1986–92 CREDIT RISK LOSS EXPERIENCE STUDY: PRIVATE PLACEMENT BONDS

ASSET RISK EXPERIENCE COMMITTEE AND PRIVATE PLACEMENT SUBCOMMITTEE

EXECUTIVE SUMMARY

The 1986–92 Credit Risk Event (CRE) Loss Experience Study represents a continuation of the 1986–89 pilot study analyzing 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 thirteen institutional investors, which accounted for between 34% and 42% 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 1986–92. 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.

Although the years 1986–92 cover a substantial fraction of an economic cycle, the period is relatively short and 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 increased almost two-fold between the periods 1986–89 and 1990–92, not surprisingly given the 1991–92 recession.
● Over the period studied, private placements rated investment grade at the start of the experience year had loss experience similar to public bonds. Although investment grade privates experienced greater incidence or default rates, they had better loss severities than public bonds on average, leaving loss rates about the same.
● Below investment grade private placements, especially those which had a most recent quality rating of 'B' or below, offered superior experience with respect to all of incidence or default rates, loss severities, and economic loss rates relative to public bonds.

---

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

○ Internal credit ratings and National Association of Insurance Commissioners (NAIC) ratings are credible in that experience by both internal rating and NAIC rating tracks the well-documented experience of public bonds.
○ Individual CRE loss severities are widely distributed and thus hard to predict.
○ Restructurings appear to carry lower loss severities than defaults on average.
○ Incidence rates vary by the number of years since asset funding (issuance) in a sensible fashion.
○ Fears that below investment grade private placements carried 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.

The remainder of this executive summary describes these results in 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 of 1986–92 followed a significant economic recession (1981 to 1982) and subsequent rebound (1982 to 1984) followed by declining relative growth rates through essentially 1989. From 1990 through 1991, the economy experienced a general recession, one which affected virtually all sectors of the economy and all business groups. Additionally, during the mid-to-late 1980s, there was a growth in investible cash flows in both the public and private bond sectors, with investors looking to maximize yields in a fairly stable to declining interest rate environment. Average annual economic loss rates on corporate debt generally were relatively low through 1989, but then rose rapidly during the recession and debt shakeout of the early 1990s. The results of the current study essentially track the general economic environment in which investors were operating.

From 1986 to 1988, both overall loss experience and incidence rates declined, but beginning in 1989, both measures began to grow, as depicted in Figure 1. Incidence rates, the primary driver of economic loss rates, continued to increase through 1992, with a doubling in the rate from 1990 to 1991. Over the full period 1986–92, loss severities averaged 36%, and annual averages were usually not far from this value. Based only upon anecdotal evidence at this time, we expect that, when data for the period following 1992 is added to the study, such data will demonstrate that incidence rates plateaued in 1992 and then fell back through 1994.[2]

Other key results and observations from the body of the study include the following (Figure 2):

[2]Requests for data for 1993 and 1994 have been sent to various institutional investors. The Society of Actuaries expects that a study covering 1986–94 will be released during 1997. Participation is welcome and encouraged.
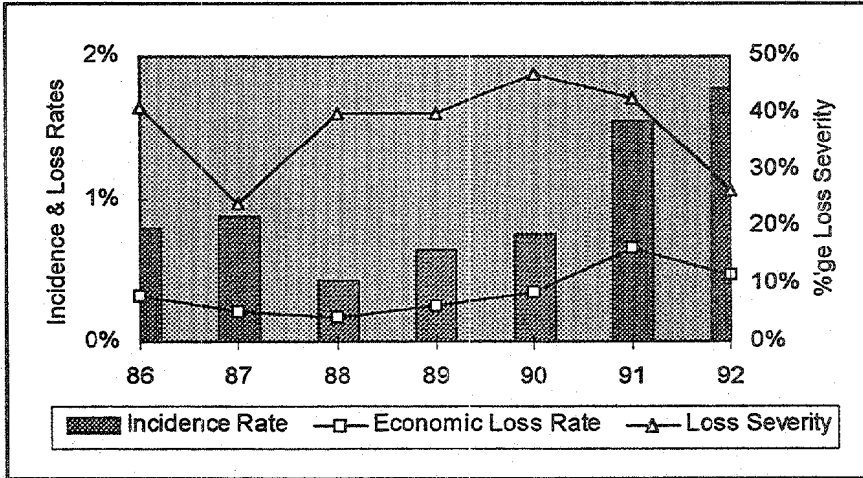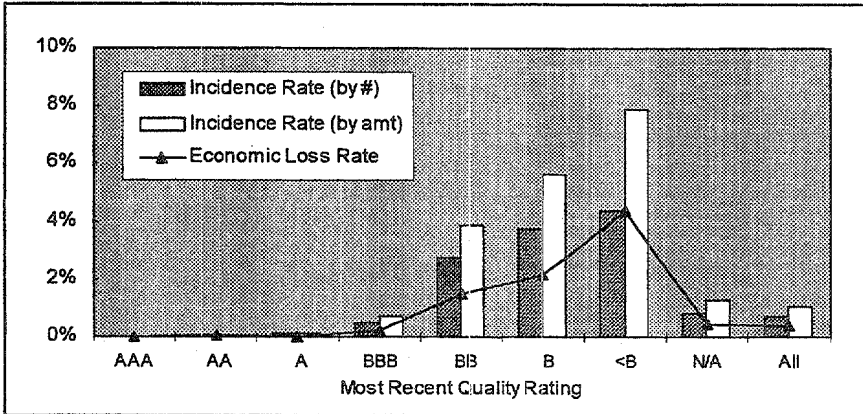
FIGURE 1

FIGURE 2

⚫ 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 were low, but rose steeply for below investment grade assets. However, no clear relationship between loss severities and ratings was evident.

○ The study compares results for private placements to results of studies of public bond default experience.[3] The motivations behind this comparison are:

— public bond studies have been the foundation, to date, of most investors' intuition about corporate debt risk in general;
— the sense that private placements offer additional protection to investors;
— regulatory and rating agency treatment of private placements has been modeled on public bond experience; to the extent that private placement experience differs, this would be a useful input into the regulatory and rating agency risk capital processes.

Highlights from the comparison between private and public bond experience include:

— Public bonds lost an average of 116 basis points annually through defaults while the sample of private placements lost 39 basis points annually. Even adjusting for differences in portfolio quality distribution between the two, private placements' economic loss rates were better by 21 to 41 basis points depending on the measure used.
— The better overall loss experience is partly due to better average loss severities, which are around 36% for privates and 60% for public bonds, although this is not the whole story.
— For investment grade bond, incidence rates are higher on privates but severities are lower, making overall private and public loss experience similar. For below investment grade bonds, especially for those rated B and below, both incidence rates and severities are better for privates, leading to substantially better average economic loss rates.
— Variations in loss rates across ratings are driven largely by variations in incidence rates. The pattern of loss rates shown in Table 1 is similar to the pattern of incidence rates.

[3]Sources for public bond default information include: Robert A. Waldman, Christopher P. Kane and Edward I. Altman, "Recoveries on Defaulted Bonds: By Industry and Debt Seniority," Salomon Brothers High Yield Research, March 26, 1996; "Corporate Defaults Level Off In 1994," Special Report, Standard & Poor's *Creditweek*, May 1, 1995, pp. 45–59; "Corporate Bond Defaults and Default Rates 1938–1995," Special Report, Moody's Investors Service, January 1996, pp. 2–37.

TABLE 1

PRIVATE AND PUBLIC ECONOMIC LOSS RATE ESTIMATES (BASIS PTS.)

Basis	Economic Loss		
	Public	Private	Difference
Aggregate unadjusted	116 bps	39 bps	77 bps
Public estimated based on private sample quality distribution	60	39	21
Private estimated based on public sample quality distribution	116	75	41

— Loss severities were sensitive to priority in bankruptcy. Higher-priority bonds had significantly 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 (Figure 3). Additionally, overall private placement incidence rates are lower than public default rates in most years, as reported by both Moody's and Standard & Poor's in their annual default studies.[4] The superior economic loss results are partly due to relatively higher average quality of the private placement sample compared to the public bond universe, but even compensating for this difference the performance of private placements is better.

FIGURE 3

○ About 60% of CREs occur for assets which were originated during the last
  half of the 1980s and about 80% of CREs occur within seven years of the
  funding date (Figure 4). These facts are to be expected given the general terms
  of private placements (predominantly seven year average lives and amortization
  schedules which may generally begin around five years from funding).

FIGURE 4
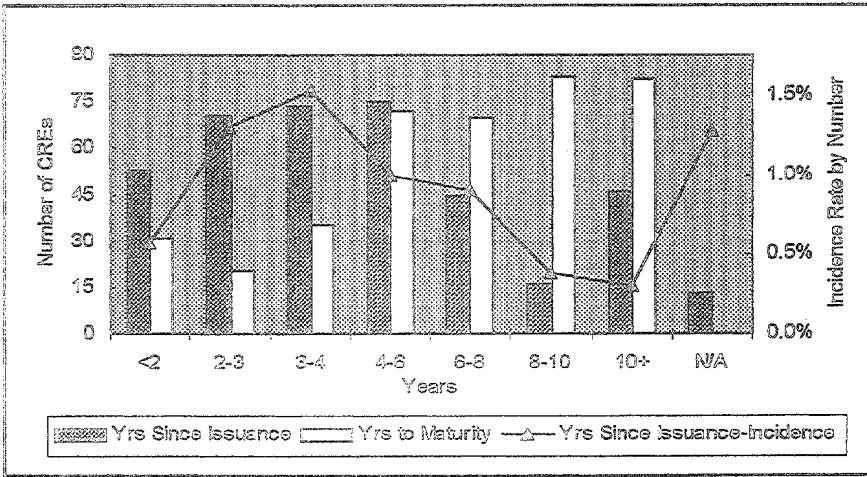
○ Of the 393 CREs in the study, defaults were the most frequent CRE type
  (272 CREs), followed by restructurings (91 CREs), distress sales (19 CREs)
  and unreported (11 CREs). Defaults and sales resulted in average loss sever-
  ities for the sample of 45% and 47%, respectively, while restructurings re-
  sulted in only a 24% loss severity. These results appear to imply that on
  average, the effort involved in restructurings is worth the cost.[5]

   In summary, the 1986–92 Credit Risk Event Loss Experience Study presents
data for the private placement industry which the investment community can
use to better understand the risks of investing in this asset class relative to public
bonds and other asset classes. This study presents a quantitative and statistical

---

[5]However, the ultimate fate of many restructurings analyzed in this study is not yet known. In
this study, once an asset has experienced a CRE, it is not eligible to experience another CRE.
Revisions to estimates of the cash flows resulting from the restructurings are tracked, but all res-
tructurings in the study have yet to fully play out.

framework in which both actuaries and investment professionals alike can understand and utilize in their analysis of private placement portfolios. The Society of Actuaries has already begun the next part of this continuing study and welcomes input and participation from the investment community. As more data are collected and analyzed, it is anticipated that the conclusions and analyses which are presented in this study will be further refined.

I. INTRODUCTION

A. *Background*

This is a report on the study of credit risk experience of private placement bonds from 1986 to 1992. It covers new data gathered in respect of 1990 through 1992 and incorporates updates of the 1986–89 experience. As such, it is complete in itself, without the reader having to refer to the pilot study report for those earlier years.

The report consists of four 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 Data Summaries, which present the 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, and a more in depth commentary than is given in this introduction about the economic landscape before and during the study's observation period.

The 1986 through 1989 study of the 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 for definition). This study was initiated by the Society of Actuaries (SOA) in cooperation with the ACLI and represents a joint effort of actuaries and investment professionals.

Commercial mortgage loans and private placement bonds represent a significant portion of fixed-income securities owned by life insurance companies. The ACLI estimates that in 1992, such assets represented approximately 31.6% of the general account assets held by life insurance companies. Private Placements alone represented 15.7%. In spite of substantial holdings, there is no published, industrywide, direct data from which default loss experience or, more importantly, the economic loss from CREs related to these securities can be assessed. Consequently, disciplined study of insurance

company commercial mortgage loans and 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 database 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 them is limited. The evidence strongly suggests otherwise (please see "comparison with public bond experience" in the Analysis and Commentary section of this report).

The insurance business has changed and continues to do so, both with respect to the types of products sold and in the way premiums are invested. The economic environment also has been transformed and provides substantial investment challenges. In the 1980s, 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 CREs of 1986 through 1992, 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 inflation, high interest rates, the rolling recession, changes in the tax law and demographics all combined during the 1980s to impact delinquency rates. These trends culminated in the recession and debt shakeout of the beginning of the 1990s. Appendix III, 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 primary 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 CREs. 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 database 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.

Because the study period covers only a portion of one full economic cycle, and a rather unusual one by past standards at that, the results contained in this report must be interpreted very carefully. In particular, although the Private Placement Committee believes the results presented provide a reasonably accurate picture of the credit risk event loss experience during 1986 through 1992, the implications for future experience are less clear. Although some relationships are becoming evident, it is anticipated that the ongoing study, providing results over a longer period of time, will be better able to identify or clarify such implications and provide information of significant value.

B. Goals of the 1986–92 Study

Having successfully met the goals of the 1986–89 study,[6] 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 experience study in respect of Private Placements are to:

a. to compile a reliable, accurate database of credit risk events and associated exposures, on a ''cash to cash ''basis;

---

[6]The goals of that study were, in the first instance, to assess whether a major experience study of this kind could be designed and implemented and whether companies would be ready to support the project. Also, a goal was to generate interest and support for the ongoing study. Of course, another key purpose was to provide information about the credit risk experience of private placements (and commercial mortgages) over the study period.

b. to continue to develop and refine the design of the study and the definition of the data to be collected;
c. to provide information about the incidence and severity of credit risk events and the economic loss resulting from them;
d. to perform analyses and develop insights into the behavior of private placement credit risk in relation to various parameters and environmental variables;
e. to stimulate further thinking and research into credit risk behavior.[7]

C. Data Contributors

Eleven companies contributed data for the 1986–89 experience years while nine companies contributed to the 1990–92 experience years. The Society of Actuaries thanks those companies for their efforts in supporting the private placement bond study.

Eight of the companies that contributed private placement data for the 1986–89 period contributed data applicable to the entire study period. However, three of them did not contribute data for the first two years of that initial period (that is, 1986 and 1987). All nine contributors to the 1990–92 experience provided data for that entire period, and seven of them were also contributors to the 1986–89 period. Therefore, while data continuity by contributor is not perfect, it is on the whole reasonable.

The companies that contributed data to the study are listed in Table 2.

In contributing data to the 1990–92 period, one company retroactively contributed data for some of the earlier period. However, the earlier period data of the study were also revised to reflect updated information submitted by the original contributors to the Pilot Study.

The total amount of outstanding principal in the 1986–92 study is summarized in Table 3. It is also compared to the aggregate estimated outstanding Private Placements held in life insurer general accounts. Finally, the table displays the number of CREs experienced by contributors year by year, and the exposure related to those CREs.

---

[7]In this regard, the Society of Actuaries notes that the individual data collected 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 done 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.

TABLE 2

ASSET RISK PROJECT CONTRIBUTING COMPANIES
PRIVATE PLACEMENT BONDS

Company	1986–89	1990–92
Aetna	✓	✓
Great-West Life		✓
John Hancock	✓	
Lutheran Brotherhood		✓
Metropolitan	✓	✓
Nationwide	✓	✓
New England Life	✓	
Principal Financial	✓	✓
Prudential	✓	✓
SAFECO	✓	✓
Sun Life	✓	
TIAA	✓	✓
Washington Square Capital	✓	

TABLE 3

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	$49.5	$147.5	34%		
1986	51.8	153.4	34	53	$397.0
1987	58.8	155.1	38	56	457.2
1988	66.7	172.9	39	35	263.2
1989	70.9	195.0	36	42	445.0
1990	88.6	201.8	44	39	552.8
1991	90.7	215.1	42	90	1,334.9
1992	90.4	223.8	40	78	1,591.4
1986–1992				393	5,041.5

* Source: ACLI estimates.

The reader may notice that the outstanding principal figures shown in the table do not agree with the aggregate exposure figures for the corresponding years as shown 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 year-end statistics.

D. Basic Model

The model used for the study was the so-called incidence and severity model. The underlying concepts are defined in the Appendix. In general, incidence[8] refers to the number of times that an event occurs over a given time period out of all possible occurrences (that is, the probability that the event—in the present case a CRE—occurs) while severity describes the loss sustained given that the CRE has occurred. Multiplying incidence by severity gives the economic loss per unit exposed. That 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, to capture all losses from credit risk, with the sole exception of loss from sale after rating deterioration but not to the point of danger or near term danger of failure to pay. It thus encompasses default, failure to pay, sale to avoid default, restructuring to avoid default, and bankruptcy.

For readers familiar with insurance or actuarial models, the conceptual basis to formulate this study was that of disability insurance. The parallels between a disability policy and the life cycle of an investment are quite striking. Just as an individual is underwritten prior to the issuance of a policy, a bond or mortgage loan is underwritten at its origination. A policyholder may or may not become disabled while the policy is in effect. Likewise, a bond or loan may or may not suffer from some condition that impairs it. A person on disability may remain disabled and draw benefits, become healthy and get off of disability, or die. An investment may remain "ill" and pay off at a lesser rate, return to a healthy status and pay off at its original rate, or terminate, which will result in default or foreclosure.

For disability insurance, various parameters need to be observed in order to calculate the price to be paid for the risk assumed. For a private placement bond or commercial mortgage, a basis point spread over Treasuries for the

---

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

interest rate on the loan is the price to be paid, and various parameters are important in determining that price.

By collecting a sufficient amount of experience, incidence rates, economic losses, loss severities, and portfolio losses can be calculated and their relationship to observed parameters analyzed. 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 economic losses and loss severities over the life cycle of the investments.

E. Appendix—Technical Description of Methodology

Appendix I to this report gives the definition of CRE, the definitions of date of CRE 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.

Appendix I 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. Change in Discounting Method (compared to the Pilot Study)

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) has been refined, compared to the Pilot 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, that spread is varied also on the basis of quality rating at the date of the CRE (for revised cash flows or RCFs) and original quality rating (for original cash flows or OCFs) 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 1986–89 therefore differ from the Pilot Study for two reasons:

1. the updating of the data by contributors, and
2. the change in the discounting method

The impact of the change in discounting methodology was to reduce the present value of revised cash flows in respect of the CREs in the 1986–89 study by 4.5% while the value of the corresponding original cash flows reduced by 3.3%. On the other hand, the updating of revised cash flows by the contributors resulted in an increase of 11.8% in respect of the 35 CREs so updated, out of 179 total CREs in that study. The combined impact of the changes on the present value of revised cash flows for all 179 CREs was to increase them by 0.9%. Since the value of RCFs increased slightly while that of the OCFs decreased, the net result was an upward revision of the loss severities and economic losses per unit of exposure compared to the 1986–89 study, as follows:

○ no material change for 1986 and 1987
○ the economic loss per unit of exposure increased from 0.15% to 0.17% for 1988 and from 0.22% to 0.26% for 1989

G. Limitations of the 1986–92 Study

Although the Private Placement Committee believes the 1986–92 study makes a significant contribution to a better understanding of the economic loss resulting from CREs, there are limitations to the study that should be noted to minimize possible misinterpretation and misuse of the study results.

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

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 it is possible to achieve, ultimately the quality of the data depend 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, which is always a hazardous process. For that reason, the Committee has less confidence in the analysis of experience by earliest quality rating.

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. Until a few more years of data are collected to encompass at least one full economic cycle or more, the value of the 1986–92 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.

Though not shown to protect contributor confidentiality, results do vary by company, suggesting that material differences may exist in company risk tolerance standards and perhaps risk assessments.

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 best set risk premiums.

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

As this report is being published, the Society of Actuaries has already received data contributions from thirteen companies in respect of the 1993–94 period and is hoping to obtain data from several more. The Private Placement Committee expects to publish its report on the 1986–94 experience in about one year's time. Thereafter, we will strive for an annual data collection cycle, and update reports at least every two years. 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.

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 database, the more reliable and valuable the results. 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.

II. 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 section III, which 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). Results that appear *only* in the current section include comparisons with public bond experience, breakdowns by the seniority of placements, experience by type of CRE, and certain distributions of loss severities. Results appearing *only* in section III include credit risk experience by original coupon rate and years to maturity. Where there is overlap, the most detailed tables usually appear in the next section.

The main statistics reported in this study, definitions of which are summarized in Table 4, differ somewhat from the default and recovery rate statistics that are familiar from public bond default studies. Public bond studies typically compute default rates as the number of bonds appearing in a given cell that default over some period of time, divided by the total number in the cell. A cell might include all A-rated bonds outstanding at the beginning of 1985, for example. 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. As trading price data are often unavailable, it is rarely

TABLE 4

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 occurring 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.

possible to compute default and severity rates for the exact same set of public bonds. 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 versus book value differences; see Appendix I).[9] However, in this study, severities are available for *every* CRE, making it possible to compute consistent economic loss rates for any subsample and to partition

---

[9]Such statistics are economically similar to public bond loss severities if the market for distressed public bonds is very efficient, as the post-default bond trading prices may then be viewed as estimates of recoverable cash flows. The efficiency of the distressed debt market is an open question, however.

the loss into default 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.

Results in this study represent experience for traditional or non-Rule 144A private placements. Rule 144A, which facilitates trading of qualifying placements among institutional investors, was adopted by the SEC in April 1990, but the number of 144A issues did not become substantial until 1992 and thereafter. Especially in more recent years, many 144A issues have been similar to public bonds and have been bought by investors' public bond departments, so the distinction may become important to future analyses.

B. Aggregate Private Placement Experience Over Time

The economic loss rate on the aggregate sample private placement portfolio during 1990–92 was approximately double that during 1986–89. Annual percentage loss rates appear in Figure 5 (in 1986, for example, the aggregate of participating company portfolios lost about 32 cents per $100 invested, or 0.32 percent, or 32 basis points). The simple average of these

FIGURE 5
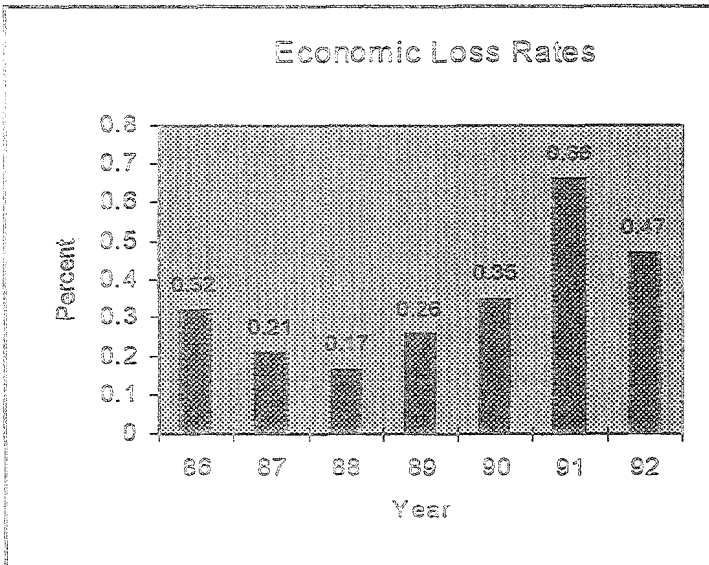
annual rates is 0.24 percent for 1986–89 and 0.49 percent for 1990–92; over all years,[10] the loss rate averaged 0.37 percent. A jump in loss rates in the early 1990s is to be expected given the recession that occurred and the large volume of defaults in corporate debt markets generally.

Economic loss rates rose because incidence rates rose, not because loss severities were worse during 1990–92. Figure 6 displays incidence rates computed both as the number of assets experiencing CREs relative to the total number and as the dollar volume experiencing CREs relative to the total amount exposed. Incidence by dollar amount is higher than that by number in each year (though often not by much), indicating that assets experiencing CREs had larger than average dollar amounts outstanding. Incidence rates approximately doubled in the 1990s by both measures. In contrast, average loss severities (cents lost per dollar of assets experiencing CREs) were close to 40 percent in most years and averaged 36 percent (Figure 7). They show no time trend.

FIGURE 6
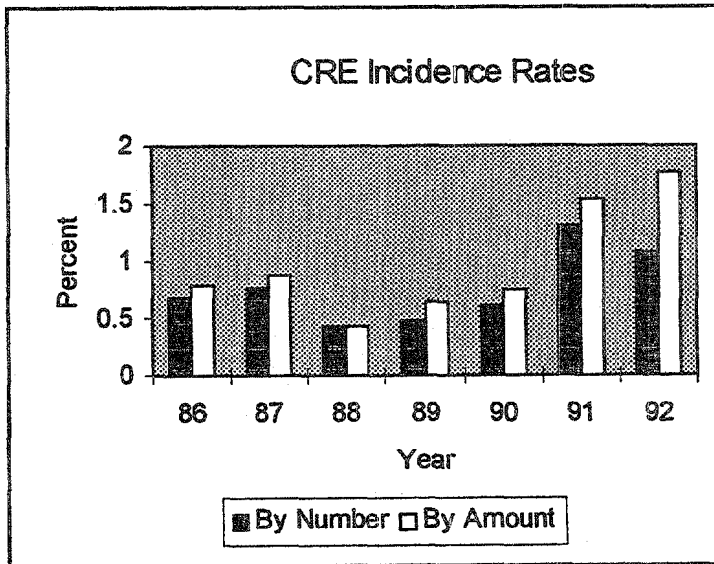
[10]The sample was split into the periods 1986–89 and 1990–92 for this comparison both because economic conditions differed in the two periods and because the Pilot Study covered the period 1986–89.

