TITLE: Summary of Final Report: 1986-1989 Credit Risk Event Loss Experience, Commercial Mortgage Loans and Private Placement Bonds

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ABSTRACT: Traditionally, actuarial techniques are used to study mortality and morbidity experience. But a new Society of Actuaries (SoA) study -- a collaborative effort between actuaries and investment professionals -- demonstrates that similar methods can be used to analyze the "mortality and morbidity" of assets -- i.e., credit risk events (CRE's) such as restructures, defaults, foreclosures, and bankruptcies.

In the past, industry studies of asset defaults have focused on the *rate* of default, rather than the total economic impact of such defaults. For example, the ACLI survey of commercial mortgage delinquencies takes quarterly inventory of the portion of life insurance company commercial mortgages in default, under foreclosure, or under restructured terms, by various regional and property type breakdowns. However, the survey does not measure the loss in principal or interest arising from these events.

The SoA study results reflect some special features of the study-- the asset types analyzed, how CRE was defined, and the methodology devised for calculating economic loss. In the SoA study, the measure of loss resulting from a CRE 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 of the investment that results from the CRE.

The report of the study presents the results for four loss statistics, by various groupings of the data.

- The "incidence rate by number" provides a general frame of reference for assessing how often such events were occurring in 1986-89.
- The "incidence rate by amount" accounts for differing amounts of outstanding principal for different CREs -- in other words, it gives the amount of potential loss per dollar of exposure.
- "Loss severity" is the ratio of the economic loss to the amount of exposure associated with CREs. It's a measure of how severe the loss is; in other words, what proportion of the possible total dollar loss is actually lost.
- Multiplying the "incidence rate by amount" by the "loss severity" yields the "ratio of economic loss to all exposure," which can be considered an overall loss "rate" or "basis point" loss, or the amount of economic loss per dollar of exposure.

SUMMARY OF FINAL REPORT
1986-89 CREDIT RISK EVENT LOSS EXPERIENCE
COMMERCIAL MORTGAGE LOANS AND PRIVATE PLACEMENT BONDS
PRESENTATION TO 1993 ACTUARIAL RESEARCH CONFERENCE
MADISON, WISCONSIN

Presented by: Mark Doherty, SoA Director of Research; Warren Luckner, SoA Research Actuary

I. Study background and methodology

A. Background

The study of the 1986 through 1989 credit risk event (CRE) loss experience of insurance company commercial mortgage loans and private placement bonds represents the first phase of an ongoing study of the economic loss resulting from credit risk events. This study was initiated by the Society of Actuaries (SOA) in cooperation with the American Council of Life Insurance (ACLI) and represents a joint effort of actuaries and investment professionals.

The study identifies asset characteristics believed to influence credit risk and develops a process for gathering and evaluating intercompany credit risk data according to these characteristics. These credit risk and associated cost data will be gathered and presented in periodic reports in a manner similar to Society of Actuaries Experience Studies for mortality and morbidity.

For the study to be manageable and productive, it currently focuses on commercial mortgage loans and private placement bonds. Commercial mortgage loans and private placement bonds represent a substantial portion of the fixed-income securities owned by life insurance companies.

Why a Credit Risk Study?

It was important to initiate a study of credit risk because 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 1980's, real interest rates were much higher and more volatile than they were previously as inflation and later the fear of inflation plagued the economy. This interest rate environment made debt service more difficult for borrowers and the economic value of missed payments more costly to lenders.

Thus, credit risk with the resulting illiquidity is arguably one of the primary risks facing insurance companies with respect to their vast liabilities supporting investment-oriented products.

In spite of substantial holdings of commercial mortgages loans and private placements bonds, there is no published, industry-wide, direct data from which default loss experience or, more importantly, the economic loss from credit risk events related to these securities can be assessed. Consequently, disciplined study of insurance company commercial mortgage loans and private placement bonds is important. An ongoing study is essential to better understand these asset

classes as well as to provide reasonable assumptions for setting asset valuation reserves and risk-based capital standards, and to provide information of value in the portfolio management process.

