

**TRANSACTIONS OF SOCIETY OF ACTUARIES  
1993-94 REPORTS**

**CREDIT LIFE INSURANCE  
ACTUAL-TO-EXPECTED MORTALITY STUDY FOR 1992  
CREDIT INSURANCE EXPERIENCE COMMITTEE\***

**I. INTRODUCTION**

The credit life actual-to-expected mortality study is based on experience for calendar 1992. The business studied was submitted by seven companies. Another company's data were partially used, and a ninth company provided a summary of its own actual-to-expected mortality study. The study reviewed only single-premium credit life insurance.

The data submitted by the companies contained certain errors and approximations. Because of the massive volume of data provided and the inability of the companies to correct specific errors, the study was completed by making reasonable actuarial adjustments to the raw results to mitigate the obvious errors or approximations.

Because the number of contributing companies to the study is relatively limited and the experience of each company more or less comes from a specific credit insurance market, the identity of the companies providing the data will not be furnished to avoid the possibility of revealing competitive information.

The report is divided into four primary sections:

- Description of the data
- Actual-to-expected mortality from the study
- Actual-to-expected mortality from a company study
- Limitations and comments.

The results of the study are meaningful, but because this is the first actual-to-expected credit life insurance mortality study and the number of contributing companies is relatively small, the results may not perfectly represent total industry or individual insurance company experience.

**II. DESCRIPTION OF THE DATA**

The study covers experience from calendar 1992. Seven companies submitted in-force information at the end of December 31, 1991 and each month end through and including December 31, 1992. The information for each

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certificate included age, in-force amount, single or joint life status, and so on. In addition, the companies also provided death claim information indicating the amount of the paid claim, the age at death, single or joint life type of coverage (but not from all companies), and the date of death.

The information from the seven companies (including one Canadian contributor) covered, on average, more than 3 million exposed certificates, about \$16 billion of average exposed insurance in force and \$82 million of death claims.

Table 1 summarizes the average number of certificates and amount of insurance, the type of business (that is, source or market), and average certificate amount for each participating company.

TABLE 1

Company	Average No. of Certificates	Average Amount (in Millions)	Principal Business	Average Face (in Millions)
B	1,375,349	\$3,360	Finance company	\$2,443
C	439,412	2,427	Mixed	5,224
D	349,913	3,236	Bank	9,247
E	403,748	2,221	Mixed	5,500
F	326,691	2,181	Auto	6,675
G	90,021	490	Bank	5,447
H	657,197	2,018	Finance company	3,070

The average finance company certificate is smaller than the average certificate of the other sources. The average amount of life insurance per certificate shown in the table is generally consistent with other published industry data.

As mentioned previously, it was necessary to make reasonable actuarial adjustments for certain data imperfections. The following are the adjustments that were made:

1. Data identified as being for attained ages under 20 and over 75 (because credit life insurance is generally not issued at or continued in force for these age ranges and it was presumed that most of the very young or very old ages represent miscoded cases).
2. In force heaped at an arbitrary issue age. (It is a common practice in credit insurance to "plug in" an age, such as 46, for all insureds who did not furnish their issue age.)

3. Claim data that did not identify whether the certificate was for single-life or joint-life coverage.

A brief explanation of the adjustments made for each of these areas is provided below.

#### *Incorrect Ages*

Since loans are not normally made to persons below an age such as 17 or 18, it is unlikely to have insureds below a certain age. Similarly, credit life insurance is not issued above some upper age (such as 65 or 70 and which varies by state) and terminates at some attained age (practically this is age 75).

Issue ages provided by insureds are not checked, and some are miscoded by the companies when the data are entered into computer records. Since there was no way to check apparently incorrect ages and the number of very young or very old insureds that was reported was relatively small, all deaths reported were included in the study (because the deaths did occur) but the in force was restricted to ages 20–74. Since the incorrect ages represent exposures that did occur, the exposures and claims for ages 20–74 were adjusted by proportionately increasing the in force reported between ages 20 and 74 for the amount of exposures reported below age 20 or above age 74.

#### *Missing Issue Ages*

Some companies do a better job than others of obtaining insured issue ages. It is a standard credit insurance actuarial practice to insert an average assumed issue age for valuation purposes if the insured does not provide an issue age. Thus, there is a disproportionate exposure of insureds at or just above the “plugged-in” issue age. (The plugged-in ages were identified in the study as those ages that obviously had significantly greater in force than the immediately preceding and following ages).

The excess in force at the plugged issue age was spread proportionately over ages 20 through 74 prior to calculating expected mortality.