FIGURE 7
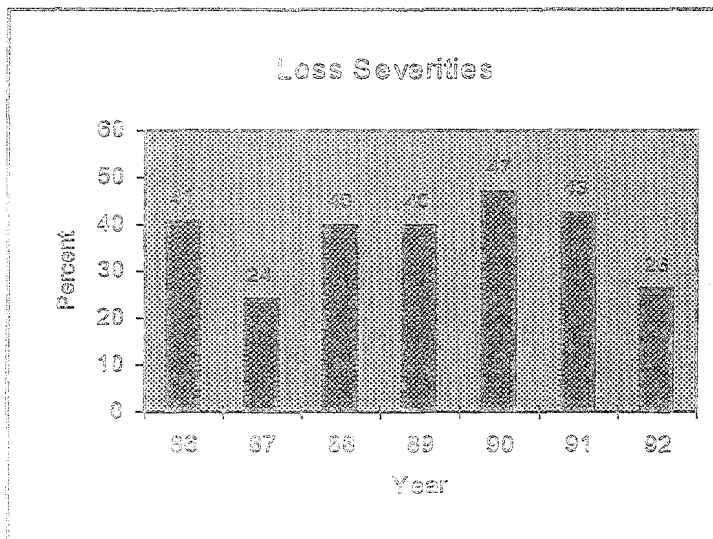
The apparent low variance of average loss severities from year to year does not imply that severities for individual bonds are highly predictable. In fact, they are widely distributed and thus rather unpredictable, as shown in Figure 8, which displays the distribution for all CREs. Experience with private placements in this regard is rather similar to public bond experience, as public bond severities are also widely distributed.[11] The significant fraction of negative severities displayed in Figure 8 is atypical of public bonds, however (31 of 393 assets experiencing CREs had recoveries greater than 100 percent and thus these CREs yielded gains). 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

[11]See "Corporate Bond Defaults and Default Rates 1970–94," *Moody's Investors Service*, January 1995.

FIGURE 8
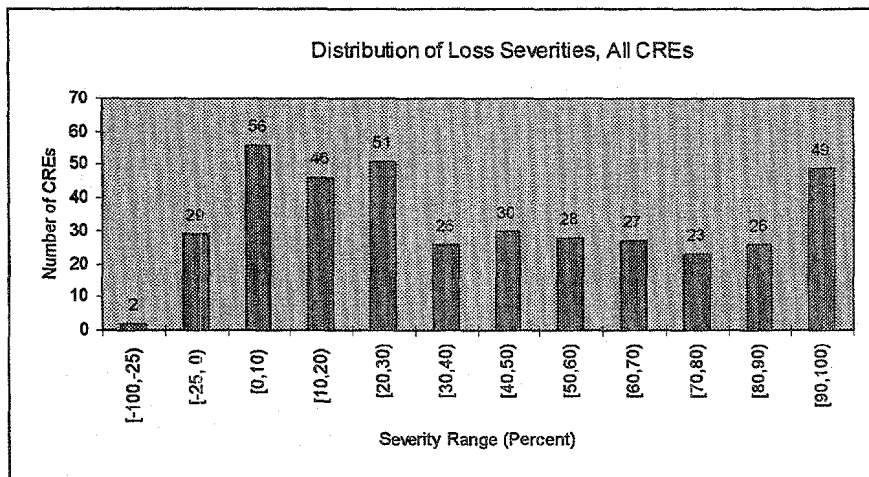
nominal total of original cash flows). Although some negative severities may be due to data errors, those CREs having negative severities were audited especially closely, and thus in general such CREs likely did result in a genuine economic gain to the investor.[12]

C. Experience by the Investor's Internal Credit Risk Rating

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

Experience by most recent internal rating (that is, rating as of the start of each portfolio year) is summarized in Table 5 and Figure 9. Average incidence and economic loss rates were low for assets with the equivalent of investment-grade ratings (AAA through BBB) during the period 1986–92

---

[12]We dropped from the study four CREs having severities less than −1 (recovery > 200%). The data for these CREs appear to involve reporting errors, but the problems could not be resolved by the time of publication. Also dropped was one 1987 CRE that was very large in terms of amount outstanding at the time of the CRE (though not large in loss); this CRE was also omitted from most computations in the Pilot Study. As noted, some data errors may remain.

TABLE 5

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	0.04	76	0.03
A	0.10	0.09	24	0.02
BBB	0.48	0.71	33	0.24
BB	2.76	3.89	39	1.50
B	3.74	5.66	38	2.16
<B	4.38	7.91	55	4.36
Unknown	0.83	1.29	32	0.42
All	0.74	1.04	36	0.37

n.c. means no CREs

FIGURE 9
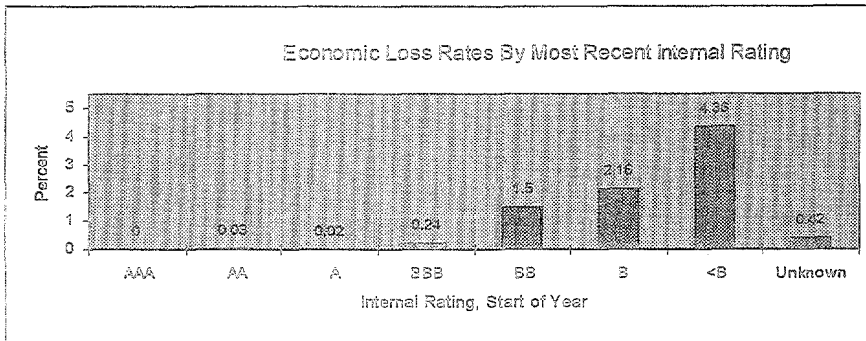
but rose steeply in the speculative grades. No clear relationship between loss severities and ratings is evident, however. Severities are between 24 and 39 percent except for the very high ratings (where the number of CREs is small and the averages likely noisy) and for the lowest rating. The number of CREs in the latter ($<B$) category is large enough (39) to make the average severity estimate (55 percent) credible. It may be that compared to bonds that move from normal to CRE status relatively rapidly, those that spend a substantial amount of time in a near-default state experience higher severities. Perhaps the borrower's assets are dissipated in the interim, or perhaps such CREs are somehow different in character.

D. Comparison with Public Bond Experience

This study's comparison of public bond and private placement experience has four motivations. First, studies of public bond defaults have to date been the foundation of 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 any incremental value, some light is shed on the subject. Third, recent 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, as a number of technical factors complicate the conduct and interpretation of the analysis. Table 6 presents various estimates of public bond and private placement economic loss rates (drawn or computed from Tables 7 and 8 below). During 1986–92, 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 39 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 6 shows the estimated loss rate for a portfolio of public bonds with the same start-of-portfolio year rating distribution as the private sample (60 bps), whereas the third row shows the estimated private loss rate for a portfolio of privates with the same rating distribution as publics (75 bps). The public-private loss difference is not the

TABLE 6

VARIOUS ESTIMATES OF PRIVATE AND PUBLIC ECONOMIC LOSS (BASIS POINTS)

Basis	Economic Loss		Difference
	Public	Private	
Aggregate unadjusted	116 bps	39 bps	77 bps
Public estimated based on private sample quality distribution	60	39	21
Private estimated based on public sample quality distribution	116	75	41
Memo: Private estimated based on public sample quality distribution, public estimated using private loss severity	70	75	−5

TABLE 7

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 basis
86	41	0.59%	0.35%	31	0.85%	0.35%	1.93%	1.57%	1.16%
87	55	0.85	0.24	37	1.07	0.24	0.98	1.10	0.59
88	30	0.39	0.14	22	0.57	0.14	1.48	1.05	0.89
89	40	0.50	0.27	33	0.80	0.27	1.56	1.75	0.94
90	39	0.60	0.35	33	1.03	0.35	2.81	2.25	1.69
91	89	1.28	0.65	71	1.98	0.65	3.33	2.15	2.00
92	78	1.08	0.47	57	1.72	0.47	1.39	0.56	0.83
All	372	0.75	0.39	284	1.13	0.39	1.94	1.49	1.16

*The total number of CREs in Panel A is 372 rather than 393 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.

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.[13]

[13]Loss rate differences in rows 2–4 of Table 6 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 numbers outstanding would alter market-portfolio loss differences. Unfortunately, dollar outstandings by rating are very hard to estimate for public bonds. In row 2, the private statistic is effectively dollar-volume-weighted as it is this study's standard economic loss statistic, whereas the public statistic is based on number of issuers. If the public market were postulated to behave the same way as private placements, namely that the 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 particular source of bias.

TABLE 8

PUBLIC VERSUS PRIVATE EXPERIENCE IN DETAIL

Most Recent Rating	A: Private Placement Statistics by Issuer, All CRE Types			B: Private Placement Statistics by Issuer, Defaults Only			C: Public Bond Statistics		
	Number of CREs	Incidence by Number	Economic Loss Rate	Number of CREs	Incidence by Number	Economic Loss Rate	Default Rate		Average Loss Rate
							S&P	Moody's	S&P basis
AAA	0	n.c.%	n.c.%	0	n.c.%	n.c.%	0.00%	0.00%	0.00%
AA	3	0.13	0.03	2	0.09	0.02	0.00	0.04	0.00
A	10	0.21	0.01	7	0.15	0.01	0.05	0.00	0.03
BBB	47	0.70	0.26	37	0.55	0.22	0.32	0.26	0.19
BB	53	3.55	1.53	36	2.41	1.14	1.39	2.42	0.83
B	44	5.54	2.66	36	4.53	2.27	6.62	9.34	3.97
<B	23	5.45	5.53	17	4.03	3.77	23.71	n.r.	14.23
Unknown	104	1.41	0.53	81	1.10	0.44	n.a.	n.a.	n.a.
All	284	1.13	0.39	216	0.86	0.31	1.94	1.49	1.16

Note.—n.c. means no CREs for that rating; n.r. means not reported by Moody's; n.a. means not applicable for public bonds.

The better overall loss experience of privates is partly due to their better average loss severities, which as noted are around 36 percent, whereas the average public loss severity is around 60 percent. In row 4 of Table 6, the private loss estimate is on the same basis as row 3 but the public estimate is based on an assumed loss severity of 36 percent. This reduces the public loss rate to 70 bps, about the same as the private rate. The reasons for differences in loss experience are discussed in more detail below—better severities are not the whole story.

On the whole, the statistics in Table 6 probably understate the superior loss experience of privates relative to publics. There are many reasons to question the comparability of the estimates, but perhaps the most important is that experience of bonds rated below CCC is not included in the public loss estimates whereas the private estimates include all sample bonds. Very low-rated bonds have relatively high loss rates and, as discussed below, default rates on such bonds may be higher in the public than in the private market. Thus the estimates may understate losses on all publics.

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 4), 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 analyzes incidence at the level of individual *assets* on individual 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 this choice of level of aggregation. For maximum comparability, incidence rates by number for private placements were produced on an issuer basis.[14] As 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.

In addition, 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. Although distressed exchanges do occur in the public market, they are relatively infrequent and often different in character than private placement restructurings. However, it is not clear whether sales and restructures should be included in private incidence rates that are compared to public bond default rates. 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 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. 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 value.

For comparison with private rates, one-year average default rates computed from public bond studies published by both S&P and Moody's are presented.[15] Those studies include in their aggregate statistics experience for years before 1986 and after 1992. As corporate defaults vary substantially with the state of the economy, however, average one-year public bond

[14]Although issuers are not identified by name in the dataset, each asset is identified by a Private Placement Number (PPN) or Cusip. These identifiers are structured similarly (both are assigned by the Cusip Service Bureau), with the first six characters identifying the issuer, allowing us to aggregate assets across company portfolios at each year-end to an issuer basis.

[15]Moody's, *op. cit.*; and Standard & Poor's *CreditWeek*, "Special Report: Corporate Defaults Level Off in 1994," May 1, 1995.

default rates for the period 1986–92 are presented here. It should be noted that S&P's and Moody's study results are themselves not directly comparable, as they are derived from different databases. Moody's includes sovereign debt and structured financing instruments whereas S&P does not. In addition, S&P's ratings are nominally focused purely on probability of default, whereas Moody's are said to incorporate likely recoveries. Although an S&P BBB is often thought of as equivalent to a Moody's Baa, for example, ratings on individual bonds can differ due to this difference in philosophy as well as for idiosyncratic reasons. Moody's and S&P's aggregate distributions of bonds by rating differ significantly in each year, with Moody's generally having proportionately more bonds in higher ratings.[16]

Results for Incidence Rates and Economic Loss

Panels A and B of Table 7 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 an approximate doubling of incidence rates in the early 1990s still appears (simple averages are 1986–89, 0.84 percent; 1990–92, 1.58 percent). The 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 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 versus issuer level of analysis.

---

[16]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, three 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 public bond studies an issuer's rating is usually that on its senior debt. If no senior debt rating is available, one is inferred by adding one or two notches to the subdebt rating (for example, an A-subrating translates into an A issuer rating). Data for this study include information on seniority only for the years 1990–92, and in addition internal ratings of the same issue can differ across investors. For this section's analysis only, where a given issuer had placements outstanding with different ratings, we used the higher rating unless the difference was more than one full grade, in which case a value of 'unknown' was assigned.

Panel C of Table 7 shows public bond default rates derived from S&P's and Moody's studies and an estimate of associated economic loss rates. The latter were computed by multiplying the S&P-based default rates by a constant public bond loss severity of 60 percent, which is very close to the overall average severity reported by Moody's. The estimated economic losses are based on S&P's rather than Moody's ratings for three reasons. First, S&P's study includes experience for bonds rated CCC whereas Moody's includes only those rated B or better. As shown below, CCC experience appears to represent a significant part of overall public bond losses. Second, as noted, Moody's sample includes a substantial number of sovereign and structured finance securities and thus is less comparable to the private placement sample. Finally, S&P ratings are nominally pure default ratings and thus are perhaps more suitable for combination with loss severities in the rating-by-rating analysis shown below.

Estimated private placement economic loss rates are lower than public rates in every year and on average, and private incidence rates are lower than both Moody's and S&P's default rates in most years. It may appear that private placements' superior loss experience arises at least partly due to better incidence rates. However, the distribution of the private sample (which is likely representative of all privates) across ratings differs substantially from the distribution in the public market, as shown in Figure 10. Proportions are similar for assets rated A and above, but there are proportionately more BBB-rated privates versus more BB and B-rated publics. As default rates are higher on the latter, private placements should naturally have a lower incidence rate than publics on average. An examination of rates by rating category is therefore helpful.

FIGURE 10

Distributions of Numbers of Privates and Publics by Rating
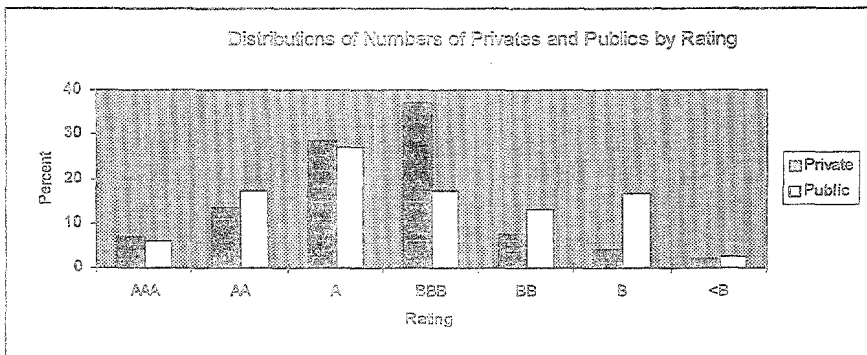
Incidence and loss rates by most recent internal rating for privates and agency ratings for publics appear in Table 8. These are weighted-average one-year rates averaged over 1986–92. Panel A shows private placement statistics when all CREs are included, Panel B such statistics when only defaults are included, and Panel C public bond default rates. Private incidence rates are of course smaller when only defaults are included, and proportionately rather substantially so (by about 15–30% in general). Loss rates are only somewhat smaller, however, because the restructurings that are omitted from Panel B have lower average severities than private defaults (discussed further below).

Private placement incidence rates are higher than public bond default rates for all but the B and <B grades, and perhaps the BB grade. Comparing Panels B and C, for the investment grades the incidence rate differences are in the range 0.09 to 0.29 percentage points, which is absolutely rather small but proportionately substantial. For the BB category, the private placement default rate is about 1 percentage point higher than that computed from the S&P study but about the same as that from Moody's study. The private default rate is 2 to 5 percentage points lower for B, and nearly 20 percentage points less for bonds rated less than B.[17]

---

[17]The next-to-last row of Table 8 reports statistics for sample private placements for which no internal rating was reported. These account for 29% of private exposure units. As the incidence and loss rates for the unknown-rating pool are somewhat higher than the overall average (in which they are included), 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 10, which therefore understates somewhat the proportion of all privates that is below investment grade. Omission of the unknown does not bias the comparisons in the second through fourth rows of Table 6, however.

That some sample private ratings were not reported has different implications for public-private comparisons than the omission of unrated and especially very low-rated bonds from the public-market statistics. The unknown-rating privates are included in overall loss experience values, so such values are representative of all private experience to the extent the portfolios of the companies contributing to this study form a representative sample. However, the omission of some low-rated bonds from the public statistics in effect imparts a bias. In panel C of Table 8, the S&P-based default rate of 23.71% for bonds rated <B includes only CCC-rated public bonds—those rated CC and C are not included as no experience for them is reported in S&P's study. Even if CC and C default rates are no worse that CCC rates, the omission of CC and C bonds means the overall average loss rate is biased downward as an estimate of experience for all public bonds. Thus relative private experience is likely even better than shown, as CC and C quality placements are in the private averages.

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, all differences are statistically significant in that they exceed two standard deviations (except default-only private incidence and Moody's public default rate for the BB rating), 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− likely differs significantly in default probability from a BB+).

There appear to be three major possible explanations for the higher private default rates at the higher ratings and lower at the low ratings. First, the internal rating systems at participating companies may not be pure default ratings, but rather may be on an expected loss basis (i.e., expected loss severities are incorporated). Even though Moody's ratings are said to incorporate loss severity considerations, average severities are lower on private placements. Thus overall loss rates by rating may be similar across the markets even if default rates on privates are higher. Table 8 shows that overall loss rates are indeed similar for the investment grades, with public and private results differing by no more than 0.03 percentage points. Differences are substantial for the below investment grade ratings, however, so this explanation is not wholly adequate.

Second, 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. Third, 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.[18]

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

[18]A possible technical reason for the pattern of results, our practice of assigning the higher rating to an issuer when ratings of different assets of that issuer differ by a single full grade, appears not to be of great significance. 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 amounts in the same range for B and below.

the lower grades. Although private default rates are higher, as noted there is a remarkable similarity in public and private economic loss rates for the investment grades. Only for the BB, and possibly the BBB, categories is there evidence that private rating scales might be more optimistic than public, and the opposite is true for the B category.

Loss Severity

Table 9 presents average severities on public bond defaults for 1986–92 as well as average severities on privates.[19] These statistics must be interpreted with special care because the statistics for public bonds do not cover all defaults, but only those for which adequate post-default trading price information was available. 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. They should be good estimates in a world of frictionless, perfect capital markets, but markets are not perfect, and the nature and degree of imperfection may be important in this case.

Overall, public bond severities averaged 60% whereas private placement severities averaged 36%, a striking difference of 24 percentage points. When only private placement defaults are considered, the average severity rises to

TABLE 9

LOSS SEVERITIES, PUBLICS AND PRIVATES (PERCENTAGE)

		Private Placements	
Subsample	Public Bonds	All CREs	Defaults Only
Whole sample (1986–92):	60%	36%	45%
1991–92 Only	59	34	49
By Priority (1991–92 only)			
Senior	46	27	49
Subordinated	63	50	52
Not reported (all years)	n.a.	38	44

Note.—Results by priority are available only for experience years 1991–92 (the priority of placements was not collected during the Pilot Study) and thus should be interpreted with caution because they are based on relatively small numbers of CREs. Public bond statistics in the lower panel are also for 1991–92 only. The last row combines 1991–92 CREs for which priority was not reported and all CREs from 1986–90.

[19]Public bond results are from Robert A. Waldman, Christopher P. Kane, and Edward I. Altman, "Recoveries on Defaulted Bonds: By Industry and Debt Seniority," Salomon Brothers High Yield Research, March 26, 1996.

45%, still a difference of 15 percentage points (as shown below, restructurings feature lower severities than defaults, but of course incidence rates are reduced, leaving loss rates rather similar on the whole (Table 8)).

The statistics for severity by priority that appear in the lower panel of Table 9 must be interpreted with even more care because they cover only experience years 1991–92 and only those private placement CREs for which seniority of the asset was reported. Seniority was not collected during the Pilot Study and thus results for earlier years are not available, and was not always reported for 1990–92 assets. As a result, the all-CRE average severities for senior and subordinated bonds are based on 70 and 40 CREs, respectively, while the averages for defaults only are based on a mere 28 and 20 CREs, respectively. The "not reported" row covers all remaining CREs from all of 1986–92.

Bonds with higher priority in bankruptcy have significantly lower loss severities on average in the public market, with senior public bond default severities averaging 46 percent versus 63 percent for subordinated instruments. Senior private placements also have lower average severities (27% versus 50% for subordinated privates), and both priority classes of private debt have lower severities than the corresponding class of public debt. When attention is restricted to private defaults alone, senior and subordinated severities are similar (49% versus 52%), but this result is almost certainly an artifact of the extremely small sample in the senior cell, not a reflection of reality. All defaulting privates for which priority was not reported have an average severity of 44 percent, less than the 49 percent estimate for the small sample of private defaults known to be senior. The not-reported group, which includes 224 CREs in the default-only column, surely includes subordinated as well as senior debt, and thus if it could be partitioned into senior and subordinated classes the average severity for the senior debt would surely be less than 44 percent. Thus 49 percent is surely an unrealistically high estimate of senior private placement loss severities. More precise estimates must await more data.

Where Is the Incremental Value?

There are many reasons why private placements might offer investors incremental value relative to public 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 also generally less liquid.

This study sheds light only on loss-related sources of value. The statistics in Table 6 imply that better loss severities are the primary source of value, but Table 8 shows the situation is more complicated. For below investment grade assets, average severities are better in the private market (Tables 5 and 9) and incidence or default rates are also better for assets rated B and below, though they are the same or 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 loss experience is a substantial source of value for below investment grade privates but not for 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, loss experience may offer some incremental value for all privates.

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.[20]

It should be noted that this study does not explore the ultimate sources of incremental value. It would be unfortunate if, in response to the statistics presented here, there was a rush to invest in below investment grade placements without careful attention to the fundamental issuer qualities or loan structures that are the source of incremental value. Fears of a few years ago that below investment grade private placements carried extraordinary portfolio risk clearly were overstated, however.

E. Experience by Earliest Internal Rating

For the current edition of this (ongoing) 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, although it may be possible to

---

[20]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.

do so in future editions.[21] Some information about loss rates by rating at private placement issuance is available now, however.

Figure 11 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 earliest year-end it was reported was used. For example, if data for an asset were reported for the years 1985–91, with ratings reported for the year-ends 1986 and thereafter but no rating at acquisition, the earliest rating variable was set to the 1986 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.

Figures 12 and 13 show incidence rates (by number) and economic loss

FIGURE 11
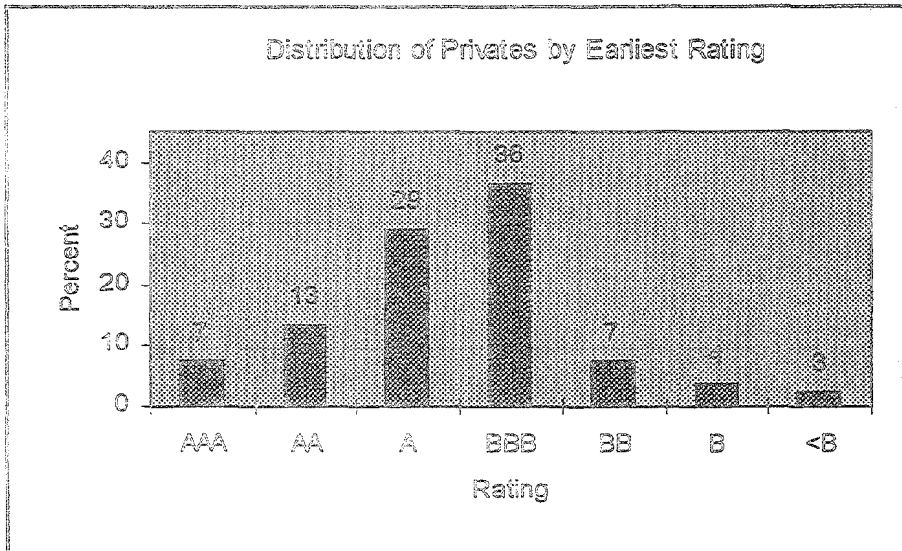
[21]See Altman, Edward I., "Measuring Corporate Bond Mortality and Performance," *Journal of Finance* September, 1989, pp. 909–22. The reported data must be linked across years for individual assets in a manner not required for other results. Such linking is a time-consuming project that is unfinished.

