasses default, failure to pay, sale to avoid default, restructuring to avoid default and bankruptcy.

For readers familiar with insurance models, the conceptual framework for this study was that of disability insurance. There is a parallel between the life cycle of a disability policy and the life cycle of a bond. Just as a disability policy is underwritten at issue, a bond is underwritten at origination. A policy holder may or may not become disabled while the policy is in force. Likewise, a bond may or may not become impaired. Once disabled, a person may remain disabled long enough to receive disability benefits, or become fully recovered before any benefit becomes payable, or die after a period of disablement. Similarly, once impaired, a bond may remain "ill" and pay off at a lesser rate, or return to a healthy status and pay off at its original rate, or terminate in default.

For disability insurance, various risk factors are used to calculate a premium that is deemed to be commensurate with the risk assumed. For a bond, various risk factors are also taken into account in determining a basis point spread over treasuries at which the bond rate is set.   Just as experience studies on disabilities can help calibrate the associated risk factors, experience studies on credit risk can serve the same purpose.

By collecting a sufficient amount of experience, the study attempts to calculate incidence rates, economic losses, loss severities and portfolio losses and to analyze their relationship to observable risk factors. The intent of the study is to follow the outflow of cash in the form of a loan until repayment is completed, "cash to cash" or "cradle to grave."   Various characteristics can be investigated to determine their relationships to problem investments and to quantify their impacts on credit losses over the life cycle of the investments.

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[6]   Incidence may be measured two ways: by number of bonds and by dollar amount of bonds exposed. Both are computed in the present study.

E. Appendix - Technical Description of Methodology

The Appendix to this report gives the definition of credit risk event, the definitions of date of credit risk event and of date of loss calculation, a summary of the calculation methodology and the data validation procedures used in the study. The summary of the calculation methodology gives detail on the interest rate methodology and the calculation of economic loss, exposure and the loss statistics.

The Appendix also contains a description of the data validation procedures used to ensure, to the best of the Society's ability, that the final "scrubbed" data used to compile the results of the study were of the best quality that could be achieved. Ultimately, however, the Society must rely on the contributors for the accuracy of the data.

F. Revisions to Prior Studies

The current study continues to follow the revised discounting methodology used in the last three reports, which cover the experience through 1998. The attention of the reader is drawn to the fact that the interest rates used to discount the cash flows on CREs (both original and revised) have been refined since the original study. That study used a single rate of discount based on the remaining term of the cash flows (original and revised) and on an overall average assumed spread for all Private Placements varying only by date of occurrence of the CRE. In the current study as in the last study, that spread is varied also on the basis of quality rating at the date of the CRE (for revised cash flows) and original quality rating (for original cash flows) and the discounting of each cash flow element is done at the spot rate applicable to the date of occurrence of that particular element.

The results presented in this study for experience years 1986-98 differ from the last report for three reasons:

1) the updating of cash-flow data by contributors on previously reported CREs,
2) the reporting of CRE and exposure data for prior periods not previously reported by contributors
3) the cleaning up of miscellaneous data problems since the last study.

These changes had almost no impact on results for the experience years of the first study (1986-89) and a small impact on results for the experience years of the second study (1990-92). However, the 1993-94 incidence rate has increased due to a 90% increase in the dollars of CREs in 1993. Offsetting this somewhat was a decline in the loss severity in both 1993 and 1994, but the economic loss for 1993-94 still increased by 20%, from 0.15% to 0.18%. In the latest round of data contributions (1999 through 2002), the classification and reporting of CREs seems to have returned to the pre1993-1994 pattern. The analysis of why the numbers changed from study to study is provided in section H of the Analysis and Commentary section of this report.

Experience Years	Incidence Rate by Amount		Loss Severity		Economic Loss	
	Previous Study	Current Study	Previous Study	Current Study	Previous Study	Current Study
1986-89	0.68%	0.68%	35.2%	35.2%	0.24%	0.24%
1990-92	1.51%	1.51%	35.5%	35.5%	0.54%	0.54%
1993-94	0.79%	0.79%	22.4%	22.1%	0.18%	0.17%
1995-98	0.40%	0.42%	22.1%	23.5%	0.09%	0.10%

G. Limitations of the 1986-2002 Study

Although the Private Placement Committee believes the 1986-2002 study makes a significant contribution to a better understanding of the economic loss resulting from credit risk events, the study has limitations that should be noted to minimize possible misinterpretation and misuse of the results.

The limitations are listed in Appendix III.   The two key limitations that the Private Placement Committee wishes to draw attention to are as follows:

1) Although the Committee devoted extensive and meticulous attention to the "scrubbing" of the data to ensure that they are as clean and reliable as possible, ultimately the quality of the data depends on the contributors and is thus beyond the control of the Committee and of the Society of Actuaries.

2) In particular, the data field that caused the most concern was the original quality rating. In too many cases the information was missing and had to be inferred by a backtracking method that gives rise to the 'earliest' quality rating. The backtracking method is reasonable and carefully undertaken but still potentially hazardous. For that reason, the Committee does not recommend blindly equating the earliest quality rating to the original quality rating at issue. Although the Committee believes the earliest quality rating is a reasonable proxy for rating at issue, certainly it is a noisy proxy.

Notwithstanding the limitations of the study, the Private Placement Committee believes that the results are reliable overall and constitute a meaningful addition to the understanding of the behavior of credit risk with respect to Private Placements.

H. Use of the Results

The data and data processing limitations identified in Appendix III suggest that the results of this study need to be interpreted and used with great care. One should not over-rely on

the absolute magnitude of these results. They inevitably reflect market and economic conditions of the period in question. Even though the study now encompasses roughly two full economic cycles, much of the value of the 1986-2002 study lies in assessing the relative significance of identifiable risk factors. The approach of the study is an empirical one through the pooling of intercompany data using consistent definitions.

While not directly displayed in the interest of confidentiality, the variability of results by company suggests that material differences may exist in company risk tolerance standards and perhaps risk assessments. The large variability of results by year for the same company is not surprising for a low-incidence, potentially high-severity occurrence.

For those involved in product pricing, reserving and setting investment risk margins, the trends and patterns of the results can provide a basis for comparison with assumptions currently being used, keeping in mind of course the variability of these results. Ultimately, it is anticipated that detailed results by asset type and asset characteristic will be useful in models in a manner similar to how companies often use the intercompany mortality and morbidity data.

For those involved in developing and managing investment portfolios, the trends and patterns can assist in providing a better understanding of how various asset characteristics impact risk and, ultimately, how to set risk premiums.

An important caution to users of the study is to note that, generally, contributors to the study possess substantial private placement portfolios and expertise in underwriting of new offerings, monitoring theirs portfolios and working out troubled assets. Companies not possessing such expertise should not necessarily expect to achieve similar results.

For the Private Placement Committee (supported by the Research Committee), the trends and patterns observed frequently suggest new perspectives for analysis and new insights, as well as more efficient ways of collecting data in future. If there is sufficient interest and demand for it, additional types of data elements may be included in the study. The Committee is pleased to receive comments, suggestions or feedback on any aspect of its work and on the study.

I. Future Plans

The Private Placement Committee continues to strive for timely data collection, and updating reports, subject to co-operation from contributing companies. Those reports will not only present the new and updated previous experience but will also contain analyses of various aspects and characteristics that the Committee and/or the contributing companies find of interest. Currently, the Committee is in the process of planning for the collection of data for 2003 through 2005.

The value of future studies will depend in large measure on the willingness of companies active in the private placement market to participate by sharing their data. The larger,

more representative the data base, the more reliable and valuable the results are. The Private Placement Committee and the Asset Risk Committee wish to express their gratitude and appreciation to the participants in the current study and strongly encourage participation by companies not yet doing so.

Extra benefits of participation include early feedback on the participant's own experience and its comparison to the experience of all participants as well as the indirect systems and data audit obtained through the data scrubbing efforts of the study.

III. ANALYSIS AND COMMENTARY

A. Introduction

This section presents and discusses the major results of the study and also compares the credit risk experience of private placements to that of publicly issued corporate bonds. There is some (but not complete) overlap between the results presented in this section and those appearing in sections IV and V. Section V features limited text but detailed tables and charts giving breakdowns of experience by year and other variables of interest (for example, experience by NAIC rating and year). Section IV includes some cross tabulations and analysis, with particular attention to effects of bond seasoning on credit losses and the relationship between coupon interest rates and credit risk event (CRE) rates. Results appearing *only* in sections IV and V include credit risk experience by original coupon rate and years to maturity. Where there is overlap, the most detailed tables usually appear in sections IV and V.

The main statistics reported in this study, the definitions of which are summarized in Table 1,
differ somewhat from the default and recovery rate statistics that are familiar from studies of default and loss on publicly issued corporate bonds. Such studies typically compute default rates as the number of bonds (or bond issuers) appearing in a given cell that default over some period of time, divided by the total number in the cell. For example, a cell might include all A-rated bonds outstanding at the beginning of 1985. Loss severity rates (loss-given-default) are typically the weighted-average difference between the post-default trading prices and the face values of defaulted bonds, perhaps with something added for lost interest. Because trading price data are often unavailable, it is rarely possible to compute default and severity rates for the exact same set of public bond defaults. This places some limitations on the computation and interpretation of overall economic loss rates for public bonds. Such loss rates typically are estimated by multiplying default rates and some average severity rate.

In this study, individual bond loss severities are the difference between the net present value of the pre- and post-CRE contract cash flows, divided by the principal outstanding at the time of the CRE (and with an adjustment for market vs. book value differences; see Appendix I).[7] Severities are available for *every* CRE, making it possible to compute consistent economic loss rates for any subsample and to partition the loss into incidence and loss severity components. Incidence rates reported in this study are conceptually similar to weighted-average one-year default rates on public bonds, but CREs include certain restructurings and sales of distressed assets, so the definition is broader than a pure default rate.

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[7]   Such statistics are economically similar to public bond loss severities if the market for distressed public bonds is very efficient and if risk premiums demanded in that market are similar to those in other markets. In that case, the post-default bond trading prices may be viewed as estimates of the discounted value of recoverable cash flows. Efficiency of the distressed debt market and risk premiums therein are open questions.

As described in subsection D below, results largely represent experience for traditional private placements, but an increasing share of private placement portfolios is asset-backed securities.

Table 1 - Brief Definitions of Primary Statistics (see Appendix I for details)

Statistic	Definition	Comments
Incidence Rate By Number	Number of assets experiencing CREs divided by number exposed (roughly, the latter is the sum of the number in the cell at the start of each year; see Appendix 1 for handling of maturities and originations within the year).	Like an average of one-year default rates, but CREs include restructurings and distress sales as well as defaults.
Incidence Rate By Amount	Outstanding principal of assets experiencing CREs, divided by total principal exposed (roughly, the latter is the sum of the principal outstanding for the cell).	Similar to incidence by number, but based on dollar amounts.
Loss Severity	The sum of dollar economic losses on assets experiencing CREs divided by the sum of principal outstanding on those assets. Economic losses for each CRE are measured as the difference in net present values of original and revised contract cash flows, multiplied by the ratio of principal outstanding to the present value of original cash flows. The latter ratio is applied in order to place economic loss on a book-value basis.	Sometimes called the loss-given-default rate. Same as (1- recovery rate).
Economic Loss Rate	The product of loss severity and incidence rate by amount for a cell. Equivalently, the sum of dollar economic losses for a cell divided by total principal exposed in the cell.	The average annual percentage loss resulting from CREs in the cell being analyzed.

A cell can be any subset of the data, for example all A-rated assets, or the aggregate sample. See Appendix I for the full definition of a CRE and for definitions of the statistics.

B. Notable Changes in Results in Comparison to the 1986-98 Study

Relative to the 1986-98 Credit Risk Loss Experience Study: Private Placement Bonds, this edition of the study features four additional years of experience data (1999-2002) and revisions to data for experience years 1986-98, especially CRE-related data. Revisions stem from receipt of updated cash flow information for some CREs as well as additional cleaning of the data completed since the last round of the study. In general, material changes in overall results from one round of the study to the next are associated far more with the addition of new years of data and with changes in the mix of contributors than

with revisions of previously contributed data.[8]

As shown in Figure 1 and discussed further below, the period 1999-2002 included a recession and years of elevated loss rates for corporate debt, similar to 1991-92. The years covered by the study now arguably cover almost two complete credit cycles, including the years of peak credit losses. Taking 1986-92 as the first cycle[9] and 1993-2002 as the second, the aggregate economic loss rates for the two cycles were 0.40 percent and 0.26 percent, respectively. However, the second period is longer and includes a larger number of non-recession years. If the first cycle is measured over the years 1986-95, the measured economic loss rate is 0.32 percent. More generally, average loss rates over any given credit cycle will depend on the severity of debt distress during the downturn phase and on the proportions of downturn and good years in the cycle. The larger the number of good years relative to downturn years in any given cycle, the lower the incidence and loss rates are likely to be.

Thus, although we present average incidence and economic loss rates for the full sample period 1986-2002, these are likely to be representative only of experience during hypothetical average credit cycles of similar duration and amplitude to the two present in this study's data. Readers believing that the average credit cycle (or the next one) will have a smaller or larger proportion of downturn years may calculate alternative average rates by, for example, omitting selected experience years from calculations. The data summary tables in Section V present sufficiently detailed information by year to support calculation of accurate weighted average rates for any combination of years.
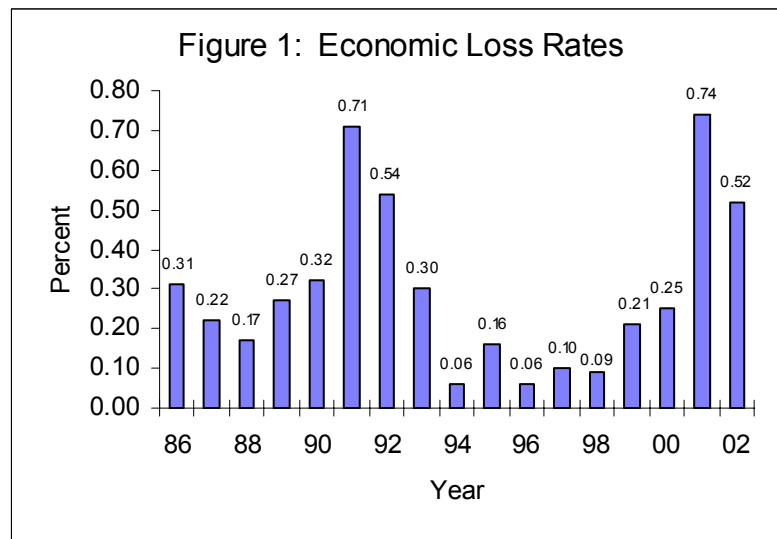
Figure 1: Economic Loss Rates

The average loss severity during both periods (1993-2002 and 1986-92) was 35 percent. However, relative to the first cycle, in the second cycle loss severities were lower during the good years and higher during the bad years. Severities on defaulted public bonds display a similar time pattern, suggesting an increased cyclicality of loss severities, but

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8   Results in this report differ from those in the 1986-98 study mainly for the years 1994 and 1998. Incidence, severity, and loss rates in those years are slightly affected by revisions to some previously reported CRE cash flows and by some newly reported CREs.

9   We take the beginning of the first cycle as 1986 because that is the first year in respect of which we collected data.

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changes in data reporting patterns and in the type of assets in private placement portfolios are also partly responsible. These changes have little effect on economic loss rates, but after they are taken into account severities appear less cyclical. This issue is discussed in more detail in subsection H below.

The share of asset-backed private placements was high enough in the later years of the study to support a comparison of loss statistics for traditional privates and asset-backed privates, which appears in subsection G. Severities were higher on asset-backed CREs, but the incidence rate for asset-backed securities was smaller, leading to a somewhat lower economic loss rate.

C. Aggregate Private Placement Experience Over Time

Annual percentage loss rates appear in Figure 1 (in 1986, for example, the aggregate of participating company portfolios lost about 31 cents per $100 invested, or 0.31 percent, or 31 basis points). The economic loss rates on the aggregate sample private placement portfolio were 0.62 percent during both sets of peak loss years 1991-92 and 2001-2002. These rates were more than double the rate for 1986-90 (0.26 percent) and almost five times the rate for the relatively low-loss years 1994-2000 (0.14 percent). The economic loss rate over all years in the sample was 0.31 percent, close to the simple mean of annual economic loss rates (0.30 percent). The peaks in loss rates in the early 1990s and the early 2000s were at about the same time as the large volume of defaults in corporate debt markets generally.

Figure 2. CRE Incidence Rates

Economic loss rates rose in 1991-92 and 2001-2002 mostly because incidence rates rose. Figure 2 displays incidence rates computed both as the number of assets experiencing Credit Risk Events (CREs) relative to the total number exposed and as the dollar volume experiencing CREs relative to the total amount exposed. Incidence by dollar amount is higher than that by number in most years (though often not by much), indicating that assets experiencing CREs had larger than average dollar amounts outstanding. Average loss severities by year, which appear in Figure 3, give an impression

Figure 3: Loss Severities

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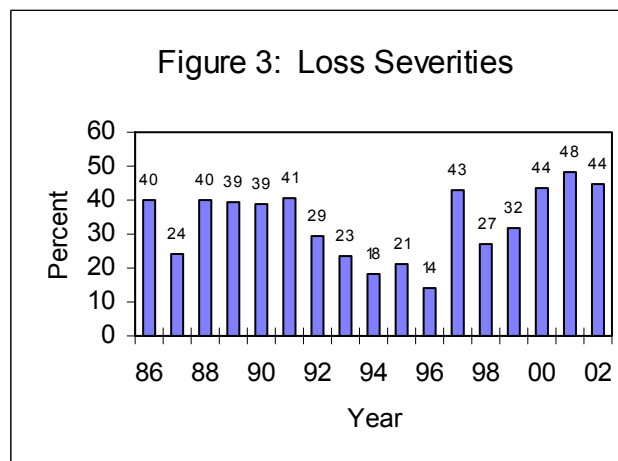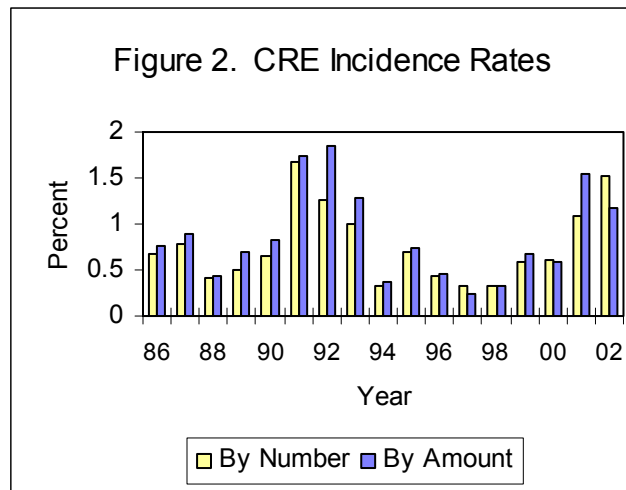
of cyclical variation in severities because severities were materially lower during 1993-96 and 1998-99 than in other years. However, a temporary increase in reporting of very low-severity CREs during those years is partly responsible (such CREs increase incidence rates and reduce average severities, leaving economic loss rates almost unchanged). This issue is discussed further below.

Severities for individual bonds are rather dispersed, as shown in Figure 4, which displays the distribution for all CREs. Experience with private placements in this regard is rather similar to public bond experience, as public bond severities are also widely distributed.[10] However, the significant fraction of negative severities displayed in Figure 4 is atypical of public bonds (111 of 1001 assets experiencing CREs had recoveries greater than 100 percent and thus these CREs yielded gains, though most such gains were small). The present value of post-CRE private placement cash flows can exceed the pre-CRE present value mainly because the post-CRE coupon rate, amount to be repaid, or amortization schedule differ from pre-CRE values. For example, after a workout or restructuring many of the revised cash flows for an asset might occur earlier than the originally scheduled cash flows and, after discounting, the revised cash flows might therefore have a larger net present value than the original cash flows (especially if the discount rates are similar and the total nominal amount of the revised cash flows is not too much smaller than the nominal total of original cash flows). Although some negative severities may be due to data errors, those CREs having negative severities were audited especially closely, and thus in general such CREs likely did result in a genuine economic gain to the investor.[11]

Figure 4: Distribution of Loss Severities, All CREs

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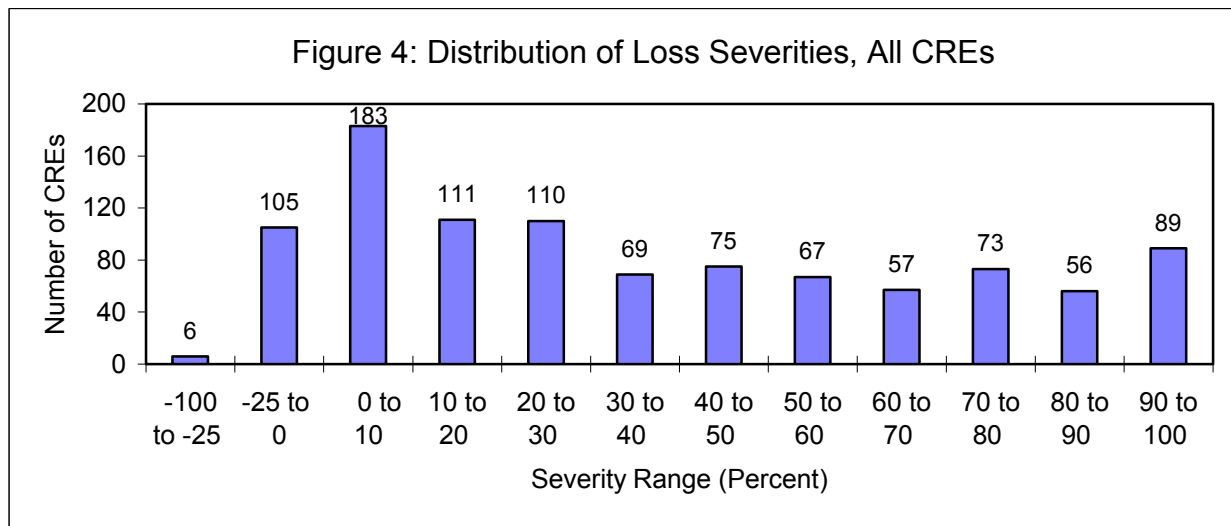
[10] See "Debt Recoveries for Corporate Bankruptcies," Moody's Investors Service, June 1999, Exhibit 9.

[11] We dropped from the study one 1987 CRE that was very large in terms of amount outstanding at the time of the CRE and that involved a moderate gain to the investor (loss severity about -10 percent); this CRE was also omitted from most computations in previous rounds of the study.

D. Characteristics of the Aggregate Private Placement Portfolio

This subsection provides some descriptive statistics that may be useful as background for interpreting results. All the percentages in this subsection refer to numbers of exposed assets (not dollars). Unless otherwise noted, percentages are of the reported values only (observations with unreported values of the given variable are omitted from calculations). Statistics for some variables are reported only for years beginning with 1995 because such variables were not collected for earlier years.

To summarize, the typical asset in contributors' portfolios continues to be a traditional private placement: dollar-denominated, non-Rule 144A, investment-grade senior straight debt from a U.S. issuer.

About 96 percent of assets are acquired at origination (rather than in the secondary market) with no trend. Over 99 percent of assets are denominated in dollars, and 85 to 90 percent are from U.S. issuers. Somewhat surprisingly, the share of U.S. issuers actually increased during 1995-2002, with European and Canadian issuers' shares falling during these years (on average, the latter represented 9 and 2 percent of assets, respectively).

Figure 5 displays the distribution of asset types during 1995-2002. The trend during those years (trends not shown in Figure 5) was toward more asset-backed securities (which increased from 13 percent of the total number of assets in 1995 to 23 percent in 2002) while conventional mortgage bonds and equipment trust securities ("Mortgage Etc." in Figure 5) fell from 10

Figure 5. Asset Types

Credit Tenant 5%
Leases 3%
Other 2%
Mortgage Etc. 6%
Asset Backed 19%
Notes Bonds Etc. 65%

percent of the total number in 1995 to 3 percent in 2002 (but some among the companies that stopped participating in the study after 1998 had larger-than-average portfolio weights on mortgages and equipment trust certificates; if these companies are omitted, the drop is from 7 to 3 percent). The share of credit-tenant loans fell steadily, from about 7 percent in 1995 to about 4 percent in 2002. The share of straight debt (notes, bonds, and debentures) stayed about the same, rising from 64 to 66 percent. Most of the "Other" category is reported as "Other non-asset-backed securities" by contributing companies. Bank-like term loans and lines of credit appear in the "other" category but represent only about 1 percent of the number of all assets. They may be under-reported relative to their actual share.[12] Loss experience by asset type is described in subsection G below.
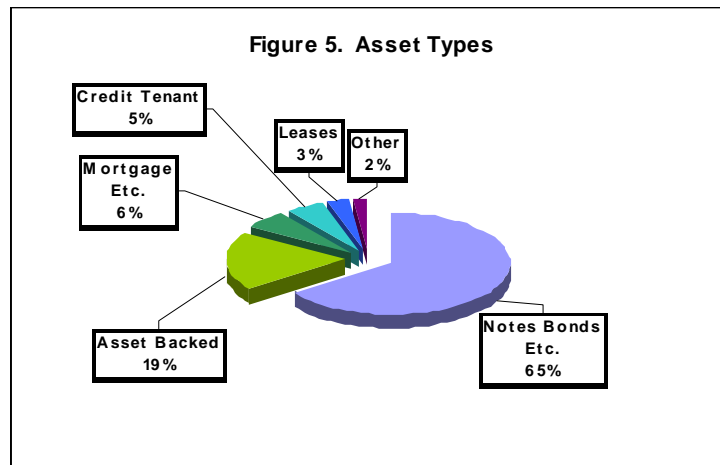
Use of proceeds was generally reported as "unknown" and, where reported, was usually

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[12] The "Other" category also includes credit-tenant loans, leases, and project-finance debt

"general corporate purposes" or "debt repayment."

Private placements continue to be predominantly long-term, fixed-rate investments. The median original years to maturity and the median average life were 12 and 8.7 years, respectively, for the whole period 1986-2002. 90 percent carried fixed interest rates and 9 percent variable rates, with a sprinkling of zero-coupon instruments. Less than 3 percent of assets reportedly had equity kickers (such as warrants or convertibility features). There was a modest trend toward shorter maturities: During 1986-89, median original maturities and average lives were 15 and 9.4 years, respectively, whereas during 1999-2002 medians were 10 and 8.7 years, respectively.

Rule 144A, which facilitates trading of qualifying placements among institutional investors, was adopted by the SEC in April 1990, but the number of outstanding 144A issues was not significant during the early 1990s. As time passed and the market developed, two kinds of 144A securities became common: 1) Those with registration rights, which tend to be similar to publicly issued bonds, are marketed to public-market investors, and which routinely are registered by the issuer, usually during the first year after issuance; and 2) Those with language in their documentation that facilitates trading using the 144A exemption, but without registration rights. In the years after 1994, 144As with registration rights represented about 6 percent of contributors' private placement assets, whereas 144As without rights rose from 6 to 17 percent of assets during those years. The growing disparity may reflect an increasing administrative tendency on the part of insurance companies to place 144As with registration rights into their public-bond portfolios immediately upon acquisition.[13]

Based on contributors' most recent internal ratings, their private placement portfolios are predominantly investment-grade, as shown in Figure 6 for all the year-ends 1986-2002. Omitting amounts in the N.R. (not reported) category, 86 percent of exposures by number and 90 percent by amount are rated BBB or better. As discussed below, results for the NR category are a bit worse than results overall, but

Figure 6: Distribution of Exposures by Most Recent Internal Rating

not enough to raise major concerns about bias from the existence of a substantial volume of unrated private placements.
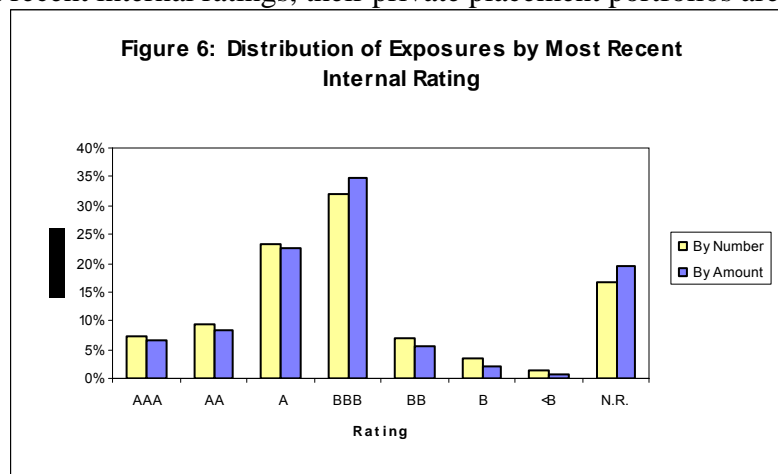
Overall during 1990-2002, about 20 to 30 percent of private exposures were subordinated

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[13]   144A status is unknown for most CREs. No CREs were reported to be 144As with registration rights, and only three were reported as other 144As. More years of data are needed before inferences can be made about the relationship between 144A status and credit incidence and loss rates.

(with the remainder senior) and half to two-thirds were unsecured. These fractions are hard to measure with confidence because secured and senior status often are unreported, especially for earlier years. Moreover, changes in the types of assets appearing in portfolios influence the average economic seniority of contributing companies' portfolio assets (for example, seniority of asset-backed securities is determined largely by tranche position, not by conventional subordination).

Figure 7: Economic Loss Rates By Most Recent Internal Rating
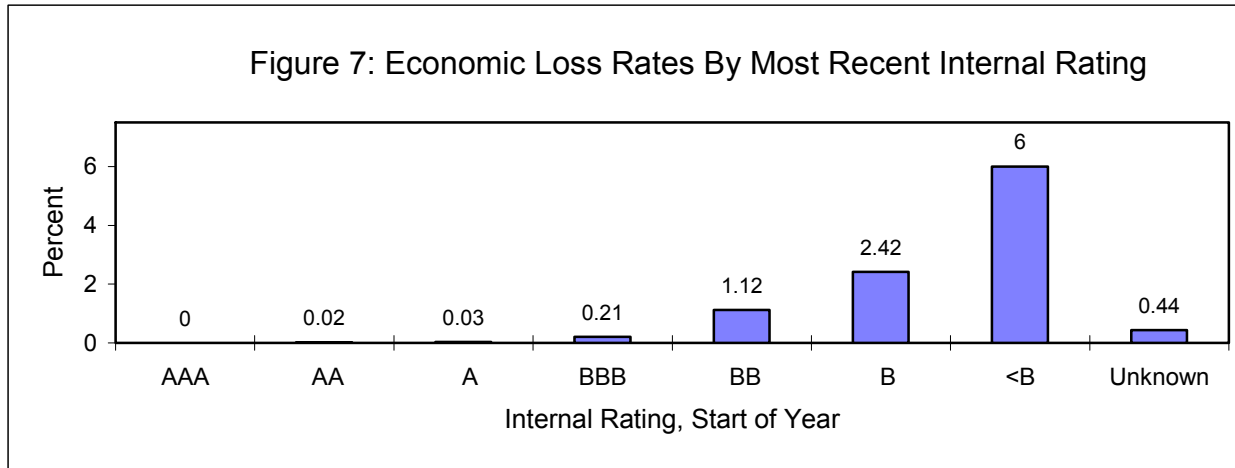
E. Experience By the Investor's Most Recent Internal Credit Risk Rating

Losses are more likely on speculative-grade bonds than on highly-rated bonds. Although the major rating agencies rarely rated private placements until the early 1990s, most sample placements were rated by the National Association of Insurance Commissioners' (NAIC) Securities Valuation Office (SVO). Most insurance companies participating in this study also routinely produced internal ratings of private placements in their portfolio. The latter ratings were reported on a scale comparable to S&P's and Moody's.

Experience by most recent internal rating (that is, rating as of the start of each year) is summarized in Table 2 and Figure 7. Average incidence and economic loss rates were low for assets with the

Table 2. Experience By Most Recent Internal Rating (percent)

Rating	Incidence Rate		Loss Severity	Economic Loss Rate
	By Number	By Amount		
AAA	n.c. %	n.c. %	n.c. %	n.c. %
AA	0.06	0.06	33	0.02
A	0.09	0.10	26	0.03
BBB	0.52	0.59	35	0.21
BB	2.78	3.81	29	1.12
B	4.24	6.28	39	2.42
<B	6.21	11.67	51	6.00
Unknown	0.97	1.31	34	0.44
All	0.78	0.89	35	0.31

n.c. means no CREs

equivalent of investment-grade ratings (AAA through BBB) during the period 1986-2002 but rose steeply in the speculative grades. There is some apparent tendency for below-

investment-grade assets to experience larger severities, which may occur because severities are larger for subordinated debt and such debt tends to be rated below investment grade (an examination of average severities by grade for senior debt alone revealed higher severities only for the <B grade). The effect of seniority on severities is discussed in the next subsection (under the subtitle "Loss Severities").

F. Comparison With Public Bond Experience

This study's comparison of private placement experience with that for publicly issued corporate bonds has four motivations (no public-market government or agency issues are included in this study's calculations). First, studies of public bond defaults have influenced most people's intuition about corporate debt credit risk, perhaps due to the lack of information about other assets. Public bond experience thus provides a useful benchmark. Second, although private placements are similar to public bonds in some respects (generally fixed-rate and often fairly long term to maturity, for example), privates are widely viewed as offering additional protections and value to investors. Although this study does not pretend to provide a complete analysis of sources of incremental value, some light is shed on the subject. Third, regulatory and rating agency treatment of private placements (such as risk-based capital requirements) has been based largely on public bond default experience. To the extent that private placement experience differs, a comparison may be a useful input. Finally, the analysis supports an assessment of the credibility of internal ratings of private placements. This issue is not wholly separable from the rest because, for example, a lower default rate on private placements for a given rating might be attributed to overly conservative ratings of privates by investors or to superior structuring and management relative to public bonds.

Summary of Comparative Loss Rates

It is helpful to set the tone by presenting some overall results before turning to details because a number of technical factors complicate the analysis. Table 3 presents various estimates of public bond and private placement economic loss rates (drawn or computed from entries in Tables 4 and 5 below). During 1986-2002, publicly issued corporate bonds rated AAA-CCC lost an average of about 116 basis points (bps) or 1.16 percent annually through default whereas sample private placements lost about 31 bps annually. Part of this substantial difference is due to portfolio quality differences---more sample privates than publics were in the investment grades. The second row of Table 3 shows the estimated loss rate for a portfolio of public bonds with the same start-of-year rating distribution as the private sample (67 bps), whereas the third row shows the estimated private loss rate for a portfolio of privates with the same rating distribution as publics (70 bps). The public-private loss difference is not the same in these two cases because estimated default rates differ by rating across the two markets, but in each case the public loss rate is larger.[14]

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[14] Loss rate differences in rows 2-4 of Table 3 are not precisely estimates of the difference per dollar invested. In rows 3 and 4 the statistics are based on distributions of numbers of issuers, not dollar volumes outstanding, so any cross-market differences in the rating distributions of dollars versus

The better overall loss experience of privates is largely due to their better average loss severity, which is around 35 percent, whereas the average public loss severity is over 60 percent. In row 4 of Table 3, the private loss estimate is on the same basis as row 3 but the public estimate is based on an assumed loss severity of 35 percent. This reduces the public loss rate to 67 bps, about the same as the private rate. Reasons for differences in loss

Table 3. Various Estimates of Private and Public Economic Loss (basis points)

Basis	Economic Loss		
	Public	Private	Difference
Aggregate unadjusted	116 bps	31 bps	85 bps
Public estimated based on private sample quality distribution	67	31	36
Private estimated based on public sample quality distribution	116	70	46
Memo: Private estimated based on public sample quality distribution, public estimated using private loss severity	67	70	-3

experience are discussed in more detail below---better severities are not the whole story.

On the whole, the statistics in Table 3 probably understate the superior loss experience of privates relative to publics. There are many reasons to question the comparability of the estimates, including that loss rates on publicly issued bonds are computed using an assumed loss severity for such bonds that is better than the historical average severity for the sample period. Thus, the estimates may understate losses on all publicly issued bonds.

Background for the Analysis of Default Rates
This study's incidence rate by number statistics are calculated in a manner that makes them comparable to public bond one-year default rates (see Table 1), but a number of technical problems must be addressed to achieve a clean comparison. Most public bond default studies analyze defaults aggregated by *issuer*, whereas this study usually analyzes incidence at the level of individual *assets* on contributing company balance sheets. The distinction is relevant only for incidence rates by number---statistics on incidence by amount, loss severity and economic loss are invariant to the level of aggregation. For maximum comparability, incidence rates by number for private placements on an issuer

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numbers outstanding would alter market-portfolio loss differences. Unfortunately, dollar outstandings by rating are not available for public bonds. In row 2, the private statistic is effectively dollar-volume-weighted because it is this study's standard economic loss statistic, whereas the public statistic is based on number of issuers. If public bonds behave the same way as private placements (incidence by amount is higher than incidence by number), then row 2 would tend to understate the differences in loss experience between the two markets whereas results in rows 3 and 4 would not be subject to this source of bias.

basis are shown below.[15]   Because one company contributed data for a few years in a manner that did not allow identification of issuers, however, that company's data for those years was not included in this part of the analysis.

Moreover, CREs include restructurings and asset sales done to avoid or minimize (further) losses whereas public bond studies focus purely on defaults. Such a focus is practical, as negotiated restructurings are rarely seen in the public market and credit-related sales would be impossible to track.[16] The approach taken here is to present incidence statistics for privates both with and without restructurings and asset sales---the two sets of results should bracket the "true" comparable values.[17]

For comparison with private incidence rates, one-year average default rates computed from data from S&P and Moody's are presented. To promote comparability, default rate "calculator" software available from the two rating agencies was used to compute public bond statistics for the same time period covered by this study (1986-2002) and, where relevant, various sub-periods. Included in the data underlying the statistics are all non-sovereign corporate bonds for all industries and regions in the respective rating agencies' data bases. [18,19] Throughout Section IV, if public bond default or loss rates are not

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[15]   Although issuers are not identified by name in this study's data, each asset is identified by a Private Placement Number (PPN) or CUSIP number. These identifiers are structured similarly (both are assigned by the CUSIP Service Bureau), with the first six characters identifying the issuer. Thus, assets can be aggregated by issuer across company portfolios at each year-end.

[16]   Although distressed exchanges do occur in the public market, they are relatively infrequent and often different in character from private placement restructurings.

[17]   On the surface, only identical events should be compared, but a primary reason for private placement restructurings and sales is that a default would be likely in their absence, and such a default would be more costly to the investor than the restructuring or sale. Restructurings are rare in the public market because they are infeasible when bonds are held by more than a few investors. If restructurings were feasible, public default and loss severity rates would likely be lower, as some defaults could be prevented through restructuring. Similarly, some investors prefer to sell to distressed debt specialists rather than maintain the staff to handle workouts themselves. Failure to include the losses such investors incur might bias the private estimates. Thus, results are presented both ways.

[18]   The rating agency all-corporate default rates by year shown in Table 4 differ slightly from those shown in previous editions of this study because of minor changes by the rating agencies in their methods and data bases.

[19]   Two additional technical problems involve the definitions of exposure and of an issuer rating. With respect to exposure, in this study an asset is generally treated as fully exposed to loss only if it is on the books at both the beginning and end of a year (a half unit of exposure is assigned if it is on the books at either the beginning or end). Public bond studies typically consider only presence on the books at the start of a year, so the latter method was used in conducting this section's exercise. In addition to altering exposure numbers somewhat, ten CREs were dropped from the analysis in this section because they occurred during the calendar year of funding of an asset and thus would not have been captured in a typical public bond study. With regard to rating, in their studies the rating agencies use "issuer" ratings that correspond to ratings on senior debt. If none of an issuer's senior debt is rated, the agencies usually infer such a rating by adding one or two notches to the rating of the issuer's subordinated debt (for example, an A- sub rating translates into an A issuer rating). We do not have enough information about seniority of placements to replicate the agencies' method. Moreover, in this study's data, internal ratings of the same issue can differ across investors. For this subsection's analysis only, where a given

broken out by rating agency, the numbers are based on a simple arithmetic average of

Table 4 - Experience At the Asset and Issuer Levels

Year	A: Private Placement Statistics By Asset, All CRE Types			B: Private Placement Statistics By Issuer All CRE Types			C: Public Bond Statistics Default Rate		Average Loss Rate*	
	Number of CREs	Incidence By Number	Economic Loss Rate	Number of CREs	Incidence By Number	Economic Loss Rate	S&P	Moody's	S&P	Moody
86	41	0.59%	0.34%	31	0.85%	0.34%	1.83%	1.92%	1.10%	1.15%
87	56	0.87	0.25	37	1.07	0.25	0.93	1.51	0.56	0.91
88	30	0.39	0.14	22	0.57	0.14	1.54	1.37	0.92	0.82
89	40	0.51	0.25	33	0.81	0.25	1.80	2.27	1.08	1.36
90	50	0.66	0.32	35	0.98	0.32	2.72	3.64	1.63	2.18
91	139	1.66	0.70	92	2.30	0.70	3.15	3.28	1.89	1.97
92	105	1.24	0.53	77	2.09	0.53	1.36	1.33	0.82	0.80
93	81	0.97	0.29	55	1.52	0.29	0.54	0.95	0.32	0.57
94	29	0.32	0.06	20	0.54	0.06	0.59	0.57	0.35	0.34
95	35	0.69	0.16	18	0.81	0.16	0.95	1.04	0.57	0.62
96	24	0.43	0.06	19	0.75	0.06	0.49	0.52	0.29	0.31
97	19	0.33	0.10	9	0.35	0.10	0.57	0.63	0.34	0.38
98	20	0.32	0.09	13	0.50	0.09	1.28	1.24	0.77	0.74
99	41	0.57	0.21	26	0.87	0.21	2.30	2.15	1.38	1.29
00	46	0.59	0.25	30	0.93	0.25	2.36	2.41	1.42	1.45
01	88	1.07	0.64	56	1.76	0.64	3.89	3.80	2.33	2.28
02	128	1.50	0.51	79	2.39	0.51	3.77	3.01	2.26	1.81
All	**972**	**0.78**	**0.31**	**652**	**1.16**	**0.31**	**1.92**	**1.95**	**1.15**	**1.17**

The total number of CREs in Panel A is 972 rather than 1001 because certain company-years of data were omitted from this part of the analysis due to problems of issuer identification, as noted more fully in the text.
* Public bond average loss rate estimated as S&P or Moody's default rate times an assumed 60% loss severity.

Moody's and S&P's default rates for the given grade and/or year.

Results for incidence rates and economic loss

Panels A and B of Table 4 compare annual private placement incidence rates on an individual asset basis and on an issuer basis. The results in Panel A are not quite the same as those shown elsewhere for the reasons noted above. In every year, issuer incidence rates are larger than the by-asset rates, although the general pattern of incidence rates more than doubling in 1991-92 still appears (simple averages are 1986-90 0.85 percent; 1991-92 2.20 percent; 1993-2000 0.81 percent, 2001-2002 2.08 percent). Consolidation to the issuer level resulted in fewer issuer-level CREs than asset-level CREs in each year, but the number of issuers with exposure was reduced proportionately

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issuer had placements outstanding with different ratings, we used the better rating unless the difference was more than one full grade, in which case a value of 'unknown' was assigned.

more relative to the number of assets exposed. Economic loss rates are the same in the two panels because, as noted, they are invariant to the choice of asset vs. issuer level of analysis.

Panel C of Table 4 shows public bond default rates derived from S&P's and Moody's default rate calculators and an estimate of associated economic loss rates. The latter were computed by multiplying the agency default rates by an assumed constant public bond loss severity of 60 percent, which was close to the overall average severity reported in many studies by Altman, but very high public bond severities during 2000-2002 pushed the average for 1986-2002 up to 66 percent. Thus, the public bond loss rates shown in Table 4 (and in Table 5 below) tend to understate the advantage of private placements.[20]

Estimated private placement economic loss rates are lower than public rates in every year and on average, and Panel B private incidence rates are lower than the average of Moody's and S&P's default rates in all but three years (Panel A incidence rates are lower in all but one year).

In comparing private and public incidence rates, it is important to note that the quality distribution of private placements across ratings differs substantially from the distribution in the public market, as shown in Figure 8.[21] Proportions are similar for assets rated A and above, but there are proportionately more BBB-rated privates versus more BB and B-rated publics. Because default rates are higher on the latter, private placements naturally should have a lower incidence rate than publicly issued bonds on average. An examination of rates by rating category is therefore helpful.

Incidence and loss rates by most recent internal rating for privates and agency ratings for publics appear in panel A of Table 5. These are weighted-average one-year rates averaged over 1986-2002. Panel 1 (the first three columns of Table 5 after the "Most Recent Rating" column) shows private placement statistics when all CREs are included, Panel 2 such statistics when only private defaults are included, and Panel 3 shows public bond default and loss rates. Private incidence rates are of course smaller when only defaults are included, and proportionately rather substantially so (by a bit less than one-third).

Private placement incidence rates are higher than public bond default rates for all but the B and <B grades. Comparing Panels 2 and 3 of Panel A, for the investment grades the incidence rate differences are in the range 0.03 to 0.20 percentage points, which is absolutely rather small but proportionately substantial. For the BB category, the private placement default rate is about one percentage point higher. The private default rate is

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[20] Average loss severities on publicly issued bonds vary from year to year, so the time variation in economic loss rates on publicly issued bonds may be larger than shown in Table 4. The most recent Altman study used in this study is Altman, Edward I., "Altman Report on Defaults and Returns for High Yield Bonds" (New York University Salomon Center), February, 2003.

[21] The public distribution is the fraction of rated obligors in each Moody's/S&P grade, using combined data for both agencies for 1986-2002, taken from output of Moody's and S&P's default rate calculator software.

more than 2 percentage points lower for B, and more than 19 percentage points less for bonds rated less than B.[22]

Figure 8. Distributions of Numbers of Privates and Publics by Rating
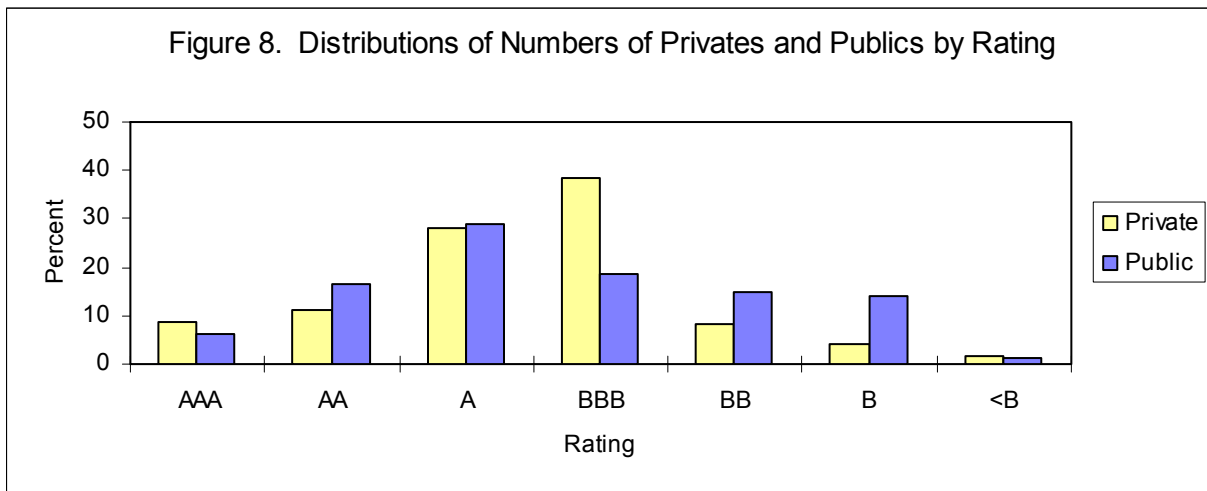
Although incidence rates are higher, better severities make private placement economic loss rates about the same as public bond economic losses in the investment grades and BB (the far right column in Table 5 reports estimated public bond loss rates, calculated as the agency default rate times an average loss severity of 60 percent). Again focusing on Panels 2 and 3, private economic loss rates are much better for assets rated B or riskier.

Panels B though D of Table 5 compare public and private experience by most recent internal rating for three subperiods: 1986-92, 1993-2002, and 1999-2002. Panel D is included because it covers the years newly added to the study, but Panels B and C are perhaps of more general interest because each arguably covers much of a credit cycle. The overall economic loss rate was larger at 0.41 percent during 1986-1992 (versus 0.25 percent for 1993-2002). Public bond loss rates were also larger during the earlier period if S&P's and Moody's results are averaged. However, as noted previously, the two periods include unequal numbers of years and the earlier period has a larger proportion of bad years. The pattern of similar loss rates for grades AAA though BB, but better loss rates on privates for lower grades, is evident for both credit cycles.

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[22] The next-to-last row of Panel A in Table 5 reports statistics for sample private placements for which no internal rating was reported. These account for 25 percent of private exposure units. Incidence and loss rates for the unknown-rating pool are somewhat higher than the overall average (in which they are included), so their credit quality distribution must be somewhat more concentrated in the below-investment grades than the remainder of the sample. The unknown-rating pool was not included in Figure 8, which therefore slightly understates the proportion of all privates that is below investment grade. Omission of the unknown category does not bias the comparisons in the second through fourth rows of Table 3, however.

Table 5 - Public vs. Private Experience In Detail

Most Recent Rating	1: Private Placement Statistics By Issuer, All CRE Types			2: Private Placement Statistics By Issuer, Defaults Only			3: Public Bond Statistics* Default Rate		Average. Loss Rate	
	Number of CREs	Incidence By Number	Economic Loss Rate	Number of CREs	Incidence By Number	Economic Loss Rate	S&P	Moody's	S&P	Moody
Panel A: All Years										
AAA	1	0.03%	0.01%	1	0.03%	0.01%	0.00%	0.00%	0.00%	0.00%
AA	4	0.08	0.04	3	0.06	0.03	0.01	0.00	0.01	0.00
A	23	0.18	0.02	16	0.13	0.02	0.05	0.03	0.03	0.02
BBB	127	0.70	0.23	88	0.48	0.19	0.35	0.28	0.21	0.17
BB	161	3.88	1.23	104	2.50	0.89	1.43	1.41	0.86	0.85
B	113	5.89	3.36	88	4.59	2.83	7.06	6.51	4.23	3.91
<B	54	6.14	4.96	39	4.43	3.23	35.34	23.63	21.20	14.18
Unknown	169	1.59	0.41	115	1.08	0.27	n.a.	n.a.	n.a.	n.a.
All	**652**	**1.16**	**0.31**	**454**	**0.81**	**0.23**	**1.92**	**1.95**	**1.15**	**1.17**
Panel B: 1986-1992										
AAA	0	n.c.%	n.c.%	0	n.c.%	n.c.%	0.00%	0.00%	0.00%	0.00%
AA	3	0.12	0.03	2	0.08	0.02	0.00	0.08	0.00	0.05
A	12	0.24	0.02	9	0.18	0.02	0.03	0.00	0.02	0.00
BBB	61	0.85	0.3	49	0.68	0.26	0.35	0.30	0.21	0.18
BB	68	4.38	1.89	45	2.90	1.43	1.40	2.58	0.84	1.55
B	52	6.08	2.84	41	4.80	2.39	7.16	10.67	4.29	6.40
<B	24	6.38	6.37	18	4.79	4.34	28.72	33.85	17.23	20.31
Unknown	107	1.45	0.53	66	0.89	0.31	n.a.	n.a.	n.a.	n.a.
All	**327**	**1.24**	**0.41**	**230**	**0.87**	**0.29**	**1.92**	**2.24**	**1.15**	**1.34**
Panel C: 1993-2002										
AAA	0	0.07	0.01	1	0.07	0.01	0.00%	0.00%	0.00%	0.00%
AA	1	0.04	0.04	1	0.04	0.04	0.02	0.00	0.01	0.00
A	11	0.15	0.02	7	0.09	0.02	0.06	0.04	0.04	0.02
BBB	66	0.60	0.20	39	0.35	0.16	0.35	0.28	0.21	0.17
BB	93	3.58	0.86	59	2.27	0.58	1.44	0.76	0.87	0.46
B	61	5.73	3.76	47	4.42	3.18	7.02	5.19	4.21	3.11
<B	30	5.95	4.28	21	4.17	2.70	39.11	22.93	23.47	13.76
Unknown	62	1.90	0.30	49	1.50	0.25	n.a.	n.a.	n.a.	n.a.
All	**325**	**1.09**	**0.25**	**224**	**0.75**	**0.19**	**1.92**	**1.85**	**1.15**	**1.11**
Panel D: 1999-2002										
AAA	1	0.14	0.02	1	0.14	0.02	0.00%	0.00%	0.00%	0.00%
AA	1	0.10	0.09	1	0.10	0.09	0.05	0.00	0.03	0.00
A	4	0.13	0.03	4	0.13	0.03	0.12	0.08	0.07	0.05
BBB	37	0.75	0.35	25	0.51	0.28	0.51	0.50	0.31	0.30
BB	58	4.80	1.53	41	3.39	1.02	2.19	1.23	1.32	0.74
B	43	7.23	5.10	34	5.71	4.07	9.28	6.53	5.57	3.92
<B	17	9.14	5.25	12	6.45	3.41	44.79	26.29	26.88	15.77
Unknown	30	3.47	0.43	26	3.01	0.36	n.a.	n.a.	n.a.	n.a.
All	**191**	**1.51**	**0.41**	**144**	**1.14**	**0.31**	**3.10**	**2.85**	**1.86**	**1.71**

n.c. means no CREs for that rating. n.a. means not applicable for public bonds. * Public bond average loss rates estimated as corresponding default rate times 60% loss severity.

Do Public and Private Default Rates Differ, and Why?
It is difficult to assess the statistical significance of the differences. If default is viewed as a binary random variable that is distributed identically within each rating class, most of the differences in private and public default rates are statistically significant in that they exceed two standard deviations, but Moody's and S&P's results also differ significantly by this criterion. Thus interpretation is difficult, and the identical-distribution assumption is likely unrealistic in any case, especially for the lower ratings (a BB- differs significantly in default probability from a BB+).

There appear to be four major possible explanations for private default rates higher than public in the better rating categories and lower in the riskiest rating categories. First, private-market investors may expend more resources in monitoring and intervening with very risky borrowers and reap a reward in the form of lower incidence and loss rates. This is consistent with much anecdotal evidence about the differing behavior of private placement and public bond market investors.

Second, the internal rating systems at participating insurance companies may not be pure default ratings, but rather may focus on expected loss (that is, expected loss severities may affect internal ratings of placements).[23] If this is the case, it is to be expected that default rates by grade would be higher in the private market but economic loss rates would be about the same, as shown in Table 5 for grades down through BB. Differences are substantial for the lower ratings, however, so an explanation of differences that focuses on rating definitions alone is not adequate.

Third, participating companies may be fairly accurate in their original ratings of issuers but be slower than the major rating agencies to update their ratings as a borrower's condition deteriorates. Public bonds would therefore be more likely to spend some time rated B or below before defaulting whereas privates would be relatively more likely to jump from a higher rating directly into default. This could explain why incidence rates are higher in the private market for grades AAA though BB but lower for the riskier grades.

Fourth, even if participating companies focus their ratings on expected losses, they may simply be somewhat more conservative than the rating agencies with respect to the assets they rate B and below. By placing relatively more not-terribly-risky assets in the B and below categories, incidence rates in those grades would be reduced (but this should also tend to reduce incidence rates in the safer grades, which is inconsistent with the results).[24]

On the whole, the results support the credibility of private placement investors' internal

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[23] Moody's bond ratings are said to incorporate loss severity considerations whereas S&P's do not. However, issuer ratings are the basis for both agencies' default rate studies, and such ratings are meant to be representative of the credit quality of a generic senior unsecured obligation of the issuer.

[24] A possible technical reason for the pattern of results, our practice of assigning the better rating to an issuer when ratings of different assets of that issuer differ by a single full grade, appears not to be a significant factor. When the lower of the two ratings is assigned, default rates fall by 0 to 0.2 percentage points for ratings through BB, and rise by similar amounts for B and below.

ratings (where the major rating agencies set the standard for credibility). As seen in public bond experience, average incidence and loss rates increase for each stepdown in rating, and more rapidly for stepdowns in the lower grades.[25]

Loss Severity

Table 6 presents average severities on public bond defaults for 1986-2002 as well as average severities on privates.[26] The statistics for publicly issued bonds must be interpreted with special care because they cover only those bonds for which adequate post-default trading price information was available, not all defaulted bonds. It is not known whether this selection mechanism imparts a bias, or whether the post-default trading prices on which public bond severity calculations are based are in fact good estimates of recoverable cash flows. In the absence of a sample selection bias, prices should be good estimates of the present value of recoverable cash flows *if* discount rates are similar across capital markets and markets are reasonably efficient.

Overall, public bond severities averaged 66 percent during 1986-2002 whereas private placement severities averaged 35 percent, a striking difference of 31 percentage points. When only private placement defaults are considered, the average severity rises to 41

Table 6 - Loss Severities, Publics and Privates (percent)

Subsample	Publicly Issued Bonds	Private Placements		
		All CREs	Restructures Only	Defaults Only
Whole Sample (1986-2002):	66 % [59]	35%	26%	41%
1991-2002 Only	67 [62]	35	26	40
By Priority (1991-2002 only)				
Senior	66 [50]	32	28	35
Subordinated	70 [66]	44	37	47
Not reported (all yrs)	n.a.	36	18	46

Results by priority are available only for experience years 1991-2002 (the priority of placements was not collected for the 1985-89 exposure year-ends) and priority was often not reported even when requested. Thus, results in some cells are based on as few as 31 CREs. Public bond statistics in the lower panel are also for 1991-2002 only. The last row combines 1991-2002 CREs for which priority was not reported with all CREs from 1986-90. The numbers in brackets in the first column provide equal-weighted averages of the average public bond loss severity for each year. These are closer to averages for the years before 1999, that is, they are less affected by the unusually severe public bond severities seen during 1999-2002.

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[25] Although incidence rates are similar for the B and <B categories in Table 5, in Table 2, which is based on this study's full panel of data, the step-up in incidence and loss rates from B to <B is substantial.

[26] Average severities on publicly issued bonds are computed from data in Altman, op cit.

percent, still a difference of 25 percentage points.[27]

The statistics for severity by priority that appear in the lower panel of Table 6 must be interpreted with some care because they cover only experience years 1991-2002 and only those private placement CREs for which seniority of the asset could be determined. Seniority was not collected for the 1985-89 exposure year-ends, and was not always reported for 1991-2002 CREs. The "not reported" row covers all CREs from all of 1986-2002 for which seniority was not reported.

A major change since the previous edition of this study is that average severities are similar for senior and subordinated public bonds (66 and 70 percent, respectively), whereas for periods ending before 1999 senior bonds experiences lower severities. The change in relative performance is due to a combination of unusually bad severities on senior bonds during 1999-2002 and to the fact that the number of public bond defaults during 1999-2002 was large relative to the total for previous years. Because public bond average severities place equal weight on each default, recent years' experience have a material impact on the averages (exposure-weighting, as is done in this study, cannot be done due to lack of data). The numbers in brackets in the first column of Table 6 provide averages that are an equal-weighted average of public bond loss severities in each year. These are closer to averages for the years before 1999 and show a larger difference in severities for senior and subordinated publicly issued bonds.

The severity advantage of senior privates over subordinated privates is about 12 percentage points when all CREs are considered (32 versus 44 percent, second column of Table 6), and is about the same for defaults and restructurings. Both priority classes of private debt have substantially lower severities than the corresponding class of public debt, by more than 20 percentage points. When the public-private comparison is made using private defaults alone, senior and subordinated severities still are about 20 percentage points less than public bond loss severities.

Somewhat surprisingly, the secured status of a placement appears to have little impact on loss severities. For example, where secured status is known, defaults of senior secured

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[27] These results are not far from average severities reported in a 1991 ACLI study for the period 1976-89. The 1991 ACLI study is Cabanilla, Nathaniel B., "Publicly Issued Bonds and Private Placements Held by Life Insurance Companies: Trends in Holdings, Measures of Credit Risk, Losses and Defaults," in Investment Topics (Washington, DC: American Council of Life Insurance, Investment Research Department), mimeo, February 1991. To estimate loss severities, the ACLI study used differences in par and statement values of NAIC No-rated assets (which are "in or near default") on the balance sheet at each year-end, separately for private placements and publicly issued bonds. Thus, the ACLI estimates are based on accounting values set by insurance companies according to NAIC guidelines, in contrast to this study's use of discounted cash flows. This study also attributes the severity for a CRE only to the year the CRE occurred, whereas the same CREs likely appear in multiple years in the ACLI study's calculations. The ACLI study finds public bond severities of 68 percent for 1989 alone (compare to Altman's (op. cit.) estimate of 64 percent for that year) and 43 percent for private placements (this study estimates a 39 percent severity for CREs that occurred in 1989 (see section V). For the whole period 1976-89, the ACLI study finds average severities of 49 percent and 33 percent for publicly issued bonds and private placements, respectively. These estimates are quite a bit better than Altman's for publicly issued bonds, but similar to this study's estimates for private placements.

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versus senior unsecured placements have average severities of 30 and 37 percent, respectively (not shown in the table). For restructurings, the analogous numbers are 34 and 22 percent respectively (restructurings of secured placements have higher severities!). These surprising results may simply reflect statistical noise (numbers of CREs in each cell are not large, ranging from 32 to 52 for the restructurings). It may also be that, because of the wide variety of collateral types and values, "secured" is not a category that is well-enough defined to support meaningful results, or that the secured status variable reported by contributing companies is as-of origination, not as-of the default date.

Where is the Incremental Value?
There are many reasons why private placements might offer investors incremental value relative to publicly issued bonds. Examples include higher interest rate spreads for a given degree of credit risk, lower loss severity rates, lower default or incidence rates for similarly rated assets, or other factors related to portfolio management. Of course, any such value is not free, as private placements are said to involve greater administrative costs than publics and are generally less liquid.

This study sheds light only on loss-related sources of value. The statistics in Table 3 imply that better loss severities are the primary source of value, but Table 5 shows the situation is more complicated. Average severities are better in the private market (Tables 2 and 6) and incidence or default rates are also better for assets rated B and below, though they are worse for BB and above. The most dramatic difference in loss rates occurs in the <B category and is due mostly to a difference in incidence rates. In the investment grades, however, the better severities on privates approximately offset their higher default rates, leaving economic loss rates about equal.

At first glance, it therefore appears that better overall economic loss experience is a substantial source of value for below investment grade privates but not for those in the investment grades. However, the comparisons are based on average one-year default rates, not ratings at acquisition. Since many originally investment grade bonds that end up in default first migrate to the junk grades, and loss experience is better there, better loss experience probably offers some incremental value for all private placements.

The evidence accords well with anecdotal evidence on pricing, which holds that investment-grade privates carry spreads above those on similarly-rated public bonds whereas lower-rated privates carry lower spreads, especially for the B category. It appears that better loss experience makes such spreads possible.[28]

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[28] The anecdotes are in turn consistent with comparative spreads produced using an earlier version of this study's data. See Carey, Mark S., and Warren Luckner, "Spreads on Privately Placed Bonds 1985-89: A Note," working paper, Society of Actuaries and Federal Reserve Board, April 1994.

G. Loss on Traditional Privates Relative to Other Asset Types

Asset type was not collected prior to 1995 and, as shown in Figure 5, in later years the fraction of exposure in several asset classes was low, making loss experience statistics likely to be noisy measures of risk. However, the fractions in asset-backed securities and in the ordinary debt category (notes, bonds and debentures) are large enough to make comparison of loss experience interesting. Table 7 reports loss experience for these categories and also for "Mortgages and equipment trusts" and for an "Other" category (see notes to the table for details).

Table 7. Experience By Asset Type, 1995-2002

Asset Type	Number of CREs	Share of dollar Exposure	Incidence Rate By number	Incidence Rate By amount	Loss Severity	Economic Loss	Benchmark EL
Notes, bonds etc.	247	73%	0.71%	0.72%	37%	0.26%	0.26%
Asset Backed	54	19	0.54	0.41	49	0.20	0.22
Mortgage & equip trust	29	4	0.89	1.1	26	0.28	0.21
Other	77	5	1.35	2.06	45	0.94	0.27

Note: Asset type not collected in sufficient detail prior to 1995. Benchmark EL (Economic Loss) applies economic loss rates by most recent internal rating for the "Notes, bonds, etc." category to the exposures by rating in other categories. The result is a set of expected loss rates that control for differences in distribution of exposure by rating. "Asset-backed" includes CLOs, CBOs, commercial and residential mortgage-backed securities, credit-linked notes, receivable-backed securities (including credit card receivables and other kinds of receivables), and other asset-backed securities as reported by contributing companies. The "Other" row includes bank and bank-like loans and lines of credit, leases, project finance debt, credit-tenant loans, and assets reported as "other non-asset-backed securities."

Average economic loss rates are similar in absolute magnitude for all but the "Other" asset category, with asset-backed securities having the lowest loss rate at 0.20 percent versus 0.26 percent for traditional private placements (Notes, bonds etc.) and 0.94 percent for the "Other" category.

Table 8 shows the percentage of dollar exposure for assets of each type having each most recent internal rating at the start of each year of exposure. Distributions across grades differ markedly by type. A far higher percentage of the Asset-Backed category carry ratings equivalent to AAA, and the share rated AA was higher as well. In contrast, assets in the other category are rated below investment grade somewhat more frequently than other categories. Such differences raise the possibility that the economic loss rates shown in Table 7 differ by asset type not because the types perform differently, but simply because credit quality distributions differ. To foster comparisons, the rightmost column of Table 7 gives benchmark or expected loss rates that adjust for differences in distribution of exposure across grades. Specifically, the benchmark rates were computed by applying the actual economic loss rate by grade for the Notes, Bonds, etc. category to the rating distribution for other categories. Such benchmark loss rates are quite similar, ranging from 0.21 percent to 0.27 percent. Such similarity arises because loss rates for

private placements rated A or better are so low that differences in the distribution of exposure across the A, AA and AAA grades does not have a big effect on expected loss rates.

Actual and benchmark economic loss rates were similar for all categories except "Other," which performed quite a bit worse than the benchmark. The "Other" category includes bank-like term loans and lines of credit, credit-tenant loans, leases, project-finance debt, and assets reported by contributors as "other non-asset-backed securities." The latter subcategory accounts for only 13 percent of exposure in the

Table 8. Percentage of dollar exposure of assets of each type falling in each most recent rating category

Rating	Percent of Exposure in each grade			
	Notes, bonds etc.	Asset Backed	Mortgage & equip trust	Other
AAA	2	37	2	3
AA	5	17	9	13
A	28	17	30	32
BBB	54	18	49	37
BB	6	4	7	10
B	2	1	1	3
<B	1	0	0	0
Unreported	2	5	2	2

Other category but more than two-thirds of dollar losses for the category (the economic loss rate for "other non-asset-backed securities" taken alone was a very high 4.9 percent; not shown in tables). To shed more light on what happened there, CREs were matched with the CUSIP Directory where possible (using reported PPNs), and the obligor names and asset descriptions were inspected. There were 20 CREs in this subcategory, 8 of them involving Enron-related entities and accounting for 49 percent of dollar losses in this subcategory, and 5 involving indirect exposure to Latin American obligors, accounting for 18 percent of dollar losses in the subcategory. Looking at the remainder of the asset types in the Other category, economic loss rates were under 0.20 percent expect for lines of credit (economic loss rate 2.19 percent, but these account for only 4 percent of Other category exposure) and project finance (1.13 percent loss rate, but only 8 percent of Other category exposure). Given the relatively small overall exposure in the Other types, and the special circumstances associated with Enron-related CREs, conclusions that assets in the Other category are more or less risky than traditional private placements do not seem warranted at this time.

Asset types in the Asset-Backed category are also somewhat diverse of subcategories of assets. Both commercial and residential mortgage-backed securities performed well, with economic loss rates of 0.01 percent and 0.02 percent, respectively, as did receivable-backed securities, with a loss rate of 0.37 percent (not shown in tables). These three subcategories account for 70 percent of asset-backed exposure. In contrast, collateralized loan and bond obligations and credit-linked notes performed poorly, with loss rates of 1.16 percent and 8.82 percent, respectively. These subcategories accounted for half of the number of Asset-Backed CREs but less than 10 percent of both the number and dollar amounts of Asset-Backed exposures.

The relatively high loss severity rates for the Asset-Backed and Other categories are related to the predominance of CBO/CLO and Enron-related CREs, respectively. Many

of the CBOs and CLOs that experienced a CRE were mezzanine or junior tranches. Such tranches often represent a rather thin slice of the "layer cake" of claims on the underlying assets. Where such tranches experience a credit event at all, the chance that losses will eat through all or most of the tranche are fairly high (thus explaining the high severity).[29]

In the "Mortgage and equipment trust" category, 24 of 29 CREs involved aircraft or other airline-related equipment trusts.

Given the cyclical upturn in credit losses on corporate debt during 2000-2002, the problems experienced by airlines, and the relatively good conditions in residential and commercial real estate markets, the concentration of non-traditional asset type losses in CLO/CBOs, equipment trusts, and Enron-related assets is not surprising. However, patterns of losses across asset types are likely to differ in the future. In a period of real estate distress, for example, one might expect both the asset-backed and the mortgage categories to experience larger losses. Moreover, 1995-2002 is a relatively short span of years. Readers are urged to view the loss rates in Table 7 and those cited in the preceding paragraphs as very preliminary indicators of long-run average loss rates for each type of private placement.

