

**TRANSACTIONS OF SOCIETY OF ACTUARIES
1997-98 REPORTS**

**REINSURANCE INTERCOMPANY MORTALITY STUDY
FOR LARGE AMOUNTS
(1994 EXPERIENCE)**

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DESCRIPTION OF THE STUDY

Observation Period and Policy Issue Years

This report covers the experience for calendar year 1994 and the earliest issue year for all policies reported by participants was 1960.

Policies Included in the Study

Only policies and net amount at risk reinsured to the participants are included in this study. Policies for large amounts are those with a total (direct) face amount of \$1 million or more, where the residence of the insured at issue is the U.S., and the currency of the policy is in U.S. dollars. Only single life policies are included.

Exposure Calculation

The net amount at risk is assumed to be level throughout the exposure period and is either the most current information or the recorded face amount as at the end of 1994, depending on the company's reporting method.

For a policy in force through the study year, two exposure records are created. One reflects the fraction of the year between the prior December 31 and the policy anniversary. The other reflects the fraction of the year between the policy anniversary and December 31 of the study year. Obviously these two fractions sum to one. The difference between the two records is in the policy duration.

For policies withdrawing during the study year, one or two exposure records will be created, depending on whether the withdrawal is after the anniversary or not. The exposure fraction is calculated consistent with the in-force situation. Fractions would not sum to one in this case except for withdrawals occurring on December 31 of the study year.

For death claims, one or two exposure records will be created, depending on whether the death occurs before the anniversary or not. Note the difference in treatment of exact anniversary deaths and withdrawals. The exposure will be one for the record reflecting the period in which the death occurs.

*Sponsored by the Society of Actuaries Reinsurance Council and Manulife Reinsurance

Hence, the total exposure will be greater than one for policies with post and anniversary deaths.

For policies issued in the study year, one exposure record will be created consistent with the rest of the exposure calculations. Hence, a policy issued on January 1 of the study year will contribute one day less than a full year's exposure to the study, while one issued on December 31 of the study year will be included in the study, but with a zero exposure value.

Expected Deaths

Expected deaths in the study are based on 100% of the Society of Actuaries A75-80 Basic Select and Ultimate Tables (pages 205-227 of *TSA XXXVIII*, 1986). The tables vary by sex and age type (age nearest birthday and age last birthday).

The A75-80 Basic Tables were extended to issue age 90, and the resulting tables were used to calculate the expected mortality for issue ages over 70. In the 1990 study, the ultimate attained age was 100. Study years 1991 and later extended this ultimate age to 105 using the constant difference pattern implicit in the values at age 100 and immediately prior. These modifications to the A75-80 Basic Tables for issue ages over 70 are not material to the overall mortality ratios because of the low exposure at these ages.

For substandard risks, the appropriate base table was increased by the appropriate substandard rating.

Actual Deaths

Actual claims are the amounts actually paid by the reinsurer. In the case of contestable claims, the actual claim amount is that actually paid out, if any.

Other Comments

Underwriting status refers to the standard and substandard categories. Preferred and nonpreferred risks are treated as regular risks. Reinsurance status refers to how the participating company receives the business based on automatic, facultative, and shopped categories.

Participants in the Study

For a complete list of participants in the study, see Appendix A. In the 1994 study, all participants from 1993 remained, and one new participant entered.

Products Included in the Study

Permanent plans include whole life, limited pay plans and other permanent plans. Universal life plans are interest-sensitive plans with a cash value buildup. Term plans include re-entry, level, and decreasing type plans.

HIGHLIGHTS OF THE STUDY (1994)

Overall Experience

The experience underlying the year 1994 data (see Tables 1–4) is based on a total exposure of \$80 billion and claims of \$138 million. The total 1994 exposure by number is 201,043 policies and 277 deaths.

All participants from the 1993 study remained, and one new participant entered. There is a 10% increase in business from the previous participants and 10% from the new. The 1993 report is understated by \$3.5 B of exposures and \$18.6 M expected claims by amount. References to 1993 in this report have been revised.

The overall mortality ratio by amounts for the 1994 study is 47.1% (60.3% in 1993). The overall mortality ratio by number for the 1994 study is 49.7% (61.4% in 1993).

Experience by Sex

A total of 88% of the total exposure by amount was from policies issued on male lives, consistent with 1993.

The mortality ratio by amount for males is 47.5% and for females, 43.5%. The 1993 report showed that females had a higher ratio and are higher by 8% by amounts (17% by number) over males.

The mortality ratio by number for males is 48.2% and for females, 62.7%.

Experience by Issue Age

More than 88% by number and by amounts of the claims occurred between the issue ages 40 and 69 where the exposures by number and by amounts are 64% and 68%, respectively. The issue age groups 40 to 49, 50 to 59, and 60 to 69 years old show mortality ratios by amount of 51.7%, 47.4%, and 58.6%, respectively.

Experience by Policy Years

The mortality ratio by amount for years 1–5 are between 5–20% below the overall ratio, especially years 1–2. Seven large claims with reinsured face amounts totaling \$11.4 million are in the 6–10 duration.

Experience by Classification Amount

The experience by classification amount in the study is calculated using one record per policy. If the experience was calculated using one record per life, several claims would move to the \$3 to \$5 million and \$5 million and over classification. The \$3 to \$5 million band has the lowest mortality ratio by amount at 23.0% and \$1 to \$3 million band has the highest at 55.8%.

Historically, the \$3 to \$5 million band had the lowest ratios relative to the other bands in 5 out of 7 years.

A total of 277 claims were reported. When analyzing each claim individually, it was possible to observe that a high number of deaths involved multiple policies.

Experience by Smoking Status

The overall mortality ratio by amount for nonsmoker is 45.0% (51.5% in 1993). The ratio for smoker is 76.3% (126.6% in 1993). We obtain such a difference in the mortality ratios because the A75-80 Basic Tables are not differentiated by smoking status. The expected level of mortality for smoker is roughly 2.5 times the mortality for nonsmoker.

The exposures for nonsmoker, smoker, and aggregate are 88%, 7%, and 5%, respectively. Of the nonsmokers, 88%, 11%, and 1% are regular, preferred, nonpreferred class. Of the smokers, they are 92%, 7%, and 1%, respectively.

Experience by Underwriting Status

The mortality ratio by amount for standard policies is 48.6% (62.6% in 1993). The ratio is 37.6% (46.0% in 1993) for substandard policies.

The exposure by amount accounts for 94.8% and 5.2%, respectively, similar to the 1993 percentages.

Experience by Reinsurance Status

The mortality experience for facultative business is lower than the mortality experience for automatic business, in contrast to all previous years, and is lower than the overall ratio.

The overall large amount mortality ratio for policies reinsured automatically is 54.8%. For policies reinsured facultatively the ratio is 40.3%.

The exposure amounts are \$49.6 billion (62.1%) for automatic business, \$30.3 billion (37.9%) for facultative business. The exposure percentages are similar to 1993. There was no shopped business exposure in 1994. Shopped policies are defined as those sent facultatively to one or more reinsurer(s) to obtain the most competitive underwriting assessment.

Experience by Plan of Insurance

The plan of insurance was provided for 138,562 policies (68.9%) compared to 69.3% in 1993. These policies were grouped as universal life (14,443 policies), whole life (10,415), and term (113,704). Term plans had the lowest mortality ratios at 42.9%.

Experience by Method of Reinsurance

The method of reinsurance was provided for 199,183 policies, almost 100%, similar to 1993. These were grouped as yearly renewable term (65,720 policies), coinsurance (133,434), and modified coinsurance (30). The mortality ratio by amount was 45.4% for yearly renewable term and 37.8% for coinsurance, much lower than 1993.