FIGURE 12

Incidence Rates By Earliest Rating

FIGURE 13

Economic Loss Rates by Earliest Rating
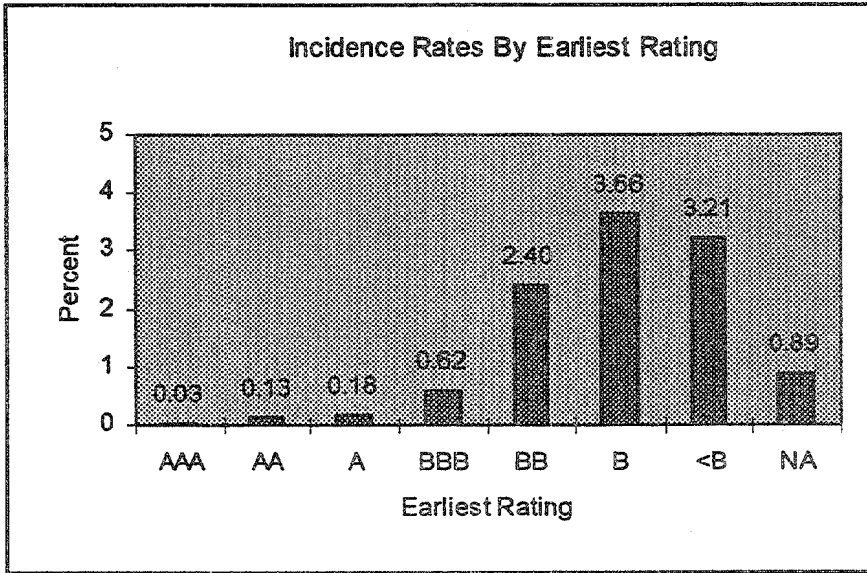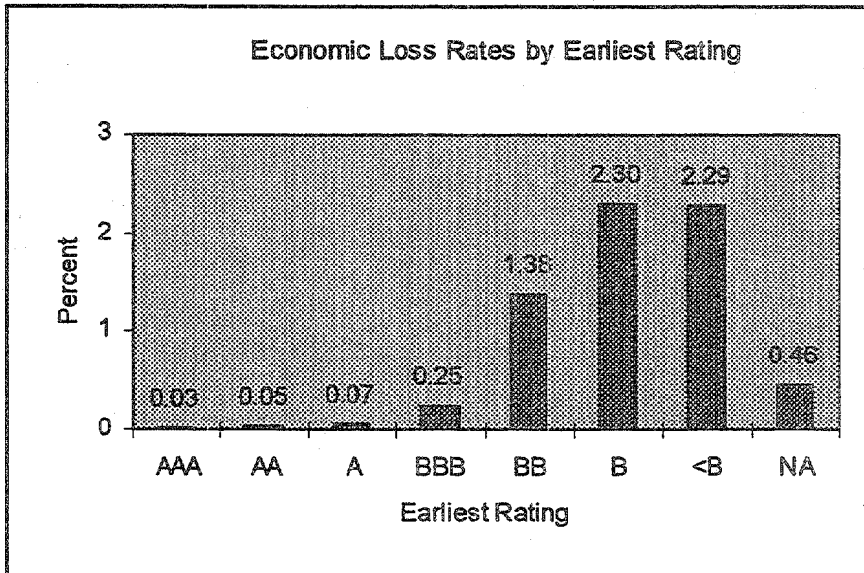
rates by earliest rating, respectively. The loss rates differ somewhat from those in Figure 9 (most recent rating), with slightly higher rates for the investment grades but a substantially lower rate for the <B category. These are average one-year rates as usual, but represent defaults occurring over a span of years after acquisition rather than over the single year following the rating. 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).

F. Experience by NAIC Rating

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 developed (judgmentally) so that results for the full sample could be shown on a common scale. Such results for economic loss appear in Figure 14; unsurprisingly, loss rates rise as the rating worsens.

Figure 15 shows incidence rates by number (all CRE types) for the old and new NAIC scales separately along with comparable public bond default rates. The incidence rates were computed in the same manner as those in Table 8 (for example, private calculations were on an issuer, not an asset basis), but those for the old NAIC scale include only the years 1986–90 whereas those for the new scale include only experience years 1991–92. (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.) Public bond default rates are for comparable time spans and ratings.

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

FIGURE 14

Economic Loss by NAIC Rating, Cocordance Scale, 1986-92

FIGURE 15

Private vs. Public Incidence Rates, NAIC Ratings
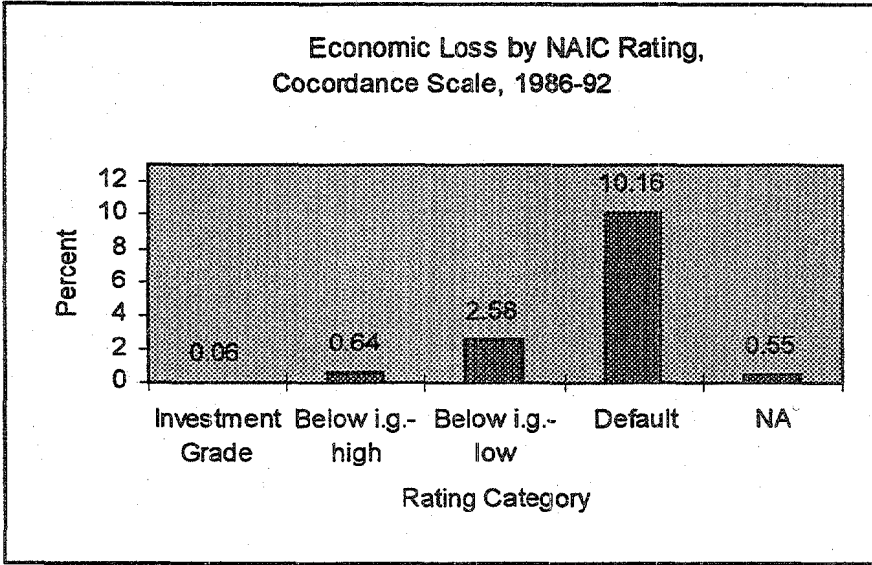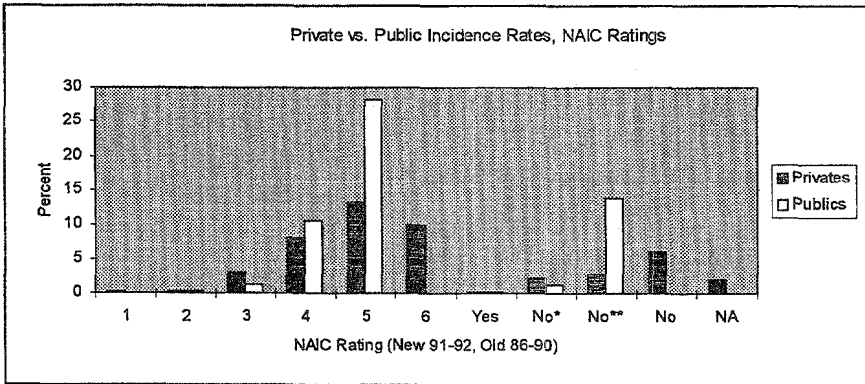
Results for the new NAIC scale, shown in the left half of Figure 15, are qualitatively similar to results for most recent internal ratings reported earlier. As in Table 8, private and public incidence rates are fairly similar for the investment grades. NAIC-3 assets' rate (3%) is somewhat higher than the public rate (1.4%), but S&P study statistics were used in producing Figure 15 and Table 8. The private and public rates for NAIC-3 would be much closer had Moody's statistics been used. In the low grades, NAIC 4 and 5 (B and <B), private incidence rates are less than in the public market as before (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 be noted that the left half of Figure 15 is based solely on the 1991–92 experience years.

The right half of Figure 15 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 at the low grades, where private incidence rates are lower.

Detailed results for the unified NAIC scale appear in section III in the usual formats, but as separate results for the old and new NAIC scales do not appear there, more detailed summary statistics are given in Table 11, along with the comparable public and private incidence rates that are also plotted in Figure 15 (private comparable incidence differs from incidence rates by number primarily because calculations were on an issuer basis—see section D above).

G. Time Patterns of Credit Risk Event Occurrence

Figures 16 through 19 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 dataset does not include all participating company assets funded in 1983, but only those that were still outstanding at some point in the 1986–92 period.

As shown in Figure 16, the majority (about 60%) of CREs occurred for assets originated during the last half of the 1980s. The corresponding

TABLE 11

INCIDENCE, SEVERITY AND LOSS BY OLD AND NEW NAIC RATINGS (PERCENTAGE)

Experience Years	Rating	Incidence Rate		Loss Severity	Economic Loss Rate	Comparable Incidence	
		By Number	By Amount			Private	Public
1991–92	1	0.03%	0.03%	62%	0.02%	0.10%	0.00%
	2	0.26	0.31	16	0.05	0.30	0.37
	3	2.03	3.38	21	0.71	2.97	1.40
	4	5.26	7.88	32	2.51	8.10	10.59
	5	7.30	10.21	43	4.40	13.33	28.33
	6	11.22	24.35	54	13.14	10.00	n.d.
1986–90	Yes	0.18	0.18	47	0.08	0.27	0.11
	No*	1.51	1.62	33	0.53	2.35	1.40
	No**	2.76	5.11	36	1.82	2.87	13.83
	No	5.14	12.47	53	6.62	6.17	n.d.
All	NA	1.73	1.69	32	0.55	2.16	n.d.
	All	0.74	1.04	36	0.37	1.13	n.d.

Note.–Statistics for ratings 1–6 are for 1991–92 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.

FIGURE 16

Distribution of CREs by Year of Funding

FIGURE 17

Incidence Rates by Number by Year of Funding

FIGURE 18

Distribution of CREs by Years Since Funding

FIGURE 19

Incidence Rates by Number By Years Since Funding
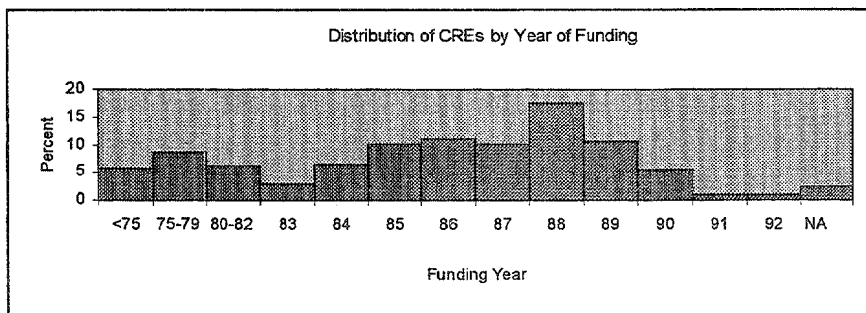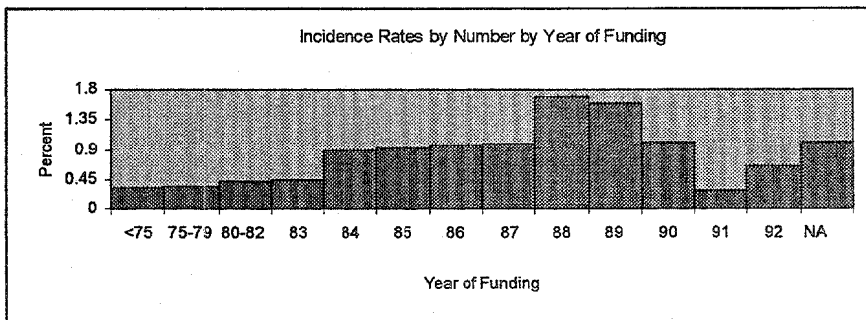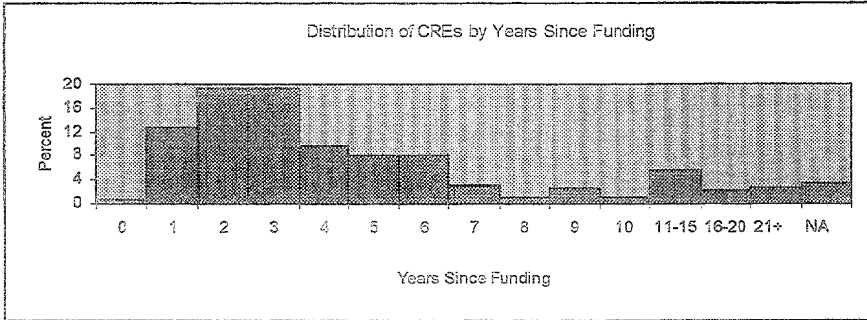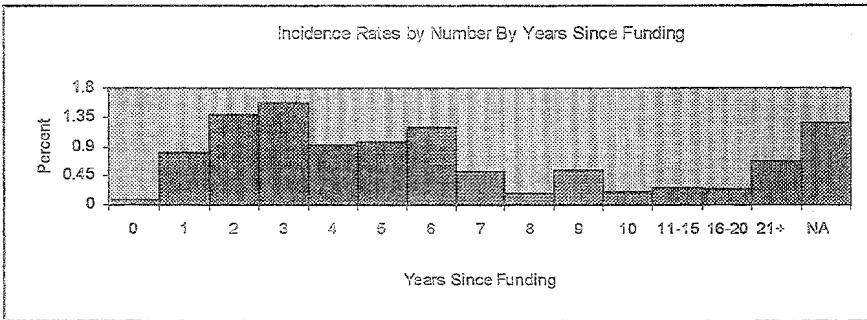
distribution of incidence rates in Figure 17 is generally similar, but the rise of late-1980s incidence rates relative to earlier rates is more pronounced and rates for both 1988 and 1989 are unusually high.

Figure 18 shows the distribution of CREs by the number of years since funding; corresponding incidence rates appear in Figure 19. Again the distributions are broadly similar, with the great majority of CREs (about 80%) occurring within seven years of the funding date.

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 and that most CREs in the sample are associated with assets issued between 1985 and 1990. For earlier cohorts of assets, a significant fraction of CREs likely occurred before this study's sample period began, whereas those issued in 1991 or 1992 did not have much time to go bad.

H. 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.[22] Table 12A displays incidence, severity, and loss rates by year for four types of credit risk events: defaults, restructurings, sales and unknown. Defaults include both borrower bankruptcies and failures to pay as scheduled.[23] 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 5 and 6 (apart from rounding error).

Of the 393 CREs in the study, defaults are the most frequent variety (272), with restructurings next (91) and few sales (19) or unreported types (11). Relative incidence rates in Table 12A basically reflect these relative frequencies. Time patterns differ somewhat across types, however. Incidence

TABLE 12A

EXPERIENCE BY CRE TYPE AND YEAR (PERCENTAGE)

Year	Economic Loss				Loss Severity			
	Sales	Restructures	Defaults	Unknown	Sales	Restructures	Defaults	Unknown
1986	0.05%	0.03%	0.24%	n.c.	72%	21%	43%	n.c.
1987	0.00	0.04	0.18	−0.01%	58	20	33	−7%
1988	n.c.	0.00	0.17	n.c.	n.c.	28	40	n.c.
1989	0.00	0.04	0.22	0.00	15	68	38	8
1990	n.c.	0.08	0.27	0.01	n.c.	37	59	11
1991	0.04	0.12	0.50	0.00	72	22	53	100
1992	0.02	0.28	0.18	n.c.	21	22	40	n.c.
All	0.02	0.10	0.26	0.00	47	24	45	3
	Incidence By Number				Incidence By Amount			
1986	0.05%	0.10%	0.53%	n.c.	0.07%	0.16%	0.56%	n.c.
1987	0.01	0.10	0.62	0.04%	0.00	0.20	0.54	0.12%
1988	n.c.	0.02	0.39	n.c.	n.c.	0.01	0.42	n.c.
1989	0.01	0.02	0.42	0.02	0.01	0.06	0.57	0.01
1990	n.c.	0.14	0.40	0.06	n.c.	0.21	0.45	0.09
1991	0.09	0.27	0.91	0.03	0.05	0.55	0.94	0.00
1992	0.10	0.61	0.37	n.c.	0.07	1.25	0.44	n.c.
All	0.04	0.17	0.52	0.02	0.03	0.41	0.57	0.03

Note.—n.c. means no CREs in cell.

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

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

for defaults doubles in 1991 and then drops back, whereas restructurings peak in 1992, and relative to prior years sales are high in both 1991–92. These relative proportions and time patterns must be interpreted with some caution, however, as inspection of the data reveals the possibility of systematic reporting errors in a few years for a few companies.[24] When these company-years are removed from the data, two features of the results change, as shown in Table 12B. Most importantly, the large jump in restructurings in 1992 disappears. When incidence by amount is the measure, restructurings peak in 1991 and fall back just like defaults. Second, the relative frequency of restructurings over all years is somewhat higher—defaults are about 2-1/2 times more likely than restructurings rather than 3 times more likely.[25] 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.

Especially interesting are loss severities by CRE type, shown in the upper right panel of Table 12A and Figure 20 (severities are not shown in Table 12B because they are very similar to those in Table 12A). Overall, average severities for asset sales are almost identical to those for defaults (about 46%), whereas those for restructurings are about half as large (24%). This

TABLE 12B

INCIDENCE BY CRE TYPE AND YEAR, POSSIBLE REPORTING
ERRORS REMOVED (PERCENTAGE)

| Year | Incidence By Number | | | |
	Sales	Restructures	Defaults	Unknown
1986	0.08%	0.17%	0.47%	n.c.
1987	n.c.	0.16	0.47	0.07%
1988	n.c.	0.04	0.34	n.c.
1989	0.02	0.04	0.39	0.04
1990	n.c.	0.21	0.60	0.10
1991	0.12	0.39	1.04	0.04
1992	0.20	0.39	0.45	n.c.
All	0.06	0.19	0.54	0.03

Note.—n.c. means no CREs in cell.

[24]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.

[25]When the suspect CREs are removed, defaults number 172, restructurings 61, sales 18, and unknown types 11.

FIGURE 20
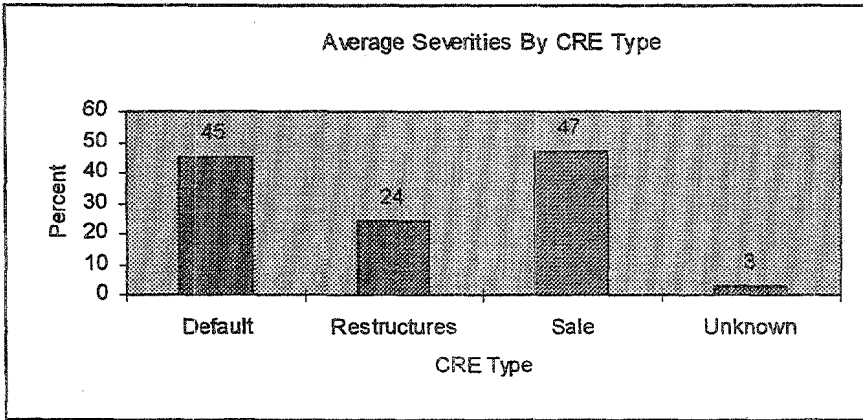
is sensible, as there might be little incentive to go to the trouble of restructuring if severities were on average similar to those for defaults. The ultimate fate of the restructurings is not known, however, as in this study once an asset has experienced a CRE it is no longer part of the experience database nor eligible to experience another CRE.

Table 13 reports results by CRE type and most recent internal rating. Severities show no particular pattern across ratings and incidence rates generally increase as rating worsens, paralleling the aggregate results. However, the incidence rate for restructurings peaks at either the BB or B rating, depending on whether incidence is measured by number or amount, whereas rates for sales and defaults peak at the <B category. Although restructurings are relatively frequent for the B and <B categories, it may be that they are most frequent for BB because the prospects of such credits are still good enough to warrant a restructuring.

I. 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. This study finds that the economic loss experience of similarly-rated investment-grade private placements and public bonds is similar, for example, but the difference for BBB-rated assets might be 31 basis points if one felt strongly that one rating agency's default study statistics should be used rather than the other's.

TABLE 13

EXPERIENCE BY CRE TYPE AND MOST RECENT RATING (PERCENTAGE)

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.	0.01%	0.02%	n.c.	n.c.	100%	68%	n.c.
A	0.00%	n.c.	0.02	0.00%	5%	n.c.	32	7%
BBB	0.00	0.05	0.19	0.00	4	46	36	−4
BB	0.05	0.40	1.04	n.c.	45	29	44	n.c.
B	0.11	0.29	1.76	n.c.	57	14	53	n.c.
<B	0.50	0.54	3.32	n.c.	81	42	55	n.c.
Unknown	0.02	0.15	0.25	0.00	46	22	47	10
All	0.02	0.10	0.26	0.00	47	24	45	3
	Incidence By Number				Incidence By Amount			
AAA	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.
AA	n.c.	0.02%	0.04%	n.c.	n.c.	0.01%	0.03%	n.c.
A	0.01%	n.c.	0.08	0.01%	0.01%	n.c.	0.06	0.02%
BBB	0.02	0.07	0.37	0.02	0.01	0.11	0.53	0.06
BB	0.10	0.74	1.92	n.c.	0.12	1.40	2.37	n.c.
B	0.24	0.48	3.02	n.c.	0.19	2.15	3.32	n.c.
<B	0.34	0.56	3.48	n.c.	0.61	1.27	6.03	n.c.
Unknown	0.03	0.29	0.46	0.04	0.04	0.70	0.52	0.03
All	0.04	0.17	0.52	0.02	0.03	0.41	0.57	0.03

Note.—n.c. means no CREs in cell.

When the uncertainties are taken into account, though, a number of findings stand out:

○ Over the sample period studied, investment grade privates have loss experience similar to publics in spite of worse incidence or default rates because of their better severities.
○ Relative to publicly issued bonds, below investment grade placements, especially those rated B and below, offer superior experience with respect to all of incidence, severity and economic loss.
○ 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 unusually badly 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.
○ Individual CRE loss severities are widely distributed and thus hard to predict, as in the public market.

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

On the whole, the picture is one of an orderly market that tracks the public bond market rather closely in performance once differences in asset characteristics are taken into account, except that private placement investors manage to elicit substantially better performance from their low-rated borrowers.

III. DATA SUMMARIES

A. *Using the Data Summaries*

Analysis Variables

- Aggregate Experience
- Most Recent Quality Rating
- Earliest Quality Rating
- NAIC Rating

- Original Coupon Rate
- Funding Year
- Years Since Funding
- Years to Maturity

Data Summaries—Four Parts per Analysis Variable

This Data Summaries section of the report presents detailed data for the four loss statistics (incidence rate by number and amount, severity and economic loss) calculated in aggregate and for selected characteristics. Each set is presented in the following consistent format:

- Part 1—This part contains some brief narrative highlighting those items considered noteworthy. Each reader is likely to find other items of interest and alternative interpretations of the data.
- Part 2—This part contains four graphs exhibiting incidence, economic loss, severity, and exposures for the characteristic variables. Economic loss and exposure is presented by year. A more detailed discussion of each graph is below.
- Part 3—This part contains the four loss statistic tables by characteristic variable by year. A cell that is *shaded* indicates the ratios in the cell have limited credibility with less than five credit events contributing to the ratios.

○ Part 4—This part contains the numbers that are used to calculate the
   incidence ratios on the previous part.

