RESERVE TESTING AND THE C-1 RISK

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Panelists: WARREN R. ADAMS
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Actuaries doing reserve testing under new valuation standards face decisions as to how to test for the C-1 or asset default risk.

- Testing/evaluating C-1 risk -- different purposes?
- What are the available methodologies?
- What are sources of assumptions?
- Real life: balancing practical considerations with the theory?
- Do Canadian and U.S. perspectives differ?
- A brief update of the SOA research on private placements and commercial mortgages -- can it help valuation actuaries?

MR. MICHAEL L. ZURCHER: By most measures, C-1 is the greatest risk faced by insurance companies, especially the larger ones. If C-4 risk is ignored, the majority of insurance company problems over the last several years resulting in regulatory intervention have stemmed from C-1 related risks.

However, I believe it is safe to say that since actuaries started talking about the C-risks, C-1 risk has played second fiddle to interest rate risk. During the 1980s, there was much more emphasis on C-3 risk in terms of actuarial software development, actuarial research and published writings, and new professional and regulatory valuation standards.

Cash-flow reserve testing has evolved in current practice to C-3 testing under various interest rate environments with annual haircuts applied to yields for the C-1 risk. There has been little integration of the interest rate scenarios that affect C-3 risk with more general economic conditions that influence C-1 risk.

While we have much to learn about C-1 risk, there are some hopeful signs. Risk-based capital (RBC) concepts have introduced new ideas about C-1 risk evaluation, actuarial software is becoming more sophisticated, and the Society has recognized the need to collect and analyze default-loss-related data.

Our panel will be discussing many of these aspects of C-1 risk testing. Our first panelist, Warren Adams, is director of actuarial education and research at The Principal Mutual in Des Moines. He is professor emeritus of actuarial science at Drake University. Warren has been an active member of the National Association of Insurance Commissioners (NAIC) RBC and Asset Valuation Reserve/Interest Mainte-nance Reserve (AVR/IMR) Technical Resource Groups over the last three years. In fact, he chaired the RBC C-1 Subcommittee. Warren will be discussing the different purposes of evaluating C-1 risk, some of the evaluation methodologies used, and the sources of data to make your assumptions.

Linn Richardson is valuation actuary in the corporate actuarial department at The Travelers where his focus is on the assumptions and methods employed in cash-flow testing. Prior to joining The Travelers, Linn spent 14 years at Connecticut Mutual in a variety of areas. He is a graduate of Middlebury College.

Linn will be bringing us an actual practice perspective for the U.S. valuation actuary where asset adequacy testing was in place for the first time at year-end 1992. He's going to be discussing some real-life issues and problems, focusing specifically on mortgage loans.

Nick Bauer is currently managing partner of the Montreal office of Eckler Partners, Ltd., a leading Canadian firm of consulting actuaries. He has served clients in asset/liability management, reinsurance and taxation. He also serves as an appointed actuary and is a tax consultant to the Canadian Life and Health Insurance Association. Before joining Eckler Partners, Ltd., Nick worked at Montreal Life Insurance Company which he joined in 1960. At Montreal Life, he became vice president and actuary in 1970, senior vice president in 1974, executive vice president in 1977, and president in 1980. He served in that capacity until 1986, when the company was merged. Nick has served two terms on the Board of the Society of Actuaries as well as serving on the Research Policy Committee and the Elections Committee. He also heads the C-1 Task Force of the Canadian Institute of Actuaries. Nick will be providing a brief overview of the Society's Credit Risk Study which looked at private placement and mortgage loan credit losses.

MR. WARREN R. ADAMS: Certainly, the interest in C-1 risk has grown in the last three years or so because of the increased regulatory interest in this area and the devolvement of RBC standards.

We're talking about default risk and not interest rate risk or C-3 risk. I will make a few broad-brush remarks which will cover the purposes and methods of evaluating C-1 risk, as well as the basis for C-1 risk assumptions. First, financial planning, which is an activity that actuaries are increasingly involved in, typically covers about a five-year period. For that purpose, one would want to look at the current default environment. I suppose, like so many companies, your company may be in a bad cycle and you will need to reflect that. Also, you need to be in touch with the investment department and be looking at their estimates of what defaults are likely to be over the next five years. In this case, you're going to want to look at current loss levels.

For pricing purposes, we want to take a longer-term focus, although that doesn't preclude looking at current loss levels. You'll still need to do that. You will need to have some basis for trying to estimate how those losses are going to shape up in the future.

Reserve testing is an area where you need to use the realistic or best estimate of credit losses, again reflecting the current level of losses. Although it's common practice to use a haircut approach where you deduct 15-20 basis points from the interest rate, there are some companies that are beginning to use some kind of a simulation process in reserve testing so that you can reflect the possibility of variations that are above or below the level of your haircut. The valuation actuary will

want to be conservative using, again, the best estimate and adding some margin for conservatism.

The haircut approach uses the expected default probability times some expected loss level based on long-term expectations. On a shorter-term basis, you will want to reflect the current levels of losses. If you're dealing with a particular line of business, you should recognize loss levels of the assets that are backing that line of business. The level of losses, of course, will vary depending on whether you're talking about bond, mortgage, real estate portfolios, or even common stock.

Assumptions should reflect past, present, and future losses adjusted for trends indicated by current and anticipated losses. This may suggest some idea of a distribution of losses. Company experience, even for a company as large as mine which has more than a $30 billion asset portfolio, cannot be depended on to produce credible loss data. In our company, we have conducted studies since about 1970. For example, in the mortgage area, there were no losses during a large part of that period, and so there was little basis for drawing any conclusions from the experience under that portfolio, which comprises several hundred mortgages with an actual value of $9-10 billion.

Lacking your own data, you might consider using RBC or AVR assumptions as a target. I know many companies are using RBC assumptions, but there is a problem with this in that they are quasi-industry averages. If your own company varies from the industry, then RBC will not be an appropriate basis, unless it is adjusted to reflect your company expectations. My company's requirements for C-1 are quite different from RBC or the AVR levels. There is some hope that the SOA credit loss studies, which are nearing completion, will provide data that can be used for this purpose.

Finally, there are the default studies, published by organizations like Moody's, which provide helpful information. Also, there is an article by E. I. Altman, published in 1989 in *Chartered Financial Analysts,* titled "Default Risk Mortality Rates and the Performance of Corporate Bonds." I understand there are later publications by Altman which may give more up-to-date information. This is an excellent source on techniques of doing default studies, which includes an excellent bibliography of other work in the area.

MR. LINN K. RICHARDSON: I'm going to focus on some practical considerations in modeling C-1 risk and living up to the applicable professional standards. I'll start with a few general comments and then get into some specific considerations about bonds and mortgages.

The second exposure draft of the proposed actuarial standard of practice on asset adequacy analysis states that "the actuary should be satisfied that the assets supporting the reserves are adequate to cover obligations under moderately adverse conditions." While I'm not prepared to define moderately adverse for the profession, I certainly believe it should be noticeably worse than the median. Most of my presentation will focus on some of the fluctuations in elements of C-1 risk that need to be considered in evaluating moderately adverse conditions.

In terms of the actuary's responsibility for assumptions, the exposure draft also states that "the actuary should be satisfied that the person or firm relied upon was qualified and that the data or analysis provided were reasonable." The recently released report of the Dynamic Solvency Task Force also says that "the actuary is responsible for the consistency of the assumptions needed for the analysis, particularly those provided by others. The actuary will be expected to comment on the validity of the assumptions and on their vulnerability and sensitivity to external conditions." I think, in many instances, we actuaries will have to rely on our own analysis and judgment that quantitative aspects of assumptions have been appropriately considered.

Regulators have expressed concerns about the quality of data and analysis provided to actuaries for asset modeling. Clearly, the current and upcoming standards require the actuary to learn enough to question the analysis provided and to understand its sensitivities. With that in mind, I hope to point out some broad-based sources of information which can provide a context for comparing to your particular company's situation. I'll also offer a few suggestions about how to incorporate some of the necessary fluctuations in C-1 risk into your modeling in a reasonably practical manner.

Table 1 provides some information on quality changes from a 1991 Moody's Special Report. I fear that there may be too many actuaries who ignore this consideration in their cash-flow testing. Unfortunately, even at an expected level, the general trend in quality ratings over time is down. This table shows selected ratings from the right most four columns of your handout. If you look across the top row, you'll see that in an average year, a total of 8% of Aaa bonds have rating downgrades. When there is a change, it averages just under two categories down, or from Aaa to Aa2. In some of the medium-quality categories, as many as 30% of the bond issues have a rating change in a year.

How would you reflect this phenomenon in your testing? I think that all you really need to reflect this and other important considerations is the ability to vary C-1 charges by year in your cash-flow testing model. I know that at least one of the major software vendors has this feature in their model, so hopefully most people either have this capability now or will have it shortly. As a simple example, consider doing some modeling on an expected basis. For Aaa bonds, the expected quality change is the 8% of the bonds that change times the downgrade of 1.9 categories for an expected change of about 15% of a category. At 15% of a category per year, the next category would be reached in roughly seven years. Thus, you might want to use C-1 charges for Aaa bonds for seven years, then move to charges appropriate for Aa1 bonds. The expected length of stay in that category also works out to about seven years, at which point you can start using Aa2 charges, and so on.

Shifting to something more adverse than an expected basis might require a few more calculations, but the result of those calculations could easily be applied in the same fashion: C-1 charges for the first rating for some period of years, followed by a period in the next rating and so on. Similarly, as you add in other elements such as fluctuation in recovery values or fluctuation appropriate for the size of your particular portfolio, the effect of these items can be boiled down to a stream of C-1 charges over time for each initial quality rating.