The 1986-89 study began the development of a comprehensive credit risk cost data base that is intended to show the full extent of current cost levels and the variability in these cost levels by asset type, credit rating, age of asset, etc. Until this data base is fully developed on an ongoing basis, it will be difficult to manage this risk most effectively. This can lead to difficulties in investing, pricing, reserving and setting of surplus standards.

Economic Context

To understand better the credit risk events of the 1986 through 1989, it is helpful to review the economic conditions and their impact on asset defaults. In particular, commercial mortgages were subject to an unprecedented set of circumstances. 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 1980's to impact delinquency rates.

The economy of the United States saw dramatic changes in its structural components in the 1970's and 1980's. The manufacturing base, exemplified by the auto and steel sectors, began a long decline. The number of lower paying and, for the most part, service type jobs rose dramatically. At the same time, there was a 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. Mortgages of all types felt the impact and 1981 and 1982 clearly exhibited a marked decrease in commercial mortgage lending activity. However, a positive aspect was that real estate investments tended to benefit from high inflation by increasing in value and making replacement costs higher.

The tightening of the money supply also had a serious effect on the economy in general. A double dip recession in the early 1980's 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. 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 was significant and quite pronounced in terms of a decrease in real estate values. 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 1980's, 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 interest rates exacerbated the situation. One result of this rolling recession was that the longer term prospects of commercial real estate were caught up in these shorter term problems which unfortunately were reflected in a slow but steady increase in the delinquency rates for commercial mortgages from 1985 on.

Changes in the tax code in 1986 also posed problems for real estate. Strict limits on the use of passive investment losses to offset income made some real estate partnerships less attractive going forward. The elimination of the accelerated cost recovery system (ACRS) for depreciation purposes further hampered future real estate deals.

To a certain extent, demographics also plays a role in the story of real estate. As the baby boom generation entered the labor force, the need for more office and work space increased. With the entry of the cohort of workers following the baby boomers, office space needs are not increasing as rapidly.

An additional piece of information on commercial mortgages is a long term perspective on delinquencies. The following graph tracks delinquent loans including those in process of foreclosure, from 1965 through 1992. Delinquencies for many years are at reasonably low rates, rising with the recession in the early 1970's and peaking in 1975 - 76 before returning to similar levels before the economic downturn. Again, after a number of years with relatively low delinquency rates, a noticeable increase in delinquencies begins in the 1986 time period. The important points here are that this timing coincides with the start of this pilot study on credit risk and that the commercial real estate market appears to run in fairly long economic cycles, at least greater than the four years of this report.