*Data Summaries (Figures 21–24)—Four Graphs (the aggregate graphs
are slightly different)*

○ Incidence and Economic Loss Graph

— for each characteristic variable, a bar indicates the aggregate 1986–
   92 incidence by number, incidence by amount and economic loss
— comparing the N/A (or not available category) to the Total provides
   an indication about the make-up of those credit events and exposures
   in N/A

○ Economic Loss Graph

— for each characteristic variable, a bar indicates the economic loss for
   each of seven years from 1986–92
— 1990–92 represents a period of more adverse economic conditions
— characteristic variable cells by year with less than five credit events
   are not shown on the graph

○ Loss Severity Distributions Graph

— for each characteristic variable, the "stacked" bar provides informa-
   tion about the severity distribution for the aggregate 1986–92 period
— the "breakpoints" of the shading in the bars indicate the level of
   severity below a given percentile—for example, at the 65th percentile,
   65% of the severities (unweighted) are at or below a severity level of
   x%; alternatively, the range of severities falling within the 25th and
   75th percentile can be determined to be y% and z%
— the number of credit events are shown at the top of each bar; if there
   are less than ten credit events, only the weighted average is shown
— the standard deviation is shown unless the characteristic has less than
   ten credit events

○ Exposure Graph

— for each characteristic variable, a bar indicates the *dollar* exposure for
   each of seven years from 1986–92
— 1990–92 represents a period of more adverse economic conditions
— the percentages below each set of bars indicate the relative exposure
   each variable has contributed in aggregate over the entire seven-year
   period

FIGURE 21

PRIVATE PLACEMENT 1986–92: AGGREGATE EXPERIENCE
INCIDENCE
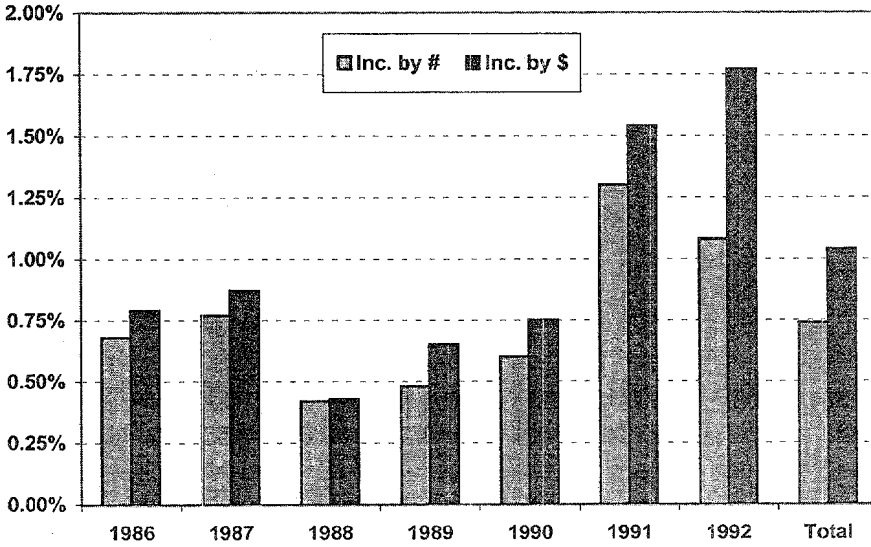
FIGURE 22

PRIVATE PLACEMENT 1986–92: AGGREGATE EXPERIENCE
ECONOMIC LOSS
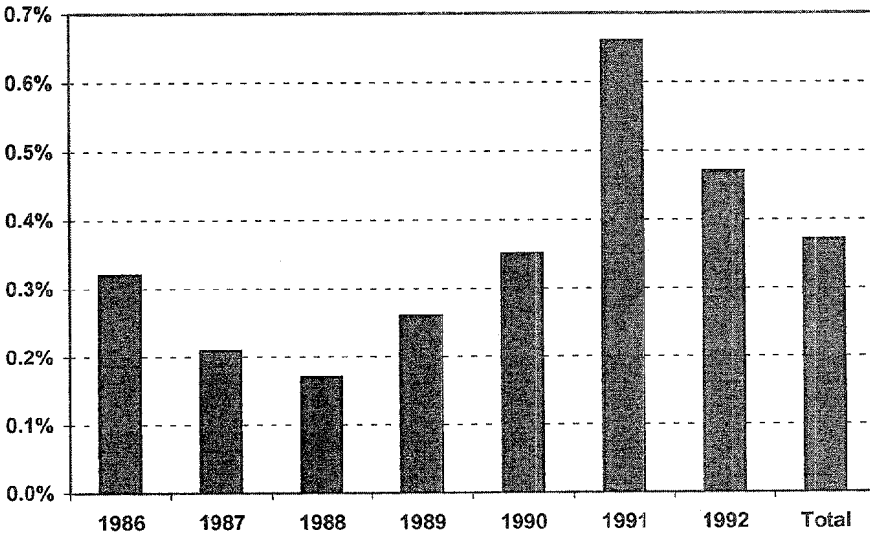
FIGURE 23
PRIVATE PLACEMENT 1986–92: AGGREGATE EXPERIENCE
LOSS SEVERITY DISTRIBUTIONS
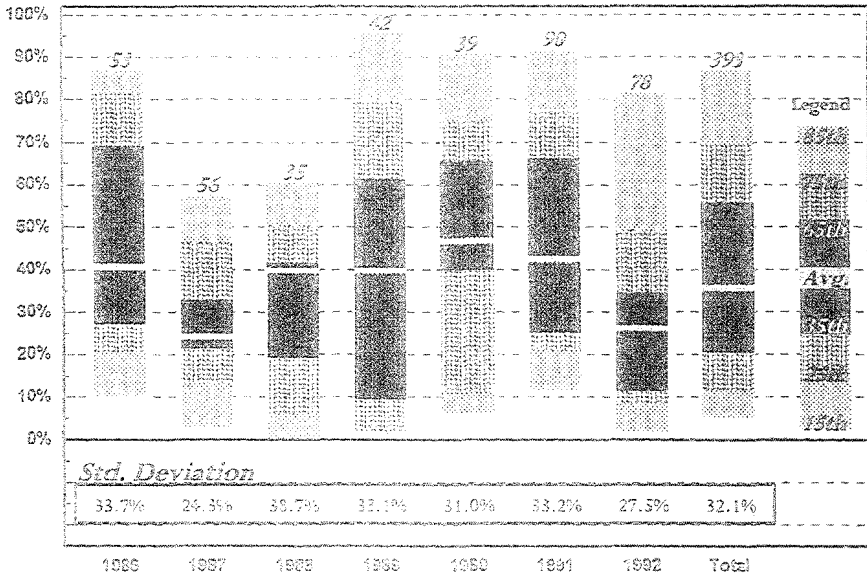
B. Private Placement 1986–92: Aggregate Experience (Tables 14–21)

Highlights

○ The aggregate economic loss over the entire 1986–92 study period was 0.37% (or 37 basis points). The 0.37% is equal to average incidence by amount of 1.04% times the average severity upon incidence of 35.8%.

○ The average economic loss during 1990–92 is about twice the 1986–89 average, coincident with the recession.

○ Economic losses during 1990–92 were higher because incidence rates increased. No time trend is evident in the severities.

○ Individual loss severities are widely distributed and thus difficult to predict.

FIGURE 24
PRIVATE PLACEMENT 1986–92: AGGREGATE EXPERIENCE
EXPOSURES IN BILLIONS

Percent of Total

10%	11%	13%	14%	15%	18%	19%
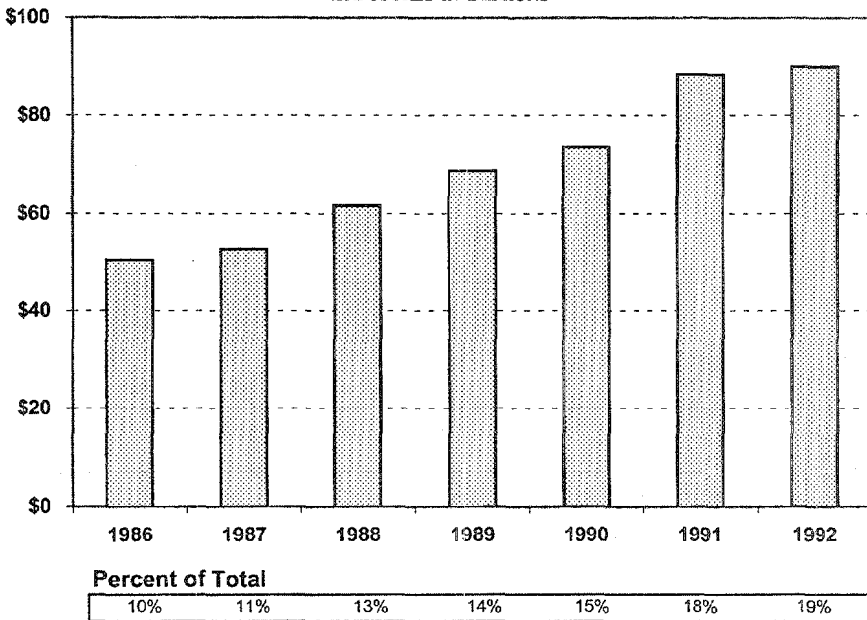
● Incidence by dollar amount exceeds incidence by number in all years, although more so in 1992, indicating that assets experiencing CREs had larger than average amounts outstanding.

Data Notes

● All CREs with loss severities less than negative 100% (four of them), i.e., a gain of more than 100%, were eliminated from the study.
● The results also exclude one large CRE, with virtually no effect on economic loss. It was felt inclusion of this large CRE distorts aggregate incidence and severity results.
● Combination of CREs was done to smooth out some loss severities (see appendix for more detail).
● Five out of the thirteen participating companies have contributed data for all years of the entire 1986–92 study period.

TABLE 14

PRIVATE PLACEMENT 1986–92: AGGREGATE EXPERIENCE
INCIDENCE BY NUMBER

1986	1987	1988	1989	1990	1991	1992	Total
0.68%	0.77%	0.42%	0.48%	0.60%	1.30%	1.08%	0.74%

TABLE 15

PRIVATE PLACEMENT 1986–92: AGGREGATE EXPERIENCE
INCIDENCE BY DOLLAR AMOUNT

1986	1987	1988	1989	1990	1991	1992	Total
0.79%	0.87%	0.43%	0.65%	0.75%	1.54%	1.77%	1.04%

TABLE 16

PRIVATE PLACEMENT 1986–92: AGGREGATE EXPERIENCE
SEVERITY

1986	1987	1988	1989	1990	1991	1992	Total
40.78%	24.27%	39.94%	39.86%	46.86%	42.63%	26.35%	35.80%

TABLE 17

PRIVATE PLACEMENT 1986–92: AGGREGATE EXPERIENCE
ECONOMIC LOSS

1986	1987	1988	1989	1990	1991	1992	Total
0.32%	0.21%	0.17%	0.26%	0.35%	0.66%	0.47%	0.37%

TABLE 18

PRIVATE PLACEMENT 1986–92: AGGREGATE EXPERIENCE
NUMBER OF CREDIT EVENTS

1986	1987	1988	1989	1990	1991	1992	Total
53	56	35	42	39	90	78	393

TABLE 19

PRIVATE PLACEMENT 1986–92: AGGREGATE EXPERIENCE
NUMBER OF EXPOSURES

1986	1987	1988	1989	1990	1991	1992	Total
7,739	7,239	8,428	8,717	6,523	6,948	7,207	52,799

TABLE 20

PRIVATE PLACEMENT 1986–92: AGGREGATE EXPERIENCE
DOLLAR AMOUNT OF CREDIT EVENTS (IN MILLIONS)

1986	1987	1988	1989	1990	1991	1992	Total
S397.0	S457.2	$263.2	$445.0	$552.8	S1,361.0	$1,591.4	$5,067.6

TABLE 21

PRIVATE PLACEMENT 1986–92: AGGREGATE EXPERIENCE
DOLLAR AMOUNT OF EXPOSURES (IN BILLIONS)

1986	1987	1988	1989	1990	1991	1992	Total
$50.366	$52.659	$61.687	S68.658	S73.560	$88.345	$89.904	$485.178

C. Private Placement 1986–92: Loss Severity Distribution

Summary

Figure 25 shows the cumulative distribution of loss severities for all credit events. The x-axis represents the percentage of credit events with a loss severity less than or equal to a given loss severity. For example, the graph shows that 70% of the credit events had a loss severity less than or equal to 60%.

The smaller graph within Figure 25 segments the distribution into loss severity bands. Shown on the y-axis is the number of credit events with a loss severity within a given severity band. On top of each bar is the percentage of credit events contained within each severity band.

D. Private Placement 1986–92: Most Recent Quality Rating (Figures 26–29)

Highlights

* Results by rating are as expected. Incidence and loss rates rise with lower quality ratings, and are much higher for the speculative grades than investment grades.
* Incidence, severity and economic loss statistics are very similar for the N/A category and the average of non-N/A categories, indicating no sample selection bias in the results due to unreported ratings.

FIGURE 25
CREDIT-RISK STUDY
LOSS SEVERITY DISTRIBUTION (ALL CRES)

FIGURE 26

PRIVATE PLACEMENT 1986–92: MOST RECENT QUALITY RATING
INCIDENCE AND ECONOMIC LOSS

FIGURE 27

PRIVATE PLACEMENT 1986–92: MOST RECENT QUALITY RATING
ECONOMIC LOSS
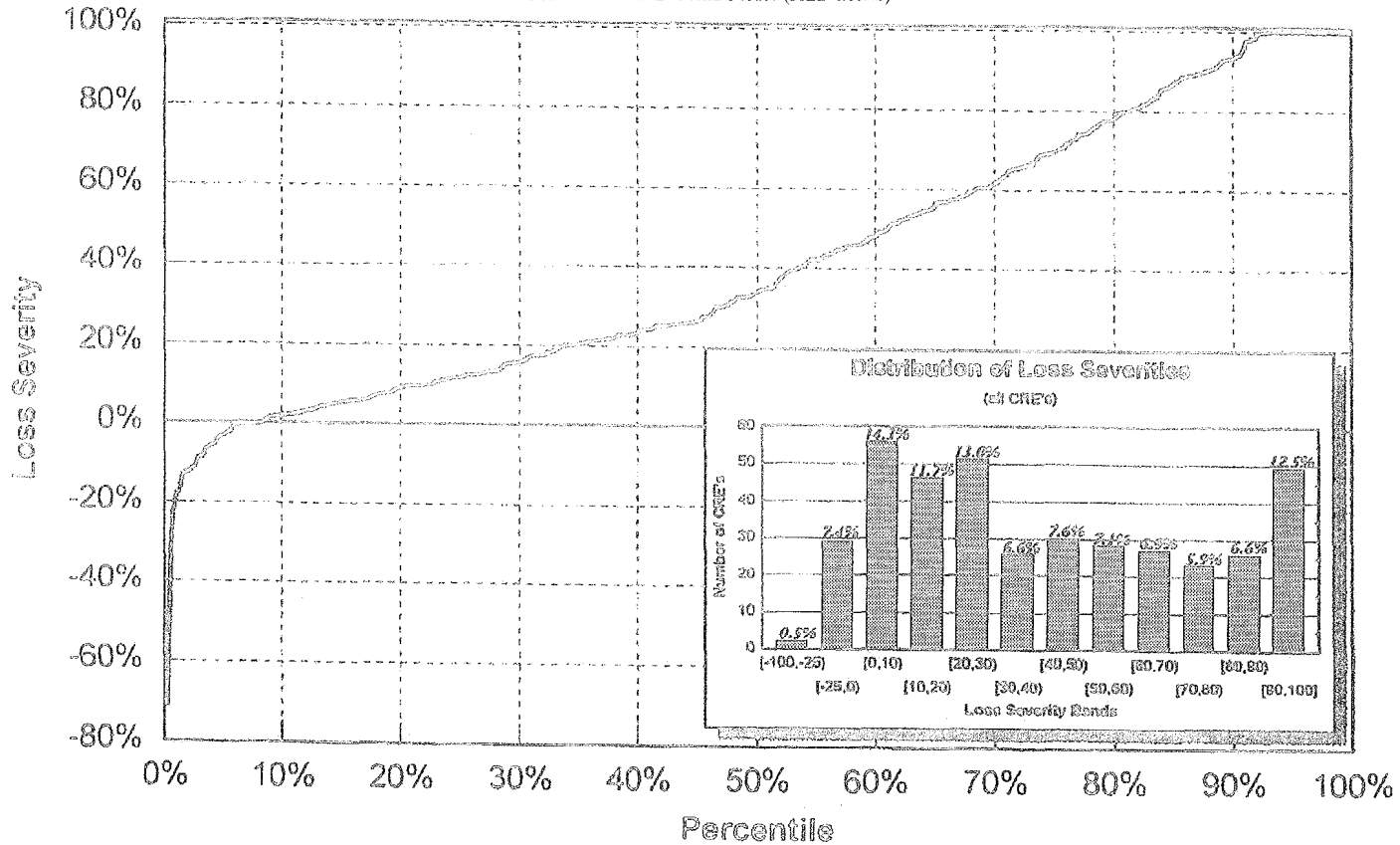
FIGURE 28
PRIVATE PLACEMENT 1986–92: MOST RECENT QUALITY RATING
LOSS SEVERITY DISTRIBUTIONS

Std. Deviation								
.....	.....	27.8%	30.7%	31.0%	34.1%	25.4%	32.1%	32.1%
AAA	AA	A	BBB	BB	B	<B	N/A	Total
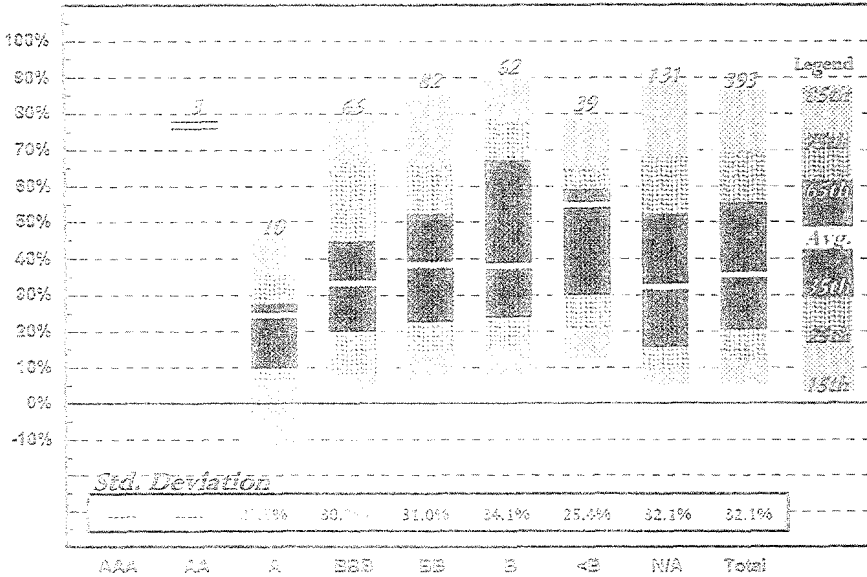
- Economic loss rates are similar across years for the investment grades, but placements rated BB and below show a very substantial jump in loss rates during the 1990–92 recession period relative to earlier years.
- Individual loss severities by rating are widely distributed just as they are for aggregate experience by year and total experience for all ratings.
- Average severity for the investment grades (ignoring AA) is about 10% lower than that for the speculative grades, but it is not clear that the differences are statistically significant. There are 39 CREs contributing to the average severity of 55% for <B grades, an average severity of over 15% higher than other grades.

Data Notes

- See Data Notes under Aggregate Experience (Section III.B.)
- The ratings are based on internal ratings produced by participating companies on a scale comparable to S&P and Moody's.
- The distribution of exposure by ratings is fairly constant over time except

FIGURE 29

PRIVATE PLACEMENT 1986–92: MOST RECENT QUALITY RATING
EXPOSURES IN BILLIONS
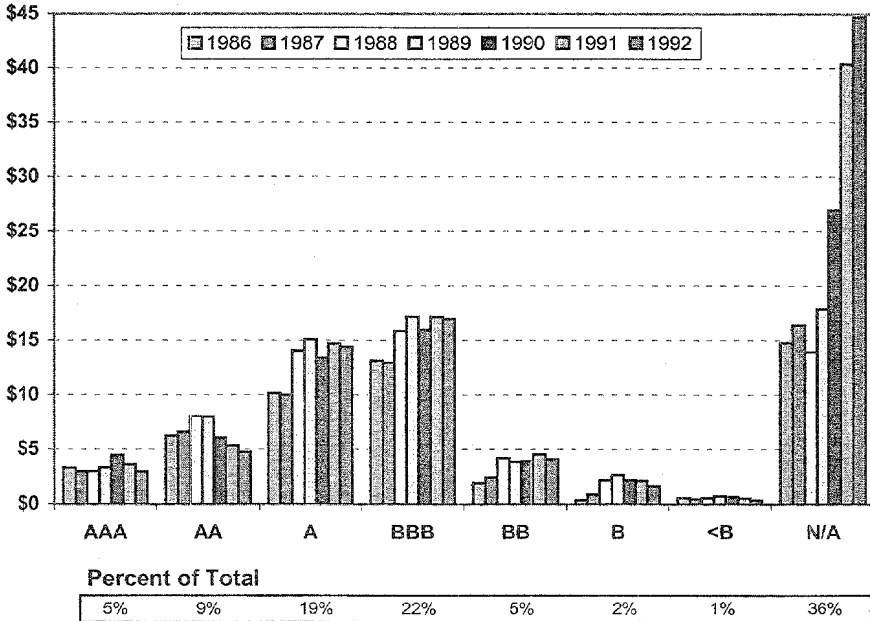
for the N/A category. The large increase in N/A exposure is due to an increase in unreported or misreported ratings by a few companies on the 1990–92 data submission.

● All AAA-A grade statistics by year have low credibility due to the low number of CREs (indicated by shaded cells in the data Tables 22–29).

TABLE 22

PRIVATE PLACEMENT 1986–92: MOST RECENT QUALITY RATING
INCIDENCE BY NUMBER

Rating	1986	1987	1988	1989	1990	1991	1992	Total
AAA	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
AA	0.00	0.00	0.00	0.11	0.00	0.16	0.18	0.06
A	0.00	0.24	0.00	0.06	0.30	0.07	0.07	0.10
BBB	0.56	1.01	0.17	0.30	0.43	0.69	0.42	0.48
BB	4.84	3.69	0.82	1.19	1.74	5.35	2.81	2.76
B	4.42	6.30	2.71	1.86	3.90	6.39	4.74	3.74
<B	0.79	7.05	4.79	1.97	3.69	5.19	8.41	4.38
N/A	0.79	0.29	0.42	0.73	0.46	1.60	1.72	0.83
Total	0.68%	0.77%	0.42%	0.48%	0.60%	1.30%	1.08%	0.74%

TABLE 23

PRIVATE PLACEMENT 1986–92: MOST RECENT QUALITY RATING
INCIDENCE BY DOLLAR AMOUNT

Rating	1986	1987	1988	1989	1990	1991	1992	Total
AAA	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
AA	0.00	0.00	0.00	0.05	0.00	0.19	0.09	0.04
A	0.00	0.19	0.00	0.03	0.36	0.03	0.05	0.09
BBB	0.84	1.63	0.06	1.13	0.32	0.76	0.41	0.71
BB	6.74	3.99	0.92	1.50	1.77	7.54	5.77	3.89
B	3.75	3.96	3.62	0.91	7.63	14.04	4.24	5.66
<B	0.24	3.09	5.81	2.89	11.02	16.87	20.93	7.91
N/A	0.98	0.49	0.76	0.79	0.55	1.22	2.54	1.29
Total	0.79%	0.87%	0.43%	0.65%	0.75%	1.54%	1.77%	1.04%

TABLE 24

PRIVATE PLACEMENT 1986–92: MOST RECENT QUALITY RATING
SEVERITY

Rating	1986	1987	1988	1989	1990	1991	1992	Total
AAA	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
AA	0.00	0.00	0.00	49.42	0.00	75.23	100.00	75.57
A	0.00	17.17	0.00	−34.79	33.80	34.81	5.27	24.45
BBB	28.94	21.83	25.24	40.57	64.27	29.94	39.15	33.24
BB	52.05	36.52	78.03	44.34	59.91	38.61	17.63	38.51
B	63.91	25.33	52.84	79.75	56.28	22.50	32.24	38.22
<B	46.77	37.50	31.51	88.61	60.24	55.27	54.28	55.08
N/A	37.56	14.74	20.32	25.09	22.44	57.92	25.17	32.36
Total	40.78%	24.27%	39.94%	39.86%	46.86%	42.63%	26.35%	35.80%

TABLE 25

PRIVATE PLACEMENT 1986–92: MOST RECENT QUALITY RATING
ECONOMIC LOSS

Rating	1986	1987	1988	1989	1990	1991	1992	Total
AAA	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
AA	0.00	0.00	0.00	0.02	0.00	0.14	0.09	0.03
A	0.00	0.03	0.00	−0.01	0.12	0.01	0.00	0.02
BBB	0.24	0.36	0.02	0.46	0.20	0.23	0.16	0.24
BB	3.51	1.46	0.72	0.67	1.06	2.91	1.02	1.50
B	2.39	1.00	1.91	0.72	4.30	3.16	1.37	2.16
<B	0.11	1.16	1.83	2.56	6.64	9.33	11.36	4.36
N/A	0.37	0.07	0.15	0.20	0.12	0.71	0.64	0.42
Total	0.32%	0.21%	0.17%	0.26%	0.35%	0.66%	0.47%	0.37%

TABLE 26

PRIVATE PLACEMENT 1986–92: MOST RECENT QUALITY RATING
NUMBER OF CREDIT EVENTS

Rating	1986	1987	1988	1989	1990	1991	1992	Total
AAA	0	0	0	0	0	0	0	0
AA	0	0	0	1	0	1	1	3
A	0	3	0	1	4	1	1	10
BBB	11	17	4	7	7	12	8	66
BB	14	12	4	6	7	25	14	82
B	4	8	10	8	9	14	9	62
<B	1	8	8	3	4	6	9	39
N/A	23	8	9	16	8	31	36	131
Total	53	56	35	42	39	90	78	393

TABLE 27

PRIVATE PLACEMENT 1986–92: MOST RECENT QUALITY RATING
NUMBER OF EXPOSURES

Rating	1986	1987	1988	1989	1990	1991	1992	Total
AAA	351	339	388	369	414	380	313	2,552
AA	652	680	896	909	650	616	558	4,959
A	1,335	1,250	1,689	1,814	1,329	1,470	1,533	10,419
BBB	1,973	1,687	2,311	2,333	1,643	1,746	1,918	13,610
BB	290	326	486	506	403	467	498	2,975
B	91	127	370	430	231	219	190	1,657
<B	127	114	167	152	109	116	107	890
N/A	2,923	2,719	2,123	2,206	1,745	1,935	2,091	15,740
Total	7,739	7,239	8,428	8,717	6,523	6,948	7,207	52,799

TABLE 28

PRIVATE PLACEMENT 1986–92: MOST RECENT QUALITY RATING
DOLLAR AMOUNT OF CREDIT EVENTS (IN MILLIONS)

Rating	1986	1987	1988	1989	1990	1991	1992	Total
AAA	$ 0.0	$ 0.0	$ 0.0	$ 0.0	$ 0.0	$ 0.0	$ 0.0	$ 0.0
AA	0.0	0.0	0.0	3.7	0.0	10.0	4.1	17.8
A	0.0	18.7	0.0	4.0	48.7	5.0	7.0	83.4
BBB	109.8	211.0	9.6	193.6	50.3	130.8	69.1	774.2
BB	128.0	98.2	38.7	58.2	69.4	343.5	235.9	972.0
B	13.6	35.8	77.7	24.4	164.5	292.1	69.5	677.6
<B	1.3	13.1	32.0	20.0	70.7	86.0	69.9	293.1
N/A	144.3	80.5	105.3	141.0	149.2	493.5	1,135.8	2,249.6
Total	$397.0	$457.2	$263.2	$445.0	$552.8	$1,361.0	$1,591.4	$5,067.6

TABLE 29

PRIVATE PLACEMENT 1986–92: MOST RECENT QUALITY RATING
DOLLAR AMOUNT OF EXPOSURES (IN BILLIONS)

Rating	1986	1987	1988	1989	1990	1991	1992	Total
AAA	$ 3.336	$ 2.997	$ 2.992	$ 3.366	$ 4.485	$ 3.639	$ 2.985	$ 23.799
AA	6.224	6.579	8.002	7.978	6.039	5.328	4.762	44.913
A	10.137	9.994	14.055	15.075	13.364	14.708	14.410	91.743
BBB	13.086	12.927	15.827	17.136	15.977	17.144	16.959	109.056
BB	1.899	2.463	4.203	3.879	3.925	4.557	4.090	25.015
B	0.363	0.902	2.145	2.687	2.155	2.080	1.637	11.969
<B	0.552	0.424	0.550	0.691	0.641	0.510	0.334	3.704
N/A	14.770	16.371	13.914	17.846	26.973	40.379	44.727	174.979
Total	$50.366	$52.659	$61.687	$68.658	$73.560	$88.345	$89.904	$485.178

E. Private Placement 1986–92: Earliest Quality Rating (Figures 30–33)

Highlights

○ As with the results by most recent quality rating, incidence and economic loss rates rise with lower quality ratings, with speculative grade loss rates much higher than investment grades.
○ Economic loss rates by earliest rating are higher than by most recent rating in the investment grades, but lower in the speculative grades. This is to be expected because most assets that were originally investment grade migrate to speculative ratings before going into default.