Experience by Level of Retention

The level of retention of the ceding company was provided for 79,600 policies (39.6%; 44.5% in 1993). These were grouped as full retention (73,729 policies), partial retention (2,410), and no retention (3,461).

TABLE 1
TRENDS IN MORTALITY RATIOS BY NUMBER OF POLICIES
(MORTALITY RATIOS BASED ON THE 1975-80 BASIC TABLES)

Categories	1987	1988	1989	1990	1991	1992	1993*	1994	1987-94
Sex									
Male	65.0%	59.7%	50.8%	85.3%	72.4%	68.4%	59.6%	48.2%	62.6%
Female	166.7	70.1	90.5	78.3	76.2	73.9	77.3	62.7	75.8
All	72.7%	60.5%	54.3%	84.7%	72.8%	69.0%	61.4%	49.7%	63.9%
Issue Ages									
Less than 20	0.0%	0.0%	0.0%	552.5%	0.0%	0.0%	0.0%	0.0%	76.5%
20-29	0.0	0.0	0.0	300.7	95.0	41.5	78.2	115.6	101.6
30-39	101.5	126.6	74.6	63.3	65.1	52.7	66.0	26.2	55.1
40-49	72.0	53.1	53.2	61.0	94.3	64.2	57.4	39.5	59.1
50-59	96.2	84.1	82.4	102.3	70.3	70.6	59.2	67.0	74.1
60-69	69.2	37.6	33.8	103.4	60.9	91.6	77.0	63.7	72.2
70-79	9.3	22.0	17.4	57.4	46.8	53.4	37.3	24.3	36.3
80 and Over	0.0	0.0	0.0	53.1	55.1	0.0	0.0	44.9	24.0
All	72.7%	60.5%	54.3%	84.7%	72.8%	69.0%	61.4%	49.7%	63.9%
Policy Years									
1	65.3%	95.3%	46.9%	68.0%	94.2%	57.0%	76.5%	39.9%	65.3%
2	54.8	46.2	49.3	60.3	73.9	64.4	34.0	34.6	50.5
3	83.0	41.2	62.1	63.8	80.6	72.5	63.4	33.7	59.5
4	54.4	76.6	60.7	59.3	33.3	42.0	52.2	51.7	51.5
5	65.2	47.6	35.7	68.5	66.6	27.1	48.6	61.3	52.7
6-10	98.3	75.2	63.9	112.2	74.1	95.3	62.2	57.9	75.7
11-15	165.6	0.0	36.4	131.3	68.0	36.2	142.1	92.6	91.2
16 and Over†	55.0	95.9	80.9	208.5	0.0	529.6	120.0	51.5	146.8
All	72.7%	60.5%	54.3%	84.7%	72.8%	69.0%	61.4%	49.7%	63.9%
Classification Amounts									
\$1,000,000-\$2,999,999	78.3%	59.8%	52.7%	83.7%	74.3%	69.4%	59.5%	51.0%	64.0%
\$3,000,000-\$4,999,999	35.1	46.9	30.8	91.9	63.5	72.7	71.0	33.2	58.7
\$5,000,000 and Over	50.1	102.8	130.4	88.0	61.8	57.9	81.3	45.6	69.8
All	72.7%	60.5%	54.3%	84.7%	72.8%	69.0%	61.4%	49.7%	63.9%

*An error was found in the 1993 data. This affected the expected claim by number only. The previous reported mortality ratio for 1993 was 62.7%.

†The ultimate expected mortality rates for duration 16 and over was found to be deficient for all study years prior to 1994, thus overstating the mortality ratios for those years. The overstatement was under 0.5% per year.

TABLE 1—Continued

Categories	1987	1988	1989	1990	1991	1992	1993*	1994	1987-94
Smoking Status									
Nonsmoker	73.7%	48.4%	52.8%	59.8%	69.3%	58.3%	52.8%	47.1%	55.2%
Smoker	102.5	79.8	152.3	135.6	141.5	164.6	108.9	74.6	119.7
Aggregate	68.4	71.5	41.5	123.1	65.1	80.7	103.3	58.5	78.2
All	72.7%	60.5%	54.3%	84.7%	72.8%	69.0%	61.4%	49.7%	63.9%
Underwriting Status									
Standard	72.3%	63.2%	53.2%	81.6%	70.2%	69.9%	59.6%	49.0%	62.7%
Substandard	75.7	45.1	60.2	104.7	89.8	62.5	77.2	55.7	72.5
All	72.7%	60.5%	54.3%	84.7%	72.8%	69.0%	61.4%	49.7%	63.9%
Reinsurance Status									
Automatic	53.4%	36.8%	30.4%	75.6%	70.9%	64.6%	56.0%	48.8%	57.9%
Facultative	86.1	76.1	70.1	101.0	77.3	78.8	78.9	53.2	76.9
Shopped	0.0	34.6	54.6	33.6	0.0	0.0	0.0	0.0	30.2
All	72.7%	60.5%	54.3%	84.7%	72.8%	69.0%	61.4%	49.7%	63.9%
Plan of Insurance									
Whole Life					56.4%	65.5%	147.4%	77.9%	
Term					72.9	53.8	45.6	42.7	
Universal Life					62.0	95.8	74.8	57.1	
Unknown					79.7	76.9	53.7	49.8	
All					72.8%	69.0%	61.4%	49.7%	
Reinsurance Method									
Coinsurance					82.8%	45.0%	56.8%	35.6%	
Modified Coinsurance					65.3	0.0	0.0	0.0	
Yearly Renewable Term					69.0	66.9	64.8	51.4	
Unknown					62.1	212.1	0.0	610.2	
All					72.8%	69.0%	61.4%	49.7%	

*An error was found in the 1993 data. This affected the expected claim by number only. The previous reported mortality ratio for 1993 was 62.7%.

TABLE 2
TRENDS IN MORTALITY RATIOS BY AMOUNT ('000'S)
(MORTALITY RATIOS BASED ON THE 1975-80 BASIC TABLES)

Categories	1987	1988	1989	1990	1991	1992	1993*	1994	1987-94
Sex									
Male	59.6%	55.5%	58.8%	73.8%	69.4%	66.9%	59.3%	47.5%	61.2%
Female	87.8	213.7	49.1	94.7	71.2	66.9	67.7	43.5	78.8
All	62.0%	70.0%	57.9%	75.8%	69.6%	66.9%	60.3%	47.1%	63.1%
Issue Ages									
Less than 20	0.0%	0.0%	0.0%	435.7%	0.0%	0.0%	0.0%	0.0%	43.8%
20-29	0.0	0.0	0.0	112.2	15.6	1.4	34.0	69.7	33.0
30-39	111.7	329.1	67.4	57.5	54.9	65.5	72.6	30.0	85.2
40-49	65.2	60.9	46.3	45.0	104.6	67.0	55.0	51.7	62.1
50-59	78.5	77.3	82.3	97.5	57.9	64.2	65.4	47.4	69.9
60-69	53.2	22.7	66.3	100.5	40.1	87.6	62.6	58.6	63.1
70-79	4.8	13.7	10.8	29.2	99.3	40.1	42.0	18.0	31.5
80 and Over	0.0	0.0	0.0	163.1	12.1	0.0	0.0	116.3	35.4
All	62.0%	70.0%	57.9%	75.8%	69.6%	66.9%	60.3%	47.1%	63.1%
Policy Years									
1	53.1%	108.2%	52.6%	86.0%	107.8%	69.0%	61.5%	26.4%	70.4%
2	64.5	30.5	67.5	41.6	73.1	62.7	43.3	27.3	52.1
3	60.4	24.8	55.7	31.1	76.7	102.7	66.7	39.4	58.2
4	63.5	91.3	63.2	69.5	17.7	26.3	58.2	41.7	53.6
5	54.4	36.5	43.6	77.1	51.1	12.7	40.5	41.9	43.2
6-10	60.5	144.6	66.5	95.8	79.9	79.6	63.9	58.7	77.0
11-15	141.1	0.0	36.8	107.8	67.5	51.3	102.5	72.0	73.1
16 and Over†	31.5	57.7	47.0	252.9	0.0	767.7	30.6	63.9	131.2
All	62.0%	70.0%	57.9%	75.8%	69.6%	66.9%	60.3%	47.1%	63.1%
Classification Amounts									
\$1,000,000-\$2,999,999	76.0%	58.9%	48.3%	74.1%	67.5%	71.3%	62.6%	55.8%	63.8%
\$3,000,000-\$4,999,999	38.2	42.8	28.7	67.4	52.3	76.9	48.8	23.0	47.5
\$5,000,000 and Over	37.5	143.7	125.7	90.0	93.3	40.3	60.5	29.9	76.4
All	62.0%	70.0%	57.9%	75.8%	69.6%	66.9%	60.3%	47.1%	63.1%