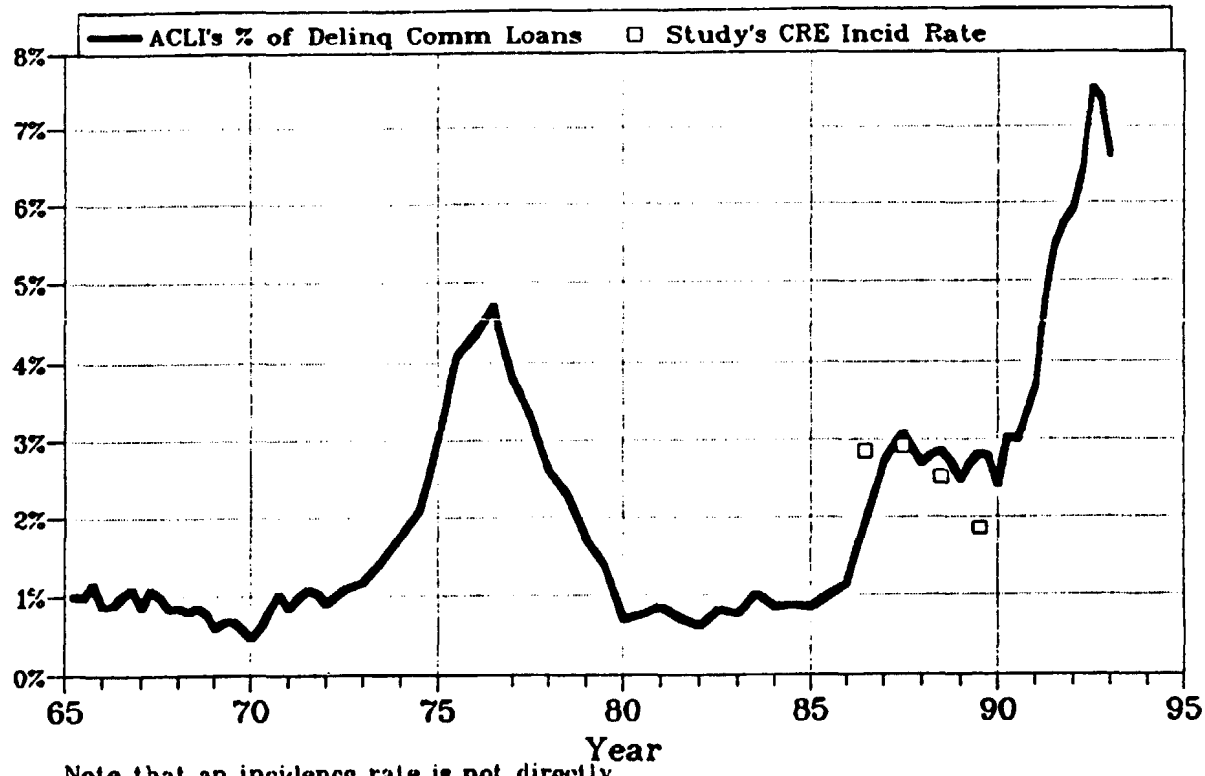
The four years of the incidence rates by dollar amounts from the SOA study also are plotted on the graph. While not strictly comparable because of definitional differences, the ACLI and SOA data do bear a striking resemblance to each other.

Weighing all these factors quite clearly complicates the picture for commercial mortgages and real estate. The continued corporate downsizing and slow job growth are still factors with which to reckon. However, with interest rates now reaching very low levels and inflation being held in check, investment opportunities pose new challenges.

With this background, credit risk is arguably the primary risk now facing life insurance companies with respect to the vast liabilities created by investment-oriented products. Moreover, insurance companies are not the only entities subject to credit risk events. Banks, pension funds and commercial credit companies encounter many of the same problems resulting from investments in commercial mortgage loans and private placement bonds.

Because the study period covers only a relatively short portion of the economic cycle, the results contained in the report must be interpreted very carefully. In particular, although the Credit Risk Project Coordinating Committee believes the results presented provide a reasonably accurate picture of the credit risk

1986–89 Credit–Risk Study on Commercial Mortgages
In the Context of the 1965–92 ACLI Survey



Note that an incidence rate is not directly comparable to the % in a status at a point in time.

event loss experience during 1986 through 1989, the implications for future experience are less clear. It is anticipated that an ongoing study that builds on this study and provides results over a longer period of time will be better able to identify such implications and provide information of significant value to all financial institutions.

1. Goals and benefits

The initial goals of establishing an intercompany credit risk study were:

a. to establish common definitions for credit risk and credit risk events;
b. to establish a common methodology for quantifying the costs of credit risk events over time; and
c. to better understand the asset characteristics that influence credit risk.

The specific goals of the 1986-89 Study were:

a. to assess the readiness of companies to participate in an ongoing intercompany credit risk experience study;
b. to gain experience in the design and implementation of an intercompany study of the economic loss associated with credit risk events;
c. to provide guidance to companies on what data to collect and how to perform useful analysis of this information;
d. to generate further interest and support for ongoing credit risk event loss studies within the actuarial and investment communities; and
e. to the extent possible, to provide information about the economic loss resulting from credit risk events that occurred in 1986 through 1989.

The Credit Risk Project Coordinating Committee believes that the final report on the 1986-89 study reflects the attainment of these goals. In particular, the results presented in the report demonstrate the ability to gather and analyze credit risk event data using a loss calculation methodology that provides additional insight into the economic loss due to credit risk events.