H. Loss Severities Are Less Procyclical Than Overall Results Imply

As shown in Figure 3, average loss severities dropped significantly in the years after 1992, from a 1986-92 average of 35 percent to 23 percent during 1993-98, but then jumped up, averaging 44 percent during 1999-2002. An obvious possible explanation is that the more benign credit environment of the middle 1990s, and better conditions in markets for the assets of distressed firms, may have tended to make losses smaller than during years of high incidence rates. However, a closer look at the data reveals that sample-composition effects play a role. After these are filtered out, loss severities on traditional senior privately placed bonds still display some cyclical variation, but not as much as Figure 3 implies.

Two changes in the character of CRE assets and in contributors' reporting practices are relevant:[30]

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[29] Only 5 of the 22 CLO/CBO CREs were rated the equivalent of A or better, and 11 of the 22 were rated BB or worse. The most senior tranches in securitizations usually are structured to be rated A or better, often AAA. Thus, the ratings (and an inspection of CUSIP directory asset descriptions) imply that most of the CLO/CBO CREs were mezzanine or junior tranches. It should be noted that such tranches might still have been profitable as an asset class even though incidence and severity rates were relatively high. With an economic loss rate of 1.16 percent, an investor would need to receive only about 100 basis points more spread than on traditional private placements, and mezzanine and junior tranches of CLOs and CBOs are often mentioned as carrying relatively high spreads.

[30] The shares of private placement CREs that are subordinated and that are secured varied somewhat over the period, but not enough to materially affect the annual pattern of average severities. Similarly, the share of CREs that are restructurings varied somewhat, but not enough to explain the variation in overall average severity, and part of such variation was due to changes in reporting practices.

- The share of CREs that are NOT traditional notes, bonds, debentures and other "ordinary" debt was much higher during 1999-2002 than in earlier periods. Severities vary somewhat with asset type, for reasons described in subsection G.
- A change in reporting practices may have influenced the time pattern of average severities while having little effect on economic loss rates.

The remainder of this subsection explores the impact of the two changes.

Reporting Practices

As described in Appendix I, section D, information about CREs reported by contributing companies is inspected closely for accuracy and consistency. Possible discrepancies are resolved through dialog with contributors wherever possible. Although the definition of "credit risk event" given in Appendix I is unchanged since the 1986-89 Credit Risk Loss Experience Study, some contributors may have adopted a more inclusive interpretation of the definition when constructing their 1993-98 data submissions than they used in constructing their 1986-92 and their 1999-2002 submissions. This possibility became apparent from dialog with contributors and from inspection of SEC filings for borrowers experiencing CREs, where available. For example, more likely to be reported as CREs during 1993-98 were relatively minor restructurings associated with covenant violations, or payment defaults that were rapidly cured, such as interest payments made after the due date. Such CREs tend to have low loss severities and often involve gains to the investor because fees and increased interest payments are received.

In part, a change of reporting practice may represent a greater sensitivity to credit events due to contributors' experience with this study. The change may also be due in part to the more benign credit environment of the middle 1990s. In earlier years, the volume of credit events involving significant losses was large and, given resource constraints, contributors may have chosen to focus more on large-loss CREs and less on events with low severities.

Both earlier and more recent interpretations and reporting practices are entirely legitimate and are consistent with the CRE definition given in Appendix I. The distinction between CREs and other events is not a sharp one and judgment must be used in deciding what to report.

The possible change in reporting does not have much effect on economic loss rates: It tends to increase average incidence rates while also reducing average loss severities. Moreover, sensitivity tests revealed that most results of the study are not qualitatively affected. For example, patterns of incidence and loss rates by most recent rating are not much affected. In contrast, a change in reporting practices could have a material impact on patterns of incidence and severity over time and on overall average loss severity. Precise measurement of any such change is not possible because of the limited nature of the information that is contributed, but based on inspection of samples of CREs and dialog with contributors, three sensitivity-test exercises were conducted.

First, the possible change of interpretation of "CRE" appears to have occurred only at three contributing companies, so we examined results when those companies are omitted.

Specifically, average private placement loss severities were calculated only for the companies that contributed during most years of the study, but omitting the three (which left four companies in the calculations). Strikingly, while the average loss severity for 1986-92 for these four companies was 37 percent, near the 35 percent full-sample value, the severity for 1993-98 was 45 percent (compared to 22 percent for the full sample). Thus, this sensitivity analysis seems to imply that a change in reporting practices may more than explain the change in average severities. However, only a bit more than 100 CREs were included in this exercise, so small-sample noise is a concern.

Second, the CREs reported by the three contributing companies were adjusted in an attempt to make 1993-98 CRE reporting comparable to that for 1986-92. Fifty-one 1993-98 CREs that might not have been reported as CREs during 1986-92 were eliminated from calculations.[31]

Table 9 reports averages of this study's four loss statistics by year, with and without the 51 CREs. The effect of the 51 CREs on the time pattern of loss severities is substantial: When they are included, annual average severities during 1993-98 are usually in the range 18 to 27 percent, whereas without them the averages are usually in the range 29 to 38 percent. The overall exposure-weighted average for 1993-98 is 23 percent when the 51 CREs are included and 34 percent when they are not, and 34 percent is very close to the overall exposure-weighted average for 1986-2002 of 35 percent. Thus, this sensitivity analysis implies that a change in reporting practices *may* have been responsible for the entire drop in average severities during 1993-1998 relative to 1986-1992.

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[31] The criteria used to select the 51 CREs were crude because detailed circumstances of each CRE are not reported. For example, at one company, all failure-to-pay CREs with severities less than 10 percent were eliminated. At another company, almost all restructure CREs were eliminated (all such CREs had reported severities less than 1 percent). SEC filings of borrowers for which CREs were reported by the three companies were examined in order to gain insight into the character of the CREs. Though such filings are often not available, and when available are often not definitive, on the whole there were clear indications that many reported CREs represented minor restructurings associated with covenant violations. Reviews of CREs during preparation of earlier editions of this study found such CREs to be relatively infrequent.

Such crude elimination criteria probably eliminated some CREs that would have been reported had they occurred during 1986-92, not just those that would not have been reported for earlier editions of this study. However, any over-elimination does not appear to be extreme because, even after dropping the 51 CREs, the relative frequency of CREs with individual loss severities below ten percent is higher at the three companies for 1993-98 than during 1986-92.

Table 9. **Experience With and Without 51 CREs Possibly Representing Change of Interpretation of Definition of CRE (percent)**

| | Incidence Rate | | | | Loss Severity | | | Economic Loss Rate | |
| | By Number | | By Amount | | | | Bonds & | | |
Year	All CREs	Drop 51	All CREs	Drop 51	All CREs	Drop 51	Drop 51	All CREs	Drop 51
86	0.67	0.67	0.76	0.76	40	40	40	0.31	0.31
87	0.79	0.79	0.89	0.89	24	24	24	0.22	0.22
88	0.42	0.42	0.43	0.43	40	40	40	0.17	0.17
89	0.49	0.49	0.69	0.69	39	39	39	0.27	0.27
90	0.66	0.66	0.83	0.83	39	39	39	0.32	0.32
91	1.67	1.67	1.73	1.73	41	41	41	0.71	0.71
92	1.26	1.26	1.84	1.84	29	29	29	0.54	0.54
93	0.99	0.87	1.28	0.98	23	31	31	0.30	0.30
94	0.32	0.28	0.36	0.24	18	29	29	0.06	0.07
95	0.69	0.42	0.74	0.44	21	36	37	0.16	0.16
96	0.43	0.23	0.45	0.18	14	37	47	0.06	0.07
97	0.33	0.30	0.23	0.19	43	52	62	0.10	0.10
98	0.32	0.16	0.32	0.19	27	38	39	0.09	0.07
99	0.59	0.59	0.68	0.68	32	32	29	0.21	0.21
00	0.60	0.60	0.58	0.58	44	44	40	0.25	0.25
01	1.09	1.09	1.54	1.54	48	48	47	0.74	0.74
02	1.52	1.52	1.17	1.17	44	44	41	0.52	0.52
Avg	**0.78**	**0.74**	**0.89**	**0.83**	**35**	**38**	**37**	**0.31**	**0.31**

Drop 51 columns have results when 51 possibly misreported CREs are dropped. Bonds & Drop 51 column has results when the 51 CREs are dropped and other CREs are limited to those in the asset type category "Notes, Bonds etc."

In contrast to the effect on severities, economic loss rates are almost unaffected by inclusion or exclusion of the 51 CREs, both overall and from year to year, as shown in the last two columns of Table 9. Even though average severities are increased by dropping the 51 CREs, incidence rates are reduced such that there is little net effect on economic loss rates.

Effect of shift in asset type composition
Severities are higher during 1999-2002, averaging 44 percent during those years for the full sample. For these years, it appears that contributors returned to the reporting practices in use during 1986-1992. However, the share of non-traditional assets was highest during these years. Because severity rates differ systematically by type, a shift in the mix of CRE asset types might affect average severities in a way that appears procyclical. To check this, the sample of CREs was restricted to those in the traditional asset type category "Notes, bonds, etc." described in the previous subsection. The 51 possibly misreported CREs were dropped as well. The impact on loss severities is shown in the "Bonds & Drop 51" column of Table 9. Overall average loss severity drops slightly, and the average severity for 1999-2002 drops from 44 to 41 percent, while the average for 1993-1998 rises from 34 to 35 percent.

Overall, the data offers mixed evidence that private placement loss severity rates have a cyclical component. Severities for 1991-92 are similar to the long-term average, but those for 2001-2002 are several percentage points higher. The magnitude of the cyclical variation is not as large as Figure 3 implies, especially for traditional private placements.

Figure 9: Distribution of Privates by Earliest Rating
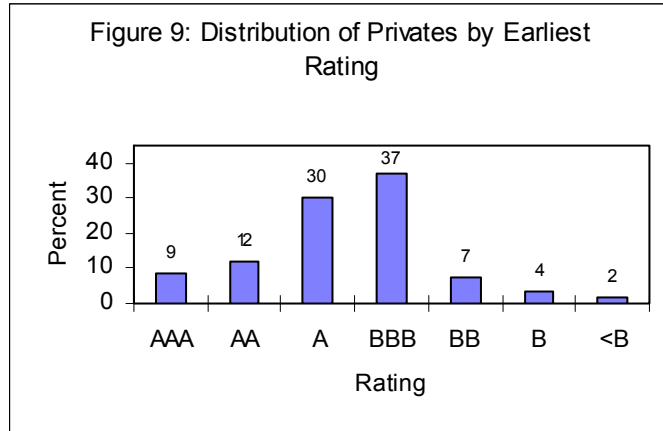
I. Experience By Earliest Internal Rating

For the current edition of this study, it is unfortunately not possible to produce multiyear cumulative average default rates similar to those reported by Moody's and S&P, nor is it possible to produce cumulative mortality rates similar to those of Altman.[32] Some information about loss rates by rating at private placement issuance is available, however.

Figure 10. Incidence Rates By Earliest Rating
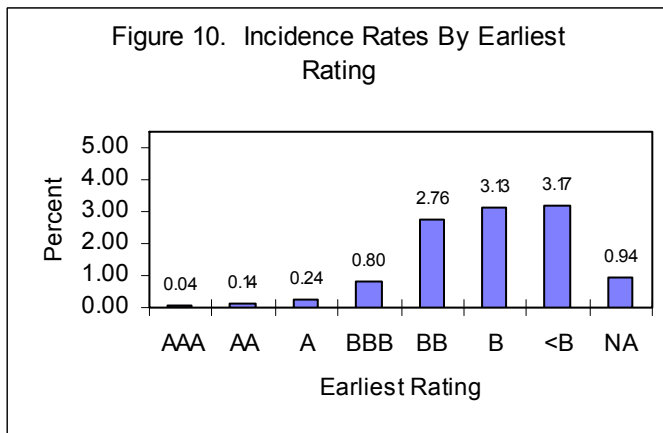
Figure 9 shows the distribution of sample placements by earliest internal rating. "Earliest rating" is a proxy for rating at private placement issuance but is not a precise measure of it. Participating companies were asked to report their internal rating at acquisition for each asset, but for those unable to report rating at acquisition, the most recent internal rating as of the

Figure 11: Economic Loss Rates by Earliest Rating

earliest year-end it was reported was used. For example, if data for an asset were reported for the years 1985-93, with ratings reported for the year-ends 1986 and thereafter but no rating at acquisition, the earliest rating variable was set to the 1986

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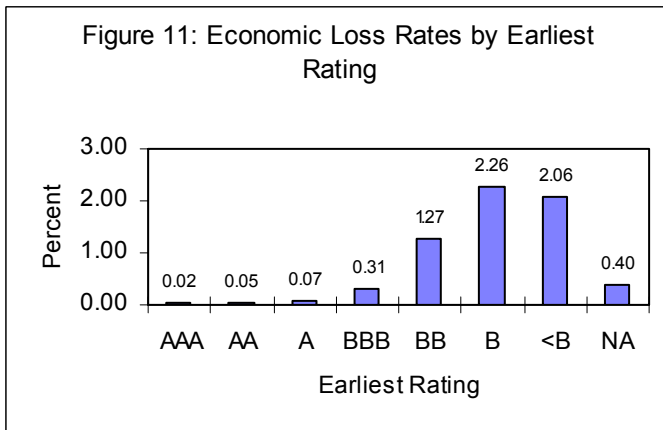
[32] See Altman, Edward I., "Measuring Corporate Bond Mortality and Performance," Journal of Finance September, 1989, pp. 909-22. The reported data must be linked across years for individual assets in a manner not required for other results. Such linking is a time-consuming project that is unfinished.

value of the most-recent-rating variable. About half of earliest rating values are inferred in this manner, with the remainder being the reported rating at acquisition. For the full sample, the distribution of earliest ratings is very similar to that of most recent ratings. Because very few private placements have ratings <B at origination, results for that grade may mainly reflect the experience of privates for which the date of our earliest rating information was at least a year or two after origination. Thus, earliest-rating results for the less risky grades may somewhat understate losses relative to rates that would be revealed if at-origination ratings were universally available.

Figures 10 and 11 show incidence rates (by number) and economic loss rates by earliest rating, respectively. The loss rates are higher than those in Figure 7 (most recent rating) for the investment grades and BB, are a little smaller for B, and are much smaller for <B. These are average one-year rates as usual, but default for an individual bond that occurs during a span of years after acquisition is associated with its rating at acquisition, not just with the most recent rating at the start of each year. Somewhat higher loss rates are thus natural for the investment grades, as such assets typically do not default within a year of being rated investment grade. Instead, they transition through the lower grades, raising the loss rates by most recent rating of those grades on the way through (in this case, especially the <B rate).

Section IV contains cross tabulations that provide economic loss rates for various secondary factors within each earliest internal rating. The secondary factors shown include years since funding, years to maturity and original coupon rate.

J. Experience by NAIC Rating

Table 10 - NAIC Rating Schemes and Concordance

Ratings Through 1989	Meaning	Ratings 1990 and After	Rating Agency Equivalent	Concordance Rating	Included in Concordance Category
Yes	Primarily investment grade	1 2	AAA,AA,A BBB	Investment Grade	Yes, 1, 2
No*	Non-investment grade, average quality	3	BB	Below investment grade--High	No*, 3
No**	Non-investment grade, below average quality	4 5	B <B	Below investment grade--low	No**,4,5
No	In or near default	6	Default	At or near default	No,6

The NAIC SVO rated most private placements throughout this study's sample period, but on two different scales, as shown in Table 10. A concordance between the two scales, also shown in the table, was judgmentally developed so that results for the full sample could be shown on a common scale. Such results for economic loss by most recent NAIC rating (that is, the rating at the start of the experience year) appear in Figure 12. Unsurprisingly, loss rates rise as the rating worsens.

Figure 13 shows incidence rates by number for the old and new NAIC scales separately along with public bond default rates for comparable agency grades and time periods. The incidence rates were computed in the same manner as those in Table 5 (for example, private calculations were on an issuer, not an asset

Figure 12: Economic Loss by Most Recent NAIC Rating, Concordance Scale, 1986-2002
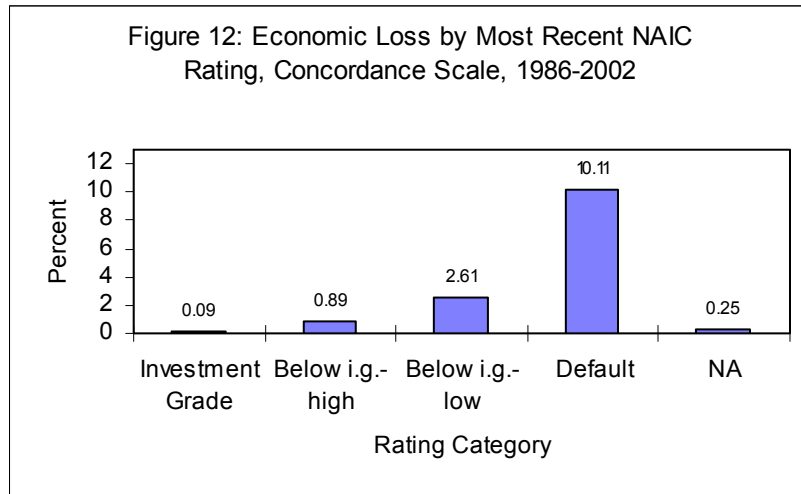
basis), but those for the old NAIC scale include only the years 1986-90 whereas those for the new scale include only experience years 1991-2002. (Experience year 1990 must be analyzed on the old scale because the year-end 1989 NAIC rating is used as the start-year-1990 rating.)

Results for the new NAIC scale, shown in the left half of Figure 13, are qualitatively similar to results for most recent internal ratings reported

Figure 13: Private vs. Public Incidence Rates, Most Recent NAIC Ratings
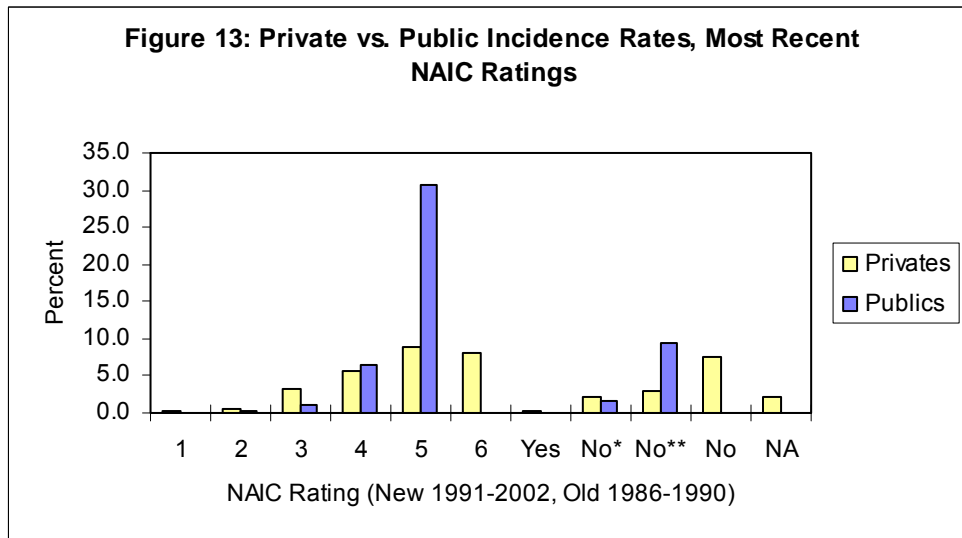
earlier. As in Table 5, private and public incidence rates are fairly similar for the investment grades. In Table 11, NAIC-3 assets' rate (2.6 percent) is higher than the public rate (1 percent), but the comparison period is limited to 1991-2002, thus capturing virtually all of the private placement market's most severe distress while omitting the 1990 year of public bond market distress. For NAIC 5 (<B), private incidence rates are less than in the public market (no public-market comparison is available for NAIC 6 assets). This study's most recent internal rating scale and new NAIC rating scale were both designed to be comparable to public scales---the identity of the institutions

producing the rating is the main difference among the three---so perhaps it is unremarkable that investors, the NAIC and the rating agencies all appear to be arriving at about the same assessments of credit quality on average. Still, the results lend credibility to both the NAIC scale and investors' internal ratings, although it should again be noted that the left half of Figure 13 is based solely on the 1991-2002 experience years and thus tends to overstate private incidence rates relative to public bond default rates.

The right half of Figure 13 focuses on the old NAIC scale and experience years 1986-90. Here public ratings AAA-BBB were assumed equivalent to Yes, BB to No*, and B and <B to No**. The story is basically the same---incidence rates for comparable NAIC and public ratings are similar except for the very risky grades, where private incidence rates are better.

Table 11 - Incidence, Severity and Loss by Old and New Most Recent NAIC Ratings (percent)

Experience Years	Rating	Incidence Rate		Loss Severity	Economic Loss	Comparable Incidence	
		By Number	By Amount			Private	Public
91-02	1	0.12%	0.11%	25%	0.03%	0.22%	0.03%
	2	0.47	0.49	30	0.15	0.59	0.31
	3	2.02	2.63	35	0.92	3.15	1.21
	4	4.48	6.85	33	2.26	5.63	6.56
	5	8.61	14.15	31	4.35	9.00	30.71
	6	8.67	21.31	50	10.70	8.11	n.d.
86-89	Yes	0.19	0.19	43	0.08	0.27	0.10
	No*	1.61	1.75	37	0.64	2.27	1.67
	No**	2.71	4.97	37	1.83	2.99	9.38
	No	6.11	14.54	53	7.77	7.57	n.d.
All	NA	1.06	0.73	35	0.25	2.09	n.d.
	All	0.78	0.89	35	0.31	1.16	n.d

Note: Statistics for ratings 1-6 are for 1991-2002 experience years only. Yes through No are for 1986-90 years. NA and All are for all years. n.d. indicates no data for cell.

Detailed results by year specific to the pertinent NAIC scale for each year appear in Appendix IV. Summary statistics are given in Table 11, along with the comparable public and private incidence rates that are also plotted in Figure 13 (the "private comparable incidence" column differs from incidence rates by number primarily because calculations were on an issuer basis --- see subsection F above).

K. Time Patterns of Credit Risk Event Occurrence

The reader is referred to the cross tabs in section IV and associated results in Appendix IV, which offer deeper analysis of time patterns of credit risk events than appears in this subsection. Figures 14 through 17 show the distributions of sample credit risk events and corresponding incidence rates by number by the year of funding and the number of years since funding, respectively. Incidence rates must be interpreted with caution here because the pool of assets for each cell is incomplete in some cases---for example, the data set does not include all participating company assets funded in 1983, but only those that were still outstanding at some point in the 1986-2002 period. In addition, the timing

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of the 1990-92 and 2000-2002 periods of credit distress obviously has some effect on these statistics.

As shown in Figure 14, more than one-third of all CREs were originated during the last half of the 1980s, whereas only 21 percent were originated during the last half of the 1990s. The corresponding distribution of incidence rates in Figure 15 is generally similar, with asset originated during 1988 having the highest incidence rate of all origination years in the sample.

Figure 14: Distribution of CREs by Year of Funding

Figure 15: Incidence Rates by Number by Year of Funding
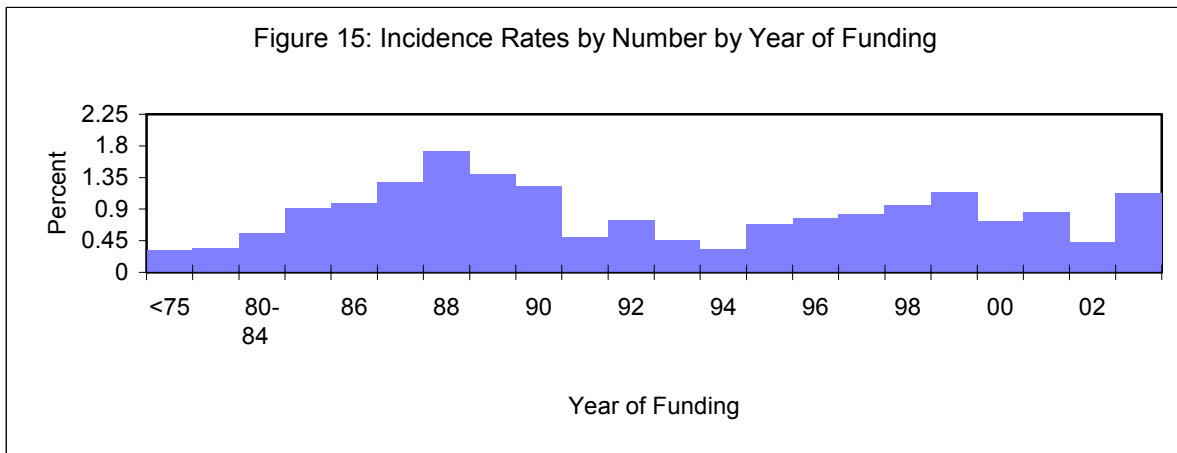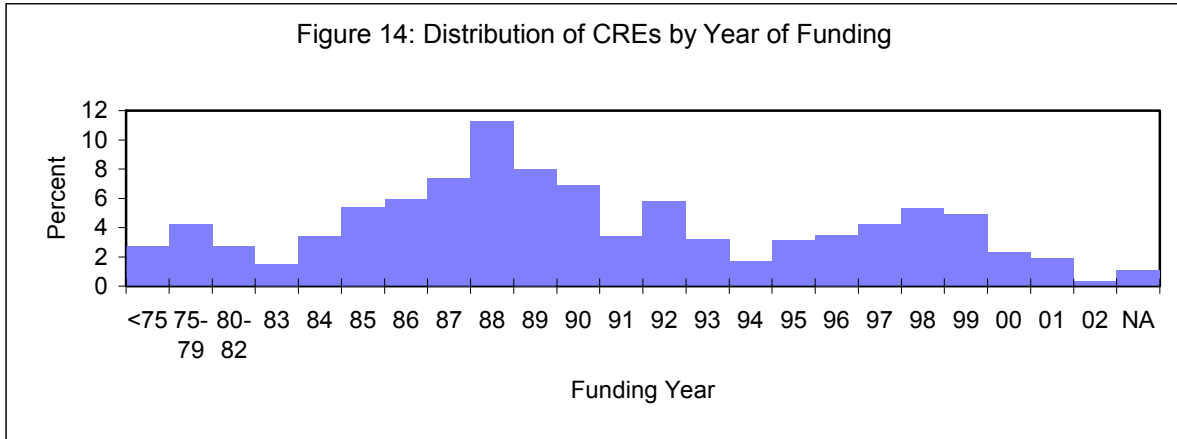
Figure 16 shows the distribution of CREs by the number of years since funding; corresponding incidence rates appear in Figure 17. Again the distributions are broadly similar, with the great majority of CREs (about 85 percent) occurring within 7 years of the funding date.

Figure 16: Distribution of CREs by Years Since Funding

Figure 17: Incidence Rates by Number By Years Since Funding
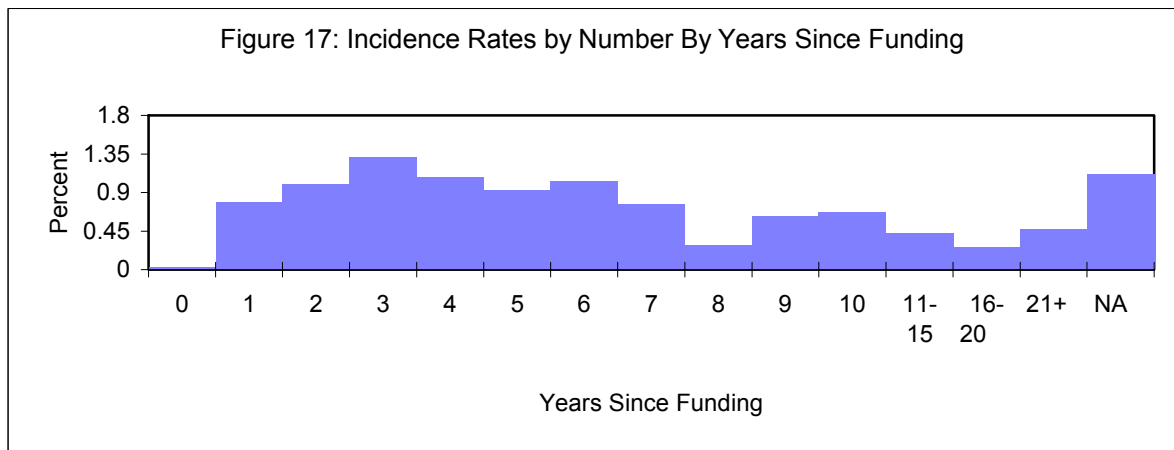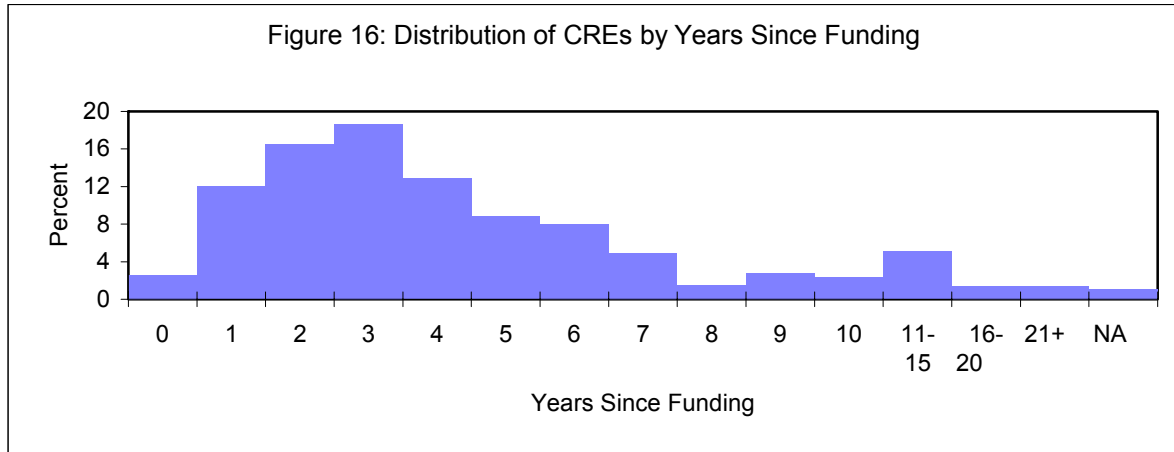
It is difficult to draw firm conclusions from Figures 14-17. On the one hand, the typical private placement has an average life of seven years or so and features some amortization of principal. Thus it is natural that most CREs occur within a few years of issuance. It is a bit surprising that origination years during the late 1980s continue to have the highest incidence rates even with the addition of data for the high-incidence years 2001-2002. However, 2003 was a year of relatively high default rates in the public bond market. When that year is added to this study's data, it is possible that incidence rates for origination years in the late 1990s will look more similar to those for the late 1980s. With the addition of another recession to the data, earlier doubts about whether results for years-since-funding were due to the confluence of historically large issuance during the mid-to-late 1980s and a recession during the early 1990s have been put to rest.

L. Experience By Type of Credit Risk Event

In this study, the definition of CRE includes restructurings and asset sales motivated by the investor's desire to avoid or minimize possible losses. Most studies of credit risk experience, especially those focusing on publicly issued bonds, consider only defaults.[33] Table 12 displays incidence, severity, and loss rates by year for four types of credit risk event: defaults, restructurings, sales, and unknown. Defaults include both borrower bankruptcies and failures to pay as scheduled.[34] Denominators for incidence and loss measures include all exposure for a year, so entries within a year sum to the aggregate incidence and loss rates shown in Figures 1 and 2 (apart from rounding error). Of the 1001 CREs in the study, defaults are the most frequent variety (688), with restructurings next (237) and few sales (46) or unreported types (30).

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[33] Negotiated restructurings are rarely seen in the public bond market and thus their inclusion in public bond default studies would not materially alter results of such studies.

[34] Although it would be possible to report results separately for bankruptcies and failures to pay, inspection of the data reveals that some participating companies did not distinguish the two types of event in their reporting.

Table 12 - Experience by CRE Type and Year (percent)

Year	Economic Loss				Loss Severity			
	Sales	Restructures	Defaults	Unknown	Sales	Restructures	Defaults	Unknown
86	0.05%	0.03%	0.23%	n.c.%	72%	21%	42%	n.c.%
87	0.00	0.04	0.18	-0.01	58	20	33	-7
88	n.c.	0.00	0.17	n.c.	n.c.	21	41	n.c.
89	0.00	0.03	0.24	0.00	15	43	40	8
90	n.c.	0.07	0.25	0.01	n.c.	24	54	8
91	0.03	0.12	0.56	0.00	73	20	51	100
92	0.01	0.28	0.25	n.c.	20	24	39	n.c.
93	0.00	0.07	0.23	0.00	-2	19	27	-4
94	0.00	0.00	0.06	n.c.	2	6	22	n.c.
95	0.00	0.03	0.12	n.c.	8	28	20	n.c.
96	0.00	0.02	0.04	n.c.	4	9	23	n.c.
97	0.01	0.00	0.09	n.c.	34	-2	54	n.c.
98	n.c.	0.02	0.03	0.04	n.c.	11	40	45
99	0.00	0.05	0.16	n.c.	19	46	29	n.c.
00	0.00	0.01	0.22	0.02	-3	19	53	41
01	0.01	0.12	0.59	0.03	6	44	54	30
02	0.02	0.15	0.30	0.05	36	59	41	39
All	**0.01**	**0.07**	**0.23**	**0.01**	**23**	**26**	**41**	**27**

Year	Incidence By Number				Incidence By Amount			
	Sales	Restructures	Defaults	Unknown	Sales	Restructures	Defaults	Unknown
86	0.05%	0.10%	0.52%	n.c.%	0.07%	0.16%	0.53%	n.c.%
87	0.01	0.10	0.64	0.04	0.00	0.20	0.57	0.12
88	n.c.	0.04	0.38	n.c.	n.c.	0.01	0.41	n.c.
89	0.01	0.02	0.44	0.02	0.01	0.06	0.61	0.01
90	n.c.	0.21	0.41	0.04	n.c.	0.30	0.45	0.08
91	0.07	0.35	1.23	0.02	0.05	0.59	1.10	0.00
92	0.09	0.66	0.50	n.c.	0.07	1.14	0.63	n.c.
93	0.04	0.30	0.64	0.01	0.04	0.36	0.87	0.00
94	0.01	0.07	0.24	n.c.	0.03	0.04	0.28	n.c.
95	0.04	0.12	0.53	n.c.	0.03	0.12	0.60	n.c.
96	0.02	0.20	0.21	n.c.	0.03	0.24	0.18	n.c.
97	0.05	0.03	0.24	n.c.	0.02	0.04	0.17	n.c.
98	n.c.	0.21	0.06	0.05	n.c.	0.16	0.07	0.09
99	0.01	0.07	0.50	n.c.	0.01	0.11	0.56	n.c.
00	0.06	0.05	0.45	0.04	0.04	0.08	0.41	0.06
01	0.05	0.27	0.70	0.07	0.10	0.26	1.08	0.09
02	0.07	0.26	1.11	0.08	0.05	0.25	0.73	0.14
All	**0.04**	**0.18**	**0.54**	**0.02**	**0.03**	**0.26**	**0.56**	**0.03**

n.c. means no CREs in cell.

Relative incidence rates in Table 12 reflect these relative frequencies. Time patterns differ somewhat across types, however. During the first period of credit distress, 1990-92, default incidence peaks in 1991 but restructuring incidence peaks in 1992. During 2000-2002, restructuring rates remain at levels typical of good years, while default incidence jumps to levels near those seen in 1990-92. These relative proportions and time patterns must be interpreted with some caution. Inspection of the data reveals the possibility of systematic reporting errors in a few years for a few companies.[35]

Table12a - Incidence By CRE Type and Year, Possible Reporting Errors Removed (percent)

	Incidence By Number			
Year	Sales	Restructures	Defaults	Unknown
86	0.08%	0.17%	0.47%	n.c.%
87	n.c.	0.16	0.47	0.07
88	n.c.	0.04	0.34	n.c.
89	0.02	0.04	0.41	0.04
90	n.c.	0.30	0.56	0.06
91	0.10	0.45	1.44	0.03
92	0.17	0.50	0.70	n.c.
93	0.04	0.32	0.65	0.01
94	0.01	0.07	0.26	n.c.
95	0.05	0.14	0.50	n.c.
96	0.02	0.23	0.13	n.c.
97	0.06	0.04	0.21	n.c.
98	n.c.	0.26	0.04	0.06
99	0.01	0.07	0.50	n.c.
00	0.06	0.05	0.45	0.04
01	0.05	0.27	0.70	0.07
02	0.07	0.26	1.11	0.08
All	**0.04**	**0.20**	**0.56**	**0.03**

n.c. means no CREs in cell.

When data for the companies and experience years for which reporting errors appear possible are removed, the large jump in restructurings in 1992 disappears, as shown in Table 12a. However, the relative frequency of restructurings over all years is about the same and defaults are still about 3 times more likely than restructures.[36] In other respects results are very robust to this change in the data. It is important to note that this possible reporting problem does not affect any other results in the study, and that there is no question that the affected CREs were in fact CREs, just a question as to their type.

Loss severities by CRE type are shown in the upper right panel of Table 12 and Figure 18 (severities are not shown in Table 12a because they are very similar to those in Table 12). Average severities for asset sales are similar to those for restructurings, whereas in the previous edition of this study asset sale severities were about halfway between those for defaults and restructurings, perhaps indicating an increased ability on the part of contributing companies to get out of troubled assets early.. Severities on restructurings are well below those for defaults, which is sensible because there might be little incentive to go to the trouble of restructuring if severities were on average similar to those for defaults. However, the ultimate fate of the restructurings may or may not be known, and

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[35] Some companies consistently reported a far lower or higher fraction of restructurings than the norm. For example, some classified all CREs as "Failure to Pay." Although such reporting may accurately reflect a policy of avoiding restructurings, if there is misclassification the relative frequencies of defaults and restructurings may be misrepresented.

[36] When the suspect CREs are removed, defaults number 573, restructurings 203, sales 45, and unknown types still number 30.

further deterioration of the borrower's condition after a restructuring might lead to increased losses. Companies that continue to contribute data are asked to (and frequently do) report revisions to cash flows for CREs from earlier data contributions, which may arise because of events following a restructuring. However, such reporting does not include a

Figure 18. Average Severities By CRE Type

description of any such events, and there is no updating of CRE cash flows by companies that drop out of the study, so the study's data may not capture post-CRE deterioration of some assets received in workouts. Thus, the measured average severity of 26 percent for restructurings may understate ultimate severities somewhat.
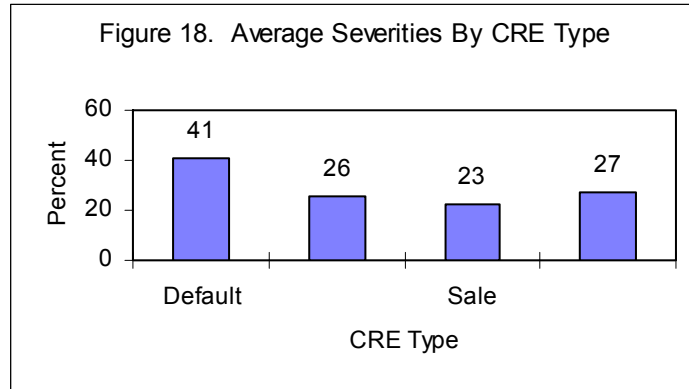
Table 13 - Experience by CRE Type and Most Recent Rating (percent)

Rating	Economic Loss				Loss Severity			
	Sales	Restructures	Defaults	Unknown	Sales	Restructures	Defaults	Unknown
AAA	n.c.%	n.c.%	n.c.%	n.c.%	n.c.%	n.c.%	n.c.%	n.c.%
AA	n.c.	0.00	0.02	n.c.	n.c.	89	28	n.c.
A	0.00	0.00	0.03	n.c.	4	1	29	n.c.
BBB	0.00	0.03	0.16	0.01	11	31	39	26
BB	0.03	0.28	0.81	0.00	14	22	36	-13
B	0.05	0.40	1.88	0.09	49	20	50	23
<B	0.28	1.08	4.50	0.15	62	48	51	60
Unknown	0.01	0.13	0.28	0.02	44	25	40	34
All	**0.01**	**0.07**	**0.23**	**0.01**	**23**	**26**	**41**	**27**

Rating	Incidence By Number				Incidence By Amount			
	Sales	Restructures	Defaults	Unknown	Sales	Restructures	Defaults	Unknown
AAA	n.c.%	n.c.%	n.c.%	n.c.%	n.c.%	n.c.%	n.c.%	n.c.%
AA	n.c.	0.01	0.05	n.c.	n.c.	0.01	0.06	n.c.
A	0.01	0.00	0.08	n.c.	0.01	0.00	0.09	n.c.
BBB	0.03	0.10	0.37	0.02	0.03	0.11	0.41	0.04
BB	0.18	0.82	1.78	0.01	0.21	1.30	2.28	0.03
B	0.11	0.87	3.12	0.14	0.10	1.99	3.77	0.41
<B	0.32	1.08	4.70	0.11	0.45	2.23	8.74	0.25
Unknown	0.03	0.30	0.58	0.06	0.02	0.52	0.71	0.05
All	**0.04**	**0.18**	**0.54**	**0.02**	**0.03**	**0.26**	**0.56**	**0.03**

n.c. means no CREs in cell.

Table 13 reports results by CRE type and most recent internal rating. Severities appear a bit better in the investment grades with the exception of restructurings, and incidence rates generally increase as rating worsens, paralleling the aggregate results.

M. Rating Transitions

Over the past few years, portfolio credit risk models and debt-pricing models that use rating transition matrices as key inputs have become increasingly popular. The credit ratings that are used for private placements are often the investor's internal rating of the asset or borrower, such as the "most recent rating" variable in this study. Insurance company internal databases may not readily support measuring how such ratings migrate over time, so many companies use the rating migration (or "transition") matrices published by Moody's or S&P for modeling purposes. However, an open question is the similarity of internal rating migrations to agency rating migration patterns.

In this study's data, it is usually possible to track most-recent-internal-rating values for a given asset from one year-end to the next. Thus, most-recent-internal-rating transition matrices can be constructed.

However, the reader should be aware that the Committee views this subsection as a presentation of preliminary and partial results. Moreover, results should be interpreted with caution because data problems may bias the results in unknown ways. For example, as described further below, private placements exit the exposure database at a rate much higher than implied by the percentage maturing in each year. Such exits may represent sales or prepayments, but may also occur because of changes in the asset ID numbers by which assets are tracked from one year-end to the next. If ID changes are routinely associated with changes in ratings, the true migration rates will differ from the results presented here. Moreover, there may be instances of miscoded ratings for individual assets in individual years, which would cause spurious migrations. The Committee has used common sense and rules of thumb in an attempt to detect and exclude from analysis systematic miscodings, but some errors may remain.

Table 14 displays average most-recent-internal-rating migration patterns over one-year horizons. For example, the first row of the table gives the percentage of all assets rated the internal equivalent of AAA/Aaa at the previous year-end that fall in each grade at the end of the year. Averaging over all the study years 1986-2002, 77.29 percent are still AAA/Aaa, 0.69 percent were downgraded to BBB, and so on. 0.01 percent (a single asset) "migrated" to the state of having experienced a CRE during the one-year horizon period. However, 17.61 percent were N.R. (not rated) by the end of the year, meaning no year-end rating value was reported. Table 15 presents migration rates when all observations that are N.R. at the end of the year are excluded.

Table 14: Most-Recent-Internal-Rating Migration Rates (percent)

Rating From:	to:								
	AAA	AA	A	BBB	BB	B	<B	CRE	N.R.
AAA	**77.29**	2.46	1.78	0.69	0.07	0.06	0.02	0.01	17.61
AA	1.59	**69.14**	5.81	0.97	0.14	0.14	0.03	0.06	22.12
A	0.87	1.38	**70.55**	5.86	0.42	0.20	0.10	0.09	20.54
BBB	0.13	0.60	3.77	**71.19**	2.62	0.68	0.39	0.51	20.12
BB	0.15	0.25	0.60	6.93	**60.93**	2.87	0.70	2.69	24.88
B	0.09	0.21	0.67	3.32	4.39	**54.02**	1.44	4.07	31.78
<B	0.41	0.10	1.24	1.44	2.21	6.69	**49.92**	4.12	33.87

Table 15: Most-Recent-Internal-Rating Migration Rates, N.R. Excluded (percent)

Rating From:	to:							
	AAA	AA	A	BBB	BB	B	<B	CRE
AAA	**93.81**	2.99	2.16	0.84	0.08	0.07	0.03	0.01
AA	2.04	**88.78**	7.47	1.25	0.18	0.18	0.04	0.08
A	1.09	1.74	**88.78**	7.37	0.53	0.25	0.12	0.12
BBB	0.17	0.75	4.72	**89.12**	3.28	0.85	0.48	0.63
BB	0.20	0.34	0.80	9.22	**81.11**	3.81	0.93	3.59
B	0.14	0.31	0.99	4.87	6.44	**79.19**	2.11	5.96
<B	0.62	0.16	1.87	2.18	3.35	10.12	**75.49**	6.23

Table 16: Moody's Rating Migration Rates (percent)

Rating From:	to:								
	Aaa	Aa	A	Baa	Ba	B	Caa-C	Default	WR
Aaa	**86.57**	9.13	0.33	0.00	0.00	0.00	0.00	0.00	3.97
Aa	0.65	**86.14**	8.60	0.27	0.08	0.02	0.00	0.00	4.24
A	0.04	2.34	**86.93**	5.48	0.64	0.22	0.02	0.02	4.31
Baa	0.05	0.30	5.01	**82.96**	4.85	1.02	0.20	0.24	5.36
Ba	0.01	0.04	0.57	4.99	**74.42**	8.65	0.71	1.43	9.17
B	0.01	0.05	0.21	0.66	5.38	**73.25**	4.38	6.79	9.25
Caa-C	0.00	0.00	0.00	1.07	1.65	6.13	**57.32**	22.97	10.86

Table 17: Moody's Rating Migration Rates, Withdrawn Ratings (WR) Excluded (percent)

Rating From:	to:							
	Aaa	Aa	A	Baa	Ba	B	Caa-C	Default
Aaa	**90.11**	9.56	0.34	0.00	0.00	0.00	0.00	0.00
Aa	0.68	**89.91**	9.02	0.28	0.09	0.02	0.00	0.00
A	0.05	2.44	**90.84**	5.72	0.67	0.23	0.02	0.02
Baa	0.06	0.32	5.30	**87.63**	5.13	1.09	0.21	0.26
Ba	0.01	0.04	0.63	5.49	**81.97**	9.50	0.78	1.58
B	0.01	0.06	0.23	0.73	5.96	**80.69**	4.80	7.52
Caa-C	0.00	0.00	0.00	1.18	1.81	7.10	**64.05**	25.86

Table 18: Estimated Allocation of N.R.
Category in Table 14 (percent)

Rating From:	Breakout of N.R. category		
	Matured	Payoff?	Unknown
AAA	4.54	12.73	0.34
AA	6.85	14.81	0.45
A	6.36	13.35	0.82
BBB	5.01	14.68	0.44
BB	4.73	19.91	0.24
B	3.65	27.81	0.33
<B	5.97	26.51	1.39

Tables 16 and 17 display one-year migration rates for Moody's ratings, with withdrawn ratings (WR) included and excluded, respectively. In principle, WR observations are similar to the NR observations that are excluded in Table 15. The Moody's rating migrations are average rates for the years 1986-2002, computed using Moody's Credit Risk Calculator software.[37] Although there are some differences in the off-diagonal patterns displayed in Tables 14 and 15 versus Tables 16 and 17, the primary differences are smaller percentages on the diagonal in Tables 14 versus Table 16 (on the diagonals, the rating is the same at the end of the year as at the beginning) and correspondingly larger percentages in the N.R. category in Table 14. In contrast, percentages on the diagonals of Tables 15 and 17 are generally quite similar.

The reasons for the larger percentage of most-recent-internal ratings migrating to N.R. are not entirely clear but may be related to the fact that Moody's migration studies use issuer ratings whereas this study's most-recent-internal rating data are maintained at the asset level.[38] In Moody's and S&P's data, an issuer migrates to "WR" (withdrawn rating) status mainly when it pays off *all* its rated debt (or sometimes when it ceases to provide information to the rating agency). In contrast, in this study, no year-end rating may be available because the *asset* has matured or has been paid off early, because its identifying number was changed, or because for some reason the year-end internal rating was not included in the data contribution. Table 18 sheds light on the relative frequency of such events, breaking down the percentages in the "N.R." column of Table 14 into three component parts:

1) Those for which N.R. status occurs in the year of maturity ("Matured").
2) Those for which there is a zero balance outstanding at the end of the year in which N.R. status occurs. These most likely were paid off early or sold, although some may be cases where the asset was transferred out of the general account or the PPN was changed, interfering with our ability to track the asset through time (thus the "?" in

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[37] The Moody's exercise included data for firms with Moody's long-term debt ratings that are in all nations and sectors, except Sovereigns. Default rates differ slightly from those shown in Table 5 because the Moody's calculator uses slightly different data or methods to compute default rates and transition matrices.

[38] The exact nature of the internal ratings reported by contributors is not known. They might be borrower ratings or ratings of individual assets (which are influenced by the structure and seniority of the asset as well as by the creditworthiness of the borrower).

the "Payoff?" column heading in Table 18).
3) The year-end outstanding balance was positive, but no internal rating was reported (the "Unknown" column in Table 18).

The great majority of issuers that pay off an asset probably continue to have other placements outstanding. Thus, if Table 14 were done at the issuer level and for the entire universe of private placements, the fraction of ratings migrating to N.R. would be much smaller. A crude way of adjusting Table 14 to be on a basis more comparable to Table 16 is to distribute most of the percentage in the N.R. column for each row across the row in proportions similar to the percentages in the non-N.R. columns. This amounts to interpolating between Tables 14 and 15. Doing this by eye yields an impression that revised percentages on the diagonal of Table 14 would be only a bit smaller than those for Moody's ratings. Alternatively, if it is convenient to exclude NR and WR cases from analysis, one can simply use Table 15.

Though such adjustments make the use of agency rating migration matrices in credit models applied to private placements seem more palatable, the off-diagonal elements of Tables 14 and 15 differ from those in Tables 16 and 17. Most-recent-internal ratings appear to have a larger probability of multiple-grade rating jumps for the investment-grade internal ratings, which may be important for some modeling applications.

Table 19: NAIC Rating Migration Rates (percent)

Rating	to:							
from:	1	2	3	4	5	6	CRE	N.R.
1	**75.78**	5.63	0.38	0.16	0.12	0.07	0.11	17.76
2	4.62	**71.56**	3.81	0.64	0.32	0.24	0.43	18.37
3	1.26	8.73	**56.59**	5.58	1.16	0.46	1.95	24.28
4	1.37	1.54	6.80	**44.03**	6.69	1.77	4.17	33.63
5	0.78	1.92	0.93	6.70	**43.91**	6.27	7.91	31.58
6	0.09	0.38	0.00	2.17	6.61	**40.60**	5.10	45.04

Table 20: NAIC Rating Migration Rates, N.R. Excluded (percent)

Rating	to:						
from:	1	2	3	4	5	6	CRE
1	**92.14**	6.84	0.46	0.19	0.15	0.09	0.14
2	5.66	**87.67**	4.66	0.79	0.40	0.29	0.53
3	1.66	11.53	**74.73**	7.37	1.53	0.61	2.58
4	2.07	2.32	10.25	**66.34**	10.07	2.67	6.28
5	1.15	2.81	1.35	9.79	**64.17**	9.17	11.56
6	0.17	0.69	0.00	3.95	12.03	**73.88**	9.28

Tables 19 and 20 display rating migration patterns for NAIC ratings, with and without N.R. cases, respectively. The underlying data are limited to the period 1991-2002 (in earlier years only ratings on the old NAIC scale are available). The chance of multiple-grade NAIC-rating improvements appears to be somewhat larger than for multiple-grade deteriorations in most recent internal rating, but this may simply reflect the time period covered (a recession ended in 1991 and the economy improved thereafter). The

breakdown of the N.R. percentage (not shown in tables) is a bit different than in Table 18, with similar fractions maturing but somewhat more moving to N.R. for unknown reasons and somewhat less because of an apparent asset payoff or sale.

N. Rating Disagreements and Relative Predictive Power

Credit ratings are opinions about credit quality. Differences of opinion are to be expected. As ratings are used more heavily and receive more attention, the frequency of differences of opinion is of some interest, as is the relative predictive power of different kinds of ratings for credit events and losses.

Like the previous subsection, the Committee views the results in this subsection as preliminary and incomplete. More results and analysis may appear in future editions of this study. Moreover, results should be interpreted with caution because data problems may affect the results. For this subsection, the most important possible data problems probably would be associated with miscoded or unreported most-recent-internal-ratings and NAIC ratings. If there is any tendency for miscoded ratings or unreported ratings to be associated with assets with volatile or very uncertain credit quality, that might tend to bias the results of this subsection in unknown ways.

Most assets in this study carry two ratings at each year-end, a most-recent-year-end internal rating and a most-recent-year-end NAIC rating. Although the scales are different, for experience years 1991 and later, the two kinds of ratings can be compared using the concordance scale shown in the middle panel of Table 10 because most-recent-internal-ratings are reported on the major rating agency scales. (In this subsection, NAIC grades 5 and 6 are lumped together into concordance grade 5.) Table 21 displays the frequency of differences between most-recent-internal and most-recent NAIC ratings of each magnitude. The extent of agreement is remarkable, with full agreement for 81 percent of the number of assets and a difference of opinion of one grade or less for 98 percent of the number of assets. However, such agreement is perhaps to be expected given that 86 percent of exposed assets are the internal equivalent of investment grade and such low-risk assets fall into the first two grades on the

Table 21. Frequency of Most-Recent-Internal Versus NAIC SVO Rating Disagreements, 1991 and later (percent).

Number of Grades Different	Marginal Frequency	Cumulative Frequency
0	81	81
1	17	98
2	2	100
3	0.4	100
4	0.1	100

Table 22. Frequency of Most-Recent Internal-Rating Disagreements Across Insurance Companies, All Years (percent).

Number of Grades Different	Marginal Frequency	Cumulative Frequency
0	70	70
1	24	94
2	5	99
3	1	99.8
4 or 5	0.2	100

concordance scale.

Table 22 reports frequencies of disagreement across insurance companies about most-recent-internal-ratings of the same asset (assets were matched across companies by PPN, yielding about 22,000 comparable pairs of ratings). Disagreements are more common than in Table 21, but the rating scale is more fine-grained, with four investment grades available.

Disagreements about most-recent-internal ratings are somewhat more frequent for very safe and very risky assets. For example, 80 percent of cases where a pair of contributors hold the same asset and where one contributor rates the internal equivalent of BBB are also BBB at the other contributor, but for AAA and B assets the percentages are 49 and 37, respectively. Table 23 displays the frequency distribution of assets across all permutations of pairs of ratings by different companies of the same asset at the same time.

Table 23. Rating Disagreements by Quality: Distribution of Ratings of the Same Assets By Different Companies For All Permutations of Company Pairs For All Common Assets

Rating At One Company	Rating At Other Company						
	1	2	3	4	5	6	7
1	2.08						
2	1.94	5.01					
3	1.72	4.70	21.28				
4	0.60	1.52	11.16	37.50			
5	0.06	0.08	0.46	4.92	2.94		
6	0.02	0.02	0.10	0.88	1.16	0.71	
7	0.00	0.02	0.12	0.18	0.24	0.26	0.28

Entries in table should sum to 100%. Because of rounding, it sums to 99.96%.

Some disagreements may arise not because of any substantive disagreements, but because the schedules on which ratings are reviewed and updated are not synchronized across insurance companies or between insurance companies and the NAIC. For example, one company might update a rating just before year-end and another just after-year end.

Although disagreements about individual most-recent-internal ratings are fairly common, contributing companies generally agree about the credit quality of assets on average. Table 24 displays mean disagreements about most-recent-internal ratings for each insurance company for assets that are common with any other company (a few companies are omitted because only a small number of their assets appear on the books at other companies). Companies more optimistic than their peers on average have negative means. Most companies are in close agreement with peers on average, with one glaring exception. Company 1 is more optimistic than peers about common assets by almost one-and-three-quarter full grades. Its optimism is economically material: When grades

are mapped into default probabilities and capital allocations, the mean difference is more than one percentage point of default probability and four percentage points of capital allocation (not shown in tables).[39] Average disagreements are also small when most-recent-internal ratings and most-recent NAIC ratings are compared, again with the one exception (not shown in tables).

The relative predictive power of internal and NAIC ratings is of some interest. The two kinds of ratings are produced differently and are intended for different purposes. Results described earlier make clear that both are predictive of loss, but where there is disagreement, is one kind of rating more informative than the other?

Table 25 displays results from a logistic regression in which the dependent variable has a value of 1 if a CRE occurred in the experience year for the observation and a value of zero otherwise. The explanatory variables are a series of indicator variables for the combination of most-recent ratings assigned by the NAIC and the insurance company, using the concordance scale shown in the middle panel of Table 10. In essence, the regression splits the data into cells corresponding to each possible combination of most-recent-internal rating and most-recent-NAIC rating and measures the likelihood of a CRE for each cell. Incidence rates by number are shown in the fourth column of Table 25. The focus of this analysis is on cases of disagreement. For example, if at the prior year-end an asset is rated 1 by the NAIC but 3 by the insurance company, are incidence and loss rates over the following year similar to those of assets rated 1 by both the NAIC and the company? If such rates are higher, the implication is that the internal rating has incremental predictive power because the internal rating 3 is riskier than the NAIC rating 1. The fifth column of Table 23 summarizes the results of comparisons, with "internal" appearing where the most-recent-internal-rating is more consistent with incidence rates and "NAIC" rating where the most-recent NAIC rating is more in line. A "Y" appears if the difference in regression coefficients is statistically significant. For example, assets rated the equivalent of 1 by both the contributing company and the NAIC have an incidence rate of 0.07 percent, whereas the incidence rate is 4.37 percent if the NAIC rating is 1 and the internal rating is 3 on the concordance scale. Thus, the riskier internal rating correctly predicts that incidence rates are higher for the given assets, and the difference between the logistic regression coefficients corresponding to the 4.37 and 0.07 percent incidence

Table 24. Mean Internal Rating Disagreement By Company (number of grades different than peers)

Company	Mean Disagreement
1	-1.73
2	-0.08
3	-0.07
4	-0.04
5	-0.21
6	-0.03
7	-0.10
8	-0.03
9	0.08
10	0.08
11	0.05
12	0.06
13	0.13
14	0.05
15	0.15
16	0.20
17	0.49

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[39] The large difference suggests the possibility of reporting error. If such error is responsible, it does not materially affect other results of this study because the unusual company is among the smaller contributors and its assets do not form a large fraction of all exposures.

rates is statistically significant.

Table 25. Predictive Ability of Different Kinds of Ratings

| Rating | | Regression | Incidence | Significance- | Economic | Number | Number of |
NAIC	Internal	Coefficient	By Number	Who's right	Loss Rate	Exposed	#CREs
5	1	NA					
5	2	-1.74	16.59	Y-NAIC	13.21	109	18
5	3	-2.46	9.43	Y-NAIC	3.06	212	20
5	4	-2.13	12.52	Y-NAIC	6.23	352	44
5	5	-3.24	4.57		4.45	789	36
4	1	NA					
4	2	-3.31	3.91	---NAIC	0.32	359	14
4	3	-2.67	7.46	Y-NAIC	2.33	630	47
4	4	-3.32	4.36		2.69	1331	58
4	5	-2.33	10.00	Y-internal	6.78	80	8
3	1	NA					
3	2	-4.41	1.32	Y-internal	0.59	1663	22
3	3	-3.88	2.30		1.01	3299	76
3	4	-2.90	5.96	Y-internal	2.86	319	19
3	5	-1.14	28.57	Y-internal	25.07	32	9
2	1	-6.59	0.15	Y-internal	0.02	3341	5
2	2	-5.61	0.40		0.15	20152	80
2	3	-3.82	2.37	Y-internal	0.47	1099	26
2	4	-3.14	4.57	Y-internal	0.91	175	8
2	5	NA					
1	1	-7.36	0.07		0.02	27485	19
1	2	-5.87	0.31	Y-internal	0.04	3264	10
1	3	-3.20	4.37	Y-internal	0.56	115	5
1	4	-3.20	4.40	Y-internal	1.22	46	2
1	5	NA					

NA (not applicable) appears in some rows because the number of observations associated with the specified most-recent internal and NAIC ratings was small and the number of CREs zero.

A glance at the fifth column of Table 25 reveals an interesting pattern: Although incidence rates are somewhat more frequently consistent with most-recent-internal-ratings than with NAIC ratings, the preponderance of the incremental predictive power of most-recent-internal-ratings' occurs when the NAIC is optimistic and the insurance company is pessimistic. In contrast, the NAIC rating is most likely to have incremental predictive power when the insurance company is relatively optimistic and the NAIC relatively pessimistic. Indeed, where the NAIC is very pessimistic (grade 5), insurance company optimism is associated with substantially *higher* incidence rates than when both the most recent internal and the most recent NAIC ratings are 5. However, a glance at the sixth column reveals a mixed pattern of economic loss rates for assets rated 5 by the NAIC.

A mirror-image exercise was conducted in which the internal rating was used as the baseline (not shown in the table). For example, instead of comparing the 4.93 percent incidence rate for NAIC=1, internal=3 assets with NAIC=1, internal=1 assets, the baseline is NAIC=3, internal=3 assets, which have an incidence rate of 2.30 percent. Here NAIC optimism is associated with incidence rates even higher than in the case when both parties agree that assets should be rated 3. In this alternative exercise, the overall pattern again implies that the more pessimistic party is more often correct, although NAIC ratings are somewhat more frequently "correct" than internal ratings than in the exercise shown in Table 25.

Results in Table 25 should be interpreted with caution because the number of exposures that are associated with some rows is small. Moreover, even though most-recent-internal ratings and most-recent-NAIC-ratings are measured as of year-end, it is possible that instances of large differences in ratings arise because one rating was downgraded or upgraded just before year-end and the other was changed just after year-end. Bearing all the caveats in mind, the results imply that an insurance company might be able to improve its loss experience by more closely monitoring assets rated as being quite risky by the NAIC but not so risky by the insurance company. It is less clear that the NAIC could profit from information about insurance companies' most-recent-internal ratings. Even if the NAIC had timely access to such internal ratings, its use of the ratings might influence internal rating decisions and reduce their value both to the NAIC and the insurance company.

O. Principal Findings

In a business where basis points matter, people with different purposes may disagree about the importance of differences in the performance of asset classes even when confronted with the same statistics. When the uncertainties are taken into account, though, a number of findings stand out:

- During the period studied, private placements had materially better loss experience than publicly issued bonds, even after controlling for differences in aggregate portfolio quality.
- Privates with internal credit ratings that equate to AAA/Aaa through BB/Ba at the start of each year had loss experience over one-year horizons similar to that for publicly issued bonds. Incidence or default rates were worse, but loss severities were better, leaving economic loss rates about the same.
- Private placements with a most recent quality rating of B or riskier had materially lower credit loss rates than publicly issued bonds. Incidence or default rates, loss severities, and economic loss rates were all better.

- If it were possible for this study to compute loss rates over a multiyear horizon, it seems quite likely that private placements across the credit quality spectrum would have lower losses that publicly issued bonds over the life-of-the-loan

(because highly rated instruments often are rated B or riskier for a while prior to default).

- If this study's data are representative of the private placement asset class, and after controlling for difference in the aggregate credit quality of the public bond and private placement assets classes, private placements have lower credit loss rates than publicly issued bonds.

- The period analyzed in this study arguably covers roughly two full credit cycles. The results of the study, while qualitatively similar to results in previous editions, are now much more credible because of the presence of two recession periods in the data.

- This study's implications for credit risk experience during a "typical" credit cycle depend on one's views about the relative proportions of recession and normal years in a "typical" cycle and about the severity of the downturn.

- In the early 1990s, various groups expressed fears that below investment grade private placements carried extraordinary portfolio risks and many insurance companies reduced their investment activity in this market segment. But in fact below investment grade private placements did not perform worse than other corporate debt during the credit market upheavals of the early 1990s (loss rates were smaller than on similarly rated public bonds). Thus, it appears the fears were overstated.

- Internal credit risk ratings of participating companies and NAIC ratings are credible in that experience by rating tracks that in the public markets. Although insurance companies fairly frequently disagree with the NAIC and with each other about ratings of individual placements, on average the disagreements are small. Where there is disagreement, the more pessimistic rating appears to have more predictive power for incidence rates, suggesting that investors be attentive to ratings assigned by others even when they disagree with such ratings.

- Individual CRE loss severities are widely distributed and thus hard to predict, as in the public market. However, severities for senior private placements are systematically better than for subordinated debt, whether the CRE is a default or a restructuring.

- Restructurings appear to carry lower severities on average than defaults.

- Assets of different types, such as asset-backed securities and traditional bonds, performed similarly on the whole during the more recent credit cycle, but these results are based on a shorter time period and a smaller amount of data than the full sample and thus should be used with caution.

- The typical life cycle of CREs has the great majority occurring during the first

seven years after issuance, and especially during the first three or four years, in line with average lives and typical amortization schedules for privates.

- Evidence of cyclical variations in loss severities is mixed.

On the whole, the picture is one of an orderly market that, over long time periods, outperforms the public bond asset class in terms of loss rates and behaves sensibly in other respects.

IV. CROSS TABULATION

A. Introduction

So far in this report we have looked at one risk factor at a time by experience year but not two factors at a time unless the second factor happens to be the experience year. It was not until our third (i.e. 93-94) study that we undertook cross tabulation analysis. We now have 17 years of data, but many cells in the two-dimensional arrays still do not have enough CREs to support definitive conclusions.

This interest in cross tabulation stems from the potential correlation between risk factors. Credit risk may seem to be driven by one factor while being actually driven by another, an underlying factor with which it happens to be correlated. We are liable to misconstrue results by failing to make such connections. So as we study one factor at a time, we should 'control' the other factors, not disregard them. One way to do so is by cross tabulation. The questions it will help answer include:

- Is the coupon effect the quality-rating effect in disguise?
- Is the seasoning effect the economic-cycle effect in disguise?

We will discuss three cross tabulations involving the following pairs of variables:

1. the original coupon rate   by the earliest quality rating
2. the number of years since funding   by the earliest quality rating
3. the funding year   by the experience year

Two of the three cross tabulations involve the earliest quality rating, which is an imperfect proxy for the original issue rating. It is defined to be the original issue rating in the instances when it is available. Otherwise, it is defined to be the historical rating that we can trace back year by year to the bond's point of first entry into the study. As such, it is only as historical as a data contributor's participation in the study.

The first cross tabulation explores the coupon effect. The second explores the seasoning effect. The third also explores the seasoning effect, but with an adjustment for economic conditions. Our analysis has led to two fairly compelling conclusions. **First, there is a coupon effect, which persists even after segregating by the earliest quality rating. Second, there is a seasoning effect, which persists even after normalizing for economic conditions.**

As we discuss each cross tabulation, we will state the objective, suggest a hypothesis with an economic rationale, analyze the four key statistics in turn, cite a corroborative study if available, and state the caveats where appropriate. The key charts and tables for each of subsections B, C and D appear within each subsection. Some auxiliary charts and tables not discussed in the text appear in Appendix IV.

Notes on the Graphs and Tables

In the interest of full disclosure, Appendix IV displays not only the four key statistics, which consist of ratios between CRE data and exposure data, but also the five aggregate values that make up the numerators and denominators of these ratios. The relation between the four ratios on one hand and the five aggregate values on the other are summarized schematically in the following table.

4 Key Statistics as Ratios of Aggregate Values

5 Aggregate Values		Incidence Rate by Number	Incidence Rate by Amount	Loss Severity	Economic Loss Rate
1	# of CREs	# of CREs			
2	# of Exposure	# of Exposure			
3	$ of Loss			$ of Loss	$ of Loss
4	$ of CRE		$ of CRE	$ of CRE	
5	$ of Exposure		$ of Exposure		$ of Exposure

The graphs often appear in sets of four, one for each key statistic. These four statistics are plotted in two granularities by quality rating and by coupon rate as summarized below and schematically presented in the next chart:

- By quality, a 2-way breakdown between Investment Grade (I.G.) and Below Investment Grade (B.I.G.)
- By quality, a 4-way breakdown by AAA-A, BBB, BB, and <BB
- By coupon, a 4-way breakdown in larger intervals (6-9%, 9-11%, 11-13%, and 13+%)
- By coupon, an 8-way breakdown in fine '1%' intervals (8-9%, 9-10%, etc.)

Earliest Quality Rating   Coupon Range in %

Division:		Broad	6-9		9-11		11-13		13+	
	Broad	Fine	6-8	8-9	9-10	10-11	11-12	12-13	13-14	14+
Total	I.G.	AAA-A								
		BBB								
	B.I.G.	BB								
		<BB								
	NA									

The 'Total' results for all quality ratings combined do not necessarily interpolate between Investment Grade and Below Investment Grade for two reasons:

1. The Total includes the Not Available category. As such, it is a three-way average, not a two-way average just between Investment Grade and Below Investment Grade.

2. Investment Grade and Below Investment Grade may be distributed differently. For example, in the cross tabulation between the original coupon rate and the earliest quality rating, Below Investment Grade is weighted towards high coupons while Investment Grade is weighted towards low coupons. So both incidence rates can be horizontal as a function of the coupon rate while the Total can still slope upwards.

In grouping data into cells, we can strive for either (1) an even distribution of calibration points or (2) an even distribution of CREs among the resultant cells. We have done the former on the coupon rate but the latter on the number of years since issuance. Thus, the coupon range is evenly spaced (in largely 1% or 2% intervals) while the seasoning is unevenly spaced (in a finer grouping of early years and a broader grouping of later years).