*An error was found in the 1993 data. This affected the expected claim amount only. The previous reported mortality ratio for 1993 was 65.7%.

†The ultimate expected mortality rates for duration 16 and over was found to be deficient for all study years prior to 1994, thus overstating the mortality ratios for those years. The overstatement was under 0.5% per year.

TABLE 2—Continued

Categories	1987	1988	1989	1990	1991	1992	1993*	1994	1987-94
Smoking Status									
Nonsmoker	68.8%	47.3%	52.2%	57.5%	60.9%	58.7%	51.5%	45.0%	54.2%
Smoker	114.4	44.0	153.8	137.3	136.1	116.5	126.6	76.3	114.3
Aggregate	48.4	102.1	50.0	99.5	75.2	81.9	90.0	45.4	73.7
All	62.0%	70.0%	57.9%	75.8%	69.6%	66.9%	60.3%	47.1%	63.1%
Underwriting Status									
Standard	62.8%	73.8%	55.6%	75.4%	67.3%	69.8%	62.6%	48.6%	63.9%
Substandard	56.6	46.9	71.3	77.8	80.8	50.4	46.0	37.6	58.7
All	62.0%	70.0%	57.9%	75.8%	69.6%	66.9%	60.3%	47.1%	63.1%
Reinsurance Status									
Automatic	49.4%	39.5%	41.7%	67.4%	54.2%	57.5%	59.7%	54.8%	54.3%
Facultative	71.1	87.8	65.8	82.5	80.7	73.6	60.8	40.3	69.7
Shopped	0.0	23.5	63.7	30.3	0.0	0.0	0.0	0.0	32.3
All	62.0%	70.0%	57.9%	75.8%	69.6%	66.9%	60.3%	47.1%	63.1%
Plan of Insurance									
Whole Life					53.7%	56.2%	119.9%	64.3%	
Term					90.9	56.8	45.6	42.9	
Universal Life					47.2	100.9	63.0	47.6	
Unknown					68.8	67.1	47.8	42.3	
All					69.6%	66.9%	60.3%	47.1%	
Reinsurance Method									
Coinsurance					114.0%	61.8%	46.7%	37.8%	
Modified Coinsurance					36.5	0.0	0.0	0.0	
Yearly Renewable Term					57.7	65.1	67.1	45.4	
Unknown					38.8	106.1	0.0	694.9	
All					69.6%	66.9%	60.3%	47.1%	

*An error was found in the 1993 data. This affected the expected claim amount only. The previous reported mortality ratio for 1993 was 65.7%.

TABLE 3
1994 EXPERIENCE BY NUMBER OF POLICIES
(MORTALITY RATIOS BASED ON THE 1975-80 BASIC TABLES)

Categories	Exposure	Actual Claims	Expected Claims	Mortality Ratio
Sex				
Male	180,144	241	500.38	48.2%
Female	20,899	36	57.45	62.7
All	201,043	277	557.83	49.7%
Issue Ages				
Less than 20	425	0	0.26	0.0%
20-29	4,678	4	3.46	115.6
30-39	65,371	18	68.69	26.2
40-49	82,198	70	177.05	39.5
50-59	36,280	107	159.78	67.0
60-69	10,529	67	105.26	63.7
70-79	1,527	10	41.10	24.3
80 and Over	35	1	2.23	44.9
All	201,043	277	557.83	49.7%
Policy Years				
1	54,207	30	75.10	39.9%
2	46,036	30	86.66	34.6
3	31,586	27	80.20	33.7
4	23,168	38	73.53	51.7
5	15,517	36	58.71	61.3
6-10	27,656	86	148.65	57.9
11-15	2,662	27	29.15	92.6
16 and Over	211	3	5.82	51.5
All	201,043	277	557.83	49.7%
Classification Amounts				
\$1,000,000-\$2,999,999	185,266	254	497.60	51.0%
\$3,000,000-\$4,999,999	9,773	12	36.12	33.2
\$5,000,000 and Over	6,005	11	24.11	45.6
All	201,043	277	557.83	49.7%
Smoking status				
Nonsmoker	180,071	226	479.55	47.1%
Smoker	11,475	24	32.16	74.6
Aggregate	9,498	27	46.12	58.5
All	201,043	277	557.83	49.7%
Underwriting Status				
Standard	195,412	248	505.76	49.0%
Substandard	5,631	29	52.07	55.7
All	201,043	277	557.83	49.7%
Reinsurance Status				
Automatic	181,860	218	446.84	48.8%
Facultative	19,183	59	110.98	53.2
Shopped	0	0	0.00	0.0
All	201,043	277	557.83	49.7%
Plan of Insurance				
Whole Life	10,415	38	48.78	77.9%
Term	113,704	115	269.42	42.7
Universal Life	14,443	36	63.05	57.1
Unknown	62,481	88	176.59	49.8
All	201,043	277	557.83	49.7%
Reinsurance Method				
Coinsurance	133,434	96	269.75	35.6%
Modified Coinsurance	30	0	0.28	0.0
Yearly Renewable Term	65,720	145	281.90	51.4
Unknown	1,860	36	5.90	610.2
All	201,043	277	557.83	49.7%

TABLE 4
1994 EXPERIENCE BY AMOUNT ('000's)
(MORTALITY RATIOS BASED ON THE 1975-80 BASIC TABLES)