TABLE 1

Magnitude of Long-Term Rating Changes 1983 through 1990 by Refined Rating Category

Quality Rating at End of Year

Quality Rating at Beginning of Year	Aaa	Aa1	Aa2	Aa3	A1	A2	A3	Baa1	Baa2	Baa3	Ba1	Ba2	Ba3	B1	B2	B3	Caa	Ca	C		Annual Probability of Change (Percent)	Expected Magnitude of Change (Number of Categories)	Percent Times Magnitude	Expected Years In Category
Aaa	92	4	2	1	1															Aaa	8	−1.9	−0.15	7
Aa1	2	89	4	3	2															Aa1	11	−1.3	−0.14	7
Aa2	1	4	79	7	6	2	1													Aa2	21	−1.1	−0.23	4
Aa3		1	3	83	8	4	1													Aa3	17	−0.8	−0.14	7
A1			1	5	82	6	3	1			1	1								A1	18	−1.2	−0.21	5
A2				1	6	82	6	4	1											A2	18	−0.5	−0.09	11
A3				3	9	73	7	5	2				1							A3	27	−0.6	−0.15	7
Baa1					4	8	72	8	4	1	1	1	1							Baa1	26	−0.6	−0.16	6
Baa2						2	5	8	69	9	2	1	1	2	1					Baa2	31	−0.4	−0.12	7
Baa3							1	4	9	69	8	4	2	2	1					Baa3	31	−0.5	−0.15	7
Ba1							1	1	5	8	69	4	5	3	2		1		1	Ba1	31	−0.6	−0.19	5
Ba2									1	3	5	76	5	6	2	1	1			Ba2	24	−0.8	−0.18	6
Ba3										1	2	3	80	7	5		2			Ba3	20	−0.8	−0.15	7
B1												2	4	82	7	1	3	1		B1	18	−0.8	−0.14	7
B2													2	4	82	2	8	2		B2	18	−0.9	−0.16	6
B3										1	1	1	2	3	4	75	7	5	1	B3	25	0.4	0.11	9
Caa														2	3	3	87	4	1	Caa	13	1.1	0.14	7
Ca						1	2						1	2	1	1	2	90	2	Ca	10	4.8	0.48	2
C									2								2	2	94	C	6	3.7	0.22	5

Source: Moody's Special Report   February 1991
Changes in Corporate Credit Quality 1970 – 1990

Largest percentage in each row adjusted so row totals equal 100%

Chart 1 is a graph of one-year default rates over a 21-year period sorted low to high. You can see the tremendous variation in rates for the lower-quality levels. Combined with the fact that higher-quality bonds can get downgraded and reach these levels, you can see why simple averages of default rates really don't cover moderately adverse conditions. Table 2 gives more detailed one-year default rates from the last ten years.
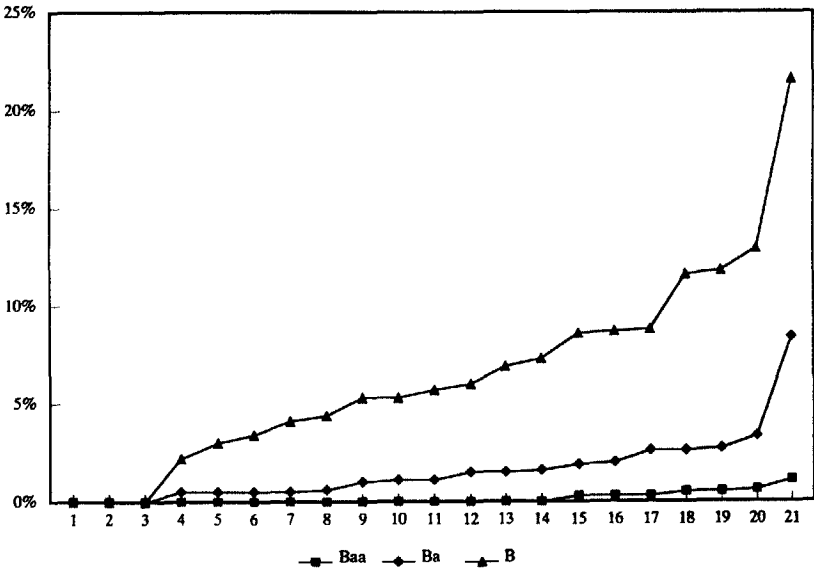
CHART 1
One-Year Default Rates: Low to High
(1970 through 1990 Moody's Study)

Chart 2 shows some of the variation in long-term average recovery values by priority position of the bond, again sorted low to high. Table 3 shows the averages by priority position for 1974-92. My initial reaction to this study was to go see how much of these various categories we own. I think you'll find that most insurance companies own largely senior debt, but I also think it's something you may want to confirm. At any rate, even the fluctuations in prices for senior debt were large enough that they need to be considered. For example, the overall average for senior debt of about 47 had a range of yearly averages from 12 to 70. Clearly, individual prices could even go outside of that range.

Table 4 shows how we calculated default cost on an expected basis, considering quality changes, with some of this data from a few years ago. I only included it as a reference point given that moderately adverse must be worse than this.

TABLE 2
One-Year Default Rates by Year and Modified Rating
(1983 through 1992 – Percent)

Quality Rating at Beginning of Year	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	Weighted Average	
Aaa– Aa2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	Aaa– Aa2
Aa3	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.10	Aa3
A1 – A3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	A1 – A3
Baa1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.08	Baa1
Baa2	0.0	0.0	0.0	2.5	0.0	0.0	0.7	0.0	0.0	0.0	0.30	Baa2
Baa3	0.0	1.8	0.0	0.9	0.0	0.0	0.9	0.0	0.0	0.0	0.36	Baa3
Ba1	0.0	0.0	0.0	1.2	5.1	0.0	1.0	3.2	1.3	0.0	1.26	Ba1
Ba2	0.0	1.5	4.6	1.1	0.8	0.0	1.7	3.3	0.0	0.0	1.24	Ba2
Ba3	2.4	0.0	1.8	2.6	2.4	2.9	3.8	3.4	9.6	0.7	3.22	Ba3
B1	1.3	9.5	4.4	9.8	4.2	5.0	7.3	9.5	8.7	1.3	6.46	B1
B2	18.5	3.7	17.9	7.0	6.8	7.0	11.7	12.4	16.8	14.3	11.69	B2
B3	11.1	0.0	5.0	26.9	8.7	8.3	11.8	41.2	21.1	18.5	18.60	B3

Source: Moody's Special Report   January 1993

Corporate Bond Defaults and Default Rates   1970 – 1992

Study is updated each year

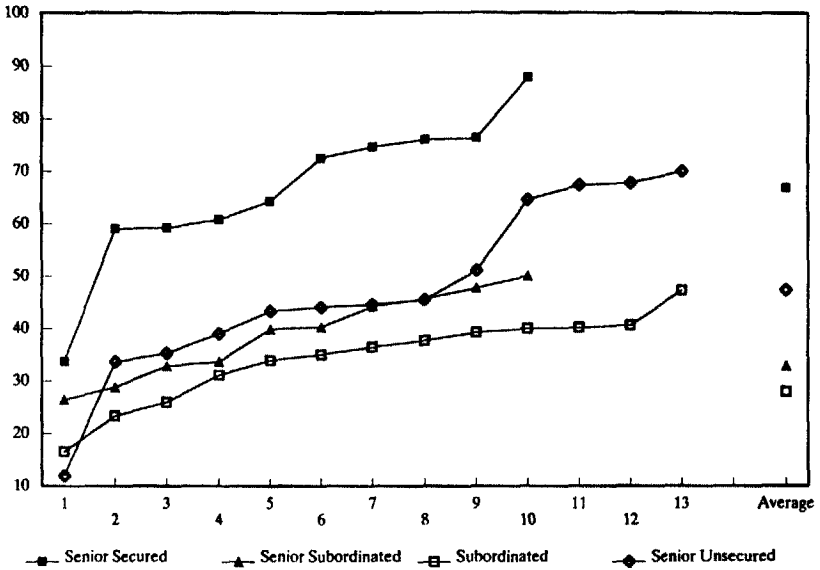## CHART 2
Sorted Recovery Values
(1980 through 1992)

Senior Secured — Senior Subordinated — Subordinated — Senior Unsecured

TABLE 3
Average Prices One Month After Default

Priority Position	1974-92
Senior Secured	$66.79
Senior	47.31
Senior Subordinated	32.86
Subordinated	27.95
Junior Subordinated	17.95
Weighted Average	40.00

Source: January 1993 Moody's Special Report
Corporate Bond Defaults and Default Rates 1970-92

Table 5 shows the additional credit cost produced by allowing for an expected level of quality changes for selected categories. You can see some noticeable additional costs here simply on an expected basis. I think that adverse deviations from there can also be very significant for reserve testing, particularly given that these are after-tax costs.

TABLE 4
Expected Default Cost
Three-year Ba1 Senior Bond

Payt. Number	Rating	Rounded Rating	Alpha Rating	Semi-Annual Quality Change	Semi-Annual Default Prob.	Cumulative Survival Prob.	Prob. of default at this payment (or total survival)	IRR given default at this payment (or total survival)
0	11	11	Ba1	0.095				
1	11.095	11	Ba1	0.095	0.76%	99.24%	0.76%	−18.58%
2	11.190	11	Ba1	0.095	0.76	98.49	0.75	−16.65
3	11.285	11	Ba1	0.095	0.76	97.74	0.75	−14.87
4	11.380	11	Ba1	0.095	0.76	97.00	0.74	−13.24
5	11.475	11	Ba1	0.095	0.76	96.27	0.74	−11.72
6	11.570	12	Ba2	0.090	0.80	95.50	0.77	−10.31
No default							95.50	9.09

Nominal Asset Yield: 9.33%
Nominal Reinvestment rate: 7.00%

Priority position: 2 Senior
Initial rating: 11 Ba1
Number of payments: 6
Allow quality changes (y,n): y
Tax Rate: 34%

Yield given no default: 9.09%

Expected IRR: 8.04%

Expected after−tax default cost: 0.69%

TABLE 5
Expected Default Costs (Basis Points)
Additional Cost Produced by Allowing for Quality Changes
Default Cost Reduced 34% for Taxes

5 year bonds

Priority position	A1		A3	Baa1	Baa2	Baa3		Ba2
Senior Secured	0		3	0	8	0		30
Senior	0		0	6	0	15		19
Senior Subordinated	0		0	0	8	0		2
Subordinated	0		0	0	9	1		2
Junior Subordinated	0		0	0	11	0		3

10 year bonds

Priority position	A1		A3	Baa1	Baa2	Baa3		Ba2
Senior Secured	0		5	0	13	3		40
Senior	0		1	8	1	21		28
Senior Subordinated	1		1	2	10	1		7
Subordinated	0		0	1	11	1		8
Junior Subordinated	0		0	2	12	2		8

20 year bonds

Priority position	A1		A3	Baa1	Baa2	Baa3		Ba2
Senior Secured	1		5	5	14	12		39
Senior	0		4	8	7	22		40
Senior Subordinated	1		1	4	11	10		22
Subordinated	1		1	4	11	10		23
Junior Subordinated	1		1	5	12	10		25

Note: Senior secured bonds use default rates from one quality rating category lower.

Subordinated bonds use default rates from one quality rating category higher.

Table 6 shows the results of some work we did in looking at possible distributions of default rates over time. For the yearly rates, we just assumed that each rate that occurred from 1970 through 1990 had a probability of one out of 21 for the number of years in the period. Applying these probabilities over five years gave us results that were reasonably in line with the observed five-year averages, but were a little bit smoother. The thought we had here was to allow for consistent conservatism in testing blocks of business with different projection period lengths. Since default rates for any one year can clearly vary more than long-term averages, we thought we would start with, say, the 75th percentile of yearly rates, two-year averages, three-year averages, and so forth. We even thought a little bit about looking at that progression and working on implied forward default rates, but we didn't really pursue that too much. At the 75th percentile, this progression of rates was fairly flat, but at higher percentiles the changes were pretty dramatic. It's important to remember that these figures are before quality changes. But again, I think you can use your selected percentile for some number of years and then drop to the next rating and so forth.

TABLE 6
Moody's Default Rates (Basis Points)
1970 through 1990

	Baa		Ba		B	
	Yearly Rate	Five-year Average	Yearly Rate	Five-year Average	Yearly Rate	Five-year Average
Average	17		162		655	
Median	0	15	110	159	570	660
75th Percentile	30	24	230	227	875	820
95th Percentile	85	39	600	334	1,700	1,080

Table 7 shows another element that some people probably ignore in their C-1 testing. While default rates that I've shown here so far are for a very large number of bonds, many companies have small portfolios in which additional fluctuation is introduced. How many people know their company's bond issuer count for RBC? Not too many. A handful. My company is pretty large and our count is about 900, so I have to imagine that an awful lot of companies are less than that. RBC is at about the 90th-95th percentile, which I think is more than moderately adverse, but it's not hard to imagine that a small company might need to tack 50% or more on to their C-1 charges for reserve testing to adequately cover the increased fluctuation in a smaller portfolio. Even for a given number of issuers, fluctuation in the size of the particular assets is an important consideration. The same phenomenon that led to an asset concentration charge in RBC should be considered in reserve testing as well.