Because the number of CREs is indicative of the credibility of a cell, we have displayed the cell-specific number of CREs in the tables below most cross-tabulation graphs. The larger cells are more stable but at the same time more liable to gloss over nuances. This tradeoff between stability and nuances is the reason behind the dual granularities in our cell definition.

As far as fitting a curve to the data points is concerned, we generally favor <u>interpolation</u> through a smoother array of data points at low granularity. For more scattered array of data points at high granularity, we favor a <u>regression</u> approach. The dual granularities facilitate two viewpoints, i.e., low granularity to capture the underlying trend more tellingly and high granularity to display the not-to-be-overlooked vicissitudes more tellingly.

B. Original Coupon Rate by Earliest Quality Rating

The first cross tabulation, between coupon rate and earliest rating, examines whether the coupon rate is a risk factor in its own right, i.e., independently of the rating. In other words, is there a 'pure' coupon effect? The fact that the incidence of CREs is positively correlated with the coupon rate irrespective of ratings is inconclusive. After all, other things being equal, the higher the coupon the lower the quality. So what purports to be a coupon factor may turn out to be nothing but the quality-rating factor in disguise.

Nevertheless, there is an economic argument for a pure coupon effect. A debt service is more onerous to the borrower at 13% than at 7%. This is because a higher coupon requires more income to service. It therefore stands to reason that a bond with a higher coupon may be more prone to credit risk over time than another issued at the same rating but with a lower coupon in a lower interest-rate environment at time of issue.

<u>*Analysis of the Four Statistics*</u>

One way to isolate the coupon effect from the quality-rating factor is to show how the experience varies by coupon while the rating is held constant. Before we do so, we first merge two of the smaller cells, the 6-7% and the 7-8%, into a single cell for greater

stability. We further exclude all cells under 6% to remove what may be a preponderance of discount or accrual ("zero-coupon") bonds at this end, where the very low coupon in and of itself may not capture the entire debt service. (For this reason, the coupon effect is a nomenclature adopted for ease of reference only; it is better called the debt-service effect.)

After such a consolidation of some cells and elimination of others, the streamlined tabulation results in the following behavioral pattern across the coupon range. All four key statistics are invariant across the three leftmost cells (6-8%, 8-9% and 9-10%), and relatively invariant across the two rightmost cells (13-14% and 14+%)   But there is a monotonically increasing trend across the 5 middle cells (9-10%, 10-11%, 11-12%, 12-13% and 13-14%), except for the loss severity where the 9-10% severity is higher than the 10-11% one.

Next, we make a minimal, first-order division by quality, just between Investment Grade (AAA, AA, A, and BBB) and Below Investment Grade (BB and below). Such bisection is enough to make the statistics 'noisier'. We can no longer make a blanket statement on all four statistics. In fact, we cannot pass a smooth curve through the noisiest statistic, the loss severity. While we can still pass a smooth curve through the data points of the other three statistics, each curve as a function of the coupon rate is now only generally increasing instead of strictly increasing.

Nevertheless, if we conserve the overall number of 'buckets' from single-tabulation to cross-tabulation by merging adjacent coupon cells to compensate for the bisection by rating, three of the four loss statistics reemerge as largely monotonically increasing functions of the coupon rate. This is true of Investment and Below Investment Grades. In either case, if we compare the highest coupon range (13+%) to the lowest (6-9%) with respect to incidence and economic loss rate, we can see a significant increase. It is noteworthy to mention that this increase is less dramatic than in the last study as shown in the table below.

	1986-1998		1986-2002	
	6-9%	13%+	6-9%	13%+
# of CREs	62	32	181	32
Incidence by #	0.22%	0.65%	0.40%	0.63%
Incidence by $	0.21%	1.06%	0.41%	0.99%
Economic Loss	0.05%	0.38%	0.16%	0.36%
Loss Severity	24%	36%	38%	36%

The latest peak in CREs in 2001 and 2002 has changed the strong increasing trend to a more moderate one for the first 3 statistics and eliminating the increase altogether in the case of loss severity.[40]

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[40] The observe is lift to wonder whether the change in trend is the result of the secular decline in interest rates making high single diget coupon rates just as onerous currently as the mid double-digit rates were in the early '90s.

Incidence by #, Incidence by $, Economic Loss Rate, and Loss Severity
By Coupon Rate
Earliest Quality Rating: Investment Grade, Below Investment Grade & Not Available

	6-8%	8-9%	9-10%	10-11%	11-12%	12-13%	13-14%	14%+
# of CREs	155	107	137	194	97	97	74	102
Incid by #	0.49%	0.47%	0.58%	1.23%	1.46%	1.71%	1.89%	2.13%
Incid by $	0.53%	0.52%	0.59%	1.36%	1.81%	2.39%	3.25%	2.99%
Econ Loss	0.18%	0.18%	0.19%	0.37%	0.55%	0.92%	1.51%	1.41%
Loss Sev	35%	36%	33%	27%	30%	38%	46%	47%

Coupon Rate

Incidence by #, Incidence by $, Economic Loss Rate, and Loss Severity
By Coupon Rate
Earliest Quality Rating: Investment Grade

Coupon Rate	6-8%	8-9%	9-10%	10-11%	11-12%	12-13%	13-14%	14%+
# of CREs	119	62	68	86	28	13	9	23
Incid by #	0.43%	0.35%	0.38%	0.82%	0.75%	0.39%	0.40%	0.81%
Incid by $	0.47%	0.38%	0.41%	0.81%	0.99%	0.43%	0.62%	1.32%
Econ Loss	0.16%	0.18%	0.14%	0.24%	0.25%	0.14%	0.24%	0.46%
Loss Sev	34%	46%	33%	30%	25%	31%	39%	35%

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Incidence by #, Incidence by $, Economic Loss Rate, and Loss Severity
By Coupon Rate
Earliest Quality Rating: Below Investment Grade

Coupon Rate	6-8%	8-9%	9-10%	10-11%	11-12%	12-13%	13-14%	14%+
# of CREs	32	36	53	88	49	49	33	52
Incid by #	1.54%	1.93%	2.51%	3.48%	3.85%	4.65%	4.26%	5.75%
Incid by $	3.86%	2.94%	2.86%	4.55%	3.66%	4.97%	4.93%	7.40%
Econ Loss	1.68%	0.84%	1.16%	1.21%	1.28%	2.46%	2.24%	4.00%
Loss Sev	43%	29%	41%	27%	35%	49%	45%	54%

Coupon Rate

Incidence by #, Incidence by $, Economic Loss Rate, and Loss Severity
By Coupon Rate
Earliest Quality Rating: Investment Grade

	6-9%		9-11%		11-13%		13%+
# of CREs	181		154		41		32
Incid by #	0.40%		0.54%		0.58%		0.63%
Incid by $	0.44%		0.55%		0.74%		0.99%
Econ Loss	0.16%		0.17%		0.20%		0.36%
Loss Sev	38%		31%		27%		36%

Coupon Rate

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Incidence by #, Incidence by $, Economic Loss Rate, and Loss Severity By Coupon Rate Earliest Quality Rating: Below Investment Grade

	6-9%		9-11%		11-13%		13%+
# of CREs	68		141		98		85
Incid by #	1.72%		3.04%		4.21%		5.06%
Incid by $	3.33%		3.79%		4.25%		6.04%
Econ Loss	1.20%		1.19%		1.81%		3.03%
Loss Sev	36%		31%		43%		50%

Coupon Rate

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Even though a further division to the individual-rating level will result in even sparser cells, it is incumbent upon us to do so because the mere classification between Investment Grade and Below Investment Grade is far too broad to produce truly homogenous cells by quality. So we minimally subdivide Investment Grade between AAA-A combined and BBB alone. We also minimally subdivide Below Investment Grade between BB alone and all below BB.

Among these four classes, the BB manifests the strongest positive correlation between each of three statistics and the coupon rate. The three are the two incidence rates and the economic loss rate. Furthermore, the positive correlation is evenly sustained through a wide coupon range, from 8% to 14%, tailing off slightly only at the two ends of the spectrum outside this range.

The AAA-A class exhibits a coupon effect only at the high end of the coupon range. As the coupon rate increases, the incidence rates and economic loss rate remain essentially flat until 12% or 13%, whereupon they all rise. The rise is significant within the context of the generally low level of incidence rates and economic loss rate for the AAA-A class but not so vis-a-vis the vicissitudes exhibited in the lower-rating classes.

The BBB class begins to exhibit the coupon effect at the crossover from single digits to double digits, namely, at 10%. Beyond this inflection point at 10%, the two incidence rates flatten or even fall off slightly as a function of the coupon rate. The economic loss rates, on the other hand, are fairly flat until they rise at 14%.

Finally, the class of bonds rated B or below defies a simple characterization of any of the four statistics. None are well correlated with the coupon rate except perhaps for the incidence rate by number. The difficulty may emanate from the fact that such low-quality bonds by definition should not 'reside' at the low end of the coupon range. So, at this rating, the cells on the far left of the coupon range may be too sparse to be credible.

Two Interpretations

The coupon effect lends itself to two interpretations, which are not mutually exclusive. One is the coupon effect as a 'second-order' quality effect. The other is the debt-service effect, which we have characterized as a pure coupon effect.

The fact that the loss statistics are positively sloping within the same quality rating does suggest that the coupon effect is not entirely a latent quality effect. However, to the extent that subtle quality distinctions within the same rating do give rise to a coupon differential, a residual quality effect may not be completely separable from the coupon effect. After all, quality is continuous while ratings are discrete. Bonds with the same rating are not all alike. Rating agencies recognize this by subdividing Baa into Baa1, Baa2, and Baa3 (Moody's) and BBB into BBB+, BBB, and BBB- (S&P). The private-placement market may be efficient enough to make similar quality distinctions through the coupon rate.

Incidence by Number
By Coupon Rate &
Earliest Quality Rating (AAA-A, BBB, BB, and B & Below)

	6-8%	8-9%	9-10%	10-11%	11-12%	12-13%	13-14%	14%+
<BB	1.43%	2.13%	1.68%	3.85%	4.29%	5.71%	5.16%	7.20%
BB	1.64%	1.84%	2.94%	3.23%	3.61%	3.95%	3.52%	4.16%
BBB	0.74%	0.54%	0.67%	1.30%	1.35%	0.51%	0.45%	1.12%
AAA-A	0.19%	0.20%	0.17%	0.33%	0.11%	0.29%	0.35%	0.50%

Coupon Rate

Incidence by Number
By Coupon Rate &
Earliest Quality Rating (AAA-A, BBB, BB, and B & Below)

	6-9%		9-11%		11-13%		13%+
● <BB	1.69%		2.95%		4.98%		6.24%
◆ BB	1.75%		3.09%		3.76%		3.69%
■ BBB	0.66%		0.93%		0.97%		0.83%
▲ AAA-A	0.20%		0.22%		0.20%		0.60%

Coupon Rate

Incidence by Amount
By Coupon Rate &
Earliest Quality Rating (AAA-A, BBB, BB, and B & Below)

	6-8%	8-9%	9-10%	10-11%	11-12%	12-13%	13-14%	14%+
● <BB	5.42%	3.47%	1.84%	7.95%	3.86%	8.13%	4.68%	9.37%
◆ BB	2.93%	2.82%	3.19%	3.42%	3.59%	3.38%	5.20%	5.27%
■ BBB	0.85%	0.66%	0.80%	1.18%	1.51%	0.56%	0.96%	1.66%
▲ AAA-A	0.17%	0.14%	0.10%	0.30%	0.22%	0.29%	0.29%	1.10%

Coupon Rate

Incidence by Amount
By Coupon Rate &
Earliest Quality Rating (AAA-A, BBB, BB, and B & Below)

	6-9%		9-11%		11-13%		13%+
● <BB	4.64%		5.23%		6.08%		6.86%
◆ BB	2.86%		3.31%		3.51%		5.14%
■ BBB	0.78%		0.95%		1.12%		1.39%
▲ AAA-A	0.16%		0.16%		0.25%		1.16%

Coupon Rate

Loss Severity
By Coupon Rate &
Earliest Quality Rating (AAA-A, BBB, BB, and B & Below)

	6-8%	8-9%	9-10%	10-11%	11-12%	12-13%	13-14%	14%+
● <BB	56%	54%	23%	20%	20%	54%	53%	48%
◆ BB	29%	22%	44%	32%	40%	44%	38%	66%
■ BBB	34%	49%	35%	29%	23%	42%	34%	43%
▲ AAA-A	32%	34%	23%	33%	40%	10%	53%	26%

Coupon Rate

Loss Severity
By Coupon Rate &
Earliest Quality Rating (AAA-A, BBB, BB, and B & Below)

	6-9%		9-11%		11-13%		13%+
● <BB	55%		20%		44%		49%
◆ BB	25%		37%		42%		40%
■ BBB	39%		32%		27%		40%
▲ AAA-A	32%		29%		23%		30%

Coupon Rate

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**Economic Loss Rate as % of Exposure
By Coupon Rate &
Earliest Quality Rating (AAA-A, BBB, BB, and B & Below)**

	6-8%	8-9%	9-10%	10-11%	11-12%	12-13%	13-14%	14%+
● <BB	3.05%	1.86%	0.43%	1.58%	0.77%	4.42%	2.48%	4.50%
◆ BB	0.86%	0.62%	1.40%	1.09%	1.45%	1.48%	1.99%	3.46%
■ BBB	0.29%	0.33%	0.28%	0.34%	0.36%	0.23%	0.33%	0.72%
▲ AAA-A	0.05%	0.05%	0.02%	0.10%	0.09%	0.03%	0.15%	0.29%

Coupon Rate

Economic Loss Rate as % of Exposure
By Coupon Rate &
Earliest Quality Rating (AAA-A, BBB, BB, and B & Below)

	6-9%		9-11%		11-13%		13%+
● <BB	2.57%		1.06%		2.66%		3.34%
◆ BB	0.71%		1.23%		1.46%		2.06%
■ BBB	0.30%		0.30%		0.30%		0.55%
▲ AAA-A	0.05%		0.05%		0.06%		0.35%

Coupon Rate

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Nevertheless, there is more to the coupon effect than a second-order quality effect. Otherwise, we would see a smooth escalation in credit risk and no 'inversion' between high coupons of one rating and low coupons of a lower rating. But inversion we do see. In fact, our results show that a high-coupon AAA-A bond exceeds a low-coupon BBB bond in incidence rates by amount. Even more so, a high-coupon BB bond exceeds a low-coupon <BB bond in incidence rates by number and economic loss rate. So, in the extreme, a big enough coupon differential can overcome a small rating differential.

Corroboration

A study to corroborate the coupon effect is hard to find. So we may have hit upon a facet that has not been widely studied. For any kind of independent confirmation we have to turn to the commercial-mortgage portion of our own 1986-89 Study[41]. In that study, we saw the same phenomenon - the higher the mortgage rate the greater the incidence of CREs as well as the economic loss rate.

Unlike bonds, commercial mortgages until recent years were not quality-rated and therefore much less differentiated in spread among concurrently originated loans[42]. So even if we assume part of the coupon variation to be an implicit quality differentiation, the clear and distinct interest-rate effect we observed on mortgages is hard to attribute entirely to the quality-rating effect.

A Caveat Regarding the Data

Here we study the relationship between the coupon rate for an asset as reported *for the given experience year* relative to the earliest quality rating. Because private placements often include material covenants, a bond that was high-quality at issuance but deteriorated thereafter might have its coupon rate revised upward with the deterioration. This might account for some of the inversion mentioned above.

C. Number of Years since Funding by Earliest Quality Rating

The cross tabulation between number of years since funding and earliest quality rating examines how the seasoning effect, which seems to hold for all quality ratings combined, manifests itself at the individual quality rating level.

The seasoning effect on the incidence rates as well the economic loss rate seems to define three periods with a fairly smooth transition from one period to the next:

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[41] Transactions, Society of Actuaries, 1993-94 Reports, 1986-1989 Credit Risk Event Loss Experience: Commercial Mortgage Loans and Private Placement Bonds, pp. 219-221

[42] Commercial-mortgage pricing might be sensitive to fundamental credit quality even if, administratively, insurance companies did not produce internal quality ratings. Nevertheless, the absence of a rigorous quality-rating system may have contributed to a smaller dispersion in credit spread compared to bonds.

- The first period, lasting about a year, is the select period (as in select-and-ultimate mortality). This may just be a reflection of the underwriting effect. That is to say, private placements do not go bad shortly after receiving a clean bill of health at issue. This statement is not as directly supported as in the previous study where we had only 4 CREs out of 681 (0.6%), now compared to 26 out of 993 CREs (2.6%). If we look only at the current period, i.e. 1999-2002, this ratio becomes 7.1% (22 CREs out of 312 occurred within 1 year of issue)

The following graph shows that even though the last period did see an increase in first year CREs, the final conclusion is still correct (i.e. a 3 phase distribution of CREs).

Distribution of CREs by Years since Funding
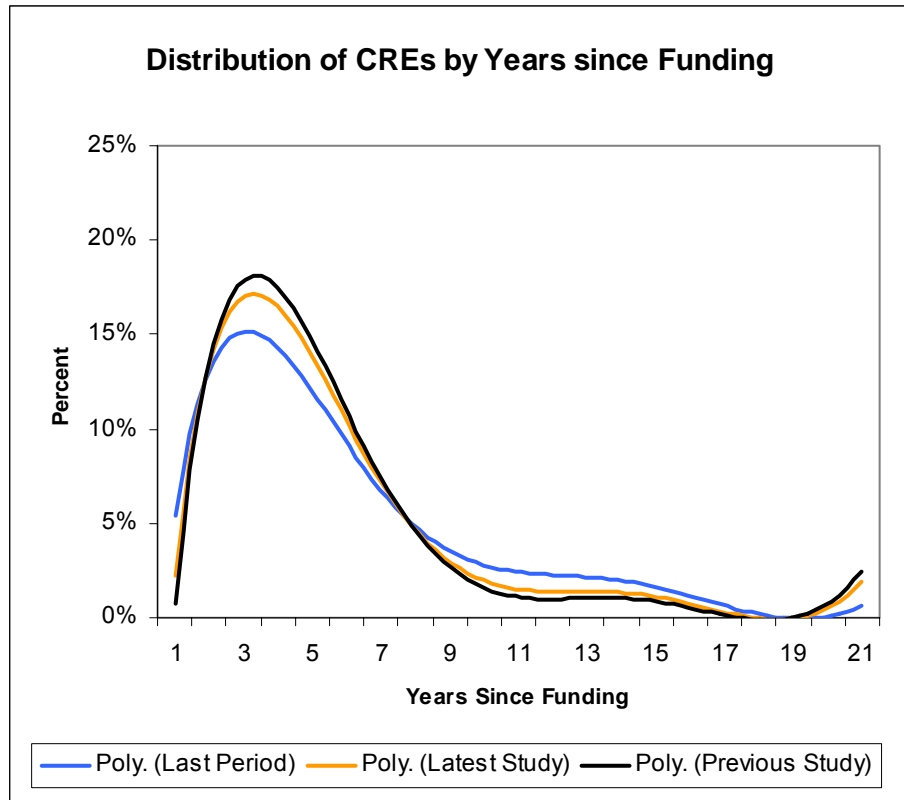
- The second period, over the next 5-6 years, is an intense weeding-out period peaking generally around year 3, when weaker private placements are most severely tested.

- The third and last period, beyond 6 or 7 years after issue, is the survival-of-the-fittest period. This is the steady state over which the hardy survivors seem to experience a lower incidence of CREs.

This pattern of going up-and-down through three phases instead of up-and-level through two makes this seasoning effect categorically different from an underwriting effect, or a select-and-ultimate effect, or a pure aging effect.

(It is tempting to reach the same conclusion from other studies by merely observing the tailing off of CREs over time since funding, as in our graph on the number of CREs by duration. This would not be a fair conclusion because the aggregate exposure itself also tails off by duration. In this study, we draw our conclusion more rigorously by observing the ratio between CREs and exposure, i.e., the incidence rate by duration.)

Analysis of the Four Statistics

In reviewing the 4 statistics one at a time, first in the two-way division between Investment Grade and Below Investment Grade, and then in the 4-way division among AAA-A, BBB, BB and <BB, we ask the following questions systematically:

1. Does the statistic fit the general pattern of rising to a peak and falling back?
2. At what point (or in what year since origination) does it rise to a peak?
3. Is the peak significant to the point of 3-4 times as high as the valley or asymptote?

In other words, we ask, 'Does it peak? When does it peak? And how high does it peak?' Of the four statistics, the one that best fits the pattern of rising to a peak and receding to a steady state is the incidence rate by number. The incidence rate by amount and the economic loss rate present the second best fit to this escalation-recession pattern. The loss severity does not fit this or any pattern at all.

For the incidence rate by number, the pattern fits Below Investment Grade very well (rising to a sharp peak in year 3) and Investment Grade reasonably well (rising to a milder peak in years 4-5). The same can essentially be said of the two divisions of Below Investment Grade, namely, BB and <BB. As for the two divisions of Investment Grade, namely, BBB and AAA-A, the pattern seems to hold, but with less CREs, the curves show some noise.

For the incidence rate by amount and the economic loss rate, similar observations can be made though not as emphatically. The exceptions to this general pattern are the BB and <BB categories, where the rather erratic loss severity has played havoc on the economic loss rate.

Overall, the pattern seems to hold within broad quality rating classes with respect to the two incidence rates and the economic loss rate but not the loss severity. In general, the lower the credit quality the sooner and more intense this middle 'weeding-out' period.

**Incidence by #, Incidence by $, Economic Loss Rate, and Loss Severity
By Years Since Funding
Earliest Quality Rating: Investment Grade, Below Investment Grade & Not Available**

	0.3	1.0	2.0	3.0	4.0	4.5	5.0	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5		19.0
# of CREs	26	121	166	187		218			172				52						51		
Incid by #	0.28%	0.67%	1.01%	1.32%		1.02%			0.72%				0.45%				0		0.41%		0
Incid by $	0.46%	0.55%	1.09%	1.25%		1.18%			0.86%				0.60%				0		0.42%		0
Econ Loss	0.27%	0.22%	0.41%	0.48%		0.34%			0.25%				0.17%				0		0.14%		0
Loss Sev	59%	41%	37%	39%		28%			29%				28%				0		33%		0

Years Since Funding

85

Incidence by #, Incidence by $, Economic Loss Rate, and Loss Severity
By Years Since Funding
Earliest Quality Rating: Investment Grade

	0.3	1.0	2.0	3.0	4.0	4.5	5.0	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5		19.0
# of CREs	12	41	50	74		97			84				32						29		
Incid by #	0.18%	0.31%	0.41%	0.69%		0.59%			0.46%				0.39%				0		0.32%		0
Incid by $	0.42%	0.24%	0.46%	0.84%		0.58%			0.52%				0.32%				0		0.33%		0
Econ Loss	0.25%	0.08%	0.19%	0.33%		0.17%			0.14%				0.05%				0		0.09%		0
Loss Sev	60%	34%	41%	39%		29%			27%				16%				0		27%		0

Years Since Funding

86

Incidence by #, Incidence by $, Economic Loss Rate, and Loss Severity
By Years Since Funding
Earliest Quality Rating: Below Investment Grade

	0.3	1.0	2.0	3.0	4.0	4.5	5.0	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5		19.0
# of CREs	12	56	92	83		68			56				17						17		
Incid by #	1.02%	2.49%	4.68%	5.35%		3.13%			2.27%				1.48%				0		1.75%		0
Incid by $	1.71%	2.72%	6.97%	5.93%		4.11%			3.08%				3.19%				0		2.12%		0
Econ Loss	0.99%	1.34%	2.85%	2.57%		0.94%			0.76%				1.46%				0		1.01%		0
Loss Sev	58%	49%	41%	43%		23%			25%				46%				0		48%		0

Years Since Funding

87

Incidence by Number
By Years Since Funding &
Earliest Quality Rating (AAA-A, BBB, BB, and B & Below)

	0.3	1.0	2.0	3.0	4.0	4.5	5.0	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5
● <BB	0.59%	3.38%	5.31%	4.28%		3.16%			2.41%				1.73%	0	0	0	0	0	1.82%
◆ BB	0.60%	1.81%	4.20%	6.09%		3.11%			2.17%				1.34%				0		1.71%
■ BBB	0.35%	0.61%	0.82%	1.40%		0.87%			0.85%				0.37%						0.80%
▲ AAA-A	0.05%	0.10%	0.12%	0.19%		0.39%			0.16%				0.40%				0		0.00%

Years Since Funding

88

Incidence by Amount
By Years Since Funding &
Earliest Quality Rating (AAA-A, BBB, BB, and B & Below)

	0.3	1.0	2.0	3.0	4.0	4.5	5.0	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5
● <BB	1.97%	3.75%	12.24%	6.99%		5.61%			3.84%				4.00%	0	0	0	0	0	3.39%
◆ BB	1.16%	2.25%	4.72%	5.53%		3.50%			3.15%				2.01%						2.79%
■ BBB	0.77%	0.42%	0.90%	1.64%		0.82%			0.92%				0.68%						0.61%
▲ AAA-A	0.09%	0.10%	0.09%	0.15%		0.36%			0.21%				0.21%						0.00%

Years Since Funding

89

Loss Severity
By Years Since Funding &
Earliest Quality Rating (AAA-A, BBB, BB, and B & Below)

	0.3	1.0	2.0	3.0	4.0	4.5	5.0	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5
<BB		52%		42%		13%			31%				49%						39%
BB		51%		42%		29%			22%				42%						53%
BBB		49%		40%		27%			27%				3%						27%
AAA-A		32%		31%		33%			26%				30%						

Years Since Funding

90

**Economic Loss Rate as % of Exposure
By Years Since Funding &
Earliest Quality Rating (AAA-A, BBB, BB, and B & Below)**

	0.3	1.0	2.0	3.0	4.0	4.5	5.0	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.0	14.5	15.5	16.5	17.5
●<BB	1.05%	0.91%	0.90%	1.18%		0.75%			1.20%				1.93%						1.46%
◆BB	0.61%	1.14%	1.94%	2.37%		1.02%			0.64%				0.79%			0			1.49%
■BBB	0.47%	0.15%	0.37%	0.65%		0.22%			0.26%				0.12%			0			0.18%
▲AAA-A	0.04%	0.02%	0.03%	0.05%		0.12%			0.05%				0.06%						0.00%

Years Since Funding
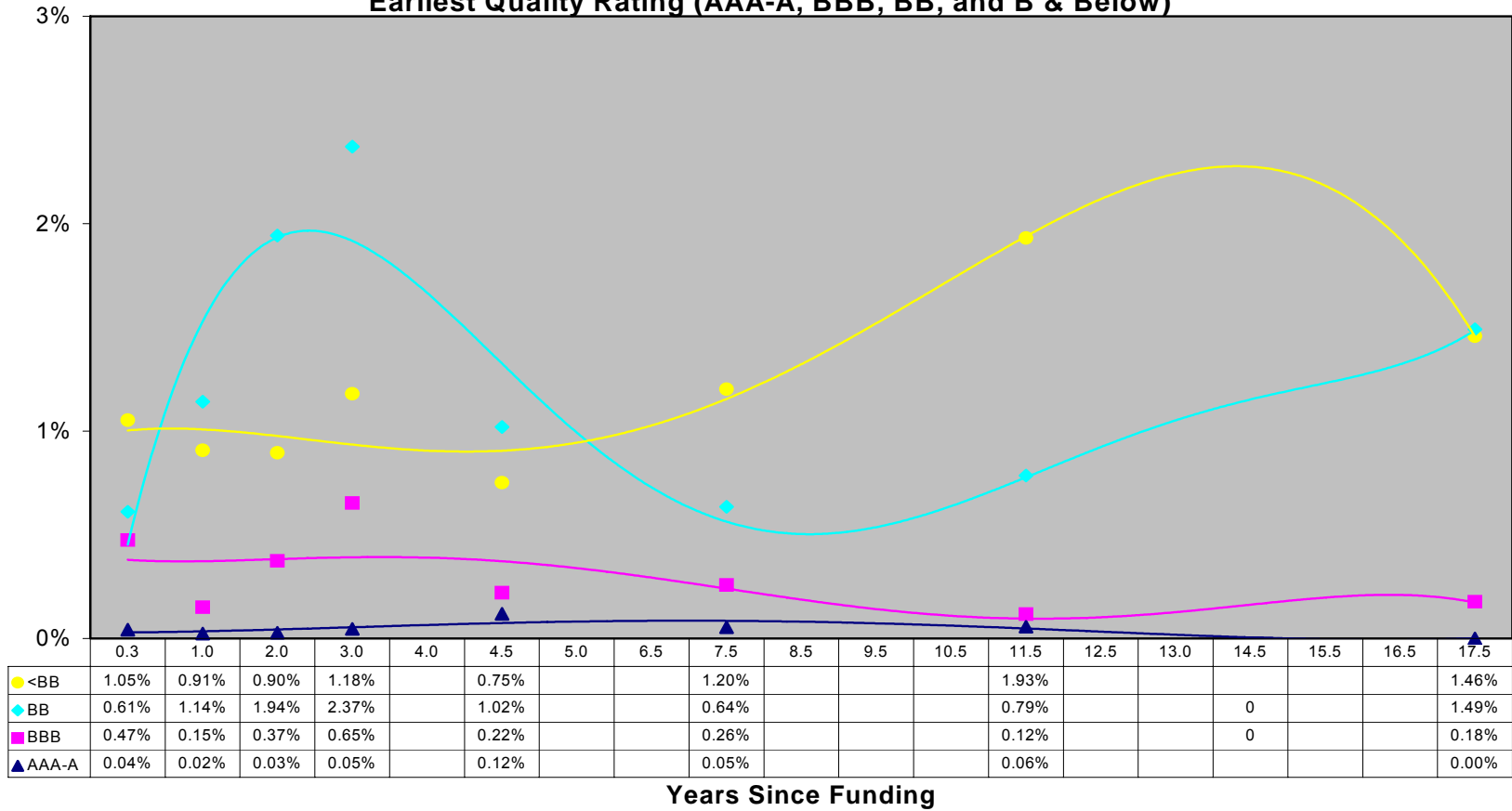
Corroboration

For a comparative study of seasoning effects, we turn to the Altman Report on "Defaults and Returns on High Yields Bonds: The year 2002 in Review and the Market Oulook" by Edward I. Altman and Gaurav Bana. It tracks the 1971-2002 mortality rates and mortality losses[43] (Figures 23 and 24 in the Report) by original bond rating and by the number of years since issue.

This public-bond study differs from our private-placement study in the following ways:
1. It uses the actual original ratings without resorting to the earliest rating as a proxy.
2. It has enough data to isolate the CCC and B rating classes by themselves.
3. It tracks the experience for 10 years after origination, not for 20+ years as we do.

As a precursor to a review of the mortality rate by duration, let us graph two related and analogous tables for a side-by-side comparison: the number of defaults by year from issuance from the Altman Report (Figure 7) and the number of CREs by years since funding from our report. The remarkable alignment between public corporate bonds and private placements in 'timing of defaults' paves the way for the ensuing discussion.

In a set of four graphs labeled 'Public Corporates 1971-2002: Original Rating', we have plotted the Altman mortality rates and mortality losses for original ratings of BBB, BB, B and CCC (omitting the rather sparse AAA-A, from which only the two-year underwriting effect can be inferred). There are four graphs because both mortality rates and mortality losses are plotted in an ungraduated version and a graduated version. The ungraduated version is in single-year intervals as reported, while the graduated version is in two-year intervals (by averaging adjacent years) to smooth out the statistical fluctuation.

The graduated version unmasks a seasoning effect obscured by the idiosyncrasies of the ungraduated version. The effect bears many similarities to private placements:
1. The lower the quality the stronger the seasoning effect.
2. The peaking coincides with private placements. The CCC peaks at year 2 while the B peaks at year 3. The BB, as in private placements, also peaks at year 3. The BBB peaks in the second year, with mortality rates greater than BB. We did not pursue this anomaly any further.
3. The peaking is to the same degree of significance as in private placements. The CCC and B peak sharply. If the BB and BBB do not peak as much as they do among private placements, the timeline here also goes out only 10 years, not 20 years, thereby potentially obliterating a further tail-off.

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[43] The mortality rate is analogous to the incidence rate by amount, while the mortality loss is analogous to the economic loss.

The one other anomaly is the BB in year 9. It does not fit the up-and-down pattern. Even more anomalous is the BB's higher mortality rate in the 9th year than the lower-quality B and CCC in the same year. If the BB's mortality were to come between BBB and B in the 9th year, as it rightfully should by quality, the up-and-down pattern as a function of seasoning would be restored.

of CRE or Defaults by Year from Issuance
Private Placements from SOA Study vs High-Yield Public Corporates from Altman Report

	0	1	2	3	4	5	6	7	8	9	10
■ Private Placements - SOA	26	121	166	187	130	88	80	49	15	28	24
■ High-Yield Publics - Altman		137	295	330	260	190	127	87	51	35	82

Year from Issuance
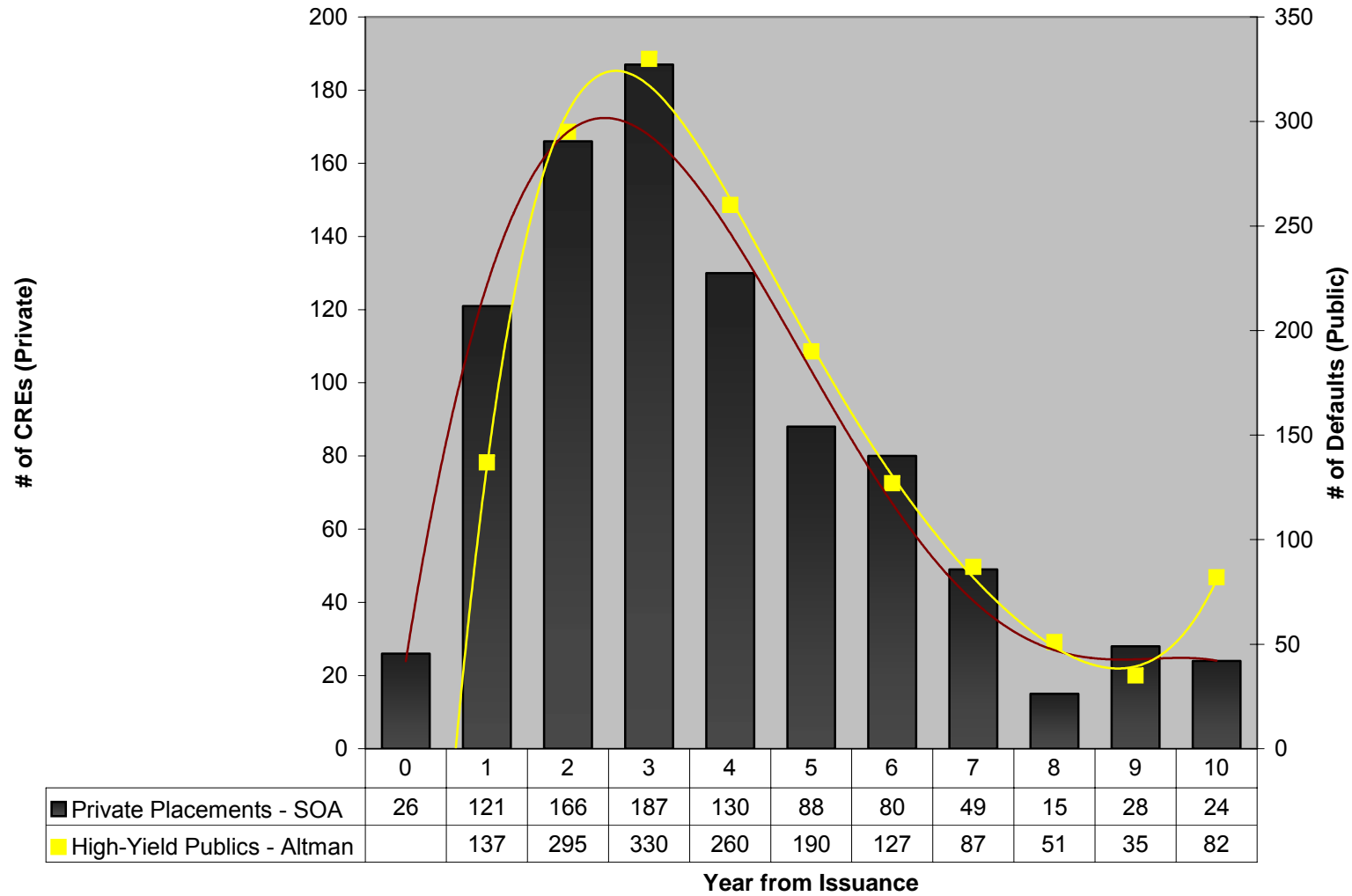
Mortality Rates (Graduated by Averaging over 2 Years)
Public Corporate Bonds by Original Rating 1971-2002 - Altman Report

	0.5	1.5	3.0	5.0	7.0	9.0
● CCC	6.70%	14.57%	13.72%	6.81%	4.30%	2.09%
◆ B	3.19%	7.14%	8.30%	5.25%	3.14%	1.47%
■ BB	1.23%	2.62%	3.34%	1.82%	1.17%	2.77%
▲ BBB	0.25%	3.42%	1.48%	0.75%	0.53%	0.26%

Years Since Issue
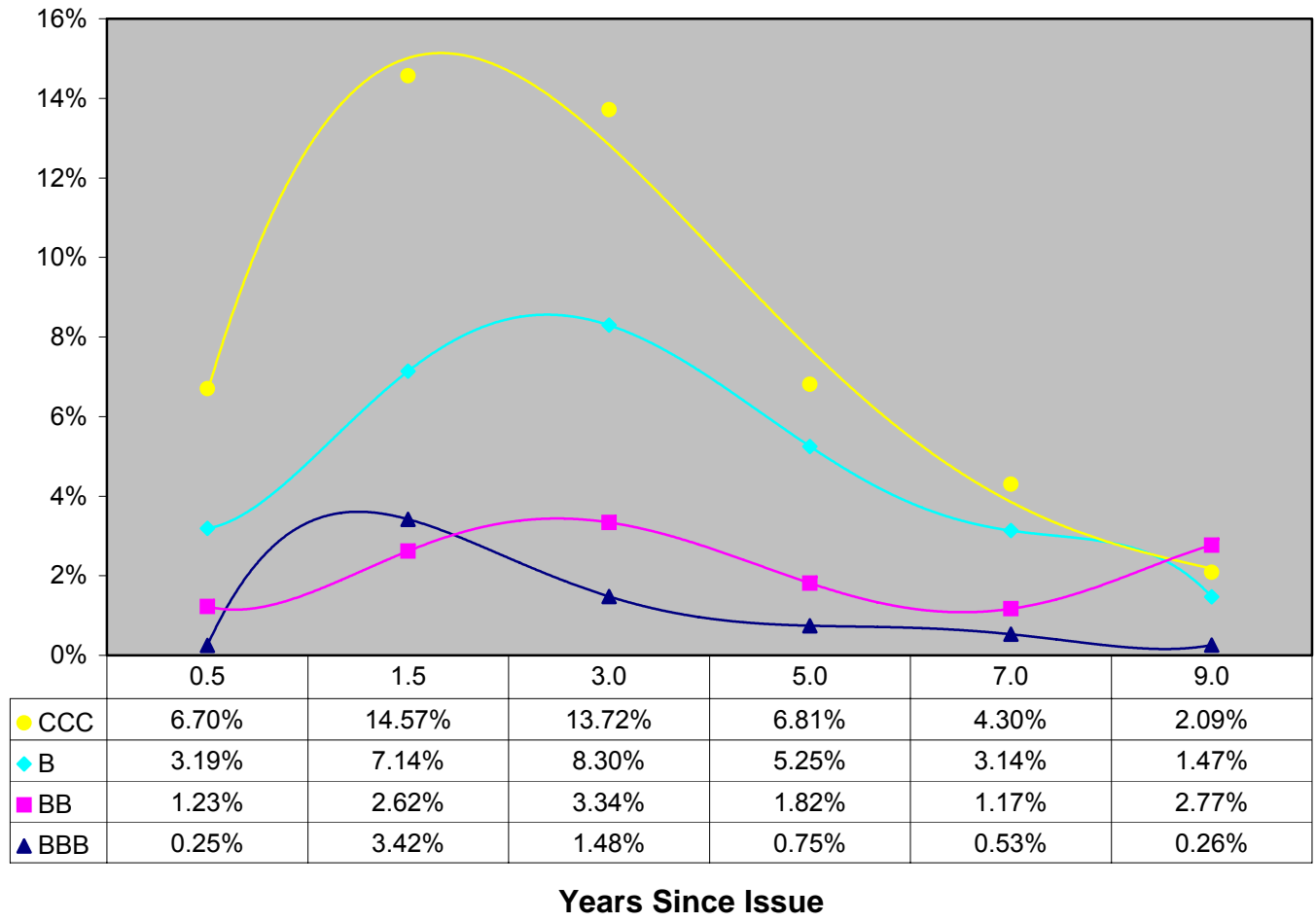
Mortality Losses (Graduated by Averaging over 2 Years)
Public Corporate Bonds by Original Rating 1971-2002 - Altman Report

	0.5	1.5	3.0	5.0	7.0	9.0
● CCC	4.52%	11.44%	11.00%	5.42%	3.46%	1.56%
◆ B	2.23%	5.36%	6.26%	3.70%	2.04%	0.92%
■ BB	0.74%	1.57%	2.48%	1.09%	0.66%	1.38%
▲ BBB	0.19%	2.53%	1.03%	0.50%	0.32%	0.18%
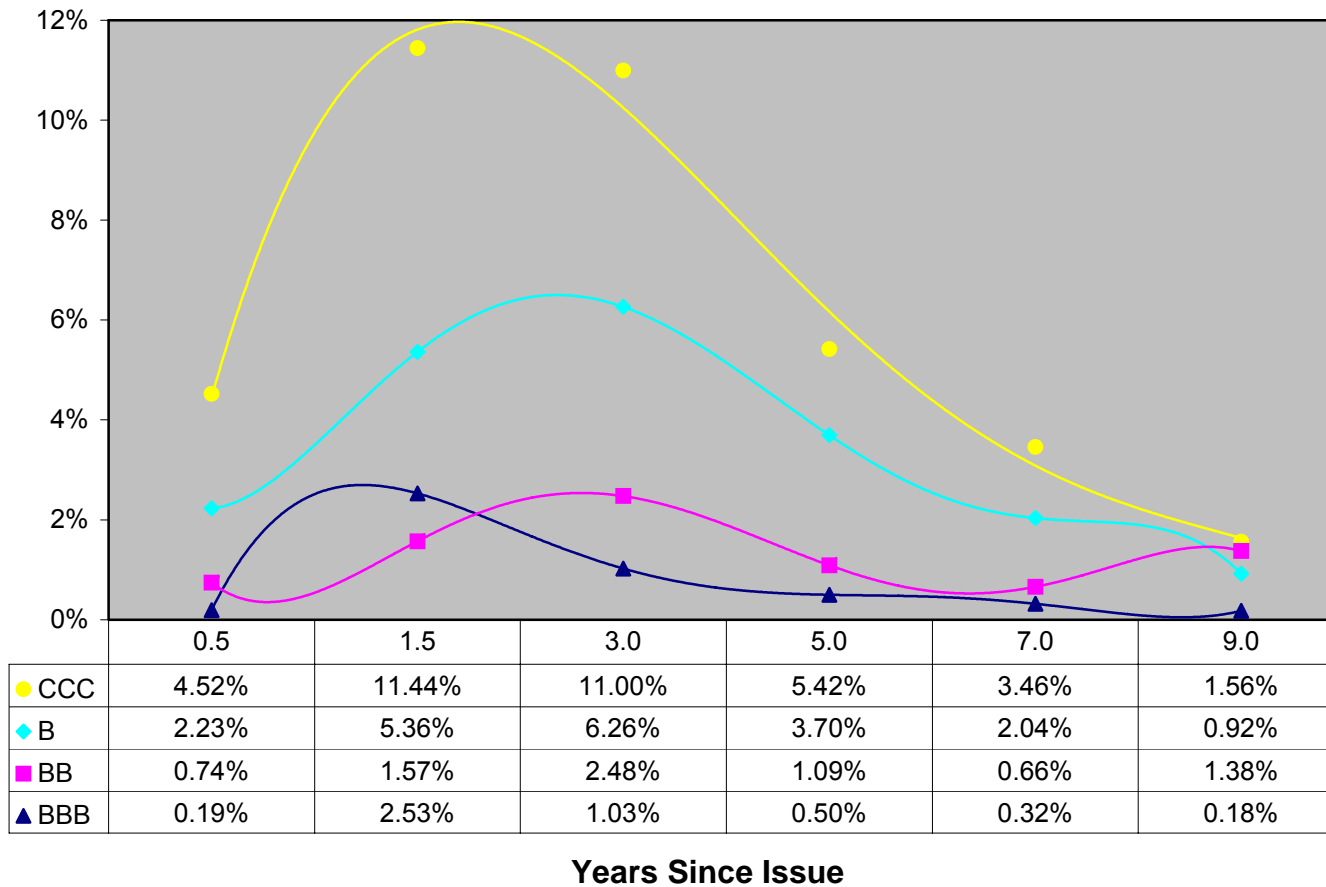
Years Since Issue

Mortality Rates (Year by Year Ungraduated)
Public Corporate Bonds by Original Rating 1971-2002 - Altman Report

	0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5
● CCC	6.70%	14.57%	16.16%	11.28%	3.36%	10.26%	5.35%	3.25%	0.00%	4.18%
◆ B	3.19%	7.14%	7.85%	8.74%	6.22%	4.28%	3.88%	2.39%	2.07%	0.87%
■ BB	1.23%	2.62%	4.53%	2.15%	2.49%	1.14%	1.67%	0.67%	1.76%	3.78%
▲ BBB	0.25%	3.42%	1.52%	1.44%	0.92%	0.57%	0.80%	0.26%	0.17%	0.35%
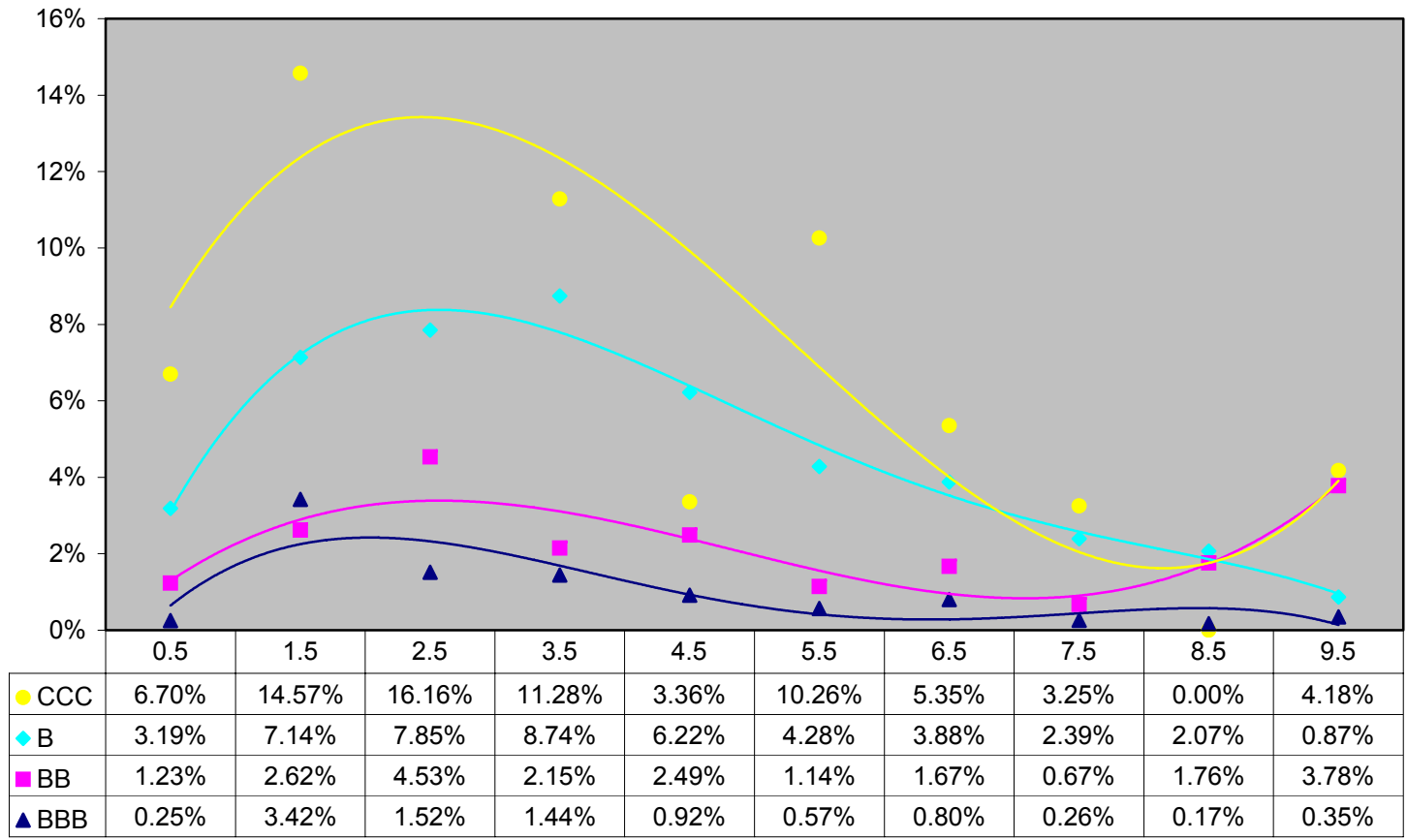
Years Since Issue

Mortality <u>Losses</u> (Year by Year Ungraduated)
Public Corporate Bonds by Original Rating 1971-2002 - Altman Report

	0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5
● CCC	4.52%	11.44%	12.97%	9.02%	2.53%	8.31%	4.28%	2.64%	0.00%	3.12%
◆ B	2.23%	5.36%	6.14%	6.38%	4.73%	2.66%	2.40%	1.67%	1.17%	0.67%
■ BB	0.74%	1.57%	3.40%	1.55%	1.38%	0.80%	1.03%	0.29%	0.95%	1.80%
▲ BBB	0.19%	2.53%	1.12%	0.93%	0.62%	0.38%	0.48%	0.16%	0.11%	0.25%
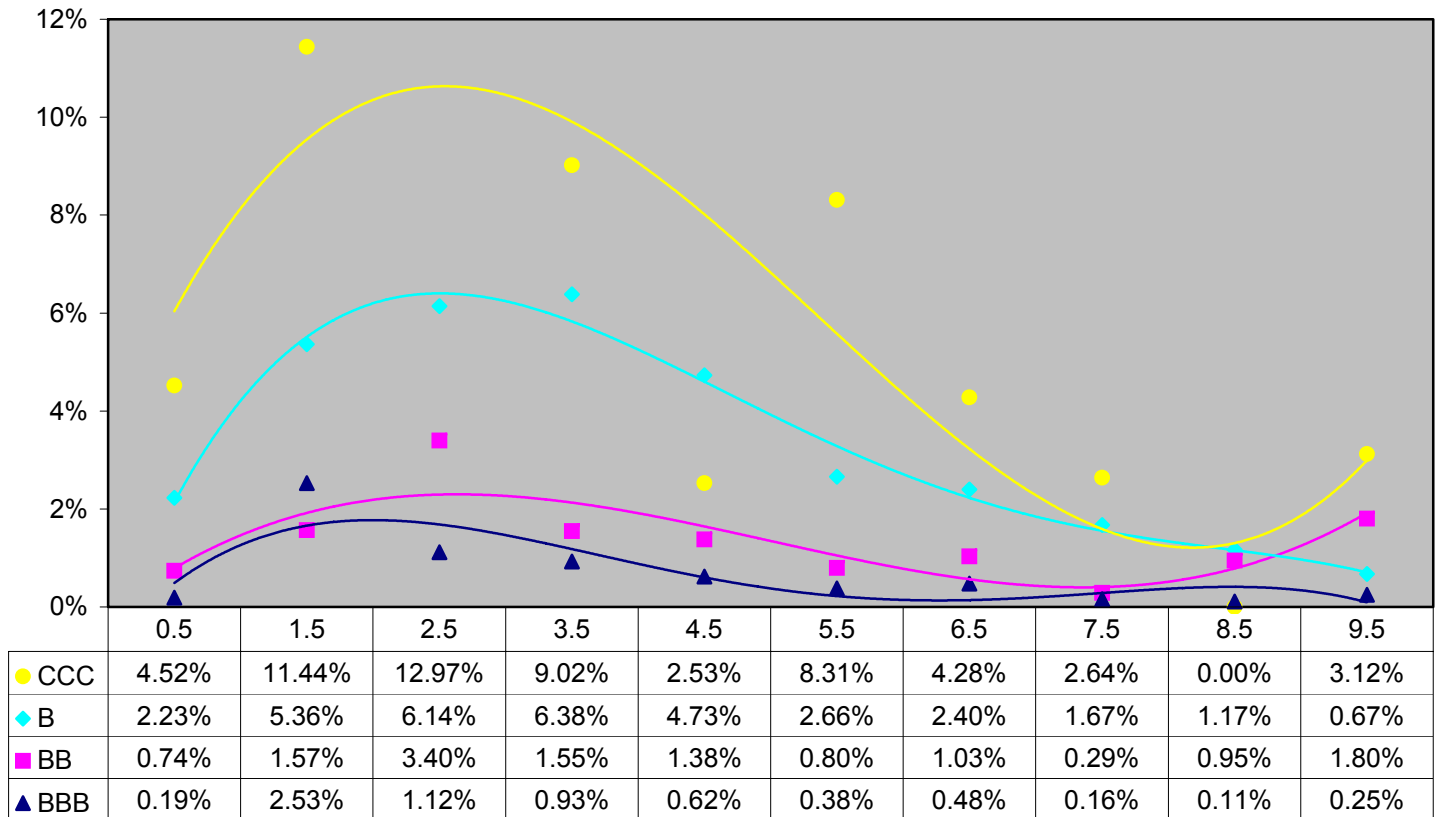
Years Since Issue

We mention in passing that the commercial-mortgage portion of our own 1986-89 study also uncovered a three-stage seasoning effect very similar to that of private placements. We did not publish the result back then in part because we did not have a technique for isolating the impact that the real-estate recession must have had on the seasoning effect.

Finally, we have reproduced a graph from yet another study, which is published in Real Estate Finance in Spring of 1999, under the title of 'Commercial Mortgage Defaults: An Update' by Esaki, L'Heureux, and Snyderman. The study tracks defaults through 1997 among commercial mortgages originated from 1972 through 1991 by 8 large insurance companies. We have fitted a curve to the article's Exhibit 7: Average Timing of Defaults (as a % of original balance) by the number of years since origination.

Exhibit 7's default rate is almost comparable to our incidence rate but not quite because it is a percentage of the <u>original</u> balance as opposed to the <u>remaining</u> balance. Still the underwriting effect lasting two years is evident. However, if normalized for an outstanding balance declining over time with amortization, the default rate as a function of the remaining balance should come down more gradually than depicted in Exhibit 7.

All in all, while the subject may not have received enough press, it is quite remarkable that commercial mortgages, public corporate bonds, and private-placement bonds all exhibit very much the same kind of seasoning pattern.

Average Timing of Defaults (as a % of <u>Original</u> Balance)
Exhibit 7 of 1972-97 Study of 8 Insurance Companies' Commercial Mortgages
by Esaki, L'Heureux & Snyderman

Years Since Origination	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Default Rate	0.38	1.34	1.89	2.03	1.97	2.12	1.89	1.13	1.01	0.68	0.67	0.50	0.46	0.36	0.26	0.34	0.26	0.11	0.08	0.10	0.03	0.01	0.01	0.01	0.00

100
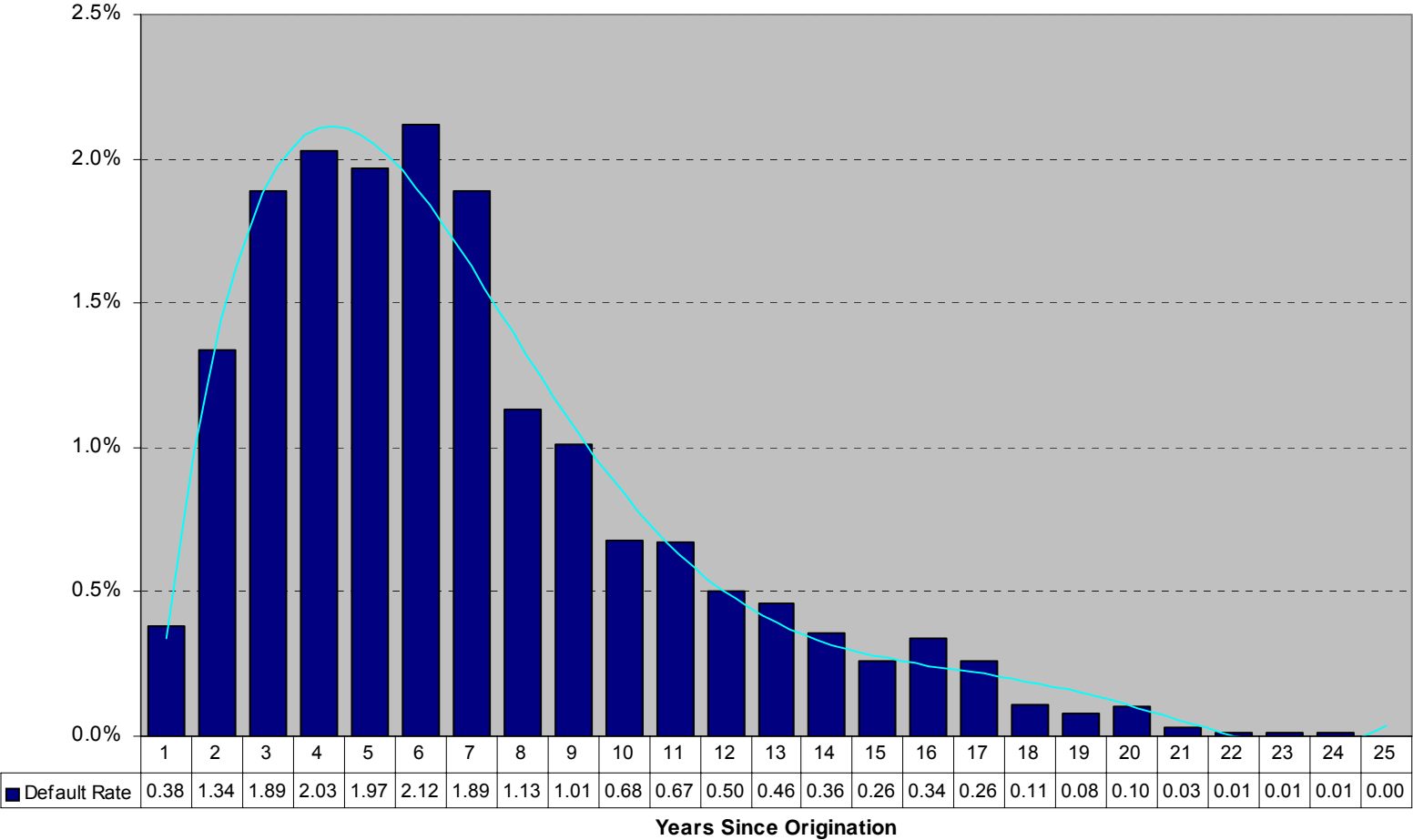
D. Funding Year by Experience Year
(Seasoning Effect Adjusted for Business Cycles)

Just as we tried to isolate the pure coupon effect in the cross tabulation between coupon rate and earliest quality rating, we now try to isolate the 'pure' seasoning effect in a cross tabulation between experience year and funding year. We define the number of years since funding as the discrete variable of experience year minus funding year. So, in a two-dimensional array between experience year and funding year, we just need to 'roll up' the cells diagonally in order to aggregate them by the number of years since issue.

The Economic Factor

Looking at the seasoning effect by quality as we have just done is interesting but not as natural as looking at the coupon effect by quality as we did in the first cross tabulation. If there is a second factor to isolate from the seasoning effect, it is the economic-cycle factor, not the quality-rating factor. This is because the apparent weeding-out period in the seasoning effect can be exacerbated in bad years and ameliorated in good years. So it is possible that a bad recession at just the 'right' time, so to speak, is the culprit and the only reason for the perceived 'bump' in the seasoning effect.

The inception of our study in the wake of the Drexel Burnham era is such that the good and bad years (economically speaking) may not have exactly offset each other in leaving their marks on the pure seasoning effect. Our study began in 1986, shortly after the surge in the high-yield issuance in 1983 and shortly before the surge in bond defaults in 1990-91. It is possible that a disproportionate amount of our 'exposure', especially Below Investment Grade, was just reaching its third and fourth years since issuance when the recession hit its stride in precipitating massive credit events. So what we perceive to be the bump in the seasoning effect may be nothing more than the recession in disguise. In other words, it may well be no more than the artifact of a bulge in low-grade issuance followed a bulge in nonperformance precipitated by a severe economic downturn.

Right off the bat, the hypothesis of misconstruing the economic cycle as the seasoning effect faces some counter arguments. First, the seasoning effect as we have observed is not unique to Below Investment Grade albeit much weaker in Investment Grade; and any seasoning effect on Investment Grade is by definition not directly attributable to a bulge in the issuance of Below Investment Grade. Second, the Altman Report shows similar seasoning patterns over 1971-2002, a much more extensive period than the Drexel Burnham era. Nevertheless, it is good to develop an independent and conclusive way of 'filtering' out the economic cycle to examine the pure seasoning effect.

Methodology For Filtering Out the Economic Cycle

Our method of filtering out the economic cycle is predicated upon a model presupposing that the economic factor and the seasoning factor are multiplicatively linked. By way of example, whatever the 'normal' seasoning pattern is, in a year that is twice as bad as normal, the seasoning pattern will simply be 'lifted' by a factor of two. In other words, the economic environment (boom or bust) in any year is assumed to have the same multiplier effect on each funding-year cell for the experience year in question. So the

expected incidence rate for that cell is raised or lowered by the same multiplicative factor as any other funding-year cell in that experience year.

The steps for deriving the normalized incidence rate by number are outlined below.

- We assume the cell-by-cell incidence rate in a two-dimensional array of experience year by funding year is the product of two factors: a seasoning factor as a function of the experience year minus the funding year, and an economic factor as a function of the experience year alone.

- We further define the economic factor to be the ratio between the incidence rate specific to that experience year and the 17-year average incidence rate from 1986 through 2002, the entire history of our study to date.

- Then, cell by cell in this two-dimensional array, we normalize for economic variation by experience year by 'taking out' the economic cycle. This we do by dividing the actual incidence rate for each cell by the ratio between the incidence rate specific to that experience year and the 17-year average incidence rate (i.e. the economic factor). After this division, all the funding-year cells that 'belong' to the same experience year will average to the same incidence rate as the corresponding cells for any other experience year.

- After artificially stabilizing the economic environment from experience year to experience year, we diagonally 'roll up' all cells that share the 'index' of the experience year minus the funding year, i.e., the number of years since issue.

- In this manner, the diagonal mapping of this two-dimensional array to a single dimension produces an array of normalized or economically adjusted incidence rates as a function of a single variable, namely, the number of years since issue.

- At this point, with the economic cycle already removed, we are left with a normalized function, to which we can make further refinements such as the consolidation of sparse cells, interpolation, graduation, and so on.

The above steps are schematically illustrated in a sequence of four three-dimensional charts with the subheading of 'By Funding Year & Experience Year' and the headings of:
1. Ungraduated Incidence Rate by #
2. Graduated Incidence Rate by #
3. Graduated & Normalized Incidence Rate by #
4. Graduated, Normalized & Diagonally Averaged Incidence Rate by #

(The longitudinal graduation shown in the two intermediate graphs is for ease of viewing only and not an integral part of the normalization process.)

Ungraduated Incidence Rate by #
By Funding Year & Experience year

103

Graduated Incidence Rate by #
by Funding Year & Experience Year

104
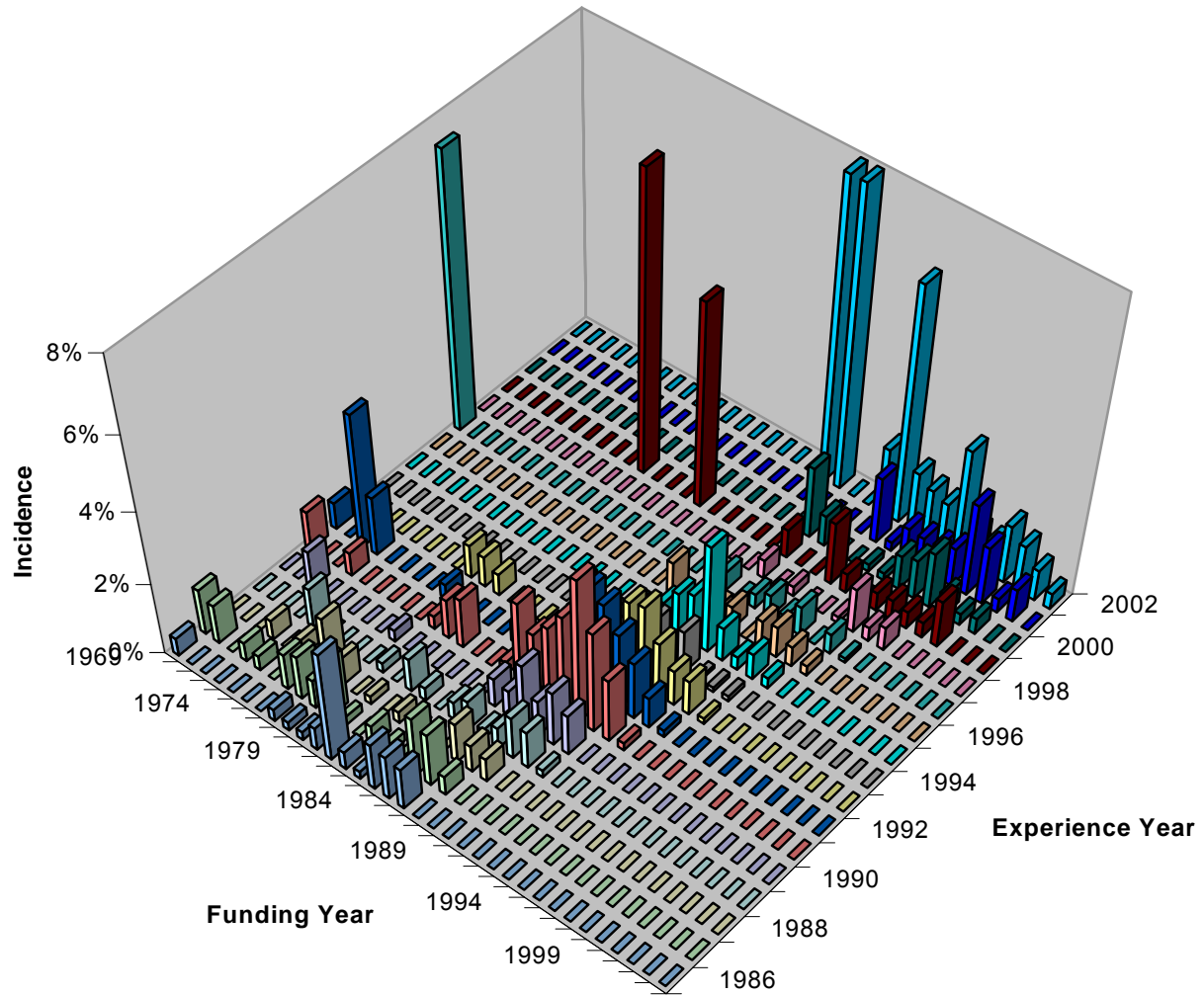
Graduated & Normalized Incidence Rate by #
By Funding Year & Experience Year
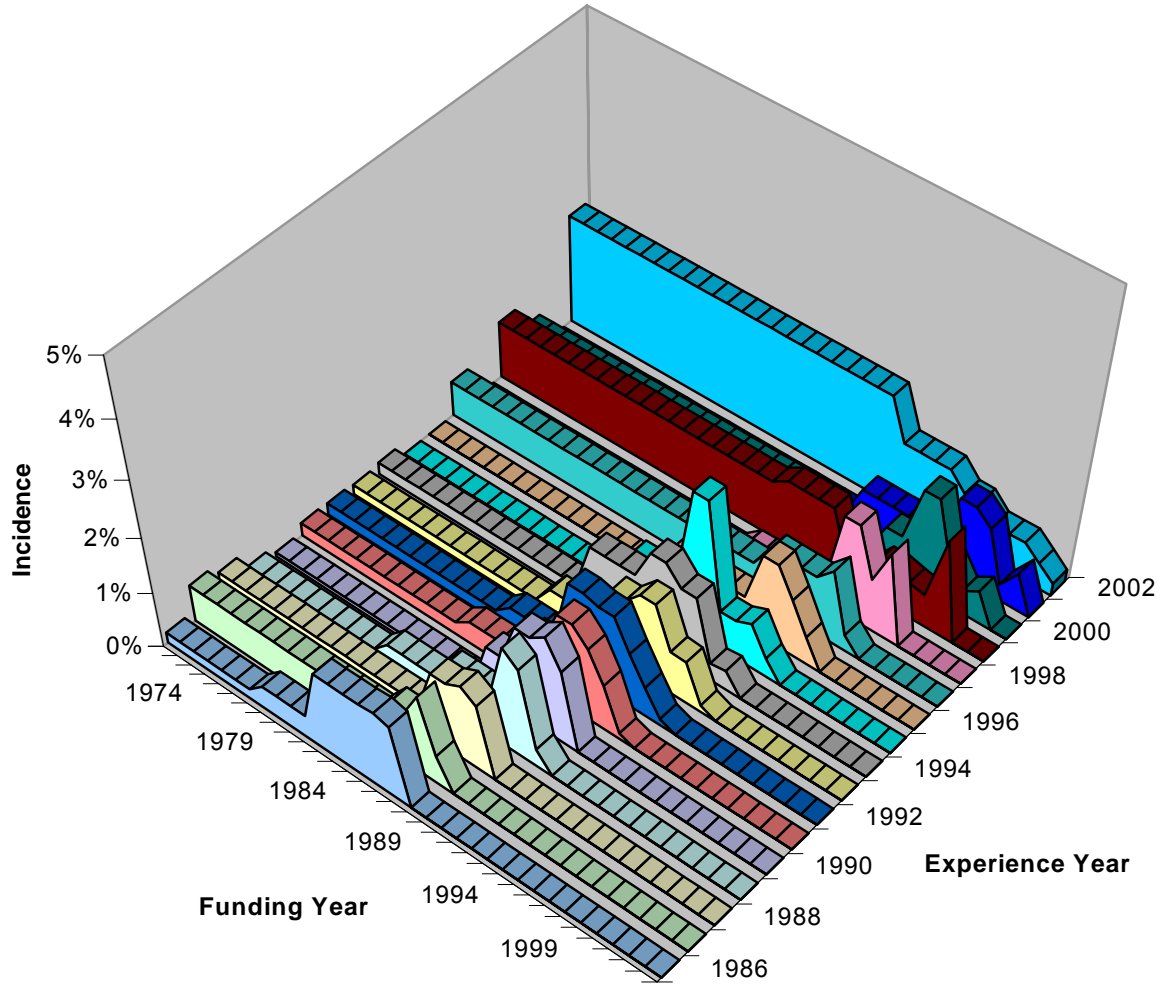
Graduated, Normalized & Diagonally Averaged Incidence Rate by #
By Funding Year & Experience Year
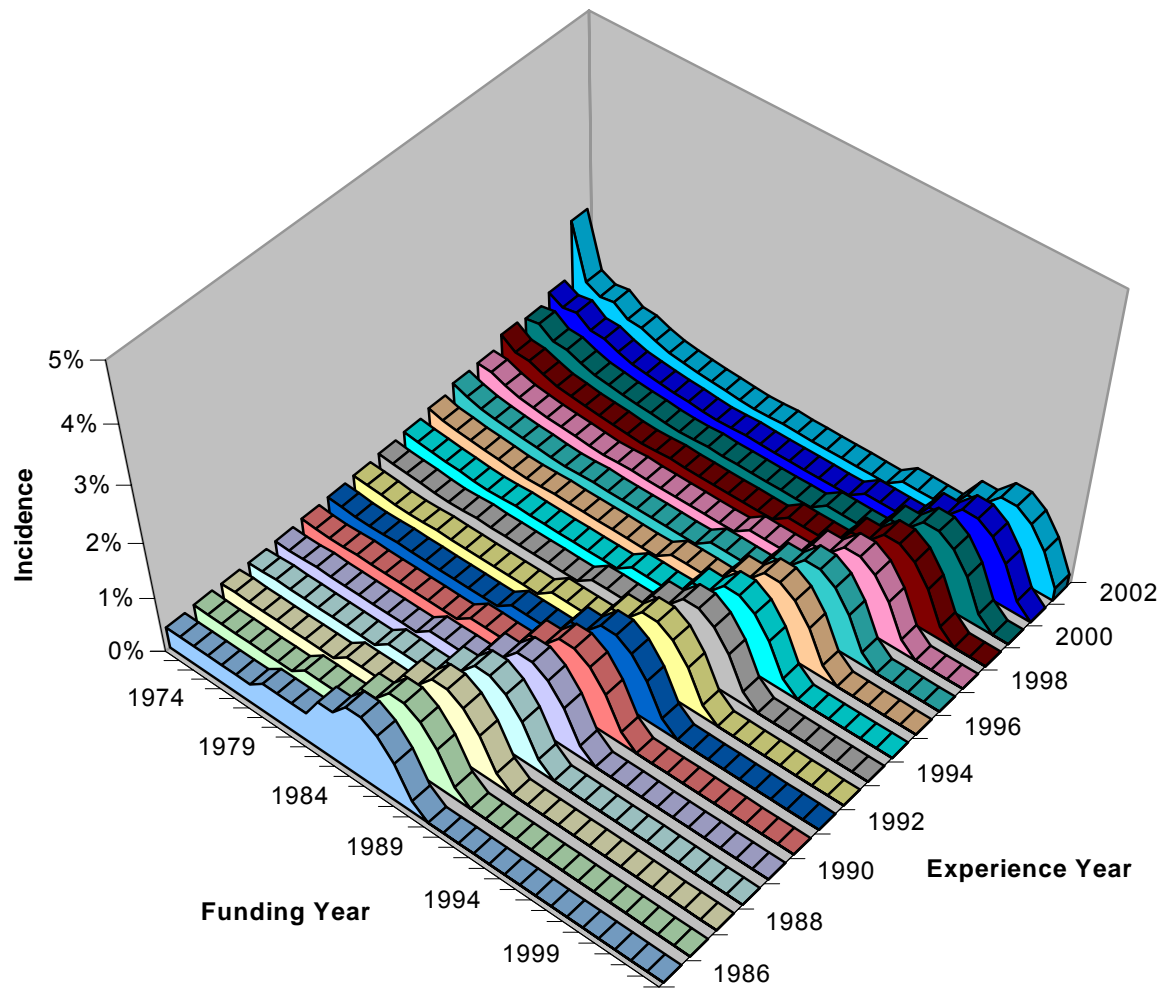
After 'normalizing' the incidence rate by number, we normalize the incidence rate by amount analogously. We bypass any normalization of the loss severity because the economic impact on loss severity is far from clear. Finally, we normalize the economic loss rate by the same ratio as in normalizing the incidence rate by amount. So the economic loss rate will remain the product between the incidence rate by amount and the loss severity.