Categories	Exposure	Actual Claims	Expected Claims	Mortality Ratio
Sex				
Male	70,300,038	122,262	257,162	47.5%
Female	9,579,307	15,314	35,229	43.5
All	79,879,345	137,576	292,391	47.1%
Issue Ages				
Less than 20	292,629	0	161	0.0%
20-29	2,438,645	1,308	1,876	69.7
30-39	21,972,285	8,101	26,989	30.0
40-49	31,332,173	41,398	80,036	51.7
50-59	17,094,188	42,286	89,270	47.4
60-69	5,765,725	38,033	64,880	58.6
70-79	964,209	5,020	27,950	18.0
80 and Over	19,491	1,430	1,230	116.3
All	79,879,345	137,576	292,391	47.1%
Policy Years				
1	15,375,701	6,881	26,075	26.4%
2	13,719,655	8,405	30,744	27.3
3	12,395,760	14,468	36,725	39.4
4	9,957,600	14,662	35,147	41.7
5	8,392,997	14,790	35,328	41.9
6-10	17,896,424	60,962	103,921	58.7
11-15	2,043,583	15,805	21,942	72.0
16 and Over	97,625	1,603	2,509	63.9
All	79,879,345	137,576	292,391	47.1%
Classification Amounts				
\$1,000,000-\$2,999,999	58,025,499	114,313	204,881	55.8%
\$3,000,000-\$4,999,999	10,494,877	9,613	41,876	23.0
\$5,000,000 and Over	11,358,968	13,650	45,634	29.9
All	79,879,345	137,576	292,391	47.1%
Smoking Status				
Nonsmoker	70,188,382	112,124	249,304	45.0%
Smoker	5,284,441	14,525	19,030	76.3
Aggregate	4,406,523	10,927	24,057	45.4
All	79,879,345	137,576	292,391	47.1%
Underwriting Status				
Standard	75,727,889	121,916	250,726	48.6%
Substandard	4,151,456	15,660	41,666	37.6
All	79,879,345	137,576	292,391	47.1%
Reinsurance Status				
Automatic	49,624,903	74,874	136,648	54.8%
Facultative	30,254,442	62,702	155,744	40.3
Shopped	0	0	0	0.0
All	79,879,345	137,576	292,391	47.1%
Plan of Insurance				
Whole Life	8,910,191	31,256	48,577	64.3%
Term	43,882,852	55,982	130,401	42.9
Universal Life	8,692,248	21,564	45,321	47.6
Unknown	18,394,054	28,774	68,092	42.3
All	79,879,345	137,576	292,391	47.1%
Reinsurance Method				
Coinsurance	38,183,936	36,548	96,592	37.8%
Modified Coinsurance	37,604	0	296	0.0
Yearly Renewable Term	41,240,816	87,957	193,622	45.4
Unknown	416,988	13,071	1,881	694.9
All	79,879,345	137,576	292,391	47.1%

HIGHLIGHTS OF THE STUDY (1987-94)

Overall Experience

The experience underlying the years 1987-94 data (see Tables 5 and 6) are based on a total exposure of \$515.0 billion and claims of \$1.2 billion. The total 1987-94 exposure by number is 726,377 policies and 1,386 deaths.

Two large claims of \$13.3 million and \$21 million occurred in 1988. These two claims were both females in the age group 30-39 and the duration group 6-10. In 1990, there was one large suicide claim of \$29.5 million for a male in the 50-59 group in durations 6-10. In 1991, there were three large aviation claims totaling \$42.5 million occurred in duration 1, which were males in the 40-49 age group. In 1992, there were five large cancer claims and one cardiovascular claim, all males in various age groups, totaling \$59.2 million in durations 6-10.

The overall mortality ratio by amounts for the 1987-94 study is 63.1%.

The overall mortality ratio by number for the 1987-94 study is 63.9%.

The mortality ratios reflect the data correction for durations 16 and over in the 1994 study year, and the revised mortality ratios for the 1993 study year. However, no corrections were made for the durations 16 and over for all study years prior to 1994. The duration 16 and over impact on mortality ratio is approximately 0.5% per study year.

Experience by Sex

A total of 89% of the total exposure by amount was from policies issued on male lives. The mortality ratio by amount for males is 61.2%. The mortality ratio by amount for females is 78.8%. The mortality ratios by number are 62.6% and 75.8% for males and females, respectively.

Experience by Issue Age

The age groups 30-39 and 50-59 years old show the highest mortality ratios with 85.2% and 69.9%, respectively. The high mortality ratio for the age group 30-39 is explained mainly by the two large claims that occurred in 1988. The age group 40-49 had large aviation claims in 1991, and cancer claims in 1992. The age groups 50-59 and 60-69 had cancer claims in 1992 also.

Other age groups did not have poor claims experiences.

Experience by Policy Years

The mortality ratio is high at duration 1 (70.4%) due to the aviation claims and varies between 52% and 60% in years 2-4. The mortality ratios for

other durations fluctuate between 43% at duration 5 and 131% at duration 16 and over. The mortality ratio at durations 6–10 is still high at 77% due to large claims over the years.

Experience by Classification Amount

As stated previously, the experience by classification amount in the study is calculated using one record per policy. If the experience was calculated using one record per life several claims would move to the \$3 to \$5 million and \$5 million and over classification amount.

A total of 1,386 claims were reported. When analyzing each claim individually, it was possible to observe that a high number of deaths involved multiple policies.

Claims experience in the \$5 million and over band has been gradually decreasing, whereas other bands were fluctuating. However, the \$3–5 million band remains to have the lowest ratios.

Experience by Smoking Status

The overall mortality ratio for nonsmoker is 54.2%. The ratio for smoker is 114.3%. Again, we obtain such a difference in the mortality ratios because the 1975–80 basic U.S. tables are not differentiated by smoking status. The expected level of mortality for smoker is roughly 2.5 times the mortality for nonsmoker.

The exposures for nonsmoker, smoker, and aggregate are 73%, 7%, and 20%, respectively.

Experience by Underwriting Status

The mortality ratio by amount for standard policies is 63.9%. This ratio is 58.7% for substandard policies. A total of 94% of exposures by amount is standard rated.

Experience by Reinsurance Status

The mortality ratio by amount for policies reinsured automatically is 54.3%. For policies reinsured facultatively the ratio is 69.7%. Only four claims were reported for shopped business.

The facultative ratio decreased by 6% versus 1993 due to improved 1994 experience.

The exposure amounts are \$249.1 billion (48.4%) for automatic business, \$256.6 billion (49.8%) for facultative business and \$9.3 billion (1.8%) for shopped business. There was more automatic business in 1994, thus narrowing the exposure gap by amount between automatic and facultative cases.

TABLE 5
1987-94 EXPERIENCE BY NUMBER OF POLICIES
(MORTALITY RATIOS BASED ON THE 1975-80 BASIC TABLES)

Categories	Exposure	Actual Claims	Expected Claims	Mortality Ratio
Sex				
Male	653,766	1,227	1,960.62	62.6%
Female	72,611	159	209.64	75.8
All	726,377	1,386	2,170.26	63.9%
Issue Ages				
Less than 20	2,227	1	1.31	76.5%
20-29	18,561	14	13.77	101.6
30-39	217,024	128	232.30	55.1
40-49	293,972	376	636.34	59.1
50-59	142,726	480	647.83	74.1
60-69	45,215	315	436.30	72.2
70-79	6,395	69	189.92	36.3
80 and Over	157	3	12.49	24.0
All	726,377	1,386	2,170.26	63.9%
Policy Years				
1	197,966	192	294.14	65.3%
2	158,037	166	328.74	50.5
3	114,673	191	321.28	59.5
4	83,142	147	285.50	51.5
5	57,896	125	237.01	52.7
6-10	104,178	437	577.35	75.7
11-15	9,061	94	103.09	91.2
16 and Over	1,424	34	23.15	146.8
All	726,377	1,386	2,170.26	63.9%
Classification Amounts				
\$1,000,000-\$2,999,999	651,217	1,207	1,886.26	64.0%
\$3,000,000-\$4,999,999	45,959	102	173.63	58.7
\$5,000,000 and Over	29,201	77	110.37	69.8
All	726,377	1,386	2,170.26	63.9%
Smoking Status				
Nonsmoker	572,497	880	1,594.35	55.2%
Smoker	44,312	161	134.54	119.7
Aggregate	109,568	345	441.37	78.2
All	726,377	1,386	2,170.26	63.9%
Underwriting Status				
Standard	697,122	1,202	1,916.37	62.7%
Substandard	29,255	184	253.89	72.5
All	726,377	1,386	2,170.26	63.9%
Reinsurance Status				
Automatic	572,548	845	1,458.52	57.9%
Facultative	150,385	537	698.47	76.9
Shopped	3,444	4	13.27	30.2
All	726,377	1,386	2,170.26	63.9%

TABLE 6
1987-94 EXPERIENCE BY AMOUNT (000's)
(MORTALITY RATIOS BASED ON THE 1975-80 BASIC TABLES)