The expected benefits of collecting and reporting credit risk data on an ongoing basis are far-reaching. With the data, the industry at large - regulators, companies and consumers - can:

a. gain a greater and fuller conceptual understanding of credit risk;
b. develop a benchmark of reliable information useful in assessing the relative value of alternative fixed income asset classes and of assets in various credit rating categories, which would be useful in making portfolio management decisions and in establishing credit ratings;
c. obtain a greater understanding of the character of credit risk, which will lead to more informed pricing, reserving and portfolio management decisions, and more informed evaluations of surplus adequacy; and
d. monitor experience year-by-year to determine if the industry's experience from credit risk is improving or deteriorating.

In addition, participating companies gain a significant advantage from the accurate analysis of their own experience and its comparison with industry

experience. Familiarity with the methodology helps to develop comparable internal experience with respect to assets not covered by the study, such as residential mortgages or publicly traded bonds.

2. Special Features

The results of this study reflect several special features:

a. the asset types studied;
b. the definition of credit risk event;
c. the methodology for calculation of economic loss; and
d. the intercompany pooling and comparison.

The special features provide additional insight into the nature and quantification of credit risk.

3. Scope of Data

The following fourteen companies contributed data to the 1986-89 study.

Aetna Life & Casualty
John Hancock Mutual Ins. Co.
Metropolitan Life Ins. Co.
Nationwide Life Insurance Co.
The New England
Penn Mutual Life Ins. Co.*
The Principal Financial Group
Prudential Insurance Co.
SAFECO Life Insurance Co.
Sun Life of Canada
TIAA/CREF
Travelers Insurance Co.*
Washington Square Capital**
Western & Southern Life* Insurance Co.

* Commercial mortgages only
** Private placements only

Nine of the thirteen companies that contributed commercial mortgage data, contributed data applicable to the entire study period; four contributed data for only the last two years of experience. Eight of the companies that contributed private placement data, contributed data applicable to the entire study period; three contributed data for only the last two years. The total amount of outstanding principal in the 1986-89 study is summarized in the following table.

Total Outstanding Principal (Billions)

Year End	Commercial Mortgages Study	ACLI Industry Estimate	%	Private Placements Study	ACLI Industry Estimate	%
1985	$ 52.5	$145.4	36%	$49.5	N/A	N/A
1986	$ 62.8	$167.7	37%	$51.8	N/A	N/A
1987	$ 88.1	$187.4	47%	$58.5	N/A	N/A
1988	$100.8	$207.4	49%	$65.9	N/A	N/A
1989	$111.2	$228.2	49%	$70.6	$195	36%

The number of Credit Risk Events and amount of Credit Risk Event Exposure are summarized in the following table.

	Commercial Mortgages		Private Placements	
Experience Year	CRE Number	CRE Exposure (Millions)	CRE Number	CRE Exposure (Millions)
1986	330	$1,655.3	53	$ 397.4
1987	315	$1,908.6	57	$ 707.2
1988	330	$2,282.8	35	$ 269.1
1989	281	$1,811.4	34	$ 407.3
1986 - 1989	1,256	$7,668.2	179	$1,781.1

4. Limitations

Although the Credit Risk Project Coordinating Committee believes the 1986-89 study makes a significant contribution to a better understanding of the economic loss resulting from credit risk events, there are limitations to the study that should be noted to minimize possible misinterpretation and misuse of the study results.

Limitations include:

- The data covers only the experience years 1986 through 1989.
- For commercial mortgages, four of thirteen companies contributed data only for the 1988 and 1989 experience years; similarly, for private placement bonds, three companies contributed data only for the 1988 and 1989 experience years; thus, for both asset types, the results for 1986 and 1987 are based on data from a group of companies which is different from, and a subset of, the sets of companies that contributed for 1988 and 1989.
- Companies determined that they could not 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 lead to significantly biased reporting, a comparison, by ACLI staff, of private placement bonds and commercial mortgages submitted as credit risk events and company annual financial statements indicated that the reporting of the credit risk events seemed reasonable.) Future data collection will emphasize the need to report all assets that incurred changes (other than for known non-credit-related reasons, such as administrative problems) from the originally contracted cash flows.
- Companies provided data to the 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.
- A long "tail" exists before the final outcomes of many credit risk events are known with certainty; the results will be updated as additional information becomes available over time.
- These preliminary results do not include an explicit analysis of the impact of external economic conditions.