Data Notes (Tables 30–37)

○ See Data Notes under Aggregate Experience (Section III. B.)
○ Earliest quality rating is not the same as rating at issue. It is a derived rating using other inputs as follows:

"Rating at acquisition" and "most recent quality rating" (both are internal ratings) are requested as of the end of each contribution year, but are not always reported. A single "earliest quality rating" was derived for each issue for all years by the following method:
1. If available, use "rating at acquisition." If reported more than once, take the earliest one.
2. If step 1 is not available, use "most recent quality rating" for the earliest year of contribution for which it was reported.
3. If neither of the above is available, then it gets coded as N/A.

FIGURE 30

PRIVATE PLACEMENT 1986–92: EARLIEST QUALITY RATING
INCIDENCE AND ECONOMIC LOSS

FIGURE 31

PRIVATE PLACEMENT 1986–92: EARLIEST QUALITY RATING
ECONOMIC LOSS

FIGURE 32
PRIVATE PLACEMENT 1986–92: EARLIEST QUALITY RATING
LOSS SEVERITY DISTRIBUTIONS
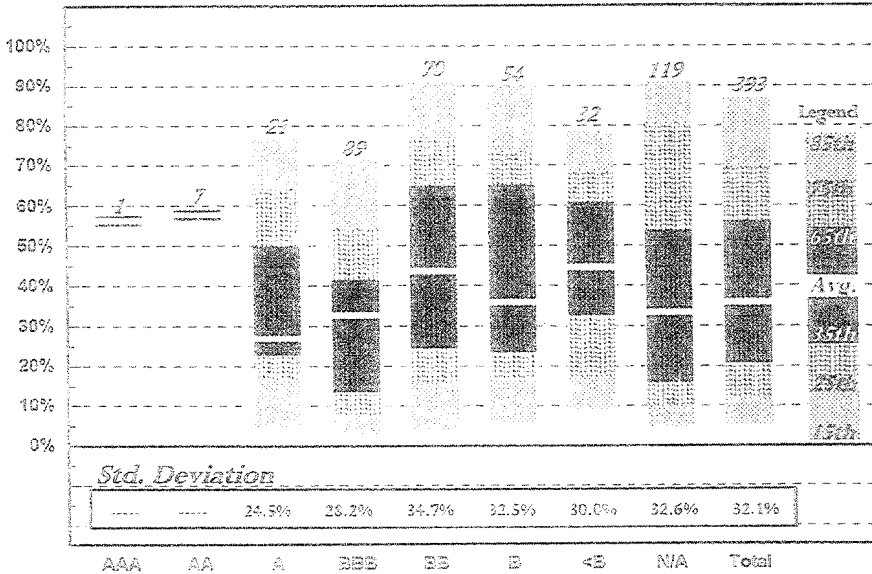
○ For two companies, reported "rating at acquisition" was unusable, so only steps 2 and 3 were applied.
○ AAA-A rating grade statistics by year have limited credibility due to the low number of CREs.

F. Private Placement 1986–92: NAIC Rating (Figures 34–37)

Highlights

○ Not surprisingly, economic loss rates are greater for speculative grades than investment grades with both higher incidence and severity.
○ There is very little difference in economic loss rates between NAIC 4 and 5 as compared to NAIC 6 over the study period, although incidence and severities differ.
○ Care must be taken in looking at these results due to the change in the NAIC rating scale in 1990.

FIGURE 33

PRIVATE PLACEMENT 1986–92: EARLIEST QUALITY RATING
EXPOSURES IN BILLIONS

Percent of Total							
6%	10%	20%	24%	5%	2%	1%	32%
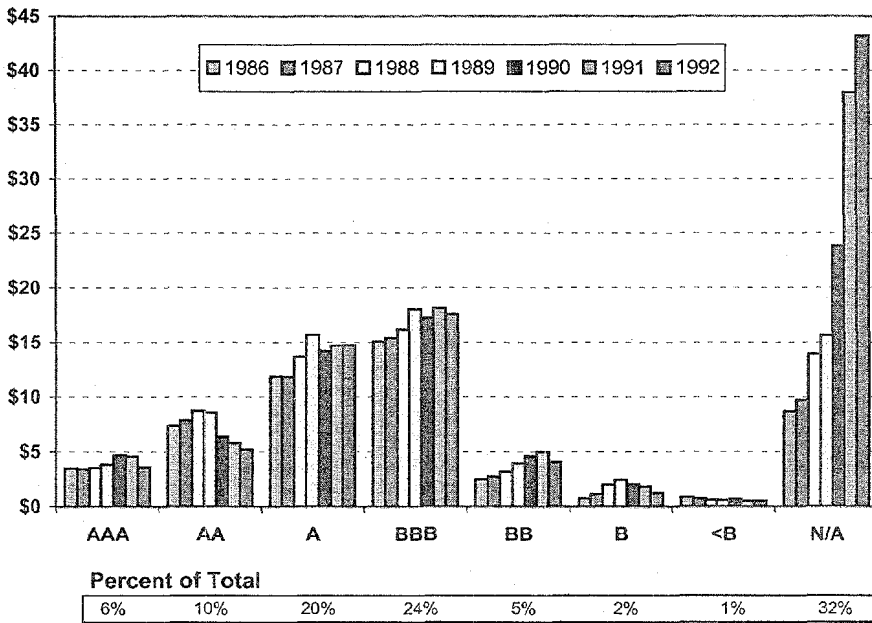
TABLE 30

PRIVATE PLACEMENT 1986–92: EARLIEST QUALITY RATING
INCIDENCE BY NUMBER

Rating	1986	1987	1988	1989	1990	1991	1992	Total
AAA	0.00%	0.00%	0.00%	0.00%	0.23%	0.00%	0.00%	0.03%
AA	0.00	0.38	0.00	0.11	0.15	0.16	0.16	0.13
A	0.00	0.14	0.00	0.19	0.19	0.71	0.06	0.18
BBB	0.61	1.36	0.30	0.40	0.23	0.74	0.80	0.62
BB	3.48	1.74	1.00	0.43	1.53	4.15	4.41	2.40
B	3.02	4.29	2.62	1.11	5.16	7.07	5.78	3.66
<B	4.28	2.99	4.28	3.40	2.71	2.94	0.83	3.21
N/A	0.70	0.34	0.43	0.88	0.69	1.59	1.64	0.89
Total	0.68%	0.77%	0.42%	0.48%	0.60%	1.30%	1.08%	0.74%

TABLE 31

PRIVATE PLACEMENT 1986–92: EARLIEST QUALITY RATING
INCIDENCE BY DOLLAR AMOUNT

Rating	1986	1987	1988	1989	1990	1991	1992	Total
AAA	0.00%	0.00%	0.00%	0.00%	0.32%	0.00%	0.00%	0.06%
AA	0.00	0.24	0.00	0.04	0.08	0.17	0.08	0.08
A	0.00	0.10	0.00	0.30	0.14	1.07	0.05	0.25
BBB	0.80	1.68	0.18	1.00	0.21	0.89	0.63	0.76
BB	5.12	1.85	1.17	0.61	1.45	4.98	6.55	3.16
B	1.98	2.85	3.52	0.54	8.71	17.06	8.91	6.39
<B	6.33	1.92	3.86	6.38	8.92	6.26	1.25	5.12
N/A	0.98	0.75	0.76	0.90	0.73	1.19	2.53	1.38
Total	0.79%	0.87%	0.43%	0.65%	0.75%	1.54%	1.77%	1.04%

TABLE 32

PRIVATE PLACEMENT 1986–92: EARLIEST QUALITY RATING
SEVERITY

Rating	1986	1987	1988	1989	1990	1991	1992	Total
AAA	0.00%	0.00%	0.00%	0.00%	54.83%	0.00%	0.00%	54.83%
AA	0.00	32.83	0.00	49.42	74.61	75.23	100.00	56.37
A	0.00	17.01	0.00	16.56	53.83	28.53	5.27	27.05
BBB	25.40	26.73	36.89	43.76	54.87	28.24	36.26	32.89
BB	52.50	23.42	74.09	62.41	58.96	50.25	27.67	43.78
B	63.91	25.37	56.80	86.21	58.74	19.69	25.29	35.97
<B	12.79	34.88	28.25	74.71	53.69	61.09	47.79	44.61
N/A	59.11	12.68	20.32	25.09	23.94	62.07	24.86	33.44
Total	40.78%	24.27%	39.94%	39.86%	46.86%	42.63%	26.35%	35.80%

TABLE 33

PRIVATE PLACEMENT 1986–92: EARLIEST QUALITY RATING
ECONOMIC LOSS

Rating	1986	1987	1988	1989	1990	1991	1992	Total
AAA	0.00%	0.00%	0.00%	0.00%	0.18%	0.00%	0.00%	0.03%
AA	0.00	0.08	0.00	0.02	0.06	0.13	0.08	0.05
A	0.00	0.02	0.00	0.05	0.08	0.31	0.00	0.07
BBB	0.20	0.45	0.06	0.44	0.12	0.25	0.23	0.25
BB	2.69	0.43	0.87	0.38	0.86	2.50	1.81	1.38
B	1.26	0.72	2.00	0.46	5.12	3.36	2.25	2.30
<B	0.81	0.67	1.09	4.77	4.79	3.82	0.60	2.29
N/A	0.58	0.09	0.15	0.23	0.17	0.74	0.63	0.46
Total	0.32%	0.21%	0.17%	0.26%	0.35%	0.66%	0.47%	0.37%

TABLE 34

PRIVATE PLACEMENT 1986–92: EARLIEST QUALITY RATING
NUMBER OF CREDIT EVENTS

Rating	1986	1987	1988	1989	1990	1991	1992	Total
AAA	0	0	0	0	1	0	0	1
AA	0	3	0	1	1	1	1	7
A	0	2	0	4	3	11	1	21
BBB	13	27	7	10	4	13	15	89
BB	12	6	4	2	7	20	19	70
B	4	6	8	4	11	13	8	54
<B	8	5	7	5	3	3	1	32
N/A	16	7	9	16	9	29	33	119
Total	53	56	35	42	39	90	78	393

TABLE 35

PRIVATE PLACEMENT 1986–92: EARLIEST QUALITY RATING
NUMBER OF EXPOSURES

Rating	1986	1987	1988	1989	1990	1991	1992	Total
AAA	375	370	445	438	442	436	380	2,884
AA	779	785	909	925	669	630	621	5,316
A	1,496	1,404	1,764	2,095	1,545	1,544	1,628	11,475
BBB	2,138	1,987	2,329	2,477	1,772	1,752	1,879	14,333
BB	345	345	399	460	459	482	431	2,921
B	133	140	305	361	213	184	139	1,474
<B	187	167	164	147	111	102	121	998
N/A	2,288	2,042	2,115	1,816	1,312	1,820	2,010	13,400
Total	7,739	7,239	8,428	8,717	6,523	6,948	7,207	52,799

TABLE 36

PRIVATE PLACEMENT 1986–92: EARLIEST QUALITY RATING
DOLLAR AMOUNT OF CREDIT EVENTS (IN MILLIONS)

Rating	1986	1987	1988	1989	1990	1991	1992	Total
AAA	$ 0.0	$ 0.0	S 0.0	$ 0.0	$ 15.0	$ 0.0	$ 0.0	$ 15.0
AA	0.0	18.4	0.0	3.7	5.0	10.0	4.1	41.2
A	0.0	12.3	0.0	46.5	19.8	157.8	7.0	243.5
BBB	120.9	259.6	28.4	179.8	37.0	161.4	111.4	898.5
BB	125.6	49.6	36.8	24.0	66.9	247.0	264.7	814.7
B	13.6	31.6	69.3	13.0	174.4	304.1	108.9	714.8
<B	52.6	13.3	23.4	37.0	60.7	30.5	6.0	223.5
N/A	84.3	72.5	105.3	141.0	174.0	450.1	1,089.3	2,116.5
Total	$397.0	$457.2	$263.2	$445.0	$552.8	$1,361.0	$1,591.4	S5,067.6

TABLE 37

PRIVATE PLACEMENT 1986–92: EARLIEST QUALITY RATING
DOLLAR AMOUNT OF EXPOSURES (IN BILLIONS)

Rating	1986	1987	1988	1989	1990	1991	1992	Total
AAA	$ 3.467	$ 3.400	$ 3.542	$ 3.818	$ 4.658	$ 4.570	$ 3.583	$ 27.038
AA	7.325	7.826	8.692	8.524	6.346	5.762	5.178	49.653
A	11.877	11.836	13.646	15.707	14.196	14.712	14.717	96.690
BBB	15.082	15.408	16.200	18.034	17.235	18.103	17.552	117.614
BB	2.452	2.685	3.134	3.926	4.601	4.965	4.041	25.804
B	0.688	1.107	1.971	2.412	2.001	1.782	1.222	11.184
<B	0.831	0.696	0.606	0.579	0.680	0.488	0.481	4.362
N/A	8.644	9.700	13.896	15.659	23.843	37.962	43.129	152.832
Total	$50.366	$52.659	$61.637	$68.658	$73.560	$88.345	$89.904	$485.178

FIGURE 34

PRIVATE PLACEMENT 1986–92: NAIC RATING
INCIDENCE AND ECONOMIC LOSS
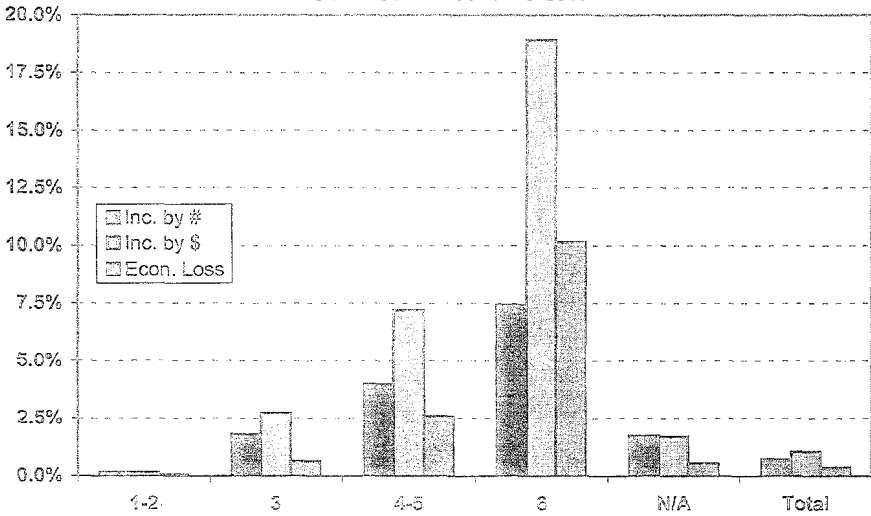
FIGURE 35
PRIVATE PLACEMENT 1986–92: NAIC RATING
ECONOMIC LOSS
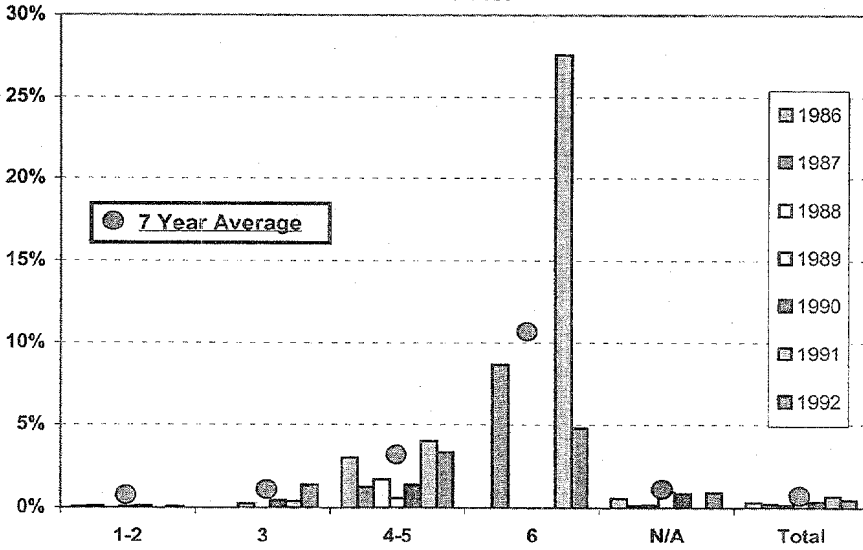
FIGURE 36
PRIVATE PLACEMENT 1986–92: NAIC RATING
LOSS SEVERITY DISTRIBUTIONS

Std. Deviation					
35.0%	31.1%	28.4%	33.8%	30.1%	32.1%

| 1-2 | 3 | 4-5 | 6 | N/A | Total |
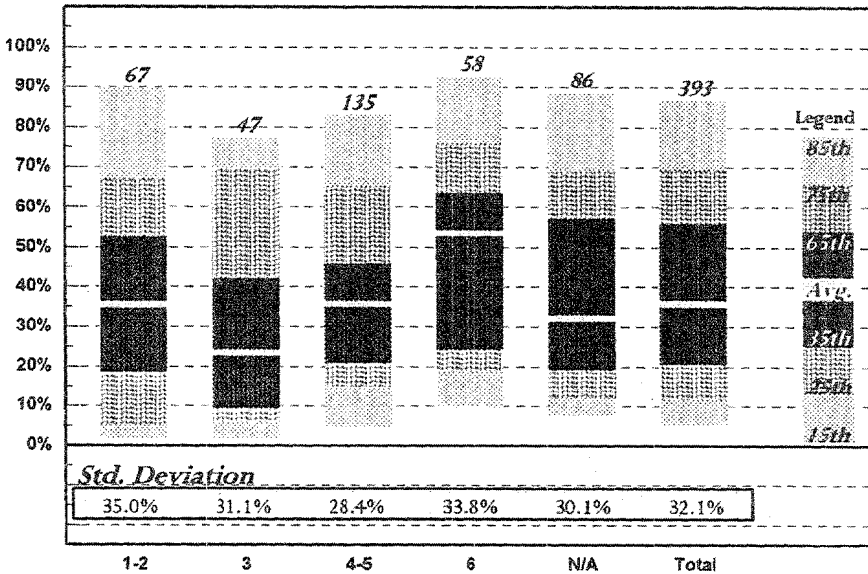
FIGURE 37
PRIVATE PLACEMENT 1986–92: NAIC RATING
EXPOSURES IN BILLIONS

Percent of Total				
76%	6%	6%	1%	12%
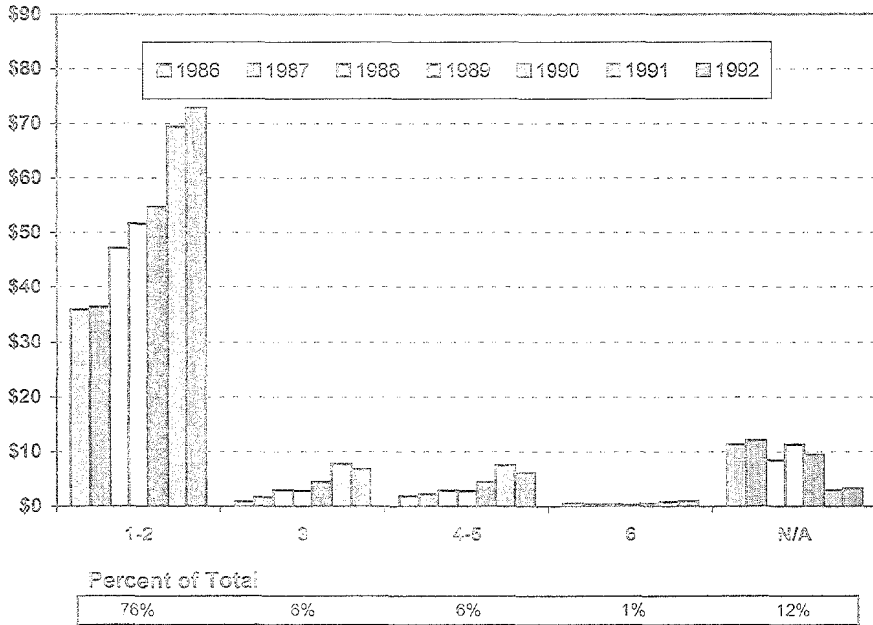
Data Notes (Tables 38–45)

- See Data Notes under Aggregate Experience (Section III.B.)
- This is the most recent NAIC rating at the year-end prior to the exposure period.
- 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 (1986–90)	Current NAIC Scale (1991–92)
Investment Grade	Yes	NAIC 1&2
Below Investment Grade (High)	No*	NAIC 3
Below Investment Grade (Low)	No**	NAIC 4&5
At or Near Default	No	NAIC 6

TABLE 38

PRIVATE PLACEMENT 1986–92: NAIC RATING
INCIDENCE BY NUMBER

Rating	1986	1987	1988	1989	1990	1991	1992	Total
1–2	0.23%	0.25%	0.04%	0.18%	0.16%	0.05%	0.24%	0.16%
3	2.37	0.54	1.83	0.28	1.54	2.11	2.76	1.79
4–5	2.86	3.49	1.80	2.68	2.06	8.82	5.09	4.00
6	0.94	13.95	4.26	0.95	3.55	16.74	9.87	7.44
N/A	1.67	0.95	1.76	1.93	2.42	2.29	3.76	1.73
Total	0.68%	0.77%	0.42%	0.48%	0.60%	1.30%	1.08%	0.74%

TABLE 39

PRIVATE PLACEMENT 1986–92: NAIC RATING
INCIDENCE BY DOLLAR AMOUNT

Rating	1986	1987	1988	1989	1990	1991	1992	Total
1–2	0.21%	0.20%	0.04%	0.17%	0.18%	0.05%	0.33%	0.17%
3	1.82	0.19	1.27	1.44	1.42	2.22	6.11	2.74
4–5	5.78	9.49	2.83	2.91	2.44	10.62	9.92	7.20
6	1.11	22.30	12.40	1.49	14.49	37.32	20.83	18.93
N/A	1.73	0.71	0.96	2.09	2.21	1.85	4.11	1.69
Total	0.79%	0.87%	0.43%	0.65%	0.75%	1.54%	1.77%	1.04%

TABLE 40

PRIVATE PLACEMENT 1986–92: NAIC RATING
SEVERITY

Rating	1986	1987	1988	1989	1990	1991	1992	Total
1–2	39.28%	48.60%	32.73%	48.25%	53.87%	29.01%	19.28%	35.59%
3	76.49	−3.37	19.30	34.83	30.56	17.18	22.45	23.48
4–5	52.22	12.92	59.59	18.89	55.65	37.78	33.80	35.82
6	57.36	38.73	65.91	49.42	62.42	73.78	23.10	53.68
N/A	31.83	16.95	17.52	44.54	38.47	26.86	22.01	32.22
Total	40.78%	24.27%	39.94%	39.86%	46.86%	42.63%	26.35%	35.80%