Categories	Exposure	Actual Claims	Expected Claims	Mortality Ratio
Sex				
Male	462,070,224	1,015,692	1,659,241	61.2%
Female	56,426,982	156,378	198,511	78.8
All	518,497,206	1,172,070	1,857,751	63.1%
Issue Ages				
Less than 20	2,717,982	733	1,674	43.8%
20-29	14,713,623	3,647	11,040	33.0
30-39	127,463,672	129,514	152,009	85.2
40-49	205,852,939	305,926	492,344	62.1
50-59	121,219,158	413,591	591,280	69.9
60-69	40,410,904	252,134	399,840	63.1
70-79	5,962,709	61,904	196,511	31.5
80 and Over	156,219	4,622	13,053	35.4
All	518,497,206	1,172,070	1,857,751	63.1%
Policy Years				
1	107,409,699	137,772	195,724	70.4%
2	100,694,923	128,473	246,503	52.1
3	85,621,299	159,425	273,888	58.2
4	68,839,866	139,711	260,768	53.6
5	52,757,344	100,606	232,796	43.2
6-10	94,281,895	416,980	541,642	77.0
11-15	7,881,361	63,513	86,930	73.1
16 and Over*	1,010,819	25,590	19,500	131.2
All	518,497,206	1,172,070	1,857,751	63.1%
Classification Amounts				
\$1,000,000-\$2,999,999	346,557,280	780,206	1,223,511	63.8%
\$3,000,000-\$4,999,999	84,192,640	152,400	320,741	47.5
\$5,000,000 and Over	87,777,285	239,464	313,499	76.4
All	518,527,206	1,172,070	1,857,751	63.1%
Smoking Status				
Nonsmoker	377,811,332	690,322	1,274,498	54.2%
Smoker	37,130,935	145,815	127,567	114.3
Aggregate	103,584,939	335,932	455,686	73.7
All	518,527,206	1,172,070	1,857,751	63.1%
Underwriting Status				
Standard	487,729,563	1,010,810	1,582,892	63.9%
Substandard	30,767,643	161,260	274,859	58.7
All	518,497,206	1,172,070	1,857,751	63.1%
Reinsurance Status				
Automatic	249,360,992	393,650	725,029	54.3%
Facultative	259,832,097	768,484	1,102,013	69.7
Shopped	9,304,116	9,936	30,716	32.3
All	518,497,206	1,172,070	1,857,757	63.1%

*The ultimate expected mortality rates for duration 16 and over was found to be deficient for all study years prior to 1994, thus overstating the mortality ratios for those years. The overstatement was under 0.5% per year.

CLAIMS ANALYSIS

A total of 17 companies submitted data for this mortality study. This study included the year 1994 mortality experience. A total of 277 claims were submitted. The cause of death was provided for all claims, except 15. (See Tables 7-12.)

The following tables show the number of claims and the percentage of claims for each cause of death reported. At least one death occurred in each claim category.

The following seven categories list the different causes of death included in the analysis:

Category	Cause of Death
"Misadventure"	Homicide Suicide Aviation Motor Vehicle Other Accident
Circulatory	Cardiovascular Cerebrovascular
All Respiratory	Respiratory Pneumonia
Cancer	Cancer
AIDS	AIDS
Other	Digestive Endocrine Genitourinary System Nervous System (Other than Cerebrovascular) Other Disease
Unknown	Unknown or Not Provided

Experience by Cause of Death

A total of 277 claims are included in the claims analysis. Of those, 127 (45.8%; 32.8% in 1993) are Cancer deaths; 60 (21.7%, 34.9% in 1993) are Circulatory deaths. A total of 47 claims (17%) are reported in the "Misadventure" category. Of those, 21 (7.6%; 5.5% in 1993) are Suicide; 4 (1.4%; 2.1% in 1993) are Aviation; 4 (1.4%, 1.7% in 1993) are Homicide; 5 (1.8%, 7.2% in 1993) are Motor Vehicle; and 13 (4.7%, 4.3% in 1993) are Other Accident. Four AIDS claims are reported.

Experience by Sex

A total of 241 claims are male deaths. This represents 87% of all claims. The exposure by number on male lives is 89.6% of the total exposure. All

21 suicide claims are reported on male lives. This represents 8.7% (6.3% in 1993) of all male claims. A total of 44 of the 47 claims in the "Misadventure" category were reported on male lives. A total of 107 of the 127 (84.3%, 79.2% in 1993) Cancer claims are male deaths. A total of 52 of the 60 (86.6%, 90.2% in 1993) Circulatory claims are reported for male lives.

Experience by Issue Age

For the 30–39 ages, the leading causes of death are Misadventure (44.4%) and Cancer (33.3%). For the 40–49 ages, Circulatory (11.4%), Misadventure (31.4%) and Cancer (38.6%) are the leading causes of death. A total of 42 Misadventure (19 Suicides) deaths are in the 30–59 age groups. Circulatory deaths are mostly 50 and over and Cancer deaths are mostly 40 and over.

Experience by Policy Years

Some 70% of the Misadventure claims occur at durations 1–5, and 25% at durations 6–10, mostly Suicides. Almost 35% of the Circulatory claims occur in durations 1–2 and over 15% of all deaths annually in durations 3–15. Cancer deaths represent approximately 40–50% of all deaths by duration. AIDS claims are in durations 6 and over.

Experience by Classification Amount

Some 64% of the claims in \$5 M and over band are Cancer deaths. Most of the claims (254; 92%) occur in the \$1–3 M band. Of those, 17% are Misadventure; 22%, Circulatory; and 45%, Cancer. Suicides account for 7.9% of the claims in the \$1–3 M band. In the \$3–5 M band, 42% is Cancer; 17% is Circulatory; and 2 homicide deaths.

Experience by Underwriting Status

Over 92% of the Cancer claims and over 81% of Circulatory claims are Standard policies. All Suicide deaths were underwritten as Standard.

Experience by Reinsurance Status

Over 80% of Circulatory and Cancer deaths and 87% of Misadventure deaths are reinsured automatically.

Experience by Smoking Status

Over 46% Nonsmoker and 50% Smoker deaths are Cancer. Cardiovascular deaths account for 20% in each smoking class.

TABLE 7

NUMBER OF CLAIMS FOR EACH CAUSE OF DEATH BY SEX AND ISSUE AGES

Category	All	Male	Female	Issue Ages							
				Less than 20	20-29	30-39	40-49	50-59	60-69	70-79	80 and Over
Other Accident	13	10	3	0	3	2	4	4	0	0	0
Homicide	4	4	0	0	0	0	4	0	0	0	0
Suicide	21	21	0	0	0	4	10	5	2	0	0
Aviation	4	4	0	0	0	0	2	2	0	0	0
Motor Vehicle	5	5	0	0	0	2	2	1	0	0	0
"Misadventure"	47	44	3	0	3	8	22	12	2	0	0
Cardiovascular	55	48	7	0	0	2	7	28	13	5	0
Cerebrovascular	5	4	1	0	0	0	1	3	0	1	0
Circulatory	60	52	8	0	0	2	8	31	13	6	0
Respiratory	8	6	2	0	0	0	2	2	4	0	0
Pneumonia	1	1	0	0	0	0	0	0	1	0	0
All Respiratory	9	7	2	0	0	0	2	2	5	0	0
Cancer	127	107	20	0	0	6	27	52	38	4	0
AIDS	4	4	0	0	0	2	1	1	0	0	0
Other Disease	6	6	0	0	0	0	6	0	0	0	0
Digestive	1	1	0	0	1	0	0	0	0	0	0
Endocrine	1	1	0	0	0	0	0	1	0	0	0
Genitourinary	1	1	0	0	0	0	0	0	1	0	0
Nervous System	6	4	2	0	0	0	0	1	4	0	1
Other	15	13	2	0	1	0	6	2	5	0	1
Unknown	15	14	1	0	0	0	4	7	4	0	0
All	277	241	36	0	4	18	70	107	67	10	1