The results of this process are captured in a graph with the subtitle 'By Years Since Funding (Normalized for Economic Cycles). For the two incidence rates, the general pattern of rising to a peak and falling to a steady state remains unchanged. However, due to a large number of CREs in the first year in the last wave of the study, the economic loss pattern is flatter and even show a higher value in the first year than in the second year. But overall, this analysis seems to affirm the presence of a pure seasoning effect. In a side-by-side comparison with the unnormalized seasoning effect, the normalized seasoning effect turns out to be only slightly flattened.

A Caveat

There is one caveat to acknowledge here. It has to do with regime changes. It is possible that the Below Investment Grade bonds issued since the Drexel Burnham era are categorically different from their earlier counterparts. If so, these two cohorts may have different seasoning effects that need to be studied independently.

In that case, our study began too late to capture the older cohort's early experience years and too recently to include the younger cohort's later experience years. In other words, our seasoning effect may be tantamount to be the splicing together of the seasoning effects of two cohorts in a disjoint manner, the left side from the younger cohort and the right side from the older cohort.

If this lack of homogeneity is a shortcoming, there is no immediate remedy. Only the collection of more years of data from the recent cohort will give us the continuity we need.

Incidence Rate by #, Incidence Rate by $, Economic Loss Rate, and Loss Severity By Years Since Funding (Normalized for Economic Cycles)

Years Since Funding	0.3	1	2	3	4	5		6-7		8-9		10-11			12-17
# of CREs	26	121	166	187	130	88		129		43		40			44
◆ Incid by #	0.28%	0.73%	1.02%	1.28%	1.15%	0.85%		0.94%		0.43%		0.54%			0.34%
■ Incid by $	0.44%	0.61%	1.06%	1.26%	1.30%	0.90%		1.12%		0.37%		0.80%			0.48%
● Econ Loss	0.26%	0.23%	0.39%	0.45%	0.38%	0.25%		0.28%		0.09%		0.21%			0.14%
▲ Loss Severity	29%	33%	30%	29%	24%	23%		23%		14%		19%			25%

Years Since Funding

108
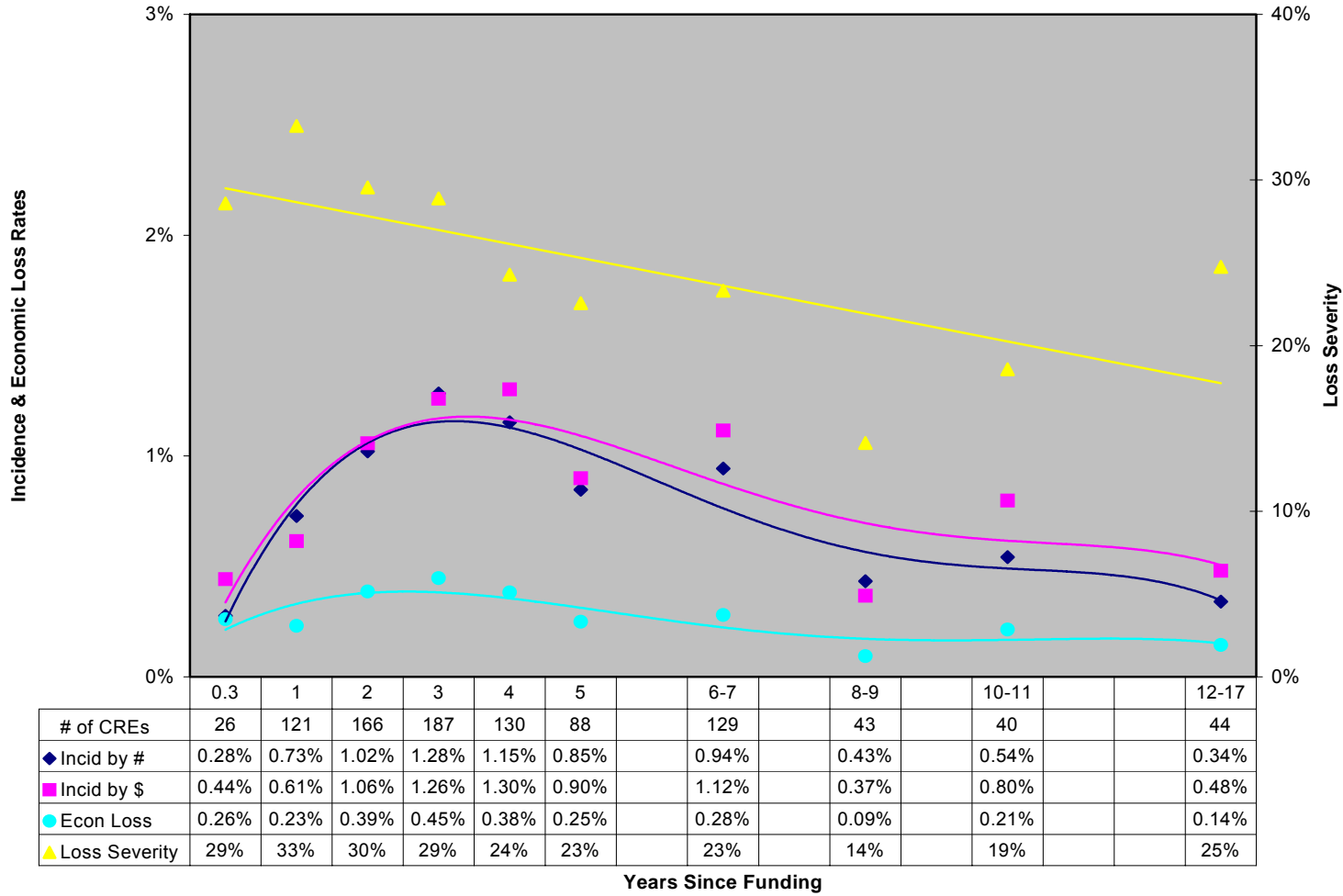
Incidence Rate by #, Incidence Rate by $, Economic Loss Rate, and Loss Severity By Years Since Funding (Not Normalized for Economic Cycles)

Years Since Funding	0.3	1	2	3	4	5	6-7	8-9	10-11	12-17
# of CREs	26	121	166	187	130	88	129	43	40	44
◆ Incid by #	0.28%	0.67%	1.01%	1.32%	1.09%	0.93%	0.92%	0.44%	0.61%	0.39%
■ Incid by $	0.46%	0.55%	1.09%	1.25%	1.28%	1.05%	1.11%	0.41%	0.62%	0.46%
● Econ Loss	0.27%	0.22%	0.41%	0.48%	0.37%	0.29%	0.33%	0.10%	0.17%	0.13%
▲ Loss Severity	59%	41%	37%	39%	29%	28%	30%	23%	27%	29%

109
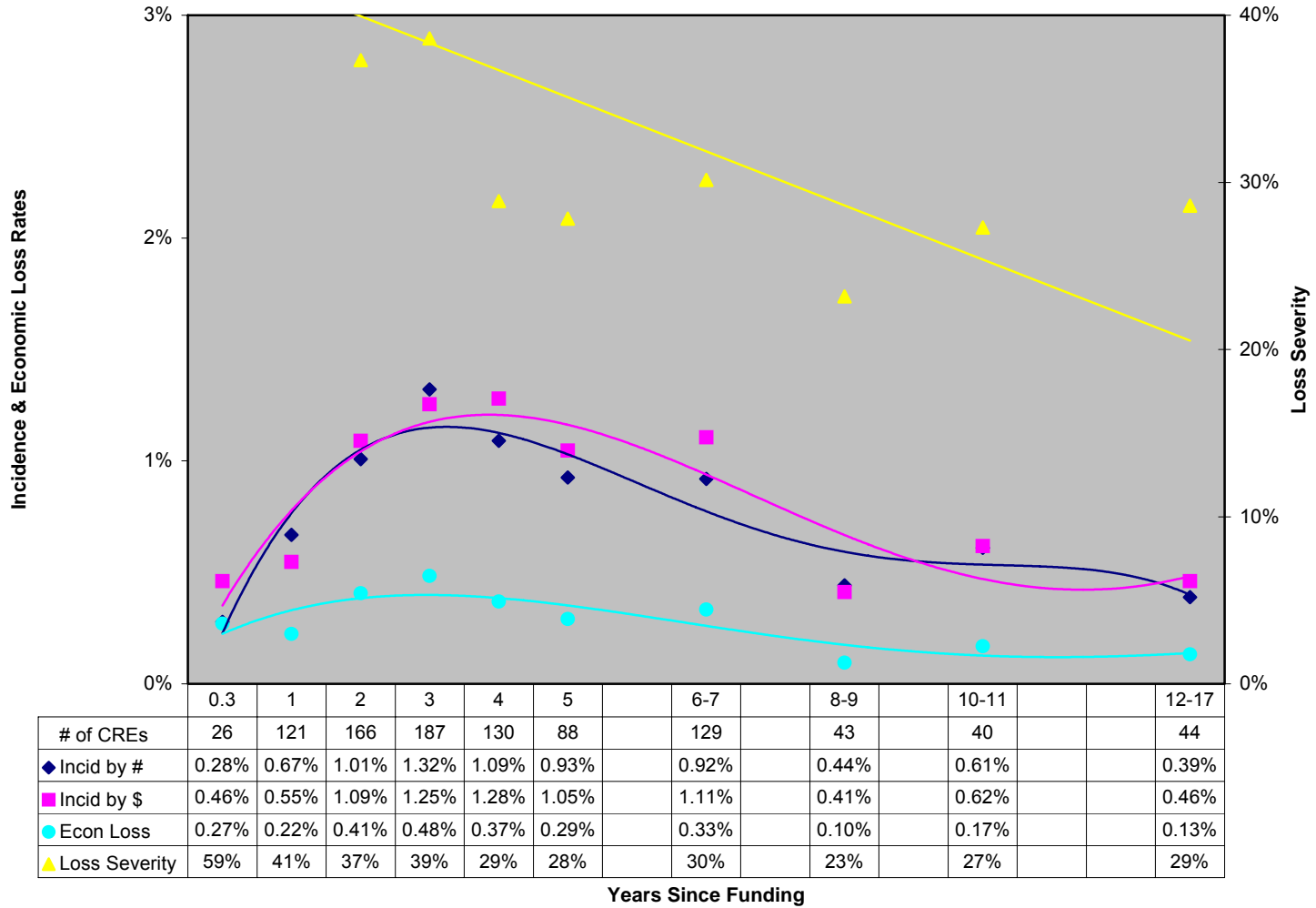
E. Recapitulation

In summary, the following are salient points of this Section.

- There is a pure coupon effect separate and distinct from the credit-quality effect. For the same earliest quality rating, a higher coupon gives rise to a higher incidence of CREs. In general, the lower the quality the stronger the coupon effect. Up to and including BB bonds, the lower the quality the more statistically credible the result.

- A seasoning effect consisting of three phases holds across earliest quality ratings. As the underwriting effect wears off, the incidence rate and economic loss rate both rise to a peak before declining to a steady state. In general, the lower the quality the stronger the seasoning effect. Up to and including BB bonds, the lower the quality the more statistically credible the result.

- The seasoning effect remains basically intact notwithstanding an adjustment for the economic cycle. So the seasoning effect does not seem to be the economic effect in disguise even though the former may have been somewhat accentuated by the latter in the recession of the early 1990s and the high number of CREs in 2001 and 2002.

- As mentioned before, the sparse cells created by cross tabulations are particularly susceptible to certain drawbacks inherent in the four key statistics:

Key Statistic	Potential Drawback
Incidence rate by number	Distortion due to multiple issues by the same issuer
Incidence rate by amount	Distortion due to significant disparity in bond size
Loss severity	Significant statistical dispersion
Economic loss rate	Bond-size disparity and statistical dispersion

- In interpreting the results, we have relied more on the incidence rate by number because it is the most stable of the four statistics. This statistic is by no means foolproof. However, any attempt to circumvent its inherent drawback by measuring the incidence rate <u>by issuer</u> rather than by issue will have to overcome the hurdle of (1) multiple ratings and (2) multiple coupons for different issues by the same issuer.

V. DATA SUMMARIES

A. Using the Data Summaries

This section of the report presents

- the **aggregate experience** by calendar year,
- the **loss-severity distribution** among CREs, and
- the experience by selected characteristics as **single-analysis variables**:

  1. Most Recent Quality Rating
  2. Earliest Quality Rating
  3. NAIC Rating
  4. Coupon Rate
  5. Funding Year
  6. Years Since Funding
  7. Years to Maturity

For the experience in aggregate and by each variable, detailed data for the four loss statistics (Incidence Rate by Number, Incidence Rate by Amount, Loss Severity and Economic Loss Rate) are calculated. In each case, there is a one-page narrative of highlights and data notes followed by a single graph depicting the four loss statistics. The loss-severity distribution is analyzed by CRE Type, Seniority and Study Period in a one-page narrative followed by three graphs. To facilitate using the graphs, the underlying data are summarized underneath each graph. Each reader is likely to find different items of interest and alternative interpretations of the data. For those interested in greater detail, in each case the graph page(s) is followed by the detailed tabulation of exposure, CREs and the loss statistics.

Formatting Notes on Charts for the Aggregate Experience

- The graph shows the four statistics for each of the seventeen years in the 1986-2002 study period.
- The left scale of the graph measures Incidence and Economic Loss Rates, while the right scale measures Loss Severity.
- A solid line linking data points is indicative of a trend line, while a dotted line is indicative of statistical fluctuation.
- The solid colored areas indicate average results over seventeen years for each of the four statistics.

- The Economic Loss Rate is expressed as a percentage of total principal exposed.
- The number of CREs by cell is provided with the data to convey relative statistical credibility (but is not shown in the graph).

Formatting Notes on Charts for the Loss-Severity Distribution

- The first graph shows the weighted average Loss Severity by CRE Type, Seniority, Study Period and Overall.
- + / - one standard deviation is indicated by the light and dark shaded bars around the weighted average value.
- Stacked bars are used to show the frequency distribution in the two graphs depicting Loss Severity by CRE Type and Seniority.
- The loss-severity distribution is captured in 10% ranges that are left-inclusive rather than right-inclusive, as denoted by [0%,10%), for example.

Formatting Notes on Charts for the Single-Analysis Variables

- Same as for the Aggregate Experience graph, the left scale of each graph measures Incidence and Economic Loss Rates, while the right scale measures Loss Severity.
- For the first three variables shown above (Most Recent Quality Rating, Earliest Quality Rating and NAIC Rating), a line graph is used for Loss Severity and bar graphs are used for Incidence Rates; the Economic Loss Rate is indicated by a single square marker overlaid onto the bar graphs. Single markers are used for the N/A (not available) and the Total categories.
- For the other variables, line graphs are used for all of the loss statistics, complemented by single markers for Total and N/A (not available) categories; a linear regression trend line is also fitted to the Loss Severity data.
- When data points suggest some kind of a trend line, they are linked by a solid line; otherwise, they are linked by a dotted line.
- The Economic Loss Rate is expressed as a percentage of total principal exposed.
- The number of CREs by cell is provided with the data to convey relative statistical credibility (but is not shown in the graph)

B. Private Placement 1986-2002: Aggregate Experience

Highlights

- The economic loss rate over all 17 years was 0.31%. The 0.31% is equal to average incidence by amount of 0.89% times the average loss severity of 35%.

- The significantly higher economic loss rate in 2001-2002 is strikingly similar to the one in 1991-1992. Both were in the wake of slower economic periods.

- The higher economic loss rate in 1991-92 is due to high incidence, not high loss severity, for which there is no discernible time trend. Contrary to 1991-92, the higher economic loss in the 2001-2002 period is due to both high incidence and high loss severity.

- The incidence by dollar amount exceeds the incidence by number almost every year, suggesting that CREs have generally higher average amounts outstanding, but there was a significant reversal in 2002.

- The loss severity is widely dispersed from CRE to CRE, with senior debt faring better than subordinated debt and restructures faring better than defaults. By period, 1999-2002 witnessed materially higher severity than any previous era.

- The loss severity was ~40% in each of the first 6 years except 1987 and in the last 3 years, but ~20% in each of the middle 6 years except 1997.

Data Notes

- The results exclude an early technical CRE, whose face amount was big enough to distort the aggregate incidence rate and loss severity but whose nominal loss was small enough to leave the aggregate economic loss intact.

- 4 out of the 20 participating companies contributed data for all years of the 1986-2002 study period. In all,

  12 companies contributed to the 1986-89 period,
  11 companies contributed to the 1990-92 period,
  15 companies contributed to the 1993-94 period,
   7 companies contributed to the 1995-98 period, and
   6 companies contributed to the 1999-02 period.

- A noteworthy feature of the 1999-2002 exposure base is the increase in AAA original rating issues as a proportion of all exposures. The proportion of AAAs has risen from roughly 5%, give or take, in the 1986 through 1998 period to 16% by number and 9% by volume over the ensuing four years. The Committee has reviewed the increase and is satisfied that there has been no miscoding. Rather, the increase appears to be accounted for by increases in types of private placements that are either new or have grown in popularity.

- See general limitations of the study listed in Appendix III.

Incidence Rate by #, Incidence Rate by $, Economic Loss Rate, and Loss Severity
By Year 1986-1998
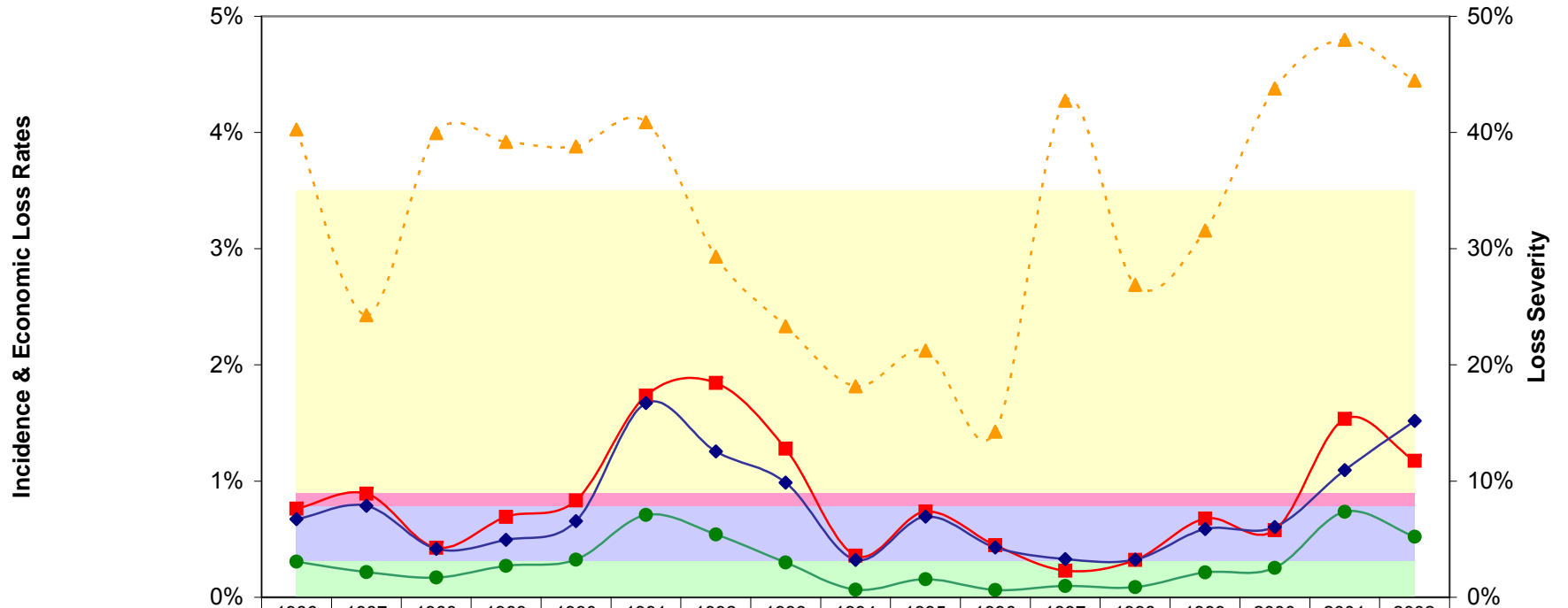
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Avg Loss Sev	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%
Avg Incid $	0.89%	0.89%	0.89%	0.89%	0.89%	0.89%	0.89%	0.89%	0.89%	0.89%	0.89%	0.89%	0.89%	0.89%	0.89%	0.89%	0.89%
Avg Incid #	0.78%	0.78%	0.78%	0.78%	0.78%	0.78%	0.78%	0.78%	0.78%	0.78%	0.78%	0.78%	0.78%	0.78%	0.78%	0.78%	0.78%
Avg Econ Loss	0.31%	0.31%	0.31%	0.31%	0.31%	0.31%	0.31%	0.31%	0.31%	0.31%	0.31%	0.31%	0.31%	0.31%	0.31%	0.31%	0.31%
Incid $	0.76%	0.89%	0.43%	0.69%	0.83%	1.73%	1.84%	1.28%	0.36%	0.74%	0.45%	0.23%	0.32%	0.68%	0.58%	1.54%	1.17%
Incid #	0.67%	0.79%	0.42%	0.49%	0.66%	1.67%	1.26%	0.99%	0.32%	0.69%	0.43%	0.33%	0.32%	0.59%	0.60%	1.09%	1.52%
Econ Loss	0.31%	0.22%	0.17%	0.27%	0.32%	0.71%	0.54%	0.30%	0.06%	0.16%	0.06%	0.10%	0.09%	0.21%	0.25%	0.74%	0.52%
Loss Sev	40%	24%	40%	39%	39%	41%	29%	23%	18%	21%	14%	43%	27%	32%	44%	48%	44%
# of CREs	52	57	35	43	50	140	106	82	29	35	24	19	20	42	47	90	130

114

C. Private Placement 1986-2002: Loss-Severity Distribution

Highlights

- The loss severity among CREs is widely dispersed, with a significant number near 100% and a significant number near 0% including some cases of gains or negative losses.

- The overall loss-severity distribution has a median of 28%, an arithmetic average of 36%, and a weighted average of 35% (36% if all gains or negative losses are excluded).

- The standard deviation of 34% is higher than the 26% among public corporate bonds as reported in one study[44].

- CRE type and debt seniority are two factors with a bearing on loss severity.

- By CRE type, defaults exhibit a higher average loss severity than restructures (41% versus 26%). Restructures account for a higher percentage of less severe losses such as a loss severity of <25%.

- By seniority, subordinated debt exhibits a higher average loss severity than senior debt (46% compared to 29%). It accounts for a higher percentage of more severe losses such as a severity of >70%.

- Of the five study periods, the two middle ones (1993-94 and 1995-98) have a lower loss severity but the same standard deviation as any of the previous (1986-89, 1990-92 and 1999-2002). The latest study period (1999-2002) showed materially higher loss severity than any of the previous ones.

Data Notes

- See the Appendix on the discounted-cashflow method of loss calculation and how it differs from the market-based loss assessment generally used in default studies on public bonds.

- Each CRE's cashflow was individually reviewed for internal consistency and reasonableness.

- The seniority indicator is underreported in the data submission but augmented by the CUSIP directory. For this Section, assets with missing seniority were matched by PPN to the CUSIP directory and assigned seniority accordingly.

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[44] Michael T. Kender and Gabriella Petrucci, Altman Report on Defaults and Returns for High Yield Bonds: Review of 2001 and Outlook for 2002, p.14, Figure 12

Loss-Severity Dispersion (Weighted Average +/- Standard Deviation)
By CRE Type, by Seniority & by Study Period

	Restruc	Default	Distress Sale			Senior	Subord.	Unknown			86-89	90-92	93-94	95-98	99-2002		Overall
Weighted m + s	57%	74%	54%			63%	83%	72%			68%	70%	52%	56%	77%		69%
Weighted m	26%	41%	23%			30%	47%	39%			35%	36%	22%	23%	44%		35%
Weighted m - s	-6%	8%	-9%			-3%	12%	6%			2%	1%	-8%	-9%	10%		1%

CRE Type - Seniority - Study Period

116
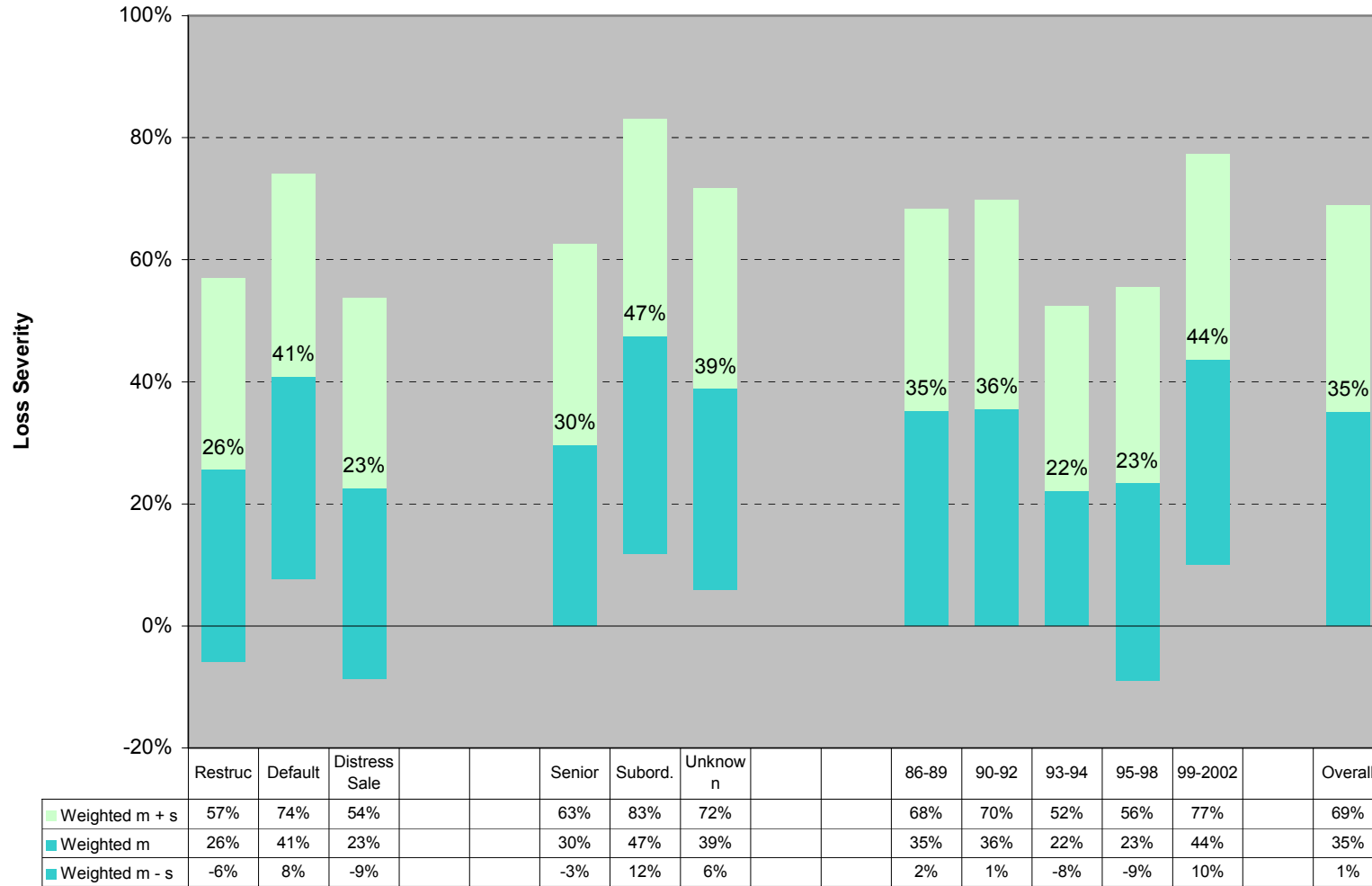
Frequency Distribution of Loss Severity of CREs (By CRE Type)

	<-20	[-20,-10)	[-10,0)	[0,10)	[10,20)	[20,30)	[30,40)	[40,50)	[50,60)	[60,70)	[70,80)	[80,90)	[90,100)	100	>100	Total
□ Unknown	-	1	6	5	3	-	1	2	1	3	2	2	-	4	-	30
□ Sale	1	-	7	14	10	2	2	2	1	1	2	2	2	-	-	46
□ Default	4	8	40	98	67	89	53	57	51	48	58	42	37	36	-	688
□ Restruc	2	6	36	66	31	19	13	15	13	5	11	10	9	1	-	237
■ Total																1,001
All CREs (#)	7	15	89	183	111	110	69	76	66	57	73	56	48	41	-	
All CREs (%)	1%	1%	9%	18%	11%	11%	7%	8%	7%	6%	7%	6%	5%	4%	0%	

Loss Severity in 10% Bands

117
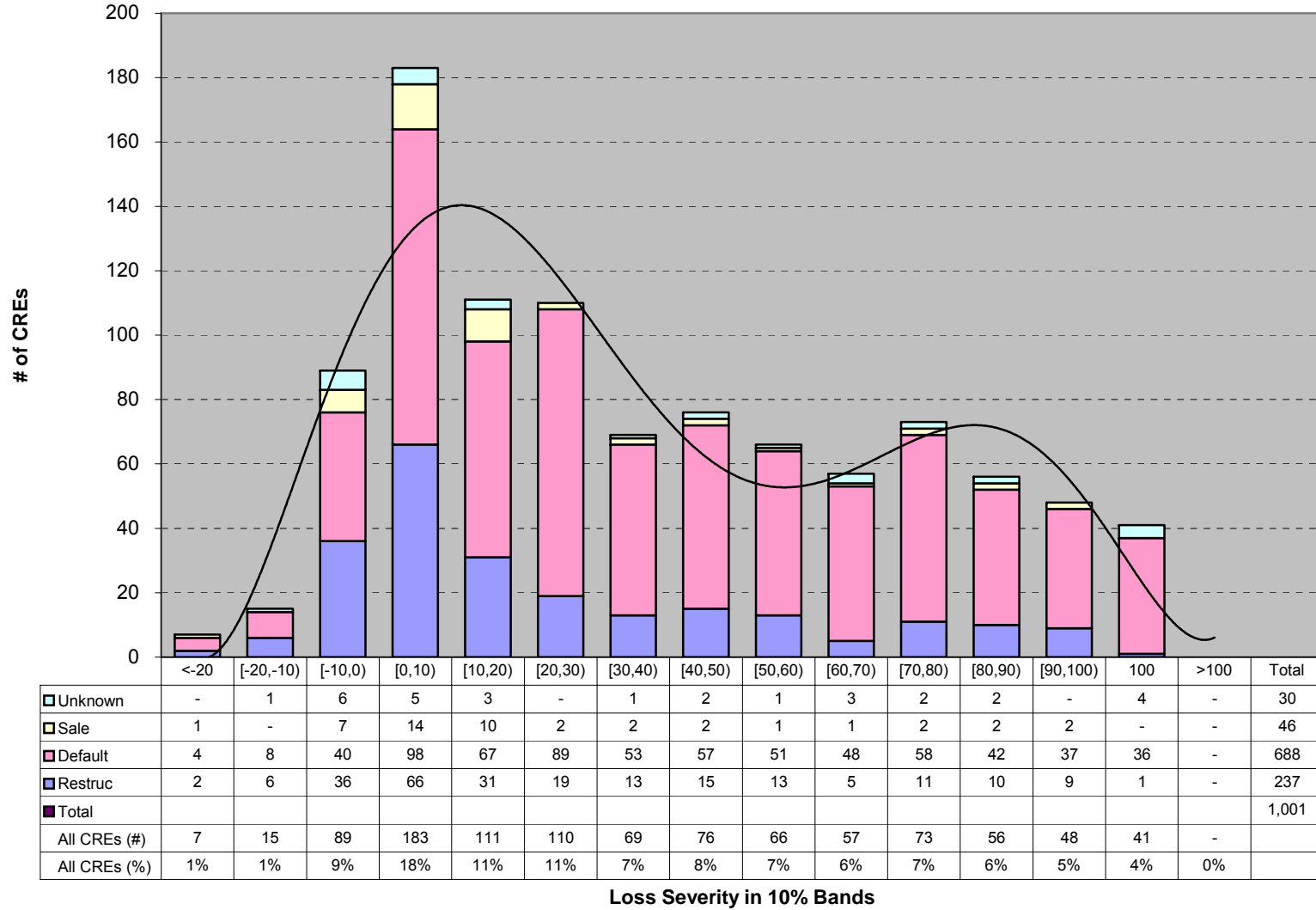
Frequency Distribution of Loss Severity of CREs (By Seniority)

	<-20	[-20,-10)	[-10,0)	[0,10)	[10,20)	[20,30)	[30,40)	[40,50)	[50,60)	[60,70)	[70,80)	[80,90)	[90,100)	100	>100	Total
☐ Unknown	-	3	19	66	42	52	22	23	19	18	26	18	20	15	-	343
☐ Subord.	2	1	15	30	22	23	14	13	17	10	21	16	13	15	-	212
☐ Senior	5	11	55	87	47	35	33	40	30	29	26	22	15	11	-	446
■ Total																1,001
All CREs (#)	7	15	89	183	111	110	69	76	66	57	73	56	48	41	-	
All CREs (%)	1%	1%	9%	18%	11%	11%	7%	8%	7%	6%	7%	6%	5%	4%	0%	

Loss Severity in 10% Bands
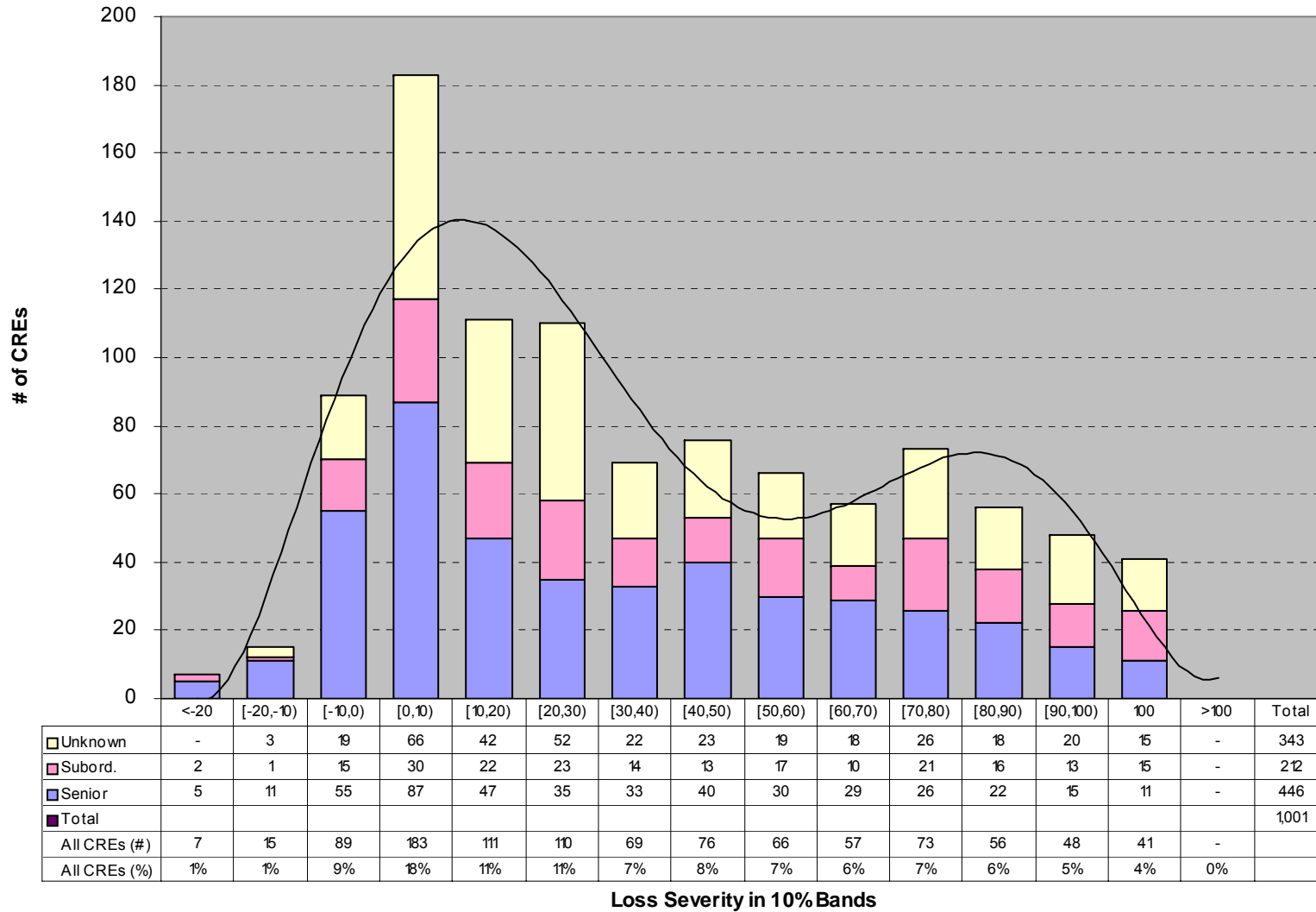
D. Private Placement 1986-2002: Most Recent Quality Rating

Highlights

- Incidence rates and economic loss rates by rating are as expected. Both rise with lower quality and are significantly higher for speculative grades than for investment grades.

- The loss severity is around 30% for ratings A to BB, but it increases significantly to 39% for B and 51% for <B.

- Incidence and economic loss statistics are somewhat larger for the N/A (ratings-not-available) category than for all private placements at large, but severities are similar. This suggests that placements in the N/A category were a bit riskier than average but, on the other hand, the volume in N/A peaked during the years with the highest loss rates, so on the whole placements in the N/A category may have been similar to the overall pool.

- AAA-AA cells are too sparsely populated with CREs to be statistically credible.

- Incidence by number was consistently lower than incidence by amount until 1996, and near each other thereafter. Only in two years (1997 and 2002) was incidence by number materially higher than incidence by amount

Data Notes

- See Data Notes under Aggregate Experience.

- The quality ratings are based on participating companies' own internal ratings mapped to a scale comparable to S&P and Moody's.

- The distribution of placements across reported quality ratings is fairly constant over time, except for the increase in the proportion of AAA ratings since 1998 (see Data notes on "Aggregate Experience").

- Before 1996, the study's database included a significant amount of unreported or unreliably reported quality ratings that had to be relegated to the N/A category.

Incidence Rate by #, Incidence Rate by $, Economic Loss Rate, and Loss Severity By Most Recent Quality Rating

	AAA	AA	A	BBB	BB	B	<B	N/A	Total
Incid by #	0.01%	0.06%	0.09%	0.52%	2.78%	4.24%	6.21%	0.97%	0.78%
Incid by $	0.01%	0.06%	0.10%	0.59%	3.81%	6.28%	11.67%	1.31%	0.89%
Econ Loss	0.00%	0.02%	0.03%	0.21%	1.12%	2.42%	6.00%	0.44%	0.31%
Loss Sev	71%	33%	26%	35%	29%	39%	51%	34%	35%
# of CREs	1	7	28	213	246	186	115	205	1,001

Most Recent Quality Rating

120
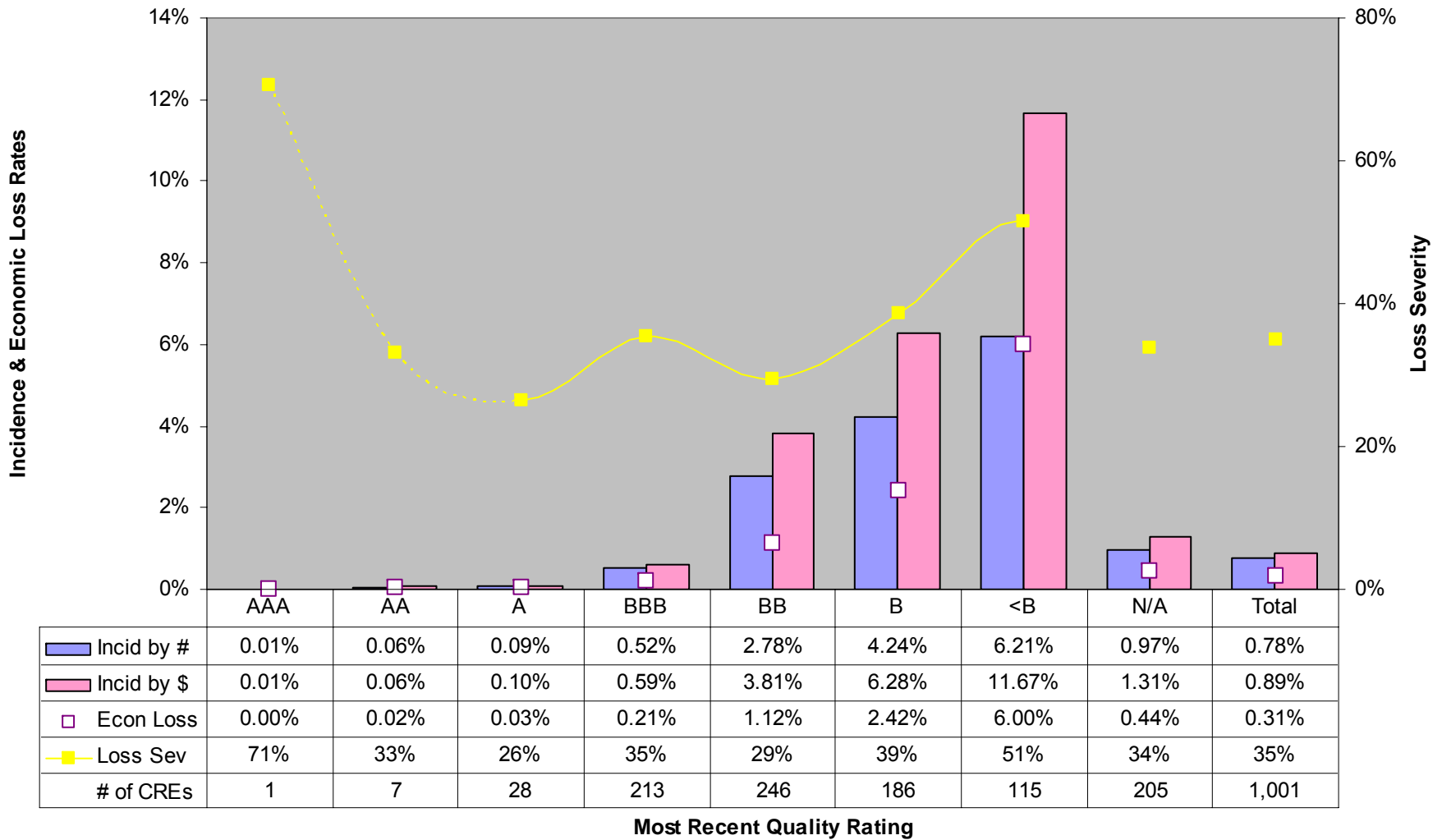
E. Private Placement 1986-2002: Earliest Quality Rating

Highlights

- As with the results by the most recent rating, the incidence rates and economic loss rates rise with lower quality ratings but not as steeply and not without exception.

- The pattern of loss severity generally increases with lower quality ratings (34% for AAA-BBB, 38% for BB-B, and 40% for <B). The pattern may be due in part to a greater frequency of subordinated debt among lower grades at issue.

- Incidence and economic loss statistics are again somewhat higher for the N/A (ratings-not-available) category than all private placements at large. See the Highlights for Most Recent Quality Rating.

- The economic loss rate by Earliest Quality Rating is higher than the economic loss rate by Most Recent Quality Rating in investment grades but lower in speculative grades. This is to be expected because most assets originated as investment grade migrate to speculative grade before onset of a CRE.

- The pattern by year of incidence by number compared to incidence by amount is similar to the pattern by most recent quality rating.

Data Notes

- See Data Notes under Aggregate Experience and Most Recent Quality Rating.

- The Earliest Quality Rating is a proxy for the rating at issue, derived from reported values of the 'rating at acquisition' and 'most recent quality rating', as of the end of each contribution year, according to the following algorithm:

  1. Use 'rating at acquisition' if available, or take the earliest one if reported more than once. (in years since 1994, the earliest quality rating has been consistently supplied by contributing companies)
  2. Use 'most recent quality rating' for the earliest contribution year if (1) above is not available.
  3. If neither of (1) or (2) above is available, default to N/A for the 'earliest quality rating.'

- AAA-AA cells are too sparsely populated by CREs to be statistically credible.

- There was a minor amount of miscoding of earliest quality ratings discovered by one contributor that affected earliest quality ratings for years 1995 through 1998 that was corrected in this study. The impact is minor on the distribution of exposures, with the proportion of AAA earliest ratings rising, and immaterial on the loss statistics.

Incidence Rate by #, Incidence Rate by $, Economic Loss Rate, and Loss Severity By Earliest Quality Rating

	AAA	AA	A	BBB	BB	B	<B	N/A	Total
Incid by #	0.04%	0.14%	0.25%	0.80%	2.76%	3.13%	3.17%	0.94%	0.78%
Incid by $	0.03%	0.14%	0.24%	0.87%	3.33%	6.06%	5.02%	1.27%	0.89%
Econ Loss	0.02%	0.05%	0.07%	0.31%	1.27%	2.26%	2.06%	0.40%	0.31%
Loss Sev	59%	39%	28%	36%	38%	37%	41%	31%	35%
# of CREs	4	18	81	321	223	124	57	173	1,001

Earliest Quality Rating

122
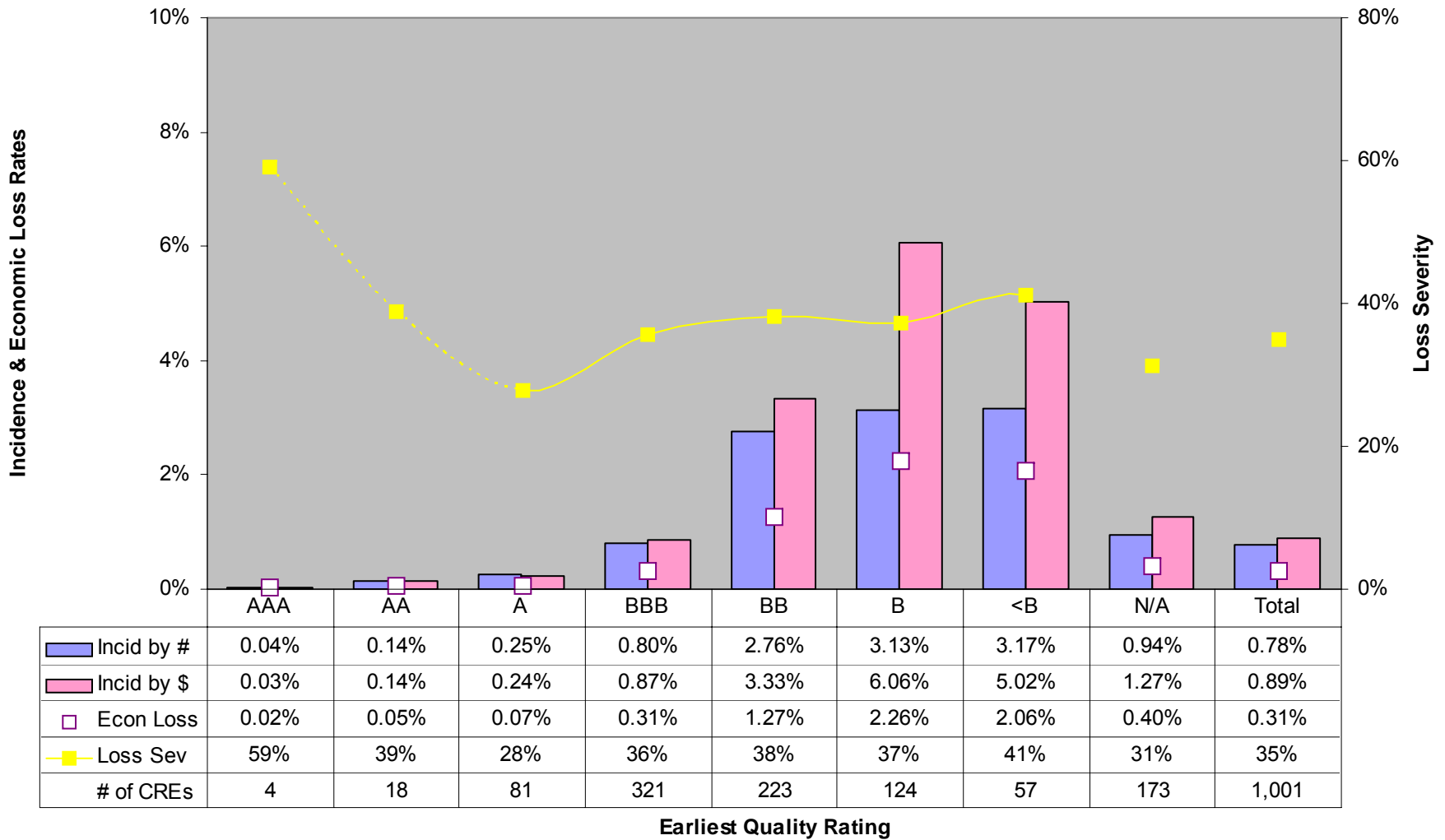
F. Private Placement 1986-2002: NAIC Rating

Highlights

- The NAIC rating scale changed in 1990, from the 4-way breakdown of Yes-No*-No**-No to the 6-way breakdown of 1-2-3-4-5-6 in descending order by credit quality. Comments in these Highlights address the current scale only.

- As a function of the NAIC rating in descending order by quality, the incidence rate by number rises exponentially from 1 through 5 before reversing slightly between 5 and 6, while the incidence rate by amount continues to rise through 6.

- The loss severity range from 30% to 35% for rating 1 to 5 without a clear trend, but rises to 50% for rating 6.

- The trend line on the incidence rate by amount, multiplied by the trend line on the loss severity, produces a trend line on the economic loss rate that rises steeply and continuously throughout the NAIC rating scale of 1 to 6.

Data Notes

- The NAIC rating in question is as of the year-end prior to each exposure year in question.

- The NAIC rating scale changed as of year-end 1990. Ratings on the two scales were converted to a single uniform scale according to the following table.

	Original NAIC Scale	Current NAIC Scale
Investment Grade	Yes	1 & 2
Below Investment Grade (High)	No*	3
Below Investment Grade (Low)	No**	4 & 5
At or Near Default	No	6

- See discussion in Section III: Analysis and Commentary.

Incidence Rate by #, Incidence Rate by $, Economic Loss Rate, and Loss Severity By Most Recent NAIC Rating

	1 (Yes)	2	3 (No*)	4 (No**)	5	6 (No)	N/A	Total
Incid by #	0.15%	0.48%	1.96%	3.76%	8.69%	7.54%	1.13%	0.78%
Incid by $	0.14%	0.51%	2.52%	6.26%	14.26%	19.19%	0.80%	0.89%
Econ Loss	0.05%	0.15%	0.89%	2.13%	4.49%	9.78%	0.26%	0.31%
Loss Sev	33%	30%	35%	34%	32%	51%	33%	35%
# of CREs	102	147	165	220	119	116	132	1,001

NAIC Rating

124
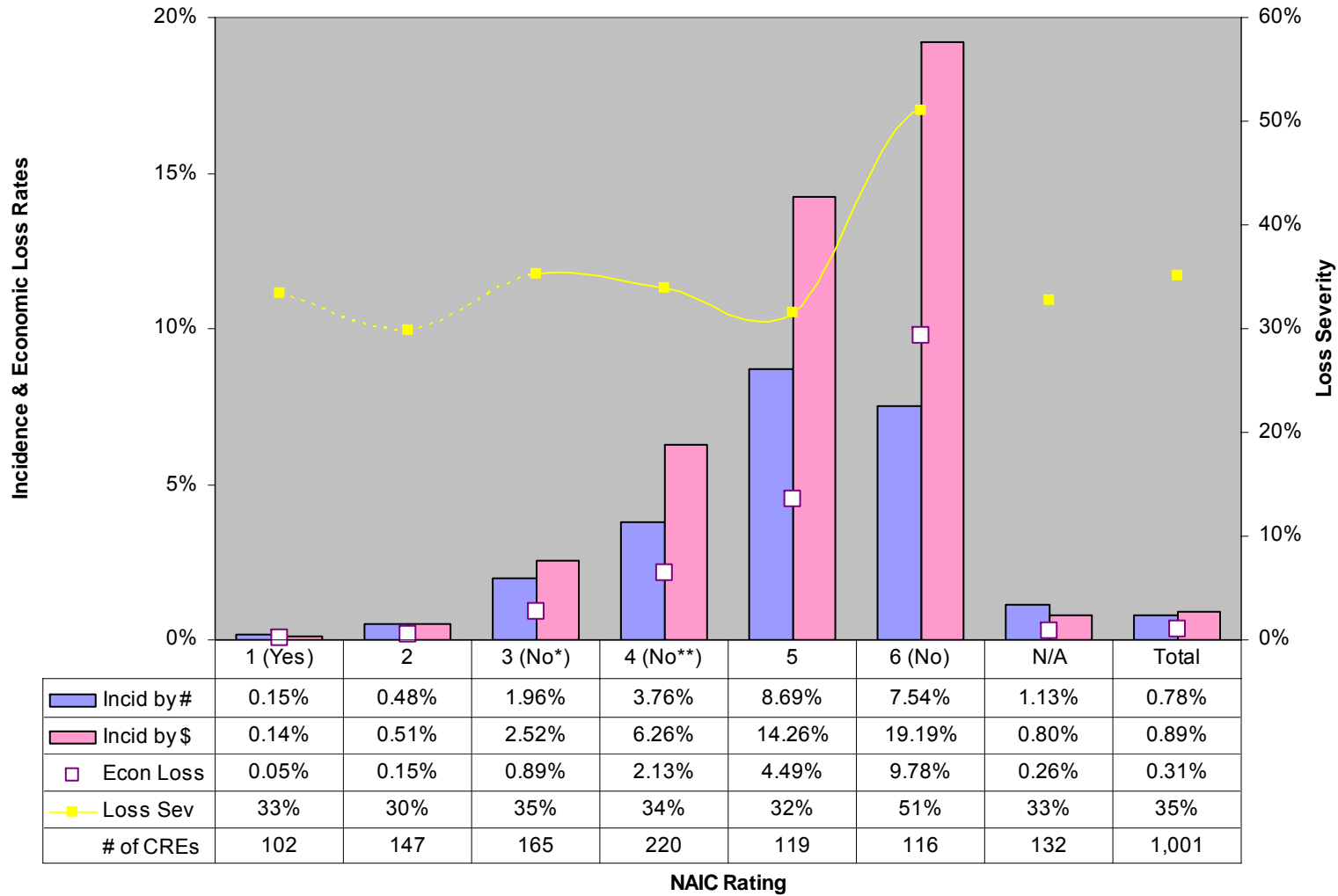
G. Private Placement 1986-2002: Coupon Rate

Highlights

- An analysis by coupon rate has to normalize for the quality rating because of the correlation between credit spread and quality rating. This is done in the Cross Tabulation section, which showed that a high coupon, even after normalizing for the credit rating, is still associated with a higher incidence rate of credit events and a higher economic loss rate.

- Ignoring the quality rating, the coupon rate on a standalone basis seems to be positively correlated with three of the four loss statistics between 9% and 14%:

	Coupon Range in %				
	9-10	10-11	11-12	12-13	13-14
Loss Statistic			%		
Incidence by #	0.58	1.23	1.46	1.71	1.89
Incidence by $	0.59	1.36	1.81	2.39	3.25
Economic Loss	0.19	0.37	0.55	0.92	1.51
Loss Severity	33	27	30	38	46

- The loss severity seems to flatten at around 30% for coupons between 7% and 12%.

- The coupon effect dissipates somewhat above 14%. It also flattens below 10% and slightly reverses itself below 5%. However, it is worth noting that low coupons on accrual bonds may not be indicative of the entire debt service load and thus may not be fully indicative of risk.

- It may be that the fall in interest rate and inflation levels is causing the "high coupon effect" of higher incidence and economic loss ratios to migrate to lower nominal coupon rates. The Committee expects to study this phenomenon and report on it in its next full report.

Data Notes

- See Section IV on Cross Tabulation.

Incidence Rate by #, Incidence Rate by $, Economic Loss Rate, and Loss Severity By Coupon Rate

	0%	0-5%	5-6%	6-7%	7-8%	8-9%	9-10%	10-11%	11-12%	12-13%	13-14%	14%+	TOTAL
Incid by #	0.19%	0.51%	0.29%	0.31%	0.60%	0.47%	0.58%	1.23%	1.46%	1.71%	1.89%	2.13%	0.78%
Incid by $	0.54%	0.31%	0.21%	0.23%	0.71%	0.52%	0.59%	1.36%	1.81%	2.39%	3.25%	2.99%	0.89%
Econ Loss	0.06%	0.13%	0.12%	0.05%	0.26%	0.18%	0.19%	0.37%	0.55%	0.92%	1.51%	1.41%	0.31%
Loss Sev	11%	41%	57%	23%	37%	36%	33%	27%	30%	38%	46%	47%	35%
# of CREs	13	12	9	39	116	107	137	194	97	97	74	102	997

Coupon Rate

126
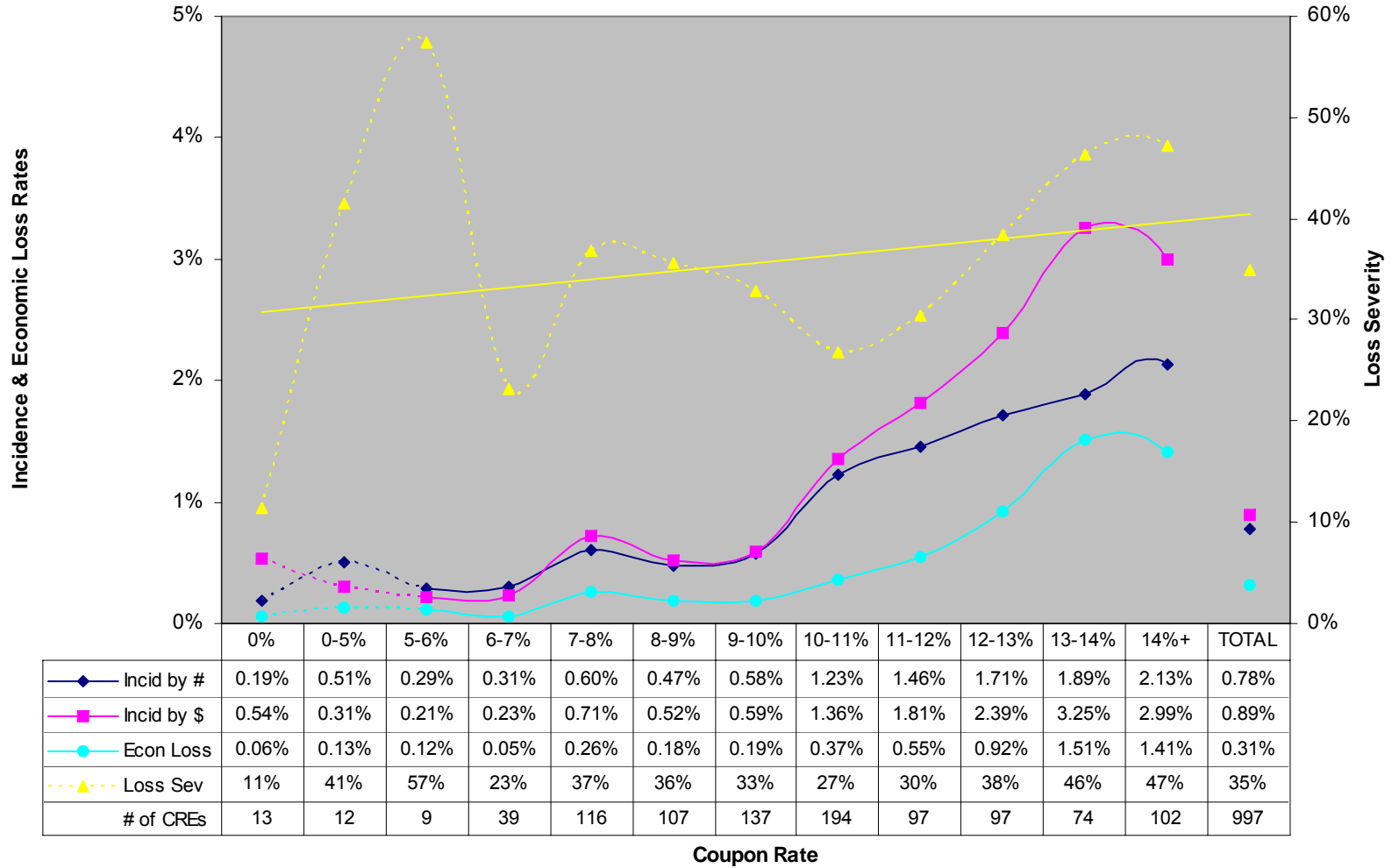
H. Private Placement 1986-2002: Funding Year

Highlights

- Among all issue years grouped in 3-year bins, the 1987-89 and 1999-01 cohorts exhibit the highest incidence rates and economic loss rates. In both cases these funding years were followed by the worst years of incidence and economic loss (1991-92 and 2001-2002) (see Aggregate Experience).

- While the underwriting standards in those years may be a contributing factor to the 'bulge' in incidence and loss rates, the 1990-91 recession and any seasoning effect may also have had their impact on the first cohort.

- The second cohort is similar though it is not yet clear if it was also preceded by somewhat more relaxed underwriting standards. More striking in the case of the second cohort are the unprecedented high loss severities.

Data Notes

- When multiple funding years are reported for the same asset in different exposure years, the earliest reported funding year is used.

- Many individual year cells have limited credibility due to a low number of CREs.

- See discussion in Section III: Analysis and Commentary. Also see the cross tabulation between funding year and experience year in Section IV.

Incidence Rate by #, Incidence Rate by $, Economic Loss Rate, and Loss Severity By Funding Year

	Pre-75	75-77	78-80	81-83	84-86	87-89	90-92	93-95	96-98	99-01	2002+	N/A	Total
Incid by #	0.31%	0.33%	0.48%	0.30%	0.94%	1.49%	0.80%	0.49%	0.85%	0.94%	0.43%	0.88%	0.78%
Incid by $	0.49%	0.86%	0.75%	0.25%	1.05%	1.38%	0.77%	0.44%	0.84%	1.28%	1.11%	1.13%	0.89%
Econ Loss	0.18%	0.20%	0.15%	0.10%	0.37%	0.48%	0.19%	0.15%	0.29%	0.75%	0.37%	0.30%	0.31%
Loss Sev	38%	24%	20%	42%	35%	34%	25%	35%	34%	59%	34%	26%	35%
# of CREs	27	20	40	24	147	267	163	81	130	91	3	8	1,001
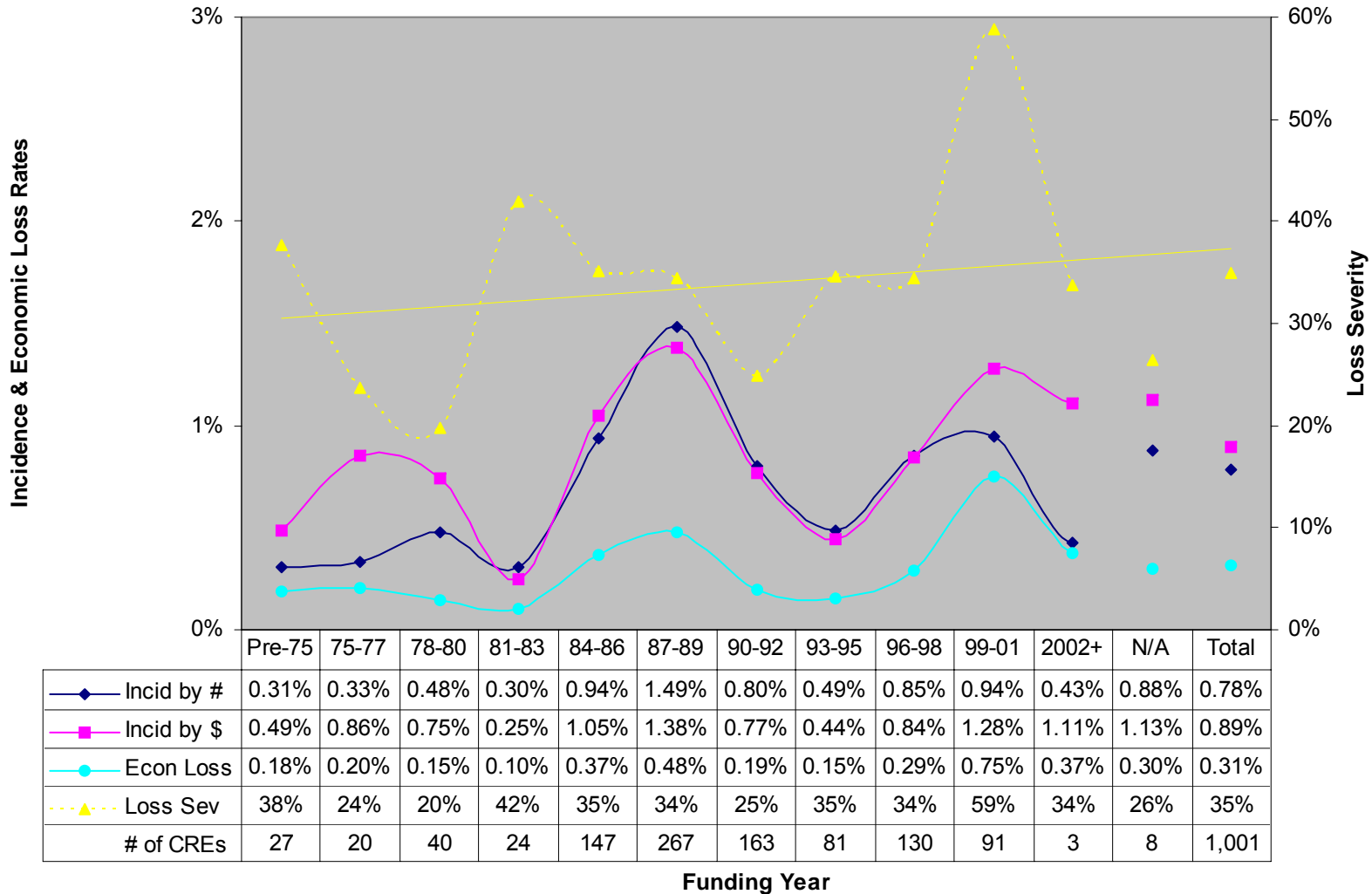
I. Private Placement 1986-2002: Years Since Funding

Highlights

- There seems to be an underwriting effect, which wears off within a 'select' period of a couple of years after funding.