I think if you compare your issuer count and issuer size limits to the number of insureds and your retention limit for life insurance, you'll conclude that it might be worth doing a little more analysis on the effect of fluctuations on the asset side. Just by considering expected quality changes, default rates and recovery values, the C-1 charges allowed in the latest revisions to New York Regulation 126 would appear to cover only expected default costs for medium-grade bonds and not even that for lower qualities. In addition to some margin for adverse deviation in these elements,

you also need to cover the additional fluctuation inherent in a small portfolio or for large issuer limits.

TABLE 7
Risk-Based Capital (RBC) Bond Count Factors

Number of Bond Issuers	Factor Multiplier
50	2.50
150	1.60
250	1.36
750	1.07
1,300	1.00

At this point, I'd like to focus on mortgages for a bit. Below is a list of useful sources of information about mortgages. The American Council of Life Insurance (ACLI) survey has virtually industry-wide information about delinquencies and foreclosures back to 1965, and more recently about restructured loans. Another ACLI survey has mortgage commitment data back as far as 1951.

Sources of Information -- Mortgages
- ACLI Quarterly Survey
- Ad Hoc Mortgage Group Findings
- Practice Notes
- Snyderman Study
- Fitch Special Report
- SOA Commercial Mortgage Study
- Barron's - "The Ground Floor"
      - Levy Index (Rates)
      - Salomon/Levy Performance Index
        (March 8, 1993 edition)

The Ad Hoc mortgage group is a group cochaired by Michael Giliberto, the head of real estate research at Salomon Brothers, and Walter Barnes of the University of Wisconsin. This group is working along with Mike Zurcher and Warren Adams to develop new mortgage factors to recommend to the NAIC for the AVR and RBC. They'll probably have a recommendation by September 1993. Everyone who paid their Academy dues should have received a set of practice notes, including one each on bond and mortgage C-1 modeling. The mortgage note mentions the Snyderman Study and a Commercial Mortgage Stress Test Special Report. Mark Snyderman currently is updating his study and the update will probably be published by this fall.

The Society's Credit Risk Research Project now has results for 1986-89, which Nick Bauer will tell you more about. Participating in this study can get you started on collecting the information you'll need to take full advantage of the results of this study. The ground floor section of Barron's has some interesting information on commercial mortgages, including a new performance index introduced in conjunction with Salomon Brothers that was introduced in the March 8 edition. Salomon also has published a write-up of this index dated March 26. I would recommend all of these

materials to any valuation actuary whose company has any significant amount of mortgages.

Chart 3 shows foreclosure rates since 1968 from the ACLI quarterly survey. The reason I've shown foreclosure rather than delinquency rates is that a loan can be delinquent or in the process of foreclosure for quite some time, and you really can't tell how many new delinquencies are occurring. Foreclosure tends to be more of a one time event, so you can see the pattern of occurrence of problems a little bit better. Unfortunately, foreclosure isn't the only type of problem we see, but I think you really do want to look at the incidence of problems rather than the accumulation of problems in figuring out how to model your loans that are still in good standing. The Society's study does this, which I think is a valuable addition to the information currently available.

CHART 3
ACLI Mortgage Study - Incidence of Foreclosure
(By Number of Loans)
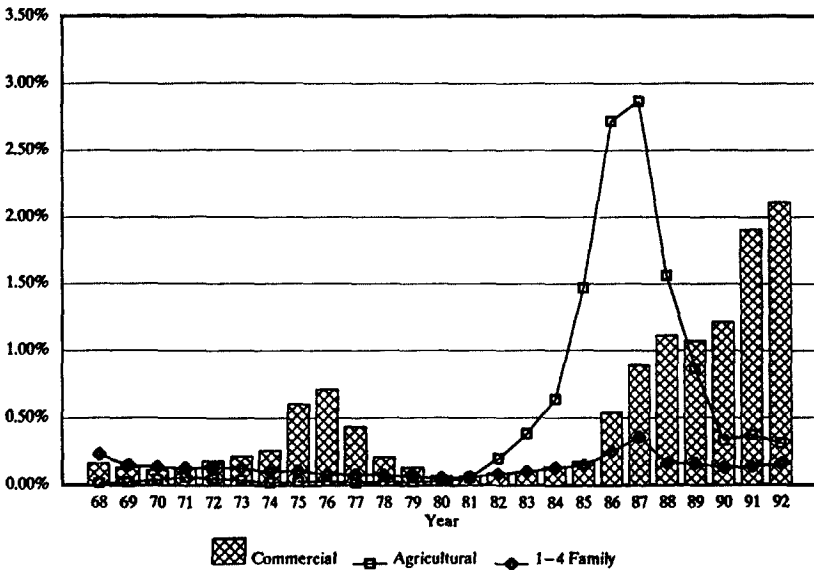
We also need to develop more information about how long loans stay in the various underperforming categories, whether it's delinquency or restructuring or foreclosing, how they perform in those categories, and where they end up. The Ad Hoc group I mentioned earlier is trying to do that right now by using a model with Schedule B data as well as Society data and some of the ACLI information to derive how loans progress through these various categories. I know that some of the commercially available software accommodates these kinds of transition probabilities and, hopefully, the Society study can help in developing some of the necessary assumptions for this

approach. Again, I think these assumptions can be boiled down to a stream of C-1 charges for each year of your projections if you need to.

Table 8 shows the commercial mortgage numbers included in the graph on Chart 3. So, if you can't find the last 100 quarterly surveys, at least you can have some of the annual numbers to take a look at. There was a much more noticeable cyclicality to the mortgage foreclose rates than there was to bond default rates, and this would certainly appear to be an important element in modeling. For example, while 20 basis points was the median one-year average foreclosure rate over this period and 51 basis points was the average, neither one makes a reasonable estimate for 1993. So, how do we reflect this cyclicality? One approach is to ask people what they think this cycle will look like.

TABLE 8
ACLI Mortgage Loan Study
Commercial Mortgages -- Number of Loans

Year	Number of Out-standing Loans	Delin-quent	In Process of Fore-closure	Fore-closed During Year	Incidence of Fore-closure	2-Year Weighted Average	5-Year Weighted Average	10-Year Weigh-ted Average
67	64,494	328	85	97	--	--	--	--
68	69,079	282	78	103	0.16%	--	--	--
69	72,234	271	56	89	0.13	0.14%	--	--
70	71,699	354	81	79	0.11	0.12	--	--
71	66,381	440	100	87	0.12	0.12	--	--
72	71,596	664	138	117	0.18	0.15	0.14%	--
73	70,469	784	155	152	0.21	0.19	0.15	--
74	70,995	1,164	325	180	0.26	0.23	0.17	--
75	51,881	1,598	480	424	0.60	0.43	0.27	--
76	67,580	1,327	377	367	0.71	0.64	0.37	--
77	66,996	1,140	272	291	0.43	0.55	0.43	0.28%
78	67,881	778	187	138	0.21	0.32	0.43	0.28
79	68,262	520	128	87	0.13	0.17	0.40	0.28
80	69,249	511	106	46	0.07	0.10	0.29	0.28
81	68,850	443	127	45	0.06	0.07	0.18	0.28
82	66,821	548	167	59	0.09	0.08	0.11	0.27
83	64,620	542	156	66	0.10	0.09	0.09	0.25
84	59,552	525	133	88	0.14	0.12	0.09	0.24
85	57,513	687	215	103	0.17	0.15	0.11	0.20
86	57,272	1,471	466	309	0.54	0.35	0.20	0.19
87	55,994	1,487	613	509	0.89	0.71	0.35	0.22
88	53,446	707	681	622	1.11	1.00	0.55	0.30
89	51,250	638	644	572	1.07	1.09	0.75	0.39
90	48,587	841	740	620	1.21	1.14	0.96	0.50
91	49,000	1,153	1,021	926	1.91	1.55	1.22	0.66
92	44,812	1,936	836	1,033	2.11	2.01	1.46	0.86
			Unweighted Average:		0.51%		0.41%	0.34%

Note: Incidence of foreclosure is the number of loans foreclosed during the year divided by number of loans outstanding at the beginning of the year.

RESERVE TESTING AND THE C-1 RISK

The results of a survey of market participants by Salomon Brothers showed CBD and suburban office markets bottomed out in 1994. Equilibrium will be achieved in 1997-98 with an equilibrium vacancy rate of 9.3% for the CBD office market and 10.4% for suburban office market. The retail and warehouse markets bottomed out in 1993. With an equilibrium vacancy rate of 7.7% for retail and 7.0% for warehouse, equilibrium should be achieved in 1995-96 for the retail market and 1994-95 for warehouse market. The apartment market bottomed out in 1992. Equilibrium will be achieved in 1993-94 with an equilibrium vacancy rate of 6.8%. While Mike Giliberto cautioned me that recoveries are probably a little farther off in the northeast and California, he did say that these consensus predictions are holding up well so far.

While you're digesting the numbers from that survey, let's look at some evidence as to how the predictions are doing. Chart 4 would suggest that both delinquencies and loans in the process of foreclosure may have passed their peak. Since the projections only called for apartments to have turned the corner, we have to look a little further.

In Chart 5, we've added restructured loans, which are the hollow triangles. Clearly, the problems in this area still seem to be headed up enough so that the total still seems to be headed up as well.

Chart 6 shows delinquencies by property type which look a little bit more erratic but, again, all of the major categories appear to have possibly peaked. Adding restructures in Chart 7 gives us a picture that seems to fit pretty well with the projections. Apartments, which are the solid squares, look like they may have, in fact, peaked in 1992. Retail and industrial space, the lower lines, look as if they could peak in 1993. Office space appears to have increasing problems, but hopefully the projection that this will turn around in 1994 will turn out to be correct.

So, how do you incorporate all of this into your projection? Refer back to Chart 3's recent annual results; I would suggest that a mirror image, or running this graph in reverse, might be a reasonable scenario. For instance, 1994 might look like 1992. Then 1995 could look like 1991 and so forth. Certainly, this would have to be adjusted for your mix of property types and your geographic concentrations and company experience, but at a broad level it might look reasonable.

Table 9 has all the numbers that went into these graphs and the ACLI Bulletins themselves have geographic breakdowns as well. Just as an aside, a natural question is, what led to all these problems? It seems that the biggest reason was an imbalance between supply and demand.

Chart 8 shows how the insurance industry may have helped to contribute to this imbalance. You can see mortgage commitments first piercing $10 billion in 1979. After a short dip, we shot up over $20 billion just a few years later. While a good part of this growth was certainly contributed to by the shortening of the mortgage terms, it seems possible that the growth may still have been a little too rapid.