#### *Joint Life Exposures*

Some companies' data did not identify claims from joint-life certificates; hence, joint-life computer runs were not prepared for these companies. The expected mortality for these companies was developed by assuming 30% of



TABLE 4  
AVERAGE AMOUNT OF LIFE INSURANCE BY AGE BRACKET

Age	Company						
	B	C	D	E	F	G	H
20-24	\$1,967	\$4,287	\$ 5,970	\$3,967	\$5,571	\$ 3,122	\$1,838
25-29	2,246	4,682	7,924	4,531	6,072	3,716	2,363
30-34	2,436	5,041	9,008	4,929	6,502	4,308	2,752
35-39	2,555	5,464	9,950	5,487	6,762	5,094	3,066
40-44	2,638	5,867	10,425	6,008	6,926	5,608	3,333
45-49	2,690	6,128	10,583	6,433	7,136	6,321	3,591
50-54	2,733	6,297	10,541	6,910	7,269	6,801	3,754
55-59	2,739	6,382	10,044	6,728	7,237	7,061	3,821
60-64	2,675	6,461	8,982	6,438	7,176	7,600	3,666
65-69	2,540	6,319	8,318	7,011	7,412	7,905	3,188
70-74	2,913	4,674	7,027	8,414	7,383	10,148	2,810
Total	\$2,443	\$5,524	\$ 9,247	\$5,500	\$6,675	\$ 5,447	\$3,070

Not surprisingly, the amount of life insurance generally increases by age because older people are more likely to take out larger loans.

### III. ACTUAL-TO-EXPECTED MORTALITY FROM THE STUDY

The basis for the expected mortality is the 1980 CSO Male ALB Mortality Table. Although it is not precisely correct, the study calculated expected mortality for joint-life contracts as exactly twice the mortality rates used for single-life contracts for the age of the primary insured (the only age reported). Since credit life contracts are very short term (usually less than five years), this approximation is reasonable.

A computer program calculated the average amount of life insurance in force for each month during 1992 by attained age. The formula for expected mortality is the (average amount of life insurance) plus (50% of the deaths at each attained age) times (the appropriate attained age mortality factor).

Table 5 presents a summary of the actual-to-expected mortality ratios by age brackets for each company. Table 6 shows the death claims (in dollars) by age bracket for each company.

Because the data came from a variety of sources and used different underwriting criteria, neither a single actual-to-expected percentage for the entire study nor age bracket mortality ratios were calculated. Where the total death claims in an age bracket were less than \$100,000, the actual-to-expected percentage is preceded by a negative sign. The ratios in these cells would normally not be considered credible.

TABLE 5  
SUMMARY OF RATIOS OF ACTUAL-TO-EXPECTED MORTALITY

Age	Company						
	B	C	D	E	F	G	H
20-24	34.88%	39.35%	55.32%	28.45%	73.44%	-18.63%	97.62%
25-29	49.05	34.29	55.39	44.28	63.25	-57.90	52.61
30-34	54.89	44.77	51.72	52.97	83.23	-25.13	57.77
35-39	58.02	38.33	58.92	41.36	74.68	-5.94	53.78
40-44	68.57	38.66	57.16	41.40	91.06	33.42	56.71
45-49	64.31	61.75	63.61	55.60	85.66	62.24	70.41
50-54	64.60	47.32	76.93	46.41	95.02	38.03	78.50
55-59	53.81	63.50	58.69	39.42	103.73	65.85	76.77
60-64	55.39	51.83	65.91	46.52	111.47	80.51	75.81
65-69	46.72	77.96	62.52	114.97	95.70	92.88	59.06
70-74	-63.17	87.31	84.58	-220.35	-133.92	2233.01	53.46
Total	57.36%	56.40%	63.90%	48.33%	96.37%	74.69%	66.63%

For all but one of the individual companies, the range of actual-to-expected mortality ratios is 48% to 75%. One company had a higher ratio of actual-to-expected mortality, for which an explanation was not available. The actual-to-expected mortality ratios for the company that submitted partial data are consistent with the results from the seven companies with complete data.

The results indicate that actual mortality for credit life insurance was significantly less than the 1980 CSO Male ALB Mortality Table. The possible reasons for this level of mortality are mentioned in Section V.

#### IV. ACTUAL-TO-EXPECTED MORTALITY FROM A COMPANY STUDY

Another company periodically has performed its own mortality study for a rather small block of single-premium credit life insurance business produced in the credit union market. The number of deaths in this block for 1992 was slightly in excess of 500.