- The select period is followed by a 'weeding out' middle period, after year 2 through year 6 or 7, when the incidence and economic loss rates hover at a relatively high level.

- There seems to be a 'tailing off' period from year 8 on, when the incidence and economic loss rates both subside to a lower level.

- Loss severity declines with years since funding perhaps because amortization of principal and inflation tend to increase the borrower's assets relative to the size of the placement.

Data Notes

- This variable is defined as the current experience year minus the funding year. As such, it is a discrete variable rather than a continuous variable.

- Many individual year cells have limited credibility due to a low number of CREs in the cell.

- See discussion in Section III: Analysis and Commentary. Also see Section IV for the cross tabulation on Years since Funding by Earliest Quality Rating as well as Funding Year by Experience Year.

Incidence Rate by #, Incidence Rate by $, Economic Loss Rate, and Loss Severity By Years Since Funding

	0-2 Yrs	2-3 Yrs	3-4 Yrs	4-6 Yrs	6-8 Yrs	8-10 Yrs	10+ Yrs	N/A	Total
Incid by #	0.54%	1.01%	1.32%	1.02%	0.92%	0.44%	0.43%	0.88%	0.78%
Incid by $	0.52%	1.09%	1.25%	1.18%	1.11%	0.41%	0.54%	1.13%	0.89%
Econ Loss	0.24%	0.41%	0.48%	0.34%	0.33%	0.10%	0.16%	0.30%	0.31%
Loss Sev	46%	37%	39%	28%	30%	23%	30%	26%	35%
# of CREs	147	166	187	218	129	43	103	8	1,001

Years Since Funding

130
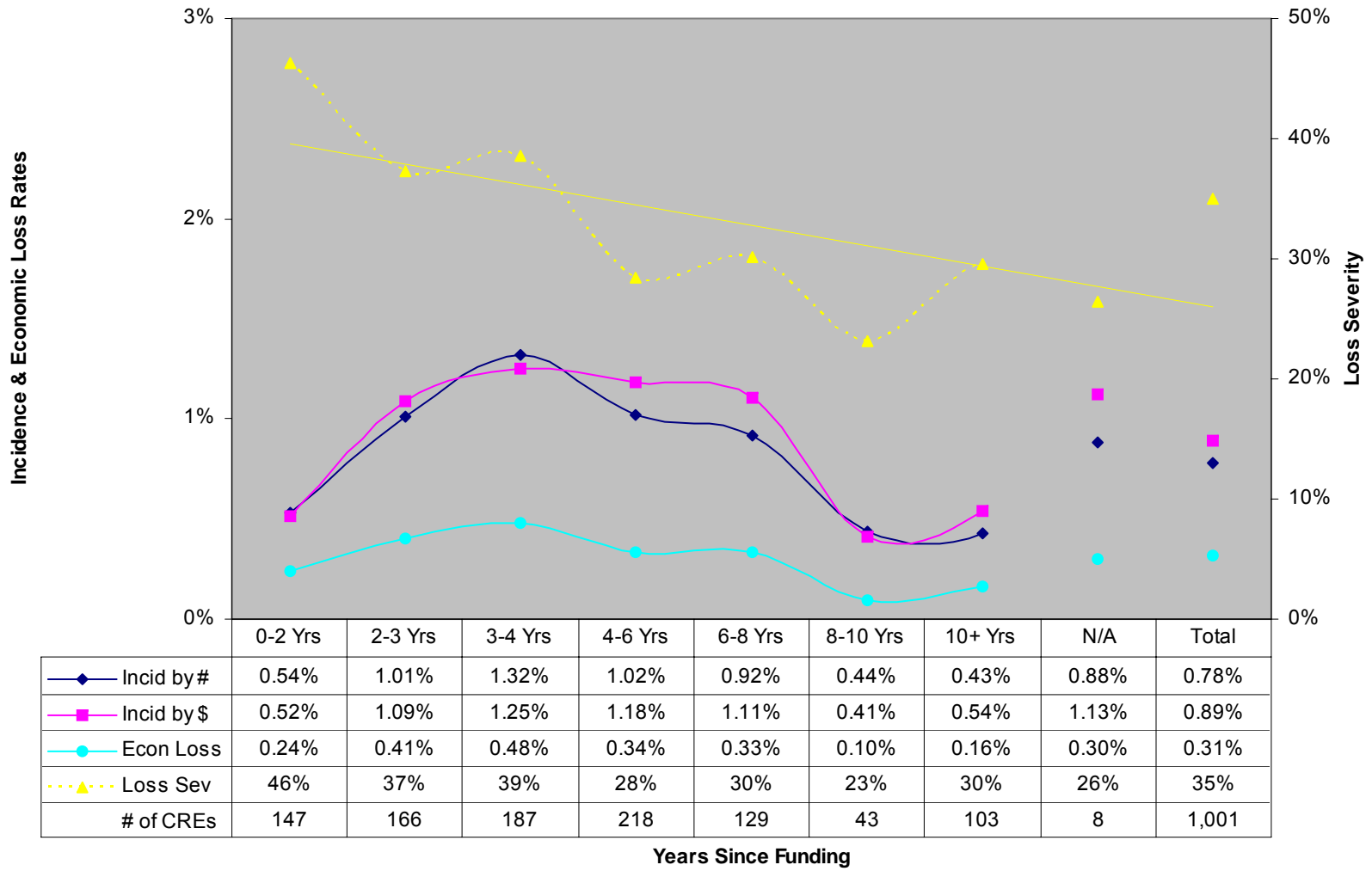
J. Private Placement 1986-2002: Years to Maturity

Highlights

- Like public bonds in recent years[45] but unlike public bonds in early years46, private placements do not exhibit a maturity crisis in that the incidence of CREs seems independent of the years to maturity.

- So while there seems to be a coupon effect on credit risk, there does not seem to be a principal-repayment effect.

- Possible explanations include improved cashflow management through amortizing debt or staggering maturity dates as well as ease of refinancing through new issuance. While interest payments are not deferrable, principal payments can be rolled over.

- An exception to the foregoing is that private placements with more than ten years to maturity exhibit incidence and economic loss rates about one-half the rate of all private placements.

Data Notes

- This variable is defined to be the year of maturity minus the current experience year.

- Many individual year cells have limited credibility due to the low number of CREs in the cell.

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[45] Edward I. Altman and Vellore M. Kishore, Defaults and Returns on High Yield Bonds: Analysis Through 1997, p.6.

[46] Ramon E. Johnson, Term Structures of Corporate Bond Yields as a Function of Risk Default, Journal of Finance, 24 (1967), pp. 313-50.

Incidence Rate by #, Incidence Rate by $, Economic Loss Rate, and Loss Severity By Years to Maturity

	0-2 Yrs	2-3 Yrs	3-4 Yrs	4-6 Yrs	6-8 Yrs	8-10 Yrs	10+ Yrs	N/A	Total
Incid by #	0.80%	0.89%	0.95%	1.05%	0.99%	0.99%	0.41%	1.97%	0.78%
Incid by $	1.12%	1.32%	1.13%	1.11%	1.31%	1.21%	0.39%	2.33%	0.89%
Econ Loss	0.35%	0.40%	0.33%	0.42%	0.42%	0.43%	0.16%	0.80%	0.31%
Loss Sev	31%	31%	29%	38%	32%	36%	41%	34%	35%
# of CREs	93	79	90	211	187	165	170	6	1,001

Years to Maturity

132
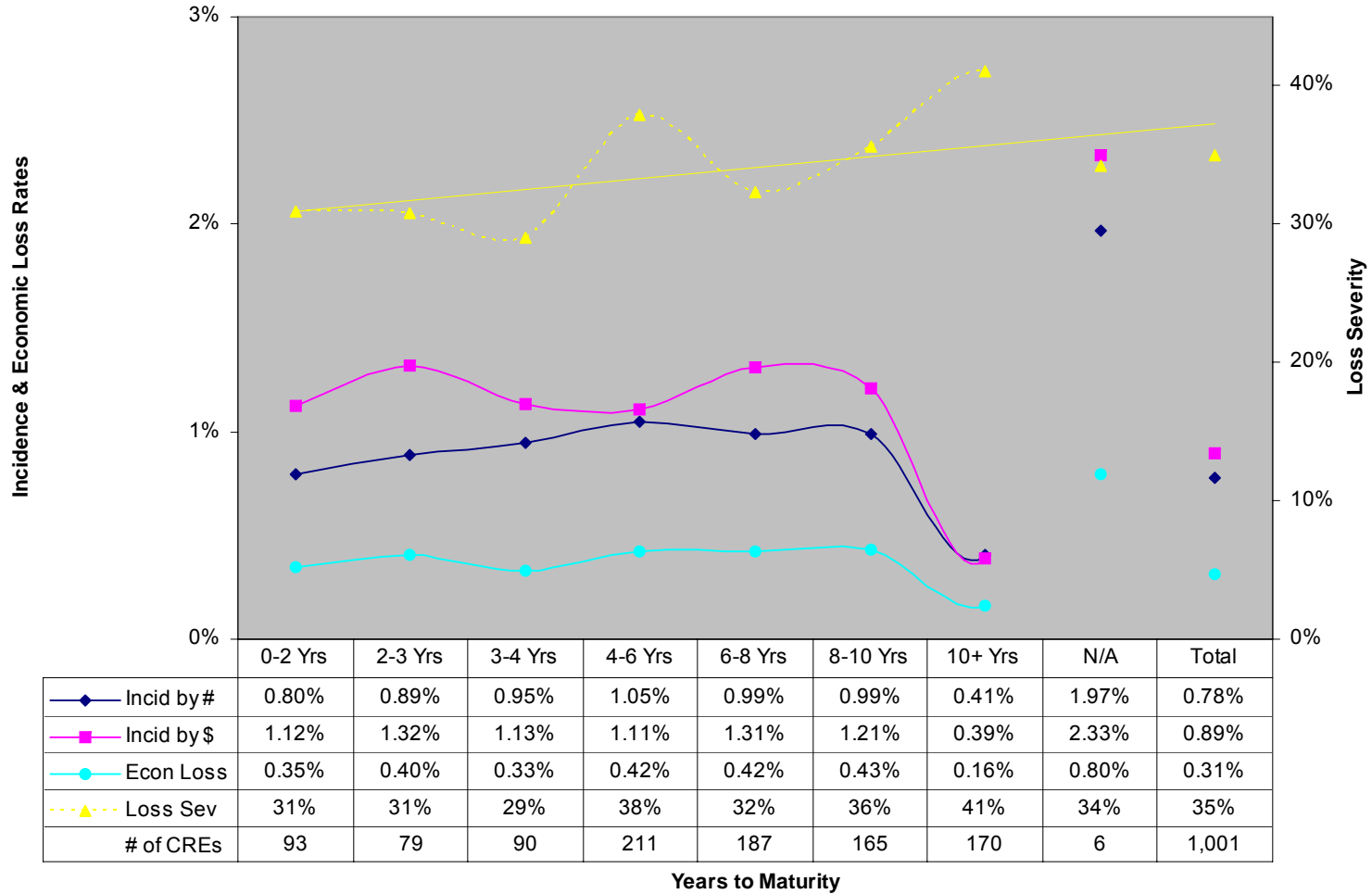
APPENDIX I: TECHNICAL ASPECT OF THE STUDY

A. Definition of Credit Risk Event

In general, any failure (other than for known non-credit-related reasons, such as administrative problems) to pay interest or principal under the terms of the investment contract is considered a credit risk event. Specifically, the occurrence of any of the following is considered a credit risk event:

a) modification of the principal or interest payment terms where the lender agrees to new terms to avoid or minimize possible losses from failure to pay interest or principal under the terms of the contract;

b) Chapter 7 or 11 bankruptcy of the borrower;

c) sale of the investment before maturity because of concerns about deteriorated credit, if the purpose of the sale is to avoid or minimize possible losses from failure to pay interest or principal under the terms of the contract; and

d) any other event, such as complete default, that results in failure to make payments of interest or principal under the terms of the contract.

The opportunity cost associated with the call or contractually allowed prepayment of an asset in a low interest rate environment is excluded as a credit risk loss because the call or prepayment is an exercise of the borrower's right and is therefore not credit-related. However, the opportunity cost associated with a restructuring or a default in a low interest rate environment is considered a credit risk loss.

B. Date of Credit Risk Event and Loss Calculation Date

The credit risk event is considered to have occurred on the earliest of the date of the first missed payment, the date of modification of the principal or interest terms, the date of the sale or the date of bankruptcy filing.

The loss calculation date is the earliest of the date of the first missed payment, the date of modification or the date of sale; for example, in the case of bankruptcy prior to default, rather than being the bankruptcy filing date, the loss calculation date is the date of the first missed payment, or if earlier, the date of modification or the date of sale of the asset.

In practice, there is significant room for interpretation in setting a loss calculation date. In order to rationalize the various interpretations of the data contributors, loss calculations dates, bankruptcy dates and payment dates are all assumed to occur on the first of the month.

C. Actuarial Methodology

1. Basic Model

The actuarial model used as a basis to formulate this study is the incidence and severity model. It is described in Section II D of this report.

2. Definition

a) Incidence

Incidence of an event is generally defined as the number of actual occurrences of that event out of the total possible number of occurrences, in a given time interval. For credit risk, incidence can be measured either by number of assets or by $ volume. It is the number ($ volume) of assets experiencing a CRE in a given year (the unit of time interval used for the study) divided by the total number ($volume) of assets exposed. The measurement can be made for the entire data base or by any predefined component thereof, referred to as a "cell".

b) Economic Loss and Loss Severity

Loss severity with respect to a particular asset is defined as the loss actually sustained, given the occurrence of a CRE, as a proportion of the maximum possible loss on that asset. The maximum possible loss is calculated as the present value, on the CRE date, of originally scheduled cash flows still remaining. The "recovery rate" or "salvage rate" is the present value on the CRE date, of the revised cash flows the investor received (and expects to receive in future) on the CRE, divided by the maximum loss. The severity is then one minus the salvage rate.

Economic loss on a particular asset is defined as its exposure, that is its carrying value or book value at the time of the CRE, multiplied by the loss severity.

Present values are calculated using interest rates described in section C5 of this Appendix.

For a group of assets each of which experienced a CRE, the economic loss is the sum of the asset by asset economic losses, while the loss severity is that sum divided by the sum of the corresponding exposures.

c) Economic Loss per unit of Exposure

Economic loss per unit of exposure is defined as the total economic loss <u>in respect of those assets in the cell that experience a CRE</u>, divided by the book

value (outstanding principal) of all assets exposed in the cell (for precise description of how to calculate the exposure, please refer to section C6).

Equivalently, the economic loss per unit of exposure may be expressed as the product of the loss severity rate and the incidence rate by amount for the cell.

It may be interpreted (after multiplying by 10,000) as the cost, in basis points, of credit risk in the particular year. In other words, it is the reduction of investment yield on the exposed assets, compared to their contractually promised yield, caused by the occurrence of CREs on the exposed assets during the particular year.

3. Loss Statistics

Consistent with the model, the following loss statistics are calculated for each exposure year:

a) *Incidence rate by number, IR^{No}:*

$$IR^{No} = \frac{Number\ of\ credit\ risk\ events\ (CRE)\ in\ cell}{Total\ number\ of\ Exposure\ units\ in\ cell}$$

b) *Incidence rate by amount, IR^{Amt}:*

$$IR^{Amt} = \frac{Amount\ of\ CRE\ Exposure\ in\ cell}{Total\ amount\ of\ Exposure\ in\ cell}$$

c) *Loss Severity, LS:*

$$LS = \frac{Economic\ Loss\ for\ cell}{Amount\ of\ CRE\ Exposure\ in\ cell}$$

d) *Economic Loss per unit of Exposure, EL / E:*

$$EL\ /\ E = \frac{Economic\ Loss\ for\ cell}{Total\ amount\ of\ Exposure\ in\ cell}$$

4. Calculation of Economic Loss

Traditionally, asset default studies have looked at either the incidence of default (number of defaults) or losses of par value. Studies considering only losses of par value do not accurately account for all lost cash flows, costs of collection or

restructure or for the time value of money. In this study, the measure of loss resulting from a credit risk event is based on comparing, at the loss calculation date, the present value of the remaining cash flows of the original investment to the present value of the cash flows that result from the credit risk event. This measure provides a single point-estimate of the losses based on the information available up to the calculation date. The economic loss needs to be recalculated whenever the cash flow changes.

The Economic Loss for credit risk event I, EL^{CRE_i}, is given by

$$EL^{CRE_i} = OP^{CRE_i}_{PYE} \left(\frac{PV^{OCF\ CRE_i}_{loss\ calc\ date} - PV^{RCF\ CRE_i}_{loss\ calc\ date}}{PV^{OCF\ CRE_i}_{loss\ calc\ date}} \right)$$

Where

$OP^{CRE_i}_{PYE}$	=	outstanding principal for credit risk event I at the year end (or more recent date if available) immediately preceding the loss calculation date
$PV^{OCF\ CRE_i}_{loss\ calc\ date}$	=	present value of the original contractual cash flow for credit risk event I at the loss calculation date
$PV^{RCF\ CRE_i}_{loss\ calc\ date}$	=	present value of the revised cash flow (net of event expenses) for credit risk event I at the loss calculation date

Note:

i)

$$PV^{OCF\ CRE_i}_{loss\ calc\ date} = \begin{array}{l} OCF_1\ v_1^{t_1} \\ + \ldots \\ + OCF_j\ v_j^{t_j} \\ + \ldots \\ + OCF_n\ v_n^{t_n} \end{array} \tag{1}$$

where

$$v = \cfrac{1}{\left(1 + \cfrac{i_j^{(2)}}{2}\right)^2}$$

t_j $\dfrac{(\textit{number of months from loss calc date to date } j)}{12}$

$i_j^{(2)}$ is determined as indicated in section C5 below (assuming nominal annual rates convertible semi-annually)

date j   date of payment of jth payment

OCF$_j$ j[th] original cash flow

n   number of original contractual cash flows on or after the loss calculation date

$$PV_{\textit{loss calc date}}^{RCF\ CRE_i} = \begin{aligned} &RCF_1\ v_1^{(\textit{date 1} - \textit{loss calc date})/365}\\ &+ \ldots\\ &+ RCF_j\ v_j^{(\textit{date j} - \textit{loss calc date})/365}\\ &+ \ldots\\ &+ RCF_k\ v_k^{(\textit{date k} - \textit{loss calc date})/365} \end{aligned} \tag{2}$$

RCF$_j$ j[th] revised cash flow (net of credit risk event expenses)

k   number of revised cash flows on or after the loss calculation date

ii) The v_j in equation (2) are usually different from the v_j in equation (1) because a different $i_j^{(2)}$ is usually used for the revised cash flows (RCF)

iii) If only the year of the loss is given, July 1 is assumed; if only the year and month are given, the 15th of the month is assumed.

iv) If the loss calculation date is between payments, the calculation begins with the next payment.

5. *Interest Rates Used for Discounting Cash Flows.*

The determination of the interest rates to use to calculate the present values is a critical component because the ultimate quantification of the economic loss depends upon the interest rates used. There are several alternatives for developing these interest rates. The following summarizes the approach used.

For bonds, three issues to consider are: should spread vary by maturity? By quality? Or by date of CRE? Based on the data provided by ACLI for spreads at issue, it was determined that for this study the spreads should vary only by quality and time period, and that the spread for AAA, AA and A bonds should be the same. Thus, the interest methodology used in this study includes the following components:

a) the treasury spot yield curve as the base;

b) the spreads listed in the following table for the indicated rating and period combinations:

SPREAD IN BASIS POINTS[47]

From	Through	AAA-A	BBB	BB	B and below
1986:Q1	1987:Q3	135	175	325	400
1987:Q4	1989:Q1	135	175	275	325
1989:Q2	1991:Q3	135	175	325	400
1991:Q4	1994:Q4	120	155	350	575
1995:Q1	1996:Q2	100	150	350	575
1996:Q3	1998:Q2	100	150	300	400
1998:Q3	1998:Q4	160	225	375	575
1999:Q1	1999:Q4	180	240	450	625
2000:Q1	2002:Q4	210	265	485	770

c) discounting original cash flows using spreads based on the quality rating at issue[48]

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[47] There was insufficient data for developing a reasonable spread estimate for classes below B.

[48] 165 basis points was used when original quality rating was not available from 1986:Q1 through 1993:Q4. Then 150 basis points was used through 1998:Q4. Thereafter, 250 basis points was used.

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d) discounting revised cash flows using spreads based on the quality rating immediately after the credit event; where not available that rating was assumed to be "B and below";[49]

e) each element of the original and revised cash flows was discounted using the spot yield corresponding to its term, that is the period from the CRE date to the date of occurrence of the particular cash flow element; and,

f) use of the quality rating immediately after the credit event is theoretically correct, because the present value of revised future cash flows should properly reflect the uncertainty associated with their receipt. As time passes, however, and revised cash flows are actually received, certainty replaces uncertainty so that the quality spread should theoretically be eliminated with respect to them. Because the data do not always permit reliable identification of actual cash flows, the RCF calculations always use the applicable spread as of the date of CRE (cf. Appendix IV, fourth bullet). The consequence is an overstatement of the loss experience, but it is not thought to be substantial.

6. Calculation of Exposure

The exposure base represents the total holdings for those investments included in the study during the study period. Using year end values facilitates data collection from Schedule D of annual statements.

The calculation of exposure is based on either OP_j, the outstanding principal at year end j, or OP_{CRE}, the outstanding principal at the time of the credit risk event, as follows:

a) *Assets that are not credit risk events*

   i) Assets in both year end j-1 and year end j exposure data files

$$Exposure_{\,Year\ j} = \frac{(OP_{j-1} + OP_j)}{2}$$

   ii) Assets only in year end j-1 exposure date file (e.g. maturity)

$$Exposure_{\,Year\ j} = \frac{(OP_{j-1})}{2}$$

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[49] Since spreads for classes below B can normally be expected to be larger than those for B, there may be a slight underestimation of loss caused by this methodology. It is not thought to be material.

iii) Assets only in year end j exposure data file (e.g., new acquisition during year)

$$Exposure_{Year\ j} = \frac{(OP_j)}{2}$$

b) *Assets that incurred a credit risk even during year j*

If **OP$_{CRE}$** is known, **Exposure$_{Year\ j}$ = OP$_{CRE}$**

Otherwise, *Exposure$_{Year\ j}$ = OP$_{j-1}$*

c) *Assets that incurred a credit risk event prior to year j and are in year end j-1 and/or year end j exposure data file*

$$Exposure_{Year\ j} = 0$$

Aggregate exposure is the sum of the exposure for the individual assets. Exposure by number of assets is calculated using the same principles.

D. Data Validation

When data was received from a contributor, a number of audits were instituted to validate the various exposure, cash flow and characteristic files. The initial review of an exposure file consisted on an edit check to verify that the input for data elements of each record were within a specified set of validity parameters.

For example, outstanding principal amounts were required to be non-negative and less than one billion dollars. Various other checks verified that data elements were reasonable. While not sufficient to pick up all errors, the process often pointed out systematic problems with the data. Sometimes the explanations were as simple as coding mistakes, incorrect record lengths, wrong justification within a field or improper positioning of information as laid out by the data specifications. In fact, the data often was there, but the format of the fields required some reworking to standardize the information. All files were edited into this fashion.

As each file was edited, questions were asked of the data contributors when appropriate. A record of the solutions to these problems was created, in part to verify with the companies what changes were made. The original data submissions were saved and duplicate files were used for processing. This practice is standard operating procedure

for SoA experience studies to maintain the integrity of company data and to be able to reconstruct what modifications were made.

The second review was to check the internal consistency of the exposure records from year to year. "Mismatches" or differences in data elements, on an asset by asset basis among consecutive years, were identified and referred to the appropriate companies for clarification.

The next data check was commonly referred to as the "exits and entrances" screen. Exposure files were compared on a year to year basis to ensure that bonds that matured during a given year did not show up in the year-end file. Also, assets that were designated as CREs during the year of observation were flagged for removal from the year-end exposure base. Bonds that disappeared from the data base without explanation were investigated. Some of these bonds were combined with others, transferred to subsidiaries or paid off early. New bonds were checked to confirm that they were originated in the given year of exposure. Again, all changes to the data were approved by the respective companies.

Another check was to tally key totals such as number of bonds and outstanding principal. Companies were asked if these values agreed with their submissions on a year to year basis.

Summary proportions were calculated to show the amount of principal outstanding for a given year-end as a percentage of the corresponding total of all private placements held by the contributor, as reported in the annual statement. This screen served as an alert to any under-reporting in a data contribution.

Also, the original and revised cash flow files were printed out to determine if the information could be interpreted from its electronic form and if it appeared to be providing reasonable responses to the data request. Glaring errors such as unmatched (unpaired) original and revised cash flow files for a given CRE asset, and loss dates outside the study period were caught during this review. Companies were asked to make corrections where appropriate.

A data quality check known as a "DQ6" was used to examine in depth the original and revised cash flow files. This multipurpose tool includes the ratio of the present value of the original cash flows, discounted at the stated interest rate for a given asset, to the outstanding principal. That ratio theoretically should be approximately 1.00. The program flagged those assets with ratios less than .85 or greater then 1.15. Most CRE assets passed this screen. Those that did not contained errors in their coding such as missing balloon/bullet payments or wrong input. In that process, one CRE was excluded from the study.

The DQ6 also includes the present value and revised cash flows as calculated for the determination of economic loss. Loss severities were calculated from these present values. The output of the DQ6 provided insight into the cash flow files. All negative

values (indicating gains) were questioned and brought to the attention of the data contributors. In some cases, theses assets had the correct information, but in others the cash flows needed to be modified. All negative loss severities and total write-offs received particular scrutiny. By cross-matching asset ID on CREs, it was found in some cases that the data made sense in aggregate but not for each record separately. In those cases, each record was kept to preserve the correct number of assets – which impacts incidence – but the RCF data were made proportional and the loss severities identical.

During the data validation process, a series of packages were sent to each data contributor asking about specific assets. In some cases, the questions related to important information that appeared to be missing, cash flows that were out of line based on DQ6 and questions about the inclusion of CREs with loss dates before 1986 or after 2002.

In responding, companies sometimes updated specific assets in their cash flow files with more currently available information. However, in most cases the changes to the data files were simply corrections.

Then, the data was put through a series of logical screens and tests to verify whether it made sense, separately for exposure and CREs and then in juxtaposition. Any apparently anomalous situations so identified were queried and corrected, if necessary after consultation with the contributor.

Finally, external date sources were used for validating CRE severities. 10-K filings at Securities and Exchange Commission were used to ascertain information about bankruptcies and restructures of publicly held companies. Sources from rating agencies, the National Association of Insurance Commissioners, and others were utilized when intractable cases were found. Credit events for assets held by two or more contributors to the study were examined with respect to each contributor's loss severity, and differences were analyzed. Some of these differences were result of differing estimates of future revised cash flow streams.

APPENDIX II: ECONOMIC CONDITION DURING THE STUDY

The purpose of the more detailed commentary on 1986 through 2002 economic conditions is a quick reference for the reader to appreciate the economic background to the study and in particular the rising and falling cyclical stresses impacting credit risk.

A. Introduction

'80's - A United States Economy.
> The economy of the United States saw dramatic changes in its structural components in the 1980's. The manufacturing base, exemplified by the auto and steel sectors, began a long decline. The number of lower-paying and, for the most part, service type jobs rose dramatically. At the same time, there was a growing recognition that the U.S. economy was intertwined with those of our trading partners and affected by their economic conditions. Quality issues, cheap labor and trade restrictions became important considerations.

'90's -Towards a Global Economy.
> The 1990s saw a great deal of volatility in the global financial markets and significant achievements for global policy makers. One of the key lessons from the integration of capital markets were that monetary conditions in a given country will be affected by developments elsewhere.

> The global instability during 1995-1998 was characterized by a number of events, including a large number of currency crises (Mexican, Asian, Russian, Brazilian), substantial swings in exchange rates among the major currencies, run-ups in asset prices followed by pronounced asset price deflation, and banking crises in almost all regions of the world.

> A particularly remarkable accomplishment during this period was establishment of broad price stability. Not only did inflation fall to the lowest levels in 40 years, but it came down for the most part across the industrial countries, and to some extent in the emerging market countries. Some of the forces at work that contributed to the decline in inflation expectations were increased competition, deregulation and the information revolution.

> For the most part, the U.S. economy avoided much of the instability that characterized the 1990s. The U.S. recession in 1990-91 was unusually mild and the subsequent expansion became the country's longest period of sustained growth on record. This growth was combined with high rates of job creation and low inflation.

B. The Nineteen Eighties'

1981. Fed acts to control inflation.

After a short attempt to control prices under the Nixon administration, inflation accelerated into a major dilemma for the economy.

In an attempt to gain control over inflation, the actions of the Federal Reserve sent interest rates to their highest levels. In fact, the yield curve became inverted with short-term rates going over 20 percent. Long-term rates also were affected and went up in response to the reduction of the money supply.

The tightening of the money supply also had a serious effect on the economy in general.

The double dip recession in the early 1980's gave way to a long expansionary period.

Mid to latter '80s. Growth with Economic Downturns and Rolling Recessions.

The recovery gained strength in the mid 1980's.

Starting about 1985 a series of economic downturns hit various segments of the economy and regions of the country. Pockets of the economy suffered slowdowns. These slowdowns affected areas of the country differently.

These rolling recessions, as they became known, hit basic and high tech industries alike. Relatively high real (as well as nominal) interest rates exacerbated the situation.

The stock market crashed in October 1987. The Oct 13th stock market crash was partially a function of the weakness of the US high-yield bond market.

1989. Aging expansion.

The increase global economic activity and commodity prices did not bode well for bond prices. The last year of the 1980's was especially challenging for fixed income investors.

The aging US expansion and the triple-credit threat from commercial loans to less developed countries, commercial real estate and high-yield debt suggested global economic contraction and higher bond prices.

Nevertheless, on the whole, the second half of the 1980's represented a long period of un-interrupted growth that proved fertile ground for lender optimism and the highly leveraged deal.

C. The Nineteen Nineties' – Golden decade for the global bond market.

1990-1991 Recession. Economic activity was slowed in early 1991 by a global credit crunch and the countdown to the First Gulf War.

Iraq's invasion of Kuwait on August 1, 1990 sent the U.S. economy into a recession during the third quarter. The recession lasted three quarters and resulted in a 2.1% decline in real GDP. This was a steep loss given the short duration of the downturn.

As is normal, this recession, even if relatively short, intensified the pace of the fundamental restructuring of corporate America. Including downsizing, re-liquefaction of balance sheets, focus on core competencies and upgrading productivity, this restructuring improved U.S. global competitiveness and export performance.

Debt associated with the highly leveraged transactions of the 1980s was based on the assumption - unsustainable in hindsight - of ever increasing values, prices and cash flows in nominal dollar terms.

Since borrowers, both mortgagors and corporations, could no longer count on continuous growth in values or volumes, they found the carrying costs of debt more and more onerous as profit margins came under pressure.

As the economy slowed and expected cash flow assumptions on which leveraged deals were based became unrealizable, carrying costs of leveraged corporate and real estate debt often became unsustainable.

As losses rose, because of the heavy borrowing needs of the government and of the increasing risk averseness of lenders, capital markets came under pressure. Regulatory pressure exacerbated this trend, reinforcing a flight to quality.

1991-1993. Recovery. Central banks lowered rates in 1991-1993.

1991. Recovery begins.

The quick end to the 100-hour war in February started of a slow, anemic recovery in the US and Europe.

To combat global economic weakness, central banks continued in an easing mode. Continued easing (10 Fed Funds and 4 Discount rate cuts) dropped the Fed Funds rate from 6.75% in January to 4.00% by December 20.

The Fed also initiated a rescue of financial institutions by steepening the yield curve to assist crippled financial institutions.

The Federal Depositary Insurance Corporation Improvement Act was enacted. This legislation required all US federal and thrift regulators to factor interest rate risk into their risk-based capital standards.

1992. Credit deterioration persisted.

Credit deterioration persisted through mid-1992, reflecting typical lags between the credit cycle and business cycle. However, in the second half of 1992, improving economic conditions resulted in a reduction in the growth of new credit events.

With interest rates reaching lower levels, investment opportunities created new challenges. Inflation remained in check and the economic outlook improved.

1993. One of top years of the '90's for fixed-income markets.

The junk bond market benefited as the economic outlook improved and as interest rates continued to ease. The 30-year treasury hit a 25-year low of 5.78% in mid-October prompting record levels of prepayments and re-financings.

Nevertheless, the modest recovery was tempered by higher taxes, uncertain health care policies, defense-related cutbacks and floods in the Midwest.

The manufacturing sector continued to trim personnel, with most employment growth occurring in the services and financial sectors. Consumer confidence slid mid-year. Real estate industry problems, while abating somewhat by year-end, remained at relatively high levels.

Those conditions limited new investment opportunities, forcing many lenders into the securities debt markets to absorb cash flows.

1994. Bond bear market. Fed raised rates.

The private sector was the engine of growth in the recovery. The economy grew strongly despite a sustained drop in spending by federal, state and local governments. The Federal Reserve raised rates six times during 1994 to keep growth at a modest pace and inflation under control.

As interest rates moved upward, ebbing inflation fears flattened the yield curve. By year-end the spread between intermediate and 30-year Treasuries narrowed to as little as 5 basis points. The spread between short and long term Treasuries also narrowed but was still about 220 basis points at year-end.

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The effect on absolute performance was devastating. High-yield corporates fared poorly. So did emerging market debt.

1995-2000. Bull equity market.

Table: 1995-2000. Bull equity market.

	Equity returns		
	S&P 500	European Stock	Pacific / Asia
1995	38%	17%	6%
1996	23%	25%	3%
1997	33%	19%	-28%
1998	29%	20%	-4%
1999	21%	31%	88%
2000	-9%	-6%	-32%

Source: Morningstar

Reasons for exceptional equity performance: Apart from the successful implementation of macroeconomic policies, Federal Reserve Chairman Alan Greenspan, in testimony before the U.S. Congress in 1997, attributed the exceptional performance to possible improvements in long-term economic efficiency and to temporary factors restraining inflation[50]:

- Technological advances appeared to have boosted productivity growth.
- A heightened sense of job insecurity held down wage demands.
- Changes in the health care industry curbed the growth in the cost of benefits.
- Increasing globalization enabled greater specialization, allowing comparative advantage to contain costs and enhance efficiency.
- A strong U.S. dollar restrained the rise in import prices and constrained the pricing power of import-competing firms.

1995-1996. Outstanding bond performance was possible during these years as the direction of rates and shape of yield curve changed frequently.

1995. Best Nominal Returns of the '90s. The Fed stops tightening.

As a result of the high rate of resource utilization during 1994, general consensus was that a slowdown was needed to reduce the risk of the economy overheating. Nevertheless except for a momentary back-up during summer, interest rates across the yield curve headed down.

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[50] IMF Survey, "Assessing the Strong U.S. Economic Performance", August 1997

After flirting with a somewhat normal shape during the year, by year-end the yield curve had again flattened. The spread between 3-month T-bills and the 30-year bond tightened to 88 basis points.

1996. New paradigm economy. Spectacular year for the global capital markets.

Expectations about higher future interest rates carried over into 1996 until conflicting economic reports shifted market sentiment towards an almost certain Federal Reserve tightening. The bearish trend was reversed when further tightening did not occur.

Although interest rates declined by almost 60 basis points during the first two months of the fourth quarter, Federal Reserve Chairman Greenspan's warnings of the equity market's "irrational exuberance" increased uncertainty.

By the end of the year about half the quarter's Treasury gains were erased. Public corporate spreads tightened from already historically aggressive levels during 1996 and private placement spreads followed suit, although more gradually.

1997-1998. The Asian financial crisis. Global yield curves reached historic lows ultimately causing the spread-sector crash of August 1998.

1997. Asian Paradigm bust.

Reacting to strong economic data in the first quarter of 1997 the Fed increased the Federal Funds rate by 25 basis points. The market's growing expectation that additional tightening would follow set the tone for a 45 to 55 basis point increase in Treasury yields.

Weak economic reports in the second quarter reversed this sentiment. Federal Reserve Chairman Greenspan's characterization of the economy as one of moderate growth with low inflation set the tone for additional Treasury rate declines early in the third quarter. The year ended with the long bond 72 basis points lower than where it began the year.

A financial crisis erupted in Southeast Asia in July1997. The crisis surprised, confounded and alarmed economic policy makers, rating agencies, and investors. Consensus explanations gushed from financial media and academia.

Although it may have actually helped prolong the economic expansion in the U.S. as capital flows added liquidity to the U.S. bond and stock markets, the effects of this crisis were felt throughout the global financial system,

1998. Great Spread Sector crash in August.

In the early part of 1998, supply was the predominant issue on investors' minds. Declining Treasury yields, the result of both increasing international demand and limited supply, drove a very strong corporate new issuance calendar.

Liquidity concerns were also heightened in the Fall with the near failure of the major hedge fund Long Term Capital Management. By this point a flight to quality was in full swing, along with a further tightening of credit.

Spreads in all credit markets increased dramatically. Investment grade spreads, including private placements, increased 30 to 75 basis points. Spreads on the riskiest asset classes - emerging markets and high yield - increased the most. High yield spreads increased more than 270 basis points.

The Asian financial crisis spread throughout the global capital markets during 1998. During the third quarter concern grew over the Japanese banking system. The Russian currency was devalued in mid-August. There was concern over the continuing spread of the crisis.

The Asian financial crisis contributed to a more risk adverse position among investors. The Fed cut rates on three occasions starting in late September and a significant degree of calm returned to the financial markets.

Nov 1998 -1999. This period produced an upward movement in yield curves hurting absolute returns.

1999. Global capital markets returned to normal.

Central banks continued to increase liquidity to combat global recession and Y2K risk and to calm jittery capital markets.

Led conspicuously by oil, commodity prices soared during 1999. By early May, on signs of gathering economic strength, the Fed began to signal its intention to tighten. On June 30 the Fed increased rates by 25 bps. Coupled with evidence of wage pressure, the second half of 1999 also featured two more tightenings from the Fed.

The European Central Bank also reversed course and moved to a tightening mode.

Central bank activity contributed to another stunning year of global equity returns.

The media trumpeted the new virtual economy. In the technology sector, the internet had a breakthrough campaign. This was year of Dot.Com IPO Mania.

Impacted by the attractiveness of the technology sector and another year of record merger & acquisition activity, global equity valuations moved even higher.

Asia enjoyed a fabulous comeback from the depths of its despair a scant 24 months earlier. Most of the rest of the equity world participated in the ever increasing equity valuations.

As in 1991, the resurgence in global economic activity aided the spread sectors. The first third and the final third of 1999 provided consistent out-performance in most spread sectors.

Despite weak absolute returns, the global bond market mood at the end of 1999 was far brighter than at the end of 1998.

D. The New Millennium

2000-2002. Bull Bond Market. The first three years of the'00's produced outstanding absolute debt returns.

Table: 2000-2002 Bull Bond Market.

	Equity returns		
	US Aggregate Index	Pan European Aggregate Index	Asia Pacific Aggregate
2000	10%	9%	4%
2001	8%	6%	4%
2002	12%	7%	n/a

Source Lehman

2000. Bursting of tech equity market.

By the late 1990s, paper wealth creation had become easy. An abundant supply of risk capital and an unfounded belief in a New Paradigm economy were distorting valuations of financial assets.

A miscalculation of equity risks had occurred in this New Paradigm. Some equities were trading at earnings multiples of infinity. The tech equity bubble burst in 2000. And a wave of differentiation spread not only over the tech industry but also over riskier assets in the capital markets.

Although the bursting of the tech bubble hurt the equity markets it benefited the debt markets. The cyclical global shift toward increased risk aversion aided the performance of the global debt capital markets. As a result, 2000 was a good year for most major bond markets.

Central banks showed their concern about the possible return of inflation by raising rates. Equity valuations appeared to be returning to normal with little damage for the remaining equities. However, during late 2000, rising rates and a contraction in debt produced an inversion of the Treasury yield curve.

In most periods, positive economic activity and profitability growth, vigilant central banks, and benign yield curves ensure the relative performance of both the securitized and the credit sectors. However, by the end of the first quarter, yield curve inversion, swap spread expansion, and credit sector underperformance reflected a deceleration of U.S. growth and profitability.

Ever optimistic, investors believed in a swift recovery.

2001. Recession.

Reacting to the signs of a slowing economy, **t**he Fed began reducing rates on January 3. The Fed reduced rates 11 times during 2001.   The Recession formally began in March 2001.

With the arrival of the recession investor's belief alternated between the ever-optimistic, new tech attitude of the late 1990's to a more traditional sober evaluation of economic and equity market prospects. Optimism for a quick economic rebound yielded to the acknowledgement of a lengthier return to a classic, fundamental style valuation regime.

The markets alternated between optimism for a swift recovery and pessimism that the global economy would remain in a slump during the remainder of the first half of the year. Bad news reigned and many operated in denial mode, claiming sunshine right around the corner.

Enron collapsed and many in the energy markets had difficulties. Questions arose about the accuracy of financial statements and the efficacy of credit analyses.

The events of September 11th increased the investor pessimism. Geopolitical and external risks had exploded. The world seemed to have changed forever.

The major equity markets had a second bad year.

The global debt markets had a second good year. Absolute debt returns were higher in October and November. With the exception of high-yield corporates (U.S. and Europe), EMG, and MBS, all spread sectors produced higher returns than their local treasury asset classes.

The global debt primary markets were awash in record new product. And the demand for debt assets soared even with rating downgrades and defaults approaching statistical heights.

Overall 2001 concluded pessimistically. Argentina defaulted. Investors had difficulty adjusting to the geopolitical and external risks of about terrorist attacks, weapons of mass destruction and confrontation in Afghanistan.

2002. Economy doesn't respond.

The recession ended in early 2002. After the eleven rate reductions in 2001, many incorrectly expected rate increases in 2002. The Fed did not raise rates. The global economy wouldn't respond as expected. The major equity markets had a third bad year.

The global debt markets had a third good year. Absolute debt returns exceeded those of 2001. U.S credit markets were extremely volatile and experienced an unpleasant year.

As with 2001, 2002 concluded with a large number of difficulties. Geopolitical risk (including the risks of military action and of terrorist threats) and corporate accounting quality were far worse than imagined. Corporate cleansings occurred. Responding to external pressures, rating agencies became more realistic and producing more frequent reviews.[51]

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[51] Text relies heavily upon information from Lehman Brothers especially Lehman Brothers Global Relative Value publications dated Jan 4, 1999; Jan 3, 2000; Jan 2, 2001; Dec 31, 2001; Dec 23, 2002; and Jan 6, 2003

APPENDIX III: LIMITATION OF THE 1986-2002 STUDY

Limitations of the 1986-2002 Study

Limitations of the study are generally of two kinds: those concerned with the quality and completeness of the data collected and used and those concerning the sufficiency of the data for purposes of drawing valid conclusions about the behavior of credit risk.

Limitations include:

- Not all companies contributed data to all years of the study. In all, 20 companies have contributed data to the study. Only four have contributed all 17 years (1986-2002).

- Six companies contributed to the 1999-2002 portion of the study. Their collective contribution represented an estimated 25% or slightly more, depending on the calendar year of exposure, of total general account private placement assets of the life insurance industry, as noted in Section II. This is materially lower than observed in the 1994 and prior study years, when the corresponding ratio was around 40% continuously since 1987. There is an increased risk, therefore, that the results of the study are less representative of underlying industry experience than up to 1994. Still, in no year did the ratio fall below 24% - a substantial sample.

- Companies determined that they could not necessarily provide the required data for every sale and restructure for the 1986-89 study; therefore, companies were asked to submit data only for those modifications, sales and other events that the company could determine were clearly credit related. (Note: Although this approach could have led to significantly biased reporting for this period, a comparison, by ACLI staff, of private placement bonds submitted as credit risk events and company annual financial statements indicated that the reporting of the credit risk events seemed reasonable.)

  To a lesser extent the same was true of the 1990-94 submissions, but the quality of the data improved through greater effort by the contributors to ensure completeness. That is even more so for the 1995-1998 and 1999-2002 submissions, since all but one of the contributors were previous participants and thus had increased familiarity with the study and its methodology.

  Future data collection will continue to emphasize the need to report all assets that incurred changes from the originally contracted cash flows.

- As part of each new data collection process, companies were asked to provide updated information on all previous CRE cash flows. Undoubtedly, not all such updates were provided. In particular, companies that ceased to be contributors did not provide updates.

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- A long "tail" exists before the final outcomes of many credit risk events are known with certainty; the results for 1986-1994 have been updated as additional information became available, and this process will continue in future studies.

- Data for some characteristics were limited. For example, information on seniority and secured status of assets was collected only from 1990 onward, and some contributors did not code those fields for all years.

- Some data elements that were expected to have remained consistent from year to year appeared to vary somewhat; however, such deviations usually had reasonable explanations.

- This study does not attempt to measure the risk-reward tradeoff of investments.

- Although significant efforts were made to ensure the reasonableness and completeness of the contributed data (please see Appendix I, Section D), the results of the study are ultimately dependent on the nature and scope of the data submitted.

- An additional limitation is that the study was not originally designed to be able to aggregate, across companies or within companies, different bond issues from a single issuer, or different shares of the same issue. However, an attempt was made to effect such an aggregation, using asset IDs as the basis of aggregation. Further comment may be found in the Analysis section of the report.

- The relatively small number of Credit Risk Events, cumulatively about 1,000 for all 17 years of the study, makes it difficult to analyze results by some characteristics.

- Comprehensive asset identification number changes during 1989 for approximately half the companies in the study made it difficult to precisely assess the completeness of the data.

- Multiple funding dates and/or multiple maturity dates are sometimes associated with the same asset identification numbers.

- The study does not attempt to capture the gains or losses from non-debt securities even though private placement bonds, particularly those associated with leveraged buyouts, often include equity components which, on a portfolio basis, can provide substantial gains to offset losses; the study also does not attempt to capture gains or losses that result directly from calls or prepayments (e.g., prepayment penalties).

- While not a limitation of the study per se, the attention of the reader is drawn to the fact that the bulk of the experience has been contributed by companies that were and are continuous and substantial participants in the private placement market. They have developed considerable expertise in the origination, acquisition and tracking of private placements, and the management of the work-out of distressed or defaulted

assets. It would be hazardous for a new entrant to the market, lacking their expertise and resources, to expect to achieve similar or better credit loss results.

Finally, it is perhaps most important to note that a primary purpose of the 1986-89 study was to learn how to better conduct such a study. It was anticipated that much of the data described would be difficult, if not impossible, to gather, but it was expected that the experience of going through the procedures necessary to gather data for 1986-89 would identify changes necessary to conduct such a study on an ongoing basis (e.g. the type of data and procedural changes needed to gather the data). In general, this hypothesis was confirmed and many data contributors now have enhanced capabilities and management information systems to respond to internal as well as external inquiries on private placement bonds and commercial mortgage loans. It is clear from the 1990-2002 data submissions that ongoing data contributors have managed to overcome or mitigate many of the initially encountered problems.

Despite the many difficulties associated with recapturing historical data, contributing companies perceived that there was an important need to develop a process for obtaining relevant loss data on an ongoing basis. Without the efforts of these companies, a study of 1986-2002 data would not have been possible.

APPENDIX IV: ADDITIONAL RESULTS

Loss Severity
CRE Type
Debt Seniority

Single Tabulation
Most Recent Quality Rating
Earliest Quality Rating
Most Recent NAIC Rating
Coupon Rate
Funding Year
Years Since Funding
Years to Maturity

Cross Tabulation
Coupon Rate by Earliest Quality Rating
Years Since Funding by Earliest Quality
Funding Year by Experience Year

Rating-Transition Probabilities
Comparing Private Placements & Public Corporate Bonds
Comparing Internal Quality Ratings & NAIC Rating

Loss Severity by CRE Type

of Credit-Risk Events
By CRE Type

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
□Unknown	0	3	0	2	3	2	0	1	0	0	0	0	3	0	3	6	7	30
□Sale	4	1	0	1	0	6	8	3	1	2	1	3	0	1	5	4	6	46
■Restruc	8	7	3	2	16	29	56	25	6	6	11	2	13	5	4	22	22	237
■Default	40	46	32	38	31	103	42	53	22	27	12	14	4	36	35	58	95	688
Grand Total	52	57	35	43	50	140	106	82	29	35	24	19	20	42	47	90	130	1001

Experience Year

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$ of Exposure Associated with Credit-Risk Events
By CRE Type

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
☐ Unknown	0	66	0	8	64	1	0	3	0	0	0	0	70	0	56	81	132	480
☐ Sale	34	2	0	10	0	47	69	38	31	18	20	16	0	10	33	98	51	476
☐ Restruc	82	103	8	40	248	577	1,136	323	46	79	178	30	130	101	70	248	235	3,632
☐ Default	269	299	256	417	372	1,075	627	771	290	405	137	129	59	510	378	1,018	699	7,711
Grand Total	384	469	263	476	684	1,700	1,832	1,135	366	502	335	175	259	620	537	1,445	1,117	12,298

Experience Year

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Economic Loss from Credit-Risk Events
By CRE Type

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
☐ Unknown	0	-5	0	1	5	1	0	0	0	0	0	0	31	0	23	24	51	131
☐ Sale	24	1	0	2	0	34	14	-1	1	1	1	5	0	2	-1	6	18	107
☐ Restruc	17	21	2	17	59	114	275	60	3	22	15	-1	15	46	13	109	138	927
☐ Default	113	97	104	167	201	546	248	205	63	83	32	70	24	147	200	553	289	3,142
Grand Total	155	114	105	186	265	695	537	265	67	107	48	75	70	196	235	693	497	4,308

Experience Year

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Incidence Rate by Number
By CRE Type

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
□ Unknown		0.04%		0.02%	0.04%	0.02%		0.01%							0.04%	0.07%	0.08%	0.02%
□ Sale	0.05%	0.01%		0.01%		0.07%	0.09%	0.04%	0.01%	0.04%	0.02%	0.05%		0.01%	0.06%	0.05%	0.07%	0.04%
□ Restruc	0.10%	0.10%	0.04%	0.02%	0.21%	0.35%	0.66%	0.30%	0.07%	0.12%	0.20%	0.03%	0.21%	0.07%	0.05%	0.27%	0.26%	0.18%
□ Default	0.52%	0.64%	0.38%	0.44%	0.41%	1.23%	0.50%	0.64%	0.24%	0.53%	0.21%	0.24%	0.06%	0.50%	0.45%	0.70%	1.11%	0.54%
Total	0.67%	0.79%	0.42%	0.49%	0.66%	1.67%	1.26%	0.99%	0.32%	0.69%	0.43%	0.33%	0.32%	0.59%	0.60%	1.09%	1.52%	0.78%

Experience Year

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Incidence Rate by Amount
By CRE Type

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
☐ Unknown		0.12%		0.01%	0.08%	0.00%		0.00%							0.06%	0.09%	0.14%	0.03%
☐ Sale	0.07%	0.00%		0.01%		0.05%	0.07%	0.04%	0.03%	0.03%	0.03%	0.02%		0.01%	0.04%	0.10%	0.05%	0.03%
☐ Restruc	0.16%	0.20%	0.01%	0.06%	0.30%	0.59%	1.14%	0.36%	0.04%	0.12%	0.24%	0.04%	0.16%	0.11%	0.08%	0.26%	0.25%	0.26%
☐ Default	0.53%	0.57%	0.41%	0.61%	0.45%	1.10%	0.63%	0.87%	0.28%	0.60%	0.18%	0.17%	0.07%	0.56%	0.41%	1.08%	0.73%	0.56%
Total	0.76%	0.89%	0.43%	0.69%	0.83%	1.73%	1.84%	1.28%	0.36%	0.74%	0.45%	0.23%	0.32%	0.68%	0.58%	1.54%	1.17%	0.89%

Experience Year

162

Loss Severity
By CRE Type

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
Unknown		-7%		8%	8%	100%		-4%							41%	30%	39%	27%
▲ Sale	72%	58%		15%		73%	20%	-2%	2%	8%	4%	34%		19%	-3%	6%	36%	23%
Restruc	21%	20%	21%	43%	24%	20%	24%	19%	6%	28%	9%	-2%	11%	46%	19%	44%	59%	26%
Default	42%	33%	41%	40%	54%	51%	39%	27%	22%	20%	23%	54%	40%	29%	53%	54%	41%	41%
Total	40%	24%	40%	39%	39%	41%	29%	23%	18%	21%	14%	43%	27%	32%	44%	48%	44%	35%

Experience Year

163

Economic Loss Rate as % of Exposure
By CRE Type

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
☐ Unknown		-0.01%		0.00%	0.01%	0.00%		0.00%							0.02%	0.03%	0.05%	0.01%
☐ Sale	0.05%	0.00%		0.00%		0.03%	0.01%	0.00%	0.00%	0.00%	0.00%	0.01%		0.00%	0.00%	0.01%	0.02%	0.01%
☐ Restruc	0.03%	0.04%	0.00%	0.03%	0.07%	0.12%	0.28%	0.07%	0.00%	0.03%	0.02%	0.00%	0.02%	0.05%	0.01%	0.12%	0.15%	0.07%
☐ Default	0.23%	0.18%	0.17%	0.24%	0.25%	0.56%	0.25%	0.23%	0.06%	0.12%	0.04%	0.09%	0.03%	0.16%	0.22%	0.59%	0.30%	0.23%
Total	0.31%	0.22%	0.17%	0.27%	0.32%	0.71%	0.54%	0.30%	0.06%	0.16%	0.06%	0.10%	0.09%	0.21%	0.25%	0.74%	0.52%	0.31%

Experience Year

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Loss Severity by Debt Seniority

of Credit-Risk Events
By Seniority

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
□Unknown	37	51	24	29	19	40	37	17	4	5	8	4	4	5	8	16	35	343
▨Subord.	3	1	4	10	11	33	14	14	1	4	2	0	0	11	13	33	58	212
■Senior	12	5	7	4	20	67	55	51	24	26	14	15	16	26	26	41	37	446
Grand Total	52	57	35	43	50	140	106	82	29	35	24	19	20	42	47	90	130	1,001

Experience Year

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$ of Exposure Associated with Credit-Risk Events
By Seniority

Experience Year	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
□ Unknown	284	455	210	357	199	305	466	110	16	45	47	21	52	55	51	217	186	3,074
■ Subord.	13	8	16	83	222	318	299	131	14	41	9	0	0	74	132	477	327	2,164
■ Senior	87	6	38	36	263	1,077	1,067	893	336	416	278	154	207	491	355	750	605	7,060
Grand Total	384	469	263	476	684	1,700	1,832	1,135	366	502	335	175	259	620	537	1,445	1,117	12,298

Economic Loss from Credit-Risk Events
By Seniority

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
Unknown	132	109	92	118	93	166	119	14	4	0	15	5	17	9	37	142	120	1,193
Subord.	4	3	10	44	105	199	112	55	4	23	0	0	0	15	51	275	125	1,025
Senior	18	3	3	24	67	330	306	196	59	83	32	69	52	172	147	277	251	2,090
Grand Total	155	114	105	186	265	695	537	265	67	107	48	75	70	196	235	693	497	4,308

Experience Year

Incidence Rate by Number
By Seniority

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
□ Unknown	0.48%	0.70%	0.29%	0.33%	0.25%	0.48%	0.44%	0.20%	0.04%	0.10%	0.14%	0.07%	0.06%	0.07%	0.10%	0.19%	0.41%	0.27%
▨ Subord.	0.04%	0.01%	0.05%	0.11%	0.14%	0.39%	0.17%	0.17%	0.01%	0.08%	0.04%			0.15%	0.17%	0.40%	0.68%	0.17%
▨ Senior	0.16%	0.07%	0.08%	0.05%	0.26%	0.80%	0.65%	0.61%	0.27%	0.52%	0.25%	0.26%	0.26%	0.36%	0.33%	0.50%	0.43%	0.35%
Total	0.67%	0.79%	0.42%	0.49%	0.66%	1.67%	1.26%	0.99%	0.32%	0.69%	0.43%	0.33%	0.32%	0.59%	0.60%	1.09%	1.52%	0.78%

Experience Year

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Incidence Rate by Amount
By Seniority

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
☐Unknown	0.56%	0.86%	0.34%	0.52%	0.24%	0.31%	0.47%	0.12%	0.02%	0.07%	0.06%	0.03%	0.06%	0.06%	0.05%	0.23%	0.20%	0.22%
☐Subord.	0.03%	0.02%	0.03%	0.12%	0.27%	0.32%	0.30%	0.15%	0.01%	0.06%	0.01%			0.08%	0.14%	0.51%	0.34%	0.16%
☐Senior	0.17%	0.01%	0.06%	0.05%	0.32%	1.10%	1.07%	1.01%	0.33%	0.61%	0.37%	0.20%	0.26%	0.54%	0.38%	0.80%	0.64%	0.51%
Total	0.76%	0.89%	0.43%	0.69%	0.83%	1.73%	1.84%	1.28%	0.36%	0.74%	0.45%	0.23%	0.32%	0.68%	0.58%	1.54%	1.17%	0.89%

Experience Year

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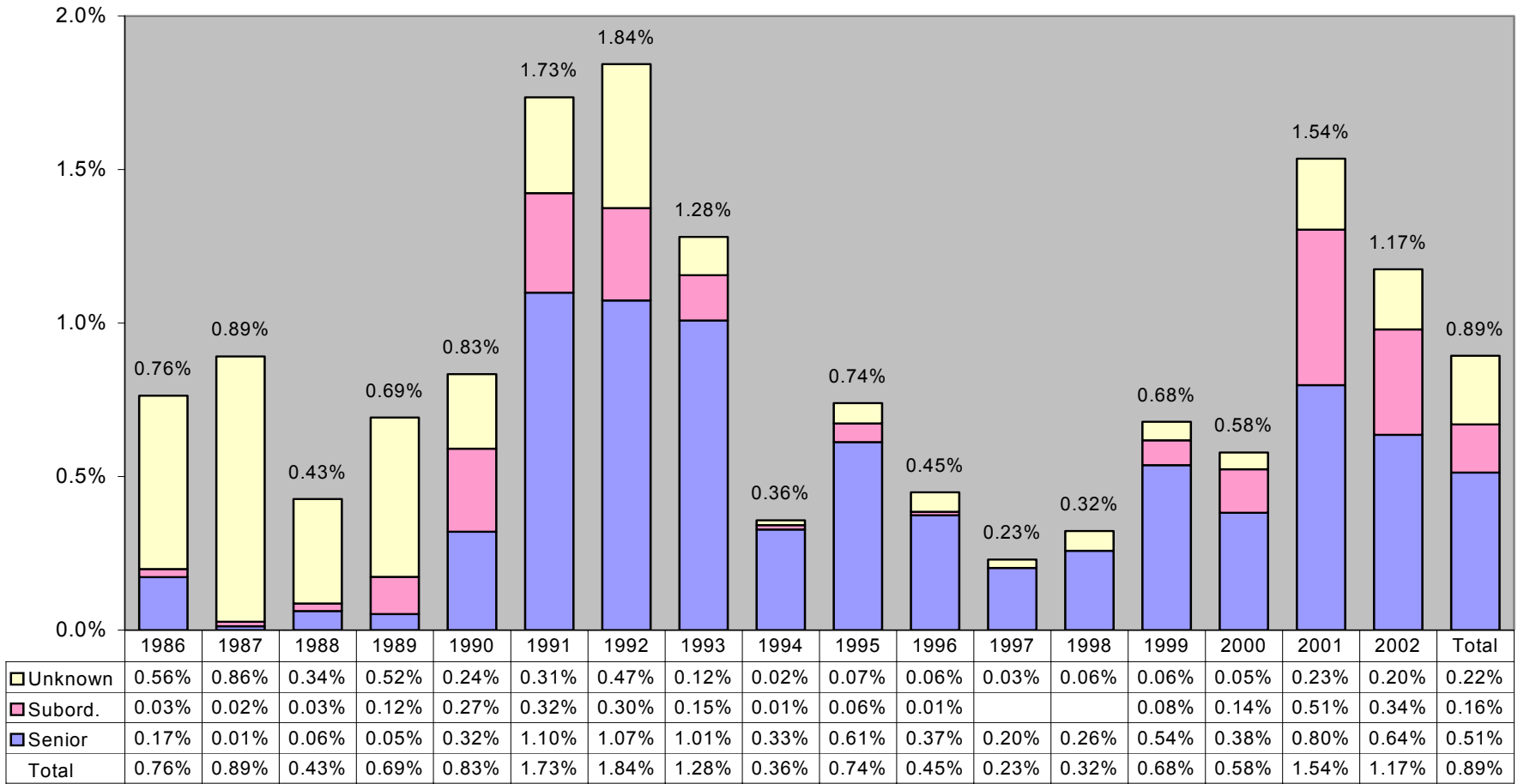
Loss Severity
By Seniority

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
Unknown	47%	24%	44%	33%	47%	54%	26%	12%	23%	1%	32%	25%	33%	17%	73%	65%	65%	39%
Subord.	31%	33%	63%	53%	47%	62%	37%	42%	28%	56%	2%			20%	39%	58%	38%	47%
Senior	21%	40%	9%	67%	26%	31%	29%	22%	17%	20%	12%	45%	25%	35%	41%	37%	42%	30%
Total	40%	24%	40%	39%	39%	41%	29%	23%	18%	21%	14%	43%	27%	32%	44%	48%	44%	35%

Experience Year

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Economic Loss Rate as % of Exposure
By Seniority

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
□ Unknown	0.26%	0.21%	0.15%	0.17%	0.11%	0.17%	0.12%	0.02%	0.00%	0.00%	0.02%	0.01%	0.02%	0.01%	0.04%	0.15%	0.13%	0.09%
■ Subord.	0.01%	0.01%	0.02%	0.06%	0.13%	0.20%	0.11%	0.06%	0.00%	0.03%	0.00%			0.02%	0.06%	0.29%	0.13%	0.07%
■ Senior	0.04%	0.00%	0.01%	0.03%	0.08%	0.34%	0.31%	0.22%	0.06%	0.12%	0.04%	0.09%	0.07%	0.19%	0.16%	0.29%	0.26%	0.15%
Total	0.31%	0.22%	0.17%	0.27%	0.32%	0.71%	0.54%	0.30%	0.06%	0.16%	0.06%	0.10%	0.09%	0.21%	0.25%	0.74%	0.52%	0.31%

Experience Year

172

Most Recent Quality Rating

of Credit-Risk Events
By Most Recent Quality Rating

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
N/A	23	8	9	16	19	33	36	33	8	1	-	-	-	1	6	7	5	205
<B	1	8	8	4	3	6	12	3	3	-	8	6	3	4	7	16	23	115
B	4	8	10	8	9	22	14	16	8	4	3	-	2	13	6	21	38	186
BB	14	12	4	6	7	44	25	18	9	5	7	4	9	18	12	14	38	246
BBB	10	18	4	7	9	33	16	11	1	23	5	8	6	4	13	27	18	213
A	-	3	-	1	3	1	2	1	-	2	1	1	-	2	2	2	7	28
AA	-	-	-	1	-	1	1	-	-	-	-	-	-	-	1	2	1	7
AAA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Total	52	57	35	43	50	140	106	82	29	35	24	19	20	42	47	90	130	1,001

Experience Year

174

Exposure in # of Assets
By Most Recent Quality Rating

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
N/A	2,952	2,739	2,145	2,218	1,737	1,927	2,054	1,912	1,740	122	503	52	94	201	300	297	216	21,204
<B	101	95	146	136	104	116	112	128	137	45	161	135	53	91	89	103	107	1,853
B	88	125	362	424	277	261	229	229	247	158	153	184	243	323	330	359	399	4,388
BB	290	325	485	500	514	573	572	537	586	332	428	455	525	669	651	679	717	8,834
BBB	1,973	1,688	2,311	2,332	2,046	2,316	2,458	2,359	2,675	2,563	2,188	2,373	2,374	2,668	2,829	2,878	2,969	40,995
A	1,335	1,250	1,689	1,814	1,663	1,899	1,908	1,927	2,188	1,234	1,485	1,801	2,029	1,982	1,802	1,831	1,849	29,681
AA	652	680	895	908	829	832	727	722	871	375	485	513	532	670	693	738	765	11,883
AAA	351	339	388	369	463	452	382	498	555	221	187	248	324	546	1,078	1,349	1,542	9,287
Total	7,740	7,239	8,419	8,700	7,631	8,373	8,439	8,310	8,996	5,048	5,589	5,759	6,173	7,148	7,771	8,232	8,562	128,124

Experience Year

175

$ of Exposure Associated with Credit-Risk Events
By Most Recent Quality Rating

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
N/A	144	80	105	142	321	502	974	711	183	40	-	-	-	30	38	160	49	3,481
<B	1	13	32	49	42	86	137	16	35	-	91	63	42	69	53	175	107	1,011
B	14	36	78	24	164	353	99	122	62	31	11	-	17	54	104	255	286	1,710
BB	128	98	39	58	65	514	410	218	56	73	135	47	88	310	145	173	332	2,889
BBB	97	223	10	194	61	230	166	63	31	349	78	60	113	108	184	629	227	2,821
A	-	19	-	4	30	5	40	3	-	8	20	5	-	50	6	15	102	306
AA	-	-	-	4	-	10	6	-	-	-	-	-	-	-	9	32	14	74
AAA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	5
Total	384	469	263	476	684	1,700	1,832	1,135	366	502	335	175	259	620	537	1,445	1,117	12,298

Experience Year

176

Exposure in $ of Assets
By Most Recent Quality Rating

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
□N/A	14,901	16,458	13,975	17,863	26,766	40,026	44,123	38,683	36,229	2,776	3,194	427	848	2,085	3,153	2,915	2,027	266,449
□<B	436	345	496	696	600	477	360	369	444	157	842	651	450	600	422	664	652	8,664
□B	348	893	2,133	2,685	2,355	2,242	1,781	1,345	1,185	1,341	723	1,004	1,317	1,928	1,783	1,934	2,235	27,232
□BB	1,899	2,461	4,200	3,863	4,957	5,539	4,964	4,029	4,661	2,921	4,360	4,233	4,871	5,941	5,639	5,493	5,764	75,795
□BBB	13,086	12,939	15,826	17,135	19,183	21,406	21,511	20,318	27,028	39,057	33,614	34,219	34,680	39,279	41,030	42,564	44,440	477,314
□A	10,137	9,994	14,055	15,075	15,932	17,307	16,949	15,128	20,804	12,329	20,328	22,176	23,681	25,342	24,538	24,316	24,141	312,232
□AA	6,224	6,579	8,001	7,978	7,413	6,840	6,211	5,453	7,391	4,083	6,654	6,761	6,545	8,058	8,171	7,305	6,891	116,559
■AAA	3,336	2,997	2,992	3,366	4,821	4,165	3,463	3,279	4,757	5,267	4,876	6,653	7,820	8,234	8,248	8,896	8,946	92,117
Total	50,366	52,668	61,679	68,661	82,028	98,004	99,362	88,605	102,499	67,929	74,591	76,124	80,212	91,466	92,983	94,087	95,097	1,376,36