CHART 4
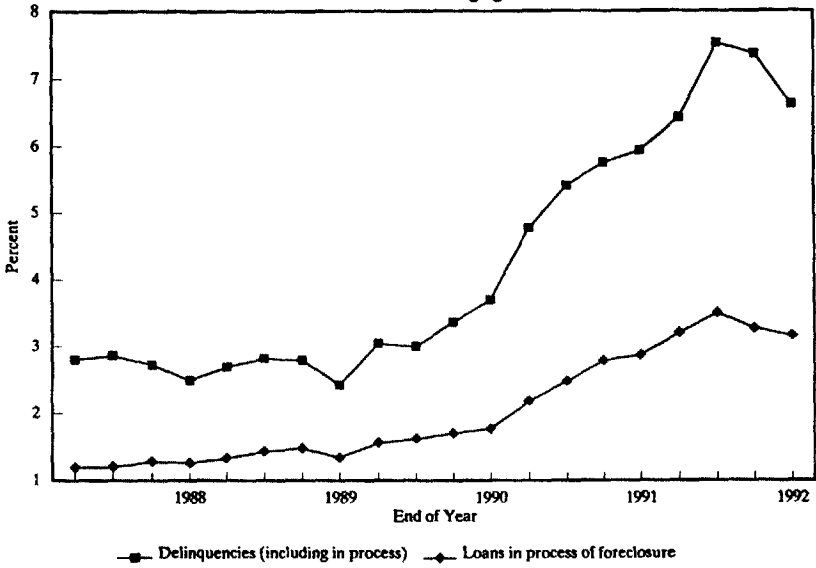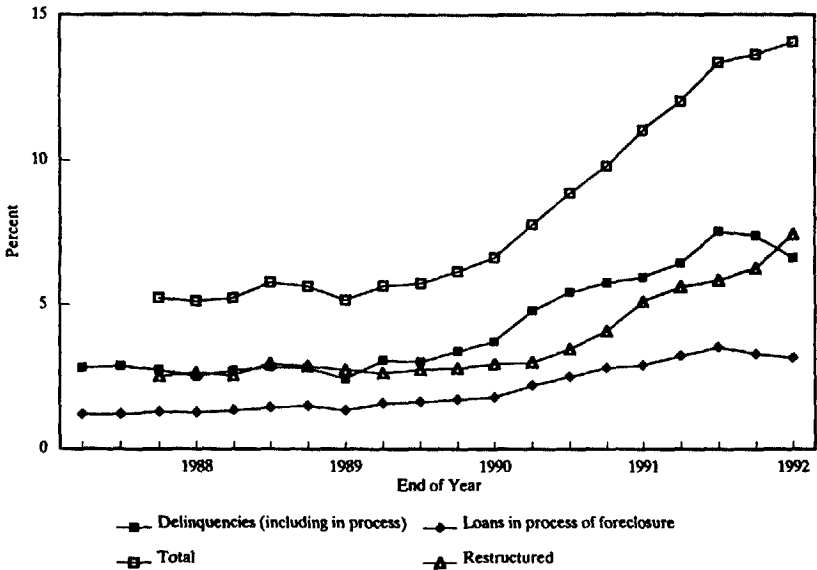### ACLI Mortgage Loan Survey
Commercial Mortgages

Delinquencies (including in process)   Loans in process of foreclosure

CHART 5
ACLI Mortgage Loan Survey
Commercial Mortgages

Delinquencies (including in process)   Loans in process of foreclosure
Total   Restructured

CHART 6
ACLI Mortgage Loan Survey
Commercial Mortgage Delinquencies

CHART 7
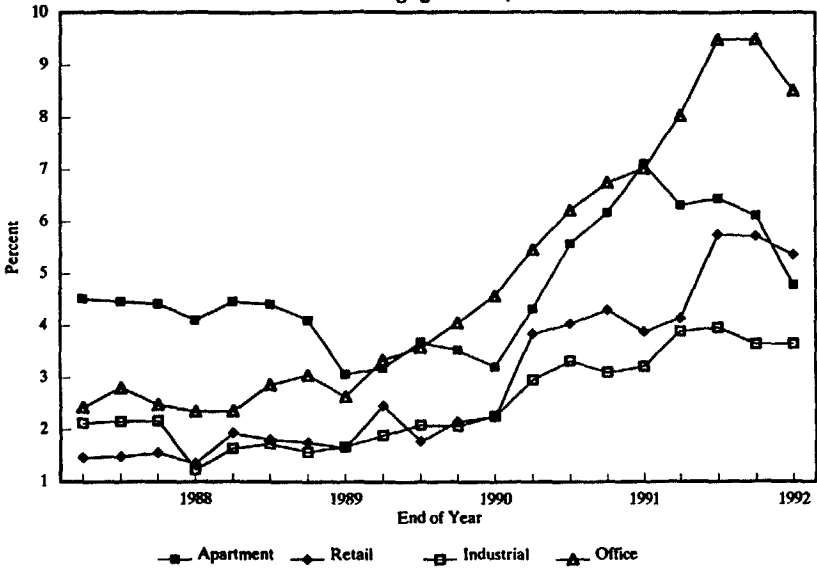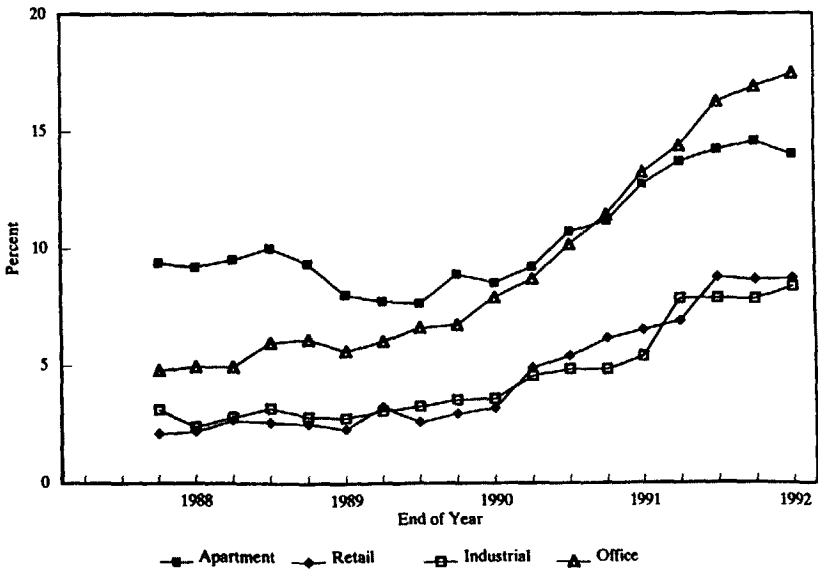ACLI Mortgage Loan Survey
Commercial Mortgage Delinquencies and Restructures

TABLE 9
ACLI Quarterly Mortgage Loan Survey
Commercial Mortgage Delinquencies, In Process of Foreclosure (IPOF) and
Restructured Loans – Rates by Amount

Year	Quarter	Total Commercial			Apartment			Retail			Office			Industrial		
		Delinquent (incl IPOF)	IPOF	Restruc-tured	Delinquent (incl IPOF)	IPOF	Restruc-tured	Delinquent (incl IPOF)	IPOF	Restruc-tured	Delinquent (incl IPOF)	IPOF	Restruc-tured	Delinquent (incl IPOF)	IPOF	Restruc-tured
1988	1	2.80	1.19		4.52	2.10		1.46	0.69		2.43	1.01		2.13	1.28	
	2	2.86	1.20		4.46	2.32		1.48	0.60		2.61	1.01		2.16	0.71	
	3	2.72	1.28	2.50	4.42	2.71	4.95	1.55	0.61	0.54	2.48	1.18	2.31	2.17	0.75	0.93
	4	2.49	1.26	2.62	4.11	2.76	5.09	1.35	0.65	0.82	2.35	1.17	2.69	1.23	0.73	1.14
1989	1	2.69	1.33	2.53	4.47	3.04	5.05	1.93	0.81	0.72	2.36	1.10	2.56	1.64	0.77	1.14
	2	2.82	1.43	2.94	4.42	2.82	5.58	1.81	0.97	0.75	2.87	1.32	3.10	1.73	0.57	1.44
	3	2.79	1.48	2.84	4.10	2.61	5.23	1.75	0.87	0.75	3.05	1.55	3.06	1.57	0.69	1.24
	4	2.42	1.34	2.73	3.07	1.83	4.93	1.65	0.94	0.63	2.64	1.40	2.97	1.68	0.64	1.07
1990	1	3.04	1.56	2.60	3.18	1.42	4.55	2.46	0.96	0.76	3.34	2.01	2.69	1.80	0.94	1.17
	2	3.00	1.62	2.73	3.66	1.48	3.97	1.78	0.95	0.79	3.56	2.16	3.04	2.09	0.85	1.16
	3	3.36	1.70	2.77	3.53	1.70	5.35	2.16	1.06	0.78	4.05	2.27	2.69	2.07	0.97	1.46
	4	3.69	1.77	2.92	3.20	1.50	5.33	2.24	1.34	0.94	4.57	2.25	3.35	2.26	0.88	1.32
1991	1	4.77	2.18	2.96	4.32	1.99	4.89	3.84	1.65	1.05	5.46	2.60	3.23	2.96	1.47	1.80
	2	5.41	2.48	3.44	5.57	2.84	5.12	4.03	1.75	1.36	6.22	3.04	3.93	3.32	1.45	1.51
	3	5.75	2.79	4.06	6.18	3.49	4.98	4.30	1.95	1.85	6.76	3.41	4.66	3.10	1.38	1.73
	4	5.93	2.87	5.09	7.12	3.65	5.64	3.88	2.05	2.63	7.03	3.48	6.22	3.21	1.64	2.18
1992	1	6.42	3.20	5.60	6.33	4.01	7.39	4.14	2.06	2.74	8.05	3.88	6.34	3.90	1.81	3.85
	2	7.53	3.50	5.83	6.45	3.91	7.79	5.75	2.09	2.99	9.49	4.39	6.78	3.96	2.07	3.90
	3	7.37	3.27	6.25	6.12	3.60	8.46	5.73	1.92	2.93	9.50	4.18	7.40	3.65	1.93	4.20
	4	6.62	3.18	7.44	4.78	2.45	9.24	5.36	1.67	3.36	8.52	4.84	8.94	3.85	1.85	4.72

CHART 8
ACLI Commercial Mortgage Commitments 1951-1992

ACLI COMMERCIALMORTGAGE COMMITMENTS 1951 - 1992
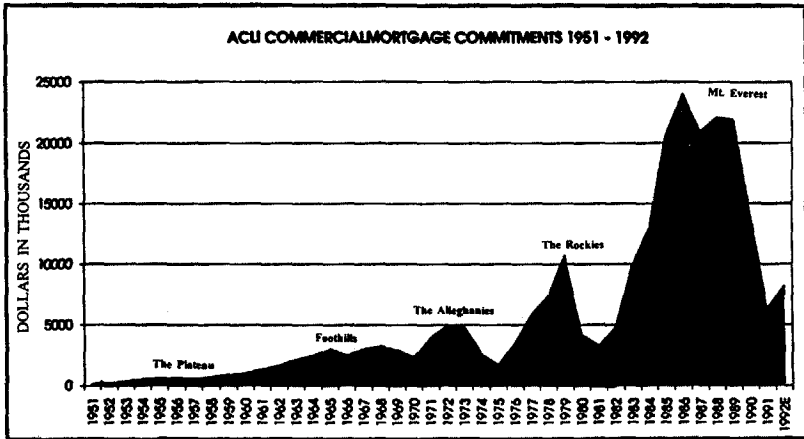
As with bonds, there's also the question of recovery values. Table 10 comes from the June 1992 FITCH Special Report that I mentioned earlier. The FITCH adjustment column generally indicates a need to adjust severity to get a current assumption for data that is less current. While the data is somewhat limited, there may be an unfortunate correlation between default rates and loss severity as well.