- The results presented do not directly take into account differences in investment underwriting practices over time or across companies.

- Data for some characteristics was limited; examples include:

  - 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, and
  - the outstanding principal values were zero or missing on approximately 5% of the commercial mortgage loan records submitted.

- Some data elements that should have remained consistent from year to year appeared to vary somewhat; however, such deviations usually had reasonable explanations.
- This study does not attempt to measure the risk-reward tradeoff of investments nor does it relate the relative size of these assets to the investment portfolios and strategies of different companies.

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. 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. An important example of what was learned is that many private placement bond data contributors were not able to easily provide quality rating at issue; having available the entire history of quality ratings would significantly enhance the value of the possible analyses.

B. Methodology

1. 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.

For commercial mortgages, a 90 day delinquency is the start of a credit risk event if the payments are not made up.

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.

The credit risk event is considered to have occurred on the earliest of the date of the first missed payment (for a private placement) or the 90 day delinquency date (for a commercial mortgage), 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 (for a private placement) or the 90 day delinquency date (for a commercial mortgage), 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.

2. Actuarial Model

The actuarial model used as a basis to formulate this study is 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 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 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 also 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.

Studying investments in terms of a disability model is a rather novel approach. However, this model is well developed by actuaries and lends itself to investigating the variables that can be important in understanding problems related to investments. In addition, actuarial models and research have pioneered the concept of large, complex studies of intercompany experience to ascertain the information necessary to understand the mortality and morbidity associated with various insurance products.

3. Loss Statistics

Consistent with a disability 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 of the investment that results from the credit risk event.

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 $OP_{PYE}^{CRE_i}$ = outstanding principal for credit risk event i at the year end (or more recent date if available) immediately preceding the loss calculation date

$PV_{loss\ calc\ date}^{OCF\ CRE_i}$ = present value of the original contractual cash flows for credit risk event i at the loss calculation date

and

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

5. Interest Rate Approaches

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 two subsections summarize the approaches used for the 1986-89 study. Other approaches might be used for the ongoing study.

a. Commercial Mortgage Loans

For commercial mortgages, the method used was to prepare a table of spot rates for the discount factors. A yield curve was created for each month of the exposure period of the study. The 3, 5, 7 and 10 year interest rates provided by the monthly Barron's/John B. Levy & Co. National Mortgage Survey were utilized as the data points to construct the yield curve using a polynomial function. Each yield curve was extended over a period of 360 months. The function provided monthly interest rate values to be used in discounting for the present value calculation for a given loss date and credit risk event.

The month and year of the loss date of the credit risk event pinpoint the appropriate yield curve for a present value calculation. The times of the original and revised cash flows then are matched to the proper monthly discount factors based on this yield curve.

b. Private Placement Bonds

For private placement bonds, the method used starts with the monthly average Treasury rates, based on the month and year of the loss calculation date and varying by term to maturity, as the base. A margin, calculated to reflect the spread over the Treasuries, is added to the base rate. This margin varies by the month and year of the loss calculation date, and by a measure of the remaining term of the investment.

Thus, the following procedure was used for determining the table of interest rates to be used in the present value calculations for the private placement bonds results:

i. The Treasury rates by month and maturity (1-year, 2-year, 3-year, 5-year, 7-year, 10-year and 30-year) for the years 1986-89 were obtained from the Federal Reserve Statistical Release.
ii. Data from the ACLI "New Investment Commitments" survey was used to determine the spread over the Treasuries by month and year, and maturity.
iii. For each month, year and Treasury maturity, the sum of the Treasury rate and the spread was rounded to the nearest .25%.

Once the table of interest rates was developed, the interest rates to be used for the original and revised cash flows of a specific credit risk event were determined by the month and year of the event and the remaining term of the investment, as measured by:

$$\sum_{t=1}^{n} t\ CF_t \text{ divided by } \sum_{t=1}^{n} CF_t$$

where CF_t = cash flow at time t for the appropriate original and revised cash flows.