Experience Year

Economic Loss from Credit-Risk Events
By Most Recent Quality Rating

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
☐ N/A	54.2	12	21	26	59	278	284	184	34	22	-	-	-	5	31	126	35	1,173
☐ <B	0.6	5	10	36	25	48	49	6	7	-	43	38	34	29	27	88	74	520
☐ B	8.7	9	41	19	97	102	30	26	11	22	6	-	(0)	10	48	125	104	659
☐ BB	66.6	36	30	26	40	192	107	29	13	5	(2)	17	4	67	33	43	141	849
☐ BBB	24.6	49	2	79	30	65	59	19	1	57	0	19	32	67	94	292	108	998
☐ A	-	3	-	(1)	15	2	2	0	-	1	1	0	-	18	3	8	30	81
☐ AA	-	-	-	2	-	8	5	-	-	-	-	-	-	-	(0)	7	4	25
☐ AAA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	4
Total	154.7	114	105	186	265	695	537	265	67	107	48	75	70	196	235	693	497	4,308

Experience Year

178

Incidence Rate by Number
By Year by Most Recent Quality Rating

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
■Total	0.67%	0.79%	0.42%	0.49%	0.66%	1.67%	1.26%	0.99%	0.32%	0.69%	0.43%	0.33%	0.32%	0.59%	0.60%	1.09%	1.52%
□N/A	0.78%	0.29%	0.42%	0.72%	1.09%	1.71%	1.75%	1.73%	0.46%	0.82%				0.50%	2.00%	2.36%	2.32%
■AAA																0.07%	
■AA				0.11%		0.12%	0.14%								0.14%	0.27%	0.13%
■A		0.24%		0.06%	0.18%	0.05%	0.10%	0.05%		0.16%	0.07%	0.06%		0.10%	0.11%	0.11%	0.38%
□BBB	0.51%	1.07%	0.17%	0.30%	0.44%	1.42%	0.65%	0.47%	0.04%	0.90%	0.23%	0.34%	0.25%	0.15%	0.46%	0.94%	0.61%
□BB	4.84%	3.69%	0.83%	1.20%	1.36%	7.69%	4.37%	3.36%	1.54%	1.51%	1.64%	0.88%	1.71%	2.69%	1.84%	2.06%	5.30%
■B	4.57%	6.40%	2.76%	1.89%	3.25%	8.43%	6.13%	7.00%	3.25%	2.53%	1.96%		0.82%	4.02%	1.82%	5.85%	9.52%
□<B	1.00%	8.47%	5.48%	2.95%	2.88%	5.19%	10.76%	2.34%	2.20%		4.98%	4.44%	5.71%	4.40%	7.91%	15.61%	21.60%

Incidence Rate by Amount
By Year by Most Recent Quality Rating
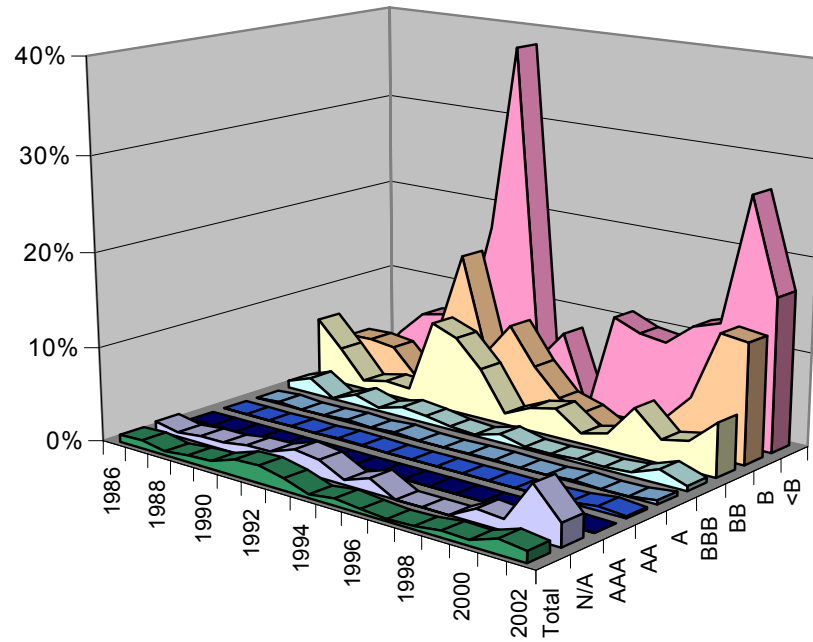
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
◼ Total	0.76%	0.89%	0.43%	0.69%	0.83%	1.73%	1.84%	1.28%	0.36%	0.74%	0.45%	0.23%	0.32%	0.68%	0.58%	1.54%	1.17%
◻ N/A	0.97%	0.49%	0.75%	0.80%	1.20%	1.25%	2.21%	1.84%	0.51%	1.44%				1.44%	1.20%	5.49%	2.41%
◼ AAA																0.06%	
◼ AA				0.05%		0.15%	0.10%								0.11%	0.44%	0.20%
◻ A		0.19%		0.03%	0.19%	0.03%	0.24%	0.02%		0.07%	0.10%	0.02%		0.20%	0.02%	0.06%	0.42%
◻ BBB	0.74%	1.72%	0.06%	1.13%	0.32%	1.08%	0.77%	0.31%	0.11%	0.89%	0.23%	0.18%	0.32%	0.27%	0.45%	1.48%	0.51%
◻ BB	6.74%	3.99%	0.92%	1.51%	1.32%	9.28%	8.25%	5.42%	1.20%	2.50%	3.11%	1.10%	1.81%	5.21%	2.57%	3.15%	5.76%
◻ B	3.91%	4.00%	3.64%	0.91%	6.98%	15.74%	5.56%	9.11%	5.24%	2.35%	1.49%		1.27%	2.78%	5.81%	13.18%	12.79%
◻ <B	0.31%	3.80%	6.45%	7.04%	6.94%	18.04%	38.11%	4.40%	7.78%		10.80%	9.64%	9.24%	11.56%	12.51%	26.43%	16.39%

Loss Severity
By Year by Most Recent Quality Rating
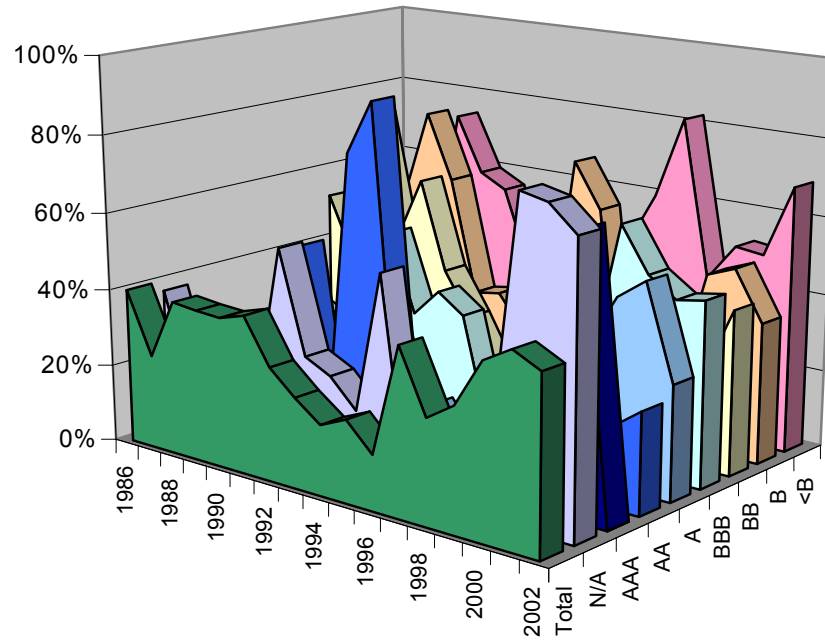
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
■Total	40%	24%	40%	39%	39%	41%	29%	23%	18%	21%	14%	43%	27%	32%	44%	48%	44%
□N/A	38%	15%	20%	19%	18%	55%	29%	26%	19%	55%				18%	80%	79%	73%
■AAA																71%	
■AA				49%		75%	89%								-3%	21%	26%
□A		17%		-24%	50%	35%	4%	9%		7%	4%	6%		35%	48%	54%	30%
□BBB	25%	22%	25%	41%	49%	28%	36%	31%	2%	16%	0%	32%	28%	63%	51%	46%	48%
□BB	52%	37%	78%	44%	61%	37%	26%	13%	24%	7%	-2%	36%	5%	22%	23%	25%	43%
□B	64%	25%	53%	76%	59%	29%	30%	21%	18%	70%	58%		-1%	18%	46%	49%	36%
□<B	47%	38%	32%	74%	59%	55%	36%	39%	21%		47%	61%	82%	42%	51%	50%	69%

**Economic Loss Rate as % of Exposure
By Year by Most Recent Quality Rating**
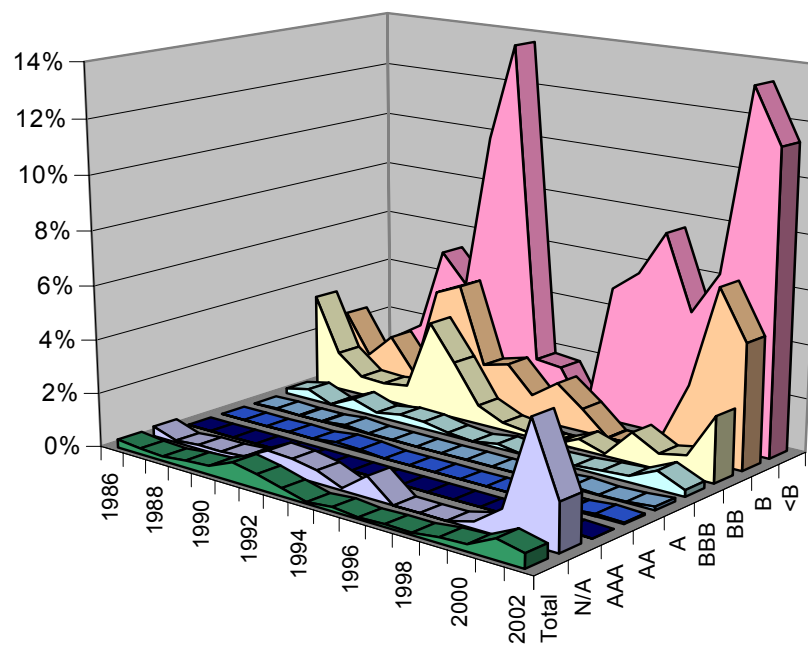
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
■Total	0.31%	0.22%	0.17%	0.27%	0.32%	0.71%	0.54%	0.30%	0.06%	0.16%	0.06%	0.10%	0.09%	0.21%	0.25%	0.74%	0.52%
□N/A	0.36%	0.07%	0.15%	0.15%	0.22%	0.70%	0.64%	0.47%	0.09%	0.79%				0.25%	0.97%	4.34%	1.75%
■AAA																0.04%	
■AA				0.02%		0.11%	0.09%								0.00%	0.09%	0.05%
□A		0.03%		-0.01%	0.09%	0.01%	0.01%	0.00%		0.00%	0.00%	0.00%		0.07%	0.01%	0.03%	0.13%
□BBB	0.19%	0.38%	0.02%	0.46%	0.16%	0.30%	0.27%	0.09%	0.00%	0.15%	0.00%	0.06%	0.09%	0.17%	0.23%	0.69%	0.24%
□BB	3.51%	1.46%	0.72%	0.67%	0.80%	3.47%	2.16%	0.72%	0.29%	0.16%	-0.05%	0.40%	0.08%	1.13%	0.59%	0.79%	2.45%
□B	2.50%	1.01%	1.92%	0.69%	4.12%	4.56%	1.67%	1.92%	0.94%	1.63%	0.87%		-0.02%	0.50%	2.69%	6.48%	4.67%
□<B	0.14%	1.42%	2.03%	5.18%	4.11%	9.99%	13.64%	1.72%	1.62%		5.10%	5.87%	7.56%	4.81%	6.41%	13.29%	11.29%

Earliest Quality Rating

of Credit-Risk Events
By Earliest Quality Rating

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
N/A	16	7	9	16	14	31	32	34	8	1	2	-	-	-	1	1	1	173
<B	8	5	7	6	2	3	2	2	-	-	3	-	-	3	1	5	10	57
B	4	6	8	4	11	28	11	10	4	11	2	-	-	5	5	12	3	124
BB	12	6	4	2	9	38	26	15	9	6	5	7	3	10	14	25	32	223
BBB	12	28	7	10	9	28	27	19	5	10	9	6	14	21	20	42	54	321
A	-	2	-	4	3	11	6	2	1	7	3	6	3	3	3	2	25	81
AA	-	3	-	1	1	1	1	-	2	-	-	-	-	-	3	2	4	18
AAA	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	1	1	4
Total	52	57	35	43	50	140	106	82	29	35	24	19	20	42	47	90	130	1,001

Experience Year

184

Exposure in # of Assets
By Earliest Quality Rating

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
N/A	2,317	2,062	2,136	1,828	1,306	1,809	1,972	2,043	1,903	48	58	66	111	139	214	234	185	18,429
<B	162	149	140	127	106	102	122	149	150	68	81	86	66	74	80	77	64	1,799
B	130	138	302	354	251	231	170	168	201	204	206	195	177	275	333	321	308	3,961
BB	345	345	398	459	564	602	523	448	473	319	350	366	425	575	608	639	635	8,070
BBB	2,138	1,987	2,327	2,476	2,176	2,288	2,390	2,136	2,248	2,002	2,241	2,302	2,416	2,724	2,740	2,817	2,955	40,359
A	1,496	1,404	1,764	2,095	1,887	1,983	2,004	2,033	2,158	1,770	1,894	1,888	1,939	1,925	1,975	2,025	2,075	32,313
AA	779	785	908	924	848	849	805	815	1,006	461	518	506	516	626	703	750	792	12,587
AAA	375	370	445	438	494	511	454	520	858	179	241	351	525	812	1,120	1,371	1,549	10,609
Total	7,740	7,239	8,419	8,700	7,631	8,373	8,439	8,310	8,996	5,048	5,589	5,759	6,173	7,148	7,771	8,232	8,562	128,124

Experience Year

185

$ of Exposure Associated with Credit-Risk Events
By Earliest Quality Rating

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
N/A	84	72	105	142	284	459	925	724	183	40	16	-	-	-	15	10	6	3,065
<B	53	13	23	66	32	31	26	4	-	-	12	-	-	43	20	56	68	446
B	14	32	69	13	174	382	118	62	19	173	7	-	-	36	22	159	22	1,303
BB	126	50	37	24	88	391	385	134	86	72	52	51	37	192	138	286	247	2,394
BBB	108	272	28	180	66	270	302	206	63	124	180	67	200	277	321	881	545	4,090
A	-	12	-	47	20	158	68	4	5	93	68	57	23	72	11	15	140	791
AA	-	18	-	4	5	10	6	-	10	-	-	-	-	-	12	32	88	184
AAA	-	-	-	-	15	-	3	-	-	-	-	-	-	-	-	5	2	25
Total	384	469	263	476	684	1,700	1,832	1,135	366	502	335	175	259	620	537	1,445	1,117	12,298

Experience Year

186

Exposure in $ of Assets
By Earliest Quality Rating

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
N/A	8,775	9,787	13,957	15,676	23,652	37,606	42,525	38,695	38,014	1,099	1,060	909	1,304	1,398	2,188	2,093	1,711	240,450
<B	715	619	546	577	639	476	469	614	632	367	436	475	466	528	499	467	365	8,888
B	673	1,098	1,967	2,407	2,191	1,965	1,338	1,018	972	1,100	780	610	570	993	1,326	1,310	1,194	21,513
BB	2,452	2,683	3,132	3,922	5,609	6,117	5,095	3,886	3,897	3,396	3,570	3,834	4,317	5,156	5,071	4,985	4,708	71,830
BBB	15,082	15,418	16,198	18,032	20,437	21,896	21,745	19,478	22,557	30,438	33,860	34,028	35,295	40,416	40,528	41,462	43,468	470,338
A	11,877	11,836	13,646	15,707	16,781	17,490	17,383	15,393	18,674	21,356	22,550	22,788	23,520	25,901	26,126	26,270	26,538	333,835
AA	7,325	7,826	8,692	8,523	7,718	7,307	6,668	6,198	9,615	6,843	7,347	6,818	6,751	8,431	8,596	8,368	8,049	131,078
AAA	3,467	3,400	3,542	3,818	5,000	5,146	4,140	3,322	8,139	3,330	4,987	6,662	7,989	8,643	8,648	9,132	9,065	98,431
Total	50,366	52,668	61,679	68,661	82,028	98,004	99,362	88,605	102,499	67,929	74,591	76,124	80,212	91,466	92,983	94,087	95,097	1,376,36

Experience Year

Economic Loss from Credit-Risk Events
By Earliest Quality Rating

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
☐ N/A	50	9	21	26	43	272	269	189	34	22	0	-	-	-	13	7	4	959.9
☐ <B	7	5	7	46	15	19	8	1	-	-	1	-	-	8	12	9	47	183.5
☐ B	9	8	39	10	107	99	30	8	5	21	6	-	-	7	12	104	20	485.2
☐ BB	66	12	27	15	48	186	116	38	20	6	22	10	21	71	57	116	81	912.7
☐ BBB	24	72	10	79	30	70	102	28	4	32	17	47	34	88	134	439	249	1,460.6
☐ A	-	2	-	8	11	42	5	0	(0)	26	0	17	14	22	6	8	59	219.3
☐ AA	-	6	-	2	4	8	5	-	3	-	-	-	-	-	1	7	36	71.5
☐ AAA	-	-	-	-	8	-	1	-	-	-	-	-	-	-	-	4	2	14.9
Total	154.7	113.9	105.1	186.3	265.3	695.0	536.8	264.6	66.5	106.5	47.7	74.6	69.6	195.7	235.4	693.2	496.7	4,307.7

Experience Year

188

Incidence Rate by Number
By Year by Earliest Quality Rating

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
■Total	0.67%	0.79%	0.42%	0.49%	0.66%	1.67%	1.26%	0.99%	0.32%	0.69%	0.43%	0.33%	0.32%	0.59%	0.60%	1.09%	1.52%
□N/A	0.69%	0.34%	0.42%	0.88%	1.07%	1.71%	1.62%	1.66%	0.42%	2.08%	3.45%	0.00%	0.00%	0.00%	0.47%	0.43%	0.54%
■AAA					0.20%		0.22%					0.00%	0.00%	0.00%	0.00%	0.07%	0.06%
■AA		0.38%		0.11%	0.12%	0.12%	0.12%		0.20%			0.00%	0.00%	0.00%	0.43%	0.27%	0.51%
□A		0.14%		0.19%	0.16%	0.55%	0.30%	0.10%	0.05%	0.40%	0.16%	0.32%	0.15%	0.16%	0.15%	0.10%	1.21%
□BBB	0.56%	1.41%	0.30%	0.40%	0.41%	1.22%	1.13%	0.89%	0.22%	0.50%	0.40%	0.26%	0.58%	0.77%	0.73%	1.49%	1.83%
□BB	3.48%	1.74%	1.01%	0.44%	1.60%	6.32%	4.97%	3.35%	1.90%	1.88%	1.43%	1.91%	0.71%	1.74%	2.30%	3.92%	5.04%
■B	3.09%	4.35%	2.65%	1.13%	4.38%	12.12%	6.49%	5.95%	2.00%	5.39%	0.97%	0.00%	0.00%	1.82%	1.50%	3.74%	0.97%
■<B	4.95%	3.36%	5.02%	4.72%	1.89%	2.96%	1.64%	1.35%			3.70%	0.00%	0.00%	4.08%	1.26%	6.54%	15.63%

Incidence Rate by Amount
By Year by Earliest Quality Rating
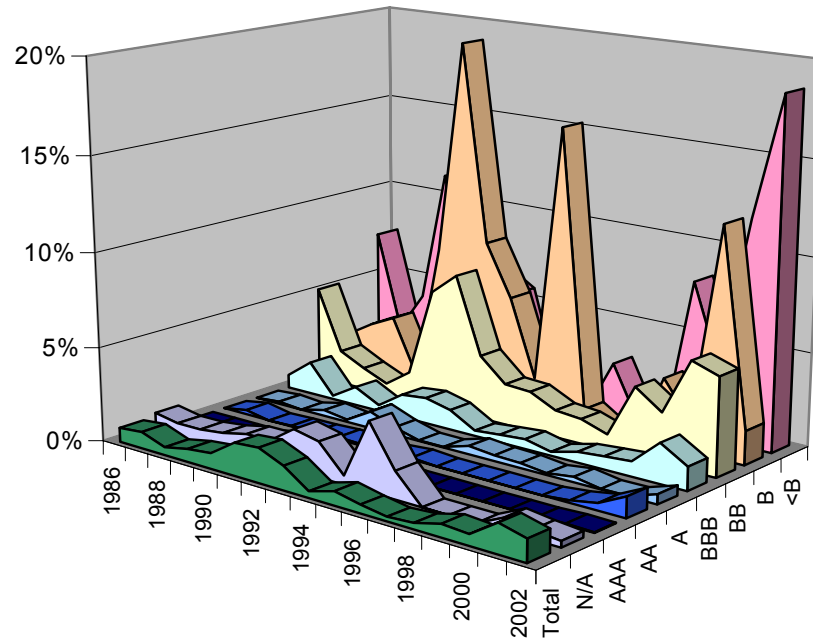
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Total	0.76%	0.89%	0.43%	0.69%	0.83%	1.73%	1.84%	1.28%	0.36%	0.74%	0.45%	0.23%	0.32%	0.68%	0.58%	1.54%	1.17%
N/A	0.96%	0.74%	0.75%	0.91%	1.20%	1.22%	2.17%	1.87%	0.48%	3.64%	1.48%	0.00%	0.00%	0.00%	0.66%	0.48%	0.33%
AAA					0.30%		0.06%					0.00%	0.00%	0.00%	0.00%	0.06%	0.02%
AA		0.24%		0.04%	0.06%	0.14%	0.09%		0.10%			0.00%	0.00%	0.00%	0.13%	0.38%	1.09%
A		0.10%		0.30%	0.12%	0.90%	0.39%	0.03%	0.03%	0.43%	0.30%	0.25%	0.10%	0.28%	0.04%	0.06%	0.53%
BBB	0.72%	1.76%	0.18%	1.00%	0.32%	1.24%	1.39%	1.06%	0.28%	0.41%	0.53%	0.20%	0.57%	0.69%	0.79%	2.13%	1.25%
BB	5.12%	1.85%	1.18%	0.61%	1.56%	6.39%	7.56%	3.46%	2.21%	2.13%	1.45%	1.33%	0.85%	3.72%	2.71%	5.74%	5.25%
B	2.02%	2.87%	3.52%	0.54%	7.96%	19.42%	8.85%	6.10%	1.96%	15.76%	0.92%	0.00%	0.00%	3.60%	1.67%	12.17%	1.81%
<B	7.35%	2.16%	4.29%	11.44%	4.95%	6.42%	5.55%	0.61%			2.85%	0.00%	0.00%	8.18%	3.91%	11.98%	18.52%

Loss Severity
By Year by Earliest Quality Rating
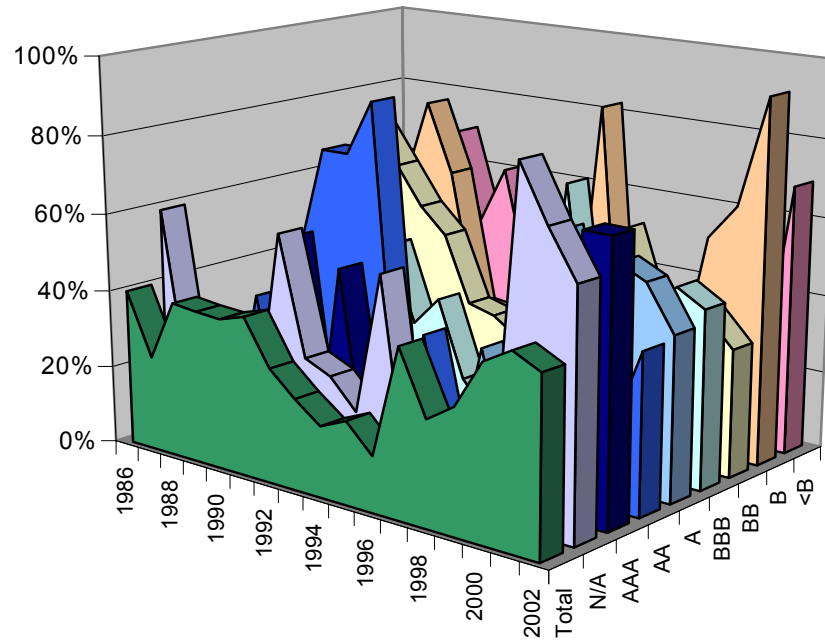
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
■Total	40%	24%	40%	39%	39%	41%	29%	23%	18%	21%	14%	43%	27%	32%	44%	48%	44%
□N/A	59%	13%	20%	19%	15%	59%	29%	26%	19%	55%	2%	0%	0%	0%	88%	74%	62%
■AAA					55%		49%					0%	0%	0%	0%	71%	71%
■AA		33%		49%	75%	75%	89%		33%			0%	0%	0%	10%	21%	41%
■A		17%		17%	53%	26%	7%	12%	-5%	28%	1%	31%	62%	30%	57%	54%	42%
□BBB	22%	27%	37%	44%	46%	26%	34%	14%	6%	26%	10%	70%	17%	32%	42%	50%	46%
□BB	52%	23%	74%	64%	54%	47%	30%	28%	24%	9%	43%	20%	58%	37%	41%	40%	33%
□B	64%	25%	57%	79%	61%	26%	25%	12%	28%	12%	85%	0%	0%	20%	56%	65%	93%
□<B	13%	35%	28%	70%	46%	61%	32%	36%			12%	0%	0%	18%	62%	16%	69%

Economic Loss Rate as % of Exposure
By Year by Earliest Quality Rating
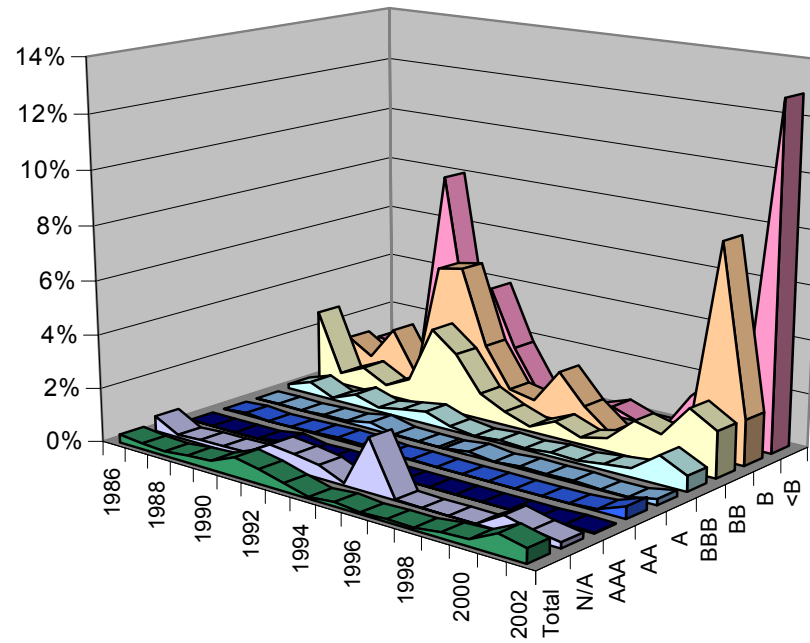
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
■Total	0.31%	0.22%	0.17%	0.27%	0.32%	0.71%	0.54%	0.30%	0.06%	0.16%	0.06%	0.10%	0.09%	0.21%	0.25%	0.74%	0.52%
□N/A	0.57%	0.09%	0.15%	0.17%	0.18%	0.72%	0.63%	0.49%	0.09%	1.99%	0.03%	0.00%	0.00%	0.00%	0.58%	0.35%	0.21%
■AAA					0.16%		0.03%					0.00%	0.00%	0.00%	0.00%	0.04%	0.02%
■AA		0.08%		0.02%	0.05%	0.10%	0.08%		0.03%			0.00%	0.00%	0.00%	0.01%	0.08%	0.45%
□A		0.02%		0.05%	0.06%	0.24%	0.03%	0.00%	0.00%	0.12%	0.00%	0.08%	0.06%	0.08%	0.02%	0.03%	0.22%
□BBB	0.16%	0.47%	0.06%	0.44%	0.15%	0.32%	0.47%	0.15%	0.02%	0.10%	0.05%	0.14%	0.10%	0.22%	0.33%	1.06%	0.57%
□BB	2.69%	0.43%	0.87%	0.39%	0.85%	3.03%	2.29%	0.98%	0.52%	0.18%	0.62%	0.26%	0.49%	1.37%	1.12%	2.32%	1.73%
□B	1.29%	0.73%	2.00%	0.43%	4.87%	5.05%	2.22%	0.74%	0.55%	1.87%	0.78%	0.00%	0.00%	0.72%	0.94%	7.93%	1.69%
□<B	0.94%	0.75%	1.21%	7.97%	2.29%	3.92%	1.75%	0.22%			0.34%	0.00%	0.00%	1.46%	2.42%	1.86%	12.82%

192

Most Recent NAIC Rating

of Credit-Risk Events
By Most Recent NAIC Rating

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
☐ N/A	24	12	11	15	13	22	11	10	1	-	2	1	1	-	6	2	1	132
☐ 6 (No)	1	15	5	1	4	17	16	7	6	1	2	5	-	1	3	8	24	116
☐ 5					-	21	14	28	10	9	4	2	2	13	7	4	5	119
☐ 4 (No**)	11	15	10	13	11	47	16	15	4	5	3	-	3	8	3	32	24	220
☐ 3 (No*)	4	1	6	1	8	18	24	9	4	6	4	-	4	11	8	15	42	165
☐ 2					-	4	16	11	3	14	8	9	9	7	17	25	24	147
■ 1 (Yes)	12	14	3	13	14	11	9	2	1	-	1	2	1	2	3	4	10	102
Total	52	57	35	43	50	140	106	82	29	35	24	19	20	42	47	90	130	1,001

Experience Year

194

Exposure in # of Assets
By Most Recent NAIC Rating

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
N/A	1,436	1,270	628	726	638	354	215	129	395	636	1,522	1,169	1,244	1,207	145	3	7	11,720
6 (No)	106	107	111	93	86	98	140	170	170	30	90	68	53	37	27	59	97	1,539
5					-	192	183	211	177	52	50	52	41	59	96	102	157	1,370
4 (No**)	384	429	555	482	483	446	360	383	419	143	112	87	121	255	394	437	365	5,851
3 (No*)	169	186	326	347	441	685	661	650	642	327	296	380	437	589	726	748	809	8,414
2					-	2,665	3,083	3,184	3,274	1,858	1,740	1,938	1,967	2,258	2,841	2,892	2,907	30,605
1 (Yes)	5,645	5,248	6,800	7,052	5,984	3,935	3,799	3,586	3,921	2,003	1,780	2,066	2,311	2,744	3,543	3,992	4,222	68,627
Total	7,740	7,239	8,419	8,700	7,631	8,373	8,439	8,310	8,996	5,048	5,589	5,759	6,173	7,148	7,771	8,232	8,562	128,124

Experience Year

195

$ of Exposure Associated with Credit-Risk Events
By Most Recent NAIC Rating

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
☐ N/A	195	85	81	266	169	130	151	110	23	-	7	17	9	-	23	26	23	1,316
☐ 6 (No)	6	88	44	4	98	280	222	92	85	15	8	68	-	12	37	266	143	1,469
☐ 5					-	244	312	379	81	202	43	6	22	107	50	64	28	1,538
☐ 4 (No**)	104	207	80	79	185	694	389	169	106	50	19	-	37	49	81	363	158	2,769
☐ 3 (No*)	16	3	37	40	83	244	365	194	35	68	67	-	46	225	123	269	338	2,153
☐ 2					-	34	296	179	33	168	171	73	138	178	208	417	281	2,174
☐ 1 (Yes)	63	85	20	86	149	77	97	11	3	-	20	11	8	50	14	39	145	879
Total	384	469	263	476	684	1,700	1,832	1,135	366	502	335	175	259	620	537	1,445	1,117	12,298

Experience Year

196

Exposure in $ of Assets
By Most Recent NAIC Rating

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
□ N/A	11,291	12,052	8,448	11,304	10,458	5,080	3,051	1,495	5,423	11,698	20,861	20,594	21,651	19,106	1,324	49	163	164,046
■ 6 (No)	518	395	353	236	541	708	815	828	636	73	431	309	193	121	256	555	690	7,657
□ 5					-	2,066	1,854	1,752	1,194	512	216	215	220	434	541	857	923	10,783
□ 4 (No**)	1,806	2,181	2,833	2,716	4,585	5,480	4,582	3,502	2,869	951	848	921	1,172	1,884	2,505	3,004	2,404	44,244
□ 3 (No*)	872	1,681	2,907	2,778	4,843	8,175	7,597	5,808	6,290	3,252	4,106	4,312	4,768	6,003	7,110	6,723	8,152	85,378
■ 2					-	33,998	39,710	40,380	44,004	27,185	27,133	27,529	27,641	33,783	41,782	41,973	43,279	428,397
■ 1 (Yes)	35,879	36,359	47,136	51,626	61,602	42,496	41,753	34,840	42,083	24,259	20,997	22,245	24,568	30,134	39,466	40,927	39,486	635,858
Total	50,366	52,668	61,679	68,661	82,028	98,004	99,362	88,605	102,499	67,929	74,591	76,124	80,212	91,466	92,983	94,087	95,097	1,376,36

Experience Year

197

Economic Loss from Credit-Risk Events
By Most Recent NAIC Rating

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
N/A	62	14	14	114	36	59	43	10	13	-	6	0	1	-	18	21	18	431
6 (No)	3	34	29	2	53	185	43	45	16	2	7	44	-	2	22	202	59	749
5					-	141	104	65	17	53	16	1	14	17	26	14	17	485
4 (No**)	55	27	48	15	78	219	133	88	4	3	1	-	(0)	8	23	178	61	941
3 (No*)	12	(0)	7	14	33	71	113	34	15	3	(0)	-	21	80	68	137	152	759
2					-	9	77	19	2	46	17	27	34	70	77	130	142	650
1 (Yes)	23	39	7	41	65	10	24	4	(0)	-	1	3	1	18	2	12	46	294
Total	155	114	105	186	265	695	537	265	67	107	48	75	70	196	235	693	496	4,307

Experience Year

198

Incidence Rate by Number
By Year by Most Recent NAIC Rating

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
▉ Total	0.67%	0.79%	0.42%	0.49%	0.66%	1.67%	1.26%	0.99%	0.32%	0.69%	0.43%	0.33%	0.32%	0.59%	0.60%	1.09%	1.52%
▢ N/A	1.67%	0.95%	1.75%	2.07%	2.04%	6.21%	5.12%	7.78%	0.25%		0.13%	0.09%	0.08%	0.00%	4.15%	66.67%	15.38%
▉ 1 (Yes)	0.21%	0.27%	0.04%	0.18%	0.23%	0.28%	0.24%	0.06%	0.03%		0.06%	0.10%	0.04%	0.07%	0.08%	0.10%	0.24%
▢ 2						0.15%	0.52%	0.35%	0.09%	0.75%	0.46%	0.46%	0.46%	0.31%	0.60%	0.86%	0.83%
▢ 3 (No*)	2.37%	0.54%	1.84%	0.29%	1.81%	2.63%	3.63%	1.39%	0.62%	1.83%	1.35%	0.00%	0.92%	1.87%	1.10%	2.01%	5.19%
▢ 4 (No**)	2.86%	3.50%	1.80%	2.70%	2.28%	10.55%	4.45%	3.92%	0.96%	3.50%	2.69%	0.00%	2.48%	3.14%	0.76%	7.33%	6.58%
▢ 5						10.97%	7.67%	13.27%	5.65%	17.31%	8.00%	3.85%	4.94%	22.03%	7.33%	3.92%	3.19%
▢ 6 (No)	0.94%	14.08%	4.52%	1.08%	4.65%	17.35%	11.43%	4.13%	3.54%	3.39%	2.22%	7.35%	0.00%	2.70%	11.32%	13.56%	24.87%
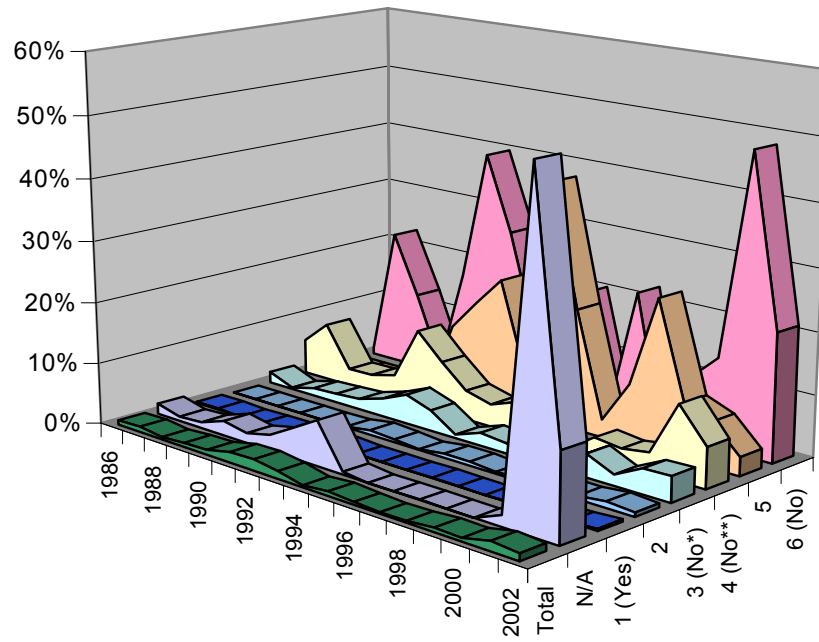
199

Incidence Rate by Amount
By Year by Most Recent NAIC Rating

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
■Total	0.76%	0.89%	0.43%	0.69%	0.83%	1.73%	1.84%	1.28%	0.36%	0.74%	0.45%	0.23%	0.32%	0.68%	0.58%	1.54%	1.17%
■N/A	1.73%	0.71%	0.96%	2.36%	1.61%	2.55%	4.94%	7.38%	0.43%		0.03%	0.08%	0.04%	0.00%	1.78%	53.75%	13.97%
■1 (Yes)	0.18%	0.23%	0.04%	0.17%	0.24%	0.18%	0.23%	0.03%	0.01%		0.10%	0.05%	0.03%	0.16%	0.04%	0.10%	0.37%
■2						0.10%	0.75%	0.44%	0.08%	0.62%	0.63%	0.26%	0.50%	0.53%	0.50%	0.99%	0.65%
■3 (No*)	1.82%	0.19%	1.27%	1.44%	1.72%	2.98%	4.80%	3.35%	0.56%	2.08%	1.62%	0.00%	0.97%	3.74%	1.74%	4.01%	4.15%
■4 (No**)	5.78%	9.49%	2.83%	2.92%	4.04%	12.66%	8.49%	4.82%	3.68%	5.24%	2.20%	0.00%	3.13%	2.58%	3.23%	12.09%	6.58%
■5						11.79%	16.83%	21.63%	6.75%	39.53%	19.81%	2.89%	9.87%	24.74%	9.21%	7.44%	3.06%
■6 (No)	1.11%	22.37%	12.58%	1.57%	18.14%	39.48%	27.23%	11.15%	13.40%	19.98%	1.84%	21.96%	0.00%	10.32%	14.61%	47.97%	20.78%
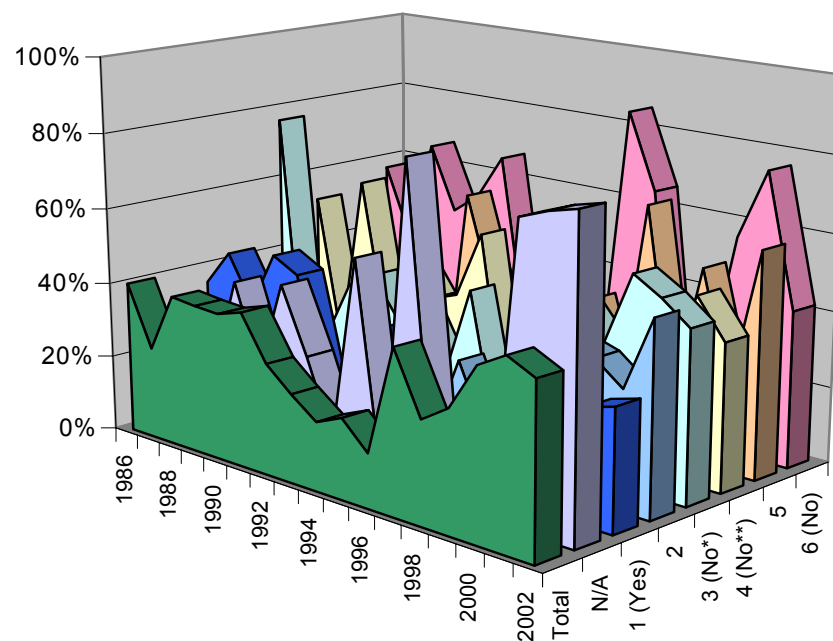
200

Loss Severity
By Year by Most Recent NAIC Rating

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
▪Total	40%	24%	40%	39%	39%	41%	29%	23%	18%	21%	14%	43%	27%	32%	44%	48%	44%
▫N/A	32%	17%	18%	43%	22%	45%	28%	9%	57%		85%	2%	7%	0%	76%	79%	81%
▪1 (Yes)	36%	45%	33%	48%	44%	13%	25%	34%	-4%		4%	24%	9%	35%	17%	30%	32%
▫2						28%	26%	11%	7%	27%	10%	37%	24%	39%	37%	31%	50%
▫3 (No*)	76%	-3%	19%	35%	39%	29%	31%	17%	41%	5%	0%	0%	45%	36%	55%	51%	45%
▫4 (No**)	52%	13%	60%	19%	42%	32%	34%	52%	4%	6%	5%	0%	-1%	17%	28%	49%	39%
▫5						58%	33%	17%	20%	26%	37%	12%	65%	16%	52%	22%	60%
▪6 (No)	57%	39%	66%	49%	54%	66%	19%	49%	18%	12%	85%	65%	0%	19%	57%	76%	41%
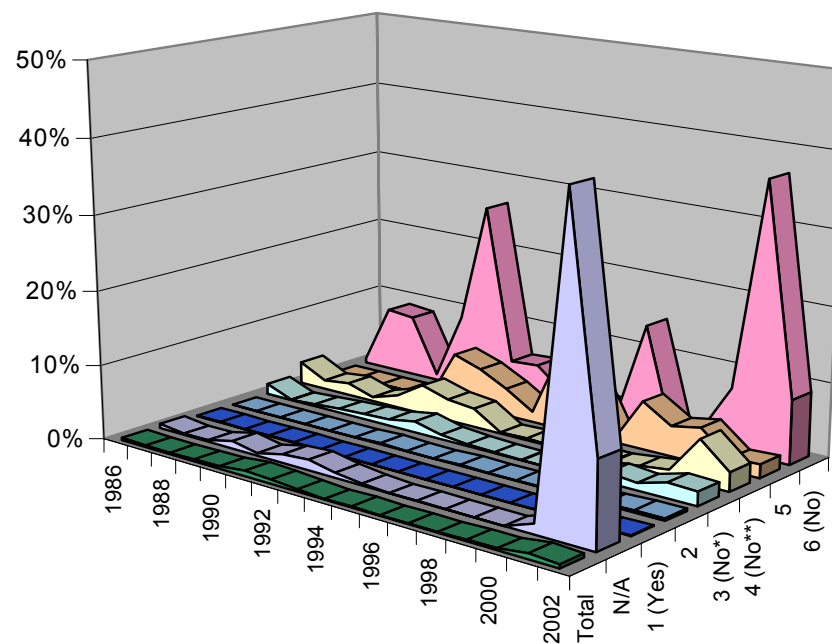
201

Economic Loss Rate as % of Exposure
By Year by Most Recent NAIC Rating

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
■ Total	0.31%	0.22%	0.17%	0.27%	0.32%	0.71%	0.54%	0.30%	0.06%	0.16%	0.06%	0.10%	0.09%	0.21%	0.25%	0.74%	0.52%
□ N/A	0.55%	0.12%	0.17%	1.01%	0.35%	1.16%	1.40%	0.66%	0.25%		0.03%	0.00%	0.00%	0.00%	1.35%	42.38%	11.28%
■ 1 (Yes)	0.06%	0.11%	0.01%	0.08%	0.11%	0.02%	0.06%	0.01%	0.00%		0.00%	0.01%	0.00%	0.06%	0.01%	0.03%	0.12%
□ 2						0.03%	0.19%	0.05%	0.01%	0.17%	0.06%	0.10%	0.12%	0.21%	0.18%	0.31%	0.33%
□ 3 (No*)	1.39%	-0.01%	0.24%	0.50%	0.67%	0.86%	1.48%	0.58%	0.23%	0.10%	0.00%	0.00%	0.43%	1.34%	0.96%	2.04%	1.87%
□ 4 (No**)	3.02%	1.23%	1.69%	0.55%	1.70%	4.00%	2.91%	2.52%	0.15%	0.30%	0.11%	0.00%	-0.02%	0.44%	0.90%	5.92%	2.56%
□ 5						6.84%	5.60%	3.69%	1.38%	10.39%	7.37%	0.35%	6.43%	4.02%	4.77%	1.65%	1.82%
■ 6 (No)	0.64%	8.66%	8.29%	0.77%	9.87%	26.17%	5.23%	5.47%	2.46%	2.32%	1.56%	14.31%	0.00%	1.91%	8.40%	36.44%	8.59%

Coupon Rate

of Credt-Risk Events
By Coupon Rate

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
14%+	18	9	6	12	10	21	10	4	1	2	2	-	-	1	-	3	3	102
12-14%	9	9	6	14	13	46	29	16	8	3	3	-	-	2	3	8	2	171
10-12%	9	23	11	11	12	61	39	33	12	12	5	4	1	8	8	11	31	291
8-10%	10	9	9	6	13	8	20	19	4	12	4	7	8	18	25	26	46	244
6-8%	2	1	3	-	2	2	5	3	1	3	10	7	11	10	10	39	46	155
0-6%	4	6	-	-	-	2	3	7	3	3	-	1	-	3	1	3	2	38
Total	52	57	35	43	50	140	106	82	29	35	24	19	20	42	47	90	130	1,001

Experience Year

204

Exposure in # of Assets
By Coupon Rate

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
■ 14%+	822	662	647	610	464	435	351	234	199	74	64	47	34	39	38	35	31	4,784
□ 12-14%	1,162	1,069	1,225	1,214	969	956	807	590	500	200	184	151	126	118	117	106	84	9,574
□ 10-12%	1,839	1,700	2,111	2,319	1,971	2,164	2,099	1,907	1,822	756	730	648	555	474	478	455	402	22,426
□ 8-10%	2,467	2,509	3,089	3,337	3,154	3,652	3,878	3,771	3,874	2,235	2,324	2,167	1,983	1,965	2,146	2,125	1,899	46,570
□ 6-8%	796	749	820	790	676	700	827	1,208	1,918	1,516	1,991	2,366	2,798	3,421	3,604	3,725	3,940	31,842
■ 0-6%	654	551	529	432	398	467	479	602	684	269	297	381	677	1,133	1,390	1,786	2,207	12,930
Total	7,740	7,239	8,419	8,700	7,631	8,373	8,439	8,310	8,996	5,048	5,589	5,759	6,173	7,148	7,771	8,232	8,562	128,124

Experience Year

205

$ of Exposure Associated with Credt-Risk Events
By Coupon Rate

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
14%+	119	73	30	58	108	275	191	34	5	31	9	-	-	3	-	61	20	1,018
12-14%	53	75	95	113	201	571	781	228	84	24	17	-	-	10	19	99	13	2,385
10-12%	92	221	54	172	98	786	556	431	168	199	79	22	20	106	124	139	195	3,462
8-10%	87	82	78	132	164	60	236	350	62	132	116	83	86	343	245	375	356	2,985
6-8%	7	3	6	-	113	6	44	26	31	37	114	68	153	147	117	763	520	2,153
0-6%	26	15	-	-	-	2	25	65	17	80	-	2	-	12	32	7	13	296
Total	384	469	263	476	684	1,700	1,832	1,135	366	502	335	175	259	620	537	1,445	1,117	12,298

Experience Year

206

Exposure in $ of Assets
By Coupon Rate

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
14%+	6,757	5,116	4,306	3,730	3,633	3,413	2,212	1,246	979	362	269	200	195	396	466	436	309	34,023
12-14%	9,881	9,039	9,389	9,146	9,129	9,822	8,017	5,336	4,416	2,307	2,059	1,872	1,587	1,513	1,586	1,492	1,220	87,811
10-12%	12,556	13,294	16,805	20,656	24,880	29,118	26,846	20,574	18,857	9,083	8,067	6,691	5,604	5,316	5,042	4,359	3,499	231,247
8-10%	16,685	20,472	26,248	30,890	38,509	48,032	51,346	42,158	45,834	29,807	30,928	28,965	26,118	25,842	27,040	27,152	24,135	540,161
6-8%	2,967	3,193	3,409	3,042	3,060	3,174	6,327	14,523	26,066	23,596	30,777	35,550	42,206	51,766	52,383	52,568	54,032	408,641
0-6%	1,519	1,554	1,522	1,197	2,817	4,444	4,614	4,768	6,346	2,774	2,491	2,846	4,503	6,634	6,467	8,080	11,903	74,480
Total	50,366	52,668	61,679	68,661	82,028	98,004	99,362	88,605	102,499	67,929	74,591	76,124	80,212	91,466	92,983	94,087	95,097	1,376,36

Experience Year

207

Economic Loss from Credit-Risk Events
By Coupon Rate

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
■14%+	66	31	15	28	70	134	66	15	2	15	1	-	-	3	-	22	13	480
■12-14%	24	34	66	40	64	324	244	77	39	5	1	-	-	0	15	61	7	1,000
□10-12%	9	41	8	41	47	209	170	100	14	36	23	10	20	34	70	71	73	975
□8-10%	33	2	16	78	37	29	40	31	11	38	(2)	37	28	139	119	206	177	1,020
□6-8%	5	0	1	-	48	0	12	14	1	12	25	27	21	22	7	329	221	745
■0-6%	17	6	-	-	-	(0)	4	27	(0)	-	-	1	-	(1)	23	4	6	87
Total	155	114	105	186	265	695	537	265	67	107	48	75	70	196	235	693	496	4,307

Experience Year

208

Incidence Rate by Number
By Year by Coupon Rate

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Total	0.67%	0.79%	0.42%	0.49%	0.66%	1.67%	1.26%	0.99%	0.32%	0.69%	0.43%	0.33%	0.32%	0.59%	0.60%	1.09%	1.52%
0-6%	0.61%	1.09%				0.43%	0.63%	1.16%	0.44%	1.12%		0.26%		0.26%	0.07%	0.17%	0.09%
6-8%	0.25%	0.13%	0.37%		0.30%	0.29%	0.60%	0.25%	0.05%	0.20%	0.50%	0.30%	0.39%	0.29%	0.28%	1.05%	1.17%
8-10%	0.41%	0.36%	0.29%	0.18%	0.41%	0.22%	0.52%	0.50%	0.10%	0.54%	0.17%	0.32%	0.40%	0.92%	1.17%	1.22%	2.42%
10-12%	0.49%	1.35%	0.52%	0.47%	0.61%	2.82%	1.86%	1.73%	0.66%	1.59%	0.68%	0.62%	0.18%	1.69%	1.68%	2.42%	7.71%
12-14%	0.77%	0.84%	0.49%	1.15%	1.34%	4.81%	3.60%	2.71%	1.60%	1.50%	1.63%			1.70%	2.56%	7.58%	2.40%
14%+	2.19%	1.36%	0.93%	1.97%	2.16%	4.83%	2.85%	1.71%	0.50%	2.72%	3.13%			2.56%		8.57%	9.68%

Incidence Rate by Amount
By Year by Coupon Rate
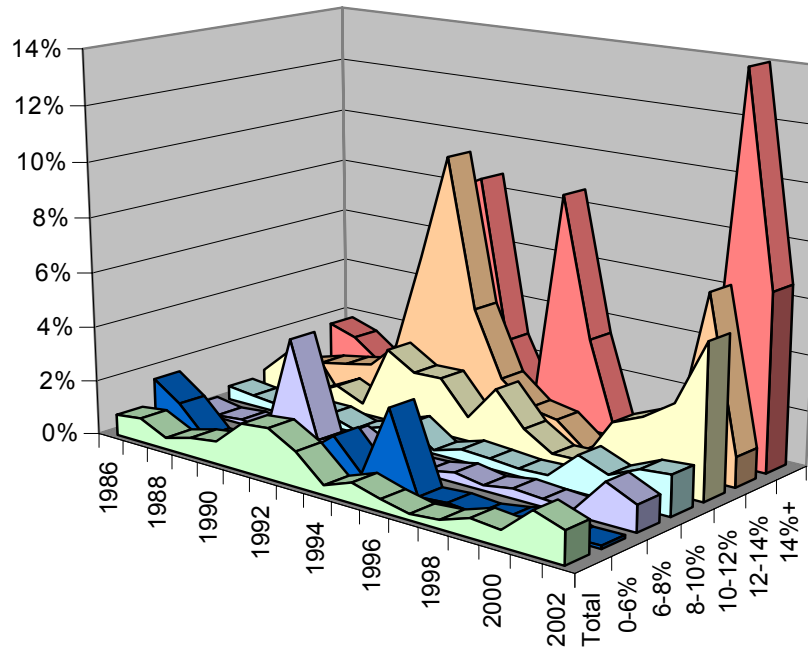
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
☐Total	0.76%	0.89%	0.43%	0.69%	0.83%	1.73%	1.84%	1.28%	0.36%	0.74%	0.45%	0.23%	0.32%	0.68%	0.58%	1.54%	1.17%
■0-6%	1.68%	0.99%				0.06%	0.54%	1.36%	0.26%	2.88%		0.08%		0.18%	0.50%	0.09%	0.11%
☐6-8%	0.25%	0.08%	0.17%		3.69%	0.18%	0.69%	0.18%	0.12%	0.16%	0.37%	0.19%	0.36%	0.28%	0.22%	1.45%	0.96%
☐8-10%	0.52%	0.40%	0.30%	0.43%	0.42%	0.12%	0.46%	0.83%	0.14%	0.44%	0.37%	0.29%	0.33%	1.33%	0.91%	1.38%	1.47%
☐10-12%	0.73%	1.66%	0.32%	0.83%	0.39%	2.70%	2.07%	2.10%	0.89%	2.19%	0.98%	0.33%	0.36%	2.00%	2.46%	3.20%	5.57%
☐12-14%	0.54%	0.83%	1.02%	1.24%	2.20%	5.82%	9.74%	4.28%	1.89%	1.04%	0.85%			0.65%	1.23%	6.63%	1.09%
■14%+	1.77%	1.43%	0.69%	1.56%	2.98%	8.06%	8.62%	2.69%	0.55%	8.56%	3.40%			0.76%		13.98%	6.47%

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Loss Severity
By Year by Coupon Rate
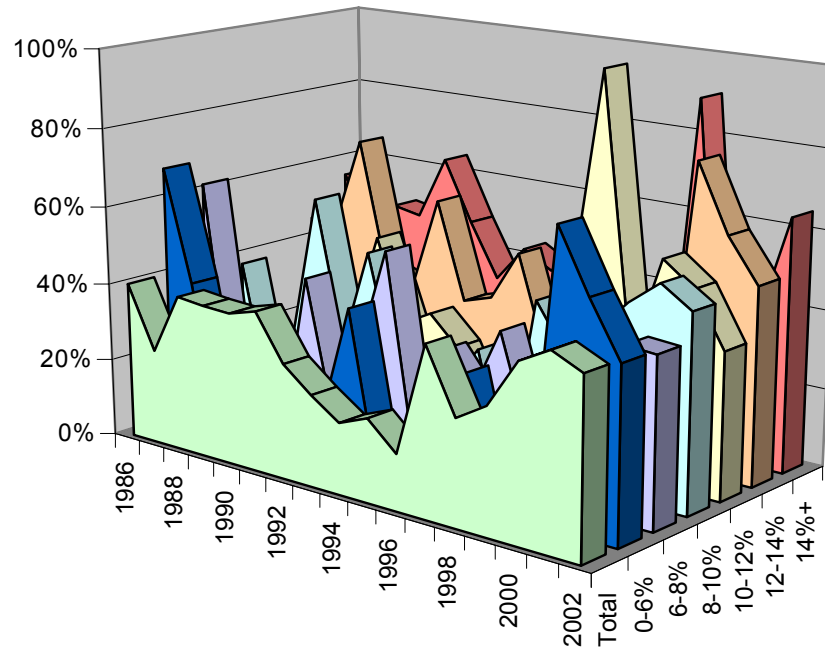
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Total	40%	24%	40%	39%	39%	41%	29%	23%	18%	21%	14%	43%	27%	32%	44%	48%	44%
0-6%	68%	39%				-9%	14%	42%	-1%	0%		33%		-9%	72%	57%	44%
6-8%	62%	3%	11%		42%	6%	28%	54%	2%	32%	22%	40%	14%	15%	6%	43%	43%
8-10%	38%	2%	20%	59%	23%	48%	17%	9%	18%	29%	-1%	45%	33%	40%	49%	55%	50%
10-12%	10%	18%	15%	24%	48%	27%	31%	23%	8%	18%	29%	45%	100%	32%	57%	51%	37%
12-14%	46%	46%	69%	35%	32%	57%	31%	34%	47%	21%	4%			3%	78%	61%	50%
14%+	55%	42%	49%	48%	64%	49%	35%	44%	40%	49%	7%			90%		37%	65%

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Economic Loss Rate as % of Exposure
By Year by Coupon Rate
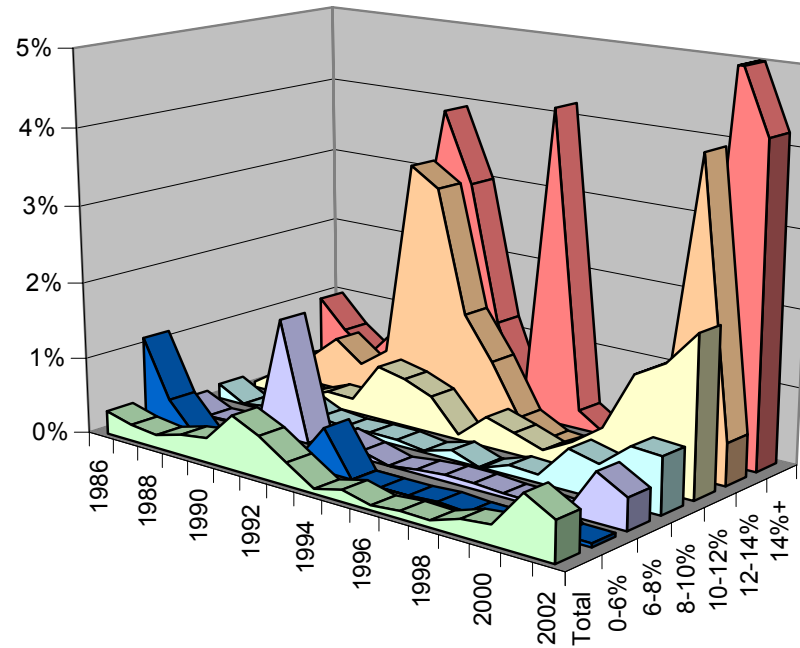
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
☐ Total	0.31%	0.22%	0.17%	0.27%	0.32%	0.71%	0.54%	0.30%	0.06%	0.16%	0.06%	0.10%	0.09%	0.21%	0.25%	0.74%	0.52%
■ 0-6%	1.14%	0.39%				0.00%	0.08%	0.57%	0.00%	0.00%		0.02%		-0.02%	0.36%	0.05%	0.05%
☐ 6-8%	0.15%	0.00%	0.02%		1.56%	0.01%	0.19%	0.10%	0.00%	0.05%	0.08%	0.08%	0.05%	0.04%	0.01%	0.63%	0.41%
☐ 8-10%	0.20%	0.01%	0.06%	0.25%	0.10%	0.06%	0.08%	0.07%	0.02%	0.13%	0.00%	0.13%	0.11%	0.54%	0.44%	0.76%	0.73%
☐ 10-12%	0.07%	0.31%	0.05%	0.20%	0.19%	0.72%	0.63%	0.49%	0.07%	0.40%	0.28%	0.15%	0.36%	0.63%	1.39%	1.62%	2.08%
■ 12-14%	0.25%	0.38%	0.70%	0.43%	0.70%	3.29%	3.05%	1.44%	0.89%	0.22%	0.03%			0.02%	0.96%	4.06%	0.55%
■ 14%+	0.98%	0.60%	0.34%	0.75%	1.92%	3.92%	3.00%	1.19%	0.22%	4.17%	0.24%			0.68%		5.16%	4.18%

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Funding Year

of Credit-Risk Events
By Experience Year & Funding Year

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
N/A	4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
02+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3
99-01	-	-	-	-	-	-	-	-	-	-	-	-	-	9	7	31	44	91
96-98	-	-	-	-	-	-	-	-	-	-	-	1	9	15	30	44	31	130
93-95	-	-	-	-	-	-	-	1	2	8	13	10	9	6	7	9	16	81
90-92	-	-	-	-	-	18	26	38	13	19	8	6	1	8	1	6	19	163
87-89	-	-	6	23	29	78	54	33	12	8	2	1	1	1	2	-	17	267
84-86	17	25	17	11	19	32	17	7	1	-	1	-	-	-	-	-	-	147
81-83	10	4	2	3	-	1	2	-	1	-	-	-	-	1	-	-	-	24
78-80	16	7	1	4	-	8	-	2	-	-	-	-	-	2	-	-	-	40
75-77	2	8	7	-	1	-	1	1	-	-	-	-	-	-	-	-	-	20
< 75	3	9	2	2	1	3	6	-	-	-	-	1	-	-	-	-	-	27
Total	52	57	35	43	50	140	106	82	29	35	24	19	20	42	47	90	130	1,001

Experience Year

214

Exposure in # of Assets
By Experience Year & Funding Year

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
■ 02+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	703	703
■ 99-01	-	-	-	-	-	-	-	-	-	-	-	-	-	697	2,010	3,273	3,659	9,638
□ N/A	634	230	12	4	-	-	3	10	8	1	1	-	-	1	-	2	6	908
■ 96-98	-	-	-	-	-	-	-	-	-	-	439	1,309	2,378	3,268	2,975	2,610	2,249	15,227
■ 93-95	-	-	-	-	-	-	-	648	2,021	1,899	2,299	2,123	1,925	1,742	1,551	1,347	1,146	16,698
■ 90-92	-	-	-	-	481	1,439	2,593	3,446	3,551	1,815	1,665	1,407	1,160	911	779	627	488	20,360
□ 87-89	-	390	1,502	2,516	2,385	2,420	2,121	1,804	1,576	718	651	531	421	290	245	216	190	17,972
□ 84-86	1,798	2,105	2,420	2,150	1,621	1,570	1,248	870	711	247	221	166	128	122	116	91	77	15,657
□ 81-83	1,429	1,222	1,191	1,025	790	700	560	355	275	83	75	57	43	39	33	23	14	7,910
□ 78-80	1,306	1,145	1,190	1,136	914	866	781	391	278	92	78	59	41	25	18	11	8	8,334
■ 75-77	974	828	841	785	654	616	504	307	227	76	62	39	27	23	20	12	6	5,998
■ < 75	1,600	1,320	1,264	1,086	788	762	631	482	351	120	101	71	50	34	26	22	18	8,722
Total	7,740	7,239	8,419	8,700	7,631	8,373	8,439	8,310	8,996	5,048	5,589	5,759	6,173	7,148	7,771	8,232	8,562	128,124

Experience Year

$ of Exposure Associated with Credit-Risk Events
By Experience Year & Funding Year

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
N/A	18	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	42
02+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	100
99-01	-	-	-	-	-	-	-	-	-	-	-	-	-	225	114	605	366	1,310
96-98	-	-	-	-	-	-	-	-	-	-	-	23	106	221	312	637	352	1,651
93-95	-	-	-	-	-	-	-	5	54	75	187	107	148	95	103	148	158	1,079
90-92	-	-	-	-	-	141	547	534	153	298	106	36	4	54	5	55	90	2,024
87-89	-	-	20	384	387	1,172	935	552	150	129	12	6	1	22	3	-	50	3,823
84-86	108	218	148	69	229	339	310	42	4	-	30	-	-	-	-	-	-	1,497
81-83	58	24	14	12	-	8	6	-	5	-	-	-	-	2	-	-	-	130
78-80	172	93	2	10	-	33	-	1	-	-	-	-	-	1	-	-	-	312
75-77	3	95	76	-	65	-	3	1	-	-	-	-	-	-	-	-	-	243
< 75	25	16	3	1	3	6	32	-	-	-	-	2	-	-	-	-	-	88
Total	384	469	263	476	684	1,700	1,832	1,135	366	502	335	175	259	620	537	1,445	1,117	12,298

Experience Year

Exposure in $ of Assets
By Experience Year & Funding Year

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
N/A	2,559	819	10	4	-	-	1	78	78	1	1	-	-	10	-	51	92	3,705
02+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9,030	9,030
99-01	-	-	-	-	-	-	-	-	-	-	-	-	-	7,671	20,776	34,487	39,359	102,294
96-98	-	-	-	-	-	-	-	-	-	-	6,009	18,252	32,519	43,145	38,290	32,248	25,722	196,185
93-95	-	-	-	-	-	-	-	8,771	27,960	30,830	37,275	33,244	28,330	24,812	20,893	17,241	13,439	242,795
90-92	-	-	-	-	8,367	24,610	41,742	43,743	44,544	23,018	19,999	15,966	12,557	9,989	7,980	6,003	4,307	262,825
87-89	-	5,979	21,083	35,106	41,668	44,083	36,886	25,198	21,166	10,847	8,828	6,886	5,444	4,395	3,683	2,960	2,240	276,453
84-86	17,894	21,673	20,725	17,511	16,434	15,747	11,600	6,399	5,185	2,247	1,711	1,205	951	1,029	943	793	695	142,742
81-83	10,940	9,114	7,629	5,925	5,092	4,358	3,062	1,933	1,686	438	361	325	270	300	306	213	139	52,088
78-80	9,386	7,629	6,229	5,130	4,755	4,069	2,731	831	541	183	121	59	26	32	44	38	33	41,837
75-77	5,754	4,473	3,667	3,108	3,720	3,317	2,108	999	813	166	110	57	28	16	11	7	4	28,358
< 75	3,833	2,981	2,336	1,877	1,993	1,820	1,232	653	527	199	176	130	88	68	55	47	37	18,052
Total	50,366	52,668	61,679	68,661	82,028	98,004	99,362	88,605	102,499	67,929	74,591	76,124	80,212	91,466	92,983	94,087	95,097	1,376,363

Experience Year

217

Economic Loss from Credit-Risk Events
By Experience Year & Funding Year

$ Million — bar chart totals by Experience Year: 1986: 155, 1987: 114, 1988: 105, 1989: 186, 1990: 265, 1991: 695, 1992: 537, 1993: 265, 1994: 67, 1995: 107, 1996: 48, 1997: 75, 1998: 70, 1999: 196, 2000: 235, 2001: 693, 2002: 496

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
02+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34	34
99-01	-	-	-	-	-	-	-	-	-	-	-	-	-	125	67	392	185	770
N/A	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
96-98	-	-	-	-	-	-	-	-	-	-	-	(1)	36	26	130	250	128	569
93-95	-	-	-	-	-	-	-	5	14	25	31	58	33	45	33	32	96	374
90-92	-	-	-	-	-	53	225	82	30	43	2	12	0	(6)	3	20	40	504
87-89	-	-	3	157	169	506	239	158	19	38	1	5	0	4	1	-	13	1,313
84-86	63	70	83	24	54	133	63	19	1	-	14	-	-	-	-	-	-	526
81-83	28	11	6	5	-	2	0	-	2	-	-	-	-	1	-	-	-	55
78-80	41	19	0	0	-	0	-	0	-	-	-	-	-	0	-	-	-	62
75-77	0	2	13	-	42	-	0	(0)	-	-	-	-	-	-	-	-	-	58
< 75	17	6	0	0	0	0	8	-	-	-	-	1	-	-	-	-	-	33
Total	155	114	105	186	265	695	537	265	67	107	48	75	70	196	235	693	496	4,307

Experience Year

218

Incidence Rate by Number
By Experience Year & Funding Year
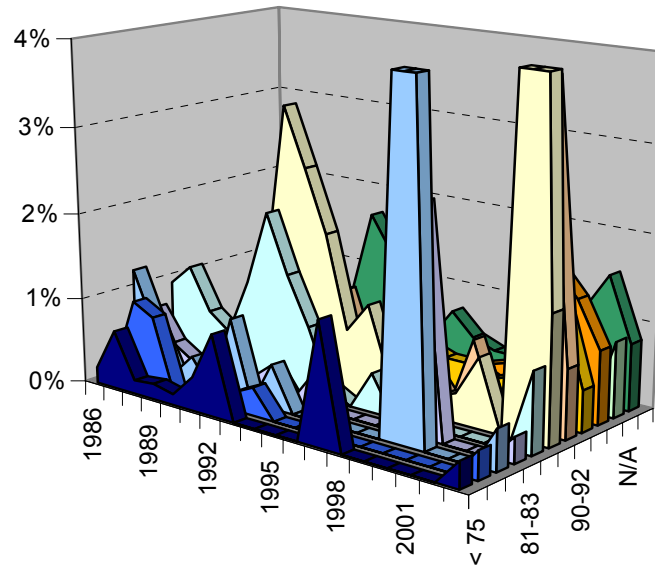
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
< 75	0.19%	0.68%	0.16%	0.18%	0.13%	0.39%	0.95%					1.42%						0.31%
75-77	0.21%	0.97%	0.83%		0.15%		0.20%	0.33%										0.33%
78-80	1.23%	0.61%	0.08%	0.35%		0.92%		0.51%						8.16%				0.48%
81-83	0.70%	0.33%	0.17%	0.29%		0.14%	0.36%		0.36%					2.60%				0.30%
84-86	0.95%	1.19%	0.70%	0.51%	1.17%	2.04%	1.36%	0.80%	0.14%		0.45%							0.94%
87-89			0.40%	0.91%	1.22%	3.22%	2.55%	1.83%	0.76%	1.11%	0.31%	0.19%	0.24%	0.35%	0.82%		8.95%	1.49%
90-92						1.25%	1.00%	1.10%	0.37%	1.05%	0.48%	0.43%	0.09%	0.88%	0.13%	0.96%	3.89%	0.80%
93-95								0.15%	0.10%	0.42%	0.57%	0.47%	0.47%	0.34%	0.45%	0.67%	1.40%	0.49%
96-98											0.00%	0.08%	0.38%	0.46%	1.01%	1.69%	1.38%	0.85%
N/A	0.63%	1.74%																0.88%
Total	0.67%	0.79%	0.42%	0.49%	0.66%	1.67%	1.26%	0.99%	0.32%	0.69%	0.43%	0.33%	0.32%	0.59%	0.60%	1.09%	1.52%	0.78%