TABLE 10
FITCH Commercial Mortgage Stress Test
Summary of Loss Severity Data

Source	% Loss	FITCH Adjustment
Midwest Life Company	21	Increase
RTC Bulk Sales	32-57.5	None
RTC (GAO Report)	39	None
Freddie Mac	45-60	None
FNMA	25-30	Increase
Insurance Companies -- Snyderman Study	32	Increase

June 8, 1992 -- FITCH -- Special Report

The Society study will also provide some information on loss severity, including the most complete calculation of economic loss as well as distributions of results. Nick will be telling you a little bit more about that.

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Overall, the FITCH study concludes that losses on the order of 40-50% are reason-able currently. Even in the current environment, we see recovery values on mortgages that are still in excess of those on bonds. In another environment, we might see a dramatically better picture for mortgages. For example, in the period of high foreclosures in the mid-1970s that you can see on a previous graph, one study by a major insurance company showed gains on overall foreclosures of the magnitude of a 2% increase in the internal rate of return. Certainly, the current levels of losses are influenced by the large declines in interest rates and low levels of inflation in recent years. The 1989 *Transactions* article on the risk of asset default states that returns on real estate correlate 85% with changes in the consumer price index (CPI) and that long-term mortgages will always produce the lower of the rate at issue and the current rate. Given that, it's really not surprising that losses are at historically high levels today.

With foreclosures rates at around 2% currently, and losses on the order of 50%, and something thrown in for delinquencies and restructures, a typical company might easily need C-1 charges over 100 basis points on current loans, hopefully tending down over time.

The following are the major elements of C-1 risk that need to be considered in your work. Consider the effects of and variation in: quality changes, default rates, recovery values, asset count, asset size, diversification, economic conditions, and company practice.

For most of these elements, a good amount of information is readily available. For others, information is becoming available fairly rapidly. While I believe that the best approach to using all this information would be a stochastic approach which is fully integrated with your cash-flow testing, I think you can still do a reasonable job of considering these elements outside your model and reducing the results to a stream of C-1 charges by year. For example, I think Rich Sega's 1986 *Transactions* article entitled "A Practical C-1" provides a good starting model to which you can easily incorporate most of the elements listed in this summary.

MR. NICHOLAS BAUER: What I'd like to start with is to give you an overview of the 1986-89 credit risk research project, and I will briefly discuss the differences between Canadian and U.S. approaches to C-1, provisions for C-1 and valuation and so on. The results of the 1986-89 credit risk study being presented at the Society of Actuaries seminar represent the fruits of years of labor by actuaries and investment professionals.

The study was initiated by the Society of Actuaries in cooperation with the ACLI. It was motivated by the recognition of the increasing importance of credit risk to the financial health of insurers and the realization that no reliable database exists to serve as a standard of comparison or to allow analysis of credit risk in relation to environ-mental or other parameters.

There is a gradually increasing volume of data and analyses being published in relation to publicly traded bonds (though their differences and differing methods of data compilation make comparisons a bit hazardous). For this reason it was decided that

the Society of Actuary/ACLI study should initially concentrate on private placement bonds and commercial mortgages.

For these two categories no database of any kind existed, yet together they represent roughly 40% of all investments of U.S. life insurers.

Although participation was open to all companies, only one Canadian company (Sun Life) decided to contribute data. Separate Canadian experience could thus not be compiled. I fervently hope that more Canadian companies will decide to participate in the future.

The major goals of the study are: (1) to establish common definitions of credit risk and credit rate events (CREs); (2) to establish common methodology for quantifying the costs of credit risk events over time, their frequency of occurrence, and the severity of loss on occurrence; and (3) to better understand the asset characteristics and other parameters that influence credit risk.

The long-term benefits of putting together and maintaining the requisite intercompany database and developing common definitions and methodologies for studying credit risk are substantial. They include: (1) a better conceptual understanding of the nature and behavior of credit risk; (2) the ability to develop reliable benchmarks for judging the relative risk/return trade offs of various asset types and for establishing credit ratings; (3) better understanding of the impact of credit risk in making informed pricing, liability valuation, surplus management and portfolio assessment decisions; and (4) the ability to monitor year-by-year performance (against set benchmarks or expectations).

The research committee and the study participants realized from the outset that creation of a reliable database is going to be a big task, but we did not realize just how big. Time forbids describing the trials and tribulations of the data compilation and validation and the numerous revisions and corrections that had to be done in order to achieve the specific goals of the 1986-89 pilot study. Those goals were: (1) to assess the readiness of companies to participate in a major study of credit risk; (2) to gain experience in the design and implementation of such a study; (3) to provide guidance to companies in the gathering and analysis of data; (4) to generate interest and support within the actuarial and investment communities by proving that such a study is feasible and its results of real value to them; and (5) to the extent possible, provide information about credit risk experience for the 1986-89 period.

I believe that all of the above objectives have in fact been achieved, though only the future willingness of companies to participate will prove whether we have succeeded in raising enough interest and gathered enough support.

It is just as well at this point to draw attention to certain caveats attached to the specific results of the 1986-89 study, a few highlights of which I propose to share with you shortly. Please keep them in mind as you consider the results.

I understand that a copy of all of the material being presented at the seminar will be made available to interested members through the Society office, for a suitable fee of course.

But back to the limitations. First, the four years covered by the study are too short as a guide to credit risk levels and behavior in all conditions, for example in various phases of an economic cycle. Second, not all companies could contribute data for the full study period, thus data by exposure years is not homogeneous. Third, the methodology called for a study of credit risk experience "cash-to-cash," that is comparing originally promised cash flows to cash flows actually received.

However, CREs can have a long tail; that is, the final cash flows may not be received for years. Future cash flows had to be estimated for CREs not yet fully settled. Estimation methods differed by company. This problem will gradually come right as CREs are tracked in future studies and actual cash flows are reported. Fourth, no analysis of the influence of external environmental factors such as economic conditions or changes in laws (e.g., tax law) was attempted. Fifth, although a uniform definition of CRE was furnished to all participants, not all were able to extract all of the requisite information from internal data files.

Therefore, companies were asked to submit information only with respect to CREs they could identify. Although this problem could have led to significant under-reporting, extensive checking confirmed that such was not the case. Finally, because this was a pilot study, it suffered from the problems of any major project undertaken for the first time. But we learned as we went along, to the extent that the results are believed to be significant and trustworthy. Nonetheless, future updates should be better and happen faster.

Table 11 shows the list of companies that contributed data to each of the two asset classes studied. Because the list contains mostly household names, it is not surprising that the database for each study year represented a substantial portion of all of the assets of the life insurance industry for each of the two classes studied.

While the number of credit risk events is much smaller for bonds than for mortgages, there is no surprise there -- it was found statistically significant in aggregate. The company-by-company and year-by-year results, on the other hand, are highly variable. In mentioning company-by-company results, I hasten to emphasize that scrupulous protection of the confidentiality of each company's data was a sine qua non of getting data contributions in the first place.

Consequently, only ratios are shown by company in the published results, and absolute numbers are only shown in aggregate. Only the contributing companies themselves, in respect of their own numbers, (MBI), the compiling agency, and the Society of Actuaries staff had access to company-specific numbers.

One final point that must be covered before I share some result highlights with you, is a brief overview of the definitions and methodology used.

TABLE 11
Intercompany Credit Risk Study
Data Contributors

	Mortgages	Bonds
Aetna	Y	Y
John Hancock	Y	Y
Metropolitan	Y	Y
Nationwide	Y	Y
New England	Y	Y
Principal	Y	Y
Prudential	Y	Y
Safeco	Y	Y
Sunlife	Y	Y
TIAA/CREF	Y	Y
Washington Square	N	Y
Penn Mutual	Y	N
Travelers	Y	N
Western & Southern	Y	N

We define CRE as the occurrence of any of the following event: (1) default, that is, failure to make payment of interest or principle as due; (2) bankruptcy of the borrower; (3) restructure under duress; or (4) sale of the asset to minimize prospective credit losses.

Note that this definition is more general than the one used in most published studies (dealing with publicly traded bonds), so it is likely to result in higher frequency of CRE occurrence, lower average loss severity and higher total C-1 loss than a more restrictive definition, such as simply default.

The behavior of credit risk bears striking similarities to the behavior of disability risks.

Both people and assets are underwritten at point of acquisition of the policy or asset, both can get sick, both can either recover or die. Consequently, traditional actuarial concepts of loss frequency and loss severity can readily be adapted to assets, with the concept of unit claim cost being analogous to total economic loss per unit of asset. In each case, this final measure is calculated as the product of incidence and severity.

The incidence rate by number equals the number of credit risk events (CRE) in a cell divided by the total number of assets in the cell.

The incidence rate by amount is the amount of CRE exposure in a cell divided by the total amount of exposure in a cell.

Let's discuss how the statistics were actually compiled. The key point to keep in mind is that exposure measures are based on numbers of assets and their book values at December 31 of 1985, 1986, 1987, 1988 and 1989, with the exposure

for any calendar year being the mean of the beginning and ending values for that year.

Loss severity refers to the proportion of the asset that is lost due to the CRE given that a CRE has occurred. It can be as high as 100% if there is no recovery, or it can be nil or even negative if the recovery exceeds the remaining balance of the original asset. This can happen, for example, if a repossessed piece of real estate is finally disposed of at a value higher than the loan balance plus lost interest plus cost of disposal.

I mentioned earlier that to ensure that all losses on CREs are fully accounted for, a cash-to-cash method of measurement was used. The formula below demonstrates how that was accomplished:

Economic Loss Calculation

The Economic Loss for Credit Risk Event $= i$

$$EL^{CRE_i} = OP_{PYE}^{CRE_i} \left[\frac{PV_{loss\ calc\ date}^{OCF\ CRE_i} - PV_{loss\ calc\ date}^{RCF\ CRE_i}}{PV_{loss\ calc\ date}^{OCF\ CRE_i}} \right]$$

The expression inside the square brackets represents the proportion of the present value of original cash flows that was lost as a result of the CRE. Because final cash flows from a CRE may take a long time to realize, the present value of revised cash flows must frequently be estimated. That is why one of the objectives of the ongoing study will be to track the evolving cash flows under CREs.

The outstanding principle to which the loss proportion is applied is that at the previous year-end, to ensure consistency between the loss and exposure statistics.

Table 12 shows a simple numerical illustration of these concepts.

And now, let us look at a few highlights of the actual results of the study. First, private placement bonds. The study reports results in both table and graphic form, but for present purposes I thought the graphs would be more visible and illustrate points in more dramatic fashion. (See Charts 9-12.)

Charts 9 and 10 show the incidence of CRE by number and by amount. The incidence by amount (0.76%) is higher in aggregate than the incidence by number (0.56%) and also more variable by company.

The components of each bar represent the relative contributions of each of the four calendar years of the study to the final result. The bottom section of each bar is 1986, the top, 1989. If the sections are relatively similar in size, that means that the year-by-year experience was relatively stable.