The company develops a graduated mortality table from its own experience. The ratio of the company's mortality table to the 1980 CSO Male ALB Mortality Table based on weighted exposures is 55%. The ratios by attained age were lower at the youngest ages, being about 25% at about age 20 and then increasing to about 70% at age 70.

The results of this company's mortality analysis are consistent with the general results that were generated by the Committee's actual-to-expected mortality study, although the Committee neither developed a mortality table nor computed weighted results by attained age.

TABLE 6

## DEATH CLAIMS INCLUDED IN STUDY BY AGE BRACKET

Age	Company							Total
	B	C	D	E	F	G	H	
20-24	\$ 285,312	\$ 214,552	\$ 252,709	\$ 148,377	\$ 402,536	\$ 11,064	\$ 229,692	\$ 1,544,242
25-29	571,962	200,457	508,368	254,966	356,421	43,728	276,202	2,212,104
30-34	714,708	317,328	629,298	363,519	537,464	27,520	471,717	3,061,554
35-39	920,078	394,071	980,712	392,930	660,661	11,222	649,599	4,009,273
40-44	1,417,906	637,101	1,404,702	597,088	1,280,639	107,535	993,492	6,438,463
45-49	1,490,280	1,327,952	1,900,965	1,063,776	1,570,519	284,041	1,623,133	9,260,666
50-54	1,611,922	1,318,905	2,626,395	1,176,531	2,216,203	237,446	2,168,699	11,356,101
55-59	1,533,836	2,295,911	2,229,318	1,368,334	3,252,649	539,645	2,586,897	13,806,590
60-64	1,840,684	2,484,429	2,437,975	1,433,110	4,777,614	967,182	2,964,648	16,905,642
65-69	480,028	2,255,854	1,444,408	831,422	1,269,874	1,075,622	2,375,446	9,732,654
70-74	41,242	735,058	958,903	69,063	80,920	455,892	1,658,782	3,999,860
Total	\$10,907,958	\$12,181,618	\$15,373,753	\$7,699,116	\$16,405,500	\$3,760,897	\$15,998,307	\$82,327,149

## V. LIMITATIONS AND COMMENTS

For several reasons, the information presented in this report should not be considered as precise. In addition to the problems with miscoded or absent age information and problems with identification of joint coverages, there is no uniformity between company underwriting and claim adjudication standards and practices. For example, the degree to which a company's applications included some form of health questions is unknown.

The results indicate that credit life insurance mortality for 1992 was less than the 1980 CS0 Male ALB Mortality Table. This general conclusion seems credible because of the amount of data used in the study. (Although it was not tracked, the number of death claims in the analysis is estimated to be between 15,000 and 20,000, which, if it were produced by a uniform block of business, would be considered very credible.)

Possible explanations for mortality being lower than the basic table include:

1. Much of the credit life insurance that has been issued in recent years has been underwritten rather than guaranteed issue. Because the basic table is very close to population mortality experience and because underwriting will eliminate unhealthy lives from the exposures, this may help to explain the actual level of mortality, as compared to the standard used in the study.
2. The female percentage of credit life exposures is increasing and may be around 30%. Because females have lower mortality than males, it would not be surprising to find that actual mortality is less than a standard based only on male mortality.

Another interesting result from the study was that the ratio of actual-to-expected joint-life mortality was very similar to the ratio for single-life coverage. Because the expected basis is twice the male mortality rate, most joint insureds would be assumed to be female spouses, and female spouses tend to be slightly younger than their partners, the joint actual-to-expected ratio would normally be expected to be less than the single-life actual-to-expected ratio.

If the observed relationship between single-life and joint-life actual-to-expected mortality ratios is correct, then probably some extra level of anti-selection is occurring in joint-life coverages. This would not be surprising because the covered parties are able to select whether single- or joint-life coverage is elected.

While this actual-to-expected mortality study will be of interest to actuaries and other parties involved with credit life insurance, it will be more valuable if future studies are conducted to confirm the results of this study and to observe trends in credit life insurance mortality levels. The Committee hopes that experience from a broader cross section of companies can be included in future studies, and then mortality could be studied by degree of underwriting, state, source of business, and the like.

Although credit A&H insurance is slightly more complicated, it is also feasible to perform a similar actual-to-expected mortality study for that type of credit insurance. The standard for this study might be the 1985 CIDA table. Some changes would have to be made to the software constructed for the present study, but the marginal effort required to adapt the study for credit A&H would seem to be within reason.

#### VI. ACKNOWLEDGMENT

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