Incidence Rate by Amount
By Experience Year & Funding Year
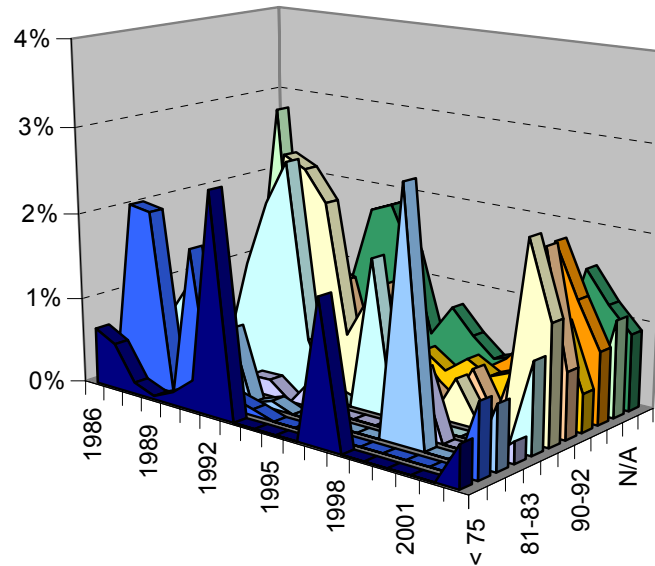
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
◾< 75	0.66%	0.53%	0.13%	0.04%	0.15%	0.35%	2.57%					1.67%						0.49%
◾75-77	0.06%	2.12%	2.07%		1.75%		0.14%	0.08%										0.86%
◻78-80	1.83%	1.22%	0.04%	0.20%		0.81%		0.09%						2.87%				0.75%
◻81-83	0.53%	0.27%	0.18%	0.21%		0.19%	0.19%		0.32%					0.77%				0.25%
◻84-86	0.60%	1.01%	0.71%	0.39%	1.40%	2.16%	2.67%	0.65%	0.08%		1.77%							1.05%
◻87-89			0.10%	1.09%	0.93%	2.66%	2.53%	2.19%	0.71%	1.19%	0.13%	0.09%	0.02%	0.51%	0.08%		2.25%	1.38%
◻90-92						0.57%	1.31%	1.22%	0.34%	1.29%	0.53%	0.23%	0.03%	0.54%	0.06%	0.91%	2.09%	0.77%
◻93-95								0.06%	0.19%	0.24%	0.50%	0.32%	0.52%	0.38%	0.49%	0.86%	1.17%	0.44%
◻96-98												0.13%	0.33%	0.51%	0.81%	1.98%	1.37%	0.84%
◻N/A	0.72%	2.85%																1.13%
◼Total	0.76%	0.89%	0.43%	0.69%	0.83%	1.73%	1.84%	1.28%	0.36%	0.74%	0.45%	0.23%	0.32%	0.68%	0.58%	1.54%	1.17%	0.89%

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Loss Severity
By Experience Year & Funding Year
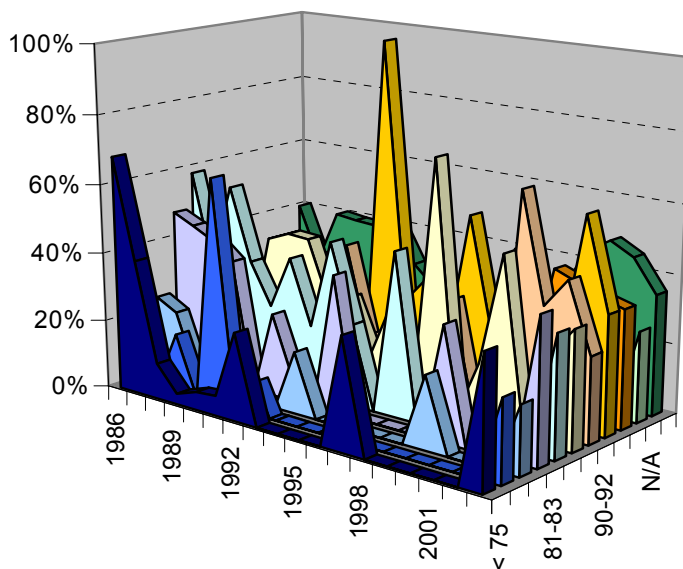
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
< 75	68%	39%	10%	3%	5%	6%	26%					33%						38%
75-77	6%	2%	17%		65%		10%	-5%										24%
78-80	24%	21%	3%	4%		1%		18%						21%				20%
81-83	48%	45%	42%	37%		24%	6%		40%					33%				42%
84-86	59%	32%	56%	35%	24%	39%	20%	46%	24%		48%							35%
87-89			12%	41%	44%	43%	26%	29%	13%	30%	4%	74%	2%	19%	51%		26%	34%
90-92						38%	41%	15%	20%	14%	2%	32%	1%	-11%	67%	36%	45%	25%
93-95								100%	26%	34%	17%	55%	23%	48%	32%	22%	61%	35%
96-98												-3%	34%	12%	42%	39%	36%	34%
N/A	28%	25%																26%
Total	40%	24%	40%	39%	39%	41%	29%	23%	18%	21%	14%	43%	27%	32%	44%	48%	44%	35%

221

Economic Loss Rate as % of Exposure
By Experience Year & Funding Year
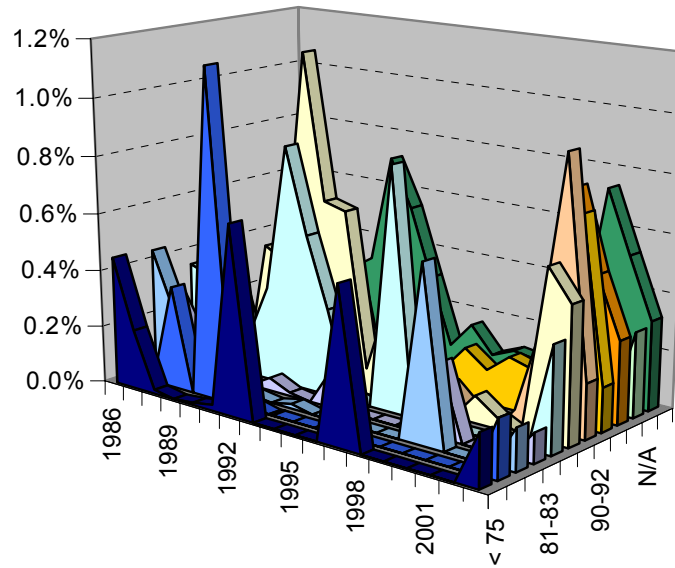
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
< 75	0.45%	0.21%	0.01%	0.00%	0.01%	0.02%	0.66%					0.54%						0.18%
75-77	0.00%	0.03%	0.36%		1.14%		0.01%	0.00%										0.20%
78-80	0.44%	0.25%	0.00%	0.01%		0.01%		0.02%						0.61%				0.15%
81-83	0.26%	0.12%	0.08%	0.08%		0.05%	0.01%		0.13%					0.26%				0.10%
84-86	0.35%	0.32%	0.40%	0.14%	0.33%	0.84%	0.55%	0.30%	0.02%		0.84%							0.37%
87-89			0.01%	0.45%	0.40%	1.15%	0.65%	0.63%	0.09%	0.35%	0.01%	0.07%	0.00%	0.09%	0.04%		0.58%	0.48%
90-92						0.22%	0.54%	0.19%	0.07%	0.19%	0.01%	0.07%	0.00%	-0.06%	0.04%	0.33%	0.93%	0.19%
93-95								0.06%	0.05%	0.08%	0.08%	0.18%	0.12%	0.18%	0.16%	0.19%	0.72%	0.15%
96-98												0.00%	0.11%	0.06%	0.34%	0.77%	0.50%	0.29%
N/A	0.20%	0.72%																0.30%
Total	0.31%	0.22%	0.17%	0.27%	0.32%	0.71%	0.54%	0.30%	0.06%	0.16%	0.06%	0.10%	0.09%	0.21%	0.25%	0.74%	0.52%	0.31%

222

Years Since Funding

of Credit-Risk Events
By Years Since Funding

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
■ N/A	4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
■ 10+ Yrs	4	17	9	3	2	11	8	3	1	-	1	1	-	4	3	-	36	103
■ 8-10 Yrs	2	7	1	4	-	1	3	2	1	1	1	1	1	-	-	7	11	43
■ 6-8 Yrs	15	2	1	2	3	18	15	8	9	7	3	4	1	11	2	8	20	129
■ 4-6 Yrs	3	2	1	6	16	34	37	30	13	16	6	8	1	3	12	14	16	218
■ 3-4 Yrs	7	9	10	5	7	34	17	13	1	3	7	-	8	4	15	30	17	187
■ 2-3 Yrs	7	12	7	10	13	24	16	11	2	6	4	4	3	5	8	19	15	166
■ 0-2 Yrs	10	4	6	13	9	18	10	15	2	2	2	1	6	15	7	12	15	147
Total	52	57	35	43	50	140	106	82	29	35	24	19	20	42	47	90	130	1,001

Experience Year

224

Exposure in # of Assets
By Years Since Funding

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
N/A	634	230	12	4	-	-	3	10	8	1	1	-	-	1	-	2	6	908
10+ Yrs	2,153	2,148	2,497	2,682	2,355	2,427	2,240	1,534	1,277	486	536	501	514	531	577	668	800	23,922
8-10 Yrs	857	808	798	604	487	518	505	504	565	292	382	421	410	447	659	753	740	9,747
6-8 Yrs	870	684	700	745	678	926	978	822	920	557	576	741	946	1,042	1,018	926	913	14,039
4-6 Yrs	887	876	1,064	1,292	1,246	1,375	1,323	1,348	1,491	978	1,358	1,406	1,272	1,164	1,188	1,430	1,743	21,436
3-4 Yrs	542	542	908	858	718	841	798	867	1,139	837	820	651	653	751	984	1,181	1,066	14,154
2-3 Yrs	571	813	939	853	864	850	1,010	1,120	1,577	843	727	731	797	1,081	1,337	1,194	1,171	16,475
0-2 Yrs	1,227	1,140	1,502	1,664	1,284	1,439	1,583	2,107	2,021	1,057	1,190	1,309	1,581	2,133	2,010	2,080	2,125	27,446
Total	7,740	7,239	8,419	8,700	7,631	8,373	8,439	8,310	8,996	5,048	5,589	5,759	6,173	7,148	7,771	8,232	8,562	128,124

Experience Year

225

$ of Exposure Associated with Credit-Risk Events
By Years Since Funding

$ Millions

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
N/A	18	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	42
10+ Yrs	27	111	79	3	68	40	38	2	5	-	30	2	-	26	8	-	141	579
8-10 Yrs	3	93	2	11	-	8	26	2	4	10	4	6	1	-	-	100	66	337
6-8 Yrs	170	15	4	9	7	228	287	96	132	119	24	21	4	108	32	103	240	1,597
4-6 Yrs	19	9	10	40	223	429	696	495	127	238	90	81	10	41	159	217	204	3,089
3-4 Yrs	40	66	75	29	57	448	239	235	7	60	141	-	138	56	181	420	126	2,317
2-3 Yrs	26	126	73	286	210	406	285	187	36	70	15	42	40	77	44	357	128	2,408
0-2 Yrs	82	26	20	98	120	141	262	117	54	5	30	23	66	312	114	248	213	1,930
Total	384	469	263	476	684	1,700	1,832	1,135	366	502	335	175	259	620	537	1,445	1,117	12,298

Experience Year

Exposure in $ of Assets
By Years Since Funding

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
■ N/A	2,559	819	10	4	-	-	1	78	78	1	1	-	-	10	-	51	92	3,705
■ 10+ Yrs	6,533	7,454	8,463	8,632	10,467	10,372	7,779	4,416	4,486	1,987	2,479	3,210	3,742	5,839	6,243	7,045	7,455	106,601
■ 8-10 Yrs	6,736	5,396	3,769	2,674	3,021	3,192	3,150	2,742	4,265	3,481	4,051	5,452	5,008	5,313	6,781	7,968	8,757	81,757
■ 6-8 Yrs	5,704	4,425	4,166	4,734	4,651	7,104	9,805	8,794	10,338	8,612	8,261	8,617	10,614	12,246	13,565	12,289	10,491	144,416
■ 4-6 Yrs	6,651	6,922	6,987	9,199	13,855	19,569	20,628	20,060	21,784	12,705	16,515	17,904	18,070	17,242	16,127	17,793	19,913	261,921
■ 3-4 Yrs	4,289	4,118	7,719	8,312	10,727	15,008	16,259	12,246	14,730	10,313	12,290	10,343	10,260	10,316	12,382	14,455	10,971	184,734
■ 2-3 Yrs	4,743	8,444	9,482	11,718	14,893	18,149	17,235	14,095	18,858	12,949	11,645	12,346	10,991	14,303	17,111	13,002	10,748	220,712
■ 0-2 Yrs	13,151	15,090	21,083	23,388	24,415	24,610	24,507	26,172	27,960	17,881	19,350	18,252	21,528	26,198	20,776	21,485	26,670	372,517
Total	50,366	52,668	61,679	68,661	82,028	98,004	99,362	88,605	102,499	67,929	74,591	76,124	80,212	91,466	92,983	94,087	95,097	1,376,3

Experience Year

227

Economic Loss from Credit-Risk Events
By Years Since Funding

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
■N/A	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
■10+ Yrs	17	8	13	(0)	43	1	9	0	2	-	14	1	-	5	5	-	54	171
■8-10 Yrs	1	19	0	1	-	2	3	0	1	(0)	0	5	0	-	-	18	28	78
■6-8 Yrs	41	11	1	4	5	88	61	43	10	39	1	5	0	21	(2)	34	121	481
□4-6 Yrs	6	0	5	1	49	213	157	134	39	21	1	46	(0)	18	49	65	74	880
□3-4 Yrs	22	38	24	23	30	195	82	48	-	22	18	-	33	7	97	185	69	894
□2-3 Yrs	14	25	59	95	86	143	114	17	-	24	13	19	2	6	19	211	52	898
■0-2 Yrs	49	7	3	62	53	53	112	22	14	1	1	(1)	34	138	67	181	98	894
Total	155	114	105	186	265	695	537	265	67	107	48	75	70	196	235	693	497	4,308

Experience Year

228

Incidence Rate by Number
By Year & by Number of Years Since Funding

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
◻Total	0.67%	0.79%	0.42%	0.49%	0.66%	1.67%	1.26%	0.99%	0.32%	0.69%	0.43%	0.33%	0.32%	0.59%	0.60%	1.09%	1.52%
◼0-2 Yrs	0.82%	0.35%	0.40%	0.78%	0.70%	1.25%	0.63%	0.71%	0.10%	0.19%	0.17%	0.08%	0.38%	0.70%	0.35%	0.58%	0.71%
◻2-3 Yrs	1.23%	1.48%	0.75%	1.17%	1.50%	2.83%	1.58%	0.98%	0.13%	0.71%	0.55%	0.55%	0.38%	0.46%	0.60%	1.59%	1.28%
◻3-4 Yrs	1.29%	1.66%	1.10%	0.58%	0.97%	4.05%	2.13%	1.50%	0.09%	0.36%	0.85%		1.23%	0.53%	1.53%	2.54%	1.59%
◻4-6 Yrs	0.34%	0.23%	0.09%	0.46%	1.28%	2.47%	2.80%	2.23%	0.87%	1.64%	0.44%	0.57%	0.08%	0.26%	1.01%	0.98%	0.92%
◻6-8 Yrs	1.72%	0.29%	0.14%	0.27%	0.44%	1.94%	1.53%	0.97%	0.98%	1.26%	0.52%	0.54%	0.11%	1.06%	0.20%	0.86%	2.19%
◻8-10 Yrs	0.23%	0.87%	0.13%	0.66%		0.19%	0.59%	0.40%	0.18%	0.34%	0.26%	0.24%	0.24%			0.93%	1.49%
◼10+ Yrs	0.19%	0.79%	0.36%	0.11%	0.08%	0.45%	0.36%	0.20%	0.08%		0.19%	0.20%		0.75%	0.52%		4.50%
◼N/A	0.63%	1.74%															

Incidence Rate by Amount
By Year & by Number of Years Since Funding
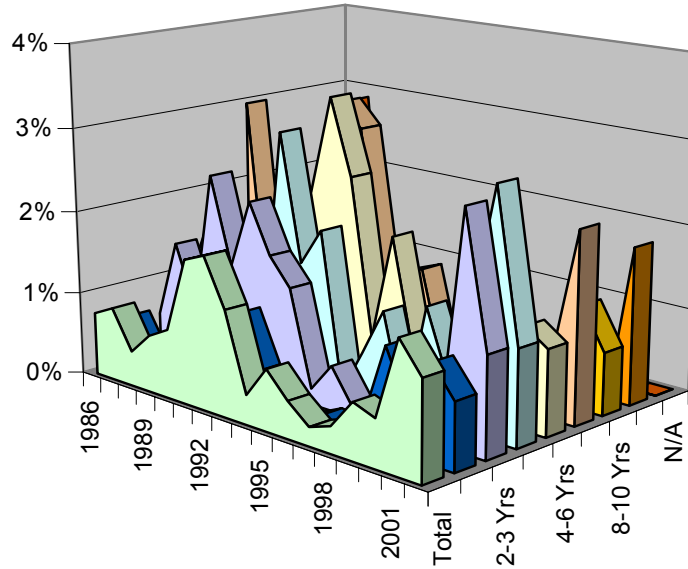
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
☐Total	0.76%	0.89%	0.43%	0.69%	0.83%	1.73%	1.84%	1.28%	0.36%	0.74%	0.45%	0.23%	0.32%	0.68%	0.58%	1.54%	1.17%
■0-2 Yrs	0.62%	0.17%	0.10%	0.42%	0.49%	0.57%	1.07%	0.45%	0.19%	0.03%	0.16%	0.13%	0.30%	1.19%	0.55%	1.15%	0.80%
☐2-3 Yrs	0.55%	1.49%	0.77%	2.44%	1.41%	2.24%	1.65%	1.33%	0.19%	0.54%	0.13%	0.34%	0.37%	0.54%	0.26%	2.75%	1.19%
☐3-4 Yrs	0.92%	1.61%	0.97%	0.35%	0.53%	2.98%	1.47%	1.92%	0.05%	0.58%	1.15%		1.34%	0.54%	1.46%	2.91%	1.14%
☐4-6 Yrs	0.28%	0.14%	0.14%	0.43%	1.61%	2.19%	3.38%	2.47%	0.58%	1.87%	0.55%	0.45%	0.06%	0.24%	0.98%	1.22%	1.03%
☐6-8 Yrs	2.97%	0.34%	0.09%	0.18%	0.15%	3.21%	2.93%	1.09%	1.28%	1.38%	0.29%	0.24%	0.04%	0.89%	0.24%	0.84%	2.28%
☐8-10 Yrs	0.05%	1.72%	0.06%	0.42%		0.26%	0.82%	0.09%	0.10%	0.29%	0.09%	0.11%	0.02%			1.25%	0.75%
■10+ Yrs	0.42%	1.48%	0.94%	0.04%	0.65%	0.38%	0.48%	0.03%	0.12%		1.22%	0.07%		0.44%	0.13%		1.89%
■N/A	0.72%	2.85%															

Loss Severity
By Year & by Number of Years Since Funding
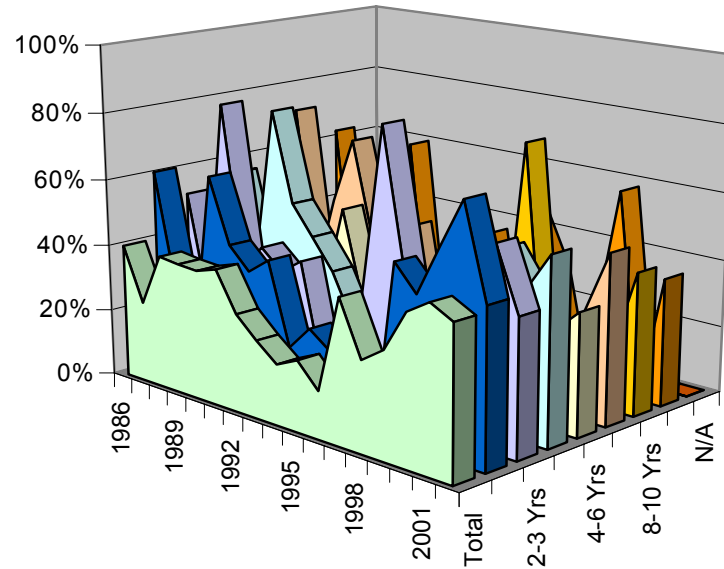
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
☐Total	40%	24%	40%	39%	39%	41%	29%	23%	18%	21%	14%	43%	27%	32%	44%	48%	44%
◼0-2 Yrs	61%	27%	12%	63%	44%	38%	43%	19%	26%	21%	2%	-3%	52%	44%	59%	73%	46%
◻2-3 Yrs	52%	20%	82%	33%	41%	35%	40%	9%	0%	35%	85%	45%	6%	8%	43%	59%	41%
☐3-4 Yrs	56%	58%	32%	79%	52%	43%	34%	21%	0%	38%	12%		24%	13%	54%	44%	55%
☐4-6 Yrs	31%	0%	49%	4%	22%	50%	23%	27%	31%	9%	2%	57%	-1%	45%	31%	30%	36%
☐6-8 Yrs	24%	74%	23%	48%	68%	38%	21%	45%	8%	32%	3%	25%	1%	19%	-7%	33%	51%
◼8-10 Yrs	30%	21%	3%	8%		24%	11%	15%	24%	-3%	5%	74%	2%			18%	43%
◼10+ Yrs	62%	7%	17%	-2%	63%	2%	23%	7%	40%		48%	33%		20%	61%		38%
◼N/A	28%	25%															

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Economic Loss Rate as % of Exposure
By Year & by Number of Years Since Funding
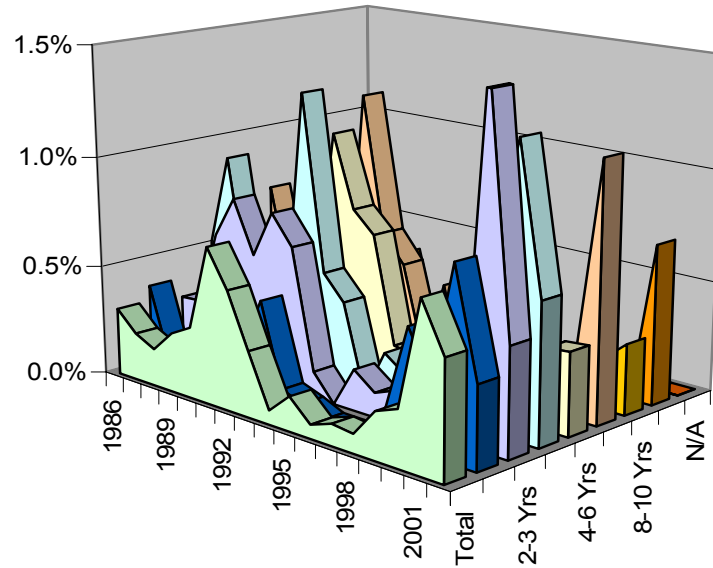
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
☐ Total	0.31%	0.22%	0.17%	0.27%	0.32%	0.71%	0.54%	0.30%	0.06%	0.16%	0.06%	0.10%	0.09%	0.21%	0.25%	0.74%	0.52%
■ 0-2 Yrs	0.38%	0.05%	0.01%	0.26%	0.22%	0.22%	0.46%	0.08%	0.05%	0.01%	0.00%	0.00%	0.16%	0.53%	0.32%	0.84%	0.37%
■ 2-3 Yrs	0.29%	0.29%	0.63%	0.81%	0.58%	0.79%	0.66%	0.12%	0.00%	0.19%	0.11%	0.15%	0.02%	0.04%	0.11%	1.62%	0.48%
☐ 3-4 Yrs	0.52%	0.93%	0.31%	0.27%	0.28%	1.30%	0.51%	0.40%	0.00%	0.22%	0.14%		0.33%	0.07%	0.79%	1.28%	0.63%
☐ 4-6 Yrs	0.09%	0.00%	0.07%	0.02%	0.36%	1.09%	0.76%	0.67%	0.18%	0.16%	0.01%	0.26%	0.00%	0.11%	0.30%	0.36%	0.37%
☐ 6-8 Yrs	0.71%	0.25%	0.02%	0.09%	0.10%	1.24%	0.62%	0.49%	0.10%	0.45%	0.01%	0.06%	0.00%	0.17%	-0.02%	0.27%	1.16%
☐ 8-10 Yrs	0.02%	0.36%	0.00%	0.03%		0.06%	0.09%	0.01%	0.02%	-0.01%	0.00%	0.08%	0.00%			0.23%	0.32%
■ 10+ Yrs	0.26%	0.10%	0.16%	0.00%	0.41%	0.01%	0.11%	0.00%	0.05%		0.58%	0.02%		0.09%	0.08%		0.72%
■ N/A	0.20%	0.72%															

Years to Maturity

of Credt-Risk Events
By Years to Maturity

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
■ N/A	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	3	1	6
■ 10+ Yrs	27	13	5	9	10	14	16	7	5	5	3	4	2	8	10	7	25	170
■ 8-10 Yrs	6	13	10	12	14	23	22	9	4	7	3	4	6	14	3	6	9	165
■ 6-8 Yrs	2	8	9	7	9	35	18	19	3	2	5	5	5	10	9	20	21	187
■ 4-6 Yrs	6	17	7	4	6	31	18	20	5	13	3	2	3	9	18	23	26	211
■ 3-4 Yrs	6	2	2	5	6	11	9	11	3	4	3	-	4	1	4	8	11	90
■ 2-3 Yrs	3	2	2	2	4	11	6	6	-	2	6	2	-	-	2	16	15	79
■ 0-2 Yrs	2	2	-	4	1	15	17	8	9	2	1	2	-	-	1	7	22	93
Total	52	57	35	43	50	140	106	82	29	35	24	19	20	42	47	90	130	1,001

Experience Year

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Exposure in # of Assets
By Years to Maturity

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
N/A	31	20	10	7	25	22	19	23	41	-	1	3	5	13	24	30	35	305
10+ Yrs	2,714	2,349	2,442	2,469	2,222	2,299	2,305	2,553	2,888	1,734	1,878	2,052	2,249	2,661	2,916	3,089	3,118	41,935
8-10 Yrs	921	976	1,282	1,315	1,116	1,125	1,026	981	1,140	756	837	714	716	839	912	957	1,106	16,716
6-8 Yrs	1,041	956	1,106	1,309	1,270	1,427	1,415	1,344	1,307	699	793	935	1,029	1,008	1,085	1,084	1,154	18,958
4-6 Yrs	1,110	1,032	1,287	1,284	1,105	1,427	1,594	1,434	1,501	821	834	798	905	1,216	1,258	1,265	1,291	20,157
3-4 Yrs	554	548	668	682	580	595	685	702	702	356	388	413	387	459	558	668	571	9,514
2-3 Yrs	599	532	654	680	556	627	560	578	666	346	356	348	392	404	455	526	613	8,887
0-2 Yrs	772	829	973	955	757	854	837	697	752	337	504	497	491	549	564	614	675	11,654
Total	7,740	7,239	8,419	8,700	7,631	8,373	8,439	8,310	8,996	5,048	5,589	5,759	6,173	7,148	7,771	8,232	8,562	128,124

Experience Year

235

$ of Exposure Associated with Credt-Risk Events
By Years to Maturity

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
N/A	-	-	-	-	-	-	-	5.7	-	-	-	-	-	-	-	23.0	22.8	51
10+ Yrs	283.3	126.4	11.5	101.4	158.3	227.6	274.6	41.1	83.6	49.5	82.2	18.0	27.6	138.6	129.2	136.4	186.4	2,076
8-10 Yrs	23.5	180.0	143.4	137.7	183.6	305.2	528.3	120.5	108.4	120.7	55.1	77.0	93.2	209.3	46.8	73.6	89.8	2,496
6-8 Yrs	5.7	33.6	41.2	63.8	137.7	551.3	449.9	372.4	38.0	35.2	68.3	32.7	40.9	120.6	112.5	396.4	316.5	2,817
4-6 Yrs	19.5	73.9	39.1	19.2	86.1	290.7	220.7	269.3	54.7	146.6	39.1	22.5	50.4	131.7	168.3	345.4	232.7	2,210
3-4 Yrs	35.5	49.2	18.0	27.4	34.3	110.3	126.4	138.7	23.4	60.2	23.7	-	46.8	20.0	8.7	118.4	103.5	944
2-3 Yrs	14.0	2.9	10.0	5.4	53.9	100.5	70.6	140.1	-	76.4	36.2	11.0	-	-	71.2	231.6	88.5	912
0-2 Yrs	2.8	3.4	-	120.7	30.0	114.5	161.3	46.8	58.1	13.4	30.0	13.4	-	-	0.8	119.8	76.8	792
Total	384	469	263	476	684	1,700	1,832	1,135	366	502	335	175	259	620	537	1,445	1,117	12,298

Experience Year

236

Exposure in $ of Assets
By Years to Maturity

$ Millions

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
N/A	111	70	33	8	203	139	61	106	202	-	4	11	21	169	294	336	437	2,204
10+ Yrs	22,622	21,108	22,257	23,947	28,772	33,054	32,965	34,330	41,154	27,690	30,167	32,396	34,673	37,269	36,181	36,772	35,329	530,688
8-10 Yrs	6,448	8,222	11,282	12,357	13,889	15,196	14,691	12,613	14,851	11,054	12,045	9,874	9,818	13,665	14,298	12,113	13,443	205,860
6-8 Yrs	6,833	6,933	8,161	10,553	14,088	16,770	17,254	15,763	16,247	10,449	11,435	12,640	13,191	11,872	12,455	14,491	15,559	214,694
4-6 Yrs	6,539	6,964	9,087	9,544	10,660	15,711	16,625	11,832	14,873	10,280	10,433	10,580	11,302	14,819	14,268	13,105	13,265	199,885
3-4 Yrs	2,563	3,561	3,527	4,610	5,618	5,461	6,788	5,893	5,246	3,399	4,307	4,138	4,193	5,670	5,884	6,651	5,824	83,332
2-3 Yrs	2,433	2,572	3,560	3,463	4,764	5,940	4,646	4,252	5,388	2,616	2,941	3,200	3,404	3,940	5,283	5,396	5,521	69,318
0-2 Yrs	2,818	3,237	3,773	4,178	4,034	5,733	6,332	3,816	4,538	2,441	3,259	3,285	3,612	4,063	4,319	5,224	5,719	70,383
Total	50,366	52,668	61,679	68,661	82,028	98,004	99,362	88,605	102,499	67,929	74,591	76,124	80,212	91,466	92,983	94,087	95,097	1,376,3

Experience Year

237

Economic Loss from Credt-Risk Events
By Years to Maturity

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
N/A	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	(1)	18	18
10+ Yrs	108	54	5	24	72	71	148	9	3	7	4	6	1	74	67	104	97	852
8-10 Yrs	10	26	67	69	105	168	129	18	26	56	0	28	39	32	13	58	44	889
6-8 Yrs	4	10	7	13	24	181	149	82	3	14	15	17	20	20	37	224	90	912
4-6 Yrs	9	19	9	7	29	175	35	51	16	31	15	16	9	68	89	98	161	838
3-4 Yrs	20	3	13	12	16	36	11	84	(0)	(2)	1	-	1	1	5	49	26	275
2-3 Yrs	4	1	4	0	10	28	27	9	-	1	12	3	-	-	24	122	35	281
0-2 Yrs	1	0	-	60	9	36	38	11	20	-	1	5	-	-	0	40	25	245
Total	155	114	105	186	265	695	537	265	67	107	48	75	70	196	235	693	497	4,308

Experience Year

238

Incidence Rate by Number
By Year & by Number of Years to Maturity

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
☐Total	0.67%	0.79%	0.42%	0.49%	0.66%	1.67%	1.26%	0.99%	0.32%	0.69%	0.43%	0.33%	0.32%	0.59%	0.60%	1.09%	1.52%
■0-2 Yrs	0.26%	0.24%		0.42%	0.13%	1.76%	2.03%	1.15%	1.20%	0.59%	0.20%	0.40%	0.00%	0.00%	0.18%	1.14%	3.26%
☐2-3 Yrs	0.50%	0.38%	0.31%	0.29%	0.72%	1.76%	1.07%	1.04%		0.58%	1.69%	0.58%	0.00%	0.00%	0.44%	3.04%	2.45%
☐3-4 Yrs	1.08%	0.37%	0.30%	0.73%	1.03%	1.85%	1.31%	1.57%	0.43%	1.12%	0.77%		1.03%	0.22%	0.72%	1.20%	1.93%
☐4-6 Yrs	0.54%	1.65%	0.54%	0.31%	0.54%	2.17%	1.13%	1.39%	0.33%	1.58%	0.36%	0.25%	0.33%	0.74%	1.43%	1.82%	2.01%
☐6-8 Yrs	0.19%	0.84%	0.81%	0.53%	0.71%	2.45%	1.27%	1.41%	0.23%	0.29%	0.63%	0.53%	0.49%	0.99%	0.83%	1.85%	1.82%
■8-10 Yrs	0.65%	1.33%	0.78%	0.91%	1.25%	2.05%	2.14%	0.92%	0.35%	0.93%	0.36%	0.56%	0.84%	1.67%	0.33%	0.63%	0.81%
■10+ Yrs	0.99%	0.55%	0.20%	0.36%	0.45%	0.61%	0.69%	0.27%	0.17%	0.29%	0.16%	0.19%	0.09%	0.30%	0.34%	0.23%	0.80%
■N/A	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	8.89%	0.00%		0.00%	0.00%	0.00%	0.00%	0.00%	10.00%	2.86%
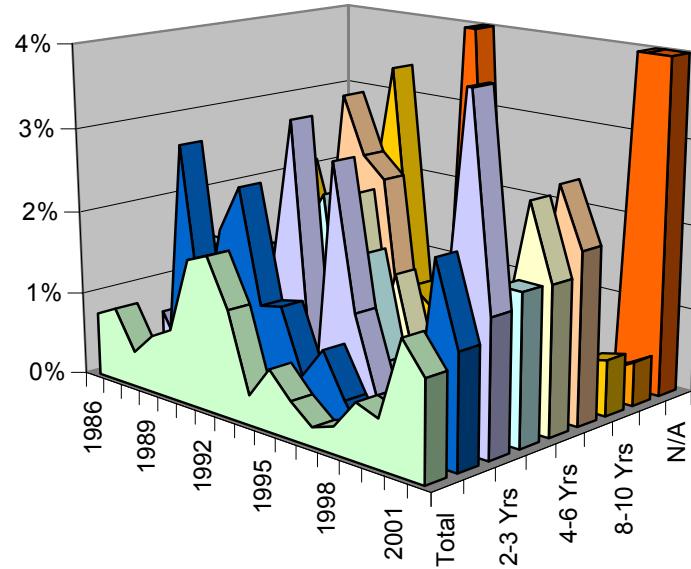
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Incidence Rate by Amount
By Year & by Number of Years to Maturity

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
☐Total	0.76%	0.89%	0.43%	0.69%	0.83%	1.73%	1.84%	1.28%	0.36%	0.74%	0.45%	0.23%	0.32%	0.68%	0.58%	1.54%	1.17%
■0-2 Yrs	0.10%	0.11%		2.89%	0.74%	2.00%	2.55%	1.23%	1.28%	0.55%	0.92%	0.41%	0.00%	0.00%	0.02%	2.29%	1.34%
☐2-3 Yrs	0.58%	0.11%	0.28%	0.16%	1.13%	1.69%	1.52%	3.29%		2.92%	1.23%	0.34%	0.00%	0.00%	1.35%	4.29%	1.60%
☐3-4 Yrs	1.39%	1.38%	0.51%	0.59%	0.61%	2.02%	1.86%	2.35%	0.45%	1.77%	0.55%		1.12%	0.35%	0.15%	1.78%	1.78%
☐4-6 Yrs	0.30%	1.06%	0.43%	0.20%	0.81%	1.85%	1.33%	2.28%	0.37%	1.43%	0.38%	0.21%	0.45%	0.89%	1.18%	2.64%	1.75%
☐6-8 Yrs	0.08%	0.48%	0.51%	0.60%	0.98%	3.29%	2.61%	2.36%	0.23%	0.34%	0.60%	0.26%	0.31%	1.02%	0.90%	2.74%	2.03%
■8-10 Yrs	0.36%	2.19%	1.27%	1.11%	1.32%	2.01%	3.60%	0.96%	0.73%	1.09%	0.46%	0.78%	0.95%	1.53%	0.33%	0.61%	0.67%
☐10+ Yrs	1.25%	0.60%	0.05%	0.42%	0.55%	0.69%	0.83%	0.12%	0.20%	0.18%	0.27%	0.06%	0.08%	0.37%	0.36%	0.37%	0.53%
■N/A	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.38%	0.00%		0.00%	0.00%	0.00%	0.00%	0.00%	6.84%	5.21%
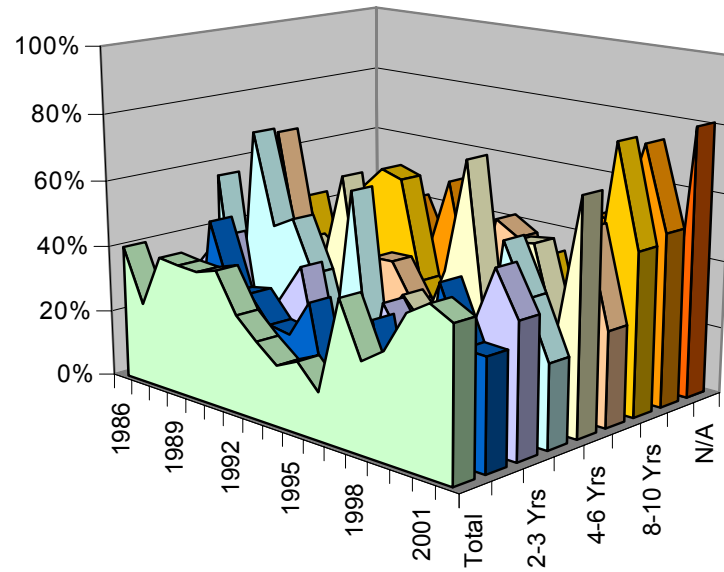
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Loss Severity
By Year & by Number of Years to Maturity

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
☐Total	40%	24%	40%	39%	39%	41%	29%	23%	18%	21%	14%	43%	27%	32%	44%	48%	44%
☐0-2 Yrs	20%	3%		50%	30%	31%	24%	23%	34%	0%	2%	34%	0%	0%	49%	33%	33%
☐2-3 Yrs	27%	35%	42%	2%	18%	28%	39%	7%		1%	34%	24%	0%	0%	34%	53%	40%
☐3-4 Yrs	56%	6%	72%	44%	48%	33%	9%	60%	-1%	-4%	3%		1%	5%	56%	41%	25%
☐4-6 Yrs	45%	26%	22%	38%	33%	60%	16%	19%	28%	21%	39%	73%	18%	52%	53%	28%	69%
☐6-8 Yrs	66%	30%	18%	21%	18%	33%	33%	22%	8%	39%	22%	53%	49%	17%	33%	56%	29%
☐8-10 Yrs	43%	15%	47%	50%	57%	55%	24%	15%	24%	47%	1%	36%	42%	15%	27%	79%	49%
☐10+ Yrs	38%	43%	42%	23%	46%	31%	54%	22%	3%	14%	4%	34%	2%	53%	52%	76%	52%
☐N/A	0%	0%	0%	0%	0%	0%	0%	6%	0%		0%	0%	0%	0%	0%	-5%	81%

Cross Tabulation: Coupon Rate By Earliest Quality Rating

Number of CREs
By Coupon Rate & Earliest Quality Rating

	0	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	>20	N/A	Total
AAA	-	-	-	-	-	-	-	2	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	4
AA	-	-	-	1	-	-	-	4	2	2	1	2	1	2	2	-	-	1	-	-	-	-	-	18
A	-	-	-	-	-	-	-	9	13	18	16	13	1	3	2	6	-	-	-	-	-	-	-	81
BBB	5	-	-	1	1	2	6	12	77	42	51	69	26	8	5	9	4	1	-	2	-	-	-	321
BB	-	-	-	-	-	3	2	5	12	23	41	49	30	25	15	8	5	2	3	-	-	-	-	223
B	3	-	-	-	1	-	-	3	6	8	7	27	15	16	14	11	10	1	2	-	-	-	-	124
<B	-	-	-	-	-	3	-	2	4	5	5	12	4	8	4	7	2	-	-	-	-	1	-	57
N/A	5	-	-	-	-	-	1	2	2	9	16	20	20	35	32	18	6	-	1	2	-	-	4	173
Total	13	-	-	2	2	8	9	39	116	107	137	194	97	97	74	59	27	5	6	4	-	1	4	1,001

Coupon Rate (%)

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Exposure in
By Coupon Rate & Earliest Quality Rating

	0	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	>20	N/A	Total
AAA	2,214	165	127	38	28	73	258	969	1,122	1,488	1,375	592	332	218	159	37	21	95	13	1	-	8	22	9,349
AA	1,248	86	43	39	22	299	420	1,398	2,034	2,294	2,307	1,054	537	491	247	146	51	102	12	2	8	29	109	12,972
A	1,635	30	30	47	45	390	956	4,314	5,643	6,267	6,504	3,495	927	1,044	749	332	223	261	57	16	4	-	224	33,189
BBB	385	20	10	50	75	303	730	4,309	7,706	7,758	7,626	5,313	1,920	1,576	1,103	583	349	369	83	34	3	5	54	40,359
BB	271	32	6	11	10	50	163	347	692	1,250	1,394	1,516	831	633	427	198	117	93	13	4	5	4	9	8,070
B	204	12	5	19	40	45	108	236	515	452	410	699	298	334	233	174	121	36	6	15	-	1	3	3,961
<B	144	13	5	10	6	8	69	122	174	160	304	313	145	87	116	55	50	2	4	6	-	4	4	1,799
N/A	871	42	12	10	23	103	397	951	1,313	3,088	3,897	2,804	1,655	1,286	874	503	289	193	51	4	1	-	65	18,429
Total	6,971	398	235	222	248	1,269	3,100	12,644	19,198	22,756	23,814	15,784	6,642	5,667	3,907	2,026	1,220	1,149	238	82	20	50	489	128,12

Coupon Rate (%)

244

Exposure in $ Associated with CREs
By Coupon Rate & Earliest Quality Rating

	0	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	>20	N/A	Total
AAA	-	-	-	-	-	-	-	8	-	-	-	18	-	-	-	-	-	-	-	-	-	-	-	25
AA	-	-	-	10	-	-	-	49	70	3	10	11	4	9	14	-	-	5	-	-	-	-	-	184
A	-	-	-	-	-	-	-	77	159	165	98	99	26	29	13	126	-	-	-	-	-	-	-	791
BBB	18	-	-	3	3	4	45	171	1,234	666	658	686	305	81	82	85	17	10	-	22	-	-	-	4,090
BB	-	-	-	-	-	28	7	21	131	264	432	557	362	244	191	64	45	29	17	-	-	-	-	2,394
B	80	-	-	-	2	-	-	21	89	58	56	340	94	206	134	149	53	3	18	-	-	-	-	1,303
<B	-	-	-	-	-	6	-	2	55	14	24	93	35	89	48	63	9	-	-	-	-	7	-	446
N/A	60	-	-	-	-	-	1	7	58	253	284	400	433	651	594	152	107	-	13	25	-	-	27	3,065
Total	159	-	-	13	5	39	53	357	1,797	1,423	1,562	2,204	1,259	1,310	1,075	639	230	48	48	46	-	7	27	12,298

Coupon Rate (%)

245

Exposure in $
By Coupon Rate & Earliest Quality Rating

	0	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	>20	N/A	Total
AAA	4.1	2.0	1.5	0.4	0.3	1.2	3.6	14.1	22.8	22.2	15.3	4.9	1.7	1.0	0.9	0.2	0.2	0.8	0.3	0.0	-	0.0	0.0	97.6
AA	4.2	1.4	0.7	0.7	0.2	1.4	3.4	17.8	24.5	30.4	22.4	10.9	5.4	4.1	1.3	1.2	0.4	0.7	0.1	0.0	0.0	0.3	0.2	131.4
A	5.6	0.2	0.5	0.7	0.3	1.3	7.3	58.9	71.0	65.3	66.8	26.8	6.5	8.0	6.8	2.7	2.2	2.4	0.4	0.0	0.0	-	0.2	334.3
BBB	3.2	0.2	0.1	0.7	0.7	1.8	4.6	54.8	111.3	100.2	82.7	58.4	20.2	14.5	8.6	3.5	1.5	2.1	0.9	0.2	0.0	0.0	0.4	470.3
BB	1.0	0.1	0.0	0.1	0.0	0.1	2.1	1.2	4.0	9.4	13.6	16.3	10.1	7.2	3.7	1.3	0.8	0.6	0.2	0.0	0.0	0.0	0.0	71.8
B	0.4	0.0	0.0	0.0	0.0	0.1	0.2	0.6	1.2	1.6	2.8	3.6	2.9	2.9	2.6	1.5	0.8	0.2	0.0	0.1	-	0.0	0.0	21.5
<B	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.3	1.0	0.5	1.6	1.9	0.5	0.7	1.3	0.4	0.2	0.0	0.0	0.0	-	0.0	0.1	8.9
N/A	10.6	0.3	0.1	0.1	0.1	0.8	4.0	9.3	15.8	45.5	60.0	39.1	22.2	16.4	7.9	4.6	2.1	0.8	0.2	0.0	0.0	-	0.3	240.4
Total	29.4	4.3	3.0	2.7	1.7	6.8	25.3	157.1	251.5	275.1	265.1	161.9	69.4	54.8	33.0	15.4	8.1	7.5	2.1	0.4	0.0	0.4	1.2	1,376.4

Coupon Rate (%)

Economic Loss of CREs
By Coupon Rate & Earliest Quality Rating

	0	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	>20	N/A	Total
AAA	-	-	-	-	-	-	-	5.4	-	-	-	9.5	-	-	-	-	-	-	-	-	-	-	-	14.9
AA	-	-	-	4.3	-	-	-	13.8	24.3	1.4	7.5	9.1	1.8	1.6	5.5	-	-	2.1	-	-	-	-	-	71.5
A	-	-	-	-	-	-	-	23.2	47.4	55.0	17.4	23.5	9.9	2.3	8.5	32.1	-	-	-	-	-	-	-	219.3
BBB	3.1	-	-	1.5	0.3	0.5	29.4	23.6	455.2	328.1	228.0	199.5	71.6	33.8	28.2	37.8	7.0	7.4	-	5.8	-	-	-	1,460.6
BB	-	-	-	-	-	13.0	1.1	8.8	35.9	58.0	190.0	177.7	146.6	106.5	72.9	29.2	32.7	24.3	15.8	-	-	-	-	912.7
B	-	-	-	-	0.8	-	-	7.2	53.1	27.2	18.1	53.9	17.0	128.5	70.5	67.7	23.7	2.7	14.8	-	-	-	-	485.2
<B	-	-	-	-	-	3.2	-	1.0	33.5	11.4	0.5	32.0	8.8	31.6	26.1	27.4	1.5	-	-	-	-	6.7	-	183.5
N/A	15.1	-	-	-	-	-	0.0	(0.2)	12.7	26.3	50.9	87.1	127.8	198.1	286.3	78.3	43.8	-	2.1	17.0	-	-	14.4	959.9
Total	18.2	-	-	5.7	1.1	16.7	30.5	82.8	662.1	507.4	512.4	592.4	383.5	502.4	498.0	272.6	108.7	36.6	32.7	22.8	-	6.7	14.4	4,307.7

Coupon Rate (%)

Incidence by Number
By Coupon Rate &
Earliest Quality Rating (Investment Grade & Below Investment Grade)

	6-8%	8-9%	9-10%	10-11%	11-12%	12-13%	13-14%	14%+
● B.I.G.	1.54%	1.93%	2.51%	3.48%	3.85%	4.65%	4.26%	5.75%
■ Overall	0.49%	0.47%	0.58%	1.23%	1.46%	1.71%	1.89%	2.13%
◆ I.G.	0.43%	0.35%	0.38%	0.82%	0.75%	0.39%	0.40%	0.81%

Coupon Rate

**Incidence by Amount
By Coupon Rate &
Earliest Quality Rating (Investment Grade & Below Investment Grade)**

	6-8%	8-9%	9-10%	10-11%	11-12%	12-13%	13-14%	14%+
● B.I.G.	3.86%	2.94%	2.86%	4.55%	3.66%	4.97%	4.93%	7.40%
■ Overall	0.53%	0.52%	0.59%	1.36%	1.81%	2.39%	3.25%	2.99%
◆ I.G.	0.47%	0.38%	0.41%	0.81%	0.99%	0.43%	0.62%	1.32%

Coupon Rate

Loss Severity
By Coupon Rate &
Earliest Quality Rating (Investment Grade & Below Investment Grade)

	6-8%	8-9%	9-10%	10-11%	11-12%	12-13%	13-14%	14%+
● B.I.G.	43%	29%	41%	27%	35%	49%	45%	54%
■ Overall	35%	36%	33%	27%	30%	38%	46%	47%
◆ I.G.	34%	46%	33%	30%	25%	31%	39%	35%

Coupon Rate

Economic Loss Rate as % of Exposure
By Coupon Rate &
Earliest Quality Rating (Investment Grade & Below Investment Grade)

	6-8%	8-9%	9-10%	10-11%	11-12%	12-13%	13-14%	14%+
● B.I.G.	1.68%	0.84%	1.16%	1.21%	1.28%	2.46%	2.24%	4.00%
■ Overall	0.18%	0.18%	0.19%	0.37%	0.55%	0.92%	1.51%	1.41%
◆ I.G.	0.16%	0.18%	0.14%	0.24%	0.25%	0.14%	0.24%	0.46%

Coupon Rate

Cross Tabulation: Years Since Funding By Earliest Quality Rating

of CREs
By Years Since Funding & Earliest Quality Rating

	0.3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20+	N/A	Total
■AAA	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
■AA	-	1	1	5	5	2	-	-	-	1	-	3	-	-	-	-	-	-	-	-	-	-	18
■A	2	7	8	5	14	14	4	5	1	5	14	1	-	-	-	-	-	-	-	-	-	1	81
□BBB	10	33	41	62	46	14	31	15	8	14	4	6	4	-	12	1	5	1	-	2	8	4	321
□BB	4	23	47	56	19	21	14	9	3	5	5	3	2	-	1	6	-	-	-	-	3	2	223
□B	5	18	33	17	11	12	11	6	2	-	-	2	2	1	-	-	-	-	-	-	4	-	124
■<B	3	15	12	10	4	1	2	4	-	-	-	-	2	-	1	1	-	-	-	-	1	1	57
□N/A	2	24	24	30	29	24	18	10	1	3	1	1	-	1	-	1	-	-	-	-	4	-	173
Total	26	121	166	187	130	88	80	49	15	28	24	16	10	2	14	9	5	1	-	2	20	8	1,001

Years Since Funding

Exposure in #
By Years Since Funding & Earliest Quality Rating

	0.3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20+	N/A	Total
■ AAA	993	1,813	1,609	1,201	924	588	421	331	259	193	145	106	89	76	68	64	60	65	75	55	159	60	9,349
■ AA	883	1,772	1,719	1,508	1,209	895	708	561	490	432	363	280	266	251	248	203	168	156	126	98	500	140	12,972
■ A	2,069	4,184	3,912	3,620	3,238	2,657	2,179	1,850	1,526	1,219	931	743	644	658	606	474	343	303	292	260	1,260	226	33,189
□ BBB	2,857	5,416	5,013	4,440	3,815	3,101	2,591	2,120	1,763	1,554	1,221	995	803	730	627	505	384	338	343	311	1,103	332	40,359
□ BB	667	1,271	1,118	920	724	563	453	377	301	297	243	201	174	128	112	88	65	60	54	46	159	53	8,070
■ B	387	688	610	451	331	292	228	196	153	123	97	75	57	47	39	27	23	20	15	17	73	18	3,961
■ <B	126	287	237	181	139	125	114	94	77	53	39	31	30	31	33	18	19	25	28	24	28	64	1,799
□ N/A	1,373	2,661	2,258	1,835	1,547	1,291	1,011	810	690	620	555	539	525	503	452	380	269	254	212	178	454	17	18,429
Total	9,355	18,091	16,475	14,154	11,926	9,511	7,703	6,337	5,258	4,489	3,592	2,968	2,586	2,422	2,184	1,758	1,330	1,219	1,143	988	3,734	908	128,124

Years Since Funding

254

Exposure in $ Associated with CREs
By Years Since Funding & Earliest Quality Rating

	0.3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20+	N/A	Total
AAA	-	-	-	8	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25
AA	-	9	9	49	38	66	-	-	-	4	-	8	-	-	-	-	-	-	-	-	-	-	184
A	43	85	66	54	148	112	25	135	20	12	77	3	-	-	-	-	-	-	-	-	-	10	791
BBB	342	337	661	1,039	575	173	360	190	83	123	13	29	59	-	52	0	4	0	-	5	29	15	4,090
BB	79	289	546	535	224	234	118	167	14	43	71	18	8	-	1	1	-	-	-	-	29	17	2,394
B	29	113	494	161	81	202	79	14	28	-	-	14	11	65	-	-	-	-	-	-	11	-	1,303
<B	63	107	110	97	13	1	31	7	-	-	-	-	10	-	2	1	-	-	-	-	4	1	446
N/A	37	396	520	374	816	387	310	161	3	6	2	44	-	0	-	3	-	-	-	-	5	-	3,065
Total	593	1,337	2,408	2,317	1,913	1,176	923	675	148	190	163	116	88	65	54	6	4	0	-	5	78	42	12,298

Years Since Funding

Exposure in $
By Years Since Funding & Earliest Quality Rating

	0.3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20+	N/A	Total
AAA	11.0	20.9	17.7	13.8	10.2	7.0	5.0	3.9	2.8	1.5	0.9	0.5	0.4	0.3	0.3	0.2	0.2	0.1	0.2	0.1	0.3	0.3	97.6
AA	10.2	21.3	20.1	17.3	13.2	9.5	7.7	5.8	4.9	4.2	3.5	2.6	2.1	1.8	1.6	1.2	0.8	0.6	0.4	0.4	1.8	0.6	131.4
A	27.0	53.3	49.4	42.1	36.6	28.8	22.6	17.9	13.9	11.0	7.6	5.6	4.2	3.6	2.5	1.8	1.3	0.9	0.9	0.7	1.9	0.8	334.3
BBB	44.2	81.1	73.4	63.3	52.1	39.2	29.9	21.9	16.6	12.7	9.4	7.2	4.9	3.9	2.7	1.7	1.1	0.8	0.6	0.5	1.6	1.3	470.3
BB	6.8	12.9	11.6	9.7	7.5	5.5	4.1	3.1	2.4	2.0	1.6	1.2	1.0	0.7	0.6	0.4	0.2	0.1	0.1	0.1	0.2	0.2	71.8
B	2.6	4.4	3.7	2.6	1.9	1.8	1.1	0.8	0.7	0.4	0.3	0.3	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	21.5
<B	0.6	1.4	1.2	1.1	0.8	0.8	0.7	0.5	0.4	0.2	0.2	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	8.9
N/A	26.0	48.8	43.6	34.8	27.1	19.8	11.8	7.7	4.9	3.2	2.4	1.8	1.5	1.4	1.4	1.1	1.0	0.8	0.4	0.2	0.6	0.2	240.4
Total	128.4	244.2	220.7	184.7	149.5	112.4	82.8	61.6	46.4	35.3	25.9	19.3	14.5	12.1	9.2	6.4	4.7	3.3	2.6	2.0	6.6	3.7	1,376.4
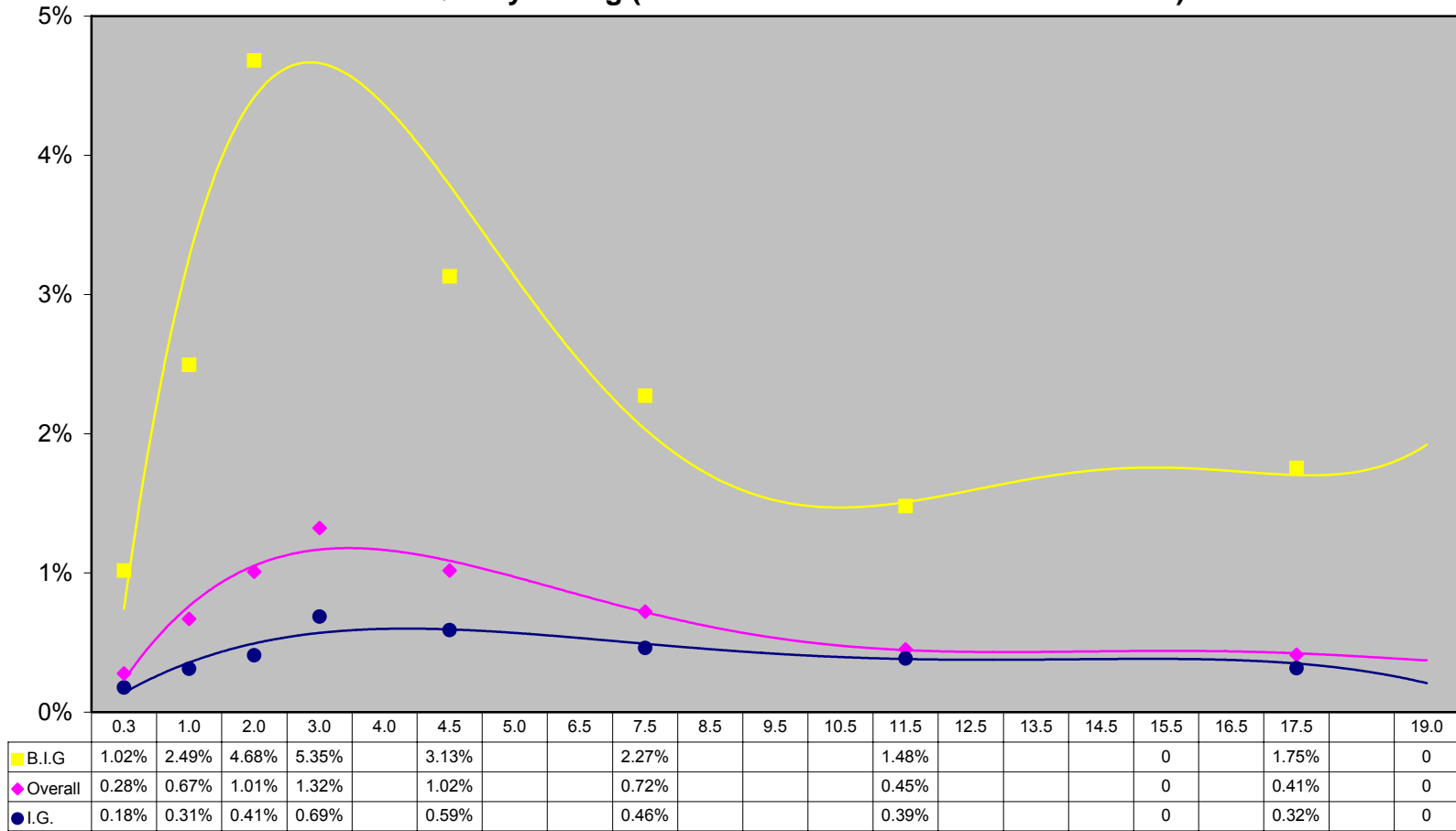
Years Since Funding

Economic Loss of CREs
By Years Since Funding & Earliest Quality Rating

	0.3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20+	N/A	Total
■ AAA	-	-	-	5.4	9.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14.9
■ AA	-	(0.3)	4.8	15.3	22.0	25.0	-	-	-	1.0	-	3.5	-	-	-	-	-	-	-	-	-	-	71.5
■ A	20.5	23.2	19.9	12.8	38.2	30.1	5.9	31.5	8.9	3.6	21.8	0.8	-	-	-	-	-	-	-	-	-	2.0	219.3
□ BBB	209.7	122.2	274.8	413.6	138.4	63.0	98.2	64.8	13.1	31.3	5.3	(0.2)	(1.8)	-	13.4	0.1	0.9	0.1	-	0.4	9.8	3.6	1,460.6
□ BB	41.8	146.8	224.6	229.7	68.4	65.0	29.8	30.4	0.2	13.9	35.3	4.4	1.3	-	0.1	0.3	-	-	-	-	15.9	4.7	912.7
■ B	24.0	51.5	201.2	71.2	24.9	12.5	36.9	8.0	4.6	-	-	2.2	2.6	42.4	-	-	-	-	-	-	3.4	-	485.2
■ <B	33.5	53.2	44.2	43.6	1.5	0.9	(2.0)	2.5	-	-	-	-	2.1	-	(0.0)	0.0	-	-	-	-	3.2	0.7	183.5
□ N/A	17.6	150.0	128.6	102.7	249.7	130.6	150.0	25.4	0.7	0.9	(0.3)	3.3	-	0.3	-	0.3	-	-	-	-	0.3	-	959.9
Total	347.0	546.6	898.2	894.4	552.6	327.2	318.8	162.6	27.4	50.7	62.2	14.1	4.1	42.7	13.5	0.7	0.9	0.1	-	0.4	32.6	11.0	4,307.7

Years Since Funding

257

Incidence by Number
By Years Since Funding &
Earliest Quality Rating (Investment & Below Investment Grade)

	0.3	1.0	2.0	3.0	4.0	4.5	5.0	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5		19.0
B.I.G	1.02%	2.49%	4.68%	5.35%		3.13%			2.27%				1.48%				0		1.75%		0
Overall	0.28%	0.67%	1.01%	1.32%		1.02%			0.72%				0.45%				0		0.41%		0
I.G.	0.18%	0.31%	0.41%	0.69%		0.59%			0.46%				0.39%				0		0.32%		0

Years Since Funding

258

Incidence by Amount
By Years Since Funding &
Earliest Quality Rating (Investment Grade & Below Investment Grade)

	0.3	1.0	2.0	3.0	4.0	4.5	5.0	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5		19.0
B.I.G.	1.71%	2.72%	6.97%	5.93%		4.11%			3.08%				3.19%				0		2.12%		0
Overall	0.46%	0.55%	1.09%	1.25%		1.18%			0.86%				0.60%				0		0.42%		0
I.G.	0.42%	0.24%	0.46%	0.84%		0.58%			0.52%				0.32%				0		0.33%		0

Years Since Funding

259

Loss Severity
By Years Since Funding &
Earliest Quality Rating (Investment Grade & Below Investment Grade)

	0.3	1.0	2.0	3.0	4.0	4.5	5.0	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5		19.0
B.I.G.	58%	49%	41%	43%		23%			25%				46%				0		48%		0
Overall	59%	41%	37%	39%		28%			29%				28%				0		33%		0
I.G.	60%	34%	41%	39%		29%			27%				16%				0		27%		0

Years Since Funding

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**Economic Loss Rate as % of Exposure
By Years Since Funding &
Earliest Quality Rating (Investment Grade & Below Investment Grade)**

	0.3	1.0	2.0	3.0	4.0	4.5	5.0	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.0	14.5	15.5	16.5	17.5		19.0
B.I.G.	0.99%	1.34%	2.85%	2.57%		0.94%			0.76%				1.46%				0		1.01%		0
Overall	0.27%	0.22%	0.41%	0.48%		0.34%			0.25%				0.17%				0		0.14%		0
I.G.	0.25%	0.08%	0.19%	0.33%		0.17%			0.14%				0.05%				0		0.09%		0

Years Since Funding

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Cross Tabulation: Funding Year By Experience Year

of CREs
By Funding Year & Experience Year

	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990	1989	1988	1987	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974	1973	1972	1971	1970	1969	N/A	TOTAL
86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	7	7	1	2	12	3	1	1	1	-	-	-	-	-	-	3	4	52
87	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	12	9	1	1	2	-	1	6	3	3	2	-	1	1	-	1	6	4	57
88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	7	10	-	1	-	1	-	1	-	3	4	-	1	-	1	-	-	-	-	35
89	-	-	-	-	-	-	-	-	-	-	-	-	-	1	12	10	5	2	4	2	-	1	3	-	1	-	-	-	-	2	-	-	-	-	-	43
90	-	-	-	-	-	-	-	-	-	-	-	-	-	9	13	7	12	4	3	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	50
91	-	-	-	-	-	-	-	-	-	-	-	1	17	24	34	20	14	10	8	1	-	-	-	3	4	1	-	-	-	-	1	-	-	-	2	140
92	-	-	-	-	-	-	-	-	-	-	1	9	16	17	20	17	11	4	2	1	1	-	-	-	-	-	1	-	-	-	2	3	-	1	-	106
93	-	-	-	-	-	-	-	-	-	1	14	11	13	17	13	3	5	1	1	-	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-	82
94	-	-	-	-	-	-	-	-	-	2	2	1	10	3	5	4	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	29
95	-	-	-	-	-	-	-	-	-	2	6	3	6	10	4	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	35
96	-	-	-	-	-	-	-	2	4	7	6	-	2	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24
97	-	-	-	-	-	-	1	4	-	6	2	3	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	19
98	-	-	-	-	-	6	3	8	1	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20
99	-	-	-	9	6	5	4	3	-	3	8	-	-	1	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	42
00	-	-	3	4	8	15	7	5	1	1	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47
01	-	7	5	19	30	9	5	4	4	1	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	90
02	3	12	15	17	9	7	15	5	5	6	16	3	-	-	11	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	130
Total	3	19	23	49	53	42	35	31	17	33	58	35	70	80	113	74	59	54	34	15	3	6	18	12	10	10	8	2	1	3	5	4	1	13	8	1,001

Funding Year

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Exposure in
By Funding Year & Experience Year

	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990	1989	1988	1987	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974	1973	1972	1971	1970	1969	N/A	TOTAL
86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	369	858	571	542	478	409	394	476	436	421	307	247	249	281	233	128	101	610	634	7,740
87	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	390	750	813	542	470	406	347	337	427	381	376	251	202	217	246	190	98	93	476	230	7,239
88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	575	927	939	908	573	491	382	318	349	449	392	399	241	202	214	222	186	116	96	432	12	8,419
89	-	-	-	-	-	-	-	-	-	-	-	-	-	500	1,164	853	858	792	501	414	331	280	324	435	377	378	215	192	182	185	181	114	91	334	4	8,700
90	-	-	-	-	-	-	-	-	-	-	-	-	481	803	864	718	689	557	376	303	256	231	242	378	295	321	182	152	111	158	155	98	55	213	-	7,631
91	-	-	-	-	-	-	-	-	-	-	-	474	965	850	841	730	645	583	343	281	237	183	219	368	280	311	170	136	112	172	156	89	47	187	-	8,373
92	-	-	-	-	-	-	-	-	-	-	532	1,052	1,010	798	735	588	517	461	270	235	187	138	197	342	242	254	136	114	105	141	123	82	44	137	3	8,439
93	-	-	-	-	-	-	-	-	-	648	1,459	1,120	867	743	605	456	366	324	181	173	106	77	102	170	120	110	111	87	69	99	74	64	38	138	10	8,310
94	-	-	-	-	-	-	-	-	605	1,416	1,577	1,139	836	656	520	400	307	258	146	133	79	63	78	122	79	75	88	65	53	71	59	46	25	99	8	8,996
95	-	-	-	-	-	-	-	371	686	843	837	643	335	294	263	161	131	74	42	39	28	16	21	42	29	28	29	19	15	33	17	24	7	24	1	5,048
96	-	-	-	-	-	-	439	752	727	820	780	578	308	269	236	147	113	67	42	35	27	13	19	36	24	24	22	16	13	30	16	17	6	21	1	5,589
97	-	-	-	-	-	456	853	731	651	741	666	486	255	228	193	110	78	49	39	29	21	7	13	27	19	13	14	13	11	25	11	8	4	14	-	5,759
98	-	-	-	-	645	936	797	653	604	668	560	386	214	196	149	77	61	35	33	24	16	4	8	22	12	6	11	10	10	20	6	6	4	6	-	6,173
99	-	-	-	697	1,436	1,081	751	608	556	578	464	306	142	128	106	56	49	49	24	18	16	5	7	11	7	7	10	7	5	14	5	5	4	2	-	7,148
00	-	-	698	1,312	1,337	984	655	533	514	504	399	261	120	103	97	46	45	56	16	12	16	5	7	4	7	7	9	5	3	11	4	4	3	2	-	7,771
01	-	778	1,303	1,194	1,181	857	573	469	457	421	332	210	86	88	92	37	36	46	10	10	9	5	4	2	5	3	6	3	3	10	4	2	1	2	-	8,232
02	705	1,422	1,171	1,066	995	748	507	406	366	374	251	166	72	79	85	27	29	41	8	8	3	4	3	2	3	2	1	3	3	10	4	-	1	1	4	8,562
Total	705	2,200	3,172	4,269	5,593	5,061	4,574	4,522	5,166	7,010	7,855	6,818	5,688	5,731	6,521	5,720	5,977	5,968	3,712	3,214	2,595	2,101	2,322	3,309	2,704	2,731	1,799	1,469	1,371	1,723	1,420	897	618	2,694	904	128,12

Funding Year

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Exposure in $ Associated with CREs
By Funding Year & Experience Year

$ Millions (y-axis) — **Funding Year** (x-axis)

Exp Yr	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990	1989	1988	1987	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974	1973	1972	1971	1970	1969	N/A	TOTAL
86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	81.52	26.10	39.52	11.64	6.945	117.0	52.45	2.080	1.336	2.000	-	-	-	-	-	-	25.25	18.39	384.3
87	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25.60	125.9	66.40	6.956	2.525	15.00	-	2.606	90.34	23.38	20.17	51.17	-	1.734	0.881	-	0.267	12.89	23.36	469.2
88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20.46	72.76	74.93	-	10.00	-	3.623	-	2.278	-	56.14	19.90	-	2.580	-	0.522	-	-	-	-	263.2
89	-	-	-	-	-	-	-	-	-	-	-	-	-	3.000	94.83	286.0	28.90	23.25	16.45	8.666	-	3.631	7.599	-	2.453	-	-	-	-	0.700	-	-	-	-	-	475.5
90	-	-	-	-	-	-	-	-	-	-	-	-	119.8	209.6	57.00	160.6	61.90	6.760	-	-	-	-	-	-	-	64.99	-	-	-	-	-	3.016	-	-	-	683.8
91	-	-	-	-	-	-	-	-	-	-	-	22.00	119.0	406.1	447.6	318.1	111.1	105.6	122.6	8.173	-	-	16.29	16.56	0.289	-	-	-	-	-	1.788	-	-	4.673	-	1,700
92	-	-	-	-	-	-	-	-	-	-	20.00	241.9	284.6	238.5	372.1	324.2	182.8	104.0	23.00	2.944	3.000	-	-	-	2.937	-	-	-	-	-	3.164	26.97	-	1.496	-	1,831
93	-	-	-	-	-	-	-	-	-	5.000	112.0	187.3	234.8	310.0	185.4	56.50	39.50	0.600	1.750	-	-	-	-	0.517	0.240	0.750	-	-	-	-	-	-	-	-	-	1,134
94	-	-	-	-	-	-	-	-	-	53.90	36.08	7.334	109.7	17.49	43.83	88.20	-	4.279	-	5.388	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	366.2
95	-	-	-	-	-	-	-	-	5.000	69.67	59.90	76.55	161.5	77.43	41.71	10.22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	502.0
96	-	-	-	-	-	-	-	30.00	15.07	141.4	90.42	-	15.64	8.077	3.657	-	30.28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	334.6
97	-	-	-	-	-	-	23.00	41.50	-	65.50	15.77	15.87	4.623	-	6.154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.167	-	174.5
98	-	-	-	-	-	65.57	40.17	137.8	10.00	-	4.200	-	1.000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	258.8
99	-	-	-	224.5	87.71	77.25	56.00	40.65	-	54.13	54.31	-	-	22.45	-	-	-	-	-	-	-	-	-	2.310	-	0.917	-	-	-	-	-	-	-	-	-	620.2
00	-	-	41.34	73.12	43.74	180.6	87.52	71.10	20.00	12.13	-	-	5.077	2.763	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	537.4
01	-	176.7	71.06	357.3	420.0	169.0	48.03	55.32	47.37	45.00	54.53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,444
02	100.3	112.1	128.1	125.6	61.06	143.3	147.8	91.82	48.56	17.48	77.03	13.17	-	-	48.99	1.456	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,117
Total	100.3	288.9	240.5	780.5	612.5	635.8	402.5	468.2	146.0	464.3	520.0	568.4	935.1	1,206	1,454	1,162	651.6	582.0	263.1	83.96	17.16	29.19	140.9	75.33	95.40	149.5	42.07	51.17	2.580	2.434	6.355	29.98	0.267	46.48	41.75	12,29

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Exposure in $
By Funding Year & Experience Year

$ Billion (vertical axis, 0–120)

Funding Year (horizontal axis)

	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990	1989	1988	1987	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974	1973	1972	1971	1970	1969	N/A	TOTAL
86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.5	8.7	4.7	4.3	3.8	2.9	2.9	2.8	3.7	3.1	1.9	0.8	0.6	0.8	0.8	0.3	0.1	1.2	2.6	50.4
87	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.0	9.1	8.4	4.1	3.8	3.1	2.2	2.2	2.3	3.1	2.5	1.4	0.6	0.5	0.6	0.7	0.2	0.1	0.8	0.8	52.7
88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.4	12.7	9.5	7.7	3.5	3.5	2.6	1.6	1.8	2.0	2.5	2.2	1.1	0.4	0.4	0.5	0.6	0.2	0.1	0.6	0.0	61.7
89	-	-	-	-	-	-	-	-	-	-	-	-	-	7.4	16.0	11.7	8.3	6.2	3.0	2.7	2.1	1.2	1.5	1.6	2.0	1.8	0.9	0.4	0.4	0.4	0.5	0.2	0.1	0.4	0.0	68.7
90	-	-	-	-	-	-	-	-	-	-	-	-	8.4	16.0	14.9	10.7	8.7	5.1	2.6	2.1	1.6	1.4	1.2	1.8	1.8	2.1	1.1	0.5	0.4	0.3	0.6	0.2	0.2	0.3	0.0	82.0
91	-	-	-	-	-	-	-	-	-	-	-	7.5	17.1	18.1	15.0	10.9	8.6	4.5	2.6	1.8	1.4	1.2	0.9	1.6	1.6	1.9	0.9	0.5	0.3	0.3	0.6	0.2	0.2	0.3	0.0	98.0
92	-	-	-	-	-	-	-	-	-	-	8.8	15.8	17.2	16.3	12.3	8.4	6.6	3.2	1.8	1.4	1.0	0.7	0.6	1.1	1.0	1.2	0.6	0.3	0.2	0.2	0.3	0.1	0.1	0.2	0.0	99.4
93	-	-	-	-	-	-	-	-	-	8.8	17.4	14.1	12.2	12.6	7.5	5.1	3.7	1.7	1.0	0.9	0.7	0.4	0.2	0.4	0.2	0.6	0.3	0.1	0.2	0.1	0.1	0.1	0.0	0.1	0.1	88.6
94	-	-	-	-	-	-	-	-	8.6	19.4	18.9	14.7	11.0	10.8	6.0	4.4	2.9	1.4	0.9	0.8	0.5	0.4	0.2	0.2	0.1	0.5	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	102.5
95	-	-	-	-	-	-	-	6.6	11.2	12.9	10.3	8.4	4.3	5.6	3.0	2.2	1.2	0.6	0.4	0.3	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	67.9
96	-	-	-	-	-	-	6.0	13.3	11.6	12.3	9.2	7.3	3.5	4.8	2.2	1.8	1.0	0.4	0.3	0.2	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	74.6
97	-	-	-	-	-	6.6	11.7	12.3	10.3	10.6	7.3	6.0	2.6	3.8	1.6	1.4	0.6	0.3	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	76.1
98	-	-	-	-	8.3	13.2	11.0	10.3	9.1	9.0	5.8	4.9	1.9	3.1	1.2	1.2	0.4	0.3	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	80.2
99	-	-	-	7.7	18.5	14.3	10.3	8.9	8.3	7.6	4.7	3.8	1.5	2.5	1.0	0.9	0.5	0.3	0.3	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.5
00	-	-	6.3	14.4	17.1	12.4	8.8	7.3	7.4	6.1	3.8	3.0	1.2	2.2	0.8	0.7	0.4	0.3	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	93.0
01	-	9.6	11.9	13.0	14.5	10.5	7.3	6.0	6.3	5.0	3.0	2.2	0.8	1.8	0.7	0.4	0.3	0.2	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	94.1
02	9.1	17.6	10.7	11.0	11.3	8.6	5.8	4.7	4.8	3.9	2.1	1.5	0.6	1.4	0.6	0.2	0.3	0.2	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	95.1
Total	9.1	27.3	29.0	46.1	69.7	65.5	60.9	69.5	77.8	95.5	91.3	89.2	82.4	106.4	91.3	78.7	66.6	49.7	26.4	22.5	17.3	12.3	11.8	13.9	16.1	16.0	8.5	3.8	3.2	3.5	4.6	1.5	1.2	4.2	3.6	1,376.