TABLE 12
Company XYZ in 1986

	Number	Amount
CRE	1	1.5M
Exposure	200	200M
Incidence	0.005	.0075
CRE PVOCF		1.8M
CRE PVRCF		1.2M
Loss Severity		33%
Economic Loss	.33* 1.5M =	0.5M
"Loss Rate"	0.5M/200M =	0.0025

CHART 9
Credit-Risk Study
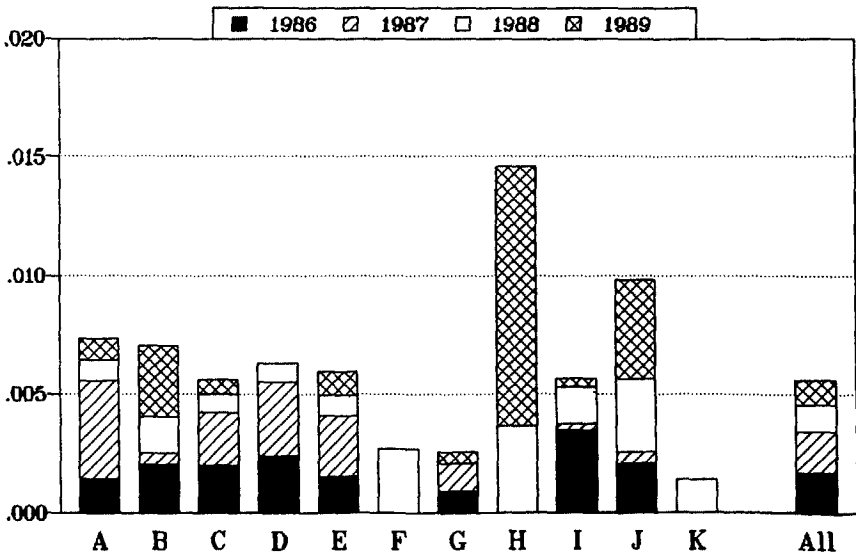Private Placements 1986-1989
Incidence Rate by Number

CHART 10
Credit-Risk Study
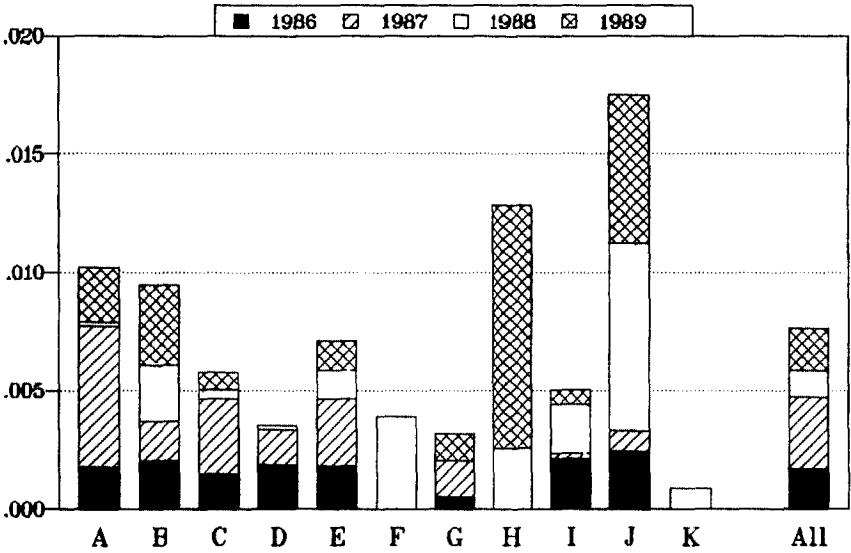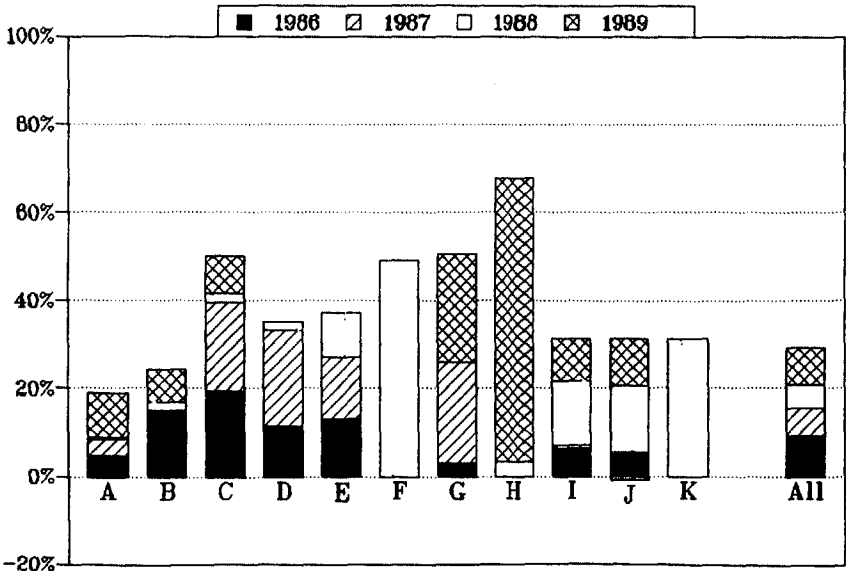Private Placements 1986-1989
Incidence Rate by Amount

CHART 11
Credit-Risk Study
Private Placements 1986-1989
Loss Severity (Ratio of Economic Loss to CRE Exposures)

CHART 12
Credit-Risk Study
Private Placements 1986–1989
Ratio of Economic Loss to All Exposures
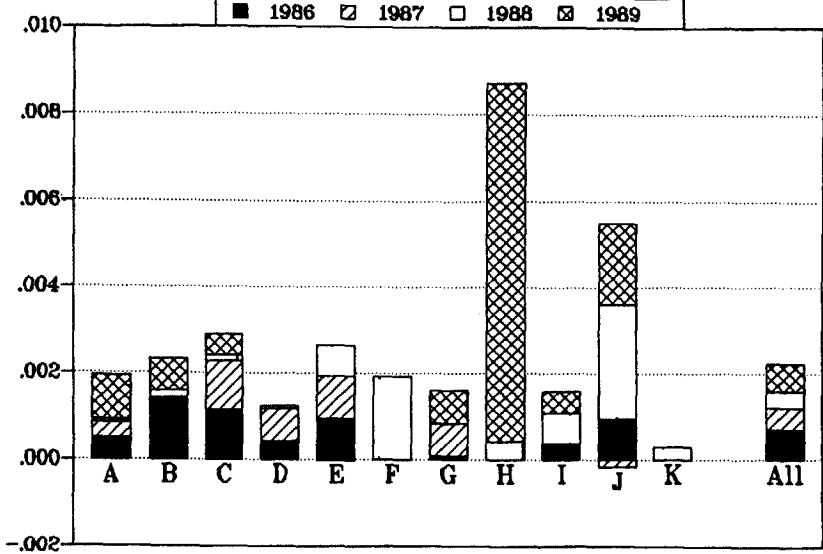
Whereas company-by-company results are highly variable both by year of exposure and between companies, the aggregate results are far more stable. This demonstrates one of the key advantages of compiling and maintaining an intercompany database for a low-frequency/high-severity type of risk such as credit risk.

Chart 11 shows loss severity, which was 29% in aggregate, varying by company from a low of under 20% to a high of nearly 70%. There appears to be no significant correlation with incidence, if anything there is a mild inverse correlation.

Finally, the ratio of economic loss to all exposures – the annual claim cost -- shown in Chart 12 amounts to 22 basis points in aggregate for the four-year period, varying from a low of 15 basis points in 1988 to a high of 32 basis points in 1986. Obviously, the company-by-company results are far more variable, especially year by year. I would hesitate to attach any real significance to them.

Two important points need to be made with respect to these results. Firstly, they represent CRE experience for entire portfolios, so in comparing results to a particular company, the quality composition, coupon rate composition, and other characteristics of the portfolio must be kept in mind. The more similar your portfolio is to the industry average represented by the participating companies the more meaningful the comparison.

For example, as a general guide, for bonds where quality rating is available in the data base about 87.5% of the exposure base was investment grade and 90.5% had a "yes" NAIC rating.

The second point is that the 1986-89 period was relatively favorable from an economic point of view, thus the loss results are likely to be more favorable than can be expected for the more adverse period that followed. This also confirms the need to make a study of this kind an ongoing one.

The study does include more detailed analyses of results. There are further analyses also being considered for future studies as the database grows and companies are able to reliably supply requisite data components.

Finally, let us take a brief look at commercial mortgages (Charts 13-16). The incidence, loss severity, and ratio of economic loss graphs are shown. The company-by-company results appear to be even more variable than was the case for bonds, but once again the aggregate results are quite stable.