TABLE 41

PRIVATE PLACEMENT 1986–92: NAIC RATING
ECONOMIC LOSS

Rating	1986	1987	1988	1989	1990	1991	1992	Total
1–2	0.08%	0.10%	0.01%	0.08%	0.10%	0.01%	0.06%	0.06%
3	1.39	−0.01	0.24	0.50	0.43	0.38	1.37	0.64
4–5	3.02	1.23	1.69	0.55	1.36	4.01	3.35	2.58
6	0.64	8.64	8.17	0.73	9.04	27.54	4.81	10.16
N/A	0.55	0.12	0.17	0.93	0.85	0.50	0.90	0.55
Total	0.32%	0.21%	0.17%	0.26%	0.35%	0.66%	0.47%	0.37%

TABLE 42

PRIVATE PLACEMENT 1986–92: NAIC RATING
NUMBER OF CREDIT EVENTS

Rating	1986	1987	1988	1989	1990	1991	1992	Total
1–2	13	13	3	13	8	3	14	67
3	4	1	6	1	6	13	16	47
4–5	11	15	10	13	9	52	25	135
6	1	15	5	1	3	18	15	58
N/A	24	12	11	14	13	4	8	86
Total	53	56	35	42	39	90	78	393

TABLE 43

PRIVATE PLACEMENT 1986–92: NAIC RATING
NUMBER OF EXPOSURES

Rating	1986	1987	1988	1989	1990	1991	1992	Total
1–2	5,645	5,247	6,801	7,052	5,075	5,459	5,771	41,049
3	169	186	328	352	390	617	579	2,620
4–5	384	430	556	485	436	590	492	3,371
6	106	108	118	105	85	108	152	780
N/A	1,436	1,269	626	724	538	175	213	4,980
Total	7,739	7,239	8,428	8,717	6,523	6,948	7,207	52,799

TABLE 44

PRIVATE PLACEMENT 1986–92: NAIC RATING
DOLLAR AMOUNT OF CREDIT EVENTS (IN MILLIONS)

Rating	1986	1987	1988	1989	1990	1991	1992	Total
1–2	$ 76.1	$ 73.3	$ 20.2	$ 86.3	$101.2	$ 32.4	$ 239.6	$ 629.0
3	15.9	3.2	36.9	40.0	63.3	171.1	416.1	746.4
4–5	104.4	207.0	80.3	79.2	106.6	798.2	607.3	1,983.1
6	5.7	88.4	44.4	3.7	73.0	305.4	196.5	717.3
N/A	194.8	85.3	81.4	235.8	208.7	53.9	132.0	991.9
Total	$397.0	$457.2	$263.2	$445.0	$552.8	$1,361.0	$1,591.4	$5,067.6

TABLE 45

PRIVATE PLACEMENT 1986–92: NAIC RATING
DOLLAR AMOUNT OF EXPOSURES (IN BILLIONS)

Rating	1986	1987	1988	1989	1990	1991	1992	Total
1–2	$35.879	$36.347	$47.137	$51.627	$54.797	$69.379	$72.815	$367.981
3	0.872	1.681	2.908	2.779	4.452	7.716	6.810	27.219
4–5	1.806	2.183	2.836	2.722	4.370	7.515	6.125	27.557
6	0.518	0.396	0.358	0.249	0.504	0.818	0.943	3.788
N/A	11.291	12.052	8.447	11.280	9.437	2.916	3.211	58.633
Total	$50.366	$52.659	$61.687	$68.658	$73.560	$88.345	$89.904	$485.178

G. Private Placement 1986–92: Original Coupon Rate (Figures 38–41)

Highlights

● Coupon is an imperfect proxy for credit risk because of its relationship to the general interest rate environment at funding and subsequent changes in the interest rate environment. In spite of this, there is a clear relationship between original coupon rate and incidence and loss rates.
● There appears to be no relationship between original coupon and severity in terms of average severity or dispersion.
● The higher coupon issues suffered most of the CREs during the 1990–92 period. Of course, there are other factors that contribute to this result including the year of issue and the rating of these CREs.

FIGURE 38
PRIVATE PLACEMENT 1986–92: ORIGINAL COUPON RATE
INCIDENCE AND ECONOMIC LOSS
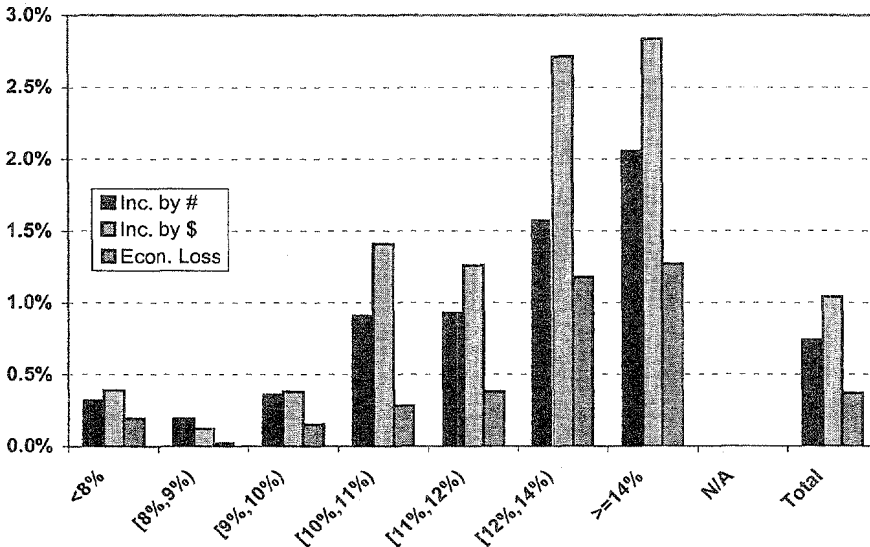
FIGURE 39
PRIVATE PLACEMENT 1986–92: ORIGINAL COUPON RATE
ECONOMIC LOSS
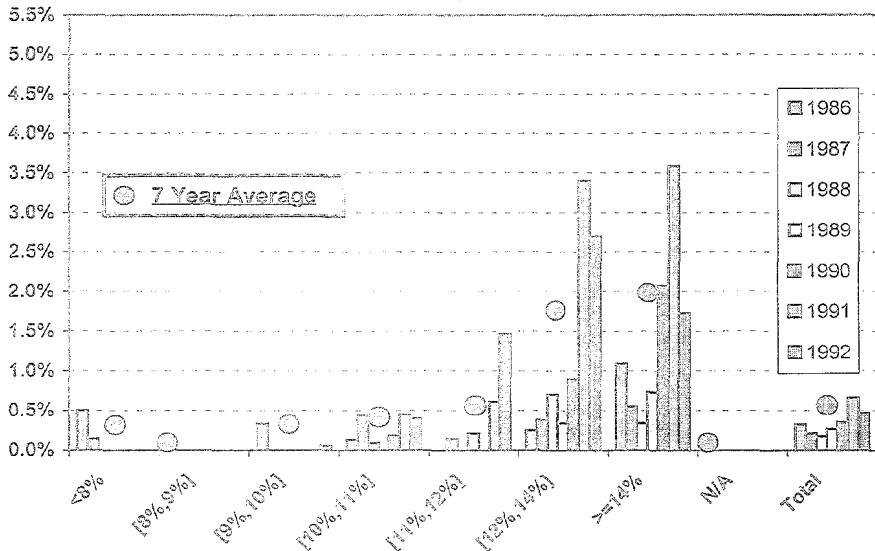
FIGURE 40
PRIVATE PLACEMENT 1986–92: ORIGINAL COUPON RATE
LOSS SEVERITY DISTRIBUTIONS
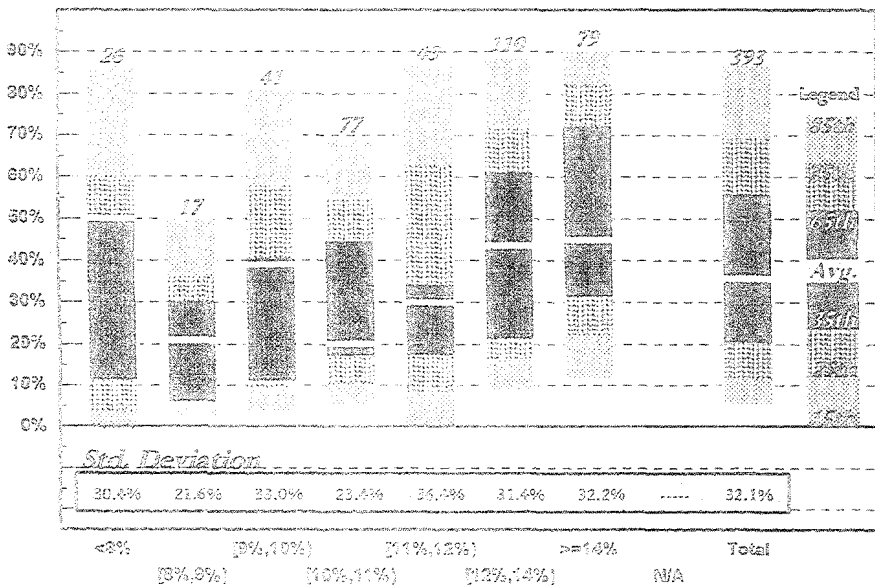
FIGURE 41
PRIVATE PLACEMENT 1986–92: ORIGINAL COUPON·RATE
EXPOSURES IN BILLIONS

Percent of Total							
8%	18%	27%	18%	9%	13%	6%	0%
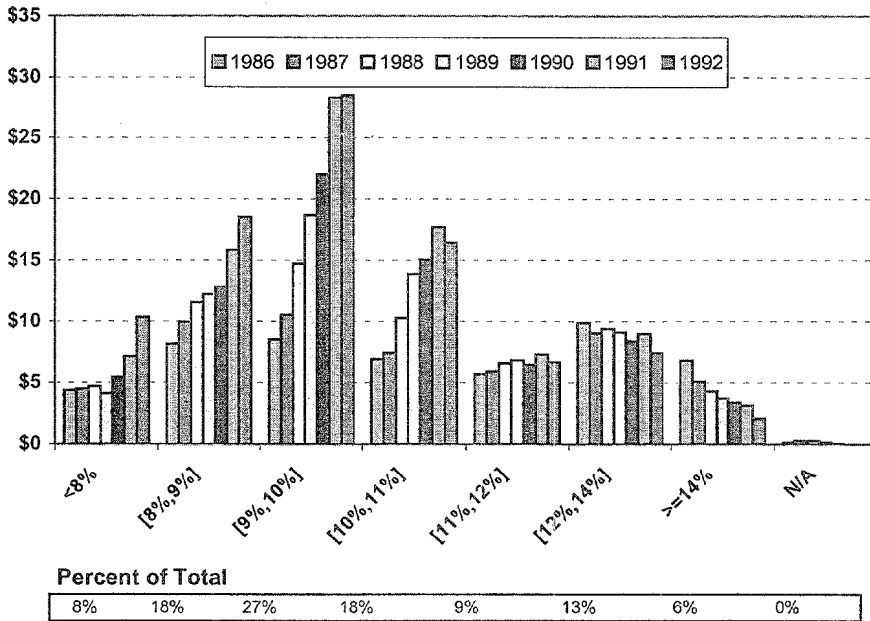
Data Notes (Tables 46–53)

- See Data Notes under Aggregate Experience (Section III.B.).
- CREs coded with a zero coupon rate were included in the "less than 8%" category.
- There are many individual year cells with low credibility due to the low number of CREs in the cell.

H. *Private Placement 1986–92: Funding Year (Figures 42–45)*

Highlights

- Economic loss rates are higher for issues after 1986, perhaps due to seasoning or migration effects.
- Approximately one-half of all exposures were issued after 1986 and one-third from 1987–89.
- Nearly two-thirds of all CREs were for issues between 1984 and 1989. This is not unexpected since about 80% of CREs occur within eight years of the funding date (see Figures 42–44 and Tables 54–61).

TABLE 46

PRIVATE PLACEMENT 1986–92: ORIGINAL COUPON RATE
INCIDENCE BY NUMBER

Rate	1986	1987	1988	1989	1990	1991	1992	Total
<8%	0.44%	0.58%	0.24%	0.00%	0.32%	0.40%	0.26%	0.32%
[8%,9%)	0.25	0.25	0.28	0.14	0.09	0.24	0.07	0.19
[9%,10%)	0.55	0.46	0.30	0.21	0.33	0.11	0.61	0.36
[10%,11%)	0.59	1.34	0.55	0.33	0.52	1.86	1.33	0.91
[11%,12%)	0.37	1.37	0.48	0.76	0.40	1.41	2.39	0.93
[12%,14%)	0.77	0.84	0.49	1.07	1.43	4.38	3.72	1.57
>=14%	2.31	1.21	0.93	1.97	2.45	4.24	2.54	2.06
N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.68%	0.77%	0.42%	0.48%	0.60%	1.30%	1.08%	0.74%

TABLE 47

PRIVATE PLACEMENT 1986–92: ORIGINAL COUPON RATE
INCIDENCE BY DOLLAR AMOUNT

Rate	1986	1987	1988	1989	1990	1991	1992	Total
<8%	0.76%	0.40%	0.13%	0.00%	1.31%	0.09%	0.22%	0.39%
[8%,9%)	0.13	0.18	0.46	0.01	0.05	0.09	0.01	0.12
[9%,10%)	0.90	0.61	0.17	0.70	0.28	0.12	0.39	0.38
[10%,11%)	1.22	2.61	0.20	0.59	0.39	2.51	2.17	1.41
[11%,12%)	0.13	0.47	0.52	1.33	1.09	1.22	3.79	1.26
[12%,14%)	0.54	0.83	1.02	0.91	2.10	5.78	9.27	2.71
>=14%	1.96	1.20	0.69	1.56	3.21	8.04	7.92	2.83
N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.79%	0.87%	0.43%	0.65%	0.75%	1.54%	1.77%	1.04%

TABLE 48

PRIVATE PLACEMENT 1986–92: ORIGINAL COUPON RATE
SEVERITY

Rate	1986	1987	1988	1989	1990	1991	1992	Total
<8%	66.46%	33.87%	11.01%	0.00%	60.18%	43.03%	19.70%	50.07%
[8%,9%)	42.75	14.73	10.56	3.08	37.06	46.76	5.94	20.89
[9%,10%)	37.12	−1.43	42.00	59.43	55.77	79.20	16.54	38.97
[10%,11%)	10.52	16.87	43.38	32.35	46.86	18.03	18.26	20.14
[11%,12%)	7.35	29.82	−1.98	15.70	10.10	49.75	38.78	30.03
[12%,14%)	45.59	45.86	68.89	37.66	42.14	58.84	28.97	43.50
>=14%	55.59	45.67	49.25	47.16	65.04	44.55	21.80	44.95
N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	40.78%	24.27%	39.94%	39.86%	46.86%	42.63%	26.35%	35.80%

TABLE 49

PRIVATE PLACEMENT 1986–92: ORIGINAL COUPON RATE
ECONOMIC LOSS

Rate	1986	1987	1988	1989	1990	1991	1992	Total
<8%	0.50%	0.14%	0.01%	0.00%	0.79%	0.04%	0.04%	0.19%
[8%,9%)	0.05	0.03	0.05	0.00	0.02	0.04	0.00	0.02
[9%,10%)	0.33	−0.01	0.07	0.42	0.16	0.10	0.06	0.15
[10%,11%)	0.13	0.44	0.09	0.19	0.18	0.45	0.40	0.28
[11%,12%)	0.01	0.14	−0.01	0.21	0.11	0.61	1.47	0.38
[12%,14%)	0.25	0.38	0.70	0.34	0.89	3.40	2.69	1.18
>=14%	1.09	0.55	0.34	0.73	2.08	3.58	1.73	1.27
N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.32%	0.21%	0.17%	0.26%	0.35%	0.66%	0.47%	0.37%

TABLE 50

PRIVATE PLACEMENT 1986–92: ORIGINAL COUPON RATE
NUMBER OF CREDIT EVENTS

Rate	1986	1987	1988	1989	1990	1991	1992	Total
<8%	6	7	3	0	3	4	3	26
[8%,9%)	3	3	4	2	1	3	1	17
[9%,10%)	7	6	5	4	5	2	12	41
[10%,11%)	6	13	7	5	6	23	17	77
[11%,12%)	3	10	4	6	2	7	11	43
[12%,14%)	9	9	6	13	12	35	26	110
>=14%	19	8	6	12	10	16	8	79
N/A	0	0	0	0	0	0	0	0
Total	53	56	35	42	39	90	78	393

TABLE 51

PRIVATE PLACEMENT 1986–92: ORIGINAL COUPON RATE
NUMBER OF EXPOSURES

Rate	1986	1987	1988	1989	1990	1991	1992	Total
<8%	1,363	1,206	1,274	1,173	933	991	1,133	8,071
[8%,9%)	1,185	1,210	1,442	1,475	1,154	1,239	1,345	9,048
[9%,10%)	1,282	1,299	1,654	1,875	1,537	1,806	1,974	11,427
[10%,11%)	1,025	972	1,270	1,531	1,145	1,240	1,280	8,462
[11%,12%)	814	729	842	791	500	496	461	4,631
[12%,14%)	1,162	1,069	1,225	1,213	837	800	699	7,003
>=14%	822	661	647	610	408	378	316	3,840
N/A	88	94	77	51	10	0	0	319
Total	7,739	7,239	8,428	8,717	6,523	6,948	7,207	52,799

TABLE 52

PRIVATE PLACEMENT 1986–92: ORIGINAL COUPON RATE
DOLLAR AMOUNT OF CREDIT EVENTS (IN MILLIONS)

Rate	1986	1987	1988	1989	1990	1991	1992	Total
<8%	$ 33.0	$ 17.9	$ 5.9	$ 0.0	$ 70.9	$ 6.1	$ 22.8	$ 156.6
[8%,9%)	10.3	18.0	53.4	0.7	6.8	14.4	2.0	105.5
[9%,10%)	76.7	64.0	24.4	131.6	62.0	35.0	111.0	504.7
[10%,11%)	84.0	193.7	20.4	82.1	58.7	442.6	356.3	1,237.8
[11%,12%)	7.6	27.6	33.9	90.0	69.9	89.0	250.4	568.3
[12%,14%)	53.3	74.7	95.5	82.6	176.2	519.8	685.4	1,687.5
>=14%	132.1	61.3	29.7	58.1	108.4	254.2	163.5	807.2
N/A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	$397.0	$457.2	$263.2	$445.0	$552.8	$1,361.0	$1,591.4	$5,067.6

TABLE 53

PRIVATE PLACEMENT 1986–92: ORIGINAL COUPON RATE
DOLLAR AMOUNT OF EXPOSURES (IN BILLIONS)

Rate	1986	1987	1988	1989	1990	1991	1992	Total
<8%	$ 4.341	$ 4.479	$ 4.678	$ 4.101	$ 5.423	$ 7.110	$10.337	$ 40.470
[8%,9%)	8.141	9.953	11.535	12.202	12.822	15.825	18.560	89.038
[9%,10%)	8.545	10.519	14.716	18.698	22.028	28.314	28.513	131.333
[10%,11%)	6.884	7.423	10.248	13.880	15.054	17.662	16.428	87.579
[11%,12%)	5.672	5.872	6.558	6.787	6.430	7.274	6.611	45.205
[12%,14%)	9.881	9.039	9.389	9.115	8.384	8.998	7.391	62.197
>=14%	6.757	5.104	4.306	3.730	3.380	3.162	2.064	28.503
N/A	0.145	0.269	0.257	0.146	0.038	0.000	0.000	0.854
Total	$50.366	$52.659	$61.687	$68.658	$73.560	$88.345	$89.904	$485.178

Data Notes (Tables 54–61)

○ See Data Notes under Aggregate Experience (Section III.B)
○ When multiple funding years are reported, the earliest reported funding
   year is used.
○ A large share of the individual year cells have limited credibility due to
   a low number of CREs in the cell.

FIGURE 42

PRIVATE PLACEMENT 1986–92: FUNDING YEAR
INCIDENCE AND ECONOMIC LOSS

FIGURE 43

PRIVATE PLACEMENT 1986–92: FUNDING YEAR
ECONOMIC LOSS
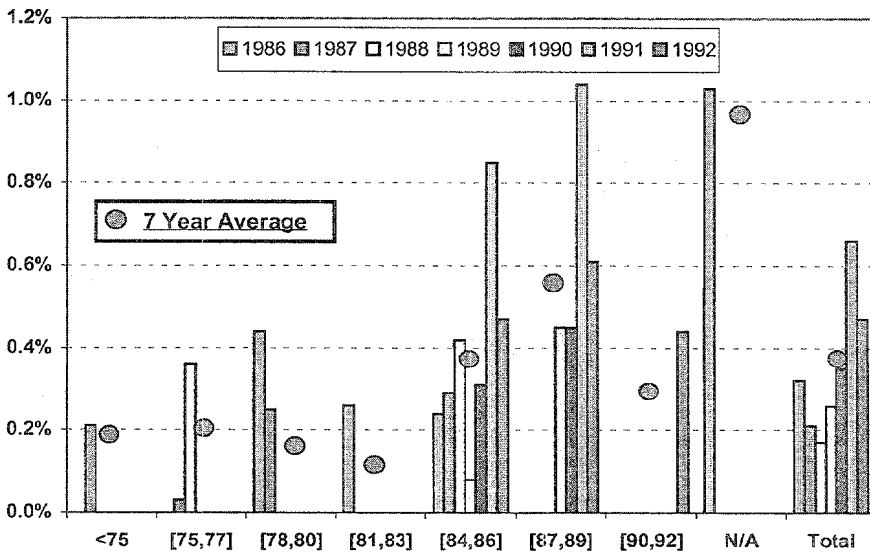
FIGURE 44
PRIVATE PLACEMENT 1986–92: FUNDING YEAR
LOSS SEVERITY DISTRIBUTIONS
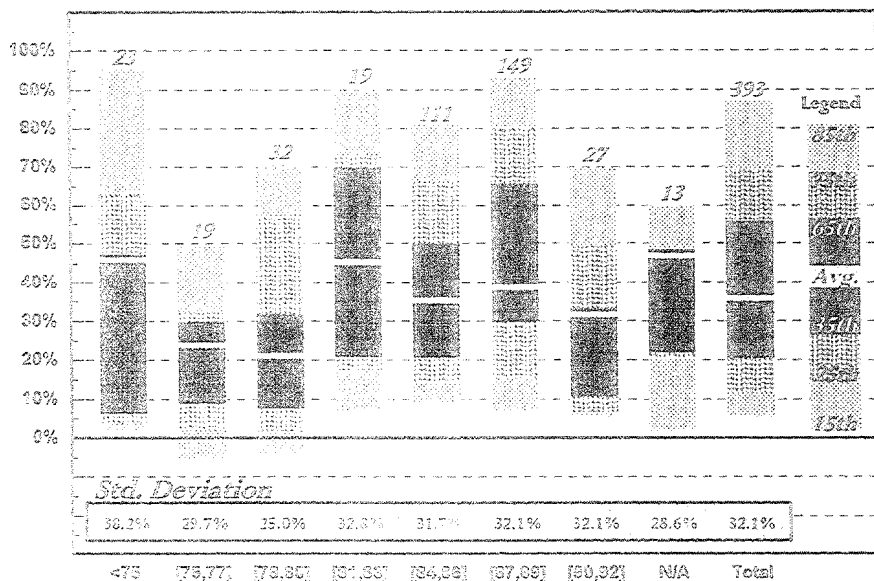
I. Private Placement 1986–92: Years Since Funding (Figures 46–49)

Highlights

○ About 80% of CREs occur within the first eight years of the funding date. This is to be expected since the typical private placement has an average life of about seven years or so and features some amortization of principal.
○ Economic loss rates are relatively low for the first two years after funding, plateau at higher levels for years since funding three through eight, and then decrease to low levels again in years since funding nine and beyond.
○ There appears to be some evidence of a decreasing trend in severity as years since funding increases.