Economic Loss of CREs
By Funding Year & Experience Year

$ Millions

Exp	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990	1989	1988	1987	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974	1973	1972	1971	1970	1969	N/A	TOTAL
86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	49.47	13.53	22.12	0.886	4.884	23.50	17.11	0.581	0.437	(0.251	-	-	-	-	-	-	17.25	5.127	154.6
87	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.956	24.72	38.33	(0.030	0.073	11.04	-	0.656	18.51	4.019	2.069	(4.568	-	(0.005	0.027	-	0.057	6.121	5.910	113.9
88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.500	59.36	23.99	-	4.912	-	0.827	-	0.076	-	6.840	6.298	-	-	0.155	-	0.170	-	-	-	-	105.1
89	-	-	-	-	-	-	-	-	-	-	-	-	-	3.000	58.77	95.23	22.83	2.648	(1.155	4.134	-	0.422	0.503	-	(0.086	-	-	-	-	0.022	-	-	-	-	-	186.3
90	-	-	-	-	-	-	-	-	-	-	-	-	52.81	86.09	29.74	46.55	2.938	4.565	-	-	-	-	-	-	-	42.44	-	-	-	-	-	0.160	-	-	-	265.3
91	-	-	-	-	-	-	-	-	-	-	-	4.868	48.42	143.4	194.6	168.2	44.81	63.19	24.55	1.978	-	-	(2.249	2.398	0.289	-	-	-	-	-	0.205	-	-	0.172	-	695.0
92	-	-	-	-	-	-	-	-	-	-	5.354	106.2	113.6	82.13	56.37	100.8	44.40	16.36	2.649	0.087	0.285	-	-	-	-	0.286	-	-	-	-	1.934	6.022	-	0.159	-	536.8
93	-	-	-	-	-	-	-	-	-	5.000	16.66	16.68	48.43	83.24	50.62	24.39	19.06	(0.081	0.433	-	-	-	-	0.095	0.041	(0.034	-	-	-	-	-	-	-	-	-	264.5
94	-	-	-	-	-	-	-	-	-	-	13.91	-	-	30.00	9.469	1.780	8.167	-	1.017	-	2.143	-	-	-	-	-	-	-	-	-	-	-	-	-	-	66.50
95	-	-	-	-	-	-	-	-	1.045	24.08	22.48	13.52	7.184	39.27	(0.744	(0.299	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	106.5
96	-	-	-	-	-	-	-	0.714	12.80	17.60	1.375	-	0.269	0.330	0.196	-	14.42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47.71
97	-	-	-	-	-	-	(0.629	18.53	-	39.87	6.405	5.391	(0.189	-	4.525	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.705	74.61
98	-	-	-	-	-	33.88	2.218	33.49	(0.093	-	0.041	-	0.019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	69.56
99	-	-	-	125.3	12.63	6.168	7.165	18.24	-	26.91	(5.935	-	-	4.175	-	-	-	-	-	-	-	0.767	-	0.194	-	-	-	-	-	-	-	-	-	-	-	195.7
00	-	-	34.00	33.42	18.98	97.30	13.79	35.18	(2.633	0.522	-	-	3.390	1.399	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	235.3
01	-	135.5	45.42	210.7	184.8	49.94	14.68	19.30	14.35	(1.305	19.62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	693.1
02	33.85	64.29	51.92	69.14	28.00	46.31	53.23	68.14	22.63	5.470	36.13	4.020	-	-	13.21	0.334	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	496.7
Total	33.85	199.7	131.3	438.7	244.5	233.6	90.46	193.6	48.11	132.0	102.1	150.8	251.1	419.3	465.4	429.1	258.4	184.2	82.92	36.11	1.244	17.17	21.76	20.53	19.34	53.99	8.116	(4.568	0.155	0.016	2.337	6.183	0.057	24.41	11.03	4,307.

Funding Year

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Incidence Rate by $
By Funding Year & Experience Year

	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
1986	2.19%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.11%	0.04%	0.06%	1.88%	4.01%	0.24%	0.31%	0.92%	0.55%	0.94%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1987	1.52%	0.24%	0.00%	0.12%	0.30%	0.00%	8.72%	1.47%	0.93%	2.92%	0.11%	0.00%	0.68%	0.08%	0.18%	1.61%	1.49%	0.28%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1988	0.00%	0.00%	0.00%	0.09%	0.00%	0.65%	0.00%	1.88%	2.59%	0.00%	0.12%	0.00%	0.23%	0.00%	0.29%	0.00%	0.97%	0.77%	0.16%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1989	0.00%	0.00%	0.00%	0.00%	0.19%	0.00%	0.00%	0.00%	0.12%	0.00%	0.51%	0.30%	0.00%	0.33%	0.56%	0.37%	0.35%	2.44%	0.59%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1990	0.00%	0.00%	1.48%	0.00%	0.00%	0.00%	0.00%	0.00%	3.05%	0.00%	0.00%	0.51%	0.30%	0.00%	0.00%	0.26%	1.21%	1.84%	0.53%	1.41%	0.75%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1991	1.49%	0.00%	0.00%	0.32%	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%	1.04%	1.81%	0.00%	0.00%	0.46%	4.75%	2.34%	1.29%	2.91%	2.98%	2.24%	0.70%	0.29%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1992	0.66%	0.00%	20.87%	1.06%	0.00%	0.00%	0.00%	0.00%	0.24%	0.00%	0.00%	0.00%	0.00%	0.00%	0.29%	0.22%	1.28%	3.27%	2.76%	3.88%	3.03%	1.47%	1.65%	1.54%	0.23%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1993	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.13%	0.11%	0.14%	0.00%	0.00%	0.00%	0.00%	0.17%	0.04%	1.08%	1.10%	2.47%	2.47%	1.92%	1.33%	0.64%	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1994	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.69%	0.00%	0.31%	0.00%	2.03%	0.73%	0.16%	1.00%	0.05%	0.19%	0.28%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1995	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.46%	1.41%	1.37%	3.78%	0.91%	0.58%	0.54%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1996	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.16%	0.00%	0.16%	0.17%	0.45%	0.00%	0.98%	1.15%	0.13%	0.22%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1997	24.75%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.38%	0.00%	0.18%	0.27%	0.21%	0.62%	0.00%	0.34%	0.20%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.03%	0.00%	0.00%	0.00%	0.00%	0.11%	1.34%	0.27%	0.50%	0.00%	0.00%	0.00%	0.00%	0.00%

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Loss Severity
By Funding Year & Experience Year

	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
1986	68%	0%	0%	0%	0%	0%	0%	-13%	33%	28%	33%	20%	70%	8%	56%	52%	61%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1987	47%	21%	0%	3%	0%	0%	-9%	10%	17%	20%	25%	0%	74%	3%	0%	58%	20%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1988	0%	0%	0%	33%	0%	6%	0%	32%	12%	0%	3%	0%	23%	0%	49%	0%	32%	82%	12%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1989	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	-3%	0%	7%	12%	0%	48%	-7%	11%	79%	33%	62%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1990	0%	0%	5%	0%	0%	0%	0%	0%	65%	0%	0%	0%	0%	0%	0%	68%	5%	29%	52%	41%	44%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1991	4%	0%	0%	11%	0%	0%	0%	0%	0%	100%	14%	-14%	0%	0%	24%	20%	60%	40%	53%	43%	35%	41%	22%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1992	11%	0%	22%	61%	0%	0%	0%	0%	10%	0%	0%	0%	0%	9%	3%	12%	16%	24%	31%	15%	34%	40%	44%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1993	0%	0%	0%	0%	0%	0%	0%	0%	-5%	17%	18%	0%	0%	0%	0%	25%	-14%	48%	43%	27%	27%	21%	9%	15%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1994	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	40%	0%	24%	0%	9%	4%	54%	27%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1995	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-3%	-2%	51%	4%	18%	38%	35%	21%	0%	0%	0%	0%	0%	0%	0%
1996	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	48%	0%	5%	4%	2%	0%	2%	12%	85%	2%	0%	0%	0%	0%	0%	0%	0%
1997	33%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	74%	0%	-4%	34%	41%	61%	0%	45%	-3%	0%	0%	0%	0%	0%	0%	0%

Economic Loss as % of Exposure By Funding Year & Experience Year
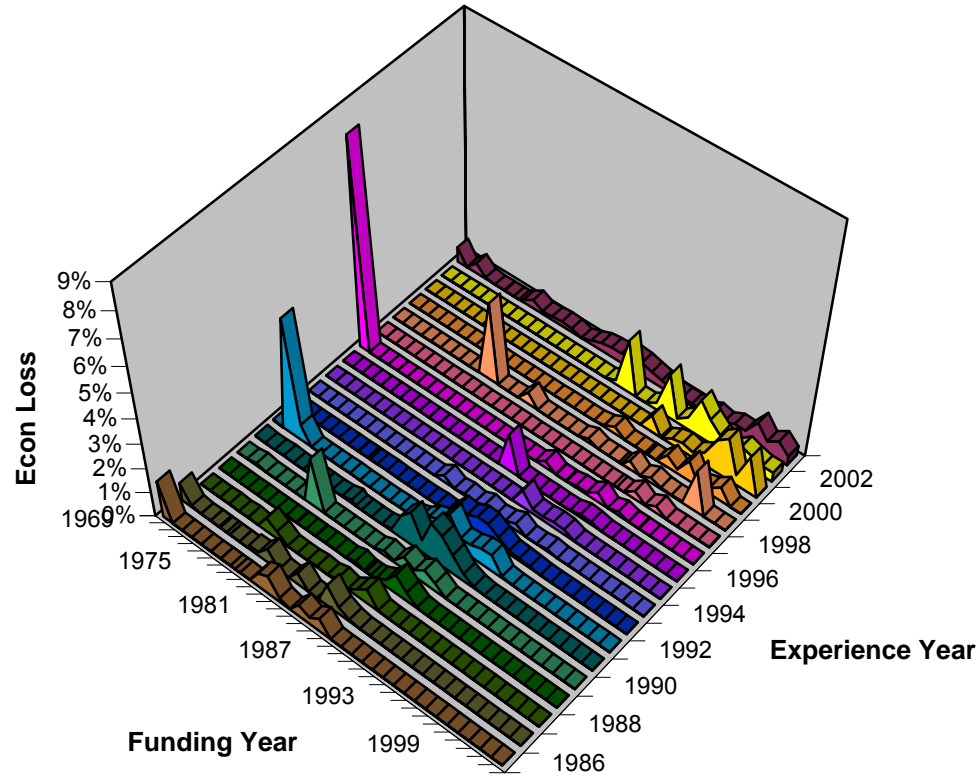
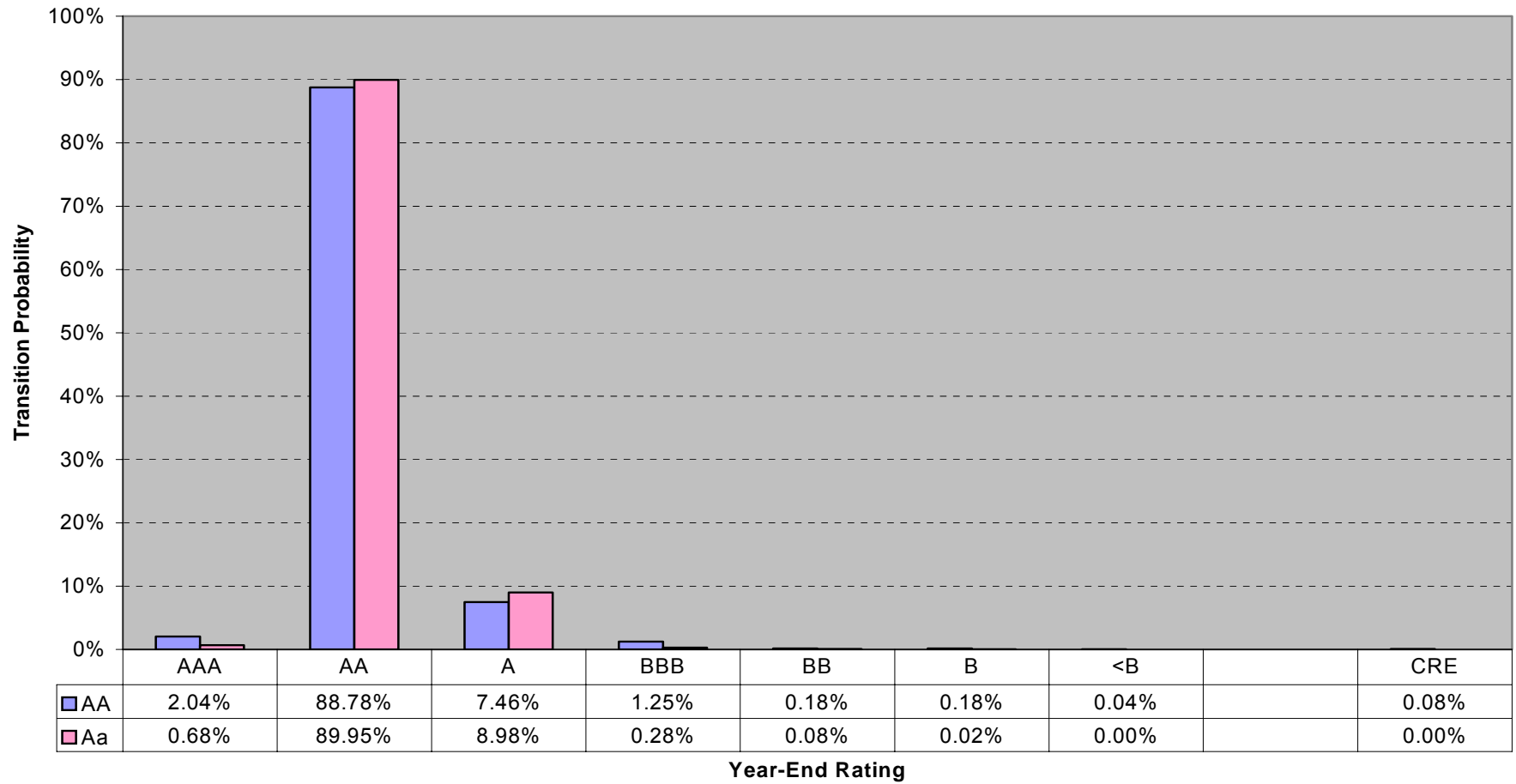|	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
1986	1.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-0.01%	0.01%	0.02%	0.61%	0.81%	0.17%	0.02%	0.52%	0.29%	0.57%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1987	0.72%	0.05%	0.00%	0.00%	0.00%	0.00%	-0.78%	0.15%	0.16%	0.60%	0.03%	0.00%	0.50%	0.00%	0.00%	0.93%	0.29%	0.08%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1988	0.00%	0.00%	0.00%	0.03%	0.00%	0.04%	0.00%	0.60%	0.32%	0.00%	0.00%	0.00%	0.00%	0.05%	0.00%	0.14%	0.00%	0.31%	0.63%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1989	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.03%	0.04%	0.00%	0.16%	-0.04%	0.04%	0.27%	0.81%	0.37%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1990	0.00%	0.00%	0.08%	0.00%	0.00%	0.00%	0.00%	0.00%	1.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.18%	0.06%	0.53%	0.28%	0.58%	0.33%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1991	0.05%	0.00%	0.00%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%	0.15%	-0.25%	0.00%	0.00%	0.11%	0.95%	1.40%	0.52%	1.54%	1.30%	0.79%	0.28%	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1992	0.07%	0.00%	4.66%	0.65%	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%	0.00%	0.03%	0.01%	0.15%	0.51%	0.67%	0.47%	0.66%	0.51%	0.66%	0.67%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1993	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-0.01%	0.02%	0.03%	0.00%	0.00%	0.00%	0.00%	0.04%	0.00%	0.52%	0.47%	0.67%	0.66%	0.40%	0.12%	0.10%	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1994	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.27%	0.00%	0.07%	0.00%	0.19%	0.03%	0.09%	0.27%	0.00%	0.00%	0.07%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1995	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-0.01%	-0.03%	0.70%	0.17%	0.16%	0.22%	0.19%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1996	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.50%	0.00%	0.01%	0.01%	0.01%	0.00%	0.01%	0.14%	0.11%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1997	8.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.28%	0.00%	-0.01%	0.09%	0.09%	0.38%	0.00%	0.15%	-0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Rating-Transition Probabilities

One-Year Rating-Transition Probabilities
Comparing Private Placements (SOA) to Public Corporate Bonds (Moody's)

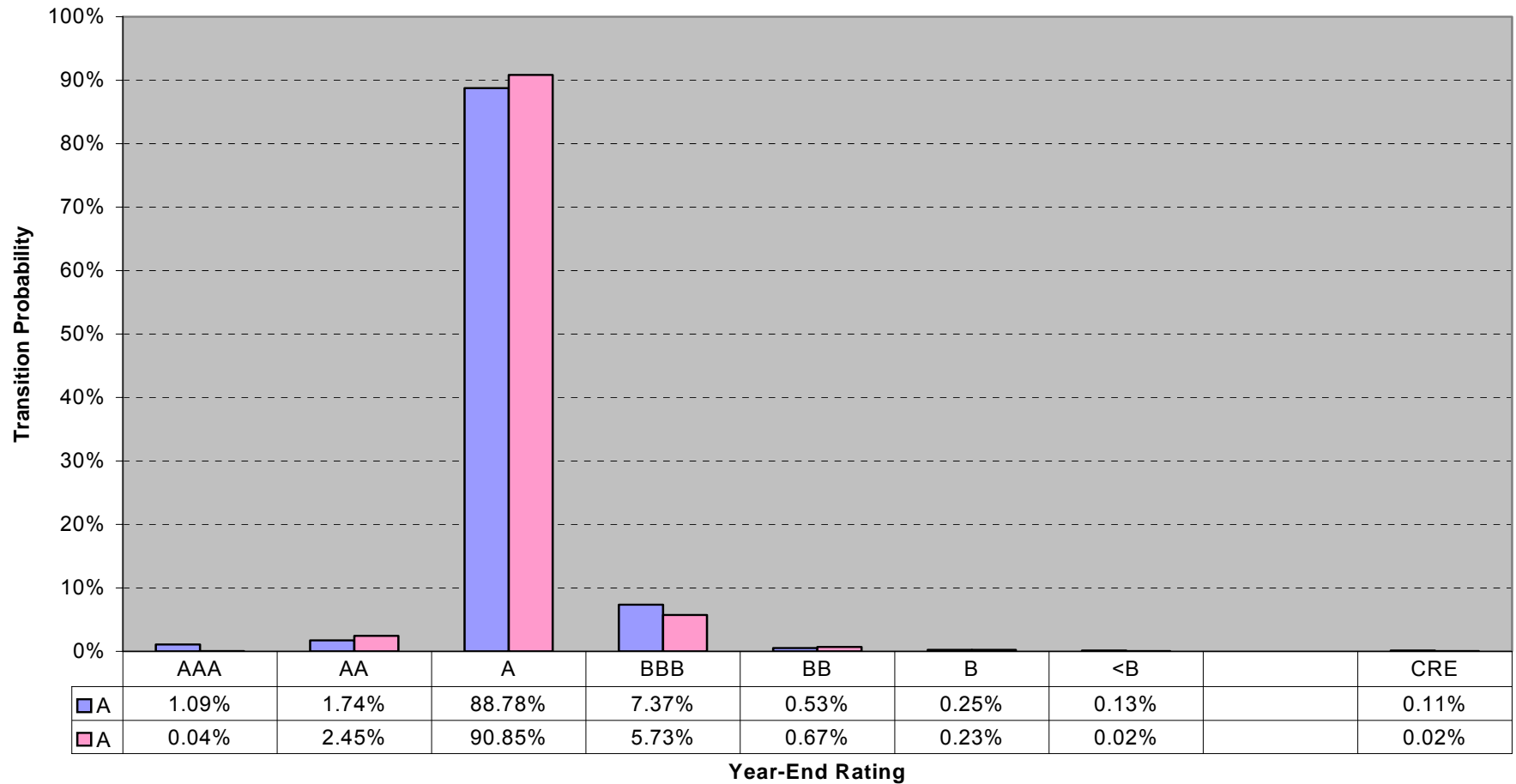| Migration from Internal Rating of	Compared to Moody's Transition from	Likelihood to Upgrade	Likelihood to Downgrade (Excluding CREs)
AAA	**Aaa**	Not applicable	More multiple downgrades
AA	**Aa**	Similar	Similar
A	**A**	Similar	Similar
BBB	**Baa**	Similar	Similar
BB	**Ba**	Similar except greater to BBB	Similar except smaller to B
B	**B**	Similar except greater to BBB	Smaller to <B
<B	**<B**	Similar except greater to B	Not applicable
Overall	**Overall**	Similar for Investment Grade Greater for Below Investment Grade	Similar for Investment Grade but more dispersed for AAA Slightly smaller overall for Below Investment Grade

One-Year Migration in Rating - SOA Study versus Moody's (Adjusted for 'Not Rated')
From AAA (SOA) or Aaa (Moody's) at the Beginning of the Year
Multiple-Downgrade (to A & BBB) as Likely as Single Downgrade to AA

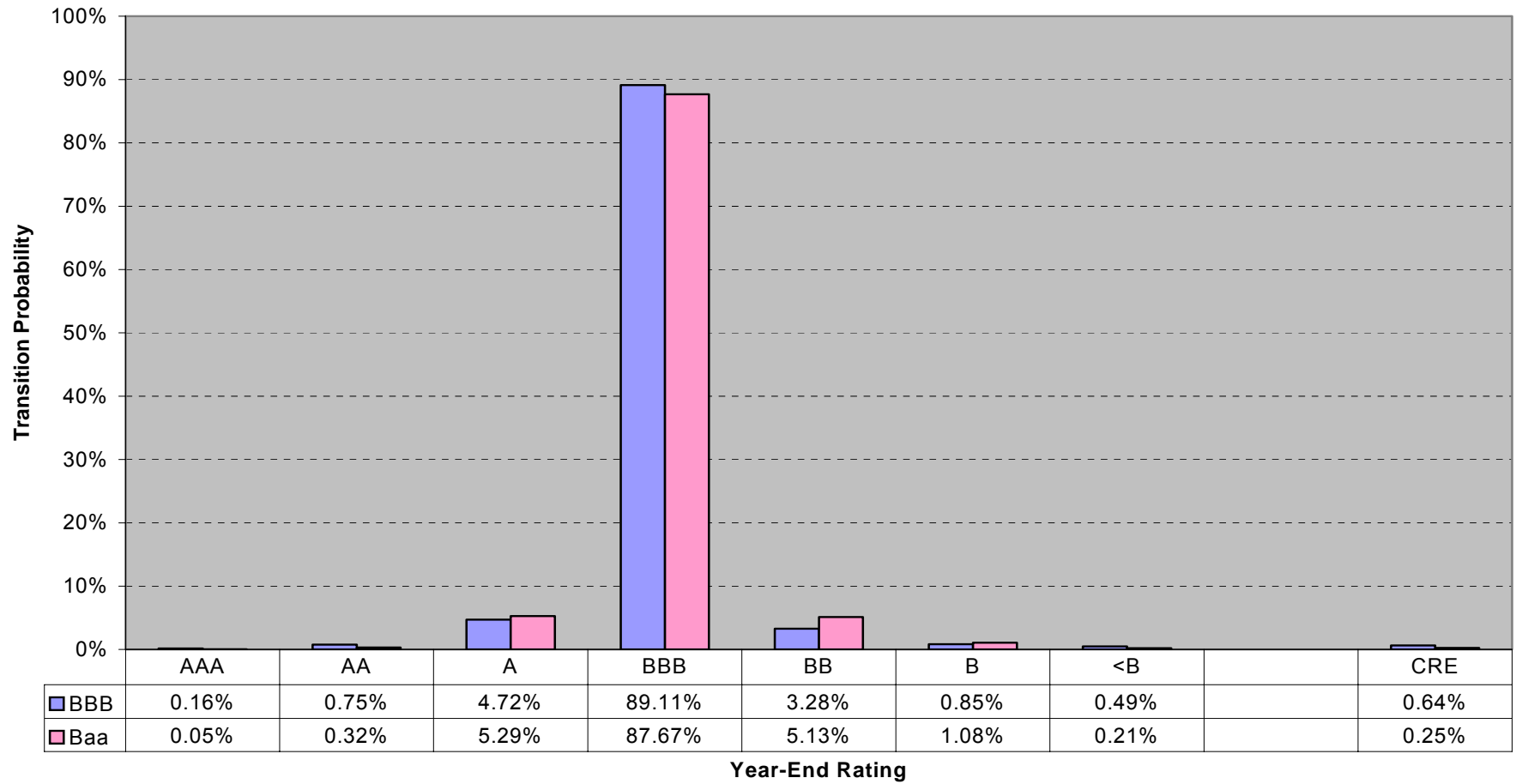|	AAA	AA	A	BBB	BB	B	<B		CRE
AAA	93.82%	2.99%	2.16%	0.84%	0.08%	0.07%	0.02%		0.01%
Aaa	90.15%	9.51%	0.34%	0.00%	0.00%	0.00%	0.00%		0.00%

Year-End Rating
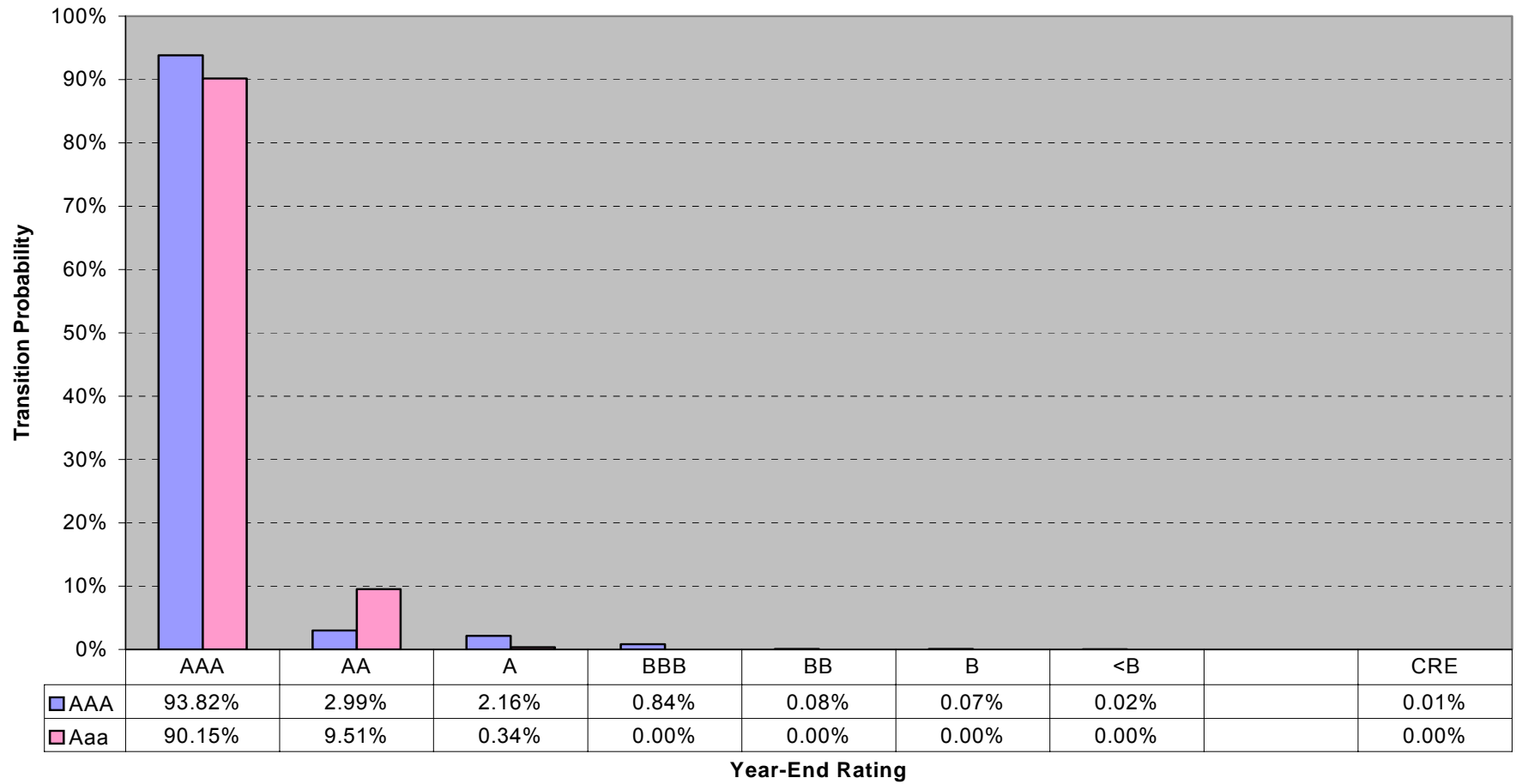
One-Year Migration in Rating - SOA Study versus Moody's (Adjusted for 'Not Rated')
From AA (SOA) or Aa (Moody's) at the Beginning of the Year
Similar between Public (Moody's) & Private (SOA)

	AAA	AA	A	BBB	BB	B	<B		CRE
AA	2.04%	88.78%	7.46%	1.25%	0.18%	0.18%	0.04%		0.08%
Aa	0.68%	89.95%	8.98%	0.28%	0.08%	0.02%	0.00%		0.00%

Year-End Rating

274

One-Year Migration in Rating - SOA Study versus Moody's (Adjusted for 'Not Rated')
From A at the Beginning of the Year
Similar between Public (Moody's) & Private (SOA)

	AAA	AA	A	BBB	BB	B	<B		CRE
A	1.09%	1.74%	88.78%	7.37%	0.53%	0.25%	0.13%		0.11%
A	0.04%	2.45%	90.85%	5.73%	0.67%	0.23%	0.02%		0.02%

Year-End Rating

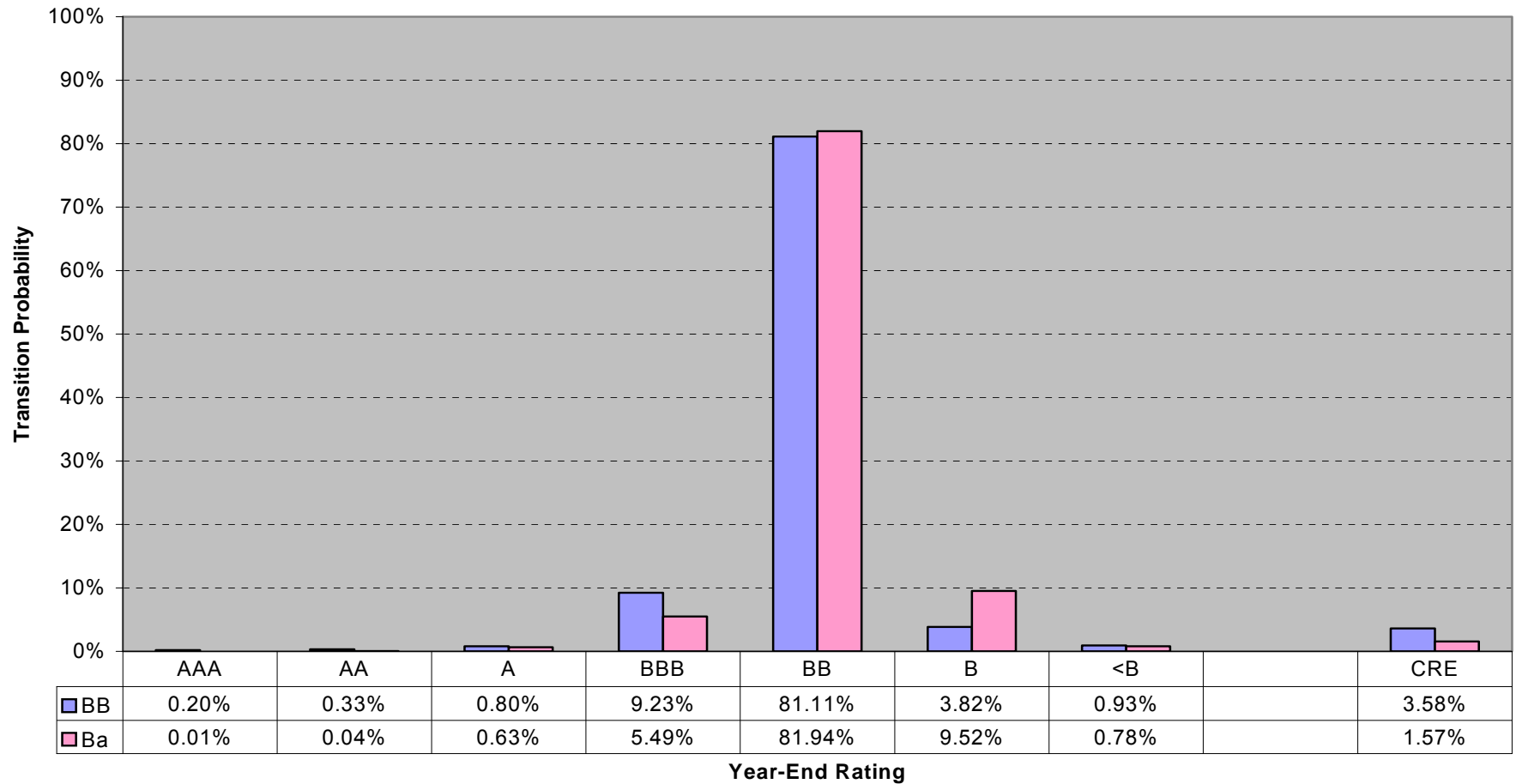**One-Year Migration in Rating - SOA Study versus Moody's (Adjusted for 'Not Rated')**
From BBB (SOA) or Baa (Moody's) at the Beginning of the Year
Similar between Public (Moody's) & Private (SOA)

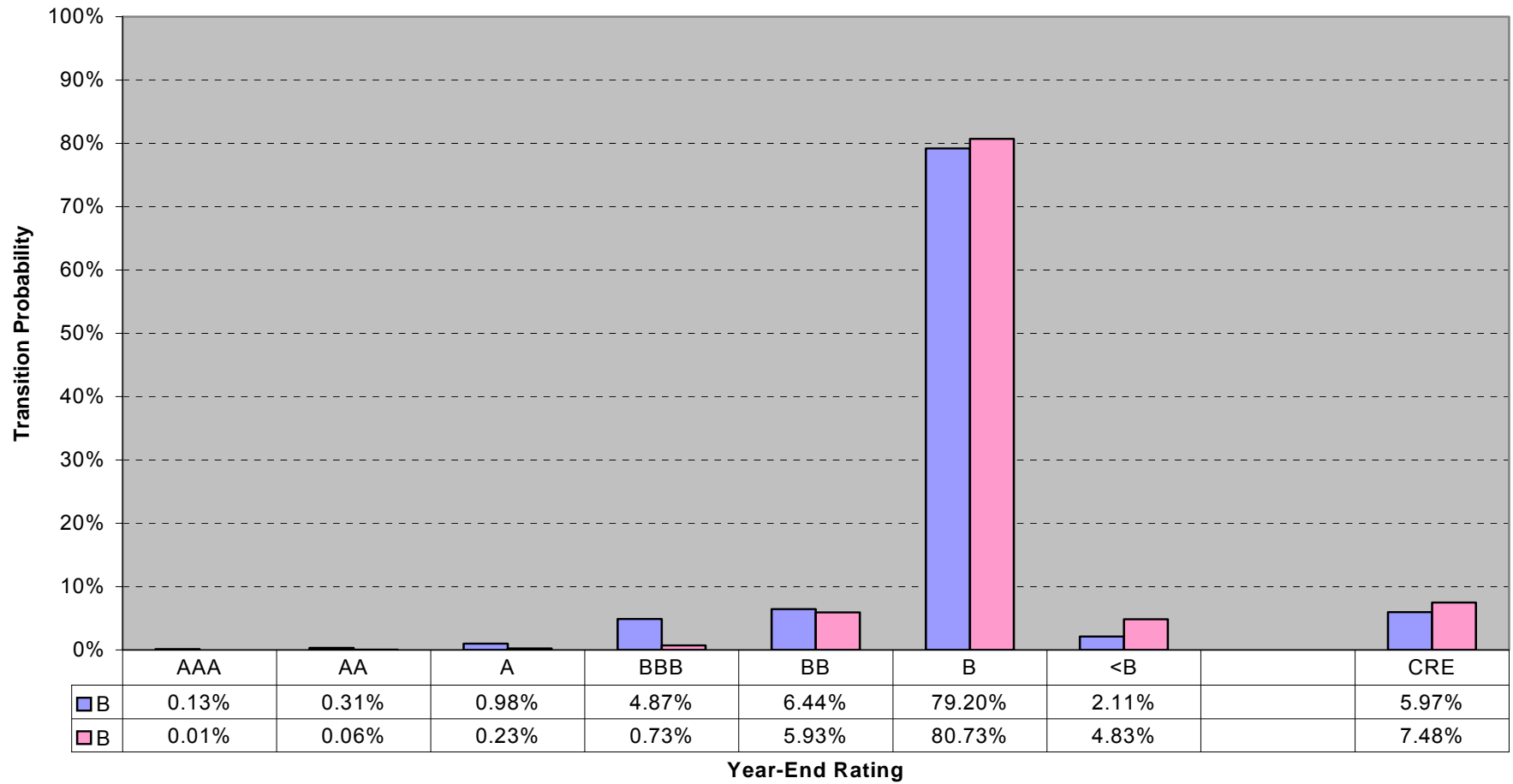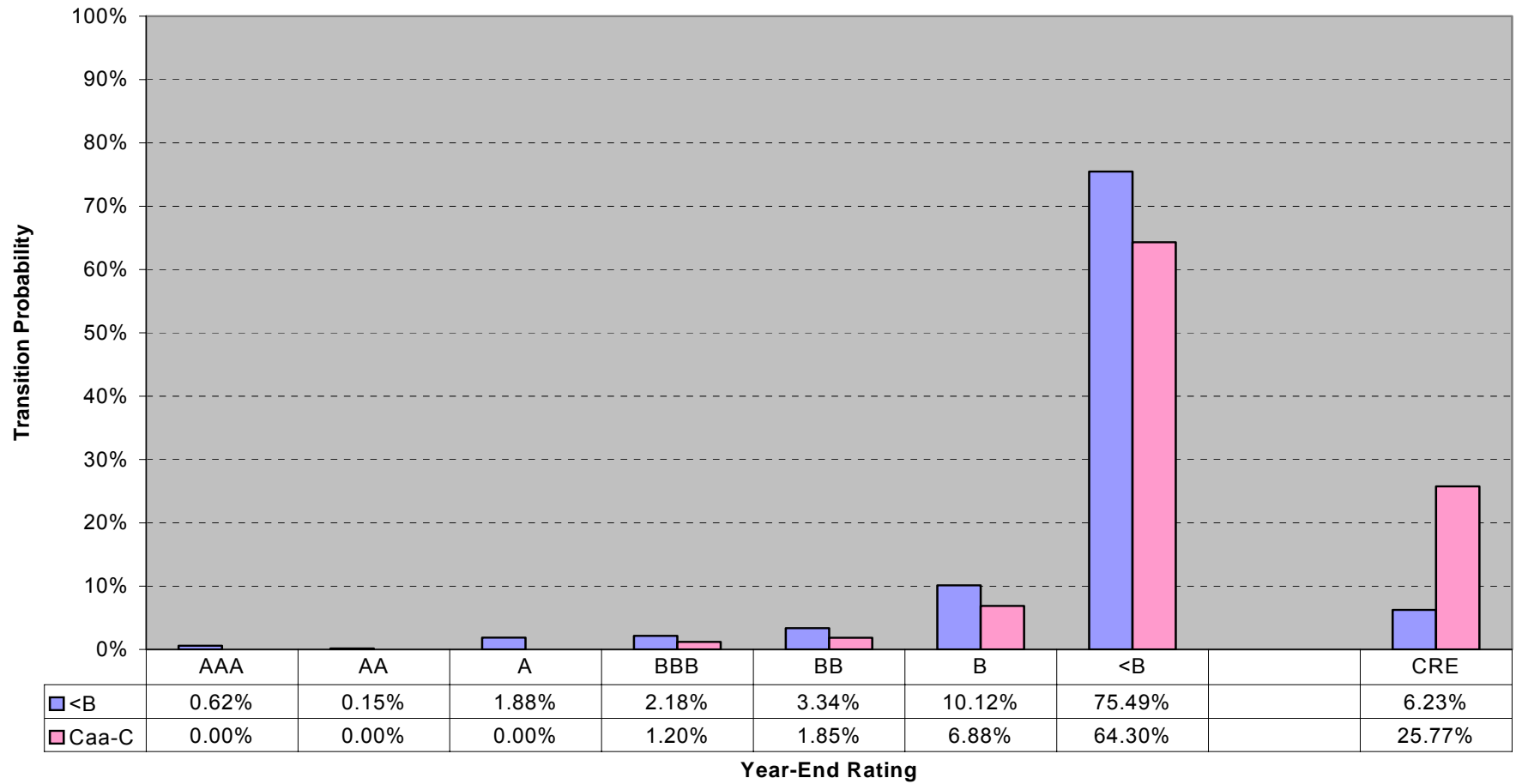|	AAA	AA	A	BBB	BB	B	<B		CRE
BBB	0.16%	0.75%	4.72%	89.11%	3.28%	0.85%	0.49%		0.64%
Baa	0.05%	0.32%	5.29%	87.67%	5.13%	1.08%	0.21%		0.25%

Year-End Rating

One-Year Migration in Rating - SOA Study versus Moody's (Adjusted for 'Not Rated')
From BB (SOA) or Ba (Moody's) at the Beginning of the Year
More Likely to Upgrade (to BBB) but Less Likely to Downgrade (to B)

	AAA	AA	A	BBB	BB	B	<B		CRE
BB	0.20%	0.33%	0.80%	9.23%	81.11%	3.82%	0.93%		3.58%
Ba	0.01%	0.04%	0.63%	5.49%	81.94%	9.52%	0.78%		1.57%

Year-End Rating

One-Year Migration in Rating - SOA Study versus Moody's (Adjusted for 'Not Rated')
From B at the Beginning of the Year
More Likely to Upgrade (Two Levels to BBB)

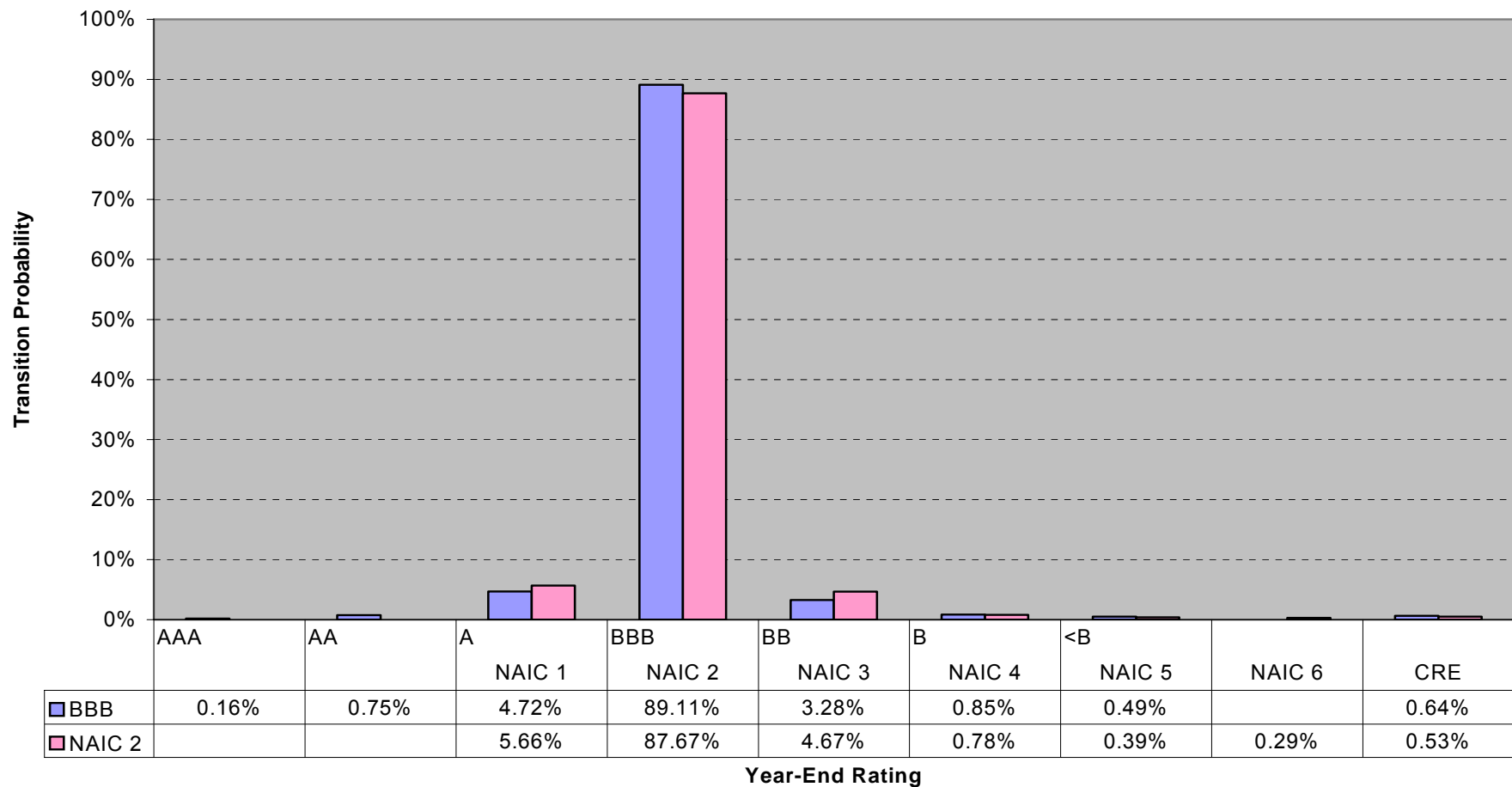|	AAA	AA	A	BBB	BB	B	<B		CRE
B	0.13%	0.31%	0.98%	4.87%	6.44%	79.20%	2.11%		5.97%
B	0.01%	0.06%	0.23%	0.73%	5.93%	80.73%	4.83%		7.48%

Year-End Rating

One-Year Migration in Rating - SOA Study versus Moody's (Adjusted for 'Not Rated')
From <B (SOA) or Caa-C (Moody's) at the Beginning of the Year
More Likely to Upgrade (to B) and Less Likely to 'Downgrade' to CRE

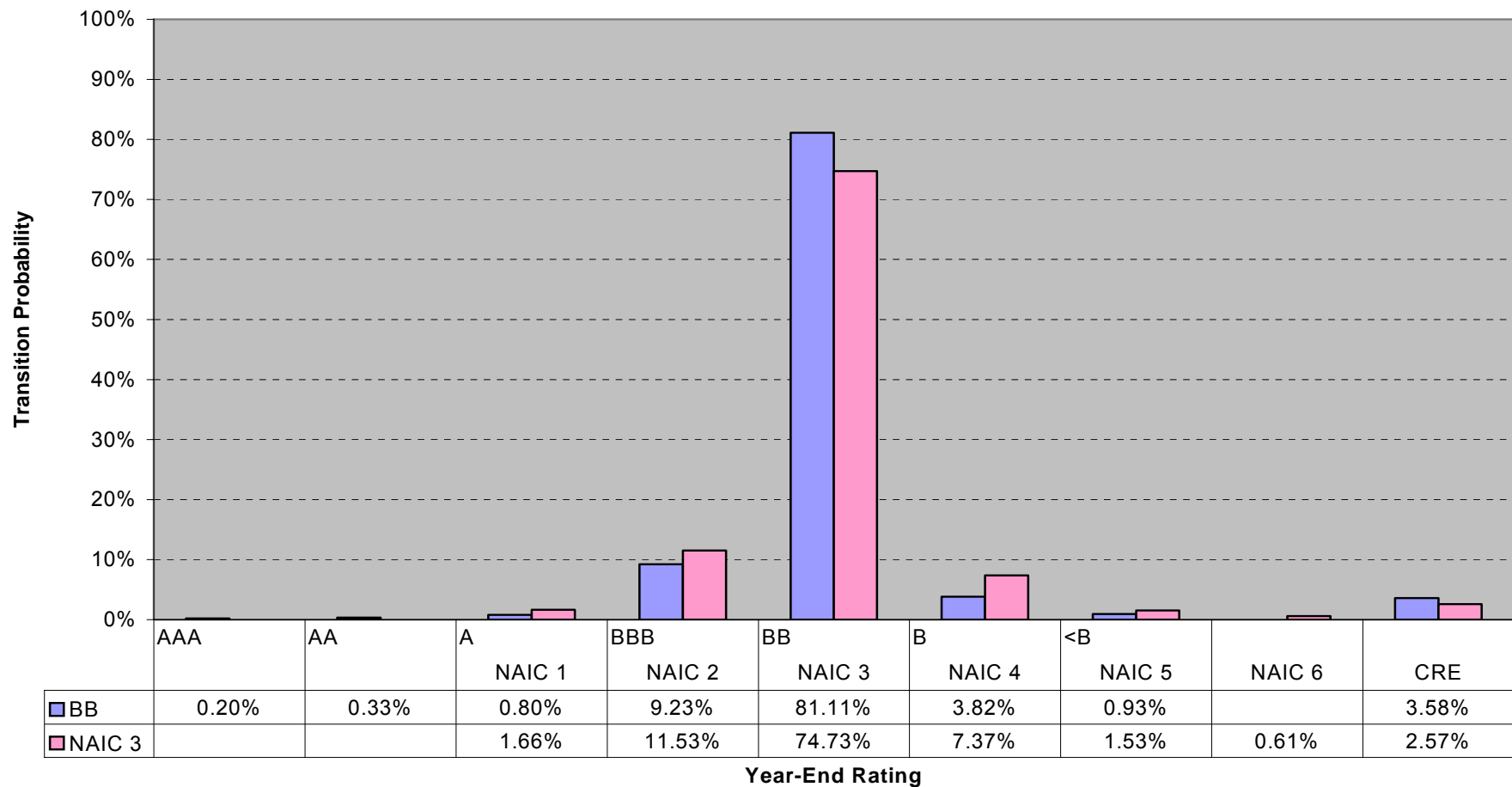|	AAA	AA	A	BBB	BB	B	<B		CRE
<B	0.62%	0.15%	1.88%	2.18%	3.34%	10.12%	75.49%		6.23%
Caa-C	0.00%	0.00%	0.00%	1.20%	1.85%	6.88%	64.30%		25.77%

Year-End Rating

279

One-Year Rating-Transition Probabilities
Comparing Patterns between Internal Ratings and NAIC Ratings

Migration from Internal Rating of	Compared to Migration from	Likelihood to Upgrade	Likelihood to Downgrade (Excluding CREs)
AAA-A	NAIC 1	No one-to-one correspondence for direct comparison	
BBB	NAIC 2	Similar	Similar
BB	NAIC 3	Similar	Similar except smaller to B (NAIC 4)
B	NAIC 4	Similar	Similar except smaller to <B (NAIC 5)
<B	NAIC 5	Similar on the whole	Not applicable
	NAIC 6	No exact analog for comparison	
Overall	Overall	Similar	Smaller for Below Investment Grade

One-Year Migration in Rating - Internal Rating versus NAIC (NR-Adjusted)
From BBB or NAIC 2 at the Beginning of the Year
Less Likely to Uprade to A but Also Less Likely to Downgrade to BB

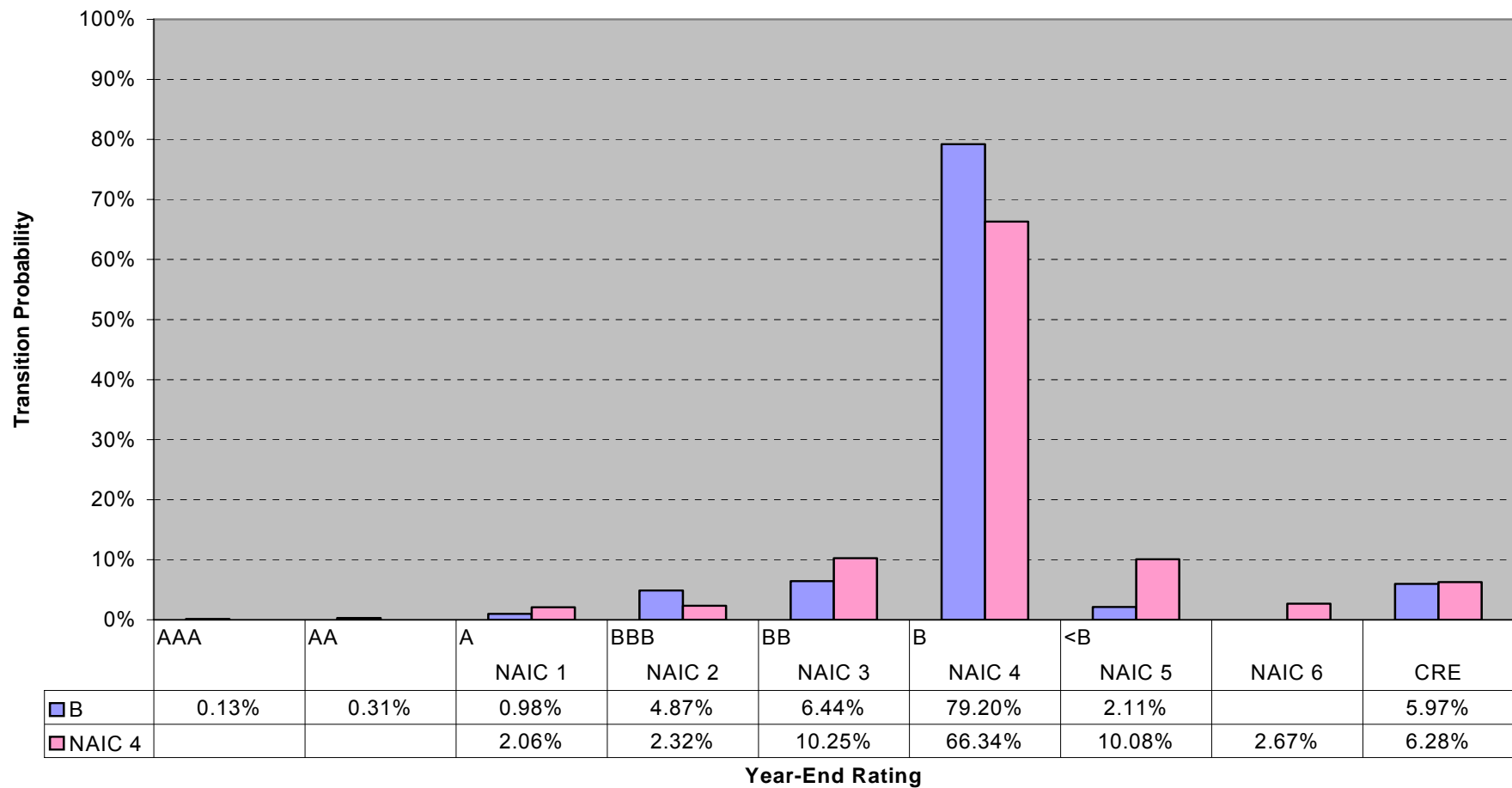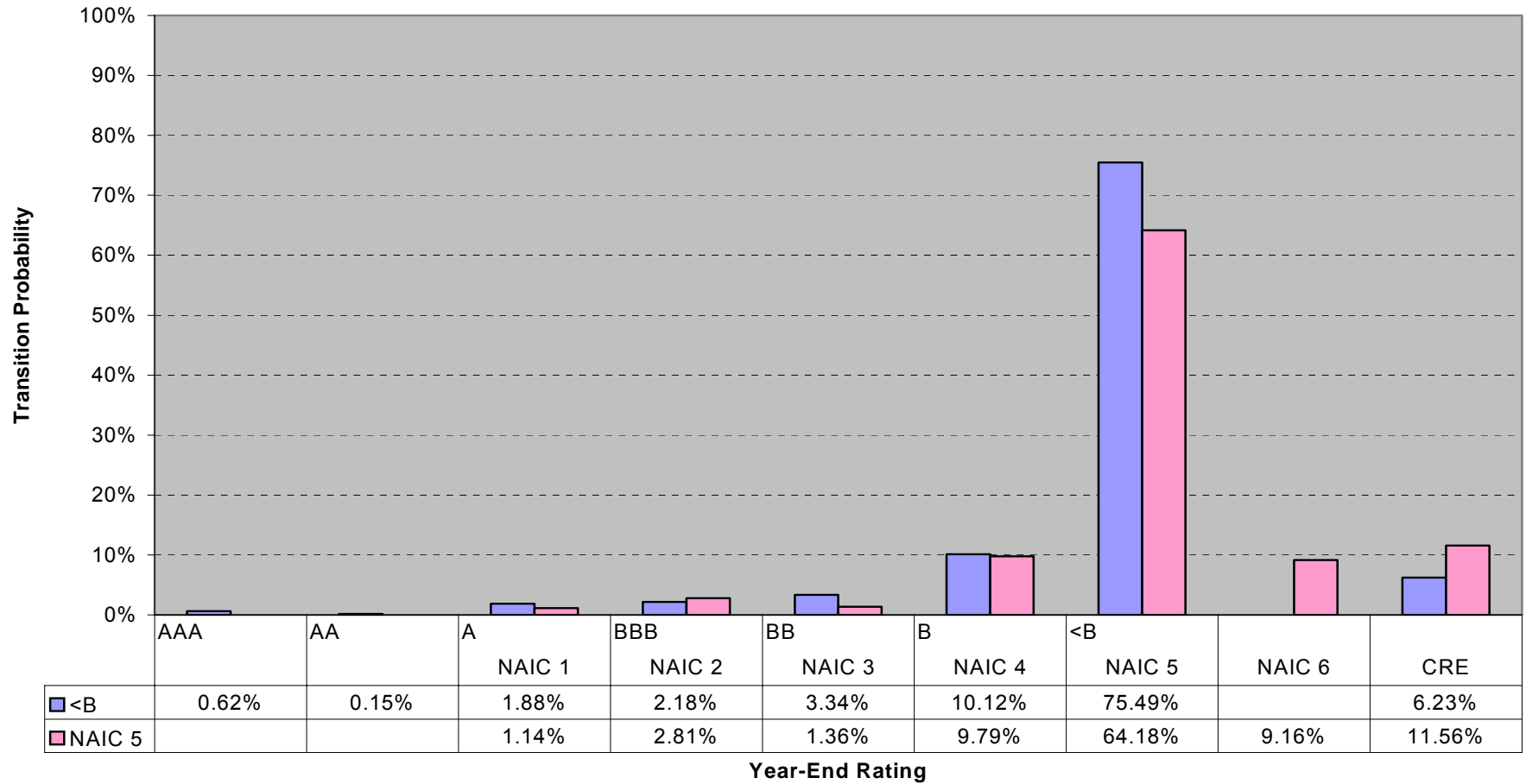|	AAA	AA	A NAIC 1	BBB NAIC 2	BB NAIC 3	B NAIC 4	<B NAIC 5	NAIC 6	CRE
BBB	0.16%	0.75%	4.72%	89.11%	3.28%	0.85%	0.49%		0.64%
NAIC 2			5.66%	87.67%	4.67%	0.78%	0.39%	0.29%	0.53%

Year-End Rating

One-Year Migration in Rating - Internal Rating versus NAIC (NR-Adjusted)
From BB or NAIC 3 at the Beginning of the Year
Less Likely for BB to Downgrade to B Than for NAIC 3 to Downgrade to NAIC 4

	AAA	AA	A NAIC 1	BBB NAIC 2	BB NAIC 3	B NAIC 4	<B NAIC 5	NAIC 6	CRE
BB	0.20%	0.33%	0.80%	9.23%	81.11%	3.82%	0.93%		3.58%
NAIC 3			1.66%	11.53%	74.73%	7.37%	1.53%	0.61%	2.57%

Year-End Rating

282

One-Year Migration in Rating - Internal Rating versus NAIC (NR-Adjusted)
From B or NAIC 4 at the Beginning of the Year
Less Likely to Uprade to BB but Also Less Likely to Downgrade to <B

	AAA	AA	A NAIC 1	BBB NAIC 2	BB NAIC 3	B NAIC 4	<B NAIC 5	NAIC 6	CRE
B	0.13%	0.31%	0.98%	4.87%	6.44%	79.20%	2.11%		5.97%
NAIC 4			2.06%	2.32%	10.25%	66.34%	10.08%	2.67%	6.28%

Year-End Rating

One-Year Migration in Rating - Internal Rating versus NAIC (NR-Adjusted)
From <B or NAIC 5 at the Beginning of the Year
Less Likely 'Downgrade' to CRE

	AAA	AA	A NAIC 1	BBB NAIC 2	BB NAIC 3	B NAIC 4	<B NAIC 5	NAIC 6	CRE
■ <B	0.62%	0.15%	1.88%	2.18%	3.34%	10.12%	75.49%		6.23%
■ NAIC 5			1.14%	2.81%	1.36%	9.79%	64.18%	9.16%	11.56%

Year-End Rating

284

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