CHART 13
Credit-Risk Study
Commercial Mortgages 1986-89
Incidence Rate by Number
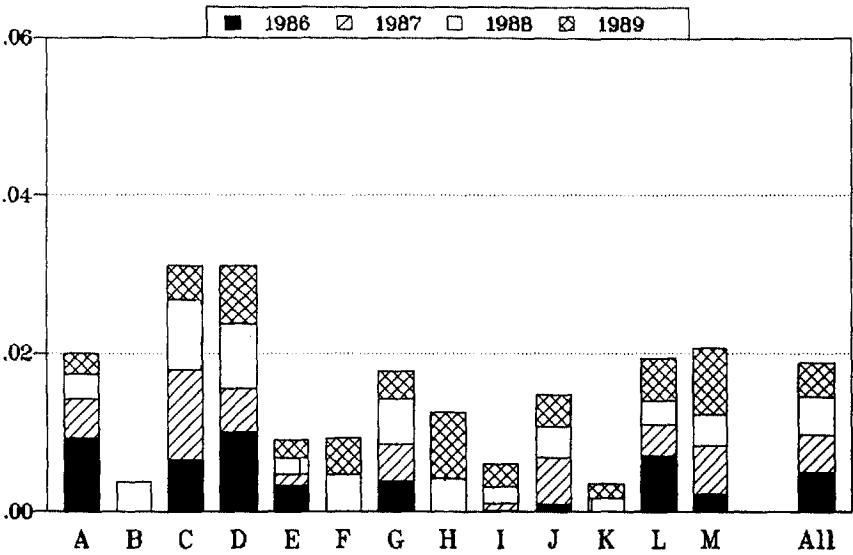
CHART 14
Credit-Risk Study
Commercial Mortgages 1986-89
Incidence Rate by Amount
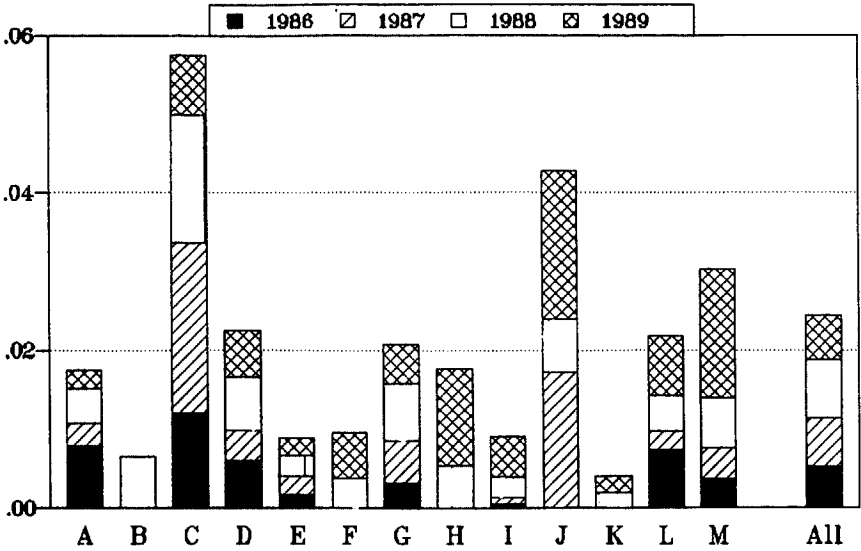
CHART 15
Credit-Risk Study
Commercial Mortgages 1986-89
Loss Severity (Ratio of Economic Loss to CRE Exposure)
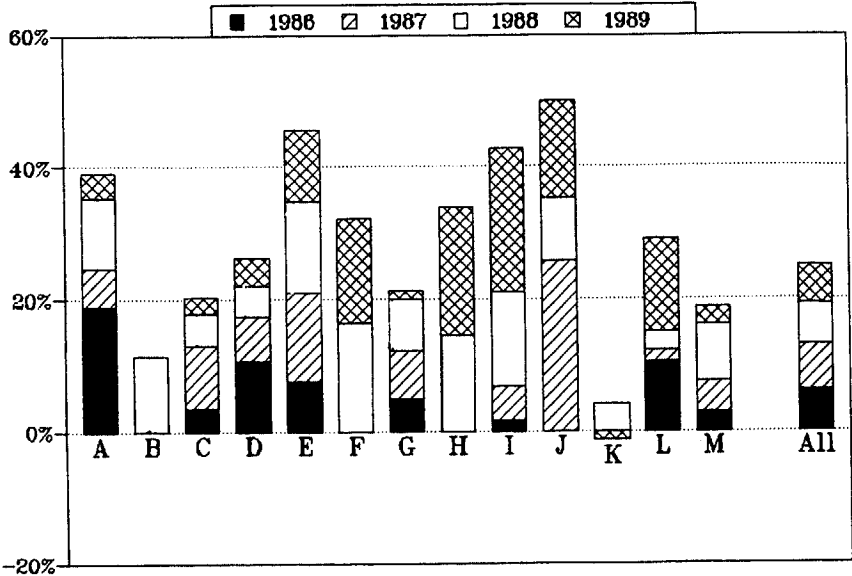
CHART 16
Credit-Risk Study
Commercial Mortgages 1986-89
Ratio of Economic Loss to All Exposure
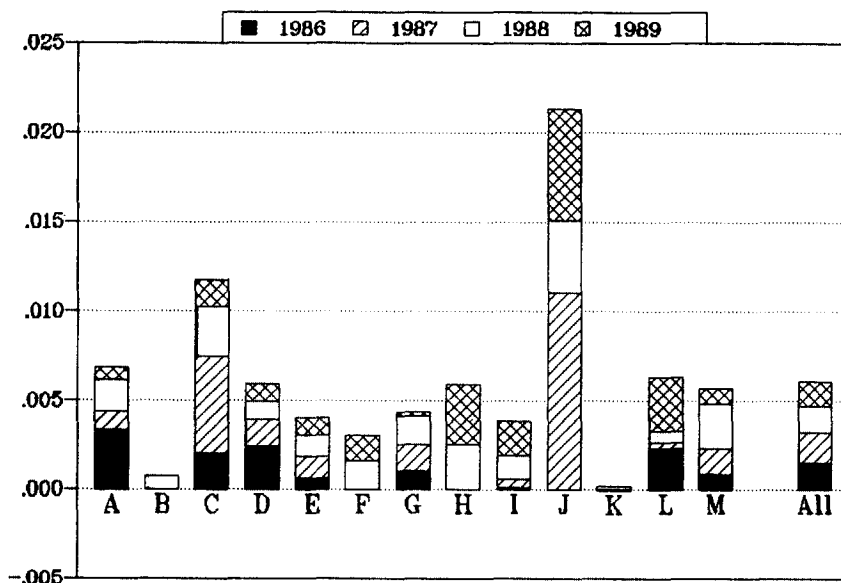
As was the case for bonds, the incidence by amount is significantly higher than the incidence by number: 2.5% versus 1.9%. They are also nearly four times as high as the corresponding incidence for bonds in Charts 13 and 14.

Loss severity at 25% in aggregate is slightly lower than the 29% observed for bonds, and is between 20% and 30% for all four years. However, if zero or negative loss CREs are eliminated from the data, then loss severity rises to 32% in aggregate in Chart 15.

The ratio of economic loss to all exposures -- the annual claim cost -- is 63 basis points in aggregate, varying from highs of 82-81 basis points in 1986-87 to lows of 53 and 48 basis points in 1988-89 (Chart 16).

The aggregate rate of credit loss over the four years for commercial mortgages is nearly triple that for private placement bonds (63 basis points versus 22 basis points). (See Charts 17-20.)

CHART 17
Credit-Risk Study
Commercial Mortgages 1986-89 by Location
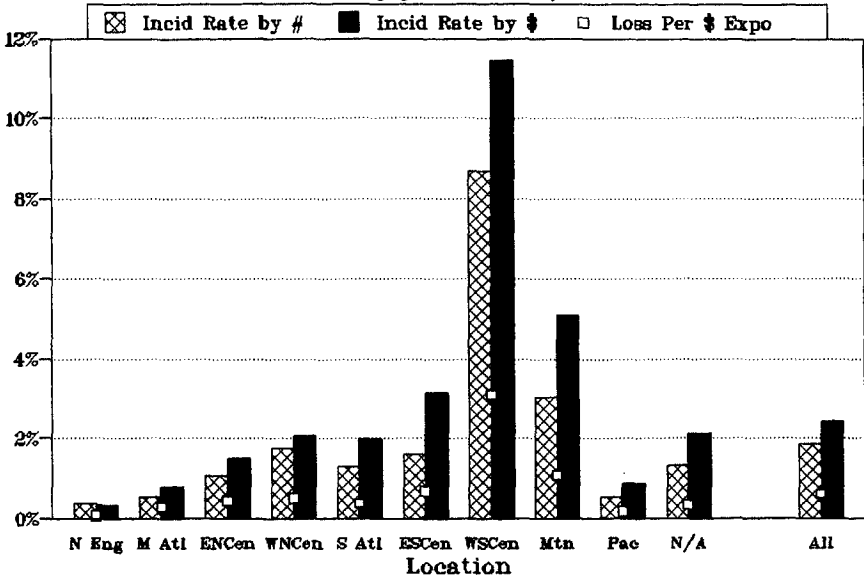
CHART 18
Credit-Risk Study
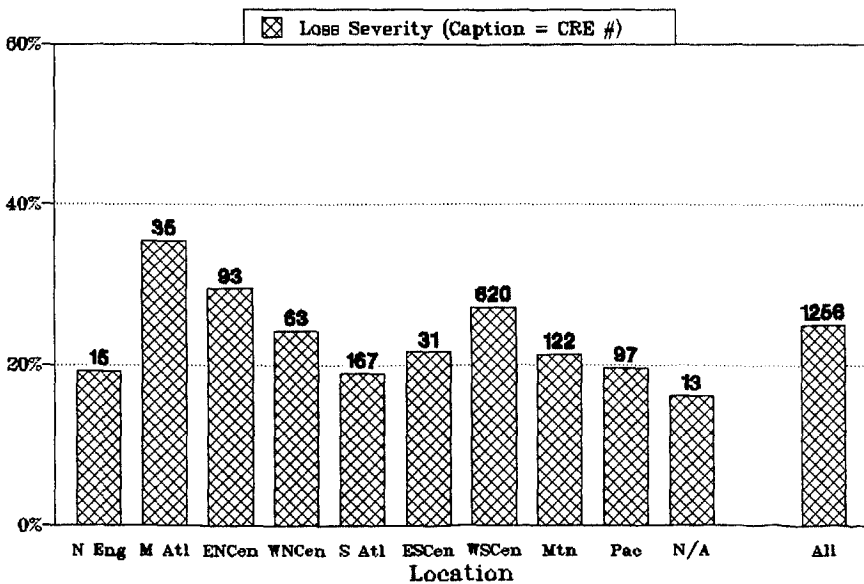Commercial Mortgages 1986-89 by Location

CHART 19
Credit-Risk Study
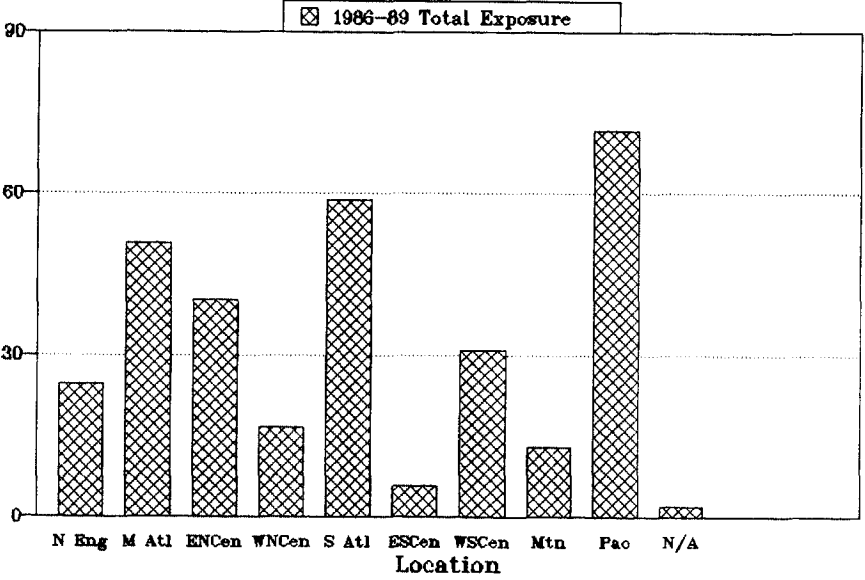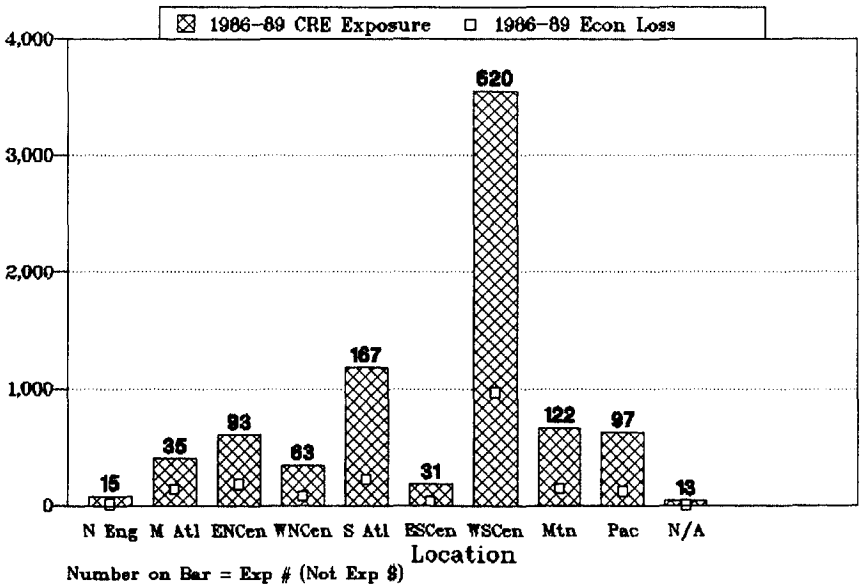Commercial Mortgages 1986-89
Exposure Amount in Billions

CHART 20
Credit-Risk Study
Commercial Mortgages 1986-89
CRE Exposure in Millions

As for bonds, a number of supplementary analyses were also carried out for commercial mortgages. The most striking among them is the analysis by location shown in Chart 17. It shows that nearly half of the CREs occurred in the West-South-Central region (620 out of 1267) and well over half in the West-South-Central plus Mountain regions (742 out of 1267). The corresponding exposures are 10% for West-South-Central and 14% for West-South-Central and Mountain combined. Although the loss severity for these regions was slightly lower than average, they still accounted for over half of all economic losses, a clear reflection of the oil-patch crisis of the second half of the 1980s.