TABLE 8

NUMBER OF CLAIMS FOR EACH CAUSE OF DEATH BY POLICY YEARS AND CLASSIFICATION AMOUNT

Category	Policy Years								Amounts		
	1	2	3	4	5	6-10	11-15	16 and Over	\$1-3 M	\$3-5 M	\$5 M and Over
Other Accident	0	1	2	3	3	3	0	1	12	0	1
Homicide	0	1	0	0	0	3	0	0	2	2	0
Suicide	0	2	2	4	7	5	1	0	20	1	0
Aviation	1	2	0	0	0	1	0	0	4	0	0
Motor Vehicle	3	1	1	0	0	0	0	0	5	0	0
“Misadventure”	4	7	5	7	10	12	1	1	43	3	1
Cardiovascular	10	10	3	7	6	16	2	1	52	2	1
Cerebrovascular	1	0	1	0	0	1	2	0	5	0	0
Circulatory	11	10	4	7	6	17	4	1	57	2	1
Respiratory	2	0	1	1	0	2	2	0	8	0	0
Pneumonia	0	0	0	0	0	1	0	0	0	1	0
All Respiratory	2	0	1	1	0	3	2	0	8	1	0
Cancer	13	13	14	20	17	36	14	0	115	5	7
AIDS	0	0	0	0	0	2	2	0	4	0	0
Other Disease	0	0	0	0	2	1	3	0	5	1	0
Digestive	0	0	0	0	0	1	0	0	1	0	0
Endocrine	0	0	0	0	0	1	0	0	0	0	1
Genitourinary	0	0	0	0	0	0	0	1	1	0	0
Nervous System	0	0	0	0	0	6	0	0	5	0	1
Other	0	0	0	0	2	9	3	1	12	1	2
Unknown	0	0	3	3	1	7	1	0	15	0	0
All	30	30	27	38	36	86	27	3	254	12	11

TABLE 9
 NUMBER OF CLAIMS FOR EACH CAUSE OF DEATH
 BY SMOKING, UNDERWRITING, AND REINSURANCE STATUS

Category	Smoking Status			Underwriting Status		Reinsurance Status		
	Nonsmoker	Smoker	Aggregate	Standard	Substandard	Automatic	Facultative	Shopped
Other Accident	11	0	2	12	1	11	2	0
Homicide	3	0	1	4	0	2	2	0
Suicide	14	4	3	21	0	19	2	0
Aviation	4	0	0	4	0	4	0	0
Motor Vehicle	5	0	0	5	0	5	0	0
“Misadventure”	37	4	6	46	1	41	6	0
Cardiovascular	45	4	6	44	11	44	11	0
Cerebrovascular	4	0	1	5	0	4	1	0
Circulatory	49	4	7	49	11	48	12	0
Respiratory	7	1	0	6	2	8	0	0
Pneumonia	1	0	0	1	0	1	0	0
All Respiratory	8	1	0	7	2	9	0	0
Cancer	105	12	10	117	10	102	25	0
AIDS	4	0	0	4	0	3	1	0
Other Disease	4	0	2	6	0	3	3	0
Digestive	1	0	0	1	0	1	0	0
Endocrine	1	0	0	0	1	0	1	0
Genitourinary	0	0	1	1	0	0	1	0
Nervous System	6	0	0	6	0	3	3	0
Other	12	0	3	14	1	7	8	0
Unknown	11	3	1	11	4	8	7	0
All	226	24	27	248	29	218	59	0

APPENDIX A
LIST OF PARTICIPANTS
1994 INTERCOMPANY MORTALITY STUDY

Allianz Life Insurance Company of North America
American United Life Insurance Company
Cologne Life Reinsurance Company
Continental Assurance Company (Re)
Crown Life Insurance Company

Equitable Life Assurance Society (Re)
Employers Reassurance Corporation
Life Reassurance Corporation of America
Manufacturers Life Insurance Company (Re)
Mercantile & General (US)

Munich American Re
Mutual Life of Canada (U.S.)
Reinsurance Group of America Incorporated (U.S.)
Reinsurance Group of America Incorporated (Canada)
Sun Life Assurance Company of Canada (Re)

Swiss Re Life Company America
Transamerica Occidental Life (Re)

APPENDIX B

TABLE B-1

LIST OF LARGE CLAIMS OVER \$5 MILLION ON ONE LIFE FOR THE PERIOD 1994

Claim	Direct Face Amount	Sex	Age Group	Policy Year	Smoking Class	Rating	Cause of Death
1	5.00 M	Male	40-49	5	Nonsmoker	100%	Cancer
2	5.00 M	Male	40-49	6-10	Nonsmoker	100	Other Accident
3	5.00 M	Male	50-59	6-10	Nonsmoker	175	Endocrine
4	5.00 M	Male	50-59	6-10	Nonsmoker	175	Cardiovascular
5	5.00 M	Male	60-69	4	Nonsmoker	100	Cancer
6	6.00 M	Female	60-69	6-10	Nonsmoker	100	Nervous System
7	9.00 M	Female	50-59	4	Nonsmoker	100	Cancer
8	10.00 M	Male	40-49	6-10	Nonsmoker	100	Cancer
9	15.26 M	Female	70-79	5	Nonsmoker	100	Cancer
10	18.00 M	Male	60-69	6-10	Nonsmoker	100	Cancer
11	18.00 M	Male	60-69	6-10	Nonsmoker	100	Cancer