Different interest rates were selected if the values of the remaining term of the investment were different for the original and revised cash flows.

6. Calculation of Exposure

The exposure base represents the total holdings for those investments included in the study during the study period. Year end values are used to facilitate data collection using Schedules B and 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 <u>not</u> credit risk events**

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

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

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

$$Exposure_{Year\ j} = OP_{j-1}/2$$

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

$$Exposure_{Year\ j} = OP_j/2$$

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

$$Exposure_{Year\ j} = OP_{j-1}$$

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

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

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

II. Overview of results

A. Use of results

The data and data processing limitations identified in Section I.A.4 suggest that the results of this pilot study over four years are of relative rather than absolute value. One should not over-rely on the absolute magnitude of the results. They inevitably reflect market conditions of the period in question. Until a few more years of data are collected to encompass an economic cycle more fully, the value of the 1986-89 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.

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. 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.

The Coordinating Committee believes that the primary value of the results based on the 1986-89 data is that the results demonstrate the ability to gather and analyze such data using a loss calculation methodology that provides a disciplined framework for analyzing credit risk and for assessing what data is needed to appropriately manage credit risk.

B. Results

The final report contains intercompany analysis of both the commercial mortgage loan data and the private placement bond data. The report also includes results by the following characteristics for all companies combined.

Commercial Mortgages	Private Placements
• by year of funding	• by quality rating (most recent; earliest; and NAIC)
• by loan to value	• by original coupon rate
• by interest rate	• by type of credit event
• by property type	• by years since funding
• by geographic location	

The following table illustrates the form of the results by giving the results for all companies and all years combined. These results can best be interpreted in the context of the discussion and the other results contained in the final report.

CREDIT RISK EVENT LOSS EXPERIENCE

(000 OMITTED FOR DOLLAR AMOUNTS)

	(A) Incidence Rate by Number (EXP = Exposure CRE = Credit Risk Event)		(B) Incidence Rate by Amount (EXP = Exposure CRE = Credit Risk Event)		(C) Loss Severity Economic Loss/CRE Exposure		(D) Economic Loss/All Exposure	
		ALL COMPANIES		ALL COMPANIES		ALL COMPANIES		ALL COMPANIES
PRIVATE PLACEMENTS 1986-89	CRE#	179	CRE EXP	1,781,110	ECON LOSS	518,704	ECON LOSS	518,704
	EXP#	31,764.0	ALL EXP	233,053,414	CRE EXP	1,781,110	ALL EXP	233,053,414
	RATIO	0.0056	RATIO	0.0076	RATIO	0.2912	RATIO	0.0022
COMMERCIAL MORTGAGES 1986-89	CRE#	1,256	CRE EXP	7,608,152	ECON LOSS	1,915,768	ECON LOSS	1,915,768
	EXP#	66,980.0	ALL EXP	313,687,585	CRE EXP	7,668,152	ALL EXP	313,687,585
	RATIO	0.0188	RATIO	0.0245	RATIO	0.2498	RATIO	0.0061

Companies that participated in the 1986-89 study have already received results based on their own data, as well as the equivalent of the final report, which is organized as indicated by the Table of Contents.

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III. Where do we go from here?

There are at least three directions to go as we continue to study credit risk: update data, add data contributors from other financial intermediaries and study other asset types. The Coordinating Committee believes all three are desirable. Updating data through 1992 is already being pursued. As that is pursued, we will approach other financial intermediaries such as banks and pension funds for data contributions. Expanding the methodology to other asset types is relatively straightforward. In particular, studying public bond holdings of insurance companies or other financial intermediaries should not present any particularly difficult problems and could provide, for example, an indication whether the significant difference between the loss severity of private placement bonds and public bonds is due to the difference between privates and publics, the difference between asset management by insurance companies and asset management by other investors, or some other difference (e.g. difference in quality rating systems or distributions).

Questions, Additional Information

If you have any questions or would like information on how you or your company can support the ongoing study by contributing data or by providing financial assistance, please contact the Society of Actuaries Research Department at 708-706-3574 (FAX: 708-706-3599).