Please recall in considering these results the caveats mentioned in connection with private placement bonds, concerning portfolio composition and time period covered.

Concerning the latter, Chart 21 may give pause: the aggregate delinquent and restructured commercial mortgages, as per the ACLI survey, for the period from September 1989 through December 1992. The feature to note is the sharp rise in the delinquency rate for all types of mortgages following the end of the exposure period of the current study.

Chart 22 compares the percentage of delinquent commercial loans to the incidence rate by amount found in the study. The correlation is not perfect, but it is striking. The solid graph line is the ACLI delinquency rate since 1965, and the four little squares are the incidence by amount coming from the study for 1986-89. Only in 1989 is there a relatively significant difference between the incidence study and the ACLI delinquency rate.

CHART 21
ACLI % of Delinquent & Restructured
Commercial Mortgages 12/92-6/93
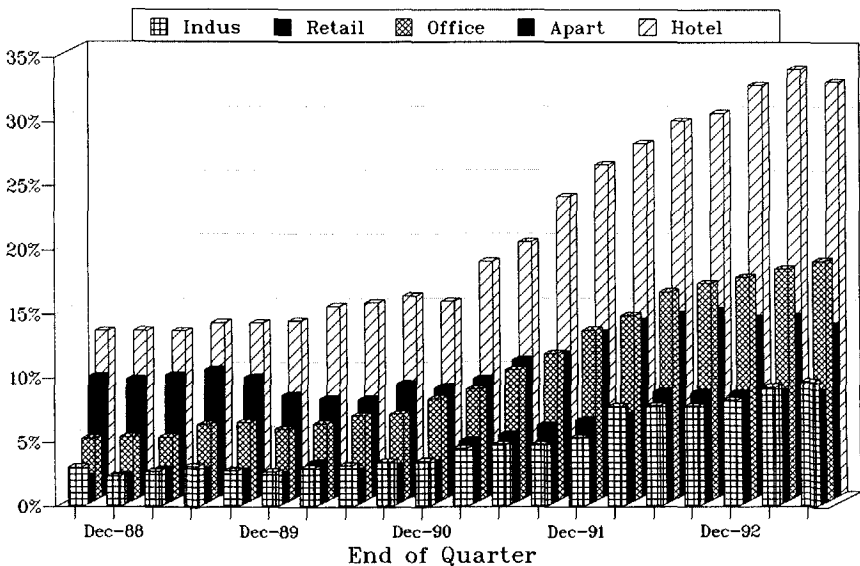by Property Type

CHART 22
1986-89 Credit-Risk Study on Commercial Mortgages
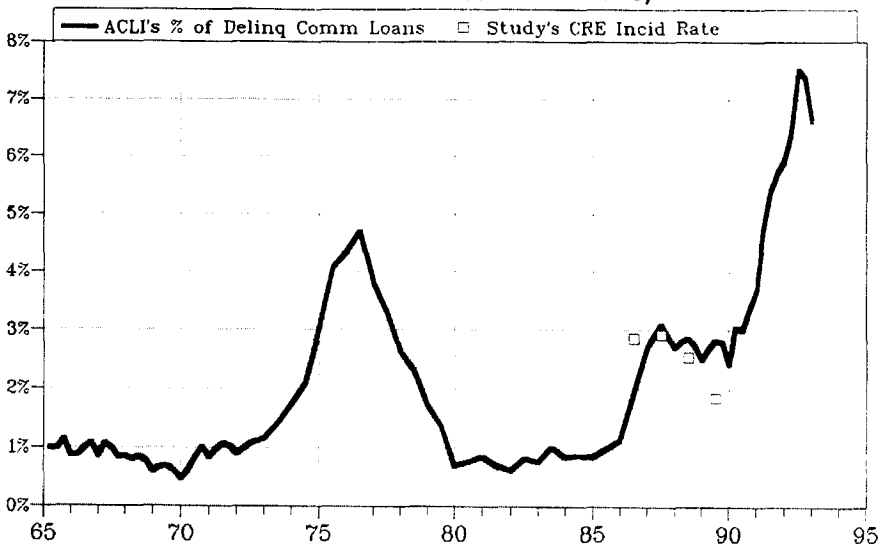In the Context of the 1965-92 ACLI Survey

Chart 23 illustrates the difference in mortgage defaults and delinquencies between the
U.S. and Canada. It is striking. The top line is U.S. delinquencies shown in the ACLI
survey. The second line is Canadian delinquencies and you can see that by and large
Canadian delinquencies tend to run at 50% of U.S. levels at least to the end of 1992.
I rather wonder if that will also be true in 1993.

CHART 23
Mortgage Delinquencies For Life Insurance Companies

U.S. Delinquencies (60 days)   U.S. Foreclosures

Canada Delinquencies (90 days)   Canada Foreclosures
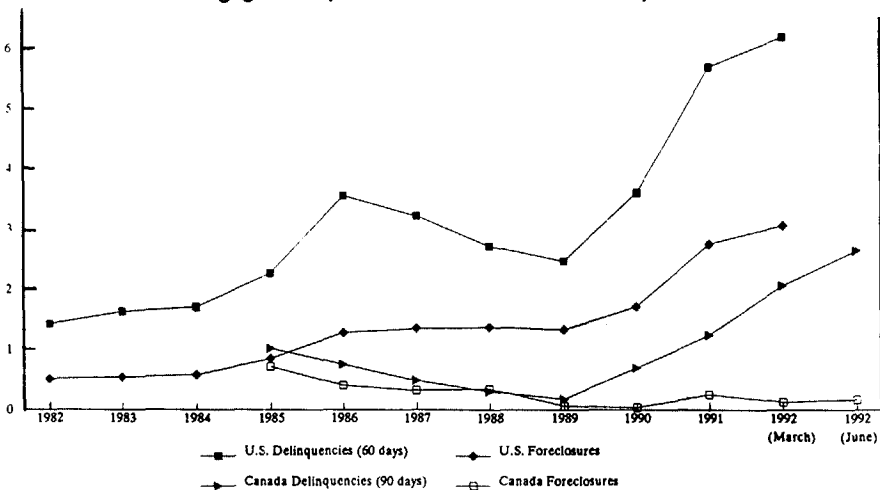
Sources ACLI, CLHIA mortgage surveys

The bottom two lines are foreclosures. The higher one of the two is obviously U.S. foreclosures. These numbers don't quite agree with Linn's. I'm not quite sure why, since the source is the same. In any event, the pattern is the same, only the numbers differ slightly. The bottom line is Canadian foreclosures. I suspect there's a certain amount of underreporting in the Canadian foreclosures, but, in any event, it's not very hard to guess which way the Canadian foreclosures line will go in the months and years following that graph. What it does illustrate is a phenomenon that we found which seems to be confirmed by the pattern of the recession in the U.S. which is that mortgage foreclosures and losses tend to lag recessions by about two years. So, you will hit the peak of the mortgage delinquency or default losses roughly two years after the drop in the economy.

MR. W. PAUL MCCROSSAN: Nick, you mentioned that one of the objectives of the Society of Actuaries study was to study defaults by loan-to-value ratio and you didn't refer to it in any of your slides. Do you have any results that indicate defaults by loan-to-value ratio that you might be willing to share?

MR. BAUER: You find a pattern of increasing economic loss per dollar exposed with increasing loan-to-value ratio up to, if I remember correctly, roughly 75% loan-to-value ratio. Thereafter, it flattens out and then declines. I have no particular explanation for that. I might hazard a guess that companies are unwilling to make high ratio commercial mortgages unless there are additional covenants or guarantees supplied, so high ratio loans might be exhibiting lower losses because of the additional covenants.

MR. WILLIAM A. ZEHNER: In the past couple of years, we have seen commercial real estate values drop tremendously and today's loans are probably based on a value such that loan-to-value ratios of loans made a couple of years ago may now be over 100%. I wonder whether the fact that there has been this depreciation in value will affect any new loans that are made in the future and how you think this will affect it. In addition, will this cause these statistics will be inappropriate five years from now because of that?

MR. BAUER: These statistics are already inappropriate because they cover 1986-89 and I'm looking very forward to getting the 1990, 1991, 1992 and 1993 statistics. Certainly, as the market rolls, statistics that are appropriate for one period are not appropriate for a different period. For example, if you look at the period from 1975 to 1989, values had a constantly rising trend (at least in Canada), so it was no surprise that somebody said their company had no losses to speak of during that period. As long as there is significant equity left in the property, no right-minded owner is going to default on it and give it to you. They're going to try and sell it even if they otherwise cannot hang onto it. So, your losses are going to be relatively low. What made the losses peak so high in 1990, 1991 and 1992 was the combination of bad economic times and falling rates of interest making the values fall, it really became attractive for mortgagees to simply walk away from the property.

Now that the values have gone through a painful decline, the question is, where do we go from here? If you postulate that the values are going to stay stable, then I would submit that you're going to end up with results somewhere in between the two extremes. You will not get as good experience as when the values were consistently rising and they were always rescuing you, and you shouldn't get as bad

as when values were falling like a rock and all of a sudden the loan-to-value ratios started rising above 100%. That's why it's useful to try to relate conditions that you're expecting in the near term to the particular past experience years that happen to be most similar in your mind.

MR. MCCROSSAN: We've seen two distinct cycles on the graph. I guess one was based on the first oil crisis and the second on the most recent crisis, but the severity seems to be much greater in the recent crisis. Has the committee tried to look at any of the leading, lagging or coincident indicators to see if there's anything that would project severity in advance? We can see a cycle, but the question is, have you tried to get any sort of correlation with any economic indicators that would project the severity of the cycle?

MR. BAUER: To date, the committee has not done work to try to correlate the results to external economic indicators. There are two reasons for that. One is that we were so very occupied with data quality issues and results compilation: we were trying to get credible results published before they were ancient history. The other reason is in order to do that it is useful to have a set of results that reflect a suffi-ciently different set of economic conditions to make such analyses more meaningful.

And so I would suspect that what will happen is we'll try to collect data right up to the end of 1992, produce further experience results, and then perhaps go after some of the kinds of value-added analyses using correlations with economic indicators, interest rates, etc.