TABLE B-2

LIST OF LARGE CLAIMS OVER \$5 MILLION ON ONE LIFE FOR THE PERIOD 1987-1993

Claim	Direct Face Amount	Sex	Age Group	Policy Year	Smoking Class	Rating	Cause of Death
1	21.00 M	Female	30-39	6-10	Aggregate	100%	
2	13.30 M	Female	30-39	6-10	Aggregate	100	
3	8.00 M	Male	30-39	2-4	Nonsmoker	100	
4	8.70 M	Male	40-49	1	Nonsmoker	100	
5	5.50 M	Male	40-49	1	Nonsmoker	100	
6	5.00 M	Male	40-49	1	Smoker	250	
7	15.80 M	Male	50-59	4-5	Nonsmoker	100%, 175%	
8	10.00 M	Male	50-59	6-10	Nonsmoker	100	
9	9.75 M	Male	50-59	3	Nonsmoker	100	
10	9.00 M	Male	50-59	5	Aggregate	100	
11	5.00 M	Male	50-59	1	Smoker	100	
12	9.25 M	Male	60-69	6-10	Aggregate	100	
13	7.50 M	Male	60-69	2	Nonsmoker	175	
14	6.20 M	Male	60-69	4	Nonsmoker	100	
15	5.00 M	Male	60-69	6-10	Aggregate	100	
16	29.50 M	Male	50-59	6-10	Aggregate	100	Suicide
17	11.25 M	Male	40-49	16+	Aggregate	100	Nervous System
18	10.84 M	Male	50-59	3	Aggregate	150	AIDS
19	10.81 M	Male	50-59	6-10	Aggregate	100	Cardiovascular
20	10.43 M	Male	60-69	6-10	Nonsmoker	100	Unknown
21	9.31 M	Male	50-59	16+	Aggregate	100	Unknown
22	7.12 M	Male	50-59	11-15	Aggregate	100	Cardiovascular
23	6.50 M	Male	20-29	11-15, 16+	Aggregate	100	Suicide
24	6.42 M	Female	50-59	16+	Aggregate	100	Unknown
25	5.00 M	Male	50-59	4	Nonsmoker	100	Pneumonia
26	5.00 M	Male	50-59	4	Nonsmoker	200	Cardiovascular
27	5.00 M	Male	50-59	6-10	Aggregate	100	Cardiovascular
28	5.00 M	Male	50-59	6-10	Nonsmoker	200	Cardiovascular
29	5.00 M	Male	60-69	1	Nonsmoker	300	Cardiovascular
30	5.00 M	Male	60-69	2	Nonsmoker	300	Cardiovascular
31	5.00 M	Male	60-69	4	Aggregate	100	Cancer
32	5.00 M	Male	60-69	6-10	Nonsmoker	100	Cancer
33	7.50 M	Female	70-79	6-10	Aggregate	100	Cancer
34	15.00 M	Male	40-49	1	Nonsmoker	100	Aviation
35	15.00 M	Male	40-49	1	Nonsmoker	100	Aviation
36	12.50 M	Male	40-49	1	Aggregate	100	Aviation
37	7.50 M	Male	40-49	3	Nonsmoker	100	Aviation
38	9.00 M	Male	50-59	1	Nonsmoker	200	Cancer
39	6.00 M	Male	50-59	6-10	Nonsmoker	100	Cancer
40	7.65 M	Male	50-59	6-10	Nonsmoker	250	Cardiovascular
41	7.50 M	Male	70-79	2	Nonsmoker	100	Other Disease
42	5.00 M	Male	70-79	6-10	Aggregate	100	Cardiovascular
43	5.00 M	Female	30-39	6-10	Nonsmoker	100	Suicide
44	11.00 M	Male	30-39	6-10	Aggregate	100	Cardiovascular
45	8.00 M	Male	40-49	4	Aggregate	100	Cerebrovascular
46	7.50 M	Male	40-49	6-10	Nonsmoker	100	Cancer
47	9.12 M	Male	50-59	6-10	Smoker	100	Cancer
48	9.12 M	Male	50-59	6-10	Smoker	100	Cancer
49	6.00 M	Male	60-69	1	Nonsmoker	150	Unknown
50	6.18 M	Male	60-69	3	Nonsmoker	100	Suicide
51	6.18 M	Male	60-69	3	Nonsmoker	100	Suicide
52	10.00 M	Male	60-69	6-10	Nonsmoker	100	Cancer
53	10.00 M	Male	60-69	6-10	Nonsmoker	100	Cancer
54	10.00 M	Male	60-69	6-10	Nonsmoker	100	Cancer
55	5.00 M	Male	30-39	11-15	Aggregate	100	Cardiovascular
56	5.00 M	Male	40-49	1	Aggregate	100	Cardiovascular
57	5.00 M	Male	40-49	1	Aggregate	100	Cardiovascular
58	5.00 M	Male	40-49	4	Nonsmoker	100	Unknown
59	5.00 M	Male	40-49	1	Smoker	100	Cardiovascular
60	5.00 M	Male	40-49	1	Smoker	100	Cardiovascular
61	14.36 M	Male	40-49	6-10	Smoker	175	Cardiovascular
62	5.00 M	Male	50-59	1	Nonsmoker	100	Other Accident
63	6.00 M	Male	50-59	4	Nonsmoker	100	Respiratory
64*	38.39 M	Male	50-59	6-10	Nonsmoker	100	Cardiovascular
65	6.12 M	Male	50-59	6-10	Nonsmoker	100	Cancer
66	9.00 M	Female	60-69	11-15	Aggregate	100	Cancer
67	10.00 M	Female	60-69	6-10	Nonsmoker	100	Cancer
68	9.00 M	Male	60-69	11-15	Aggregate	100	Cancer
69	5.00 M	Male	60-69	2	Nonsmoker	100	Cardiovascular

*We are confirming the validity of this direct face amount. The reinsured face amount and claim were approximately \$385,000, and did not have a significant impact on the overall mortality ratio.

APPENDIX C STANDARD DEVIATIONS

In the interest of readability, this report does not contain standard deviation of the numerous mortality ratios that are quoted.

Standard deviation can be obtained by the use of the following formula:

$$\text{Standard Deviation of Mortality Ratio} = \frac{\text{Mortality Ratio}}{\sqrt{\text{Actual Number of Deaths}}}$$

It is necessary to use the number of deaths in this formula even when the mortality ratio involved is based on an amount of insurance. The range of virtual certainty is plus or minus three times the standard deviation. Plus or minus the standard deviation itself indicates 68% likelihood. This assumes a normal distribution whereas the formula is binomial.

The mortality ratios for the 1994 and the 1987-94 experience by amount of insurance and their standard deviations are shown in Tables C-1 and C-2.

APPENDIX C

TABLE C-1

STANDARD DEVIATIONS* FOR THE PERIOD 1994
(MORTALITY RATIOS BASED ON THE 1975-80 BASIC TABLES)

Categories	Actual Claims	Mortality Ratio	Standard Deviation
All Combined	277	47.1%	2.83
Sex			
Male	241	47.5%	3.06
Female	36	43.5	7.24
Issue Ages			
40-49	70	51.7%	6.18
50-59	107	47.4	4.58
60-69	67	58.6	7.16
Policy Years			
4	38	41.7%	6.77
5	36	41.9	6.98
6-10	36	58.7	6.33
Classification Amounts			
\$1,000,000-\$2,999,999	254	55.8%	3.50
Smoking Status			
Nonsmoker	226	45.0%	2.99
Underwriting Status			
Standard	248	48.6%	3.09
Reinsurance Status			
Automatic	218	54.8%	3.71
Facultative	59	40.3	5.24
Plan of Insurance			
Whole Life	38	64.3%	10.44
Term	115	42.9	4.00
Universal Life	36	47.6	7.93
Unknown	88	42.3	4.50
Reinsurance Method			
Coinsurance	96	37.8%	3.86
Yearly Renewable Term	145	45.4	3.77
Unknown	36	694.9	115.82

*Standard Deviation Calculations Are Done for Cases in Which at Least 35 Deaths Are Observed.

TABLE C-2
STANDARD DEVIATIONS* FOR THE PERIOD 1987-94
(MORTALITY RATIOS BASED ON THE 1975-80 BASIC TABLES)

Categories	Actual Claims	Mortality Ratio	Standard Deviation
All Combined	1,386	63.1%	1.69
Sex			
Male	1,227	61.2%	1.75
Female	159	78.8	6.25
Issue Ages			
30-39	128	85.2%	7.53
40-49	376	62.1	3.20
50-59	480	69.9	3.19
60-69	315	63.1	3.55
70-79	69	31.5	3.79
Policy Years			
1	192	70.4%	5.08
2	166	52.1	4.05
3	191	58.2	4.21
4	147	53.6	4.42
5	125	43.2	3.87
6-10	437	77.0	3.68
11-15	94	73.1	7.54
Classification Amounts			
\$1,000,000-\$2,999,999	1,207	63.8%	1.84
\$3,000,000-\$4,999,999	102	47.5	4.70
\$5,000,000 and Over	77	76.4	8.70
Smoking Status			
Nonsmoker	880	54.2%	1.83
Smoker	161	114.3	9.01
Aggregate	345	73.7	3.97
Underwriting Status			
Standard	1,202	63.9%	1.84
Substandard	184	58.7	4.33
Reinsurance Status			
Automatic	845	54.3%	1.87
Faculative	537	69.7	3.01

*Standard Deviation Calculations Are Done for Cases in Which at Least 35 Deaths Are Observed.