Data Notes (Tables 62–69)

○ See Data Notes under Aggregate Experience (Section III.B)

FIGURE 45

PRIVATE PLACEMENT 1986–92: FUNDING YEAR
EXPOSURES IN BILLIONS

| 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 |

Percent of Total

| 3% | 5% | 8% | 9% | 24% | 36% | 14% | 1% |
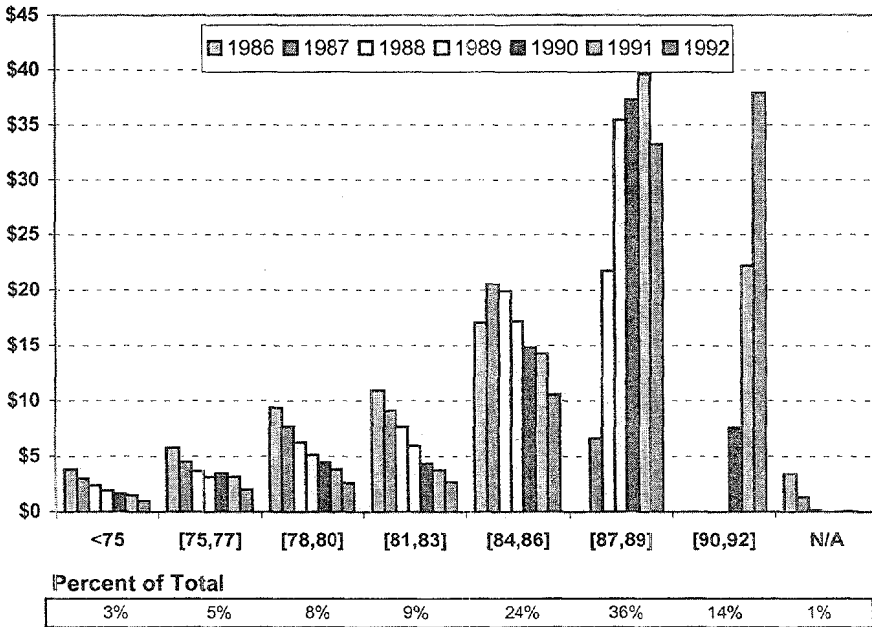
TABLE 54

PRIVATE PLACEMENT 1986–92: FUNDING YEAR
INCIDENCE BY NUMBER

	1986	1987	1988	1989	1990	1991	1992	Total
<75	0.19%	0.68%	0.16%	0.18%	0.44%	0.48%	0.19%	0.32%
[75,77]	0.21	0.97	0.83	0.00	0.17	0.00	0.23	0.38
[78,80]	1.23	0.61	0.08	0.35	0.00	0.52	0.00	0.45
[81,83]	0.70	0.33	0.17	0.29	0.00	0.00	0.00	0.30
[84,86]	0.92	1.04	0.72	0.43	0.88	1.70	1.50	0.94
[87,89]		0.00	0.00	0.94	1.03	2.65	2.34	1.43
[90,92]					0.00	0.00	0.79	0.69
N/A	0.86	1.76	3.51	0.00	0.00	50.00	0.00	1.28
Total	0.68%	0.77%	0.42%	0.48%	0.60%	1.30%	1.08%	0.74%

● This variable is defined as the current experience year minus the funding year.

● A large share of the individual year cells have limited credibility due to the low number of CREs in the cell.

TABLE 55
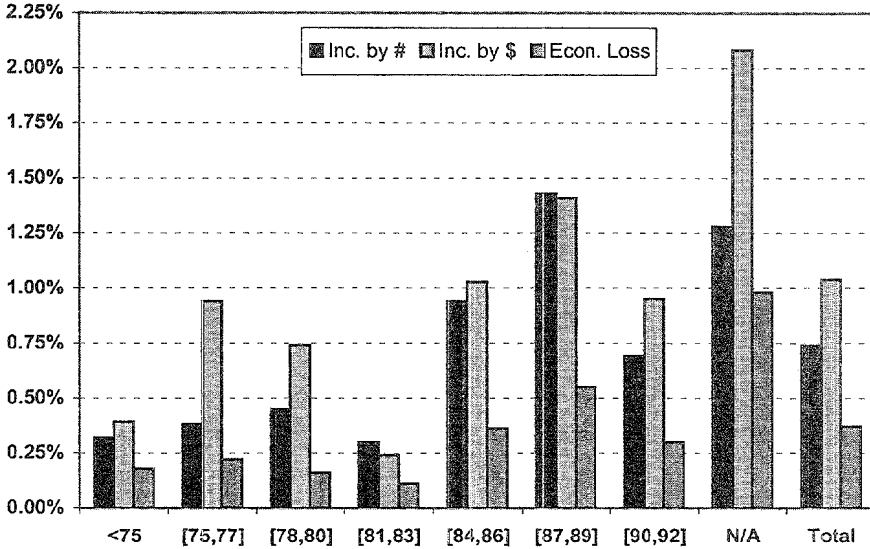
PRIVATE PLACEMENT 1986–92: FUNDING YEAR
INCIDENCE BY DOLLAR AMOUNT

	1986	1987	1988	1989	1990	1991	1992	Total
<75	0.66%	0.53%	0.13%	0.04%	0.55%	0.30%	0.12%	0.39%
[75,77]	0.06	2.12	2.07	0.00	1.86	0.00	0.02	0.94
[78,80]	1.83	1.22	0.04	0.20	0.00	0.34	0.00	0.74
[81,83]	0.53	0.27	0.18	0.21	0.00	0.00	0.00	0.24
[84,86]	0.48	0.89	0.74	0.23	1.07	2.03	2.59	1.03
[87,89]		0.00	0.00	1.08	0.85	2.40	2.29	1.41
[90,92]					0.00	0.00	1.46	0.95
N/A	1.66	2.12	1.88	0.00	0.00	40.48	0.00	2.08
Total	0.79%	0.87%	0.43%	0.65%	0.75%	1.54%	1.77%	1.04%

TABLE 56

PRIVATE PLACEMENT 1986–92: FUNDING YEAR
SEVERITY

	1986	1987	1988	1989	1990	1991	1992	Total
<75	68.33%	39.13%	10.49%	3.08%	−5.07%	64.75%	100.00%	46.12%
[75,77]	5.56	1.61	17.28	0.00	65.31	0.00	9.72	23.94
[78,80]	24.01	20.63	3.32	4.15	0.00	5.74	0.00	21.25
[81,83]	48.01	45.30	42.13	37.05	0.00	0.00	0.00	45.42
[84,86]	49.05	33.15	56.43	34.88	29.08	41.77	18.26	35.35
[87,89]		33.92	14.02	41.48	53.32	43.27	26.54	38.80
[90,92]					63.03	42.58	29.95	31.77
N/A	62.02	21.73	−0.95	0.00	0.00	44.10	0.00	46.92
Total	40.78%	24.27%	39.94%	39.86%	46.86%	42.63%	26.35%	35.80%

TABLE 57

PRIVATE PLACEMENT 1986–92: FUNDING YEAR
ECONOMIC LOSS

	1986	1987	1988	1989	1990	1991	1992	Total
<75	0.45%	0.21%	0.01%	0.00%	−0.03%	0.20%	0.12%	0.18%
[75,77]	0.00	0.03	0.36	0.00	1.22	0.00	0.00	0.22
[78,80]	0.44	0.25	0.00	0.01	0.00	0.02	0.00	0.16
[81,83]	0.26	0.12	0.08	0.08	0.00	0.00	0.00	0.11
[84,86]	0.24	0.29	0.42	0.08	0.31	0.85	0.47	0.36
[87,89]		0.00	0.00	0.45	0.45	1.04	0.61	0.55
[90,92]					0.00	0.00	0.44	0.30
N/A	1.03	0.46	−0.02	0.00	0.00	0.20	0.00	0.98
Total	0.32%	0.21%	0.17%	0.26%	0.35%	0.66%	0.47%	0.37%

TABLE 58

PRIVATE PLACEMENT 1986–92: FUNDING YEAR
NUMBER OF CREDIT EVENTS

	1986	1987	1988	1989	1990	1991	1992	Total
<75	3	9	2	2	3	3	1	23
[75,77]	2	8	7	0	1	0	1	19
[78,80]	16	7	1	4	0	4	0	32
[81,83]	10	4	2	3	0	0	0	19
[84,86]	16	21	17	9	12	21	15	111
[87,89]		2	5	24	21	54	43	149
[90,92]					2	7	18	27
N/A	6	5	1	0	0	1	0	13
Total	53	56	35	42	39	90	78	393

TABLE 59

PRIVATE PLACEMENT 1986–92: FUNDING YEAR
NUMBER OF EXPOSURES

	1986	1987	1988	1989	1990	1991	1992	Total
<75	1,600	1,320	1,267	1,092	682	621	520	7,100
[75,77]	974	828	845	794	603	532	436	5,012
[78,80]	1,306	1,145	1,190	1,136	816	773	714	7,080
[81,83]	1,429	1,223	1,192	1,025	595	520	421	6,403
[84,86]	1,736	2,028	2,353	2,105	1,367	1,234	1,001	11,823
[87,89]		412	1,553	2,563	2,046	2,040	1,840	10,453
[90,92]					414	1,226	2,276	3,916
N/A	695	284	29	4	1	2	0	1,014
Total	7,739	7,239	8,428	8,717	6,523	6,948	7,207	52,799

TABLE 60

PRIVATE PLACEMENT 1986–92: FUNDING YEAR
DOLLAR AMOUNT OF CREDIT EVENTS (IN MILLIONS)

	1986	1987	1988	1989	1990	1991	1992	Total
<75	$ 25.3	$ 15.8	$ 3.1	$ 0.7	$ 8.9	$ 4.5	$ 1.2	$ 59.4
[75,77]	3.3	94.7	76.0	0.0	65.0	0.0	0.4	239.5
[78,80]	171.6	92.9	2.3	10.1	0.0	13.0	0.0	289.9
[81,83]	58.1	24.5	13.6	12.3	0.0	0.0	0.0	108.5
[84,86]	82.1	182.6	147.7	39.7	158.9	289.7	274.0	1,174.8
[87,89]		19.1	18.0	382.3	317.6	952.2	762.9	2,452.2
[90,92]					2.4	86.5	552.9	641.8
N/A	56.5	27.5	2.5	0.0	0.0	15.0	0.0	101.5
Total	$397.0	S457.2	$263.2	$445.0	S552.8	$1,361.0	S1,591.4	$5,067.6

TABLE 61

PRIVATE PLACEMENT 1986–92: FUNDING YEAR
DOLLAR AMOUNT OF EXPOSURES (IN BILLIONS)

	1986	1987	1988	1989	1990	1991	1992	Total
<75	S 3.833	S 2.981	S 2.338	S 1.883	S 1.627	S 1.481	S 0.962	S 15.105
[75,77]	5.754	4.473	3.669	3.116	3.493	3.105	1.966	25.576
[78,80]	9.386	7.629	6.229	5.133	4.422	3.817	2.574	39.189
[81,83]	10.940	9.116	7.630	5.925	4.353	3.743	2.612	44.318
[84,86]	17.055	20.580	19.913	17.182	14.837	14.240	10.564	114.372
[87,89]		6.583	21.777	35.414	37.253	39.680	33.276	173.983
[90,92]					7.567	22.243	37.951	67.761
N/A	3.398	1.297	0.131	0.004	0.007	0.037	0.000	4.874
Total	S50.366	S52.659	S61.687	S68.658	S73.560	S88.345	S89.904	S485.178

FIGURE 46

PRIVATE PLACEMENT 1986–92: YEARS SINCE FUNDING
INCIDENCE AND ECONOMIC LOSS
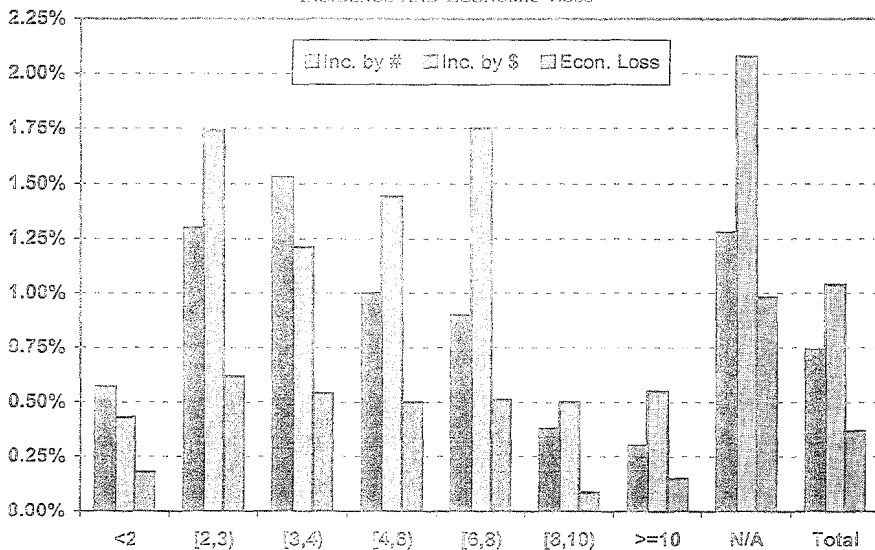
FIGURE 47

PRIVATE PLACEMENT 1986–92: YEARS SINCE FUNDING
ECONOMIC LOSS
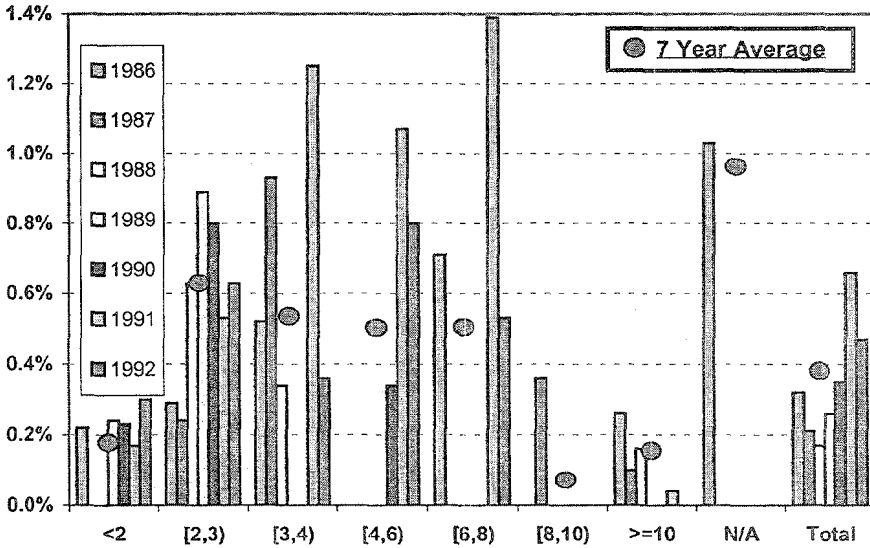
FIGURE 48

PRIVATE PLACEMENT 1986–92: YEARS SINCE FUNDING
LOSS SEVERITY DISTRIBUTIONS
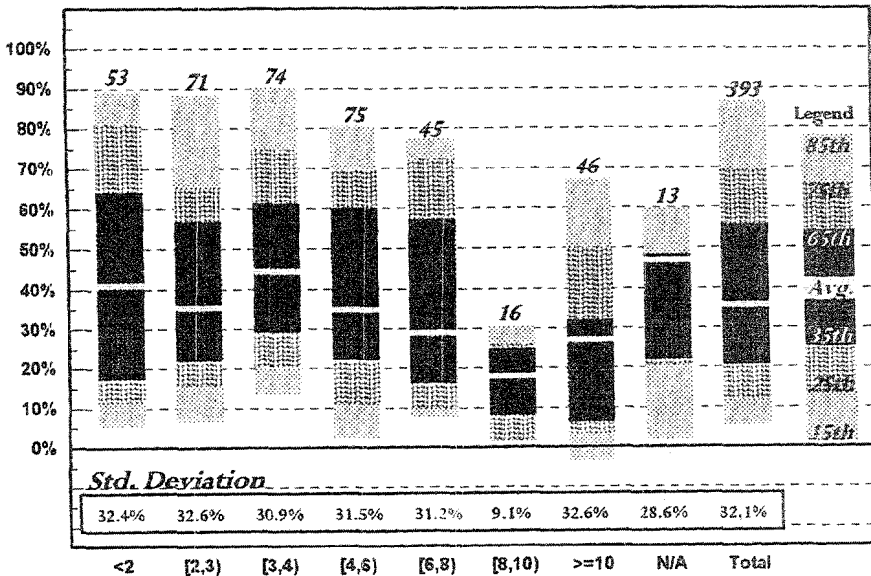
FIGURE 49

PRIVATE PLACEMENT 1986–92: YEARS SINCE FUNDING
EXPOSURES IN BILLIONS
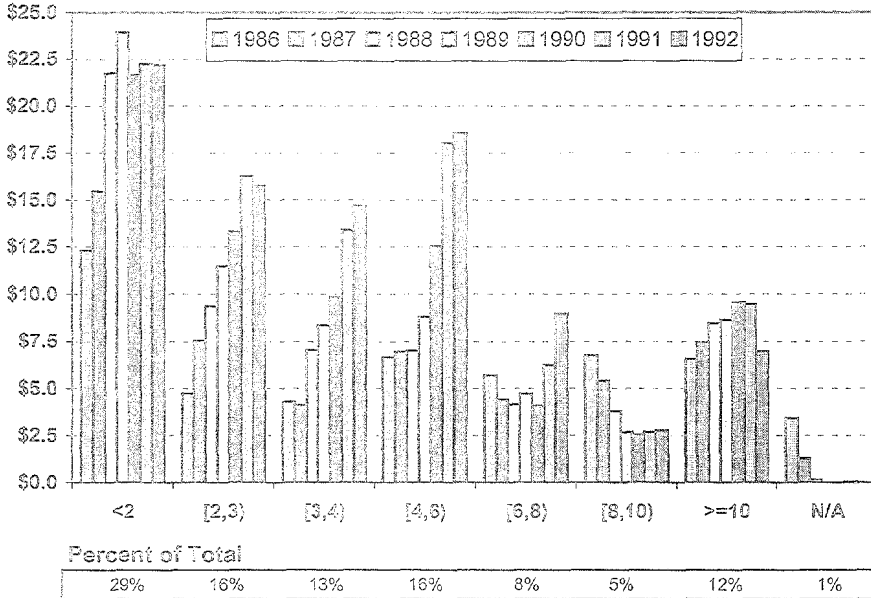
TABLE 62

PRIVATE PLACEMENT 1986–92: YEARS SINCE FUNDING
INCIDENCE BY NUMBER

	1986	1987	1988	1989	1990	1991	1992	Total
<2	0.77%	0.35%	0.32%	0.87%	0.66%	0.57%	0.44%	0.57%
[2,3)	1.23	1.33	0.76	1.06	1.57	2.05	1.33	1.30
[3,4)	1.29	1.66	1.17	0.47	0.63	3.35	2.33	1.53
[4,6)	0.34	0.23	0.09	0.40	1.03	2.17	2.34	1.00
[6,8)	1.72	0.29	0.14	0.27	0.19	1.64	1.66	0.90
[8,10)	0.23	0.87	0.13	0.66	0.00	0.00	0.51	0.38
>=10	0.19	0.79	0.36	0.11	0.19	0.34	0.10	0.30
N/A	0.86	1.76	3.51	0.00	0.00	50.00	0.00	1.28
Total	0.68%	0.77%	0.42%	0.48%	0.60%	1.30%	1.08%	0.74%

TABLE 63

PRIVATE PLACEMENT 1986–92: YEARS SINCE FUNDING
INCIDENCE BY DOLLAR AMOUNT

	1986	1987	1988	1989	1990	1991	1992	Total
<2	0.45%	0.22%	0.08%	0.62%	0.41%	0.39%	0.76%	0.43%
[2,3)	0.55	1.34	0.78	2.04	1.57	2.08	2.44	1.74
[3,4)	0.92	1.61	1.07	0.23	0.22	2.45	1.35	1.21
[4,6)	0.28	0.14	0.14	0.23	1.23	1.98	3.04	1.44
[6,8)	2.97	0.34	0.09	0.18	0.12	3.50	2.80	1.75
[8,10)	0.05	1.72	0.06	0.42	0.00	0.00	0.83	0.50
>=10	0.42	1.48	0.93	0.04	0.77	0.18	0.02	0.55
N/A	1.66	2.12	1.88	0.00	0.00	40.48	0.00	2.08
Total	0.79%	0.87%	0.43%	0.65%	0.75%	1.54%	1.77%	1.04%

TABLE 64

PRIVATE PLACEMENT 1986–92: YEARS SINCE FUNDING
SEVERITY

	1986	1987	1988	1989	1990	1991	1992	Total
<2	47.73%	30.79%	14.02%	38.41%	54.36%	42.58%	39.11%	41.30%
[2,3)	51.87	17.95	81.57	43.41	50.83	25.57	25.92	35.51
[3,4)	55.98	57.74	32.01	69.62	74.15	50.91	27.02	44.71
[4,6)	31.04	0.45	49.12	1.26	27.55	53.95	26.38	34.85
[6,8)	23.96	73.64	22.83	47.71	75.86	39.79	18.88	29.00
[8,10)	29.77	20.63	3.32	8.23	0.00	0.00	11.52	17.94
>=10	62.39	6.96	17.01	−2.03	56.82	20.94	76.08	27.14
N/A	62.02	21.73	−0.95	0.00	0.00	44.10	0.00	46.92
Total	40.78%	24.27%	39.94%	39.86%	46.86%	42.63%	26.35%	35.80%

TABLE 65

PRIVATE PLACEMENT 1986–92: YEARS SINCE FUNDING
ECONOMIC LOSS

	1986	1987	1988	1989	1990	1991	1992	Total
<2	0.22%	0.07%	0.01%	0.24%	0.23%	0.17%	0.30%	0.18%
[2,3)	0.29	0.24	0.63	0.89	0.80	0.53	0.63	0.62
[3,4)	0.52	0.93	0.34	0.16	0.16	1.25	0.36	0.54
[4,6)	0.09	0.00	0.07	0.00	0.34	1.07	0.80	0.50
[6,8)	0.71	0.25	0.02	0.09	0.09	1.39	0.53	0.51
[8,10)	0.02	0.36	0.00	0.03	0.00	0.00	0.10	0.09
>=10	0.26	0.10	0.16	−0.00	0.44	0.04	0.02	0.15
N/A	1.03	0.46	−0.02	0.00	0.00	17.85	0.00	0.98
Total	0.32%	0.21%	0.17%	0.26%	0.35%	0.66%	0.47%	0.37%

TABLE 66

PRIVATE PLACEMENT 1986–92: YEARS SINCE FUNDING
NUMBER OF CREDIT EVENTS

	1986	1987	1988	1989	1990	1991	1992	Total
<2	9	4	5	15	7	7	6	53
[2,3)	7	10	7	9	12	14	12	71
[3,4)	7	9	10	4	4	24	16	74
[4,6)	3	2	1	5	11	26	27	75
[6,8)	15	2	1	2	1	11	13	45
[8,10)	2	7	1	4	0	0	2	16
>=10	4	17	9	3	4	7	2	46
N/A	6	5	1	0	0	1	0	13
Total	53	56	35	42	39	90	78	393

TABLE 67

PRIVATE PLACEMENT 1986–92: YEARS SINCE FUNDING
NUMBER OF EXPOSURES

	1986	1987	1988	1989	1990	1991	1992	Total
<2	1,165	1,147	1,553	1,716	1,060	1,226	1,374	9,240
[2,3)	571	751	926	847	762	685	902	5,444
[3,4)	542	542	854	852	638	717	687	4,831
[4,6)	887	876	1,064	1,253	1,071	1,201	1,153	7,504
[6,8)	870	685	701	745	537	672	785	4,993
[8,10)	857	808	798	605	355	377	396	4,195
>=10	2,153	2,148	2,504	2,697	2,101	2,069	1,911	15,581
N/A	695	284	29	4	1	2	0	1,014
Total	7,739	7,239	8,428	8,717	6,523	6,948	7,207	52,799

TABLE 68

PRIVATE PLACEMENT 1986–92: YEARS SINCE FUNDING
DOLLAR AMOUNT OF CREDIT EVENTS (IN MILLIONS)

	1986	1987	1988	1989	1990	1991	1992	Total
<2	$ 56.0	$ 34.2	$ 18.0	$147.3	$ 89.8	$ 86.5	$ 168.8	$ 600.6
[2,3)	26.1	101.1	72.8	235.0	208.7	338.9	384.1	1,366.8
[3,4)	39.5	66.4	74.9	19.5	21.5	327.6	198.5	748.0
[4,6)	18.6	9.5	10.0	20.2	153.9	357.8	564.4	1,134.2
[6,8)	169.5	15.0	3.6	8.7	5.0	217.7	251.0	670.6
[8,10)	3.4	92.9	2.3	11.2	0.0	0.0	23.0	132.9
>=10	27.3	110.5	79.1	3.2	73.9	17.5	1.6	313.1
N/A	56.5	27.5	2.5	0.0	0.0	15.0	0.0	101.5
Total	$397.0	$457.2	$263.2	$445.0	$552.8	$1,361.0	$1,591.4	$5,067.6

TABLE 69

PRIVATE PLACEMENT 1986–92: YEARS SINCE FUNDING
DOLLAR AMOUNT OF EXPOSURES (IN BILLIONS)

	1986	1987	1988	1989	1990	1991	1992	Total
<2	$12.312	$15.490	$21.777	$23.922	$21.686	$22.243	$22.199	$139.630
[2,3)	4.743	7.555	9.379	11.492	13.282	16.259	15.751	78.461
[3,4)	4.289	4.118	7.010	8.372	9.852	13.381	14.704	61.725
[4,6)	6.651	6.922	6.987	8.810	12.546	18.051	18.572	78.539
[6,8)	5.704	4.427	4.167	4.734	4.095	6.229	8.962	38.318
[8,10)	6.736	5.396	3.769	2.678	2.550	2.684	2.774	26.588
>=10	6.533	7.454	8.467	8.646	9.542	9.461	6.940	57.043
N/A	3.398	1.297	0.131	0.004	0.007	0.037	0.000	4.874
Total	$50.366	$52.659	$61.687	$68.658	$73.560	$88.345	$89.904	$485.178

J. Private Placement 1986–92: Years to Maturity (Figures 50–53)

Highlights

● Economic loss is relatively higher within two years of maturity and also beyond six years to maturity.
● This economic loss pattern appears to be driven by severity rather than incidence, at least for the higher economic loss results within two years of maturity.