APPENDIX D

TABLE D-1

1994 EXPERIENCE BY NUMBER OF POLICIES
(MORTALITY RATIOS BASED ON THE 1975-80 BASIC TABLES)

Policy Years	Exposure	Actual Claims	Expected Claims	Mortality Ratio
Issue Ages 30-39				
1	18,844	4	12.33	32.4%
2	15,200	1	12.13	8.2
3	10,172	0	10.73	0.0
4	7,306	1	9.01	11.1
5	4,715	7	6.64	105.5
6-10	8,330	4	15.28	26.2
11-15	748	1	2.26	44.2
16 and Over	55	0	0.31	0.0
All	65,371	18	68.69	26.2%
Issue Ages 40-49				
1	21,667	6	24.57	24.4%
2	19,250	7	31.51	22.2
3	13,472	5	29.16	17.1
4	9,734	7	25.23	27.7
5	6,575	14	19.62	71.3
6-10	10,521	22	39.97	55.0
11-15	916	8	6.00	133.4
16 and Over	62	1	1.00	99.8
All	82,198	70	177.05	39.5%
Issue Ages 50-59				
1	9,679	14	21.20	66.0%
2	8,263	15	24.67	60.8
3	5,517	13	21.23	61.2
4	4,059	18	19.41	92.7
5	2,718	6	15.82	37.9
6-10	5,375	30	45.63	65.7
11-15	616	11	9.77	112.6
16 and Over	52	0	2.04	0.0
All	36,280	107	159.78	67.0%
Issue Ages 60-69				
1	2,332	5	9.58	52.2%
2	2,084	5	12.50	40.0
3	1,604	9	13.66	65.9
4	1,365	11	14.03	78.4
5	961	7	11.98	58.4
6-10	1,920	23	33.17	69.3
11-15	234	5	7.98	62.6
16 and Over	30	2	2.36	84.6
All	10,529	67	105.26	63.7%

TABLE D-2
 1994 EXPERIENCE BY AMOUNT (000's)
 (MORTALITY RATIOS BASED ON THE 1975-80 BASIC TABLES)

Policy Years	Exposure	Actual Claims	Expected Claims	Mortality Ratio
Issue Ages 30-39				
1	4,337,692	1,340	2,886	46.4%
2	3,737,146	188	3,015	6.2
3	3,438,315	0	3,629	0.0
4	2,831,923	500	3,494	14.3
5	2,244,604	2,690	3,165	85.0
6-10	4,822,586	2,384	9,051	26.3
11-15	536,999	1,000	1,621	61.7
16 and Over	23,021	0	127	0.0
All	21,972,285	8,101	26,989	30.0%
Issue Ages 40-49				
1	5,931,750	2,081	6,936	30.0%
2	5,494,002	1,858	9,265	20.1
3	4,903,973	3,935	10,870	36.2
4	4,023,219	4,071	10,653	38.2
5	3,515,426	5,548	10,838	51.2
6-10	6,728,772	15,535	26,319	59.0
11-15	705,228	7,794	4,698	165.9
16 and Over	29,803	575	457	125.9
All	31,332,173	41,398	80,036	51.7%
Issue Ages 50-59				
1	3,416,731	2,420	7,656	31.6%
2	2,967,908	4,623	9,064	51.0
3	2,632,660	5,784	10,427	55.5
4	1,961,764	4,230	9,586	44.1
5	1,640,430	2,875	9,742	29.5
6-10	3,929,641	19,289	33,909	56.9
11-15	517,321	3,065	7,941	38.6
16 and Over	27,732	0	946	0.0
All	17,094,188	42,286	89,270	47.4%
Issue Ages 60-69				
1	1,026,570	1,028	4,389	23.4%
2	942,311	811	5,841	13.9
3	913,248	4,749	8,109	58.6
4	717,440	5,613	7,671	73.2
5	615,773	2,991	8,003	37.4
6-10	1,363,147	18,232	23,897	76.3
11-15	175,237	3,582	6,008	59.6
16 and Over	11,999	1,028	963	106.8
All	5,765,725	38,033	64,880	58.6%

APPENDIX E

TABLE E-1

1994 EXPERIENCE BY NUMBER OF POLICIES
(MORTALITY RATIOS BASED ON THE 1975-80 BASIC TABLES)

Plan of Insurance by Policy Years	Exposure	Actual Claims	Expected Claims	Mortality Ratio
Permanent				
1	1,225	0	2.45	0.0%
2	919	2	2.48	80.7
3	1,281	3	3.86	77.7
4	1,399	3	4.84	62.0
5	2,052	4	7.37	54.3
6-10	2,899	18	17.56	102.5
11-15	553	8	7.34	109.0
16 and Over	86	0	2.88	0.0
All	10,415	38	48.77	77.9%
Term				
1	33,347	13	42.29	30.7%
2	26,679	13	47.02	27.6
3	18,637	14	44.44	31.5
4	13,563	20	40.50	49.4
5	7,920	17	27.54	61.7
6-10	12,561	28	57.58	48.6
11-15	940	8	9.05	88.4
16 and Over	57	2	0.99	202.3
All	113,704	115	269.42	42.7%
Universal Life				
1	2,797	3	4.54	66.1%
2	1,946	2	4.65	43.0
3	1,586	3	5.44	55.1
4	1,406	2	6.09	32.8
5	1,283	6	6.54	91.7
6-10	4,950	18	31.07	57.9
11-15	467	2	4.48	44.6
16 and Over	8	0	0.22	0.0
All	14,443	36	63.05	57.1%
Unknown				
1	16,838	14	25.83	54.2%
2	16,492	13	32.50	40.0
3	10,082	7	26.45	26.5
4	6,800	13	22.11	58.8
5	4,262	9	17.25	52.2
6-10	7,246	22	42.44	51.8
11-15	702	9	8.28	108.7
16 and Over	60	1	1.74	57.6
All	62,481	88	176.59	49.8%

TABLE E-2
 1994 EXPERIENCE BY AMOUNT (000's)
 (MORTALITY RATIOS BASED ON THE 1975-80 BASIC TABLES)

Plan of Insurance by Policy Years	Exposure	Actual Claims	Expected Claims	Mortality Ratio
Permanent				
1	1,063,266	0	2,838	0.0%
2	992,488	1,100	3,151	34.9
3	1,189,598	4,000	4,615	86.7
4	1,049,653	2,411	4,787	50.4
5	1,268,888	3,294	6,540	50.4
6-10	2,855,967	13,784	19,837	69.5
11-15	460,552	6,666	5,751	115.9
16 and Over	29,779	0	1,058	0.0
All	8,910,191	31,256	48,577	64.3%
Term				
1	8,617,892	3,009	12,385	24.3%
2	7,853,451	4,276	15,294	28.0
3	7,628,518	7,377	19,447	37.9
4	6,159,720	10,168	18,867	53.9
5	4,700,035	6,994	16,644	42.0
6-10	8,227,490	18,917	40,592	46.6
11-15	666,860	4,388	6,695	65.5
16 and Over	28,886	853	476	179.2
All	43,882,852	55,982	130,401	42.9%
Universal Life				
1	1,520,697	1,305	3,393	38.5%
2	1,126,275	265	3,519	7.5
3	1,008,848	1,333	4,405	30.3
4	890,239	475	4,457	10.7
5	948,892	2,257	5,738	39.3
6-10	2,901,808	13,766	20,702	66.5
11-15	291,078	2,162	3,036	71.2
16 and Over	4,412	0	71	0.0
All	8,692,248	21,564	45,321	47.6%
Unknown				
1	4,173,846	2,567	7,460	34.4%
2	3,747,441	2,764	8,780	31.5
3	2,568,797	1,758	8,258	21.3
4	1,857,988	1,607	7,036	22.8
5	1,475,182	2,245	6,405	35.0
6-10	3,911,159	14,494	22,790	63.6
11-15	625,093	2,589	6,460	40.1
16 and Over	34,548	750	904	82.9
All	18,394,054	28,774	68,092	42.3%