Data Notes (Tables 70–77)

● See Data Notes under Aggregate Experience (Section III.B)
● This variable is defined as 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.

FIGURE 50
PRIVATE PLACEMENT 1986–92: YEARS TO MATURITY
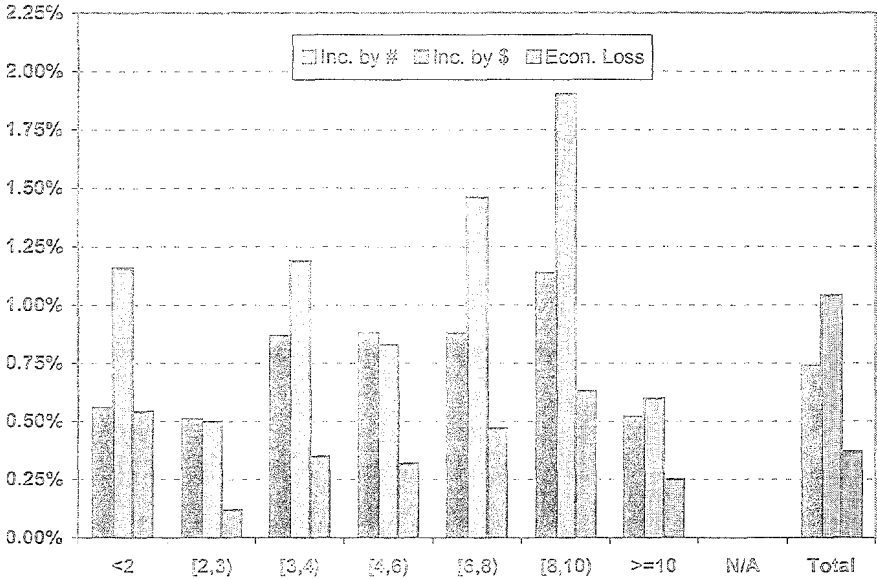INCIDENCE AND ECONOMIC LOSS

FIGURE 51
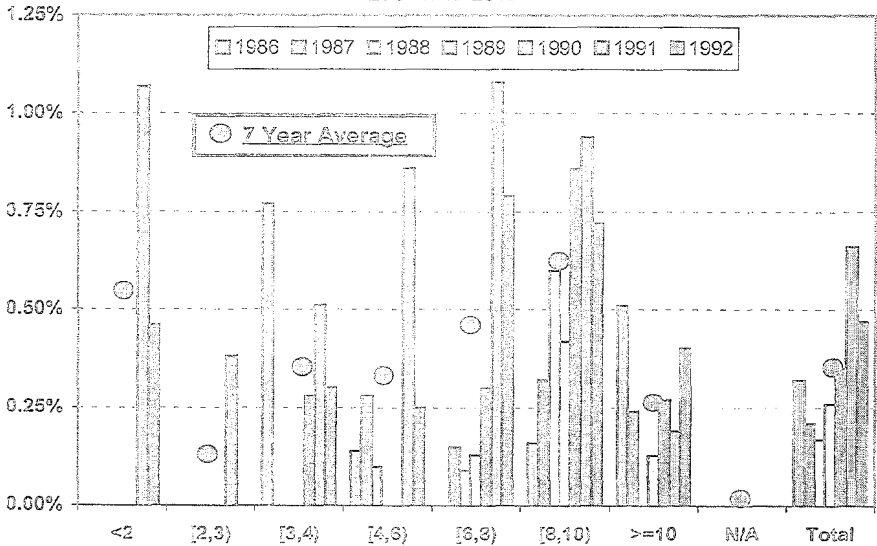PRIVATE PLACEMENT 1986–92: YEARS TO MATURITY
ECONOMIC LOSS

FIGURE 52

PRIVATE PLACEMENT 1986–92: YEARS TO MATURITY
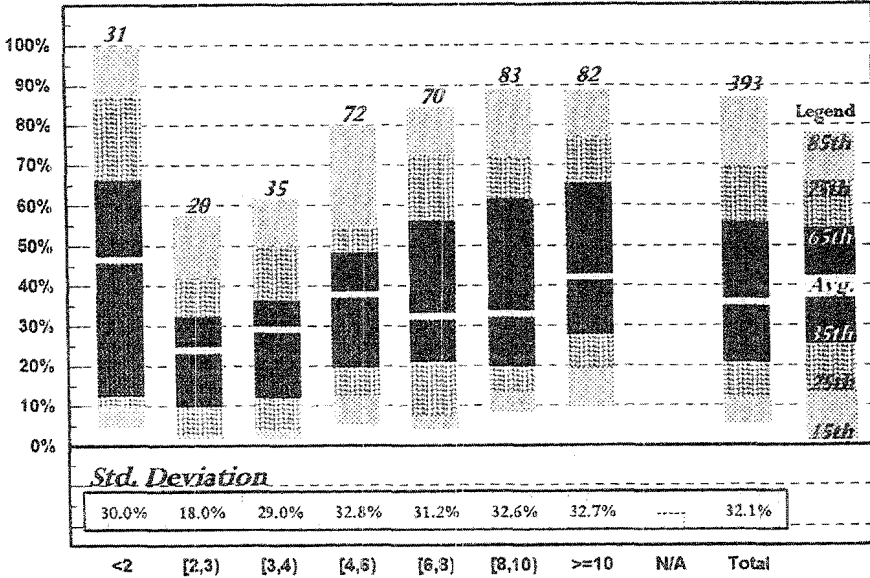LOSS SEVERITY DISTRIBUTIONS

FIGURE 53

PRIVATE PLACEMENT 1986–92: YEARS TO MATURITY
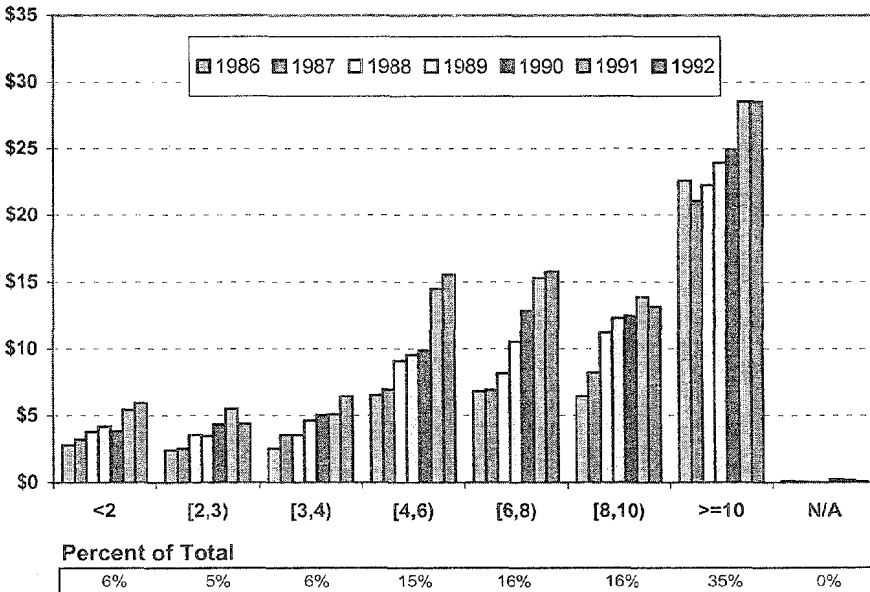EXPOSURES IN BILLIONS

TABLE 70

PRIVATE PLACEMENT 1986–92: YEARS TO MATURITY
INCIDENCE BY NUMBER

	1986	1987	1988	1989	1990	1991	1992	Total
<2	0.26%	0.24%	0.00%	0.42%	0.15%	2.05%	1.14%	0.56%
[2,3)	0.50	0.38	0.31	0.29	0.00	1.56	0.62	0.51
[3,4)	1.08	0.37	0.30	0.73	1.43	1.21	1.20	0.87
[4,6)	0.54	1.65	0.54	0.31	0.42	1.35	1.32	0.88
[6,8)	0.19	0.84	0.81	0.53	0.64	1.93	1.14	0.88
[8,10)	0.65	1.33	0.78	0.84	1.47	1.47	1.74	1.14
>=10	1.03	0.51	0.20	0.36	0.32	0.47	0.66	0.52
N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.68%	0.77%	0.42%	0.48%	0.60%	1.30%	1.08%	0.74%

TABLE 71

PRIVATE PLACEMENT 1986–92: YEARS TO MATURITY
INCIDENCE BY DOLLAR AMOUNT

	1986	1987	1988	1989	1990	1991	1992	Total
<2	0.10%	0.11%	0.00%	2.89%	0.78%	2.34%	0.95%	1.16%
[2,3)	0.58	0.11	0.28	0.16	0.00	1.43	0.48	0.50
[3,4)	1.39	1.38	0.51	0.59	0.78	1.48	1.91	1.19
[4,6)	0.30	1.06	0.43	0.20	0.57	1.24	1.36	0.83
[6,8)	0.08	0.48	0.51	0.60	0.92	3.02	2.47	1.46
[8,10)	0.36	2.19	1.27	0.88	1.36	1.90	4.45	1.90
>=10	1.31	0.54	0.05	0.42	0.56	0.61	0.71	0.60
N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.79%	0.87%	0.43%	0.65%	0.75%	1.54%	1.77%	1.04%

TABLE 72

PRIVATE PLACEMENT 1986–92: YEARS TO MATURITY
SEVERITY

	1986	1987	1988	1989	1990	1991	1992	Total
<2	20.41%	2.93%	0.00%	50.08%	41.46%	45.77%	48.25%	46.70%
[2,3)	26.79	35.21	42.08	1.84	0.00	26.63	8.17	24.06
[3,4)	55.91	5.52	71.73	44.25	36.30	34.86	15.95	29.29
[4,6)	45.42	26.29	22.21	38.12	34.78	69.36	18.07	37.88
[6,8)	65.95	30.05	17.97	21.01	32.71	35.65	31.85	32.50
[8,10)	43.33	14.71	46.82	47.65	63.09	49.65	16.19	33.10
>=10	38.83	44.74	41.51	32.27	48.04	31.20	56.11	42.19
N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	40.78%	24.27%	39.94%	39.86%	46.86%	42.63%	26.35%	35.80%

TABLE 73

PRIVATE PLACEMENT 1986–92: YEARS TO MATURITY
ECONOMIC LOSS

	1986	1987	1988	1989	1990	1991	1992	Total
<2	0.02%	0.00%	0.00%	1.45%	0.32%	1.07%	0.46%	0.54%
[2,3)	0.15	0.04	0.12	0.00	0.00	0.38	0.04	0.12
[3,4)	0.77	0.08	0.37	0.26	0.28	0.51	0.30	0.35
[4,6)	0.14	0.28	0.10	0.08	0.20	0.86	0.25	0.32
[6,8)	0.05	0.15	0.09	0.13	0.30	1.08	0.79	0.47
[8,10)	0.16	0.32	0.60	0.42	0.86	0.94	0.72	0.63
>=10	0.51	0.24	0.02	0.13	0.27	0.19	0.40	0.25
N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.32%	0.21%	0.17%	0.26%	0.35%	0.66%	0.47%	0.37%

TABLE 74

PRIVATE PLACEMENT 1986–92: YEARS TO MATURITY
NUMBER OF CREDIT EVENTS

	1986	1987	1988	1989	1990	1991	1992	Total
<2	2	2	0	4	1	14	8	31
[2,3)	3	2	2	2	0	8	3	20
[3,4)	6	2	2	5	7	6	7	35
[4,6)	6	17	7	4	4	16	18	72
[6,8)	2	8	9	7	7	23	14	70
[8,10)	6	13	10	11	14	14	15	83
>=10	28	12	5	9	6	9	13	82
N/A	0	0	0	0	0	0	0	0
Total	53	56	35	42	39	90	78	393

TABLE 75

PRIVATE PLACEMENT 1986–92: YEARS TO MATURITY
NUMBER OF EXPOSURES

	1986	1987	1988	1989	1990	1991	1992	Total
<2	773	830	974	959	653	682	702	5,571
[2,3)	599	532	655	684	469	512	485	3,934
[3,4)	554	548	669	685	489	495	585	4,024
[4,6)	1,110	1,032	1,290	1,288	954	1,182	1,367	8,221
[6,8)	1,041	956	1,107	1,311	1,088	1,192	1,230	7,924
[8,10)	920	975	1,282	1,314	954	953	863	7,261
>=10	2,714	2,349	2,443	2,470	1,892	1,912	1,962	15,741
N/A	30	19	10	7	25	21	15	125
Total	7,739	7,239	8,428	8,717	6,523	6,948	7,207	52,799

TABLE 76

PRIVATE PLACEMENT 1986–92: YEARS TO MATURITY
DOLLAR AMOUNT OF CREDIT EVENTS (IN MILLIONS)

	1986	1987	1988	1989	1990	1991	1992	Total
<2	$ 2.8	$ 3.4	$ 0.0	$120.7	$ 30.0	$ 126.4	$ 56.5	$ 339.8
[2,3)	14.0	2.9	10.0	5.4	0.0	78.6	20.9	131.8
[3,4)	35.5	49.2	18.0	27.4	39.4	75.2	123.1	367.8
[4,6)	19.5	73.9	39.1	19.2	56.1	180.4	211.7	599.9
[6,8)	5.7	33.6	41.2	63.8	118.2	461.9	389.6	1,113.9
[8,10)	23.5	180.0	143.4	108.7	170.3	263.3	587.7	1,477.0
>=10	296.0	114.3	11.5	99.9	138.9	175.2	201.9	1,037.6
N/A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	$397.0	$457.2	$263.2	$445.0	$552.8	$1,361.0	$1,591.4	$5,067.6

TABLE 77

PRIVATE PLACEMENT 1986–92: YEARS TO MATURITY
DOLLAR AMOUNT OF EXPOSURES (IN BILLIONS)

	1986	1987	1988	1989	1990	1991	1992	Total
<2	$ 2.819	$ 3.238	$ 3.774	$ 4.183	$ 3.832	$ 5.410	$ 5.931	$ 29.187
[2,3)	2.433	2.572	3.560	3.472	4.343	5.477	4.385	26.243
[3,4)	2.563	3.561	3.528	4.614	5.045	5.095	6.439	30.846
[4,6)	6.539	6.964	9.091	9.548	9.857	14.494	15.547	72.040
[6,8)	6.833	6.935	8.161	10.555	12.873	15.291	15.802	76.449
[8,10)	6.448	8.222	11.283	12.328	12.490	13.882	13.206	77.860
>=10	22.622	21.098	22.258	23.949	24.907	28.545	28.529	171.907
N/A	0.110	0.069	0.033	0.008	0.213	0.149	0.065	0.646
Total	$50.366	$52.659	$61.687	$68.658	$73.560	$88.345	$89.904	$485.178

APPENDIX I

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.

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 the Section I.D.

2. Definitions

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 database 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 that 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.

In effect, economic loss is thus the dollar difference between the net present value of original and revised cash flows, multiplied by a factor that converts the loss to be on a basis consistent with the carrying value of the asset.

Present values are calculated using interest rates described in section C.5 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 in respect of those assets in the cell that experience a CRE, 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 C.6).

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.

3. Loss Statistics

Consistent with the model, the following loss statistics are calculated.
a. *Incidence rate by number, $IR^{No.}$*

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

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

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

c. *Loss Severity, LS*

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

d. *Economic Loss per Unit of Exposure, EL/E*

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

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 flows for credit risk event "i" at the loss calculation date

$PV^{RCF\ CRE_i}_{loss\ calc\ date}$ = present value of the revised cash flows (net of event expenses) for credit risk event "i" at the loss calculation date

Note:

i. $PV^{OCF\ CRE_i}_{loss\ calc\ date}$ = $OCF_i v_i^{(date\ i\text{-}loss\ calc\ date)/365}$
$+$
$OCF_j v_j^{(date\ j\text{-}loss\ calc\ date)/365}$ (1)
$+ ... +$
$OCF_n v_n^{(date\ n\text{-}loss\ calc\ date)/365}$

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

$i_j^{(2)}$ is determined as indicated in section C.5 below (assuming nominal annual rates convertible semiannually)

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

$PV^{RCF\ CRE_i}_{loss\ calc\ date}$ = $RCF_i v_i^{(date\ i\text{-}loss\ calc\ date)/365}$
$+$
$RCF_j v_j^{(date\ j\text{-}loss\ calc\ date)/365}$
$+ ... +$
$RCF_x v_x^{(date\ k\text{-}loss\ calc\ date)/365}$ (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[26]

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	1992:Q4	135	175	350	575

c. discounting original cash flows using spreads based on the quality rating at issue[27];

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"[28]; and

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

[27]165 bp was used when original quality rating was not available.

[28]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.

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.

It is anticipated that the same methodology will be used for the study of data through 1994, with the appropriate spread values based on the ACLI data through 1994.

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 OP_j, the outstanding principal at year-end j, 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

$$\text{Exposure}_{\text{Year } j} = (OP_{j-1} + OP_j)/2$$

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

$$\text{Exposure}_{\text{Year } j} = OP_{j-1}/2$$

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

$$\text{Exposure}_{\text{Year } j} = OP_j/2$$

b. *Assets that incurred a credit risk event during year j*

$$\text{Exposure}_{\text{Year } j} = OP_{j-1}$$

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*

$$\text{Exposure}_{\text{Year } j} = 0$$

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 were 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 of 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 enough 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 in 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 database 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.

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 computer flagged those assets with ratios less than 0.85 or greater than 1.15. Most CRE assets passed this screen. For those that did not, many 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 of the original 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, these 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 IDs 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. Finally, all loss severities less than −100% i.e., a gain of more than 100% were eliminated from the study. There were four such CREs.

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 the DQ6, and questions about the inclusion of CREs with loss dates before 1986 or after 1992.

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.

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

To provide an independent check on the data validation process, an external consulting firm was engaged. The results were not released until their confirmation of their satisfaction with both the validation procedures and the actual validation and resulting figures.

APPENDIX II

ECONOMIC CONDITIONS OVER THE 1986–92 STUDY PERIOD

The economy of the United States saw dramatic changes in its structural components in the 1970s and 1980s. 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 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 also became important considerations.

After a short attempt to control prices under the Nixon administration, inflation accelerated into a major dilemma for the economy. The actions of the Federal Reserve in 1981 to attempt to gain control over inflation sent interest rates to their highest levels. In fact, the yield curve became inverted with short-term rates, as evidenced by the prime rate, 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. A double dip recession in the early 1980s did give way to a long expansion period. Even so, during this time of growth, a series of economic downturns hit various segments of the economy and regions of the country starting about 1985. The oil and gas industry was among the first sectors to feel this change due in large part to an increase in a stable supply of lower cost foreign oil. The effect on the economies of the oil and gas producing states (West South Central and Mountain regions by ACLI definition) was significant and quite pronounced in terms of a decrease in real estate values and company profits. This boom and bust cycle in the oil and gas business is not uncommon, but the seriousness of this decline was much worse than expected.

As the recovery gained strength in the middle to latter 1980s, pockets of the economy suffered slow downs affecting areas of the country differently. This "rolling recession" as it became known seemed to hit the high tech companies as well as basic industries. Relatively high real (as well as nominal) interest rates exacerbated the situation. Nonetheless, on the whole the second half of the 1980s represented a long period of uninterrupted growth that proved fertile ground for lender optimism and the highly leveraged deal (the LBO and HLT era).

The early 1990s featured a recession that may have been mild when measured by classical standards, because the contraction lasted only three quarters before growth reappeared. From the perspective of the debt and real

estate markets, however, the matter was far different. This period saw the testing of overextended and frequently overleveraged balance sheets of many borrowers. The creation of debt, and particularly debt associated with highly leveraged transactions, during the 1980s was based on an assumption—unsustainable in hindsight—of ever increasing values, prices and cash flows in nominal dollar terms. 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. Capital markets continued under pressure in the meanwhile, because of the heavy borrowing needs of the government and because of the increasing risk averseness of lenders, as losses rose. Regulatory pressure exacerbated this trend, reinforcing the flight to quality.

The recession of 1990–91, even if relatively short, was the harbinger of fundamental restructuring of much of corporate America. The buzzwords of the day became downsizing, reliquification of balance sheets, focus on core competencies and upgrading productivity. This lead to much better export performance in due course but the drying up of domestic demand and purchasing power. Borrowers, whether mortgagors or corporations, could no longer count on continuous growth in values or business volumes and found the carrying costs of debt more and more onerous to meet as profit margins came under pressure.

The continued corporate downsizing and slow job growth are still factors with which to reckon. However, with interest rates now reaching lower levels, inflation apparently being held in check and the economy transforming rapidly, investment opportunities pose new challenges.

The transformation of the economy is leading to different, more testing lending conditions. In a high real interest rate, stable prices environment, compounded by increasing international competition and globalization, the leveraging of assets or balance sheets is a more hazardous exercise than in the past, because the nearly automatic increase year by year of asset values and interest coverage can no longer be taken for granted. This is particularly true of the real estate sector but applies to the corporate sector as well—furthermore the expected global demand for capital is likely to keep that commodity expensive. Also, the transformation is creating winners and losers in unexpected ways so traditional lending standards do not always provide good guidance in current and future lending.

APPENDIX III

LIMITATIONS OF THE 1986–92 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. Specifically, three companies contributed to the first four years only (1986–89), two companies contributed to all but the first two years (1988–92), while five companies contributed to all years of the study. Finally three other companies contributed data for other partial periods.
- 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 lead 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 1990–92 submissions, but the quality of the data improved through greater effort by the contributors to ensure completeness.

  Future data collection will continue to emphasize the need to report all assets that incurred changes from the originally contracted cash flows.
- Companies provided data to the 1986–89 study at different points in time; some companies updated their revised cash-flow files with more current information as part of the data validation and correction process. As part of the 1990–92 data collection process, companies were asked to provide updated information on the 1986–89 CRE cash flows. Undoubtedly, not all such updates were provided.
- A long "tail" exists before the final outcomes of many credit risk events are known with certainty; the results for 1986–89 have been updated as additional information became available, and this process will continue in future studies.
- Results to date do not include an explicit analysis of the impact of external economic conditions, although some early indications are observed.

○ Data for some characteristics was limited, for example approximately 9% of the private placement bond asset records for which non-zero outstanding principal values were expected (e.g., because there were year-end records with non-zero outstanding principal before or after) seemed to be missing; possible explanations include: movement of assets among subsidiaries, calls/prepayments, consolidation of assets, and occurrence of a credit risk event.

○ 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 trade-off of investments.

○ Although significant efforts were made to ensure the reasonableness and completeness of the contributed data (please see the Appendix); 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 CREs 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 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).

○ After the study was essentially finished, a graph was developed to display the scatter of the ratio of the present value of original cash flows on CREs to outstanding principal. Even though extensive scrubbing of the CRE cash flows had been done, the scatter was somewhat larger than expected

which led to a last minute reexamination of the original cash-flow patterns. Two possible sources of error were identified, which however, produced offsetting impacts so that in aggregate the study results changed immaterially when the data for the CREs with the potential errors were excluded. For that reason the Committee decided to go ahead with the publication of the current report notwithstanding the potentially erroneous data, but to pursue any required rectification in the next study.

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 1990–92 data submission that ongoing data contributors have managed to overcome or mitigate many of the initially encountered problems. In particular, the quality rating information seems to be materially better than the pilot study.

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 1986–92 data would not have been possible.

APPENDIX IV

COMMITTEE MEMBERS

Society of Actuaries
Asset Risk Experience Study
Private Placement Subcommittee:

Michael L. Zurcher, FSA, Chairperson
Lincoln National Corp.

Bradley Scher*, Cochairperson
TIAA/CREF

Mark S. Carey*
Federal Reserve Board

Mark Poeppelman*
Nationwide Insurance Co.

Kenneth S. Roberts, FSA
Prudential Ins. Co. of America

George E. Silos, FSA
New York Life Insurance Co.

Stacy Gill
MIB/CMAS Liaison

Warren R. Luckner, FSA
SOA Director of Research

John A. Luff, FSA
SOA Experience Studies Actuary

Society of Actuaries
Asset Risk Experience Study
Steering Committee:

Nicholas Bauer, FSA, Chairperson
Eckler Partners, Ltd.

Bradley Scher*
TIAA/CREF

Kin On Tam, FSA
Metropolitan Life Ins. Co.

Michael L. Zurcher, FSA
Lincoln National Corp.

Warren R. Adams, FSA
(in memoriam)

Warren R. Luckner, FSA
SOA Director of Research

John A. Luff, FSA
SOA Experience Studies Actuary

Subcommittee Support:

Serge Goulet, FSA
Eckler Partners, Ltd.

Daniel J. Towriss, ASA
Lincoln National Corp.

* non SOA members representing the
  investment community